



Brussels, 30.11.2016
COM(2016) 767 final

2016/0382 (COD)

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on the promotion of the use of energy from renewable sources (recast)

(Text with EEA relevance)

{SWD(2016) 416 final}

{SWD(2016) 417 final}

{SWD(2016) 418 final}

{SWD(2016) 419 final}

EXPLANATORY MEMORANDUM

1. CONTEXT OF THE PROPOSAL

•1.1 Reasons for and objectives of the proposal

Renewable Energy Sources (RES) contribute to climate change mitigation through the reduction of greenhouse gas emissions, achieve sustainable development, protect the environment and improve citizens' health. Moreover, renewable energy is also emerging as a driver of inclusive economic growth, creating jobs and reinforcing energy security across Europe.

These aspects are enshrined in Article 194 of the Treaty on the Functioning of the European Union, which has conferred Union competences to promote renewable energy.

The European Union (EU) has long been worldwide leader in the promotion and development of renewable energy, steering the effort to combat climate change, encourage the shift to a low-carbon economy and stimulate high-potential economic growth. President Juncker has already defined the ambition of the EU becoming the world's number one on renewables as one of the Commission's main political priorities. This ambition should cover not only the objective to increase deployment of renewable energy, but also the supply by European companies of key components inside and outside the EU.

The current 2020 framework sets a EU 20% target for energy consumption which relies on legally binding national targets until 2020. National Renewable Energy Action Plans and the biennial monitoring provided for by the Directive 2009/28/EC on the promotion of the use of energy from renewable sources have been effective in promoting transparency for investors and other economic operators and thereby favoured the rapid deployment increase in the share of renewables from 10.4% in 2007 to 17% in 2015.

In October 2014, the European Council agreed the 2030 framework for climate and energy reaffirming the Union's long-term commitment to the ambitious EU strategy in renewable energies. The new framework sets out the European Union target of at least 27% for the share of renewable energy consumed in the EU in 2030. This target is binding at EU level and will be fulfilled through individual Member States' contributions guided by the need to deliver collectively for the EU. In addition, the new framework also enables the collective delivery to be done without preventing Member States from setting their own, including more ambitious, national targets. Member States can support renewable energy, subject to State aid rules.

On several occasions, the European Council¹ has encouraged the Commission to review and develop legislation related i.a. to renewables to underpin the agreed 2030 target. The European Parliament has also called upon the Commission to present the renewable energy legislation and to increase even further the ambition level to at least 30%.

EU energy system projections indicate that current Member States and EU policies, if no new policies are put in place, would only lead to, approximately, 24.3% of renewable energy consumption in 2030. This level would be well below the at least 27% EU level binding renewable energy target as agreed by the European Council, and would prevent the Union from collectively delivering on the commitments made in the 2015 Paris Agreement. The continuation of unchanged policies would also seriously risk undermining the realisation of the Union's political ambition for world leadership in renewable energy. In addition, it would forego the benefits of security offered by increasing energy supply from indigenous sources, and reduce consumers' participation in the energy system.

¹ European Council conclusions of 19 – 20 March 2015, of 17-18 December 2015, of 17-18 March 2016

The analysis that underpins this proposal for a recast of the Renewable Energy Directive (the Proposal) therefore indicates that reaching the EU level target of at least 27% calls for a change in policies in the form of a Union level framework leading to EU, national and regional level measures. This is even more the case once it is considered that the exact size of the target shortfall is subject to unavoidable uncertainty given the assumptions required for the estimation, that an EU renewables' share above 27%, is the minimum level that must be reached, and that the significant investment effort required to fill the gap in the EU (*e.g.* 254 billion Euro for renewable energy only in electricity generation) calls for early, clear and stable policy signals.

At the same time, and in the absence of an updated regulatory framework, there is a risk that greater differences within the EU will arise, whereby only the best performing Member States will continue the increasing trajectory in renewables' consumption, while those who are lagging behind will not find any incentive to increase their production and consumption of renewable energy. Moreover, this concentration of the efforts in a few Member States would be more expensive and further distort the internal energy market.

Furthermore, Union-level action is a particularly appropriate tool given the fundamental difference between the 2020 framework and the 2030 framework. While delivery under the first could heavily rely on the strength of national binding targets, and thus allow Member States a large discretion on the choice of national measures, the 2030 framework is solely based on a EU-level binding target, which is not translated into national targets.

The Union's 2030 target can thus be best achieved through a partnership with Member States combining their national actions supported by a framework of measures as outlined in this Proposal. In the electricity sector, Member States will be able to promote renewable electricity by implementing cost-effective national support schemes subject to State aid rules and the framework conditions defined at EU level, including rules for cross-border participation. In the heating and cooling sector, a greater penetration of renewable energy will exploit untapped potential. This is to be achieved flexibly through Member State endeavours. In transport, given cross-border trade of biofuels, a harmonised approach is required.

In this context, an important coordinating element of the overall 2030 energy and climate framework is the proposal on the Energy Union Governance, which includes (i) planning, whereby Member States formulate national plans on energy and climate; (ii) reporting and monitoring, whereby Member States report progress on implementing their national plans; and (iii) gap filling/corrective measure, whereby the Commission in 2025 will undertake a more thorough review of the renewable energy progress.

For the EU, the investment needs are estimated to be around or above €1 trillion from 2015 to 2030 in renewable electricity generation alone². In this context, strengthening investors' certainty is crucial and therefore it is one of the specific objectives of the Proposal. This needs to be put into context by noting that at \$48.8 billion in 2015, EU investment in renewables has fallen some 60% compared to 2011, a drop which is not just caused by the reduction in technology costs. As a consequence, while the Union still keep the leading position in terms of renewable energy investments per capita, its share in total renewables investment has been declining at a rapid pace, from almost one half in 2010 to less than one fifth in 2015.

An updated framework also needs to take into consideration the new elements already in place in the field of investments. The 2030 framework is an opportunity for the European Union in terms of investments, creation of growth and jobs. The EU has to make sure that the

² Source: Bloomberg New Energy Finance (2014). 2030 Market Outlook; International Energy Agency (2014). World Energy Investment Outlook.

right conditions for investments are in place. In this spirit the European Fund for Strategic Investments (EFSI), as part of the Investment Plan for Europe and the European Structural and Investment Funds (ESIF), have been shown to be a major contributor to investments in the renewable energy sector. Out of the EFSI transactions approved by the European Investment Bank (EIB), 23% are in the energy sector. Almost half of the projects in this sector are related to renewable energy investments. This shows that there is a real interest by private investors to engage in concrete projects across the EU as this is seen as a key sector for the energy transition of the European Union and as a strategic sector in which to invest. The ESIF have a strong focus on low-carbon investments, including renewable energy, in the 2014-2020 period.

Furthermore, the proposal to double the duration of the EFSI as well as its financial strength must also be seen as an opportunity for more investments in renewables. The proposal for the continuation of EFSI until 2020 contains the objective to mobilize up to 40% of the investments in the infrastructure and an innovation window to COP21 related projects. For this to happen, renewable energy projects, together with energy efficiency, need to continue to be a major part of the investments in the energy sector. Therefore, it is essential that the right signals are maintained so that the private and public sectors in the EU have a clear indication on the future of EU policies. In this context, this Proposal establishes the right regulatory framework. Investments in renewables and energy efficiency and in the modernization and integration of European energy markets, are essential for the decarbonisation of EU economy. But most importantly for the creation of growth and jobs all over Europe, and for the Union's global competitiveness, as the technological advantage these investments sustain will be essential for the European industry.

Last but not least, the revision of the current renewable energy framework is also necessary to reflect the global change that has taken place since 2009, with competitors becoming stronger on a world stage due to their increasing investments in renewable energy. If the EU wants to retain its leadership role, a strong renewable energy framework is required to support the deployment of renewable energy in all sectors. This will also entail significant benefits in terms of competitive advantages for European industry.

The Proposal lays down the principles according to which Member States can collectively and continuously ensure that the share of renewable energy in the EU final energy consumption reaches at least 27% by 2030 in a cost-effective manner across the three sectors of electricity (RES-E), heating and cooling (RES-H&C) and transport (RES-T), taking into account the following specific objectives:

- address investment uncertainty, along a path that takes account of medium and long term decarbonisation objectives;
- ensure cost-effective deployment and market integration of renewable electricity;
- ensure collective attainment of the EU-wide target for renewable energy in 2030, establishing a policy framework in coordination with the Energy Union Governance that avoids any potential gap;
- developing the decarbonisation potential of advanced biofuels and clarify role of food-based biofuels post 2020;
- develop renewable energy potential in the heating and cooling sector.

Therefore, the measures included in the Proposal aim to tackle, in a proportionate way, the existing issues hampering renewable energy deployment, such as investor uncertainty,

administrative hurdles, the need to improve cost-effectiveness of renewables deployment, the need to update the policy framework and the risk of loss of citizen-buy in during the transition towards 2030.

1.2. Consistency with existing policy provisions in the policy area

The Proposal is consistent with the Market Design and Energy Union Governance proposals as well as the revision of the Energy Efficiency and Energy Performance of Buildings Directives, the EU ETS proposal of July 2015 and the proposed Effort Sharing Regulation, the Land Use, Land Use Change and Forestry Regulation (LULUCF) of July 2016.

The Proposal needs to be viewed together with the above mentioned initiatives, which are not by themselves sufficient to allow the EU to reach, collectively, a share of at least 27% renewables in the final energy consumption by 2030 in a cost-effective way.

The Proposal builds on the development of an electricity market fit for renewable energy under the **Market Design initiative**, where short term markets are fully developed and integrated, flexibility plays a key role in enhancing the market value of renewables, and renewable energy generators can earn a higher fraction of their revenues from the energy markets reducing the need for public support. Moreover, the Proposal complements the Market Design initiative by introducing different measures aimed at attracting the necessary investments cost-efficiently and in a timely manner and by further reducing administrative burden for renewables producers, including consumers producing their own renewable heat and electricity.

The Proposal complements the **Energy Union Governance** by creating the conditions across the three sectors (electricity, heating and cooling and transport) to facilitate the EU target achievement in a collective manner. At the same time, the Governance initiative streamlines and integrates the existing planning, reporting and monitoring obligations of the energy acquis including those for renewable energy post 2020 which will help track progress towards EU-wide target achievement, allow for a revision of the ambition in national plans and activate elements in response to a gap in the collective ambition or a delivery gap.

The **Energy Efficiency Directive (EED)** and **Energy Performance for Buildings Directive (EPBD)** aim, respectively, at facilitating the achievement of the energy efficiency target and at enhancing the energy performance of buildings. The provisions on heating and cooling in the proposed EED and EPBD will complement Member States endeavours to facilitate the penetration of renewable energy in the heating and cooling sector under the twin action of the provisions contained in this Proposal and the Governance Regulation. This will preserve as much flexibility as possible to reflect national differences of such systems in place while ensuring the necessary contribution for the achievement of the overall 2030 target.

In the context of the reformed **EU Emission Trading Scheme (EU ETS)** for the period after 2020, a strengthened EU ETS will play an increasing role in providing a stronger investment signal for lower carbon technologies, including renewables, and will ensure that synergies between renewable energy and climate policies are better exploited. However, the ETS prices under the reformed EU ETS will not be sufficient to reach the EU-binding target in renewables of at least 27%. The provisions on support for renewable energy in the power sector will ensure that such mechanisms will be fully complementary with the ETS and minimise any potentially negative impact on the carbon price.

Furthermore, the proposed **Effort Sharing Regulation** makes proposals for setting national binding emission reduction targets for greenhouse gases for the sectors outside the EU ETS and on LULUCF, without indicating how these could be met in the most cost-efficient way. EU energy system projections show that renewable policies across the power, heating and

cooling, and transport sectors are necessary to reach the non-ETS target and to do so cost-effectively.

The proposed **LULUCF Regulation** aims at including carbon emissions and removals from agriculture and forestry into the EU 2030 climate and energy framework. The reinforced EU sustainability criteria on bioenergy aim to continue guaranteeing the sustainability of forest biomass used in the energy sector, including through a LULUCF requirement ensuring proper carbon accounting of carbon impacts of forest biomass used for energy.

2. LEGAL BASIS, SUBSIDIARITY AND PROPORTIONALITY

•2.1. Legal basis

The Proposal is based on Article 194(2) of the Treaty on the Functioning of the European Union, which is the legal basis for measures on energy. As the Treaty contains a specific energy legal basis, it is appropriate to use it.

•2.2. Subsidiarity principle

The subsidiarity principle is addressed in this Proposal as the Union does not have exclusive competences on renewable energy policy. The Proposal builds on the growing importance of energy as a political and economic challenge and its close interrelation to the policy areas of security of energy supply, climate change, internal market and economic and social development.

The need for EU action

EU level action is needed to ensure that Member States contribute to the at least 27% EU level binding renewable energy target and that this is collectively and cost-effectively met. Member States are requested to define their own ambition levels including trajectories that correspond to their national circumstances and preferences. A linear EU-wide trajectory will help track progress towards the achievement of the EU-wide target without being binding on Member States individually. The progressive opening of support of renewable electricity is needed to address fragmentation of the internal market and ensure cross-border tradability, especially for common rules on transport fuels.

As regards the electricity sector, the EU has set up a single integrated power market where main principles, rules for common problems and rules regarding cross-border aspects are being established at EU-level. It follows that also for renewables such cross-border aspects need to be addressed at EU level through specific rules.

Some of the sustainability risks linked to the development of bioenergy have a cross border dimension and hence can be more efficiently addressed at EU level. This is in particular the case for environmental impacts such as climate change and biodiversity loss. In addition, there is a need for a harmonised EU sustainability framework for biomass in heat and power in order to facilitate biomass trade and promote the internal market in biomass fuels.

Analysis shows that action only at Member States' level would likely lead to distortions in, and fragmentation of the internal energy market, resulting in an overall higher costs and lower deployment of renewable energy across the Union.

EU added value

As regards the heating and cooling sector, it consumes close to 50% of EU's energy and 75% of the EU's consumption in this sector is still fossil-based. The lack of an EU-wide strategy has compounded investors' uncertainty and allowed the fragmentation of local markets, where consumers have difficulties in making choices based on their preferences and lack of

regulatory policies creating incentives for decentralised energy. EU guidance in this sector could help create an integrated EU market for renewables in heating and cooling. Therefore,, Member States are provided with options on how to address the untapped potential in the heating and cooling sector.

Given the local dimension of heating and cooling, the Proposal sets up an overall framework for incentivising renewables in this sector, while leaving to the Member States the possibility to adapt to local circumstances in the most cost-efficient way.

Transport consumes approximately a third of EU's total energy demand and this demand is almost entirely met by oil. While the transition to low-emission alternative energy in transport has already begun, spurred also by the current Renewable Energy Directive, the sector is significantly lagging behind the other sectors for a number of reasons, including the lack of strong incentives to innovate in energies and technologies needed for the long-term decarbonisation and energy diversification of transport as well as infrastructure issues related to electrification (which is being addressed via the implementation of the Alternative Fuel Directive and the proposed measures under the review of the Energy Performance of Building Directive).

A common EU action will ensure that that the objectives of the policy (*e.g.* developing the decarbonisation potential of advanced biofuels) are achieved collectively at least cost.

An EU-wide energy and climate framework for renewable energy in 2030 will also help to monitor and support Member States energy policies to achieve a sustainable, secure and affordable energy system for European citizens. With a predictable EU regulatory framework leading the renewables' sector towards 2030 supporting Europeanisation of renewables policy, in particular strengthening the market-based approach to renewables and promoting the opening of cross-border support, Member States can better design national policies towards the 2020 target, which ensure that renewable energy policies are coherent with other energy and climate objectives, namely the ETS, the Effort-Sharing Regulation and the EU energy efficiency target for 2030. An EU-level framework setting out high-level principles for support schemes would also provide investor certainty, which may have been undermined in the past by the stop and go policy – and sometimes retroactive measures – taken by certain Member States.

By acting at EU-level, several barriers to public and private investments (*e.g.* related to authorisation procedures) could be tackled, addressing the lack of coordination between various authorising bodies at national level and stimulating the administrative capacity to implement cross-border projects and support schemes.

EU action will deliver investors certainty in an EU-wide regulatory framework, a consistent and cost-efficient deployment of renewable energy across the EU and an efficient operation of the internal energy market whilst respecting the potential of Member States to produce different forms of renewable energy according to the energy mix of choice.

In this regard, Member States retain wide discretion and flexibility to favour the development of renewable energy in any sector of their economies in the way that suits their national potential and circumstances best, including the option of achieving the EU-level target by supporting the deployment of renewable energy in other Member States, compatible with market design proposals.

The Proposal therefore complies with the subsidiarity principle.

2.3. Proportionality principle and choice of instruments

The Proposal complies with the proportionality principle, as it sets out EU actions that will ensure the Union to meet the at least 27% target but provides flexibility for Member States to implement the envisaged actions and develop the renewable energy sector that corresponds best to their national situation, preferences and potential, provided they collectively reach the at least 27% target.

The EU level target entails a fundamental shift in the policy framework for 2030, from legally binding national targets, allowing Member States large discretion on their national measures, to a legally binding target placed at the level of the European Union. Within this context, having solely national measures would lead to a non-cost efficient and unevenly spread efforts across the EU, leading to an insufficient deployment of renewables in the EU internal energy market, potentially falling short of the agreed target. Within this context, having solely national measures coordinated under the proposed governance mechanisms would not offer sufficient guarantees in terms of meeting the target, achieving it in the most cost-efficient manner, avoiding any free riding among Member States and reducing market fragmentation. EU level action can therefore create a robust and stable framework that enables the collective and cost-efficient achievement of the Union's binding objective of at least 27% renewable energy in 2030, with a fair distribution of efforts by Member States, without going beyond the necessary measures needed to ensure cost-optimality of the common effort.

Concerning specific sectoral provisions, the heating and cooling consumes close to 50% of EU's energy and 75% of the EU's fuel needs for heating and cooling still come from fossil fuels. As such, decarbonising the heating and cooling sector is crucial if the EU is to stay on the path of our long term decarbonisation objectives and improve security of supply. By 2030, close to half³ of the contribution to the EU renewable energy target should come from heating and cooling. This magnitude shows the need for action in this specific sector. The proposed heating and cooling options guide Member States in the choice of approach to facilitate the penetration of renewables in the sector contributing to reach this cost-efficient share, while leaving them full flexibility in the design of their integrated climate and energy plans. Should all Member States adopt the suggested measure, this would roughly cover one fourth of the gap between the no policy change and the EU level target of at least 27%.

Important national prerogatives, such as the Member State's right to determine the conditions for exploiting their energy resources, their choice between different energy technologies and the general structure of their energy supply, remain fully untouched. Furthermore, the EU bioenergy sustainability framework includes minimum criteria to demonstrate the sustainable production and efficient use of biomass in transport, heat and power. The new sustainability provisions follow a risk-based approach and do apply only to large-scale heat and power generators.

Finally, proportionality is ensured by striking a balance between objectives of competitiveness, security of supply and sustainability, and by considering the long term benefits beyond 2030 of the proposed course of action - and not only be based on short to medium term impacts.

The level of constraint imposed is thus proportionate to the objective.

2.4. Choice of the instrument

The instrument chosen is a Directive that has to be implemented by the Member States. A Directive is the appropriate instrument for the promotion of renewables as it clearly defines

³ 40% of final energy consumption, according to PRIMES EU2027 scenario

the EU objectives to be reached, while leaving Member States sufficient flexibility to implement it in the way that suits their particular national circumstances best. Therefore, only limited provisions imposing mandatory action are included, and exclusively in order to increase the necessary cost-optimal deployment across the Union (e.g. Article 5 of the Proposal on partial mandatory opening of support schemes).

The Proposal entails a substantive amendment to the Renewable Energy Directive, and the recasting technique allows the adoption of a single legislative text which simultaneously makes the desired amendment, codifies that amendment with the unchanged provisions of the earlier act, and repeals that act. Therefore, a recast Directive is the appropriate instrument and is in line with the Commission's commitment under the interinstitutional agreement on better law-making⁴.

3. RESULTS OF EX-POST EVALUATIONS, STAKEHOLDER CONSULTATIONS AND IMPACT ASSESSMENTS

3.1. REFIT evaluation

A regulatory fitness programme (REFIT) evaluation of the Renewable Energy Directive was carried out between 2014 and 2016. The results of this evaluation are submitted in a separate REFIT evaluation Staff Working Document presented together with the Impact Assessment accompanying the Proposal.

The REFIT evaluation concluded that the objective of sustainably increasing the share of renewable energy in the EU final energy consumption has been successful. The binding national targets, the National Renewable Energy Action Plans and the biennial monitoring provided for by the Renewable Energy Directive have been particularly effective for promoting transparency for investors and other economic operators, and have ensured high quality information on renewable energy markets and policies in the Member States. This is illustrated by the rapid deployment increase after the date of adoption of the Directive, passing from 10.4% share of renewables in 2007 to 17% in 2015.

These legal provisions, together with additional national policies and other non-regulatory measures, have contributed to the overall achievement of EU's energy and climate policy goals, resulting in greenhouse gas emission saving, increased security of energy supply, innovation leadership, employment creation, public acceptance and regional development. They have proved their relevance, coherence, efficiency, effectiveness and added value for the overall EU energy and climate change objectives. Renewable energy is, currently, the only decarbonisation option in the power sector deployed at a rate that is close to what is required under long-term International Energy Agency (IEA) scenarios to limit global temperature rise to 2°C above pre-industrial levels.

However, even if the EU as a whole and all but one Member States are currently on track towards its overall renewable energy targets for 2020, target achievement by 2020 will only be secured if Member States continue to promote the deployment of renewables with the view to meet their increasingly steep trajectories. Furthermore, additional efforts are necessary to increase the current progress rate of renewables deployment in transport to ensure the sectorial 10% target is met. In particular, the regulatory uncertainty caused by the long lead political discussion on how to address the risk of Indirect Land Use Change (ILUC) associated to food based biofuels has had a negative impact in the deployment of renewables in the transport sector.

⁴ OJ L 123, 12 May 2016, p.1.

3.2. Stakeholder consultations

3.2.1. Consultation methods, main sectors targeted and general profile of respondents

A wide range of stakeholders including Member States and National Regulatory Authorities have been involved throughout the preparation of the proposal. This has included a 12-week public consultation, a stakeholder workshop held on 5 February 2016, a dedicated discussion at the Electricity Regulatory Forum in Florence and numerous bilateral discussions.

A public consultation was launched on 18 November 2015 and remained open until 10 February 2016. The Commission received in total 614 replies. 340 replies were sent by national and EU-wide associations, accounting for 58% of the replies. Out of these, 110 came from industry associations (18% of total replies) and 90 were submitted by the renewable energy industry (15%). Moreover, there were 186 replies directly from undertakings (30%). A total of 19 national governments and 22 regional or local authorities also participated in this consultation. It is important to note the significant participation by individual citizens, energy cooperatives and Non-Governmental Organisations.

The Commission also carried out an online public consultation on bioenergy sustainability, running from 10 February until 10 May 2016, which received over 950 replies. This was complemented by a thematic stakeholder conference which took place on 12 May 2016.

3.2.2 Summary of stakeholder views

The detailed assessment of the replies to the public consultation confirms broad consensus amongst respondents on a number of the elements put forward in the public consultation, including inter alia the need for a stable and predictable EU legal framework for renewables, the importance of defining complementary measures in the recast Directive to ensure the achievement of the at least 27% binding target at EU-level and the relevance of developing a market fit for renewables. However, stakeholders are divided on other issues, such as on the geographical scope of support schemes and the exposure of renewables to market conditions (e.g. priority dispatch and balancing responsibilities).

With regard to the role of private and public entities in the electricity market, there is a strong support for additional EU action for empowering energy consumers and local authorities. The vast majority of replies support stronger EU rules guaranteeing that consumers have the possibility to produce and store their own renewable heat and electricity and participate in all relevant energy markets in a non-discriminatory and simple way, including through aggregators. Many respondents support increasing short-term market exposure for self-consumption systems, by valuing surplus electricity injected into the grid at the wholesale market price. However, a number of renewables' generators highlight that market-based support schemes are still needed for small-scale self-consumption systems during the transition towards a reformed market design. Several respondents support facilitated access to finance for local initiatives on renewable energy.

Stakeholders stress that retroactive changes to support schemes should be prevented. Other elements are identified as important to improve the stability of investments; these include the removal of administrative barriers, further market integration and a reinforced investment protection regime going beyond the Energy Charter Treaty. Several respondents also insist on the necessity to ensure a quick implementation of the recast Directive, well ahead of 2021, in order to give timely policy signals and an outlook to investors.

Several Member States have in particular underlined that the right for Member States to choose their own energy mix and to develop the renewable technologies that they have chosen, e.g. for diversification reasons, needs to be guaranteed, especially in the design of support schemes. They also stressed that market integration of renewables has to be organised

in a coordinated way and cannot be left only to fragmented procedures depending on individual notification schedules of Member States.

Last but not least, having a robust legal framework enshrined in the Renewables Directive is considered key to achieving the at least 27% EU renewable energy target by 2030. The majority of respondents favour preventive measures to avoid a gap in target achievement, but also see a need for implementing corrective actions if this happens to be the case. Some stakeholders, such as energy regulators, highlight the need to ensure consistency of any complementary measures with national support schemes.

The public consultation highlighted that the main barriers to increasing renewable energy in transport include inter alia the lack of a stable policy framework for the period after 2020, the long debate on biofuels sustainability, and the high price of electric vehicles. The vast majority of respondents also indicated that an EU wide fuel incorporation obligation would be an effective or very effective measure to promote the consumption of sustainable renewable fuels in the EU transport sector and increasing the uptake of electric vehicles.

In addition, the Electricity Regulatory Forum held in Florence on 13-14 June 2016 with the participation of Member States, National Regulatory Authorities and key stakeholders concluded that the Renewables framework for the post 2020 period should be based on an enhanced market design, fit for the full integration of renewables, a strong carbon price signal through a strengthened ETS, and that specific support for renewables, that when and if needed, should be market based and minimise market distortions. To this end, the Forum encouraged the Commission to develop common rules on support schemes as a part of the revision of the Renewable Energy Directive that facilitate a market based and more regionalised approach to renewables.

The public consultation on bioenergy sustainability has shown a divided perception on the benefits and risks of bioenergy and on the need for a new EU policy. Nevertheless, an overwhelming majority of respondents underlined climate mitigation as the main objective of a bioenergy sustainability policy.

A number of public authorities and public enterprises as well as biofuel and bioliquids producers and forestry companies and several Member States indicated that they prefer the baseline scenario, i.e. no additional EU sustainability requirements. One of the main reasons invoked is the existence of other legislation that covers the potential risks linked to biomass for energy, as well as the risk of excessive administrative burden.

On the other hand, many EU bioenergy producers and users, as well as by a number of Member States support additional EU action in order to extend the EU sustainability criteria to biomass used in heating/cooling and electricity. A recent opinion of the EU Standing Forestry Committee, the advisory group on EU forest action, supported the option of introducing a risk-based sustainability criterion for forest biomass.

Requirements on the efficiency of conversion of biomass to energy are supported by a range of stakeholders including in particular the wood using industry, including pulp and paper producers, and environmental NGOs. NGOs also support a cap on the overall use of bioenergy, as well as restrictions on certain feedstocks or sources, and environmental and social requirements for biomass production.

In general, stakeholders have asked for consistency of treatment when imposing measures that concern specific feedstocks, regardless of their final use: this means for example that the rules should be the same for agricultural biomass that is used for producing biofuels or for biogas for heat and power.

3.3. Collection and use of expertise

The following main studies were commissioned from external contractors:

- Study on the impact assessment for a new Directive mainstreaming deployment of renewable energy and ensuring that the EU meets its 2030 renewable energy target - ECN, Oeko Institute, Eclareon, REBEL, SUER, BBH.
- Study on Technical Assistance in Realisation of the 2016 Report on Renewable Energy, in preparation of the Renewable Energy Package for the Period 2020-2030 in the European Union - Öko-Institut, E3-Modelling, Observ'ER, COWI.
- Supporting investments into renewable electricity in context of deep market integration of RES-e after 2020: Study on EU-, regional- and national-level options - Cambridge Economic Policy Associates (CEPA).
- Study on the sustainable and optimal use of biomass for energy in the EU beyond 2020 – PricewaterhouseCoopers, Vito, TU Wien, Utrecht University, INFRO, Rutter Soceco.
- Carbon impacts of biomass consumed in the EU - Forest Research UK, VTT, North Energy, Alterra.
- Study on impacts on resource efficiency on future EU demand for bioenergy, IISA, Idufor, EFI, Oeko Institute, IEEP.

3.4. Impact assessment

The Impact Assessment (IA) accompanying the Proposal did not present a set of preferred options but carried out a detailed analysis of each policy option with a gradual approach from a business as usual scenario (Op. 0), consisting in the continuation of national measures but excluding additional action at EU level, to alternative scenarios including more EU-comprehensive measures across the five areas below.

On 16 September 2016⁵, the Regulatory Scrutiny Board delivered its first opinion on the Impact Assessment and asked for its resubmission. This was subsequently revised and resubmitted to the Regulatory Scrutiny Board on 17 October 2016 which issued a second negative opinion on 4 November 2016 but did not ask for the impact assessment to be further revised and resubmitted.

Against this background, the Commission has considered it opportune to go ahead with a recasting proposal for the Renewable Energy Directive while taking into due account the reservation expressed by the Regulatory Scrutiny Board in its second opinion. In particular, it has opted for more proportionate and less burdensome provisions for the heating and cooling sector combined with strengthened provisions in the governance framework to safeguard the achievement of the 2030 targets. It has also ensured that the provisions contained in the Proposal are fully compatible with and complementary to State aid rules and do not impinge on Commission's competencies in the field of State aid. The proposed provisions are general principles requiring the use (where needed) of market-based and cost-effective schemes. This is fully consistent with the new market design and helps to minimise costs for tax payers and electricity consumers. The provisions further support the investor certainty over the 2021-2030 period. The Commission has taken into consideration all the objectives of the Energy Union. Finally, it notes the unavoidable uncertainties in the estimate of the gap to be filled,

⁵ Opinions available at: http://ec.europa.eu/smart-regulation/impact/ia_carried_out/cia_2016_en.htm . More specific comments about the Board's comments can be found in Annex I of the IA accompanying this proposal.

the minimum nature of the EU-level 27 binding target and the need to provide stable and timely incentives for investment with high lead times. Given all of the above, the Commission considers the overall package of measures to be a proportionate answer to the problems faced. More detailed information on this is presented in this chapter.

(i) Options to increase renewable energy in the electricity sector (RES-E)

a) A common European framework for support schemes: (1) sole use of market mechanisms; (2) European framework for market-based and cost-effective support; (3) mandatory move towards investments aid.

The Renewable Energy Directive allows the possibility for support schemes, but leaves the choice of support schemes to Member States. This has led to the sub-optimal situation where Member States have introduced support schemes which were subsequently, in many cases, changed or revoked retroactively. This has in turn negatively impacted investor confidence. Clearer rules are therefore needed in the recast Renewable Energy Directive to increase investor confidence.

Against this background, Option 2 entails the introduction of principles for support schemes that Member States can put in place and are currently still needed for attracting sufficient investments to reach the Union 2030 target. This option includes design principles for Member States to use for support schemes and the protection for investors against retroactive changes. Such principles are without prejudice to State aid rules.

In relation to this sector, the Regulatory Scrutiny Board considered that the existing state aid guidelines already address most of the issues included in the Impact Assessment and already acknowledge the 2030 climate and energy targets.

It is a political choice to anchor these principles in the legislation. In this way, these provisions will support the Europeanisation of renewable energy policy, making renewables fit for the market, while ensuring certainty for investors until 2030. More details can be found in Annex 1 of the Impact Assessment. In this context, the proposed framework sets out design principles that (i) ensure sufficient investor certainty over the 2021-2030 period and (ii) require the use (where needed) of market-based and cost-effective schemes based on emerging best practice design. The principles in this Proposal are fully in line with the orientations already taken by the Commission in the Environment and Energy State Aid Guidelines (EEAG) and develop them further in a number of areas such as notably on cross-border participation.

Moreover, the framework is effective in ensuring sufficient investor certainty by defining general design principles in accordance with market-based principles and based on best practice that will be valid over the 2021-2030 period.

At the same time, the framework is proportionate and not overly prescriptive, since rules are of general nature, and also respects subsidiarity as it fully takes into account Member States' right to determine their energy mix. For this purpose it is necessary to define in the present regulatory framework the relation between, on the one hand, the right for Member States to choose their own energy mix and to develop the renewable technologies that they have chosen, e.g. for diversification reasons, and the objective to ensure a level of competition between technologies on the other. Submitting these basic principles of the energy framework for Europe to agreement in the Council and the European Parliament, will build legitimacy and public acceptance for the market integration agenda.

Furthermore, various stakeholders including regulators⁶ as well as a number of Member States have called for such a framework to be introduced in the Proposal, in complementarity to applicable State aid rules.

b) A more coordinated regional approach: (1) mandatory regional support; (2) mandatory partial opening of support schemes to cross-border participation.

This proposal reflects the second option (Option 1 in the Impact Assessment Report), in order to make a partial opening of RES-E support schemes to cross-border participation mandatory. This option allows achieving lower overall system costs and support costs by ensuring that investments are increasingly located where potential and other conditions are most favourable. The results of the Impact Assessment show that this measure would result in reduced energy system costs of €1.0 billion annually for the period 2021-2030, while renewable energy support costs paid by the consumer are reduced by 3%.

This option is proportionate as it only proposes a progressive, partial opening, reflecting the level of physical interconnections. It respects subsidiarity as it does not limit Member State's ability to design their support scheme and thus does not interfere with their right to determine their energy mix.

c) A renewable-focused financial instrument: (1) an EU-level financial instrument with wide eligibility criteria; (2) an EU-level financial instrument in support of higher-risk RES projects.

The goal under this area is to enhance the use of funds under existing or new financial instruments to support the high ambition of Member States in deploying renewables. The details of such enabling framework should be set out in the context of the preparation of the Multiannual Financial Framework for 2021-2027.

d) Administrative simplification: (1) reinforced provisions with "one-stop-shop", time ranges and facilitated procedures for repowering; (2) permitting procedures time limited, through automatic approval and simple notification for small projects.

A combination of Options 1 and 2 is preferred for this Proposal, in order to establish a permit granting process for renewable energy projects with one designated authority ("one-stop-shop"), a maximum time limit for the permit granting process, a simple notification to Distribution System Operators for small scale projects and a specific provision on accelerating permit granting process for repowering existing renewable plants. This option allows achieving clearer, more transparent, predictable and less time-consuming permitting processes for applicants.

This option is proportionate as it is to a large extent the implementation of best-practice procedures that already exist in some Member States. It does not entail high costs. It respects subsidiarity as it leaves Member States the choice of how to organise the one-stop-shops. It also does not interfere with the content of the permitting procedures.

(ii) Options to increase renewable energy in the heating and cooling sector (RES-H&C):

a) Mainstream renewables in the heating and cooling supply: (0) continuation of the current national measures with no EU action; (1) introducing RES H&C obligation for fossil fuel suppliers; (2) same obligation but for all fuel suppliers.

⁶ See for instance the conclusions of the meeting of the European Electricity Regulatory Forum held on 13-14 June 2016: "the Forum encourages the Commission to develop common rules on support schemes as a part of the revision of the Renewables Directive that facilitate a market based and more regionalised approach to renewables".

The preferred option was Option 2, where suppliers designated by the Member States and covering at least 50% of the energy supply would have been required to gradually mainstream renewable energy in their total annual sales volume until 2030 (by 1 percentage point annually).

In relation to this sector, the Regulatory Scrutiny Board has questioned the proportionality of establishing an obligation on heating and cooling energy suppliers. In order to address these concerns, the current proposal replaces the obligation by several options open to Member States, therefore providing flexibility of implementation at national level.

Taken into account that heating and cooling represents nearly half of the EU final energy use⁷ and that, while the share of renewable energy in electricity has increased by more than 8 percentage points between 2009 and 2015, the share of renewables in the heating and cooling sector has only expanded by less than 3 percentage points in the same period, there is a need for an ambitious, but flexible, measure in this sector.

This option is proportionate, as it does not go beyond what is necessary to increase deployment of renewables in the RES-H&C sector at EU level and does not place a heavy burden on SMEs.

This option is consistent and complementary to EED and EPBD. The energy efficiency in the heating and cooling sector is promoted through energy savings and renovation, especially in the building sector. In parallel, the heating and cooling options would accelerate the fuel-switching from fossil fuels to renewable energy in the heating and cooling sector, also tackling the existing building stock. Dedicated renewable-energy measures in the heating and cooling supply and energy use at building level will reduce the risk of technology lock-in, i.e. where the approach focused on energy efficiency only triggers fossil fuel technologies being replaced by more efficient but still fossil fuel solutions.

b) Facilitate the uptake of renewable energy and waste heat in District Heating and Cooling (DHC) systems: (1) best practice sharing; (2) energy performance certificates and opening access to local H&C; (3) measures under 1 and 2 together with an additional reinforced consumer rights framework.

Option 3 is preferred for this Proposal. This option empowers consumers to produce renewable heat locally, and use a renewable district heating and cooling system to create local synergies with other users, therefore having a positive social impact. The disconnection possibility would allow for additional renewable heat production between 2020 and 2030 further contributing to climate change mitigation. Even though allowing disconnection could have negative consequences for the revenue streams of local district heating and cooling companies, these impacts would be off-set by the positive social and environmental impacts.

This option is also proportionate since administrative burden will be directly correlated to the level of penetration of district heating systems at national level. In particular, Member States with low share of district heating will face limited certification burden and likely moderate disconnection demand.

District heating and cooling represents around 10% of energy supply in the EU. District heating and cooling systems are an enabler for higher shares of renewable energy in the EU energy system. For example, there is a vast untapped potential for using industrial scale heat pumps in district heating and it is estimated that over 25% of the EU population live in areas suitable for geothermal district heating applications. Furthermore, district heating systems

⁷ ["An EU Strategy for Heating and Cooling" \(COM \(2016\) 51 final\)](#).

represent an important infrastructural technology to facilitate increased total conversion efficiencies of waste-to-energy plants⁸.

The older district heating and cooling systems must evolve to accommodate the increase of renewable energy supply. However, the current investment in district heating and cooling does not allow a transition to efficient and renewable energy supply.

Energy performance measures require relative simple administrative support, but could potentially substantially increase renewable energy deployment, therefore the efficiency of the measure.

In addition, this option is also proportionate (as it creates a level playing field between local district heating and cooling operators and the contributors and users of heat through a transparent, yet comparable system) and respects subsidiarity (as it provides the principles but respects the role of national and local authorities in establishing district heating and cooling systems).

(iii) Options to increase low-carbon and renewable energy in the transport sector (RES-T):

(1) EU incorporation obligation for advanced renewable fuels; (2) EU incorporation obligation for advanced renewable transport fuels (including advanced biofuels), alongside a reduction of food-based biofuels with a range of variants covering the speed and extent of reduction; (3) building on option 2, a dedicated EU incorporation obligation for aviation and maritime renewable fuels; (4) GHG emission reduction obligation (continuation of the Fuel Quality Directive).

The Regulatory Scrutiny Board considered that the sustainability of biofuels and their potential contribution to the Union-level target should be clearly specified and assessed in the same way as for other forms of bioenergy. It also asked for the consideration of an additional option applying improved sustainability criteria to all biofuels.

The Impact Assessment has analysed these four policy options for EU action to promote the decarbonisation and energy diversification of transport fuels, while addressing Indirect Land Use Change (ILUC) associated to food-based biofuels. In this context, it builds on the analysis developed in the impact assessment to the ILUC Directive, the Impact Assessment assesses a number of options for strengthening the existing sustainability framework for biofuels, including by extending and further reducing the existing cap on food-based biofuels to the period after 2020 in order to minimise ILUC emissions. In addition, the Impact Assessment on bioenergy assessed options for strengthening the overall sustainability criteria for bioenergy, including a new sustainability criterion for forest biomass (used also for biofuel production) and an extension of the sustainability criteria to biomass used for heat and power.

Option 2 is preferred for this Proposal since it builds on the practice of 25 Member States, which have introduced biofuel blending mandates, and provides industry with greater certainty about future market demand/volumes for advanced biofuels, which is needed to ensure large-scale investment and innovation into the sector. This option will also allow for a gradual reduction of food-based biofuels, as indicated in the July 2016 Strategy on Low Emission Mobility⁹.

The proposed reduction trajectory takes into account the important past investments realised so far, and is in line with a realistic speed in the rollout of advanced biofuels in the market.

⁸ Persson & Muenster (2016). Current and future prospects for heat recovery from waste in European district heating systems: A literature and data review. *Energy*. September 2016.

⁹ "A European Strategy for Low-Emission Mobility" (COM(2016) 501 final).

The option is easier and straightforward to implement, as it builds on the extensive policy and administrative experience gained at national level.

The preferred option addresses ILUC emissions and promotes high GHG performance of advanced biofuels. ILUC can be significantly reduced through a gradual reduction of conventional biofuels by 2030, focusing primarily on oil-crop based that are associated with higher ILUC impacts. In addition, the minimum GHG saving requirement would promote optimal carbon performance of new biofuel installations.

In its Strategy on Low Emission Mobility the Commission indicated that food-based biofuels have a limited role in decarbonising the transport sector due to the concern about their real contribution to the decarbonisation of the transport sector. In the proposal for the ILUC directive, a precautionary approach was proposed and accepted by the co-legislators limiting the contribution of food-based biofuels to no more 7% by 2020. The regulatory uncertainty surrounding the preparation and negotiation of the ILUC Directive discouraged new investments in this sector beyond what was already in place.

A progressive reduction of food based biofuels and their replacement by more advanced biofuels will realise the potential for decarbonising the transport sector. However, in determining the progression of the reduction of conventional biofuels, it is important not to retrospectively undermine the business models incentivised by the existing directive. Therefore the proposed trajectory progressively reducing the share of conventional biofuels aims at avoiding stranded assets and unintended job losses, whilst taking into account the important past investments realised so far, and is also in line with a realistic rollout of advanced biofuels in the market. The exact path of the gradual reduction trajectory set out in this Proposal reflects an informed political assessment of what would constitute a balanced approach to stability of investments and the reduction of greenhouse gas emissions in transport.

(iv) Options to empower and inform consumers of renewable energy:

a) Empowering consumers to generate self-consume and store renewable electricity: (1) EU guidance on self-consumption; (2) empowering citizens to self-consume and store renewable electricity; (3) a distance self-consumption for municipalities.

Option 2 is preferred for this proposal as it maximises consumer's empowerment and their potential participation, mitigates grid deployment costs and grid costs distributional issues and enhances the contribution of rooftop solar PV to the renewable energy target.

This option is also proportionate (as it does not open a universal right to self-consume) and respects subsidiarity (as it does not pre-empt on the freedom of Member State to support a specific technology, but only creates the right enabling framework for the roll-out of decentralised renewables production).

b) Disclose information for renewable electricity: (1) consolidating the Guarantees of Origin (GO) system; (2) Building on option 1 making GOs mandatory for disclosure; (3) Building on option 2 extending GOs to all sources of electricity generation.

A combination of Option 1 and Option 2 is preferred for this Proposal, to consolidate the system and make the use of GOs mandatory for disclosure of renewable electricity. This strikes a good balance and allows to increase transparency and trust in the system while avoiding the additional administrative costs that would result from extending the system to all sources of generation.

This option is also proportionate as it does not entail an excessive administrative burden for the management of the system (especially for small scale producers). It also and respects

subsidiarity as it allows Member States to choose their preferred method of managing the system.

c) Tracing renewable fuels used in heating and cooling and transport: (1) extended GOs to renewable gaseous fuels; (2) extended GOs to renewable liquid and gaseous fuels; (3) the development of alternative tracking system for renewable liquid and gaseous fuels.

Option 1 for gaseous fuels and Options 3 for liquid fuels are preferred for this Proposal. This allows to bring benefits in terms of a more robust tracking of renewable fuels to the benefit of consumers and reduce risks of fraud especially in relation to liquid biofuels. In addition, cross border trade in renewable fuels should also be facilitated with such systems. Lastly, Option 3 looks preferable to Option 2 for the liquid fuels since it fits better with the current administrative systems already in place for tracking the sustainability of these fuels.

This option is also proportionate (as it builds upon existing systems in place for biofuels, and supports the simplest method to facilitate cross-border trade for renewable gaseous fuels) and respects subsidiarity (as it is complementary with existing registration schemes for renewable liquid and gaseous fuels at a national level).

(v) Options to ensure the achievement of at least 27% renewable energy in 2030:

a) 2020 national targets: 2020 national targets as basis vs. baseline.

Option 1, *i.e.* to ensure that 2020 targets act as a baseline post-2020 was preferred for this Proposal. The option of keeping the 2020 target provides a backstop and should require no additional effort assuming Member States achieve that target in the first place.

This option is also proportionate (as it should require no additional effort assuming Member States achieve that target in the first place) and respects subsidiarity (as it is only a prolongation in time of targets already agreed by Member States).

It is important to note that all other options related to the achievement of the at least 27% renewable energy in 2030 are addressed in the Energy Union Governance Regulation while the obligation to meet the at least 27% target on the EU remains enshrined in the Proposal.

b) Trajectory: Linear Vs. Non-linear.

Option 1, which involves setting a linear trajectory from the 2020 target to 2030, was preferred for this Proposal. It provides more certainty and should help reduce the costs and avoid risks associated with achieving the 2030 target.

This option is also proportionate (as it has limited impact on cost of deployment now that technology learnings have been largely reaped for the most mature technologies) and respects subsidiarity (this is simply a modality for measuring progress against the EU-level target decided by Member States).

c) Mechanisms to avoid an ambition gap to the EU renewable energy target: (1) to revise ambition of national plans; (2) include review clause to propose additional EU level delivery mechanisms at a later stage if needed; (3) to increase the ambition of EU wide measures; (4) to introduce binding national targets.

A combination of Options 1 and 2, relying on the governance process to deliver the at least 27% target and then a review clause to consider proposing additional EU-wide measures, was preferred for the Proposal on the Energy Union Governance. The other options are not considered politically feasible and may not be possible to agree on without prejudging the next mid-term budgetary framework.

This approach is also proportionate (as it does not automatically trigger any additional measures that require funding at the EU-level) and respects subsidiarity (as it leaves the choice to Member States for delivering additional efforts).

d) Mechanisms to avoid and fill a delivery gap: (1) to revise national plans; (2) include review clause to propose additional EU level delivery mechanisms at a later stage if needed; (3) increasing the ambition of EU wide measures; (4) to introduce binding national targets.

A variant of Option 3 was preferred for the proposal on the Energy Union governance, as it is considered most feasible means of correcting any gap in delivery. This would be supported by Option 1 (revise the delivery of national plans) which should also come into effect with the Energy Union governance process.

This option is also proportionate (as it does not trigger any additional measures that require funding at the EU-level) and respects subsidiarity (as it leaves the choice to Member States for delivering additional efforts).

(vi) Options to strengthen the EU sustainability framework for bioenergy:

In addition, an impact assessment on the sustainability of bioenergy examined options for the sustainability of biomass used for heat and power: (1) Baseline scenario: relying on other elements of the 2030 climate and energy framework as well as on national policies to ensure the sustainability of biomass used for heat and power; (2) Extend existing sustainability and greenhouse gas saving criteria for biofuels in transport to encompass solid and gaseous biomass in heat and electricity; (3) Building on option 2, further develop sustainability requirements for forest biomass alongside a requirement to include LULUCF emissions in national commitments under the Paris agreement; (4) Building on either option 2 or 3, include an energy efficiency requirement for heat and power installations; (5) Building on either option 2 or 3 include a cap on the use of certain feedstocks (e.g. roundwood) for energy production.

Option 3 was preferred for this Proposal as it is considered the most cost-effective approach to continue ensuring that bioenergy use in the EU post-2020 delivers optimal GHG savings while minimizing the risks of adverse environmental impacts associated to increased forest biomass harvesting. This option respects subsidiarity because, building on risk-based approach, it relies firstly on the national laws and standards for demonstrating sustainable production of forest biomass for energy use. It is also proportionate because it applies only on large-scale generators of biomass heat and power.

3.5. Models used

The Proposal builds on policy options assessed vis-à-vis the outcomes of energy-system modelling scenarios. More specifically, the starting point used in the impact assessment accompanying the Proposal is the EU Reference Scenario 2016 (REF2016), which provides 2030 energy-system projections, based on current trends and policies.

3.5.1. The baseline scenarios

Building on the REF2016 and the EUCO27 (see below in 3.5.2.), specific baseline scenarios have then been used, which highlight the expected implications of the continuation of current policies and practices on the developments in the specific sectors subject to policy interventions, assuming that all other sectors and policies are in line with the central policy scenario.

3.5.2. The policy scenarios

A central policy scenario built for the impact assessments accompanying the proposal for a revision of the Energy Efficiency Directive and the proposal on the Effort Sharing Regulation, was also used. This scenario (called "EU2027") projects the expected developments across sectors to reach the 2030 targets and help identify the scale of the economic, social and environmental challenges to cost-effectively reach an at least 27% renewable energy share.

This approach, building on a common policy scenario and then focusing on 'one issue at a time', was deemed the only operational way to assess the impacts of specific policy options in the general context of various far-reaching initiatives put forward by the Commission as part of the 2016 Energy Union initiatives.

3.5.3. Model used

The model suite used for assessing the policy options underpinning the Proposal is the same model suite as used for the 2020 climate and energy package as well as for the 2030 climate and energy policy framework.

The model suite includes models (PRIMES, PRIMES- TAPEM & PRIMES-TREMOVE, PRIMES Biomass Supply, GAINS, GLOBIOM-G4M, Prometheus and CAPRI) linked with each other in formally-defined ways to ensure consistency in the building of scenarios. These inter-linkages are necessary to provide the core of the analysis, which are energy, transport and GHG emissions trends, covering the following:

- The entire energy system (energy demand, supply, prices and investments to the future) and all GHG emissions and removals:
- Time horizon: 1990 to 2050 (5-year time steps)
- Geography: individually all EU Member States, EU candidate countries and, where relevant Norway, Switzerland and Bosnia and Herzegovina
- Impacts: on energy, transport and industry (PRIMES), agriculture, forestry and land use (GLOBIOM-G4M), atmospheric dispersion, health and ecosystems (acidification, eutrophication) (GAINS); macro-economy with multiple sectors, employment and social welfare.

The Impact Assessment on bioenergy sustainability uses EU2027 as a baseline scenario, and assesses the policy options with the two following modelling tools:

- GLOBIOM (global economic land use model) and G4M (forestry sector model), which gives projections on commodity prices, land impacts, and greenhouse gas emissions from the land use, land use change and forestry sector.
- Green-X (EU renewable energy model), combined with ArcGIS Network (geospatial model for biomass transport chains) and MULTIREG (input-output model), which models the breakdown of renewable energy sources and bioenergy feedstocks as well as greenhouse gas emissions from the energy sector, and economic and social impacts such as gross value added, investment, and jobs.

4. BUDGETARY IMPLICATIONS

The Proposal recasts the Renewable Energy Directive and the new measures set forth in Articles 23 and 25 are expected to bring limited additional budgetary and administrative consequences for the public authorities of Member States in terms of administrative structures to be put in place. In most of the cases the costs associated with the measures are passed on to

final consumers, whom in turn will profit from the benefits of decarbonisation. The Proposal has no implication for the Union budget.

5. DETAILED EXPLANATION OF THE SPECIFIC PROVISIONS OF THE PROPOSAL

The main provisions which substantially change Directive 2009/28/EC or add new elements are the following:

Article 1 indicates the scope of this Proposal mentioning new elements for the period after 2020 such as the overall EU binding target, renewable self-consumption, improved biofuels, bioliquids and biomass fuels sustainability and greenhouse gas emissions saving criteria.

Article 2 introduces new specific definitions, in the light of the amendments carried out to the Renewable Energy Directive.

Article 3 sets out the 2030 EU target. It establishes the 2020 national targets as baseline (*i.e.* Member States cannot go below the 2020 national targets from 2021 onwards). It also includes a reference to the mechanism to ensure that this baseline is maintained and to avoid the emergence of a gap in target achievement, both as set out under the Governance Regulation. Furthermore, it deletes the 10% RES-T target after 2020.

Article 4 lays down the general principles that Member States may apply when designing cost-effective support schemes to facilitate a market-oriented and Europeanised approach, subject to State aid rules.

Article 5 establishes a gradual and partial opening of support schemes to cross-border participation in the electricity sector.

Article 6 ensures that the level of, and the conditions attached to, the support granted to renewable energy projects, when Member States opt to do so, are not revised in a way that negatively impact supported projects.

Article 7, which regulates how to calculate the share of energy from renewable sources, includes a decreasing maximum share of biofuels and bioliquids produced from food or feed crops starting from 2021, with the aim to address ILUC emissions. Member States may set a lower limit and may distinguish between different types of biofuels and bioliquids produced from food and feed crops, for instance by setting a lower limit for the contribution from biofuels produced from oil crops, taking into account indirect land use change.

Article 15 includes a new calculation methodology (anchored on the Energy Performance of Buildings Directive) of minimum levels of energy from renewable sources in new and existing buildings that are subject to renovation.

Article 16 establishes a permit granting process for renewable energy projects with one designated authority ("one-stop-shop") and a maximum time limit for the permit granting process.

Article 17 introduces a simple notification to Distribution System Operators for small scale projects and a specific provision on accelerating permit granting process for repowering existing renewable plants;

Article 19 includes some modifications to the guarantees of origin system (i) to extend the guarantees of origin (GOs) system to renewable gas; (ii) to make the issuance of GOs for heating and cooling mandatory upon a producer's request; (iii) to make the use of GOs mandatory for RES-E and renewable gas disclosure; (iv) to enable the issuance of GOs to supported RES-E allocated through auctioning, with revenues raised to be used to offset the

costs of renewable support; and (v) to improve the administrative procedures through the application of the CEN standard.

Article 21 empowers consumers by enabling them to self-consume without undue restrictions, being remunerated for the electricity they feed into the grid.

Article 22 sets forth new provisions on energy communities to empower them to participate in the market.

Article 23 aims to exploit the renewables potential in the heating and cooling sector, ensuring a cost-efficient contribution of the sector to target achievement, and to create a larger market for RES-H&C across the EU. Accordingly, Member States will endeavour to achieve an annual increase of 1% in the share of renewable energy in the heating and cooling supply. Member States will decide how to implement it.

Article 24 empowers energy consumers by providing them information of district heating energy performance, and enabling them to stop buying heat/cold from a district heating/cooling system at building level if the consumers, or a party on their behalf, can achieve a significantly better energy performance by measures taken at building level. It also opens local heating and cooling systems for producers of renewables heating and cooling and waste heat or cold and third parties acting on their behalf.

Article 25 establishes a EU-level obligation for fuel suppliers to provide a certain share (6.8% in 2030) of low-emission and renewable fuels (including renewable electricity and advanced biofuels), in order to stimulate decarbonisation and energy diversification and to ensure a cost-efficient contribution of the sector to the overall target achievement. ILUC issues are addressed through Article 7 which introduces a decreasing maximum share of biofuels and bioliquids produced from food or feed crops starting from 2021. The switch to advanced biofuels is promoted by a specific sub-mandate, increasing yearly their contribution to reach at least 3.6% by 2030. Finally, the article includes a provision providing for the introduction of national databases that ensures traceability of the fuels and mitigate the risk of fraud.

Article 26 reinforces the existing EU sustainability criteria for bioenergy, including by extending their scope to cover biomass and biogas for heating and cooling and electricity generation. The sustainability criterion applying to agricultural biomass is streamlined in order to reduce the administrative burden. The new text also makes the criterion for peatland protection stricter, but easier to verify. A new risk-based sustainability criterion for forest biomass is introduced, as well as LULUCF requirement for ensuring proper carbon accounting of carbon impacts of forest biomass used in energy generation. In addition, the GHG saving performance requirement applying to biofuels is increased to 70% for new plants and an 80% saving requirement is applied to biomass-based heating/cooling and electricity. To avoid excessive administrative burden, the EU sustainability and greenhouse gas saving criteria do not apply to small biomass-based heating/cooling and electricity installations, with a fuel capacity below 20 MW. Annex V includes updated default values for biofuels and bioliquids, and a new Annex VI is added to include a common greenhouse gas accounting methodology for biomass fuels for heat and power, including default values.

Article 27 brings a clarification on the mass balance system and adapt it to cover biogas co-digestion and injection of biomethane in the natural gas grid. The amended article includes the obligatory recognition of evidence from national schemes of other Member States that have been verified by the Commission. To streamline the EU sustainability criteria, it deletes a number of non-operational provisions, including the possibility to establish bilateral agreements with third countries, and the possibility for the Commission to recognise areas for the protection of rare, threatened or endangered ecosystems or species recognised by

international agreements or included in lists drawn up by intergovernmental organisations or the International Union for the Conservation of Nature. Furthermore it clarifies the legal basis allowing the Commission to specify the auditing approaches to be applied by the voluntary schemes, with stronger focus on limiting administrative burden. Finally, it enhances the involvement of Member States in the governance of voluntary schemes by allowing checks of certification bodies.

Article 28 includes a legal basis allowing the Commission to update the GHG calculation methodology. It also clarifies the future use of Member States reports on average cultivation emissions.

Articles 3, 4, 16 (1-8), 22 and 23, 24 and 26 of the Directive 2009/28/EC will be repealed by this proposal. Articles 6, 7, 8, 9, 10, 11, 12, 14, 25, 25a, 27, 28, 29 of Directive 2009/28/EC (Articles 8, 9, 10, 11, 12, 13, 14, 18, 31, 32, 33, 35 and 36 of this proposal) are slightly revised (e.g. technicalities or adaptations to new amendments and provisions) or just renumbered.

6. ADDITIONAL INFORMATION

• Simplification and regulatory fitness

The EU-level 2030 target setting offers an opportunity to implement a holistic approach to deployment of renewable energy. This entails a single overarching renewable energy target of at least 27% for the Union by 2030, without the need to keep a specific sub-target for RES-T. Moreover, the Proposal includes measures across the three sectors of renewable energies, strengthening visibility for investments in renewable energy, enhancing the general regulatory framework and exploiting the potential of all sectors in contributing to the collective effort to reach the 2030 target.

The calculation of the final consumption of energy from renewable sources in transport is moved to Article 7 to make it consistent with the calculation of the final consumption of energy from renewable sources in electricity and heating and cooling.

Measures streamlining the current framework for support to renewable electricity (*e.g.* Article 4 of the Proposal) and addressing cross cutting issues (*e.g.* administrative barriers in Articles 15, 16 and 17 of the Proposal) are included.

• Repeal of existing legislation

The adoption of the Proposal will lead to the repeal of the existing Renewable Energy Directive as of 1 January 2021.

• Review/revision/sunset clause

The Proposal includes a general review clause in Article 30.

• Recasting

This explanatory memorandum accompanies a Proposal for recasting the Renewable Energy Directive. This specific approach has been adopted because recasting involves new substantive changes, while some provisions of the earlier act remain unchanged.

• Correlation table

The Member States are required to communicate to the Commission the text of national provisions transposing the Directive as well as a correlation table between those provisions and the Directive.

Given the large scope of this Proposal and the number of legal obligations it establishes, this correlation table is necessary so that the Commission can appropriately carry out its tasks of overseeing the transposition of the Directive

- European Economic Area (EEA)

The proposed act concerns an EEA matter and should therefore extend to the European Economic Area.

↓ 2009/28/EC (adapted)

⇒ new

2016/0382 (COD)

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on the promotion of the use of energy from renewable sources (recast)

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty ~~establishing the European Community~~ on the Functioning of the European Union , and in particular Article ~~175(1)~~ 194(2) thereof, ~~and Article 95 thereof in relation to Articles 17, 18 and 19 of this Directive,~~

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee¹⁰,

Having regard to the opinion of the Committee of the Regions¹¹,

Acting in accordance with the ordinary legislative procedure ~~laid down in Article 251 of the Treaty~~¹²;

Whereas:

↓ new

(1) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC¹³ has been substantially amended several times¹⁴. Since further amendments are to be made, that Directive should be recast in the interests of clarity.

¹⁰ ~~Opinion of 17 September 2008 (OJ C 77, 31.3.2009, p. 43).~~

¹¹ ~~OJ C 325, 19.12.2008, p. 12.~~

¹² ~~Opinion of the European Parliament of 17 December 2008 (not yet published in the Official Journal) and Council Decision of 6 April 2009.~~

¹³ OJ L 140, 5.6.2009, p. 16–62.

¹⁴ See part A of Annex XI.

↓ 2009/28/EC Recital 1 (adapted)
⇒ new

- (2) ⇒ Promoting renewable forms of energy is one of the goals of the Union energy policy. ⇐ ~~The control of European energy consumption and the~~ The increased use of energy from renewable sources, together with energy savings and increased energy efficiency, ~~constitute~~ ☒ constitutes an ☒ important parts of the package of measures needed to reduce greenhouse gas emissions and comply with ~~the Kyoto Protocol to the United Nations Framework Convention~~ ☒ the 2015 Paris Agreement ☒ on Climate Change, and ~~with further Community and international greenhouse gas emission reduction commitments beyond 2012~~ ☒ the Union 2030 energy and climate framework, including the binding target to cut emissions in the Union by at least 40% below 1990 levels by 2030 ☒ . ~~Those factors also have~~ ☒ It also has ☒ an important part to play in promoting the security of energy supply, ~~promoting~~ technological development and innovation and providing opportunities for employment and regional development, especially in rural and isolated areas ⇒ or regions with low population density ⇐ .

↓ 2009/28/EC Recital 2 (adapted)
⇒ new

- (3) In particular, increasing technological improvements, incentives for the use and expansion of public transport, the use of energy efficiency technologies and ☒ the promotion of ☒ the use of energy from renewable sources ⇒ in the electricity, heating and cooling sectors as well as ⇐ in ☒ the ☒ transport ☒ sector ☒ are ~~some of the most~~ ☒ very ☒ effective tools ⇒ , together with energy efficiency measures ⇐, ☒ for reducing ☒ ~~by which the Community can reduce its~~ ⇒ greenhouse gas emissions in the Union and ⇐ ~~its~~ ☒ the Union's ☒ dependence on imported ⇒ gas and ⇐ oil ~~in the transport sector, in which the security of energy supply problem is most acute, and influence the fuel market for transport.~~

↓ new

- (4) Directive 2009/28/EC established a regulatory framework for the promotion of the use of energy from renewable sources which set binding national targets on the share of renewable energy sources in energy consumption and transport to be met by 2020. Commission Communication of 22 of January 2014¹⁵ established a framework for future Union energy and climate policies and promoted common understanding of how to develop those policies after 2020. The Commission proposed that the Union 2030 target for the share of renewable energy consumed in the Union should be at least 27%.
- (5) The European Council of October 2014 endorsed that target, indicating that Member States may set their own more ambitious national targets.
- (6) The European Parliament, in its Resolutions on "A policy framework for climate and energy in the period from 2020 to 2030" and on "the Renewable energy progress report", has favoured a binding Union 2030 target of at least 30% of total final energy consumption from renewable energy sources, stressing that that target should be

¹⁵ "A policy framework for climate and energy in the period from 2020 to 2030" (COM/2014/015 final).

implemented by means of individual national targets taking into account the individual situation and potential of each Member State.

- (7) It is thus appropriate to establish a Union binding target of at least 27% share of renewable energy. Member States should define their contribution to the achievement of this target as part of their Integrated National Energy and Climate Plans through the governance process set out in Regulation [Governance].
- (8) The establishment of a Union binding renewable energy target for 2030 would continue to encourage the development of technologies which generate renewable energy and provide certainty for investors. A target defined at the Union level would leave greater flexibility for Member States to meet their greenhouse gas reduction targets in the most cost-effective manner in accordance with their specific circumstances, energy mixes and capacities to produce renewable energy.
- (9) The national targets set for 2020 should constitute Member States' minimum contribution to the new 2030 framework. Under no circumstances the national share of renewables should fall below such contribution and, in case this happens, the relevant Member States should take the appropriate measures to ensure that this baseline is maintained as well as contribute to the financial instrument referred to in Regulation [Governance].
- (10) Member States should take additional measures in the event that the share of renewables at the Union level does not meet the Union trajectory towards the at least 27% renewable energy target. As set out in Regulation [Governance], if an ambition gap is identified by the Commission during the assessment of the Integrated National Energy and Climate Plans, the Commission may take measures at Union level in order to ensure the achievement of the target. If a delivery gap is identified by the Commission during the assessment of the Integrated National Energy and Climate Progress Reports, Member States should apply the measures set out in Regulation [Governance], which are giving them enough flexibility to choose.
- (11) In order to support Member States' ambitious contributions to the Union target, a financial framework aiming to facilitate investments in renewable energy projects in those Member States should be established, also through the use of financial instruments.
- (12) The Commission should focus the allocation of funds on the reduction of the cost of capital of renewables projects, which has a material impact on the cost of renewable energy projects and on their competitiveness.
- (13) The Commission should facilitate the exchange of best practices between the competent national or regional authorities or bodies, for instance through regular meetings to find a common approach to promote a higher uptake of cost-efficient renewable energy projects, encourage investments in new, flexible and clean technologies, and set out an adequate strategy to manage the retirement of technologies which do not contribute to the reduction of emissions or deliver sufficient flexibility, based on transparent criteria and reliable market price signals.

↓ 2009/28/EC Recital 7 (adapted)
⇒ new

- (14) Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the

~~internal electricity market~~¹⁶ and, Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport¹⁷, ~~⇒~~ and Regulation (EC) 1099/2008 of the European Parliament and of the Council¹⁸ ~~⇐~~ established definitions for different types of energy from renewable sources. Directive ~~2003/54/EC~~ XXXX/XX/EU of the European Parliament and of the Council of ~~26 June 2003~~XX concerning common rules for the ~~internal market in electricity~~ ~~⊗~~¹⁹ ~~⊗~~ established definitions for the electricity sector in general. In the interests of legal certainty and clarity it is appropriate to use ~~⊗~~ those ~~⊗~~ the same or similar definitions in this Directive.

↓ new

- (15) Support schemes for electricity generated from renewable sources have proved to be an effective way of fostering deployment of renewable electricity. If and when Member States decide to implement support schemes, such support should be provided in a form that is as non-distortive as possible for the functioning of electricity markets. To this end, an increasing number of Member States allocate support in a form where support is granted in addition to market revenues.
- (16) Electricity generation from renewable sources should be deployed at the lowest possible cost for consumers and taxpayers. When designing support schemes and when allocating support, Member States should seek to minimise the overall system cost of deployment, taking full account of grid and system development needs, the resulting energy mix, and the long term potential of technologies.
- (17) The opening of support schemes to cross-border participation limits negative impacts on the internal energy market and can, under certain conditions, help Member States achieve the Union target more cost-efficiently. Cross-border participation is also the natural corollary to the development of the Union renewables policy, with a Union-level binding target replacing national binding targets. It is therefore appropriate to require Member States to progressively and partially open support to projects located in other Member States, and define several ways in which such progressive opening may be implemented, ensuring compliance with the provisions of the Treaty, including Articles 30, 34 and 110.
- (18) Without prejudice to adaptations of support schemes to bring them in line with State aid rules, renewables support policies should be stable and avoid frequent changes. Such changes have a direct impact on capital financing costs, the costs of project development and therefore on the overall cost of deploying renewables in the Union. Member States should prevent the revision of any support granted to renewable energy projects from having a negative impact on their economic viability. In this context, Member States should promote cost-effective support policies and ensure their financial sustainability.
- (19) Member States' obligations to draft renewable energy action plans and progress reports and the Commission's obligation to report on Member States' progress are essential in order to increase transparency, provide clarity to investors and consumers and allow

¹⁶ OJ L 283, 27.10.2001, p. 33.

¹⁷ OJ L 123, 17.5.2003, p. 42.

¹⁸ Regulation (EC) 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics (OJ L...)

¹⁹ ~~⊗~~ Directive XXXX/XX/EU of the European Parliament and of the Council of ... concerning common rules for the internal market in electricity (OJ L...) ~~⊗~~

for effective monitoring. Regulation [Governance] integrates those obligations in the Energy Union governance system, where planning, reporting and monitoring obligations in the energy and climate fields are streamlined. The transparency platform on renewable energy is also integrated in the broader e-platform established in Regulation [Governance].

↓ 2009/28/EC Recital 11
(adapted)

- (20) It is necessary to set transparent and unambiguous rules for calculating the share of energy from renewable sources and for defining those sources. ~~In this context, the energy present in oceans and other water bodies in the form of waves, marine currents, tides, ocean thermal energy gradients or salinity gradients should be included.~~

↓ 2009/28/EC Recital 5

~~In order to reduce greenhouse gas emissions within the Community and reduce its dependence on energy imports, the development of energy from renewable sources should be closely linked to increased energy efficiency.~~

↓ 2009/28/EC Recital 8

~~The Commission communication of 10 January 2007 entitled ‘Renewable Energy Roadmap — Renewable energies in the 21st century: building a more sustainable future’ demonstrated that a 20 % target for the overall share of energy from renewable sources and a 10 % target for energy from renewable sources in transport would be appropriate and achievable objectives, and that a framework that includes mandatory targets should provide the business community with the long term stability it needs to make rational, sustainable investments in the renewable energy sector which are capable of reducing dependence on imported fossil fuels and boosting the use of new energy technologies. Those targets exist in the context of the 20 % improvement in energy efficiency by 2020 set out in the Commission communication of 19 October 2006 entitled ‘Action Plan for Energy Efficiency: Realising the Potential’, which was endorsed by the European Council of March 2007, and by the European Parliament in its resolution of 31 January 2008 on that Action Plan.~~

↓ 2009/28/EC Recital 9

~~The European Council of March 2007 reaffirmed the Community’s commitment to the Community wide development of energy from renewable sources beyond 2010. It endorsed a mandatory target of a 20 % share of energy from renewable sources in overall Community energy consumption by 2020 and a mandatory 10 % minimum target to be achieved by all Member States for the share of biofuels in transport petrol and diesel consumption by 2020, to be introduced in a cost effective way. It stated that the binding character of the biofuel target is appropriate, subject to production being sustainable, second generation biofuels becoming commercially available and Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels²⁰ being amended to allow for adequate levels of blending. The European Council of March 2008 repeated that it is essential to develop and fulfil effective sustainability criteria for biofuels and ensure the~~

²⁰ OJL 350, 28.12.1998, p. 58.

commercial availability of second generation biofuels. The European Council of June 2008 referred again to the sustainability criteria and the development of second generation biofuels, and underlined the need to assess the possible impacts of biofuel production on agricultural food products and to take action, if necessary, to address shortcomings. It also stated that further assessment should be made of the environmental and social consequences of the production and consumption of biofuels.

↓ 2009/28/EC Recital 10

In its resolution of 25 September 2007 on the Road Map for Renewable Energy in Europe²¹, the European Parliament called on the Commission to present, by the end of 2007, a proposal for a legislative framework for energy from renewable sources, referring to the importance of setting targets for the shares of energy from renewable sources at Community and Member State level.

↓ 2009/28/EC Recital 12

The use of agricultural material such as manure, slurry and other animal and organic waste for biogas production has, in view of the high greenhouse gas emission saving potential, significant environmental advantages in terms of heat and power production and its use as biofuel. Biogas installations can, as a result of their decentralised nature and the regional investment structure, contribute significantly to sustainable development in rural areas and offer farmers new income opportunities.

↓ 2009/28/EC Recital 13

In the light of the positions taken by the European Parliament, the Council and the Commission, it is appropriate to establish mandatory national targets consistent with a 20 % share of energy from renewable sources and a 10 % share of energy from renewable sources in transport in Community energy consumption by 2020.

↓ 2009/28/EC Recital 14

The main purpose of mandatory national targets is to provide certainty for investors and to encourage continuous development of technologies which generate energy from all types of renewable sources. Deferring a decision about whether a target is mandatory until a future event takes place is thus not appropriate.

↓ 2009/28/EC Recital 15

The starting point, the renewable energy potential and the energy mix of each Member State vary. It is therefore necessary to translate the Community 20 % target into individual targets for each Member State, with due regard to a fair and adequate allocation taking account of Member States' different starting points and potentials, including the existing level of energy from renewable sources and the energy mix. It is appropriate to do this by sharing the required total increase in the use of energy from renewable sources between Member States on the basis of an equal increase in each Member State's share weighted by their GDP, modulated to reflect their starting points, and by accounting in terms of gross final consumption of energy,

²¹ OJ C 219 E, 28.8.2008, p. 82.

~~with account being taken of Member States' past efforts with regard to the use of energy from renewable sources.~~

↓ 2009/28/EC Recital 16

~~By contrast, it is appropriate for the 10 % target for energy from renewable sources in transport to be set at the same level for each Member State in order to ensure consistency in transport fuel specifications and availability. Because transport fuels are traded easily, Member States with low endowments of the relevant resources will easily be able to obtain biofuels from elsewhere. While it would technically be possible for the Community to meet its target for the use of energy from renewable sources in transport solely from domestic production, it is both likely and desirable that the target will in fact be met through a combination of domestic production and imports. To this end, the Commission should monitor the supply of the Community market for biofuels, and should, as appropriate, propose relevant measures to achieve a balanced approach between domestic production and imports, taking into account, inter alia, the development of multilateral and bilateral trade negotiations, environmental, social and economic considerations, and the security of energy supply.~~

↓ 2009/28/EC Recital 17

~~The improvement of energy efficiency is a key objective of the Community, and the aim is to achieve a 20 % improvement in energy efficiency by 2020. That aim, together with existing and future legislation including Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings²², Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy using products²³, and Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services²⁴, has a critical role to play in ensuring that the climate and energy objectives are being achieved at least cost, and can also provide new opportunities for the European Union's economy. Energy efficiency and energy saving policies are some of the most effective methods by which Member States can increase the percentage share of energy from renewable sources, and Member States will thus more easily achieve the overall national and transport targets for energy from renewable sources laid down by this Directive.~~

↓ 2009/28/EC Recital 18

~~It will be incumbent upon Member States to make significant improvements in energy efficiency in all sectors in order more easily to achieve their targets for energy from renewable sources, which are expressed as a percentage of gross final consumption of energy. The need for energy efficiency in the transport sector is imperative because a mandatory percentage target for energy from renewable sources is likely to become increasingly difficult to achieve sustainably if overall demand for energy for transport continues to rise. The mandatory 10 % target for transport to be achieved by all Member States should therefore be~~

²² OJL 1, 4.1.2003, p. 65.

²³ OJL 191, 22.7.2005, p. 29.

²⁴ OJL 114, 27.4.2006, p. 64.

~~defined as that share of final energy consumed in transport which is to be achieved from renewable sources as a whole, and not from biofuels alone.~~

↓ 2009/28/EC Recital 19

~~To ensure that the mandatory national overall targets are achieved, Member States should work towards an indicative trajectory tracing a path towards the achievement of their final mandatory targets. They should establish a national renewable energy action plan including information on sectoral targets, while having in mind that there are different uses of biomass and therefore it is essential to mobilise new biomass resources. In addition, Member States should set out measures to achieve those targets. Each Member State should assess, when evaluating its expected gross final consumption of energy in its national renewable energy action plan, the contribution which energy efficiency and energy saving measures can make to achieving its national targets. Member States should take into account the optimal combination of energy efficiency technologies with energy from renewable sources.~~

↓ 2009/28/EC Recital 20

~~To permit the benefits of technological progress and economies of scale to be reaped, the indicative trajectory should take into account the possibility of a more rapid growth in the use of energy from renewable sources in the future. Thus special attention can be given to sectors that suffer disproportionately from the absence of technological progress and economies of scale and therefore remain under developed, but which, in future, could significantly contribute to reaching the targets for 2020.~~

↓ 2009/28/EC Recital 21

~~The indicative trajectory should take 2005 as its starting point because that is the latest year for which reliable data on national shares of energy from renewable sources are available.~~

↓ 2009/28/EC Recital 23

~~Member States may encourage local and regional authorities to set targets in excess of national targets and to involve local and regional authorities in drawing up national renewable energy action plans and in raising awareness of the benefits of energy from renewable sources.~~

↓ 2009/28/EC Recital 24

~~In order to exploit the full potential of biomass, the Community and the Member States should promote greater mobilisation of existing timber reserves and the development of new forestry systems.~~

↓ 2009/28/EC Recital 25

~~Member States have different renewable energy potentials and operate different schemes of support for energy from renewable sources at the national level. The majority of Member States apply support schemes that grant benefits solely to energy from renewable sources that is produced on their territory. For the proper functioning of national support schemes it is vital~~

~~that Member States can control the effect and costs of their national support schemes according to their different potentials. One important means to achieve the aim of this Directive is to guarantee the proper functioning of national support schemes, as under Directive 2001/77/EC, in order to maintain investor confidence and allow Member States to design effective national measures for target compliance. This Directive aims at facilitating cross border support of energy from renewable sources without affecting national support schemes. It introduces optional cooperation mechanisms between Member States which allow them to agree on the extent to which one Member State supports the energy production in another and on the extent to which the energy production from renewable sources should count towards the national overall target of one or the other. In order to ensure the effectiveness of both measures of target compliance, i.e. national support schemes and cooperation mechanisms, it is essential that Member States are able to determine if and to what extent their national support schemes apply to energy from renewable sources produced in other Member States and to agree on this by applying the cooperation mechanisms provided for in this Directive.~~

↓ 2009/28/EC Recital 26

~~It is desirable that energy prices reflect external costs of energy production and consumption, including, as appropriate, environmental, social and healthcare costs.~~

↓ 2009/28/EC Recital 27

~~Public support is necessary to reach the Community's objectives with regard to the expansion of electricity produced from renewable energy sources, in particular for as long as electricity prices in the internal market do not reflect the full environmental and social costs and benefits of energy sources used.~~

↓ 2009/28/EC Recital 28

~~The Community and the Member States should strive to reduce total consumption of energy in transport and increase energy efficiency in transport. The principal means of reducing consumption of energy in transport include transport planning, support for public transport, increasing the share of electric cars in production and producing cars which are more energy efficient and smaller both in size and in engine capacity.~~

↓ 2009/28/EC Recital 29

~~Member States should aim to diversify the mix of energy from renewable sources in all transport sectors. The Commission should present a report to the European Parliament and the Council by 1 June 2015 outlining the potential for increasing the use of energy from renewable sources in each transport sector.~~

↓ 2009/28/EC Recital 30

- (21) In calculating the contribution of hydropower and wind power for the purposes of this Directive, the effects of climatic variation should be smoothed through the use of a normalisation rule. Further, electricity produced in pumped storage units from water that has previously been pumped uphill should not be considered to be electricity produced from renewable energy sources.

↓ 2009/28/EC Recital 31

- (22) Heat pumps enabling the use of aerothermal, geothermal or hydrothermal heat at a useful temperature level need electricity or other auxiliary energy to function. The energy used to drive heat pumps should therefore be deducted from the total usable heat. Only heat pumps with an output that significantly exceeds the primary energy needed to drive it should be taken into account.

↓ 2009/28/EC Recital 32

- (23) Passive energy systems use building design to harness energy. This is considered to be saved energy. To avoid double counting, energy harnessed in this way should not be taken into account for the purposes of this Directive.

↓ 2009/28/EC Recital 33
(adapted)

- (24) Some Member States have a large share of aviation in their gross final consumption of energy. In view of the current technological and regulatory constraints that prevent the commercial use of biofuels in aviation, it is appropriate to provide a partial exemption for such Member States, by excluding from the calculation of their gross final consumption of energy in national air transport, the amount by which they exceed one-and-a-half times the ~~Community~~ ☒ Union ☒ average gross final consumption of energy in aviation in 2005, as assessed by Eurostat, i.e. 6,18 %. Cyprus and Malta, due to their insular and peripheral character, rely on aviation as a mode of transport, which is essential for their citizens and their economy. As a result, Cyprus and Malta have a gross final consumption of energy in national air transport which is disproportionately high, i.e. more than three times the ~~Community~~ ☒ Union ☒ average in 2005, and are thus disproportionately affected by the current technological and regulatory constraints. For those Member States it is therefore appropriate to provide that the exemption should cover the amount by which they exceed the ~~Community~~ ☒ Union ☒ average gross final consumption of energy in aviation in 2005 as assessed by Eurostat, i.e. 4,12 %.

↓ new

- (25) In order to ensure that Annex IX takes into account the principles of the waste hierarchy established in Directive 2008/98/EC, the Union sustainability criteria, and the need to ensure that the annex does not create additional demand for land while promoting the use of wastes and residues, the Commission, when regularly evaluating the annex, should consider the inclusion of additional feedstocks that do not cause significant distortive effects on markets for (by-)products, wastes or residues.

↓ 2009/28/EC Recital 34

~~To obtain an energy model that supports energy from renewable sources there is a need to encourage strategic cooperation between Member States, involving, as appropriate, regions and local authorities.~~

↓ 2009/28/EC Recital 35

~~Whilst having due regard to the provisions of this Directive, Member States should be encouraged to pursue all appropriate forms of cooperation in relation to the objectives set out in this Directive. Such cooperation can take place at all levels, bilaterally or multilaterally. Apart from the mechanisms with effect on target calculation and target compliance, which are exclusively provided for in this Directive, namely statistical transfers between Member States, joint projects and joint support schemes, cooperation can also take the form of, for example, exchanges of information and best practices, as provided for, in particular, in the transparency platform established by this Directive, and other voluntary coordination between all types of support schemes.~~

↓ 2009/28/EC Recital 36
(adapted)
⇒ new

- (26) To create opportunities for reducing the cost of ~~achieving~~ meeting the Union targets laid down in this Directive and to give flexibility to Member States to comply with their obligation not to go below their 2020 national targets after 2020, it is appropriate both to facilitate the consumption in Member States of energy produced from renewable sources in other Member States, and to enable Member States to count energy from renewable sources consumed in other Member States towards their own renewable energy share national targets. For this reason, flexibility measures cooperation mechanisms are required, but they remain under Member States' control in order not to affect their ability to reach their national targets to complement the obligations to open up support to projects located in other Member States. Those flexibility measures mechanisms include take the form of statistical transfers, joint projects between Member States or joint support schemes.

↓ 2009/28/EC Recital 35
(adapted)
⇒ new

- (27) ~~Whilst having due regard to the provisions of this Directive,~~ Member States should be encouraged to pursue all appropriate forms of cooperation in relation to the objectives set out in this Directive. Such cooperation can take place at all levels, bilaterally or multilaterally. Apart from the mechanisms with effect on target renewable energy share calculation and target compliance, which are exclusively provided for in this Directive, namely statistical transfers between Member States, joint projects and joint support schemes, cooperation can also take the form of, for example, exchanges of information and best practices, as provided for, in particular, in the transparency platform e-platform established by this Directive, Regulation [Governance], and other voluntary coordination between all types of support schemes.

↓ 2009/28/EC Recital 37
(adapted)
⇒ new

- (28) It should be possible for imported electricity, produced from renewable energy sources outside the ~~the~~ Union ~~Community~~, to count towards Member States' ~~renewable energy shares~~ ~~targets~~. However, ~~to avoid a net increase in greenhouse gas emissions through the diversion of existing renewable sources and their complete or partial replacement by conventional energy sources, only electricity produced by renewable energy installations that become operational after the entry into force of this Directive or by the increased capacity of an installation that was refurbished after that date should be eligible to be counted~~. In order to guarantee an adequate effect of energy from renewable sources replacing conventional energy in the ~~Community~~ ~~the~~ Union ~~as well as in third countries it is appropriate to ensure that such imports can be tracked and accounted for in a reliable way. Agreements with third countries concerning the organisation of such trade in electricity from renewable energy sources will be considered. If, by virtue of a decision taken under the Energy Community Treaty²⁵ to that effect, the contracting parties to that Treaty become~~ ~~the~~ ~~are~~ bound by the relevant provisions of this Directive, the measures of cooperation between Member States provided for in this Directive ~~will~~ ~~the~~ should ~~be~~ be applicable to them.

↓ 2009/28/EC Recital 38

~~When Member States undertake joint projects with one or more third countries regarding the production of electricity from renewable energy sources, it is appropriate that those joint projects relate only to newly constructed installations or to installations with newly increased capacity. This will help ensure that the proportion of energy from renewable sources in the third country's total energy consumption is not reduced due to the importation of energy from renewable sources into the Community. In addition, the Member States concerned should facilitate the domestic use by the third country concerned of part of the production of electricity by the installations covered by the joint project. Furthermore, the third country concerned should be encouraged by the Commission and Member States to develop a renewable energy policy, including ambitious targets.~~

↓ 2009/28/EC Recital 39

~~Noting that projects of high European interest in third countries, such as the Mediterranean Solar Plan, may need a long lead time before being fully interconnected to the territory of the Community, it is appropriate to facilitate their development by allowing Member States to take into account in their national targets a limited amount of electricity produced by such projects during the construction of the interconnection.~~

↓ 2009/28/EC Recital 40
(adapted)

- (29) The procedure used ~~by the administration responsible~~ for supervising the authorisation, certification and licensing of renewable energy plants should be

²⁵ OJ L 198, 20.7.2006, p. 18.

objective, transparent, non-discriminatory and proportionate when applying the rules to specific projects. In particular, it is appropriate to avoid any unnecessary burden that could arise by classifying renewable energy projects under installations which represent a high health risk.

↓ 2009/28/EC Recital 42

- (30) For the benefit of rapid deployment of energy from renewable sources and in view of their overall high sustainable and environmental beneficial quality, Member States should, when applying administrative rules, planning structures and legislation which are designed for licensing installations with respect to pollution reduction and control for industrial plants, for combating air pollution and for the prevention or minimisation of the discharge of dangerous substances in the environment, take into account the contribution of renewable energy sources towards meeting environmental and climate change objectives, in particular when compared to non-renewable energy installations.

↓ 2009/28/EC Recital 43

~~In order to stimulate the contribution by individual citizens to the objectives set out in this Directive, the relevant authorities should consider the possibility of replacing authorisations by simple notifications to the competent body when installing small decentralised devices for producing energy from renewable sources.~~

↓ 2009/28/EC Recital 44
(adapted)

- (31) The coherence between the objectives of this Directive and the ~~Community's~~ Union's other environmental legislation should be ensured. In particular, during the assessment, planning or licensing procedures for renewable energy installations, Member States should take account of all ~~Community~~ Union environmental legislation and the contribution made by renewable energy sources towards meeting environmental and climate change objectives, in particular when compared to non-renewable energy installations.

↓ 2009/28/EC Recital 45
(adapted)
⇒ new

- (32) National technical specifications and other requirements falling within the scope of Directive ~~98/34/EC~~ (EU) 2015/1535 of the European Parliament and of the Council ²⁶ of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and rules on Information Society services²⁷ relating for example to levels of quality, testing methods or conditions of use, should not create barriers for trade in renewable energy equipment and systems.

²⁶ Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services (OJ L 241, 17.9.2015, p. 1)

²⁷ ~~OJ L 204, 21.7.1998, p. 37.~~

Therefore, support schemes for energy from renewable sources should not prescribe national technical specifications which deviate from existing ~~Community~~ ~~Union~~ standards or require the supported equipment or systems to be certified or tested in a specified location or by a specified entity.

↓ 2009/28/EC Recital 46

~~It is appropriate for Member States to consider mechanisms for the promotion of district heating and cooling from energy from renewable sources.~~

↓ 2009/28/EC Recital 47
(adapted)

- (33) At national and regional level, rules and obligations for minimum requirements for the use of energy from renewable sources in new and renovated buildings have led to considerable increases in the use of energy from renewable sources. Those measures should be encouraged in a wider ~~Community~~ ~~Union~~ context, while promoting the use of more energy-efficient applications of energy from renewable sources through building regulations and codes.

↓ 2009/28/EC Recital 48
(adapted)
⇒ new

- (34) ~~It may be appropriate for Member States, in order to facilitate and accelerate the setting of minimum levels for the use of energy from renewable sources in buildings, to provide that such levels are achieved by incorporating a factor for energy from renewable sources in meeting minimum energy performance requirements under Directive 2002/91/EC, relating to a cost optimal reduction of carbon emissions per building.~~ ⇒ the calculation of those minimum levels in new and existing buildings subject to major renovation should be consistent with the methodology set out in Directive 2010/31/EU of the European Parliament and of the Council²⁸. ⇐

↓ new

- (35) To ensure that national measures for developing renewable heating and cooling are based on comprehensive mapping and analysis of the national renewable and waste energy potential and provide for increased integration of renewable energy and waste heat and cold sources, it is appropriate to require that Member States carry out an assessment of their national potential of renewable energy sources and the use of waste heat and cold for heating and cooling, in particular to facilitate mainstreaming renewable energy in heating and cooling installations and promote efficient and competitive district heating and cooling as defined by Article 2(41) of Directive 2012/27/EU. To ensure consistency with energy efficiency requirements for heating and cooling and reduce administrative burden this assessment should be included in the comprehensive assessments carried out and notified in accordance with Article 14 of Directive 2012/27/EU.

²⁸ Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153, 18.6.2010, p. 13).

↓ 2009/28/EC Recital 41

⇒ new

- (36) The lack of transparent rules and coordination between the different authorisation bodies has been shown to hinder the deployment of energy from renewable sources. ⇒ The establishment of a single administrative contact point integrating or coordinating all permit-granting processes should reduce complexity and increase efficiency and transparency. ⇐ ~~Therefore the specific structure of the renewable energy sector should be taken into account when national, regional and local authorities review their administrative procedures for giving permission to construct and operate plants and associated transmission and distribution network infrastructures for the production of electricity, heating and cooling or transport fuels from renewable energy sources.~~ Administrative approval procedures should be streamlined with transparent timetables for installations using energy from renewable sources. Planning rules and guidelines should be adapted to take into consideration cost-effective and environmentally beneficial renewable heating and cooling and electricity equipment. ⇒ This Directive, in particular the provisions on the organisation and duration of the permit granting process, should apply without prejudice to international and Union law, including provisions to protect the environment and human health. ⇐
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↓ new

- (37) Lengthy administrative procedures constitute a major administrative barrier and are costly. The simplification of permit-granting processes, associated with a clear time-limit for the decision to be taken by the respective authorities regarding the construction of the project should stimulate a more efficient handling of procedures thus reducing administrative costs.
- (38) Another barrier to the cost-effective deployment of renewables is the lack of predictability by investors over the expected deployment of support by Member States. In particular, Member States should ensure that investors have sufficient predictability on the planned use of support by Member States. This allows industry to plan and develop a supply chain, leading to lower overall cost of deployment.
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↓ 2009/28/EC Recital 39

(adapted)

⇒ new

- ~~(39)~~ In order to ~~stimulate~~ ☒ facilitate ☒ the contribution by ⇒ micro, small and medium-sized enterprises (SMEs) and ⇐ individual citizens to the objectives set out in this Directive, ~~the relevant authorities should consider the possibility of replacing authorisations~~ ⇒ should be replaced ⇐ by simple notifications to the competent body ~~when installing small~~ ⇒ for small renewable energy projects, including ⇐ decentralised ⇒ ones such as rooftop solar installations. Given the increasing need for the repowering of existing renewables plants, accelerated permit granting procedures should be set out ⇐ ~~devices for producing energy from renewable sources.~~

↓ 2009/28/EC Recital 49

- (40) Information and training gaps, especially in the heating and cooling sector, should be removed in order to encourage the deployment of energy from renewable sources.
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↓ 2009/28/EC Recital 50

- (41) In so far as the access or pursuit of the profession of installer is a regulated profession, the preconditions for the recognition of professional qualifications are laid down in Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications²⁹ This Directive therefore applies without prejudice to Directive 2005/36/EC.
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↓ 2009/28/EC Recital 51

- (42) While Directive 2005/36/EC lays down requirements for the mutual recognition of professional qualifications, including for architects, there is a further need to ensure that architects and planners properly consider an optimal combination of renewable energy sources and high-efficiency technologies in their plans and designs. Member States should therefore provide clear guidance in this regard. This should be done without prejudice to the provisions of Directive 2005/36/EC and in particular Articles 46 and 49 thereof.
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↓ 2009/28/EC Recital 52
(adapted)

- (43) Guarantees of origin issued for the purpose of this Directive have the sole function of proving showing to a final customer that a given share or quantity of energy was produced from renewable sources. A guarantee of origin can be transferred, independently of the energy to which it relates, from one holder to another. However, with a view to ensuring that a unit of electricity from renewable energy sources is disclosed to a customer only once, double counting and double disclosure of guarantees of origin should be avoided. Energy from renewable sources in relation to which the accompanying guarantee of origin has been sold separately by the producer should not be disclosed or sold to the final customer as energy from renewable sources. ~~It is important to distinguish between green certificates used for support schemes and guarantees of origin.~~
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↓ 2009/28/EC Recital 53
(adapted)
⇒ new

- (44) It is appropriate to allow the emerging consumer market for electricity from renewable energy sources to contribute to the construction ⇒ development ⇐ of new installations for energy from renewable sources. Member States should therefore be able to require electricity suppliers who disclose their energy mix to final customers in accordance with Article X 3(6) of Directive [Market Design]2003/54/EC, ⇒ or who market

²⁹ OJ L 255, 30.9.2005, p. 22.

energy ⇐ to include ⇒ consumers with ⇐ a minimum percentage ⇒ reference to the consumption of energy from renewable sources, to use ⇐ of guarantees of origin from recently constructed installations producing energy from renewable sources, provided that such a requirement is in conformity with Community law.

↓ 2009/28/EC Recital 54
(adapted)
⇒ new

- (45) It is important to provide information on how the supported electricity is allocated to final customers ~~in accordance with Article 3(6) of Directive 2003/54/EC~~. In order to improve the quality of that information to consumers, ~~in particular as regards the amount of energy from renewable sources produced by new installations, the Commission should assess the effectiveness of the measures taken by Member States~~ ⇒ Member States should ensure that guarantees of origin are issued for all units of renewable energy produced. In addition, with a view to avoiding double compensation, renewable energy producers already receiving financial support should not receive guarantees of origin. However, those guarantees of origin should be used for disclosure so that final consumers can receive clear, reliable and adequate evidence on the renewable origin of the relevant units of energy. Moreover, for electricity that received support, the guarantees of origin should be auctioned to the market and the revenues should be used to reduce public subsidies for renewable energy. ⇐
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↓ 2009/28/EC Recital 55
⇒ new

- (46) Directive ~~2004/8/EC~~ 2012/27/EU of the European Parliament and of the Council ~~of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market³⁰~~ provides for guarantees of origin for proving the origin of electricity produced from high-efficiency cogeneration plants. ⇒ However no use is specified for ⇐ ~~Such~~ guarantees of origin ~~cannot~~ ⇒ , so they should also ⇐ be used when disclosing the use of energy from ~~renewable sources in accordance with Article 3(6) of Directive 2003/54/EC as this might result in double counting and double disclosure. 2012/27/EC on energy efficiency provides for guarantees of origin for proving the origin of electricity produced from high efficiency cogeneration plants. However no use is specified for such guarantees of origin cannot, so they should also be used when disclosing the use of energy from renewable sources in accordance with Article 3(6) of Directive 2003/54/EC as this might result in double counting and double disclosure~~ ⇒ high efficiency CHP ⇐.
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↓ 2009/28/EC Recital 56
(adapted)

~~Guarantees of origin do not by themselves confer a right to benefit from national support schemes.~~

³⁰ ~~QJL 52, 21.2.2004, p. 50.~~

↓ new

- (47) Guarantees of origin, which are currently in place for renewable electricity and renewable heating and cooling, should be extended to cover renewable gas. This would provide a consistent means of proving to final customers the origin of renewable gases such as biomethane and would facilitate greater cross-border trade in such gases. It would also enable the creation of guarantees of origin for other renewable gases such as hydrogen.
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↓ 2009/28/EC Recital 57
(adapted)
⇒ new

- (48) There is a need to support the integration of energy from renewable sources into the transmission and distribution grid and the use of energy storage systems for integrated ~~intermittent~~ ⇒ variable ⇐ production of energy from renewable sources, ⇨ in particular as regards the rules regulating dispatch and access to the grid. Directive [Electricity Market Design] lays down the framework for the integration of electricity from renewable energy sources. However, this framework does not include provisions on the integration of gas from renewable energy sources into the gas grid. It is therefore necessary to keep them in this Directive . ⇐
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↓ 2009/28/EC Recital 58

~~The development of renewable energy projects, including renewable energy projects of European interest under the Trans-European Network for Energy (TEN-E) programme should be accelerated. To that end, the Commission should also analyse how the financing of such projects can be improved. Particular attention should be paid to renewable energy projects that will contribute to a significant increase in security of energy supply in the Community and neighbouring countries.~~

↓ 2009/28/EC Recital 3 (adapted)

- (49) The opportunities for establishing economic growth through innovation and a sustainable competitive energy policy have been recognised. Production of energy from renewable sources often depends on local or regional ~~small and medium-sized enterprises~~ (SMEs). The opportunities for growth and employment that investments in regional and local production of energy from renewable sources bring about in the Member States and their regions are important. The Commission and the Member States should therefore support national and regional development measures in those areas, encourage the exchange of best practices in production of energy from renewable sources between local and regional development initiatives and promote the use of structural cohesion policy funding in this area.
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↓ 2009/28/EC Recital 4

- (50) When favouring the development of the market for renewable energy sources, it is necessary to take into account the positive impact on regional and local development

opportunities, export prospects, social cohesion and employment opportunities, in particular as concerns SMEs and independent energy producers.

↓ new

(51) The specific situation of the outermost regions is recognised in Article 349 of the Treaty on the Functioning of the European Union. The energy sector in the outermost regions is often characterised by isolation, limited supply and dependence on fossil fuels while these regions benefit from important local renewable sources of energy. The outermost regions could thus serve as examples of the application of innovative energy technologies for the Union. It is therefore necessary to promote the uptake of renewable energy in order to achieve a higher degree of energy autonomy for those regions and recognise their specific situation in terms of renewable energy potential and public support needs.

↓ 2009/28/EC Recital 6 (adapted)
⇒ new

(52) It is appropriate to ~~support the demonstration and commercialisation phase~~ ⇒ allow for the development ⇐ of decentralised renewable energy technologies ⇐ under non-discriminatory conditions and without hampering the financing of infrastructure investments ⇐. The move towards decentralised energy production has many benefits, including the utilisation of local energy sources, increased local security of energy supply, shorter transport distances and reduced energy transmission losses. Such decentralisation also fosters community development and cohesion by providing income sources and creating jobs locally.

↓ new

(53) With the growing importance of self-consumption of renewable electricity, there is a need for a definition of renewable self-consumers and a regulatory framework which would empower self-consumers to generate, store, consume and sell electricity without facing disproportionate burdens. Collective self-consumption should be allowed in certain cases so that citizens living in apartments for example can benefit from consumer empowerment to the same extent as households in single family homes.

(54) Local citizen participation in renewable energy projects through renewable energy communities has resulted in substantial added value in terms of local acceptance of renewable energy and access to additional private capital. This local involvement will be all the more crucial in a context of increasing renewable energy capacity in the future.

(55) The specific characteristics of local renewable energy communities in terms of size, ownership structure and the number of projects can hamper their competition on equal footing with large-scale players, namely competitors with larger projects or portfolios. Measures to offset those disadvantages include enabling energy communities to operate in the energy system and easing their market integration.

(56) Representing around half of the final energy consumption of the Union, heating and cooling is considered to be a key sector in accelerating the decarbonisation of the energy system. Moreover, it is also a strategic sector in terms of energy security, as it is projected that around 40% of the renewable energy consumption by 2030 should

come from renewable heating and cooling. The absence of a harmonised strategy at Union level, the lack of internalisation of external costs and the fragmentation of heating and cooling markets have led to relatively slow progress in this sector so far.

- (57) Several Member States have implemented measures in the heating and cooling sector to reach their 2020 renewable energy target. However, in the absence of binding national targets post-2020, the remaining national incentives may not be sufficient to reach the long-term decarbonisation goals for 2030 and 2050. In order to be in line with such goals, reinforce investor certainty and foster the development of a Union-wide renewable heating and cooling market, while respecting the energy efficiency first principle, it is appropriate to encourage the effort of Member States in the supply of renewable heating and cooling to contribute to the progressive increase of the share of renewable energy. Given the fragmented nature of some heating and cooling markets, it is of utmost importance to ensure flexibility in designing such an effort. It is also important to ensure that a potential uptake of renewable heating and cooling does not have detrimental environmental side-effects.
- (58) District heating and cooling currently represents around 10% of the heat demand across the Union, with large discrepancies between Member States. The Commission's heating and cooling strategy has recognized the potential for decarbonisation of district heating through increased energy efficiency and renewable energy deployment.
- (59) The Energy Union strategy also recognized the role of the citizen in the energy transition, where citizens take ownership of the energy transition, benefit from new technologies to reduce their bills, and participate actively in the market.
- (60) The potential synergies between an effort to increase the uptake of renewable heating and cooling and the existing schemes under Directives 2010/31/EU and 2012/27/EU should be emphasised. Member States should, to the extent possible, have the possibility to use existing administrative structures to implement such effort, in order to mitigate the administrative burden.
- (61) In the area of district heating, it is therefore crucial to enable the fuel-switching to renewables and prevent regulatory and technology lock-in and technology lock-out through reinforced rights for renewable energy producers and final consumers, and bring the tools to end-consumers to facilitate their choice between the highest energy performance solution that take into account future heating and cooling needs in line with expected building performance criteria.
- (62) The European Strategy for a low-carbon mobility of July 2016 pointed out that food-based biofuels have a limited role in decarbonising the transport sector and should be gradually phased out and replaced by advanced biofuels. To prepare for the transition towards advanced biofuels and minimise the overall indirect land-use change impacts, it is appropriate to reduce the amount of biofuels and bioliquids produced from food and feed crops that can be counted towards the Union target set out in this Directive.
- (63) Directive (EU) 2015/1513 of the European Parliament and of the Council³¹ called on the Commission to present without delay a comprehensive proposal for a cost-effective and technology-neutral post-2020 policy in order to create a long-term perspective for investment in sustainable biofuels with a low risk of causing indirect land-use change and in other means of decarbonising the transport sector. An

³¹ Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources (OJ L 239, 15.9.2015, p. 1).

incorporation obligation on fuel suppliers can provide certainty for investors and encourage the continuous development of alternative renewable transport fuels including advanced biofuels, renewable liquid and gaseous transport fuels of non-biological origin, and renewable electricity in transport. It is appropriate to set the obligation on fuel suppliers at the same level in each Member State in order to ensure consistency in transport fuel specifications and availability. As transport fuels are traded easily, fuel suppliers in Member States with low endowments of the relevant resources should be able to easily obtain renewable fuels from elsewhere.

- (64) Advanced biofuels and other biofuels and biogas produced from feedstock listed in Annex IX, renewable liquid and gaseous transport fuels of non-biological origin, and renewable electricity in transport can contribute to low carbon emissions, stimulating the decarbonisation of the Union transport sector in a cost-effective manner, and improving inter alia energy diversification in the transport sector while promoting innovation, growth and jobs in the Union economy and reducing reliance on energy imports. The incorporation obligation on fuels suppliers should encourage continuous development of advanced fuels, including biofuels, and it is important to ensure that the incorporation obligation also incentivises improvements in the greenhouse gas performance of the fuels supplied to meet it. The Commission should assess the greenhouse gas performance, technical innovation and sustainability of those fuels.
- (65) The promotion of low carbon fossil fuels that are produced from fossil waste streams can also contribute towards the policy objectives of energy diversification and transport decarbonisation. It is therefore appropriate to include those fuels in the incorporation obligation on fuel suppliers.
- (66) Feedstocks which have low indirect land use change impacts when used for biofuels, should be promoted for their contribution to the decarbonisation of the economy. Especially feedstocks for advanced biofuels, for which technology is more innovative and less mature and therefore needs a higher level of support, should be included in an annex to this Directive. In order to ensure that this annex is up to date with the latest technological developments while avoiding unintended negative effects, an evaluation should take place after the adoption of the Directive in order to assess the possibility to extend the annex to new feedstocks.

↓ 2009/28/EC Recital 94

~~Since the measures provided for in Articles 17 to 19 also have an effect on the functioning of the internal market by harmonising the sustainability and greenhouse gas emissions criteria for biofuels and bioliquids for the target accounting purposes under this Directive, and thus facilitate, in accordance with Article 17(8), trade between Member States in biofuels and bioliquids which comply with those conditions, they are based on Article 95 of the Treaty.~~

↓ 2009/28/EC Recital 59

~~Interconnection among countries facilitates integration of electricity from renewable energy sources. Besides smoothing out variability, interconnection can reduce balancing costs, encourage true competition bringing about lower prices, and support the development of networks. Also, the sharing and optimal use of transmission capacity could help avoid excessive need for newly built capacity.~~

↓ 2009/28/EC Recital 60

~~Priority access and guaranteed access for electricity from renewable energy sources are important for integrating renewable energy sources into the internal market in electricity, in line with Article 11(2) and developing further Article 11(3) of Directive 2003/54/EC. Requirements relating to the maintenance of the reliability and safety of the grid and to the dispatching may differ according to the characteristics of the national grid and its secure operation. Priority access to the grid provides an assurance given to connected generators of electricity from renewable energy sources that they will be able to sell and transmit the electricity from renewable energy sources in accordance with connection rules at all times, whenever the source becomes available. In the event that the electricity from renewable energy sources is integrated into the spot market, guaranteed access ensures that all electricity sold and supported obtains access to the grid, allowing the use of a maximum amount of electricity from renewable energy sources from installations connected to the grid. However, this does not imply any obligation on the part of Member States to support or introduce purchase obligations for energy from renewable sources. In other systems, a fixed price is defined for electricity from renewable energy sources, usually in combination with a purchase obligation for the system operator. In such a case, priority access has already been given.~~

↓ 2009/28/EC Recital 61

~~In certain circumstances it is not possible fully to ensure transmission and distribution of electricity produced from renewable energy sources without affecting the reliability or safety of the grid system. In such circumstances it may be appropriate for financial compensation to be given to those producers. Nevertheless, the objectives of this Directive require a sustained increase in the transmission and distribution of electricity produced from renewable energy sources without affecting the reliability or safety of the grid system. To this end, Member States should take appropriate measures in order to allow a higher penetration of electricity from renewable energy sources, inter alia, by taking into account the specificities of variable resources and resources which are not yet storable. To the extent required by the objectives set out in this Directive, the connection of new renewable energy installations should be allowed as soon as possible. In order to accelerate grid connection procedures, Member States may provide for priority connection or reserved connection capacities for new installations producing electricity from renewable energy sources.~~

↓ 2009/28/EC Recital 62
(adapted)

~~(67) — The costs of connecting new producers of electricity and gas from renewable energy sources to the electricity and gas grids should be ☒ based on ☒ objective, transparent and non-discriminatory ☒ criteria ☒ and due account should be taken of the benefit that embedded producers of electricity from renewable energy sources and local producers of gas from renewable sources bring to the electricity and gas grids.~~

↓ 2009/28/EC Recital 63

~~Electricity producers who want to exploit the potential of energy from renewable sources in the peripheral regions of the Community, in particular in island regions and regions of low population density, should, whenever feasible, benefit from reasonable connection costs in~~

~~order to ensure that they are not unfairly disadvantaged in comparison with producers situated in more central, more industrialised and more densely populated areas.~~

↓ 2009/28/EC Recital 64

~~Directive 2001/77/EC lays down the framework for the integration into the grid of electricity from renewable energy sources. However, there is a significant variation between Member States in the degree of integration actually achieved. For this reason it is necessary to strengthen the framework and to review its application periodically at national level.~~

↓ 2009/28/EC Recital 24
(adapted)
⇒ new

(68) In order to exploit the full potential of biomass ⇒ to contribute to the decarbonisation of the economy through its uses for materials and energy ⇐ , the ~~Community~~ ⇔ Union ⇔ and the Member States should promote greater ⇒ sustainable ⇐ mobilisation of existing timber reserves ⇒ and agricultural resources ⇐ and the development of new forestry ⇒ and agriculture production ⇐ systems.

↓ 2009/28/EC Recital 65
(adapted)
⇒ new

(69) ~~Biofuel production should be sustainable.~~ Biofuels ⇒ , bioliquids and biomass fuels should always be produced in a sustainable manner. Biofuels, bioliquids and biomass fuels ⇐ used for compliance with the ⇔ Union ⇔ targets laid down in this Directive, and those ~~that~~ ⇔ which ⇔ benefit from ~~national~~ support schemes, should therefore be required to fulfil sustainability ⇒ and greenhouse gas emissions savings ⇐ criteria.

↓ 2009/28/EC Recital 66
(adapted)
⇒ new

(70) The ~~Community~~ ⇔ Union ⇔ should take appropriate steps in the context of this Directive, including the promotion of sustainability ⇒ and greenhouse gas emissions savings ⇐ criteria for biofuels ⇒ , and for bioliquids and biomass fuels used for heating or cooling and electricity generation ⇐ ~~and the development of second and third generation biofuels in the Community and worldwide, and to strengthen agricultural research and knowledge creation in those areas.~~

↓ 2009/28/EC Recital 67

~~The introduction of sustainability criteria for biofuels will not achieve its objective if those products that do not fulfil the criteria and would otherwise have been used as biofuels are used, instead, as bioliquids in the heating or electricity sectors. For this reason, the sustainability criteria should also apply to bioliquids in general.~~

↓ 2009/28/EC Recital 68
(adapted)

~~(68) The European Council of March 2007 invited the Commission to propose a comprehensive Directive on the use of all renewable energy sources, which could contain criteria and provisions to ensure sustainable provision and use of bioenergy. Such sustainability criteria should form a coherent part of a wider scheme covering all bioliquids and not biofuels alone. Such sustainability criteria should therefore be included in this Directive. In order to ensure a coherent approach between energy and environment policies, and to avoid the additional costs to business and the environmental incoherence that would be associated with an inconsistent approach, it is essential to provide the same sustainability criteria for the use of biofuels for the purposes of this Directive on the one hand, and Directive 98/70/EC on the other. For the same reasons, double reporting should be avoided in this context. Furthermore, the Commission and the competent national authorities should coordinate their activities in the framework of a committee specifically responsible for sustainability aspects. The Commission should, in addition, in 2009, review the possible inclusion of other biomass applications and the modalities relating thereto.~~

↓ 2009/28/EC Recital 69
(adapted)
⇒ new

(71) The ~~increasing worldwide demand~~ ⇒ production of agricultural raw material ⇐ for biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐, and the incentives for their use provided for in this Directive, should not have the effect of encouraging the destruction of biodiverse lands. ~~Those~~ ⊗ Such ⊗ finite resources, recognised in various international instruments to be of value to all mankind, should be preserved. ~~Consumers in the Community would, in addition, find it morally unacceptable that their increased use of biofuels and bioliquids could have the effect of destroying biodiverse lands. For these reasons,~~ It is ⊗ therefore ⊗ necessary to provide sustainability ⇒ and greenhouse gas emissions savings ⇐ criteria ensuring that biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐ ~~can~~ qualify for the incentives only when it ⊗ is ⊗ ~~can be~~ guaranteed that ~~they~~ ⇒ the agricultural raw material ⇐ ~~do~~ ⊗ does ⊗ not originate in biodiverse areas or, in the case of areas designated for nature protection purposes ~~or for the protection of rare, threatened or endangered ecosystems or species, the relevant competent authority demonstrates~~ ⊗ it is demonstrated ⊗ that the production of the ⇒ agricultural ⇐ raw material does not interfere with ~~these~~ ⊗ such ⊗ purposes. ~~The sustainability criteria should consider forest~~ ⊗ Forests should be considered ⊗ as biodiverse ⊗ according to the sustainability criteria, ⊗ where ⊗ they are ⊗ ~~it is a~~ primary ⊗ forests ⊗ ~~forest~~ in accordance with the definition used by the Food and Agriculture Organisation of the United Nations (FAO) in its Global Forest Resource Assessment, ~~which countries use worldwide to report on the extent of primary forest~~ or where ~~it is~~ ⊗ they are ⊗ protected by national nature protection law. Areas where ⊗ the ⊗ collection of non-wood forest products occurs should be ⊗ considered to be biodiverse forests ⊗ ~~included~~, provided the human impact is small. Other types of forests as defined by the FAO, such as modified natural forests, semi-natural forests and plantations, should not be considered as primary forests. Having regard, furthermore, to the highly biodiverse nature of certain grasslands, both temperate and tropical, including highly biodiverse savannahs, steppes, scrublands and prairies, biofuels ⇒, bioliquids and biomass

fuels ⇐ made from ⇒ agricultural ⇐ raw materials originating in such lands should not qualify for the incentives provided for by this Directive. The Commission should establish appropriate criteria ~~and geographical ranges~~ to define such highly biodiverse grasslands in accordance with the best available scientific evidence and relevant international standards.

↓ 2009/28/EC Recital 70

~~If land with high stocks of carbon in its soil or vegetation is converted for the cultivation of raw materials for biofuels or bioliquids, some of the stored carbon will generally be released into the atmosphere, leading to the formation of carbon dioxide. The resulting negative greenhouse gas impact can offset the positive greenhouse gas impact of the biofuels or bioliquids, in some cases by a wide margin. The full carbon effects of such conversion should therefore be accounted for in calculating the greenhouse gas emission saving of particular biofuels and bioliquids. This is necessary to ensure that the greenhouse gas emission saving calculation takes into account the totality of the carbon effects of the use of biofuels and bioliquids.~~

↓ 2009/28/EC Recital 71

~~In calculating the greenhouse gas impact of land conversion, economic operators should be able to use actual values for the carbon stocks associated with the reference land use and the land use after conversion. They should also be able to use standard values. The work of the Intergovernmental Panel on Climate Change is the appropriate basis for such standard values. That work is not currently expressed in a form that is immediately applicable by economic operators. The Commission should therefore produce guidance drawing on that work to serve as the basis for the calculation of carbon stock changes for the purposes of this Directive, including such changes to forested areas with a canopy cover of between 10 to 30 %, savannahs, scrublands and prairies.~~

↓ 2009/28/EC Recital 72

~~It is appropriate for the Commission to develop methodologies with a view to assessing the impact of the drainage of peatlands on greenhouse gas emissions.~~

↓ 2009/28/EC Recital 73

(adapted)

⇒ new

(72) Land should not be converted for the production of ⇒ agricultural raw material for ⇐ biofuels ⇒ , bioliquids and biomass fuels ⇐ if its carbon stock loss upon conversion could not, within a reasonable period, taking into account the urgency of tackling climate change, be compensated by the greenhouse gas emission saving resulting from the production ⇒ and use ⇐ of biofuels, ~~or~~ bioliquids ⇒ and biomass fuels ⇐. This would prevent unnecessary, burdensome research by economic operators and the conversion of high-carbon-stock land that would prove to be ineligible for producing ⇒ agricultural ⇐ raw materials for biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐. Inventories of worldwide carbon stocks indicate that wetlands and continuously forested areas with a canopy cover of more than 30 % should be included in that category. ~~Forested areas with a canopy cover of between 10 and 30 % should also be~~

~~included, unless there is evidence demonstrating that their carbon stock is sufficiently low to justify their conversion in accordance with the rules laid down in this Directive. The reference to wetlands should take into account the definition laid down in the Convention on Wetlands of International Importance, especially as Waterfowl Habitat, adopted on 2 February 1971 in Ramsar.~~

↓ new

- (73) Agricultural feedstock from the production of biofuels, bioliquids and biomass fuels should not be produced on peatland as the cultivation feedstock on peatland would result in significant carbon stock loss if the land was further drained for that purpose while the absence of such drainage cannot be easily verified.
- (74) In the framework of the Common Agricultural Policy Union farmers should comply with a comprehensive set of environmental requirements in order to receive direct support. Compliance with those requirements can be most effectively verified in the context of agricultural policy. Including those requirements in the sustainability scheme is not appropriate as the sustainability criteria for bioenergy should set out rules that are objective and apply globally. Verification of compliance under this Directive would also risk causing unnecessary administrative burden.
- (75) It is appropriate to introduce Union-wide sustainability and greenhouse gas emission saving criteria for biomass fuels used in the electricity and heating and cooling generation, in order to continue to ensure high greenhouse gas savings compared to fossil fuel alternatives, to avoid unintended sustainability impacts, and to promote the internal market.
- (76) To ensure that, despite the growing demand for forest biomass, harvesting is carried out in a sustainable manner in forests where regeneration is ensured, that special attention is given to areas explicitly designated for the protection of biodiversity, landscapes and specific natural elements, that biodiversity resources are preserved and that carbon stocks are tracked, woody raw material should come only from forests that are harvested in accordance with the principles of sustainable forest management developed under international forest processes such as Forest Europe and are implemented through national laws or the best management practices at the forest holding level. Operators should take the appropriate steps in order to minimise the risk of using unsustainable forest biomass for the production of bioenergy. To that end, operators should put in place a risk-based approach. In this context, it is appropriate for the Commission to develop operational guidance on the verification of compliance with the risk based approach, following the consultation of the Energy Union Governance Committee, and the Standing Forestry Committee established by Council Decision 89/367/EEC³².
- (77) In order to minimize the administrative burden, the Union sustainability and greenhouse gas saving criteria should apply only to electricity and heating from biomass fuels produced in installations with a fuel capacity equal or above to 20 MW.
- (78) Biomass fuels should be converted into electricity and heat in an efficient way in order to maximise energy security and greenhouse gas savings, as well as to limit emissions of air pollutants and minimise the pressure on limited biomass resources. For this

³² Council Decision 89/367/EEC of 29 May 1989 setting up a Standing Forestry Committee (OJ L 165, 15.6.1989, p. 14).

reason, public support to installations with a fuel capacity equal to or exceeding 20 MW, if needed, should only be given to highly efficient combined power and heat installations as defined Article 2(34) of Directive 2012/27/EU. Existing support schemes for biomass-based electricity should however be allowed until their due end date for all biomass installations. In addition electricity produced from biomass in new installations with a fuel capacity equal to or exceeding 20 MW should only count towards renewable energy targets and obligations in the case of highly efficient combined power and heat installations. In accordance with State aid rules, Member States should however be allowed to grant public support for the production of renewables to installations, and count the electricity they produce towards renewable energy targets and obligations, in order to avoid an increased reliance on fossil fuels with higher climate and environmental impacts where, after exhausting all technical and economic possibilities to install highly efficient combined heat and power biomass installations, Member States would face a substantiated risk to security of supply of electricity..

(79) The minimum greenhouse gas emission savings threshold for biofuels and bioliquids produced in new installations should be increased in order to improve their overall greenhouse gas balance as well as to discourage further investments in installations with a low greenhouse gas emission savings performance. This increase provides investment safeguards for biofuels and bioliquids production capacities.

(80) Based on experience in the practical implementation of the Union sustainability criteria, it is appropriate to strengthen the role of voluntary international and national certification schemes for verification of compliance with the sustainability criteria in a harmonised manner.

↓ 2009/28/EC Recital 74

~~The incentives provided for in this Directive will encourage increased production of biofuels and bioliquids worldwide. Where biofuels and bioliquids are made from raw material produced within the Community, they should also comply with Community environmental requirements for agriculture, including those concerning the protection of groundwater and surface water quality, and with social requirements. However, there is a concern that production of biofuels and bioliquids in certain third countries might not respect minimum environmental or social requirements. It is therefore appropriate to encourage the development of multilateral and bilateral agreements and voluntary international or national schemes that cover key environmental and social considerations, in order to promote the production of biofuels and bioliquids worldwide in a sustainable manner. In the absence of such agreements or schemes, Member States should require economic operators to report on those issues.~~

↓ 2009/28/EC Recital 75

~~The requirements for a sustainability scheme for energy uses of biomass, other than bioliquids and biofuels, should be analysed by the Commission in 2009, taking into account the need for biomass resources to be managed in a sustainable manner.~~

↓ 2009/28/EC Recital 76

~~Sustainability criteria will be effective only if they lead to changes in the behaviour of market actors. Those changes will occur only if biofuels and bioliquids meeting those criteria command a price premium compared to those that do not. According to the mass balance method of verifying compliance, there is a physical link between the production of biofuels and bioliquids meeting the sustainability criteria and the consumption of biofuels and bioliquids in the Community, providing an appropriate balance between supply and demand and ensuring a price premium that is greater than in systems where there is no such link. To ensure that biofuels and bioliquids meeting the sustainability criteria can be sold at a higher price, the mass balance method should therefore be used to verify compliance. This should maintain the integrity of the system while at the same time avoiding the imposition of an unreasonable burden on industry. Other verification methods should, however, be reviewed.~~

↓ 2009/28/EC Recital 77

~~Where appropriate, the Commission should take due account of the Millennium Ecosystem Assessment which contains useful data for the conservation of at least those areas that provide basic ecosystem services in critical situations such as watershed protection and erosion control.~~

↓ 2009/28/EC Recital 78

~~It is appropriate to monitor the impact of biomass cultivation, such as through land use changes, including displacement, the introduction of invasive alien species and other effects on biodiversity, and effects on food production and local prosperity. The Commission should consider all relevant sources of information, including the FAO hunger map. Biofuels should be promoted in a manner that encourages greater agricultural productivity and the use of degraded land.~~

↓ 2009/28/EC Recital 79
(adapted)
⇒ new

(81) It is in the interests of the ~~Community~~ ☒ Union ☒ to encourage the development of ~~multilateral and bilateral agreements and~~ voluntary international or national schemes that set standards for the production of sustainable biofuels, ~~and~~ bioliquids ⇒ , and biomass fuels ⇐ and that certify that the production of biofuels, ~~and~~ bioliquids ⇒ , and biomass fuels ⇐ meets those standards. For that reason, provision should be made for ~~such agreements or schemes~~ ☒ should ☒ to be recognised as providing reliable evidence and data, ☒ where ☒ ~~provided that~~ they meet adequate standards of reliability, transparency and independent auditing. ⇒ In order to ensure that the compliance with the sustainability and greenhouse gas emissions savings criteria is verified in a robust and harmonised manner and in particular to prevent fraud, the Commission should be empowered to set out detailed implementing rules, including adequate standards of reliability, transparency and independent auditing to be applied by the voluntary schemes. ⇐

↓ new

(82) Voluntary schemes play an increasingly important role in providing evidence of compliance with the sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels. It is therefore appropriate for the Commission to require voluntary schemes, including those already recognised by the Commission, to report regularly on their activity. Such reports should be made public in order to increase transparency and to improve supervision by the Commission. Furthermore, such reporting would provide the necessary information for the Commission to report on the operation of the voluntary schemes with a view to identifying best practice and submitting, if appropriate, a proposal to further promote such best practice.

(83) To facilitate the functioning of the internal market, evidence regarding the sustainability and greenhouse gas emissions criteria for biomass for energy that has been obtained in accordance with a scheme that has been recognised by the Commission should be accepted in all Member States. Member States should contribute towards ensuring the correct implementation of the certification principles of voluntary schemes by supervising the operation of certification bodies that are accredited by the national accreditation body and by informing the voluntary schemes about relevant observations.

↓ 2009/28/EC Recital 80

~~It is necessary to lay down clear rules for the calculation of greenhouse gas emissions from biofuels and bioliquids and their fossil fuel comparators.~~

↓ 2009/28/EC Recital 81

~~Co-products from the production and use of fuels should be taken into account in the calculation of greenhouse gas emissions. The substitution method is appropriate for the purposes of policy analysis, but not for the regulation of individual economic operators and individual consignments of transport fuels. In those cases the energy allocation method is the most appropriate method, as it is easy to apply, is predictable over time, minimises counter-productive incentives and produces results that are generally comparable with those produced by the substitution method. For the purposes of policy analysis the Commission should also, in its reporting, present results using the substitution method.~~

↓ 2009/28/EC Recital 82

(adapted)

⇒ new

(84) In order to avoid a disproportionate administrative burden, a list of default values should be laid down for common biofuel ⇒, bioliquid and biomass fuel ⇐ production pathways and that list should be updated and expanded when further reliable data is available. Economic operators should always be entitled to claim the level of greenhouse gas emission saving for biofuels, and bioliquids ⇒ and biomass fuels ⇐ established by that list. Where the default value for greenhouse gas emission saving from a production pathway lies below the required minimum level of greenhouse gas emission saving, producers wishing to demonstrate their compliance with this

minimum level should be required to show that actual emissions from their production process are lower than those that were assumed in the calculation of the default values.

↓ new

- (85) It is necessary to lay down clear rules for the calculation of greenhouse gas emission savings from biofuels, bioliquids and biomass fuels and their fossil fuel comparators.
- (86) In accordance with the current technical and scientific knowledge, the greenhouse gas accounting methodology should take into account the transformation of the solid and gaseous biomass fuels into final energy in order to be consistent with the calculation of renewable energy for the purposes of counting towards the Union target laid down in this Directive. The allocation of emissions to co-products, as distinct from wastes and residues, should also be reviewed in cases where electricity and/or heating and cooling are produced in co-generation or multi-generation plants.
- (87) To ensure consistency and comparability of greenhouse gas savings of biomass fuels for heating and cooling, and electricity generation in different Member States, it is appropriate to apply a fossil fuel comparator based on average Union emissions in the heating and electricity sectors.
- (88) If land with high stocks of carbon in its soil or vegetation is converted for the cultivation of raw materials for biofuels, bioliquids and biomass fuels, some of the stored carbon will generally be released into the atmosphere, leading to the formation of carbon dioxide. The resulting negative greenhouse gas impact can offset the positive greenhouse gas impact of the biofuels, bioliquids or biomass fuels, in some cases by a wide margin. The full carbon effects of such conversion should therefore be taken into account in calculating the greenhouse gas emission saving of particular biofuels, bioliquids and biomass fuels. This is necessary to ensure that the greenhouse gas emission saving calculation takes into account the totality of the carbon effects of the use of biofuels, bioliquids and biomass fuels.
- (89) In calculating the greenhouse gas impact of land conversion, economic operators should be able to use actual values for the carbon stocks associated with the reference land use and the land use after conversion. They should also be able to use standard values. The methodology of the Intergovernmental Panel on Climate Change is the appropriate basis for such standard values. That work is not currently expressed in a form that is immediately applicable by economic operators. The Commission should therefore revise the guidelines of 10 June 2010 for the calculation of land carbon stocks for the purpose of Annex V to this Directive, while ensuring coherence with Regulation (EU) No 525/2013 of the European Parliament and of the Council³³.
- (90) Co-products from the production and use of fuels should be taken into account in the calculation of greenhouse gas emissions. The substitution method is appropriate for the purposes of policy analysis, but not for the regulation of individual economic operators and individual consignments of transport fuels. In those cases the energy allocation method is the most appropriate method, as it is easy to apply, is predictable over time, minimises counter-productive incentives and produces results that are generally comparable with those produced by the substitution method. For the

³³ Regulation No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC (OJ L 165, 18.6.2013, p. 13)

purposes of policy analysis the Commission should also, in its reporting, present results using the substitution method.

- (91) Co-products are different from residues and agricultural residues, as they are the primary aim of the production process. It is therefore appropriate to clarify that agricultural crop residues are residues and not co-products. This has no implications on the existing methodology but clarifies the existing provisions.
- (92) The established method of using energy allocation as a rule for dividing greenhouse gas emissions between co-products has worked well and should be continued. It is appropriate to align the methodology for calculating greenhouse gas emissions coming from the use of cogeneration of heat and electricity (CHP) when the CHP is used in processing biofuels, bioliquids and biomass fuels to the methodology applied to a CHP being the end use.
- (93) The methodology takes into account the reduced greenhouse gas emissions arising from the use of CHP, compared to the use of electricity- and heat-only plants, by taking into account the utility of heat compared to electricity, and the utility of heat at different temperatures. It follows that higher temperature should bear a larger part of the total greenhouse gas emissions, than heat at low temperature, when the heat is co-produced with electricity. The methodology takes into account the whole pathway to final energy, including conversion to heat or electricity.

↓ 2009/28/EC Recital 84

~~In order to avoid encouraging the cultivation of raw materials for biofuels and bioliquids in places where this would lead to high greenhouse gas emissions, the use of default values for cultivation should be limited to regions where such an effect can reliably be ruled out. However, to avoid a disproportionate administrative burden, it is appropriate for Member States to establish national or regional averages for emissions from cultivation, including from fertiliser use.~~

↓ 2009/28/EC Recital 83
(adapted)

- (94) It is appropriate for the data used in the calculation of the default values to be obtained from independent, scientifically expert sources and to be updated as appropriate as those sources progress their work. The Commission should encourage those sources to address, when they update their work, emissions from cultivation, the effect of regional and climatological conditions, the effects of cultivation using sustainable agricultural and organic farming methods, and the scientific contribution of producers, within the ~~Community~~ ☒ Union ☒ and in third countries, and civil society.

↓ 2009/28/EC Recital 85
(adapted)
⇒ new

- (95) Global demand for agricultural commodities is growing. Part of that increased demand will be met through an increase in the amount of land devoted to agriculture. The restoration of land that has been severely degraded ~~or heavily contaminated~~ and therefore cannot be used, in its present state, for agricultural purposes is a way of increasing the amount of land available for cultivation. The sustainability scheme

should promote the use of restored degraded land because the promotion of biofuels, ~~and~~ ~~and~~ ~~bioliquids~~ ⇨ and biomass fuels ⇩ will contribute to the growth in demand for agricultural commodities. ~~Even if biofuels themselves are made using raw materials from land already in arable use, the net increase in demand for crops caused by the promotion of biofuels could lead to a net increase in the cropped area. This could affect high carbon stock land, which would result in damaging carbon stock losses. To alleviate that risk, it is appropriate to introduce accompanying measures to encourage an increased rate of productivity on land already used for crops, the use of degraded land, and the adoption of sustainability requirements, comparable to those laid down in this Directive for Community biofuel consumption, in other biofuel-consuming countries. The Commission should develop a concrete methodology to minimise greenhouse gas emissions caused by indirect land use changes. To this end, the Commission should analyse, on the basis of best available scientific evidence, in particular, the inclusion of a factor for indirect land use changes in the calculation of greenhouse gas emissions and the need to incentivise sustainable biofuels which minimise the impacts of land use change and improve biofuel sustainability with respect to indirect land use change. In developing that methodology, the Commission should address, inter alia, the potential indirect land use changes resulting from biofuels produced from non-food cellulosic material and from ligno-cellulosic material.~~

↓ 2009/28/EC Recital 86

~~In order to permit the achievement of an adequate market share of biofuels, it is necessary to ensure the placing on the market of higher blends of biodiesel in diesel than those envisaged by standard EN590/2004.~~

↓ 2009/28/EC Recital 87

~~In order to ensure that biofuels that diversify the range of feedstocks used become commercially viable, those biofuels should receive an extra weighting under national biofuel obligations.~~

↓ 2009/28/EC Recital 88

~~Regular reporting is needed to ensure a continuing focus on progress in the development of energy from renewable sources at national and Community level. It is appropriate to require the use of a harmonised template for national renewable energy action plans which Member States should submit. Such plans could include estimated costs and benefits of the measures envisaged, measures relating to the necessary extension or reinforcement of the existing grid infrastructure, estimated costs and benefits to develop energy from renewable sources in excess of the level required by the indicative trajectory, information on national support schemes and information on their use of energy from renewable sources in new or renovated buildings.~~

↓ 2009/28/EC Recital 89

~~When designing their support systems, Member States may encourage the use of biofuels which give additional benefits, including the benefits of diversification offered by biofuels made from waste, residues, non-food cellulosic material, ligno-cellulosic material and algae,~~

~~as well as non-irrigated plants grown in arid areas to fight desertification, by taking due account of the different costs of producing energy from traditional biofuels on the one hand and of those biofuels that give additional benefits on the other. Member States may encourage investment in research and development in relation to those and other renewable energy technologies that need time to become competitive.~~

↓ new

(96) In order to ensure a harmonised implementation of the greenhouse gas emissions calculation methodology and to align to the latest scientific evidence the Commission should be empowered to adapt the methodological principles and values necessary for assessing whether greenhouse gas emissions savings criteria have been fulfilled and to decide that reports submitted by Member States and third countries contain accurate data on cultivation emissions of feedstock.

↓ 2009/28/EC Recital 22
(adapted)

(97) The achievement of the objectives of this Directive requires that the ~~Community~~ Union and Member States dedicate a significant amount of financial resources to research and development in relation to renewable energy technologies. In particular, the European Institute of Innovation and Technology should give high priority to the research and development of renewable energy technologies.

↓ 2009/28/EC Recital 90

(98) The implementation of this Directive should reflect, where relevant, the provisions of the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, in particular as implemented through Directive 2003/4/EC of the European Parliament and of the Council ~~of 28 January 2003 on public access to environmental information~~³⁴.

↓ new

(99) In order to amend or supplement non-essential elements of the provisions of this Directive, the power to adopt acts in accordance with Article 290 of the Treaty on the Functioning of the European Union should be delegated to the Commission in respect of the list of feedstocks for the production of advanced biofuels, the contribution of which towards the fuel suppliers' obligation in transport is limited; the adaptation of the energy content of transport fuels to scientific and technical progress; the methodology to determine the share of biofuel resulting from biomass being processed with fossil fuels in a common process; the implementation of agreements on mutual recognition of guarantees of origin; the establishment of rules to monitor the functioning of the system of guarantees of origin; and the rules for calculating the greenhouse gas impact of biofuels, bioliquids and their fossil fuel comparators. It is of particular importance that the Commission carry out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in accordance with the principles laid down in the Interinstitutional

³⁴ OJ L 41, 14.2.2003, p. 26.

Agreement of 13 April 2016 on Better Law-Making. In particular, to ensure equal participation in the preparation of delegated acts, the European Parliament and the Council receive all documents at the same time as Member States' experts, and their experts systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts.

↓ 2009/28/EC Recital 91
(adapted)
⇒ new

- (100) The measures necessary for the implementation of this Directive should be adopted in accordance with ~~Council Decision 1999/468/EC of 28 June 1999~~ ⇒ Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 ⇐ ~~laying down the procedures for the exercise of implementing powers conferred on the Commission~~³⁵

↓ 2009/28/EC Recital 92

~~In particular, the Commission should be empowered to adapt the methodological principles and values necessary for assessing whether sustainability criteria have been fulfilled in relation to biofuels and bioliquids, to adapt the energy content of transport fuels to technical and scientific progress, to establish criteria and geographic ranges for determining highly biodiverse grassland, and to establish detailed definitions for severely degraded or contaminated land. Since those measures are of general scope and are designed to amend non-essential elements of this Directive, inter alia, by supplementing it with new non-essential elements, they must be adopted in accordance with the regulatory procedure with scrutiny provided for in Article 5a of Decision 1999/468/EC.~~

↓ 2009/28/EC Recital 93

~~Those provisions of Directive 2001/77/EC and Directive 2003/30/EC that overlap with the provisions of this Directive should be deleted from the latest possible moment for transposition of this Directive. Those that deal with targets and reporting for 2010 should remain in force until the end of 2011. It is therefore necessary to amend Directive 2001/77/EC and Directive 2003/30/EC accordingly.~~

↓ 2009/28/EC Recital 95

~~The sustainability scheme should not prevent Member States from taking into account, in their national support schemes, the higher production cost of biofuels and bioliquids that deliver benefits that exceed the minima laid down in the sustainability scheme.~~

↓ 2009/28/EC Recital 96
(adapted)
⇒ new

- (101) Since the ~~general~~ objectives of this Directive, namely to achieve a ~~20 %~~ ⇒ at least 27% ⇐ share of energy from renewable sources in the ~~Community's~~ ⇔ Union's ⇔

³⁵ ~~OJL 184, 17.7.1999, p. 23~~

gross final consumption of energy and a 10 % share of energy from renewable sources in each Member State's transport energy consumption by 2020 \Rightarrow 2030 \Leftarrow , cannot be sufficiently achieved by the Member States and \boxtimes but \boxtimes can therefore \boxtimes rather \boxtimes , by reason of the scale of the action, be better achieved at Community \boxtimes Union \boxtimes level, the Community \boxtimes Union \boxtimes may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty \boxtimes on European Union \boxtimes . In accordance with the principle of proportionality, as set out in that Article, this Directive does not go beyond what is necessary in order to achieve those objectives.

↓ 2009/28/EC Recital 97

~~In accordance with point 34 of the Interinstitutional agreement on better law making³⁶, Member States are encouraged to draw up, for themselves and in the interest of the Community, their own tables illustrating, as far as possible, the correlation between this Directive and the transposition measures and to make them public,~~

↓ new

(102) The obligation to transpose this Directive into national law should be confined to those provisions which represent a substantive amendment as compared to the earlier Directive. The obligation to transpose provisions which are unchanged arises under the earlier Directive.

(103) In accordance with the Joint Political Declaration of Member States and the Commission on explanatory documents of 28 September 2011 \Rightarrow ³⁷ \Leftarrow , Member States have undertaken to accompany, in justified cases, the notification of their transposition measures with one or more documents explaining the relationship between the components of a directive and the corresponding parts of national transposition instruments.

(104) This Directive should be without prejudice to the obligations of the Member States relating to the time-limit for the transposition into national law of the Directives set out in part B of Annex XI.

↓ 2009/28/EC (adapted)
 \Rightarrow new

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Subject-matter and scope

This Directive establishes a common framework for the promotion of energy from renewable sources. It sets \boxtimes a binding \boxtimes mandatory national \Rightarrow Union \Leftarrow targets for the overall share of energy from renewable sources in gross final consumption of energy \Rightarrow in 2030 \Leftarrow and for the share of energy from renewable sources in transport. It \boxtimes also \boxtimes lays down rules \boxtimes on \boxtimes relating to statistical transfers between Member States, joint projects \Rightarrow financial support to electricity produced from renewable sources, self-consumption of renewable

³⁶ OJ C 321, 31.12.2003, p. 1.

³⁷ OJ C 369, 17.12.2011, p. 14.

electricity, and renewable energy use in the heating and cooling and transport sectors, regional cooperation ⇄ between Member States and with third countries, guarantees of origin, administrative procedures, ⇄ and ⇄ information and training, and access to the electricity grid for energy from renewable sources. It establishes sustainability ⇄ and greenhouse gas emissions saving ⇄ criteria for biofuels, and bioliquids ⇄ and biomass fuels ⇄.

↓ 2009/28/EC Article 2 (adapted)
⇄ new

Article 2

Definitions

For the purposes of this Directive, the definitions in Directive ~~2003/54/EC~~ 2009/72/EC apply.

The following definitions also apply:

(a) 'energy from renewable sources' means energy from renewable non-fossil sources, namely wind, solar ⇄ (solar thermal and solar photovoltaic) and ⇄, ~~aerothermal~~, geothermal, ⇄ energy ⇄ ~~hydrothermal and~~ ⇄, ambient heat, tide, wave and other ⇄ ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases;

↓ new

(b) 'ambient heat' means heat energy at a useful temperature level which is extracted or captured by means of heat pumps that need electricity or other auxiliary energy to function, and which can be stored in the ambient air, beneath the surface of solid earth or in surface water. The reported values shall be established on the basis of the same methodology used for the reporting of heat energy extracted or captured by heat pumps;

↓ 2009/28/EC Article 2 (adapted)
⇄ new

~~(b) 'aerothermal energy' means energy stored in the form of heat in the ambient air;~~

~~(c) 'geothermal energy' means energy stored in the form of heat beneath the surface of solid earth;~~

~~(d) 'hydrothermal energy' means energy stored in the form of heat in surface water;~~

(~~e~~c) 'biomass' means the biodegradable fraction of products, waste and residues from biological origin from agriculture, ~~(including vegetal and animal substances)~~, forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of ⇄ waste, including ⇄ industrial and municipal waste ⇄ of biological origin ⇄;

(~~f~~d) 'gross final consumption of energy' means the energy commodities delivered for energy purposes to industry, transport, households, services including public services, agriculture, forestry and fisheries, including the consumption of electricity and heat by the energy branch for electricity and heat production and including losses of electricity and heat in distribution and transmission;

(~~ee~~) ‘district heating’ or ‘district cooling’ means the distribution of thermal energy in the form of steam, hot water or chilled liquids, from a central source of production through a network to multiple buildings or sites, for the use of space or process heating or cooling;

(~~ef~~) ‘bioliquids’ means liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass;

(~~eg~~) ‘biofuels’ means liquid ~~or gaseous~~ fuel for transport produced from biomass;

(~~eh~~) ‘guarantee of origin’ means an electronic document which has the sole function of providing proof to a final customer that a given share or quantity of energy was produced from renewable sources ~~as required by Article 3(6) of Directive 2003/54/EC~~;

(~~ei~~) ‘support scheme’ means any instrument, scheme or mechanism applied by a Member State or a group of Member States, that promotes the use of energy from renewable sources by reducing the cost of that energy, increasing the price at which it can be sold, or increasing, by means of a renewable energy obligation or otherwise, the volume of such energy purchased. This includes, but is not restricted to, investment aid, tax exemptions or reductions, tax refunds, renewable energy obligation support schemes including those using green certificates, and direct price support schemes including feed-in tariffs and premium payments;

(~~ej~~) ‘renewable energy obligation’ means a ~~national~~ support scheme requiring energy producers to include a given proportion of energy from renewable sources in their production, requiring energy suppliers to include a given proportion of energy from renewable sources in their supply, or requiring energy consumers to include a given proportion of energy from renewable sources in their consumption. This includes schemes under which such requirements may be fulfilled by using green certificates;

(~~ek~~) ‘actual value’ means the greenhouse gas emission saving for some or all of the steps of a specific biofuel production process calculated in accordance with the methodology laid down in part C of Annex V;

(~~el~~) ‘typical value’ means an estimate of the ~~representative~~ greenhouse gas ~~emissions and~~ emission saving for a particular biofuel ~~emissions and~~ , bioliquid or biomass fuel ~~emissions and~~ production pathway ~~emissions and~~ , which is representative of the Union consumption ~~emissions and~~ ;

(~~em~~) ‘default value’ means a value derived from a typical value by the application of pre-determined factors and that may, in circumstances specified in this Directive, be used in place of an actual value;

(~~en~~) ‘waste’ shall be defined as in Article 3(1) of Directive 2008/98/EC of the European Parliament and of the Council³⁸; substances that have been intentionally modified or contaminated to meet that definition are not covered by this definition;

(~~eo~~) ‘starch-rich crops’ means crops comprising mainly cereals (regardless of whether only the grains are used, or the whole plant, such as in the case of green maize, is used), tubers and root crops (such as potatoes, Jerusalem artichokes, sweet potatoes, cassava and yams), and corm crops (such as taro and cocoyam);

³⁸

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 22.11.2008, p. 3).

(~~ep~~) 'ligno-cellulosic material' means material composed of lignin, cellulose and hemicellulose such as biomass sourced from forests, woody energy crops and forest-based industries' residues and wastes;

(~~sq~~) 'non-food cellulosic material' means feedstocks mainly composed of cellulose and hemicellulose, and having a lower lignin content than ligno-cellulosic material; it includes food and feed crop residues (such as straw, stover, husks and shells), grassy energy crops with a low starch content (such as ryegrass, switchgrass, miscanthus, giant cane and cover crops before and after main crops), industrial residues (including from food and feed crops after vegetal oils, sugars, starches and protein have been extracted), and material from biowaste;

(~~tr~~) 'processing residue' means a substance that is not the end product(s) that a production process directly seeks to produce; it is not a primary aim of the production process and the process has not been deliberately modified to produce it;

(~~rs~~) 'renewable liquid and gaseous transport fuels of non-biological origin' means liquid or gaseous fuels other than biofuels whose energy content comes from renewable energy sources other than biomass, and which are used in transport;

(~~at~~) 'agricultural, aquaculture, fisheries and forestry residues' means residues that are directly generated by agriculture, aquaculture, fisheries and forestry; they do not include residues from related industries or processing;

(~~wu~~) 'low indirect land-use change-risk biofuels and bioliquids' means biofuels and bioliquids, the feedstocks of which were produced within schemes which reduce the displacement of production for purposes other than for making biofuels and bioliquids and which were produced in accordance with the sustainability criteria for biofuels and bioliquids set out in Article ~~17~~ 26;.

↓ new

(x) 'distribution system operator' shall be defined as in Article 2(6) of Directive 2009/72/EC;

(y) 'waste heat or cold' means heat or cold which is generated as by-product in industrial or power generation installations and which would be dissipated unused in air or water without access to a district heating or cooling system;

(z) 'repowering' means renewing power plants producing renewable energy, including the full or partial replacement of installations or operation systems and equipment, in order to replace capacity or increase efficiency;

(aa) 'renewable self-consumer' means an active customer as defined in Directive [MDI Directive] who consumes and may store and sell renewable electricity which is generated within his or its premises, including a multi-apartment block, a commercial or shared services site or a closed distribution system, provided that, for non-household renewable self-consumers, those activities do not constitute their primary commercial or professional activity;

(bb) 'renewable self-consumption' means the generation and consumption, and, where applicable, storage, of renewable electricity by renewable self-consumers;

(cc) 'power purchase agreement' means a contract under which a legal person agrees to purchase renewable electricity directly from an energy generator;

- (dd) 'food and feed crops' means starch-rich crops, sugars and oil crops produced on agricultural land as a main crop excluding residues, waste or ligno-cellulosic material;
- (ee) 'advanced biofuels' means biofuels that are produced from feedstocks listed in part A of Annex IX;
- (ff) 'waste-based fossil fuels' means liquid and gaseous fuels produced from waste streams of non-renewable origin, including waste processing gases and exhaust gases;
- (gg) 'fuel supplier' means the entity supplying fuel to the market responsible for passing fuel or energy through an excise duty point or, where no excise is due, any other relevant entity designated by a Member State;
- (hh) 'agricultural biomass' means biomass produced from agriculture;
- (ii) 'forest biomass' means biomass produced from forestry;
- (jj) 'harvesting permit' means an official document giving the right to harvest the forest biomass;
- (kk) 'SME' means a micro, small or medium sized enterprise as defined in Commission Recommendation 2003/361/EC⁽³⁹⁾;
- (ll) 'forest regeneration' means the re-establishment of a forest stand by natural or artificial means following the removal of the previous stand by felling or as a result of natural causes, including fire or storm;
- (mm) 'forest holding' means one or more parcels of forest and other wooded land which constitute a single unit from the point of view of management or utilisation;
- (nn) 'biowaste' means biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from the food processing industry;
- (oo) 'residual energy mix' means the total annual energy mix for a Member State, excluding the share covered by the cancelled guarantees of origin;
- (pp) 'biomass fuels' means gaseous and solid fuels produced from biomass;
- (qq) 'biogas' means gaseous fuels produced from biomass;
- (rr) 'opened tender' means a tender procedure for the installation of renewable energy plants organised by a Member State and opened for bids from projects located in one or several other Member States;
- (ss) 'joint tender' means a tender procedure for the installation of renewable energy plants jointly designed and organised by two or more Member States, that is open to projects located in all Member States involved;
- (tt) 'opened certificate scheme' means a certificate scheme implemented by a Member State, that is open to installations located in one or several other Member States;
- (uu) 'financial instruments' means financial instruments as defined in the Financial Regulation.

³⁹ Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (OJ L 124, 20.5.2003, p. 36)

↓ 2009/28/EC

~~Article 3~~

~~Mandatory national overall targets and measures for the use of energy from renewable sources~~

~~1. Each Member State shall ensure that the share of energy from renewable sources, calculated in accordance with Articles 5 to 11, in gross final consumption of energy in 2020 is at least its national overall target for the share of energy from renewable sources in that year, as set out in the third column of the table in part A of Annex I. Such mandatory national overall targets are consistent with a target of at least a 20 % share of energy from renewable sources in the Community's gross final consumption of energy in 2020. In order to achieve the targets laid down in this Article more easily, each Member State shall promote and encourage energy efficiency and energy saving.~~

↓ 2015/1513 Art. 2.2(a)

~~For the purpose of compliance with the targets referred to in the first subparagraph of this paragraph, the maximum joint contribution from biofuels and bioliquids produced from cereal and other starch rich crops, sugars and oil crops and from crops grown as main crops primarily for energy purposes on agricultural land shall be no more than the energy quantity corresponding to the maximum contribution as set out in paragraph 4(d).~~

↓ 2009/28/EC

~~2. Member States shall introduce measures effectively designed to ensure that the share of energy from renewable sources equals or exceeds that shown in the indicative trajectory set out in part B of Annex I.~~

~~3. In order to reach the targets set in paragraphs 1 and 2 of this Article Member States may, inter alia, apply the following measures:~~

~~(a) support schemes;~~

~~(b) measures of cooperation between different Member States and with third countries for achieving their national overall targets in accordance with Articles 5 to 11.~~

~~Without prejudice to Articles 87 and 88 of the Treaty, Member States shall have the right to decide, in accordance with Articles 5 to 11 of this Directive, to which extent they support energy from renewable sources which is produced in a different Member State.~~

~~4. Each Member State shall ensure that the share of energy from renewable sources in all forms of transport in 2020 is at least 10 % of the final consumption of energy in transport in that Member State.~~

~~For the purposes of this paragraph, the following provisions shall apply:~~

↓ 2015/1513 Art. 2.2(b)

~~(a) for the calculation of the denominator, that is the total amount of energy consumed in transport for the purposes of the first subparagraph, only petrol, diesel, biofuels consumed in road and rail transport, and electricity, including electricity~~

~~used for the production of renewable liquid and gaseous transport fuels of non-biological origin, shall be taken into account;~~

↓ 2009/28/EC
→₁ 2015/1513 Art. 2.2(b)

~~(b) for the calculation of the numerator, that is the amount of energy from renewable sources consumed in transport for the purposes of the first subparagraph, all types of energy from renewable sources consumed in all forms of transport shall be taken into account. →₁ This point shall be without prejudice to point (d) of this paragraph and Article 17(1)(a); ←~~

↓ 2015/1513 Art. 2.2(b)

~~(c) for the calculation of the contribution from electricity produced from renewable sources and consumed in all types of electric vehicles and for the production of renewable liquid and gaseous transport fuels of non-biological origin for the purpose of points (a) and (b), Member States may choose to use either the average share of electricity from renewable energy sources in the Union or the share of electricity from renewable energy sources in their own country as measured two years before the year in question. Furthermore, for the calculation of the electricity from renewable energy sources consumed by electrified rail transport, that consumption shall be considered to be 2,5 times the energy content of the input of electricity from renewable energy sources. For the calculation of the electricity from renewable energy sources consumed by electric road vehicles in point (b), that consumption shall be considered to be five times the energy content of the input of electricity from renewable energy sources;~~

↓ 2015/1513 Art. 2.2(b)

~~(d) for the calculation of biofuels in the numerator, the share of energy from biofuels produced from cereal and other starch-rich crops, sugars and oil crops and from crops grown as main crops primarily for energy purposes on agricultural land shall be no more than 7 % of the final consumption of energy in transport in the Member States in 2020.~~

~~Biofuels produced from feedstocks listed in Annex IX shall not count towards the limit set out in the first subparagraph of this point.~~

~~Member States may decide that the share of energy from biofuels produced from crops grown as main crops primarily for energy purposes on agricultural land, other than cereal and other starch-rich crops, sugars and oil crops, does not count towards the limit set out in the first subparagraph of this point, provided that:~~

~~(i) verification of compliance with the sustainability criteria set out in Article 17(2) to (5) was carried out in accordance with Article 18; and~~

~~(ii) those crops were grown on land that falls under point 8 of part C of Annex V and the corresponding bonus 'e_B' set out in point 7 of part C of Annex V was included in the calculation of greenhouse gas emissions, for the purposes of showing compliance with Article 17(2).~~

~~(c) each Member State shall seek to achieve the objective of there being a minimum level of consumption on their territory of biofuels produced from feedstocks and of other fuels, listed in part A of Annex IX. To that effect, by 6 April 2017, each Member State shall set a national target, which it shall endeavour to achieve. A reference value for this target is 0,5 percentage points in energy content of the share of energy from renewable sources in all forms of transport in 2020 referred to in the first subparagraph, to be met with biofuels produced from feedstocks and with other fuels, listed in part A of Annex IX. In addition, biofuels made from feedstocks not listed in Annex IX that were determined to be wastes, residues, non-food cellulosic material or ligno-cellulosic material by the competent national authorities and are used in existing installations prior to the adoption of Directive (EU) 2015/1513 of the European Parliament and of the Council⁴⁰, may be counted towards the national target.~~

~~Member States may set a national target lower than the reference value of 0,5 percentage points, based on one or more of the following grounds:~~

~~(i) objective factors such as the limited potential for the sustainable production of biofuels produced from feedstocks and of other fuels, listed in part A of Annex IX, or the limited availability of such biofuels at cost-efficient prices on the market;~~

~~(ii) the specific technical or climatic characteristics of the national market for transport fuels, such as the composition and condition of the road vehicle fleet;~~
~~or~~

~~(iii) national policies allocating commensurate financial resources to incentivising energy efficiency and the use of electricity from renewable energy sources in transport.~~

~~When setting their national targets, Member States shall provide available information on the quantities of biofuels consumed from feedstocks and other fuels, listed in part A of Annex IX.~~

~~When setting policies for the promotion of the production of fuels from feedstocks listed in Annex IX, Member States shall have due regard to the waste hierarchy as established in Article 4 of Directive 2008/98/EC, including its provisions regarding life-cycle thinking on the overall impacts of the generation and management of different waste streams.~~

~~The Commission shall publish in accordance with Article 24 of this Directive:~~

~~the national targets of the Member States;~~

~~where available, the Member States' plans for achieving the national targets;~~

~~where applicable, the grounds for differentiation of the national targets of the Member States as compared to the reference value, notified in accordance with Article 4(2) of Directive (EU) 2015/1513; and~~

~~a synthesis report on Member States' achievements towards their national targets;~~

⁴⁰ Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources (OJ L 239, 15.9.2015, p. 1).

~~(f) biofuels produced from feedstocks listed in Annex IX shall be considered to be twice their energy content for the purpose of complying with the target set out in the first subparagraph.~~

↓ 2015/1513 Art. 2.2(c)

~~By 31 December 2017, the Commission shall present, if appropriate, a proposal permitting, subject to certain conditions, the whole amount of the electricity originating from renewable sources used to power all types of electric vehicles, and for the production of renewable liquid and gaseous transport fuels of non-biological origin to be considered.~~

↓ 2009/28/EC

~~By 31 December 2011, the Commission shall also present, if appropriate, a proposal for a methodology for calculating the contribution of hydrogen originating from renewable sources in the total fuel mix.~~

↓ 2015/1513 Art. 2.2(d)

~~5. With a view to minimising the risk of single consignments being claimed more than once in the Union, Member States and the Commission shall endeavour to strengthen cooperation among national systems and between national systems and voluntary schemes established pursuant to Article 18, including where appropriate the exchange of data. To prevent materials from being intentionally modified or discarded in order to fall under Annex IX, Member States shall encourage the development and use of systems which track and trace feedstocks and the resulting biofuels over the whole value chain. Member States shall ensure that when fraud is detected, appropriate action is taken. Member States shall by 31 December 2017, and every two years thereafter, report on the measures they have taken if they have not provided equivalent information on reliability and protection against fraud in their reports on progress in the promotion and use of energy from renewable sources drawn up in accordance with Article 22(1)(d).~~

~~The Commission shall be empowered to adopt delegated acts in accordance with Article 25a to amend the list of feedstocks in part A of Annex IX in order to add feedstocks, but not to remove them. The Commission shall adopt a separate delegated act in respect of each feedstock to be added to the list in part A of Annex IX. Each delegated act shall be based on an analysis of the latest scientific and technical progress, taking due account of the principles of the waste hierarchy established in Directive 2008/98/EC, and supporting the conclusion that the feedstock in question does not create an additional demand for land or cause significant distortive effects on markets for (by-)products, wastes or residues, that it delivers substantial greenhouse gas emission savings compared to fossil fuels, and that it does not risk creating negative impacts on the environment and biodiversity.~~

↓ new

Article 3

Union binding overall target for 2030

1. Member States shall collectively ensure that the share of energy from renewable sources in the Union's gross final consumption of energy in 2030 is at least 27%.

2. Member States' respective contributions to this overall 2030 target shall be set and notified to the Commission as part of their Integrated National Energy and Climate Plans in accordance with Articles 3 to 5 and 9 to 11 of Regulation [Governance].

3. From 1 January 2021 onwards, the share of energy from renewable sources in each Member State's gross final consumption of energy shall not be lower than that shown in the third column of the table in part A of Annex I. Member States shall take the necessary measures to ensure compliance with this baseline.

4. The Commission shall support the high ambition of Member States through an enabling framework comprising the enhanced use of Union funds, in particular financial instruments, especially in view of reducing the cost of capital for renewable energy projects.

5. In case the Commission finds in the context of the assessment of the Integrated National Energy and Climate Plans in accordance with Article 25 of Regulation [Governance] that the Union trajectory is not collectively met or that the baseline referred to in Paragraph 3 is not maintained, Article 27(4) of that Regulation shall apply.

Article 4

Financial support for electricity from renewable sources

1. Subject to State aid rules, in order to reach the Union target set in Article 3(1), Member States may apply support schemes. Support schemes for electricity from renewable sources shall be designed so as to avoid unnecessary distortions of electricity markets and ensure that producers take into account the supply and demand of electricity as well as possible grid constraints.

2. Support for electricity from renewable sources shall be designed so as to integrate electricity from renewable sources in the electricity market and ensure that renewable energy producers are responding to market price signals and maximise their market revenues.

3. Member States shall ensure that support for renewable electricity is granted in an open, transparent, competitive, non-discriminatory and cost-effective manner.

4. Member States shall assess the effectiveness of their support for electricity from renewable sources at least every four years. Decisions on the continuation or prolongation of support and design of new support shall be based on the results of the assessments.

Article 5

Opening of support schemes for renewable electricity

1. Member States shall open support for electricity generated from renewable sources to generators located in other Member States under the conditions laid down in this Article.

2. Member States shall ensure that support for at least 10% of the newly-supported capacity in each year between 2021 and 2025 and at least 15% of the newly-supported capacity in each year between 2026 and 2030 is open to installations located in other Member States.

3. Support schemes may be opened to cross-border participation through, inter alia, opened tenders, joint tenders, opened certificate schemes or joint support schemes. The allocation of renewable electricity benefiting from support under opened tenders, joint tenders or opened certificate schemes towards Member States respective contributions shall be subject to a cooperation agreement setting out rules for the cross-border disbursement of funding, following the principle that energy should be counted towards the Member State funding the installation.

4. The Commission shall assess by 2025 the benefits on the cost-effective deployment of renewable electricity in the Union of provisions set out in this Article. On the basis of this assessment, the Commission may propose to increase the percentages set out in paragraph 2.

Article 6

Stability of financial support

Without prejudice to adaptations necessary to comply with State aid rules, Member States shall ensure that the level of, and the conditions attached to, the support granted to renewable energy projects are not revised in a way that negatively impacts the rights conferred thereunder and the economics of supported projects.

↓ 2009/28/EC

Article 4

National renewable energy action plans

~~1. Each Member State shall adopt a national renewable energy action plan. The national renewable energy action plans shall set out Member States' national targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020, taking into account the effects of other policy measures relating to energy efficiency on final consumption of energy, and adequate measures to be taken to achieve those national overall targets, including cooperation between local, regional and national authorities, planned statistical transfers or joint projects, national policies to develop existing biomass resources and mobilise new biomass resources for different uses, and the measures to be taken to fulfil the requirements of Articles 13 to 19.~~

~~By 30 June 2009, the Commission shall adopt a template for the national renewable energy action plans. That template shall comprise the minimum requirements set out in Annex VI. Member States shall comply with that template in the presentation of their national renewable energy action plans.~~

~~2. Member States shall notify their national renewable energy action plans to the Commission by 30 June 2010.~~

~~3. Each Member State shall publish and notify to the Commission, six months before its national renewable energy action plan is due, a forecast document indicating:~~

~~(a) its estimated excess production of energy from renewable sources compared to the indicative trajectory which could be transferred to other Member States in accordance with Articles 6 to 11, as well as its estimated potential for joint projects, until 2020; and~~

~~(b) its estimated demand for energy from renewable sources to be satisfied by means other than domestic production until 2020.~~

~~That information may include elements relating to cost and benefits and financing. That forecast shall be updated in the reports of the Member States as set out in Article 22(1)(l) and (m).~~

~~4. A Member State whose share of energy from renewable sources fell below the indicative trajectory in the immediately preceding two-year period set out in part B of Annex I, shall submit an amended national renewable energy action plan to the Commission by 30 June of~~

~~the following year, setting out adequate and proportionate measures to rejoin, within a reasonable timetable, the indicative trajectory in part B of Annex I.~~

~~The Commission may, if the Member State has not met the indicative trajectory by a limited margin, and taking due account of the current and future measures taken by the Member State, adopt a decision to release the Member State from the obligation to submit an amended national renewable energy action plan.~~

~~5. The Commission shall evaluate the national renewable energy action plans, notably the adequacy of the measures envisaged by the Member State in accordance with Article 3(2). In response to a national renewable energy action plan or to an amended national renewable energy action plan, the Commission may issue a recommendation.~~

~~6. The Commission shall send to the European Parliament the national renewable energy action plans and the forecast documents in the form as made public on the transparency platform as referred to in Article 24(2), as well as any recommendation as referred to in paragraph 5 of this Article.~~

↓ 2009/28/EC
⇒ new

Article 57

Calculation of the share of energy from renewable sources

1. The gross final consumption of energy from renewable sources in each Member State shall be calculated as the sum of:

- (a) gross final consumption of electricity from renewable energy sources;
- (b) gross final consumption of energy from renewable sources for heating and cooling; and
- (c) final consumption of energy from renewable sources in transport.

Gas, electricity and hydrogen from renewable energy sources shall be considered only once in point (a), (b), or (c) of the first subparagraph, for calculating the share of gross final consumption of energy from renewable sources.

Subject to the second subparagraph of Article ~~17-26~~ (1), biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐ that do not fulfil the sustainability ⇒ and greenhouse gas emissions saving ⇐ criteria set out in Article ~~26-17~~(2) to ~~(6)~~ (7) shall not be taken into account.

↓ new

For the calculation of a Member State's gross final consumption of energy from renewable energy sources, the contribution from biofuels and bioliquids, as well as from biomass fuels consumed in transport, if produced from food or feed crops, shall be no more than 7% of final consumption of energy in road and rail transport in that Member State. This limit shall be reduced to 3,8% in 2030 following the trajectory set out in part A of Annex X. Member States may set a lower limit and may distinguish between different types of biofuels, bioliquids and biomass fuels produced from food and feed crops, for instance by setting a lower limit for the contribution from food or feed crop based biofuels produced from oil crops, taking into account indirect land use change.

↓ 2009/28/EC (adapted)

⇒ new

~~2. Where a Member State considers that, due to force majeure, it is impossible for it to meet its share of energy from renewable sources in gross final consumption of energy in 2020 set out in the third column of the table in Annex I, it shall inform the Commission accordingly as soon as possible. The Commission shall adopt a decision on whether force majeure has been demonstrated. In the event that the Commission decides that force majeure has been demonstrated, it shall determine what adjustment shall be made to the Member State's gross final consumption of energy from renewable sources for the year 2020.~~

32. For the purposes of paragraph 1(a), gross final consumption of electricity from renewable energy sources shall be calculated as the quantity of electricity produced in a Member State from renewable energy sources, ⇒ including the production of electricity from renewable self-consumers and energy communities and ⇐ excluding the production of electricity in pumped storage units from water that has previously been pumped uphill.

In multi-fuel plants using renewable and conventional sources, only the part of electricity produced from renewable energy sources shall be taken into account. For the purposes of this calculation, the contribution of each energy source shall be calculated on the basis of its energy content.

The electricity generated by hydropower and wind power shall be accounted for in accordance with the normalisation rules set out in Annex II.

43. For the purposes of paragraph 1(b), the gross final consumption of energy from renewable sources for heating and cooling shall be calculated as the quantity of district heating and cooling produced in a Member State from renewable sources, plus the consumption of other energy from renewable sources in industry, households, services, agriculture, forestry and fisheries, for heating, cooling and processing purposes.

In multi-fuel plants using renewable and conventional sources, only the part of heating and cooling produced from renewable energy sources shall be taken into account. For the purposes of this calculation, the contribution of each energy source shall be calculated on the basis of its energy content.

⇒ Ambient ⇐ ~~Aerothermal, geothermal and hydrothermal~~ heat energy captured by heat pumps shall be taken into account for the purposes of paragraph 1(b) provided that the final energy output significantly exceeds the primary energy input required to drive the heat pumps. The quantity of heat to be considered as energy from renewable sources for the purposes of this Directive shall be calculated in accordance with the methodology laid down in Annex VII.

Thermal energy generated by passive energy systems, under which lower energy consumption is achieved passively through building design or from heat generated by energy from non-renewable sources, shall not be taken into account for the purposes of paragraph 1(b).

↓ new

4. For the purposes of paragraph 1(c), the following provisions shall apply:

(a) The gross final consumption of energy from renewable sources in transport shall be calculated as the sum of all biofuels, biomass fuels and renewable liquid and gaseous transport fuels of non-biological origin consumed in the transport sector. However, renewable

liquid and gaseous transport fuels of non-biological origin that are produced from renewable electricity shall only be considered to be part of the calculation pursuant to paragraph 1(a) when calculating the quantity of electricity produced in a Member State from renewable energy sources.

(b) For the calculation of gross final consumption of energy in transport the values regarding the energy content of transport fuels, as set out in Annex III, shall be used.

5. With a view to minimising the risk of single consignments being claimed more than once in the Union, Member States and the Commission shall strengthen cooperation among national systems and between national systems and voluntary schemes established pursuant to Article 27, including where appropriate the exchange of data.

The Commission is empowered to adopt delegated acts in accordance with Article 32 to amend the list of feedstocks in parts A and B of Annex IX in order to add feedstocks, but not to remove them. Each delegated act shall be based on an analysis of the latest scientific and technical progress, taking due account of the principles of the waste hierarchy established in Directive 2008/98/EC, in compliance with the Union sustainability criteria, supporting the conclusion that the feedstock in question does not create an additional demand for land and promoting the use of wastes and residues, while avoiding significant distortive effects on markets for (by-)products, wastes or residues, delivering substantial greenhouse gas emission savings compared to fossil fuels, and not creating risk of negative impacts on the environment and biodiversity.

Every 2 years, the Commission shall carry out an evaluation of the list of feedstocks in parts A and B of Annex IX in order to add feedstocks, in line with the principles set out in this paragraph. The first evaluation shall be carried out no later than 6 months after [date of entry into force of this Directive]. If appropriate, the Commission shall adopt delegated acts to amend the list of feedstocks in parts A and B of Annex IX in order to add feedstocks, but not to remove them.

↓ 2015/1513 Art. 2.3 (adapted)

~~56.~~ The Commission ~~shall be~~ is empowered to adopt delegated acts in accordance with Article ~~25a~~ 32 concerning the adaptation of the energy content of transport fuels, as set out in Annex III, to scientific and technical progress.

↓ 2009/28/EC (adapted)

~~67.~~ The share of energy from renewable sources shall be calculated as the gross final consumption of energy from renewable sources divided by the gross final consumption of energy from all energy sources, expressed as a percentage.

For the purposes of the first subparagraph, the sum referred to in paragraph 1 shall be adjusted in accordance with Articles ~~6, 8, 10 and 11~~ 8, 10, 12 and 13 .

In calculating a Member State's gross final energy consumption for the purpose of measuring its compliance with the targets and indicative trajectory laid down in this Directive, the amount of energy consumed in aviation shall, as a proportion of that Member State's gross final consumption of energy, be considered to be no more than 6,18 %. For Cyprus and Malta the amount of energy consumed in aviation shall, as a proportion of those Member States' gross final consumption of energy, be considered to be no more than 4,12 %.

~~78~~. The methodology and definitions used in the calculation of the share of energy from renewable sources shall be those of Regulation (EC) No 1099/2008 of the European Parliament and of the Council ~~of 22 October 2008 on energy statistics~~⁴¹.

Member States shall ensure coherence of statistical information used in calculating those sectoral and overall shares and statistical information reported to the Commission under Regulation (EC) No 1099/2008.

Article ~~68~~

Statistical transfers between Member States

↓ 2015/1513 Art. 2.4 (adapted)
⇒ new

1. Member States may agree on ~~and may make arrangements for~~ the statistical transfer of a specified amount of energy from renewable sources from one Member State to another Member State. The transferred quantity shall be:

(a) deducted from the amount of energy from renewable sources that is taken into account in measuring ~~⇒ the renewable energy share of~~ ~~⇒ compliance by~~ the Member State making the transfer ~~⇒ for the purposes of this Directive~~ ~~⇒ with the requirements of Article 3(1), (2) and (4)~~; and

(b) added to the amount of energy from renewable sources that is taken into account in measuring ~~compliance by another~~ ~~⇒ the renewable energy share of~~ Member State accepting the transfer ~~with the requirements of Article 3(1), (2) and (4)~~ ~~⇒ for the purposes of this Directive~~.

2. The arrangements referred to in paragraph 1 of this Article ~~in respect of Article 3(1), (2) and (4)~~ may have a duration of one or more years. They shall be notified to the Commission not later than ~~three~~ ~~⇒ twelve~~ months after the end of each year in which they have effect. The information sent to the Commission shall include the quantity and price of the energy involved.

↓ 2009/28/EC (adapted)
⇒ new

3. Transfers shall become effective only after all Member States involved in the transfer have notified the transfer to the Commission.

Article ~~79~~

Joint projects between Member States

1. Two or more Member States may cooperate on all types of joint projects relating to the production of electricity, heating or cooling from renewable energy sources. That cooperation may involve private operators.

2. Member States shall notify the Commission of the proportion or amount of electricity, heating or cooling from renewable energy sources produced by any joint project in their territory, that became operational after 25 June 2009, or by the increased capacity of an

⁴¹ OJ L 304, 14.11.2008, p. 1.

installation that was refurbished after that date, which is to be regarded as counting towards the national overall ~~target~~ ⇒ renewable energy share ⇐ of another Member State for the purposes of ~~measuring compliance with the requirements~~ of this Directive.

3. The notification referred to in paragraph 2 shall:

- (a) describe the proposed installation or identify the refurbished installation;
- (b) specify the proportion or amount of electricity or heating or cooling produced from the installation which is to be regarded as counting towards the national overall ~~target~~ ⇒ renewable energy share ⇐ of another Member State;
- (c) identify the Member State in whose favour the notification is being made; and
- (d) specify the period, in whole calendar years, during which the electricity or heating or cooling produced by the installation from renewable energy sources is to be regarded as counting towards the national overall ~~target~~ ⇒ renewable energy share ⇐ of the other Member State.

4. ~~The period specified under paragraph 3(d) shall not extend beyond 2020.~~ The duration of a joint project may extend beyond ~~2020~~ ⇒ 2030 ⇐ .

5. A notification made under this Article shall not be varied or withdrawn without the joint agreement of the Member State making the notification and the Member State identified in accordance with paragraph 3(c).

Article 9

Effects of joint projects between Member States

1. Within three months of the end of each year falling within the period specified under Article 9 (3)(d), the Member State that made the notification under Article 9 shall issue a letter of notification stating:

- (a) the total amount of electricity or heating or cooling produced during the year from renewable energy sources by the installation which was the subject of the notification under Article 9; and
- (b) the amount of electricity or heating or cooling produced during the year from renewable energy sources by that installation which is to count towards the national overall ~~target~~ ⇒ renewable energy share ⇐ of another Member State in accordance with the terms of the notification.

2. The notifying Member State shall send the letter of notification to the Member State in whose favour the notification was made and to the Commission.

3. For the purposes of ~~measuring target compliance with the requirements of~~ this Directive ~~concerning national overall targets~~, the amount of electricity or heating or cooling from renewable energy sources notified in accordance with paragraph 1(b) shall be:

- (a) deducted from the amount of electricity or heating or cooling from renewable energy sources that is taken into account, in measuring ~~compliance by~~ ⇒ the renewable energy share of ⇐ the Member State issuing the letter of notification under paragraph 1; and
- (b) added to the amount of electricity or heating or cooling from renewable energy sources that is taken into account, in measuring ~~compliance by~~ ⇒ the renewable energy share of ⇐ ~~compliance by~~ the Member State receiving the letter of notification in accordance with paragraph 2.

Joint projects between Member States and third countries

1. One or more Member States may cooperate with one or more third countries on all types of joint projects regarding the production of electricity from renewable energy sources. Such cooperation may involve private operators.

2. Electricity from renewable energy sources produced in a third country shall be taken into account only for the purposes of measuring ~~compliance with the requirements of this Directive concerning national overall targets~~ ⇒ Member States' renewable energy shares ⇐ if the following conditions are met:

(a) the electricity is consumed in the ~~Community~~ ☒ Union. This ~~is a~~ requirement ~~that~~ is deemed to be met where:

(i) an equivalent amount of electricity to the electricity accounted for has been firmly nominated to the allocated interconnection capacity by all responsible transmission system operators in the country of origin, the country of destination and, if relevant, each third country of transit;

(ii) an equivalent amount of electricity to the electricity accounted for has been firmly registered in the schedule of balance by the responsible transmission system operator on the ~~Community~~ ☒ Union ☒ side of an interconnector; and

(iii) the nominated capacity and the production of electricity from renewable energy sources by the installation referred to in paragraph 2(b) refer to the same period of time;

(b) the electricity is produced by a newly constructed installation that became operational after 25 June 2009 or by the increased capacity of an installation that was refurbished after that date, under a joint project as referred to in paragraph 1; and

(c) the amount of electricity produced and exported has not received support from a support scheme of a third country other than investment aid granted to the installation.

3. Member States may apply to the Commission, for the purposes of Article ~~5~~ 7, for account to be taken of electricity from renewable energy sources produced and consumed in a third country, in the context of the construction of an interconnector with a very long lead-time between a Member State and a third country if the following conditions are met:

(a) construction of the interconnector started by 31 December ⇒ 2026 ⇐ ~~2016~~;

(b) it is not possible for the interconnector to become operational by 31 December ⇒ 2030 ⇐ ~~2020~~;

(c) it is possible for the interconnector to become operational by 31 December ⇒ 2032 ⇐ ~~2022~~;

(d) after it becomes operational, the interconnector will be used for the export to the ~~Community~~ ☒ Union ☒, in accordance with paragraph 2, of electricity generated from renewable energy sources;

(e) the application relates to a joint project that fulfils the criteria in points (b) and (c) of paragraph 2 and that will use the interconnector after it becomes operational, and to a quantity of electricity that is no greater than the quantity that will be exported to the ~~Community~~ ☒ Union ☒ after the interconnector becomes operational.

4. The proportion or amount of electricity produced by any installation in the territory of a third country, which is to be regarded as counting towards the national overall ~~target~~ energy share of one or more Member States for the purposes of this Directive ~~measuring compliance with Article 3~~, shall be notified to the Commission. When more than one Member State is concerned, the distribution between Member States of this proportion or amount shall be notified to the Commission. This proportion or amount shall not exceed the proportion or amount actually exported to, and consumed in, the ~~Community~~ Union , corresponding to the amount referred to in paragraph 2(a)(i) and (ii) of this Article and meeting the conditions as set out in its paragraph (2)(a). The notification shall be made by each Member State towards whose overall national target the proportion or amount of electricity is to count.

5. The notification referred to in paragraph 4 shall:

- (a) describe the proposed installation or identify the refurbished installation;
- (b) specify the proportion or amount of electricity produced from the installation which is to be regarded as counting towards the national ~~target~~ renewable energy share of a Member State as well as, subject to confidentiality requirements, the corresponding financial arrangements;
- (c) specify the period, in whole calendar years, during which the electricity is to be regarded as counting towards the national overall ~~target~~ renewable energy share of the Member State; and
- (d) include a written acknowledgement of points (b) and (c) by the third country in whose territory the installation is to become operational and the proportion or amount of electricity produced by the installation which will be used domestically by that third country.

6. ~~The period specified under paragraph 5(c) shall not extend beyond 2020.~~ The duration of a joint project may extend beyond ~~2020~~ 2030 .

7. A notification made under this Article may not be varied or withdrawn without the joint agreement of the Member State making the notification and the third country that has acknowledged the joint project in accordance with paragraph 5(d).

8. Member States and the ~~Community~~ Union shall encourage the relevant bodies of the Energy Community Treaty to take, in conformity with the Energy Community Treaty, the measures which are necessary so that the Contracting Parties to that Treaty can apply the provisions on cooperation laid down in this Directive between Member States.

Article ~~10~~12

Effects of joint projects between Member States and third countries

1. Within twelve ~~three~~ months of the end of each year falling within the period specified under Article ~~9~~ 11 (5)(c), the Member State having made the notification under Article ~~9~~ 11 shall issue a letter of notification stating:

- (a) the total amount of electricity produced during that year from renewable energy sources by the installation which was the subject of the notification under Article ~~9~~ 11 ;
- (b) the amount of electricity produced during the year from renewable energy sources by that installation which is to count towards its national overall ~~target~~ .

⇒ renewable energy share ⇐ in accordance with the terms of the notification under Article ~~9~~ 11 ; and

(c) proof of compliance with the conditions set out in Article ~~9~~ 11 (2).

2. The Member State shall send the letter of notification to the third country which has acknowledged the project in accordance with Article ~~9~~ 11 (5)(d) and to the Commission.

3. For the purposes of ~~measuring target compliance with the requirements of this Directive concerning~~ ⇒ calculating the ⇐ national overall ⇒ renewable energy shares under this Directive ⇐ ~~targets~~, the amount of electricity produced from renewable energy sources notified in accordance with paragraph 1(b) shall be added to the amount of energy from renewable sources that is taken into account, in measuring ⇒ the renewable energy shares of ⇐ ~~compliance by~~ the Member State issuing the letter of notification.

Article ~~11~~ 13

Joint support schemes

1. Without prejudice to the obligations of Member States under Article 3 5, two or more Member States may decide, on a voluntary basis, to join or partly coordinate their national support schemes. In such cases, a certain amount of energy from renewable sources produced in the territory of one participating Member State may count towards the national ~~overall target~~ ⇒ renewable energy share ⇐ of another participating Member State if the Member States concerned:

(a) make a statistical transfer of specified amounts of energy from renewable sources from one Member State to another Member State in accordance with Article ~~6~~ 8; or

(b) set up a distribution rule agreed by participating Member States that allocates amounts of energy from renewable sources between the participating Member States. Such a rule shall be notified to the Commission no later than three months after the end of the first year in which it takes effect.

2. Within three months of the end of each year each Member State having made a notification under paragraph 1(b) shall issue a letter of notification stating the total amount of electricity or heating or cooling from renewable energy sources produced during the year which is to be the subject of the distribution rule.

3. For the purposes of ~~measuring compliance with the requirements of this Directive concerning~~ ⇒ calculating the ⇐ national overall ⇒ renewable energy shares under this Directive ⇐ ~~targets~~, the amount of electricity or heating or cooling from renewable energy sources notified in accordance with paragraph 2 shall be reallocated between the concerned Member States in accordance with the notified distribution rule.

Article ~~12~~ 14

Capacity increases

For the purpose of Article ~~7~~ 9 (2) and Article ~~9~~ 11 (2)(b), units of energy from renewable sources imputable to an increase in the capacity of an installation shall be treated as if they were produced by a separate installation becoming operational at the moment at which the increase of capacity occurred.

Article ~~13~~15

Administrative procedures, regulations and codes

1. Member States shall ensure that any national rules concerning the authorisation, certification and licensing procedures that are applied to plants and associated transmission and distribution network infrastructures for the production of electricity, heating or cooling from renewable energy sources, and to the process of transformation of biomass into biofuels or other energy products, are proportionate and necessary.

Member States shall, in particular, take the appropriate steps to ensure that:

~~(a) subject to differences between Member States in their administrative structures and organisation, the respective responsibilities of national, regional and local administrative bodies for authorisation, certification and licensing procedures including spatial planning are clearly coordinated and defined, with transparent timetables for determining planning and building applications;~~

~~(b) comprehensive information on the processing of authorisation, certification and licensing applications for renewable energy installations and on available assistance to applicants are made available at the appropriate level;~~

(a) ~~(e)~~ administrative procedures are streamlined and expedited at the appropriate administrative level;

(b) ~~(d)~~ rules governing authorisation, certification and licensing are objective, transparent, proportionate, do not discriminate between applicants and take fully into account the particularities of individual renewable energy technologies;

(c) ~~(e)~~ administrative charges paid by consumers, planners, architects, builders and equipment and system installers and suppliers are transparent and cost-related; and

(d) ~~(f)~~ simplified and less burdensome authorisation procedures, including through simple notification if allowed by the applicable regulatory framework, are established ~~for smaller projects and~~ for decentralised devices for producing energy from renewable sources, ~~where appropriate.~~

2. Member States shall clearly define any technical specifications which must be met by renewable energy equipment and systems in order to benefit from support schemes. Where European standards exist, including eco-labels, energy labels and other technical reference systems established by the European standardisation bodies, such technical specifications shall be expressed in terms of those standards. Such technical specifications shall not prescribe where the equipment and systems are to be certified and should not impede the operation of the internal market.

3. Member States shall ensure that investors have sufficient predictability of the planned support for energy from renewable sources. To this aim, Member States shall define and publish a long-term schedule in relation to expected allocation for support, covering at least the following 3 years and including for each scheme the indicative timing, the capacity, the

budget expected to be allocated, as well as a consultation of stakeholders on the design of the support.

↓ 2009/28/EC Article 13
(adapted)
⇒ new

~~43. Member States shall recommend to all actors, in particular local and regional administrative bodies to ensure equipment and systems are installed for the use of electricity, heating and cooling from renewable energy sources and for district heating and cooling~~
⇒ ensure that their competent authorities at national, regional and local level include provisions for the integration and deployment of renewable energy and the use of unavoidable waste heat or cold ⇐ when planning, designing, building and renovating ⇒ urban infrastructure, ⇐ industrial or residential areas ⇒ and energy infrastructure, including electricity, district heating and cooling, natural gas and alternative fuel networks ⇐. ~~Member States shall, in particular, encourage local and regional administrative bodies to include heating and cooling from renewable energy sources in the planning of city infrastructure, where appropriate.~~

54. Member States shall introduce in their building regulations and codes appropriate measures in order to increase the share of all kinds of energy from renewable sources in the building sector.

In establishing such measures or in their regional support schemes, Member States may take into account national measures relating to substantial increases in energy efficiency and relating to cogeneration and to passive, low or zero-energy buildings.

~~By 31 December 2014,~~ Member States shall, in their building regulations and codes or by other means with equivalent effect, ~~where appropriate,~~ require the use of minimum levels of energy from renewable sources in new buildings and in existing buildings that are subject to major renovation⇒, reflecting the results of the cost-optimal calculation carried out pursuant to Article 5(2) of Directive 2010/31/EU. ⇐ Member States shall permit those minimum levels to be fulfilled, inter alia, ~~through district heating and cooling produced~~ using a significant proportion of renewable energy sources.

The requirements of the first subparagraph shall apply to the armed forces, only to the extent that its application does not cause any conflict with the nature and primary aim of the activities of the armed forces and with the exception of material used exclusively for military purposes.

~~65.~~ Member States shall ensure that new public buildings, and existing public buildings that are subject to major renovation, at national, regional and local level fulfil an exemplary role in the context of this Directive from 1 January 2012 onwards. Member States may, inter alia, allow that obligation to be fulfilled ~~by complying with standards for zero energy housing, or~~ by providing that the roofs of public or mixed private-public buildings are used by third parties for installations that produce energy from renewable sources.

~~76.~~ With respect to their building regulations and codes, Member States shall promote the use of renewable energy heating and cooling systems and equipment that achieve a significant reduction of energy consumption. Member States shall use energy or eco-labels or other appropriate certificates or standards developed at national or ~~Community~~ ⊗ Union ⊗ level, where these exist, as the basis for encouraging such systems and equipment.

~~In the case of biomass, Member States shall promote conversion technologies that achieve a conversion efficiency of at least 85 % for residential and commercial applications and at least 70 % for industrial applications.~~

~~In the case of heat pumps, Member States shall promote those that fulfil the minimum requirements of eco-labelling established in Commission Decision 2007/742/EC of 9 November 2007 establishing the ecological criteria for the award of the Community eco-label to electrically driven, gas driven or gas absorption heat pumps⁴².~~

~~In the case of solar thermal energy, Member States shall promote certified equipment and systems based on European standards where these exist, including eco-labels, energy labels and other technical reference systems established by the European standardisation bodies.~~

~~In assessing the conversion efficiency and input/output ratio of systems and equipment for the purposes of this paragraph, Member States shall use Community or, in their absence, international procedures if such procedures exist.~~

↓ new

8. Member States shall carry out an assessment of their potential of renewable energy sources and of the use of waste heat and cold for heating and cooling. That assessment shall be included in the second comprehensive assessment required pursuant to Article 14(1) of Directive 2012/27/EU for the first time by 31 December 2020 and in the updates of the comprehensive assessments thereafter.

9. Member States shall remove administrative barriers to corporate long-term power purchase agreements to finance renewables and facilitate their uptake.

Article 16

Organisation and duration of the permit granting process

1. By 1 January 2021 Member States shall set up one or more single administrative contact points which will coordinate the entire permit granting process for applicants for permits to build and operate plants and associated transmission and distribution network infrastructures for the production of energy from renewable energy sources.

2. The single administrative contact point shall guide the applicant through the application process in a transparent manner, provide the applicant with all necessary information, coordinate and involve, where appropriate, other authorities, and deliver a legally binding decision at the end of the process.

3. The single administrative contact point, in collaboration with transmission and distribution system operators, shall publish a manual of procedures for renewable project developers, including for small scale projects and renewable self-consumers projects.

4. The permit granting process referred to in paragraph 1 shall not exceed a period of three years, except for the cases set out in Article 16(5) and Article 17.

5. Member States shall facilitate the repowering of existing renewable energy plants by, inter alia, ensuring a simplified and swift permit granting process, which shall not exceed one year from the date on which the request for repowering is submitted to the single administrative contact point.

⁴² OJL 301, 20.11.2007, p. 14.

Article 17

Simple notification procedures

1. Demonstration projects and installations with an electricity capacity of less than 50 kW shall be allowed to connect to the grid following a notification to the distribution system operator.

2. Repowering shall be allowed following a notification to the single administrative contact point established in accordance with Article 16, where no significant negative environmental or social impact is expected. The single administrative contact point shall decide within six months of the receipt of the notification if this is sufficient.

Where the single administrative contact point decides that the notification is sufficient, it shall automatically grant the permit.

Where the single administrative contact point decides that the notification is not sufficient, it shall be necessary to apply for a new permit. In this case the time limits referred to in Article 16(5) apply.

↓ 2009/28/EC (adapted)

⇒ new

Article ~~17~~18

Information and training

1. Member States shall ensure that information on support measures is made available to all relevant actors, such as consumers, builders, installers, architects, and suppliers of heating, cooling and electricity equipment and systems and of vehicles compatible with the use of energy from renewable sources.

2. Member States shall ensure that information on the net benefits, cost and energy efficiency of equipment and systems for the use of heating, cooling and electricity from renewable energy sources is made available either by the supplier of the equipment or system or by the national competent authorities.

3. Member States shall ensure that certification schemes or equivalent qualification schemes ~~become or~~ are available by ~~31 December 2012~~ for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. Those schemes may take into account existing schemes and structures as appropriate, and shall be based on the criteria laid down in Annex IV. Each Member State shall recognise certification awarded by other Member States in accordance with those criteria.

4. Member States shall make available to the public information on certification schemes or equivalent qualification schemes as referred to in paragraph 3. Member States may also make available the list of installers who are qualified or certified in accordance with the provisions referred to in paragraph 3.

5. Member States shall ensure that guidance is made available to all relevant actors, notably for planners and architects so that they are able properly to consider the optimal combination of renewable energy sources, of high-efficiency technologies and of district heating and cooling when planning, designing, building and renovating industrial, ⇒ commercial ⇐ or residential areas.

6. Member States, with the participation of local and regional authorities, shall develop suitable information, awareness-raising, guidance or training programmes in order to inform citizens of the benefits and practicalities of developing and using energy from renewable sources.

↓ 2009/28/EC (adapted)

⇒ new

Article ~~15~~19

Guarantees of origin of electricity, heating and cooling produced from renewable energy sources

1. For the purposes of proving to final customers the share or quantity of energy from renewable sources in an energy supplier's energy mix ⇒ and in the energy supplied to consumers under contracts marketed with reference to the consumption of energy from renewable sources ⇐ ~~in accordance with Article 3(6) of Directive 2003/54/EC~~, Member States shall ensure that the origin of ~~electricity~~ ⊗ energy ⊗ produced from renewable energy sources can be guaranteed as such within the meaning of this Directive, in accordance with objective, transparent and non-discriminatory criteria.

2. To that end, Member States shall ensure that a guarantee of origin is issued in response to a request from a producer of ~~electricity~~ ⊗ energy ⊗ from renewable ~~energy~~ sources. Member States may arrange for guarantees of origin to be issued ⇒ for non-renewable energy sources. ⇐ ~~in response to a request from producers of heating and cooling from renewable energy sources. Such an arrangement~~ ⇒ Issuance of guarantees of origin ⇐ may be made subject to a minimum capacity limit. A guarantee of origin shall be of the standard size of 1 MWh. No more than one guarantee of origin shall be issued in respect of each unit of energy produced.

Member States shall ensure that the same unit of energy from renewable sources is taken into account only once.

Member States ~~may provide~~ ⇒ shall ensure ⇐ that no ~~support be granted~~ ⇒ guarantees of origin are issued ⇐ to a producer ~~when that producer~~ receives ⇒ financial support from a support scheme ⇐ ~~a guarantee of origin~~ for the same production of energy from renewable sources. ⇒ Member States shall issue such guarantees of origin and transfer them to the market by auctioning them. The revenues raised as a result of the auctioning shall be used to offset the costs of renewables support. ⇐

The guarantee of origin shall have no function in terms of a Member State's compliance with Article 3. Transfers of guarantees of origin, separately or together with the physical transfer of energy, shall have no effect on the decision of Member States to use statistical transfers, joint projects or joint support schemes for target compliance or on the calculation of the gross final consumption of energy from renewable sources in accordance with Article ~~5~~ 7.

~~3. Any use of a guarantee of origin shall take place within 12 months of production of the corresponding energy unit. A guarantee of origin shall be cancelled once it has been used.~~

↓ new

3. For the purposes of paragraph 1, guarantees of origin shall be valid with respect to the calendar year in which the energy unit is produced. Six months after the end of each calendar

year, Member States shall ensure that all guarantees of origin from the previous calendar year that have not been cancelled shall expire. Expired guarantees of origin shall be included by Member States in the calculation of the residual energy mix.

4. For the purposes of disclosure referred to in paragraphs 8 and 13, Member States shall ensure that guarantees of origin are cancelled by energy companies by 30 June of the year following the calendar year in relation to which the guarantees of origin are issued.

↓ 2009/28/EC

⇒ new

45. Member States or designated competent bodies shall supervise the issuance, transfer and cancellation of guarantees of origin. The designated competent bodies shall have non-overlapping geographical responsibilities, and be independent of production, trade and supply activities.

56. Member States or the designated competent bodies shall put in place appropriate mechanisms to ensure that guarantees of origin shall be issued, transferred and cancelled electronically and are accurate, reliable and fraud-resistant. ⇒ Member States and designated competent bodies shall ensure that their requirements are compliant with the standard CEN - EN 16325. ⇐

67. A guarantee of origin shall specify at least:

(a) the energy source from which the energy was produced and the start and end dates of production;

(b) whether it relates to:

(i) electricity; or

↓ new

(ii) gas, or

↓ 2009/28/EC

~~(iii)~~ heating or cooling;

(c) the identity, location, type and capacity of the installation where the energy was produced;

(d) whether ~~and to what extent~~ the installation has benefited from investment support, whether ~~and to what extent~~ the unit of energy has benefited in any other way from a national support scheme, and the type of support scheme;

(e) the date on which the installation became operational; and

(f) the date and country of issue and a unique identification number.

↓ new

Simplified information may be specified on guarantees of origin from small scale installations.

↓ 2009/28/EC (adapted)
⇒ new

~~87.~~ Where an electricity supplier is required to prove the share or quantity of energy from renewable sources in its energy mix for the purposes of Article 3(~~69~~) of Directive ~~2003/54/EC~~2009/72/EC, it ~~may~~ ⇒ shall ⇐ do so by using ~~its~~ guarantees of origin. ⇐ Likewise, guarantees of origin created pursuant to Article 14(10) of Directive 2012/27/EC shall be used to substantiate any requirement to prove the quantity of electricity produced from high-efficiency cogeneration. Member States shall ensure that transmission losses are fully taken into account when guarantees of origin are used to demonstrate consumption of renewable energy or electricity from high efficiency cogeneration. ⇐

~~8. The amount of energy from renewable sources corresponding to guarantees of origin transferred by an electricity supplier to a third party shall be deducted from the share of energy from renewable sources in its energy mix for the purposes of Article 3(6) of Directive 2003/54/EC.~~

9. Member States shall recognise guarantees of origin issued by other Member States in accordance with this Directive exclusively as proof of the elements referred to in paragraph 1 and paragraph ~~67~~ (a) to (f). A Member State may refuse to recognise a guarantee of origin only when it has well-founded doubts about its accuracy, reliability or veracity. The Member State shall notify the Commission of such a refusal and its justification.

10. If the Commission finds that a refusal to recognise a guarantee of origin is unfounded, the Commission may adopt a decision requiring the Member State in question to recognise it.

↓ new

11. Member States shall not recognise guarantees of origins issued by a third country except where the Commission has signed an agreement with that third country on mutual recognition of guarantees of origin issued in the Union and compatible guarantees of origin systems established in that country, where there is direct import or export of energy. The Commission is empowered to adopt delegated acts in accordance with Article 32 to enforce these agreements.

↓ 2009/28/EC (adapted)
⇒ new

~~112.~~ A Member State may introduce, in conformity with ~~Community~~ ☒ Union ☒ law, objective, transparent and non-discriminatory criteria for the use of guarantees of origin in complying with the obligations laid down in Article 3(~~69~~) of Directive ~~2003/54/EC~~ 2009/72/EC.

~~1213.~~ Where energy suppliers market energy from renewable sources ⇐ or high-efficiency cogeneration ⇐ to ~~consumers~~ customers with a reference to environmental or other benefits of energy from renewable sources ⇐ or from high-efficiency cogeneration ⇐, Member States ~~may~~ ⇒ shall ⇐ require those energy suppliers to ~~make available, in summary form, information on~~ ⇐ use guarantees of origin to disclose ⇐ the amount or share of energy from renewable sources ⇐ or from high efficiency cogeneration ⇐ ~~that comes from installations or increased capacity that became operational after 25 June 2009.~~

↓ new

14. The Commission is empowered to adopt delegated acts in accordance with Article 32 establishing the rules to monitor the functioning of the system set out in this Article.

↓ 2009/28/EC (adapted)
⇒ new

Article ~~16~~20

Access to and operation of the grids

~~1. Member States shall take the appropriate steps to develop transmission and distribution grid infrastructure, intelligent networks, storage facilities and the electricity system, in order to allow the secure operation of the electricity system as it accommodates the further development of electricity production from renewable energy sources, including interconnection between Member States and between Member States and third countries. Member States shall also take appropriate steps to accelerate authorisation procedures for grid infrastructure and to coordinate approval of grid infrastructure with administrative and planning procedures.~~

~~2. Subject to requirements relating to the maintenance of the reliability and safety of the grid, based on transparent and non-discriminatory criteria defined by the competent national authorities:~~

~~(a) Member States shall ensure that transmission system operators and distribution system operators in their territory guarantee the transmission and distribution of electricity produced from renewable energy sources;~~

~~(b) Member States shall also provide for either priority access or guaranteed access to the grid system of electricity produced from renewable energy sources;~~

~~(c) Member States shall ensure that when dispatching electricity generating installations, transmission system operators shall give priority to generating installations using renewable energy sources in so far as the secure operation of the national electricity system permits and based on transparent and non-discriminatory criteria. Member States shall ensure that appropriate grid and market-related operational measures are taken in order to minimise the curtailment of electricity produced from renewable energy sources. If significant measures are taken to curtail the renewable energy sources in order to guarantee the security of the national electricity system and security of energy supply, Member States shall ensure that the responsible system operators report to the competent regulatory authority on those measures and indicate which corrective measures they intend to take in order to prevent inappropriate curtailments.~~

~~3. Member States shall require transmission system operators and distribution system operators to set up and make public their standard rules relating to the bearing and sharing of costs of technical adaptations, such as grid connections and grid reinforcements, improved operation of the grid and rules on the non-discriminatory implementation of the grid codes, which are necessary in order to integrate new producers feeding electricity produced from renewable energy sources into the interconnected grid.~~

~~Those rules shall be based on objective, transparent and non-discriminatory criteria taking particular account of all the costs and benefits associated with the connection of those~~

~~producers to the grid and of the particular circumstances of producers located in peripheral regions and in regions of low population density. Those rules may provide for different types of connection.~~

~~4. Where appropriate, Member States may require transmission system operators and distribution system operators to bear, in full or in part, the costs referred to in paragraph 3. Member States shall review and take the necessary measures to improve the frameworks and rules for the bearing and sharing of costs referred to in paragraph 3 by 30 June 2011 and every two years thereafter to ensure the integration of new producers as referred to in that paragraph.~~

~~5. Member States shall require transmission system operators and distribution system operators to provide any new producer of energy from renewable sources wishing to be connected to the system with the comprehensive and necessary information required, including:~~

~~(a) a comprehensive and detailed estimate of the costs associated with the connection;~~

~~(b) a reasonable and precise timetable for receiving and processing the request for grid connection;~~

~~(c) a reasonable indicative timetable for any proposed grid connection.~~

~~Member States may allow producers of electricity from renewable energy sources wishing to be connected to the grid to issue a call for tender for the connection work.~~

~~6. The sharing of costs referred in paragraph 3 shall be enforced by a mechanism based on objective, transparent and non-discriminatory criteria taking into account the benefits which initially and subsequently connected producers as well as transmission system operators and distribution system operators derive from the connections.~~

~~7. Member States shall ensure that the charging of transmission and distribution tariffs does not discriminate against electricity from renewable energy sources, including in particular electricity from renewable energy sources produced in peripheral regions, such as island regions, and in regions of low population density. Member States shall ensure that the charging of transmission and distribution tariffs does not discriminate against gas from renewable energy sources.~~

~~8. Member States shall ensure that tariffs charged by transmission system operators and distribution system operators for the transmission and distribution of electricity from plants using renewable energy sources reflect realisable cost benefits resulting from the plant's connection to the network. Such cost benefits could arise from the direct use of the low-voltage grid.~~

~~91. Where relevant, Member States shall assess the need to extend existing gas network infrastructure to facilitate the integration of gas from renewable energy sources.~~

~~102. Where relevant, Member States shall require transmission system operators and distribution system operators in their territory to publish technical rules in line with Article 6 of Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning the common rules for the internal market in natural gas⁴³, in particular regarding network connection rules that include gas quality, gas odoration and gas pressure requirements. Member States shall also require transmission and distribution system operators~~

⁴³ OJ L 176, 15.7.2003, p. 57.

to publish the connection tariffs to connect renewable gas sources based on transparent and non-discriminatory criteria.

~~113 Member States in their national renewable energy action plans shall assess the necessity to build new infrastructure for district heating and cooling produced from renewable energy sources in order to achieve the 2020 national target referred to in Article 3(1). Subject to that~~ their assessment₂ included in the integrated national energy and climate plans in accordance with Annex I of Regulation [Governance], on the necessity to build new infrastructure for district heating and cooling produced from renewable energy sources in order to achieve the Union target referred to in Article 3(1), Member States shall, where relevant, take steps with a view to developing a district heating infrastructure to accommodate the development of heating and cooling production from large biomass, solar and geothermal facilities.

↓ new

Article 21

Renewable self-consumers

1. Member States shall ensure that renewable self-consumers, individually or through aggregators:

(a) are entitled to carry out self-consumption and sell, including through power purchase agreements, their excess production of renewable electricity without being subject to disproportionate procedures and charges that are not cost-reflective;

(b) maintain their rights as consumers;

(c) are not considered as energy suppliers according to Union or national legislation in relation to the renewable electricity they feed into the grid not exceeding 10 MWh for households and 500 MWh for legal persons on an annual basis; and

(d) receive a remuneration for the self-generated renewable electricity they feed into the grid which reflects the market value of the electricity fed in.

Member States may set a higher threshold than the one set out in point (c).

2. Member States shall ensure that renewable self-consumers living in the same multi-apartment block, or located in the same commercial, or shared services, site or closed distribution system, are allowed to jointly engage in self-consumption as if they were an individual renewable self-consumer. In this case, the threshold set out in paragraph 1(c) shall apply to each renewable self-consumer concerned.

3. The renewable self-consumer's installation may be managed by a third party for installation, operation, including metering, and maintenance.

Article 22

Renewable energy communities

1. Member States shall ensure that renewable energy communities are entitled to generate, consume, store and sell renewable energy, including through power purchase agreements, without being subject to disproportionate procedures and charges that are not cost-reflective.

For the purposes of this Directive, a renewable energy community shall be an SME or a not-for-profit organisation, the shareholders or members of which cooperate in the generation,

distribution, storage or supply of energy from renewable sources, fulfilling at least four out of the following criteria:

- (a) shareholders or members are natural persons, local authorities, including municipalities, or SMEs operating in the fields of renewable energy;
- (b) at least 51% of the shareholders or members with voting rights of the entity are natural persons;
- (c) at least 51% of the shares or participation rights of the entity are owned by local members, i.e. representatives of local public and local private socio-economic interests or citizens having a direct interest in the community activity and its impacts;
- (d) at least 51% of the seats in the board of directors or managing bodies of the entity are reserved to local members, i.e. representatives of local public and local private socio-economic interests or citizens having a direct interest in the community activity and its impacts;
- (e) the community has not installed more than 18 MW of renewable capacity for electricity, heating and cooling and transport as a yearly average in the previous 5 years.

2. Without prejudice to State aid rules, when designing support schemes, Member States shall take into account the specificities of renewable energy communities.

Article 23

Mainstreaming renewable energy in the heating and cooling installations

1. In order to facilitate the penetration of renewable energy in the heating and cooling sector, each Member State shall endeavour to increase the share of renewable energy supplied for heating and cooling by at least 1 percentage point (pp) every year, expressed in terms of national share of final energy consumption and calculated according to the methodology set out in Article 7.

2. Member States may designate and make public, on the basis of objective and non-discriminatory criteria, a list of measures and the implementing entities, such as fuel suppliers, which shall contribute to the increase set out in paragraph 1.

3. The increase set out in paragraph 1 may be implemented through one or more of the following options:

- (a) physical incorporation of renewable energy in the energy and energy fuel supplied for heating and cooling;
- (b) direct mitigation measures such as installation of highly efficient renewable heating and cooling systems in buildings or renewable energy use for industrial heating and cooling processes;
- (c) indirect mitigation measures covered by tradable certificates proving compliance with the obligation through support to indirect mitigation measures, carried out by another economic operator such as an independent renewable technology installer or energy service company - ESCO providing renewable installation services.

4. Member States may use the established structures under the national energy efficiency obligation schemes set out in Article 7a of Directive 2012/27/EU to implement and monitor the measures referred to in Paragraph 2.

5. The entities designated under paragraph 2 shall ensure that their contribution is measurable and verifiable and shall report annually starting from 30 June 2021, to the authority designated by the Member State, on:

(a) the total amount of energy supplied for heating and cooling;

(b) the total amount of renewable energy supplied for heating and cooling;

(c) the share of renewable energy in the total amount of energy supplied for heating and cooling; and

(d) the type of renewable energy source.

6. Member States shall ensure that the reports referred to in paragraph 5 are subject to verification by the competent designated authority.

Article 24

District Heating and Cooling

1. Member States shall ensure that district heating and cooling suppliers provide information to end-consumers on their energy performance and the share of renewable energy in their systems. Such information shall be in accordance with standards used under Directive 2010/31/EU.

2. Member States shall lay down the necessary measures to allow customers of those district heating or cooling systems which are not 'efficient district heating and cooling' within the meaning of Article 2(41) of Directive 2012/27/EU to disconnect from the system in order to produce heating or cooling from renewable energy sources themselves, or to switch to another supplier of heat or cold which has access to the system referred to in paragraph 4.

3. Member States may restrict the right to disconnect or switch supplier to customers who can prove that the planned alternative supply solution for heating or cooling results in a significantly better energy performance. The performance assessment of the alternative supply solution may be based on the Energy Performance Certificate as defined in Directive 2010/31/EU.

4. Member States shall lay down the necessary measures to ensure non-discriminatory access to district heating or cooling systems for heat or cold produced from renewable energy sources and for waste heat or cold. This non-discriminatory access shall enable direct supply of heating or cooling from such sources to customers connected to the district heating or cooling system by suppliers other than the operator of the district heating or cooling system.

5. An operator of a district heating or cooling system may refuse access to suppliers where the system lacks the necessary capacity due to other supplies of waste heat or cold, of heat or cold from renewable energy sources or of heat or cold produced by high-efficiency cogeneration. Member States shall ensure that where such a refusal takes place the operator of the district heating or cooling system provides relevant information to the competent authority according to paragraph 9 on measures that would be necessary to reinforce the system.

6. New district heating or cooling systems may, upon request, be exempted from the application of paragraph 4 for a defined period of time. The competent authority shall decide on such exemption requests on a case-by-case basis. An exemption shall only be granted if the new district heating or cooling system constitutes 'efficient district heating and cooling' within the meaning of Article 2(41) of Directive 2012/27/EU and if it exploits the potential for the use of renewable energy sources and of waste heat or cold identified in the comprehensive assessment made in accordance with Article 14 of Directive 2012/27/EU.

7. The right to disconnect or switch supplier may be exercised by individual customers, by joint undertakings formed by customers or by parties acting on the behalf of customers. For multi-apartment blocks, such disconnection may only be exercised at whole building level.

8. Member States shall require electricity distribution system operators to assess at least biannually, in cooperation with the operators of district heating or cooling systems in their respective area, the potential of district heating or cooling systems to provide balancing and other system services, including demand response and storing of excess electricity produced from renewable sources and if the use of the identified potential would be more resource- and cost-efficient than alternative solutions.

9. Member States shall designate one or more independent authorities to ensure that the rights of consumers and the rules for operating district heating and cooling systems in accordance with this Article are clearly defined and enforced.

Article 25

Mainstreaming renewable energy in the transport sector

1. With effect from 1 January 2021, Member States shall require fuel suppliers to include a minimum share of energy from advanced biofuels and other biofuels and biogas produced from feedstock listed in Annex IX, from renewable liquid and gaseous transport fuels of non-biological origin, from waste-based fossil fuels and from renewable electricity in the total amount of transport fuels they supply for consumption or use on the market in the course of a calendar year.

The minimum share shall be at least equal to 1.5% in 2021, increasing up to at least 6.8% in 2030, following the trajectory set out in part B of Annex X. Within this total share, the contribution of advanced biofuels and biogas produced from feedstock listed in part A of Annex IX shall be at least 0.5% of the transport fuels supplied for consumption or use on the market as of 1 January 2021, increasing up to at least 3.6% by 2030, following the trajectory set out in part C of Annex X.

The greenhouse gas emission savings from the use of advanced biofuels and other biofuels and biogas produced from feedstock listed in Annex IX shall be at least 70% as of 1 January 2021.

For the calculation of the shares referred to in the second sub-paragraph, the following provisions shall apply:

a) for the calculation of the denominator, that is the energy content of road and rail transport fuels supplied for consumption or use on the market, petrol, diesel, natural gas, biofuels, biogas, renewable liquid and gaseous transport fuels of non-biological origin, waste-based fossil fuels and electricity, shall be taken into account;

b) for the calculation of the numerator, the energy content of advanced biofuels and other biofuels and biogas produced from feedstock listed in Annex IX, renewable liquid and gaseous transport fuels of non-biological origin, waste based fossil fuels supplied to all transport sectors, and renewable electricity supplied to road vehicles, shall be taken into account.

For the calculation of the numerator, the contribution from biofuels and biogas produced from feedstock included in part B of Annex IX shall be limited to 1.7% of the energy content of transport fuels supplied for consumption or use on the market and the contribution of fuels supplied in the aviation and maritime sector shall be considered to be 1.2 times their energy content.

c) For the calculation of both numerator and denominator, the values regarding the energy content of transport fuels, as set out in Annex III, shall be used. For the determination of the energy content of transport fuels not included in Annex III, the Member States shall use the respective ESOs standards for determination of calorific values of fuels. Where no ESOs standard has been adopted for this purpose, the respective ISO standards shall be used.

2. For the purpose of paragraph 1, Member States shall set up a system allowing fuel suppliers to transfer the obligation set out in paragraph 1 to other fuel suppliers and ensure that all transfers are documented in the national databases referred to in paragraph 4.

3. To determine the share of renewable electricity for the purposes of paragraph 1 either the average share of electricity from renewable energy sources in the Union or the share of electricity from renewable energy sources in the Member State where the electricity is supplied, as measured two years before the year in question may be used. In both cases, an equivalent amount of guarantees of origin issued in accordance with Article 19 shall be cancelled.

The share of renewable energy in liquid and gaseous transport fuels shall be determined on the basis of the share of renewable energy in the total energy input used for the production of the fuel.

For the purposes of this paragraph, the following provisions shall apply:

(a) When electricity is used for the production of renewable liquid and gaseous transport fuels of non-biological origin, either directly or for the production of intermediate products, either the average share of electricity from renewable energy sources in the Union or the share of electricity from renewable energy sources in the country of production, as measured two years before the year in question, may be used to determine the share of renewable energy. In both cases, an equivalent amount of guarantees of origin issued in accordance with Article 19 shall be cancelled.

However, electricity obtained from direct connection to an installation generating renewable electricity (i) that comes into operation after or at the same time as the installation producing the renewable liquid and gaseous transport fuel of non-biological origin and (ii) is not connected to the grid, can be fully counted as renewable electricity for the production of that renewable liquid and gaseous transport fuel of non-biological origin.

(b) When biomass is processed with fossil fuels in a common process, the amount of biofuel in the product shall be established applying adequate conversion factors to the biomass input. In case the process yields more than one product, all products stemming from the process shall be assumed to contain the same share of biofuel. The same rules shall apply for the purposes of Article 27(1).

4. Member States shall put in place a database enabling tracing of transport fuels that are eligible for counting towards the numerator set out in paragraph 1, point b, and require the relevant economic operators to enter information on the transactions made and the sustainability characteristics of the eligible fuels, including their life cycle greenhouse gas emissions, starting from their point of production to the fuel supplier that places the fuel on the market.

The database shall include information on the requirement placed on fuel suppliers described in paragraph 1 and how the requirement is fulfilled.

The national databases shall be interlinked so as to allow transactions of fuels between Member States to be traced. In order to ensure the compatibility of national databases, the Commission shall set out technical specifications of their content and use by means of

implementing acts adopted in accordance with the examination procedure referred to in Article 31.

5. Member States shall report on the aggregated information from the national databases, including fuels' life cycle greenhouse gas emissions, in accordance with Annex VII of Regulation [Governance].

6. The Commission is empowered to adopt delegated acts in accordance with Article 32 to further specify the methodology referred to in paragraph 3(b) of this Article to determine the share of biofuel resulting from biomass being processed with fossil fuels in a common process, to specify the methodology for assessing greenhouse gas emission savings from renewable liquid and gaseous transport fuels of non-biological origin and waste-based fossil fuels and to determine minimum greenhouse gas emission savings required for these fuels for the purpose of paragraph 1.

7. By 31 December 2025, in the context of the biennial assessment of progress made pursuant to the Regulation [Governance], the Commission shall assess whether the obligation laid down in paragraph 1 effectively stimulates innovation and promotes greenhouse gas savings in the transport sector, and whether the applicable greenhouse gas savings requirements for biofuels and biogas are appropriate. The Commission shall, if appropriate, present a proposal to modify the obligation laid down in paragraph 1.

↓ 2009/28/EC (adapted)
⇒ new

Article ~~17~~26

Sustainability ⇒ **and greenhouse gas emissions saving** ⇐ **criteria for biofuels, and bioliquids** ⇒ **and biomass fuels** ⇐

1. ~~Irrespective of whether the raw materials were cultivated inside or outside the territory of the Community,~~ Energy from biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐ shall be taken into account for the purposes referred to in points (a), (b) and (c) only if they fulfil the sustainability criteria set out in paragraphs 2 to 6 ⇒ and the greenhouse gas emissions saving criteria set out in paragraph 7 ⇐ :

- (a) ~~measuring compliance with the requirements of this Directive concerning national targets,~~ ⇒ contributing towards the Union target and Member States renewable energy share ⇐;
- (b) measuring compliance with renewable energy obligations ⇒ , including the obligations set out in Articles 23 and 25 ⇐ ;
- (c) eligibility for financial support for the consumption of biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐ .

However, biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐ produced from waste and residues, other than agricultural, aquaculture, fisheries and forestry residues, need only fulfil the ~~sustainability~~ ⇒ greenhouse gas emissions saving ⇐ criteria set out in paragraph ~~27~~ in order to be taken into account for the purposes referred to in points (a), (b) and (c). ⇒ This provision shall also apply to waste and residues that are first processed into a product before being further processed into biofuels, bioliquids and biomass fuels. ⇐

↓ new

Biomass fuels need to fulfil the sustainability and greenhouse gas emissions saving criteria set out in paragraphs 2 to 7 only if used in installations producing electricity, heating and cooling or fuels with a fuel capacity equal to or exceeding 20 MW in case of solid biomass fuels and with an electrical capacity equal to or exceeding 0.5 MW in case of gaseous biomass fuels. Member States may apply the sustainability and greenhouse gas emission saving criteria to installations with lower fuel capacity.

The sustainability criteria set out in paragraphs 2 to 6 and the greenhouse gas emissions saving criteria set out in paragraph 7 shall apply irrespectively of the geographical origin of the biomass.

↓ 2009/28/EC Article 17
(adapted)
⇒ new

32. Biofuels, ~~and~~ bioliquids ⇒ and biomass fuels produced from agricultural biomass ⇐ taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 shall not be made from raw material obtained from land with high biodiversity value, namely land that had one of the following statuses in or after January 2008, whether or not the land continues to have that status:

(a) primary forest and other wooded land, namely forest and other wooded land of native species, where there is no clearly visible indication of human activity and the ecological processes are not significantly disturbed;

(b) areas designated:

(i) by law or by the relevant competent authority for nature protection purposes; or

(ii) for the protection of rare, threatened or endangered ecosystems or species recognised by international agreements or included in lists drawn up by intergovernmental organisations or the International Union for the Conservation of Nature, subject to their recognition in accordance with the ~~first~~~~second~~ subparagraph of Article ~~18~~27(4);

unless evidence is provided that the production of that raw material did not interfere with those nature protection purposes;

(c) highly biodiverse grassland ⇒ spanning more than one hectare ⇐ that is:

(i) natural, namely grassland that would remain grassland in the absence of human intervention and which maintains the natural species composition and ecological characteristics and processes; or

(ii) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and which is species-rich and not degraded ⇒ and has been identified as being highly biodiverse by the relevant competent authority, ⇐ unless evidence is provided that the harvesting of the raw material is necessary to preserve its ~~grassland~~ status ⊗ as highly biodiverse grassland ⊗.

↓ new

The Commission may establish the criteria to determine which grassland shall be covered by point (c) of the first subparagraph, by means of implementing acts adopted in accordance with the examination procedure referred to in Article 31(2).

↓ 2009/28/EC Article 17
(adapted)
⇒ new

~~4.3.~~ Biofuels, bioliquids ⇒ and biomass fuels produced from agricultural biomass ⇐ taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 shall not be made from raw material obtained from land with high carbon stock, namely land that had one of the following statuses in January 2008 and no longer has that status:

(a) wetlands, namely land that is covered with or saturated by water permanently or for a significant part of the year;

(b) continuously forested areas, namely land spanning more than one hectare with trees higher than five metres and a canopy cover of more than 30 %, or trees able to reach those thresholds in situ;

(c) land spanning more than one hectare with trees higher than five metres and a canopy cover of between 10 % and 30 %, or trees able to reach those thresholds in situ, unless evidence is provided that the carbon stock of the area before and after conversion is such that, when the methodology laid down in part C of Annex V is applied, the conditions laid down in paragraph ~~7.2~~ of this Article would be fulfilled.

The provisions of this paragraph shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008.

~~5.4.~~ Biofuels, ~~and~~ bioliquids ⇒ and biomass fuels produced from agricultural biomass ⇐ taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 shall not be made from raw material obtained from land that was peatland in January 2008, ~~unless evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil.~~

↓ new

5. Biofuels, bioliquids and biomass fuels produced from forest biomass taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 shall meet the following requirements to minimise the risk of using unsustainable forest biomass production:

(a) the country in which forest biomass was harvested has national and/or sub-national laws applicable in the area of harvest as well as monitoring and enforcement systems in place ensuring that:

i) harvesting is carried out in accordance to the conditions of the harvesting permit within legally gazetted boundaries;

ii) forest regeneration of harvested areas takes place;

iii) areas of high conservation value, including wetlands and peatlands, are protected;

iv) the impacts of forest harvesting on soil quality and biodiversity are minimised; and

v) harvesting does not exceed the long-term production capacity of the forest;

(b) when evidence referred to in the first subparagraph is not available, the biofuels, bioliquids and biomass fuels produced from forest biomass shall be taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 if management systems are in place at forest holding level to ensure that:

i) the forest biomass has been harvested according to a legal permit;

ii) forest regeneration of harvested areas takes place;

iii) areas of high conservation value, including peatlands and wetlands, are identified and protected;

(iv) impacts of forest harvesting on soil quality and biodiversity are minimised;

(v) harvesting does not exceed the long-term production capacity of the forest.

6. Biofuels, bioliquids and biomass fuels produced from forest biomass shall be taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 if the country or regional economic integration organisation of origin of the forest biomass meets the following LULUCF requirements:

(i) is a Party to, and has ratified, the Paris agreement;

(ii) has submitted a Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC), covering emissions and removals from agriculture, forestry and land use which ensures that either changes in carbon stock associated with biomass harvest are accounted towards the country's commitment to reduce or limit greenhouse gas emissions as specified in the NDC, or there are national or sub-national laws in place, in accordance with Article 5 of the Paris Agreement, applicable in the area of harvest, to conserve and enhance carbon stocks and sinks;

(iii) has a national system in place for reporting greenhouse gas emissions and removals from land use including forestry and agriculture, which is in accordance with the requirements set out in decisions adopted under the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris agreement;

When evidence referred to in the first subparagraph is not available, the biofuels, bioliquids and biomass fuels produced from forest biomass shall be taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 if management systems are in place at forest holding level to ensure that carbon stocks and sinks levels in the forest are maintained.

The Commission may establish the operational evidence for demonstrating compliance with the requirements set out in paragraphs 5 and 6, by means of implementing acts adopted in accordance with the examination procedure referred to in Article 31(2).

By 31 December 2023, the Commission shall assess whether the criteria set out in paragraphs 5 and 6 effectively minimise the risk of using unsustainable forest biomass and address LULUCF requirements, on the basis of available data. The Commission shall, if appropriate, present a proposal to modify the requirements laid down in paragraphs 5 and 6.

↓ 2009/28/EC

~~6. Agricultural raw materials cultivated in the Community and used for the production of biofuels and bioliquids taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 shall be obtained in accordance with the requirements and standards under the provisions referred to under the heading 'Environment' in part A and in point 9 of Annex II to~~

~~Council Regulation (EC) No 73/2009 of 19 January 2009 establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers⁴⁴ and in accordance with the minimum requirements for good agricultural and environmental condition defined pursuant to Article 6(1) of that Regulation.~~

↓ new

7. The greenhouse gas emission saving from the use of biofuels, bioliquids and biomass fuels taken into account for the purposes referred to in paragraph 1 shall be:

(a) at least 50 % for biofuels and bioliquids produced in installations in operation on or before 5 October 2015;

(b) at least 60 % for biofuels and bioliquids produced in installations starting operation from 5 October 2015;

(c) at least 70 % for biofuels and bioliquids produced in installations starting operation after 1 January 2021;

(d) at least 80 % for electricity, heating and cooling production from biomass fuels used in installations starting operation after 1 January 2021 and 85% for installations starting operation after 1 January 2026.

An installation shall be considered to be in operation once the physical production of biofuels or bioliquids and of heating and cooling, and electricity for biomass fuels has started.

↓ 2009/28/EC

⇒ new

~~2. The greenhouse gas emission saving from the use of biofuels and bioliquids taken into account for the purposes referred to in paragraph 1 shall be at least 60 % for biofuels and bioliquids produced in installations starting operation after 5 October 2015. An installation shall be considered to be in operation if the physical production of biofuels or bioliquids has taken place.~~

~~In the case of installations that were in operation on or before 5 October 2015, for the purposes referred to in paragraph 1, biofuels and bioliquids shall achieve a greenhouse gas emission saving of at least 35 % until 31 December 2017 and at least 50 % from 1 January 2018.~~

The greenhouse gas emission saving from the use of biofuels, ~~and~~ bioliquids ⇒ and biomass fuels used in installations producing heating, cooling and electricity ⇐ shall be calculated in accordance with Article ~~19~~ 28(1).

↓ new

8. Electricity from biomass fuels produced in installations with a fuel capacity equal to or exceeding 20 MW shall be taken into account for the purposes referred to in points (a), (b) and (c) of paragraph 1 only if it is produced applying high efficient cogeneration technology as defined under Article 2(34) of Directive 2012/27/EU of the European Parliament and of the Council. For the purposes of points (a) and (b), this provision shall only apply to installations

⁴⁴ ~~OJL 30, 31.1.2009, p. 16.~~

starting operation after [3 years from date of adoption of this Directive]. For the purposes of point (c), this provision is without prejudice to public support provided under schemes approved by [3 years after date of adoption of this Directive].

The first sub-paragraph shall not apply to electricity from installations which are the object of a specific notification by a Member State to the Commission based on the duly substantiated existence of risks for the security of supply of electricity. Upon assessment of the notification, the Commission shall adopt a decision taking into account the elements included therein.

↓ 2009/28/EC (adapted)
⇒ new

~~7. The Commission shall, every two years, report to the European Parliament and the Council, in respect of both third countries and Member States that are a significant source of biofuels or of raw material for biofuels consumed within the Community, on national measures taken to respect the sustainability criteria set out in paragraphs 2 to 5 and for soil, water and air protection. The first report shall be submitted in 2012.~~

~~The Commission shall, every two years, report to the European Parliament and the Council on the impact on social sustainability in the Community and in third countries of increased demand for biofuel, on the impact of Community biofuel policy on the availability of foodstuffs at affordable prices, in particular for people living in developing countries, and wider development issues. Reports shall address the respect of land-use rights. They shall state, both for third countries and Member States that are a significant source of raw material for biofuel consumed within the Community, whether the country has ratified and implemented each of the following Conventions of the International Labour Organisation:~~

~~— Convention concerning Forced or Compulsory Labour (No 29);~~

~~— Convention concerning Freedom of Association and Protection of the Right to Organise (No 87);~~

~~— Convention concerning Equal Remuneration of Men and Women Workers for Work of Equal Value (No 100);~~

~~— Convention concerning Discrimination in Respect of Employment and Occupation (No 111);~~

~~— Convention concerning Minimum Age for Admission to Employment (No 138);~~

~~— Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour (No 182).~~

~~Those reports shall state, both for third countries and Member States that are a significant source of raw material for biofuel consumed within the Community, whether the country has ratified and implemented:~~

~~— the Cartagena Protocol on Biosafety;~~

~~— the Convention on International Trade in Endangered Species of Wild Fauna and Flora.~~

~~The first report shall be submitted in 2012. The Commission shall, if appropriate, propose corrective action, in particular if evidence shows that biofuel production has a significant impact on food prices.~~

↓ 2009/28/EC (adapted)

⇒ new

(bc) requires information about the sustainability ⇒ and greenhouse gas emissions saving ⇐ characteristics and sizes of the consignments referred to in point (a) to remain assigned to the mixture; and

(ed) provides for the sum of all consignments withdrawn from the mixture to be described as having the same sustainability characteristics, in the same quantities, as the sum of all consignments added to the mixture ⇒ and requires that this balance be achieved over an appropriate period of time ⇐.

↓ new

2. Where a consignment is processed, information on the sustainability and greenhouse gas emissions saving characteristics of the consignment shall be adjusted and assigned to the output in accordance with the following rules:

(a) when the processing of a consignment of raw material yields only one output that is intended for the production of biofuels, bioliquids or biomass fuels, the size of the consignment and the related quantities of sustainability and greenhouse gas emissions saving characteristics shall be adjusted applying a conversion factor representing the ratio between the mass of the output that is intended for the production of biofuels, bioliquids or biomass fuels and the mass of the raw material entering the process;

(b) when the processing of a consignment of raw material yields more than one output that is intended for the production of biofuels, bioliquids or biomass fuels, for each output a separate conversion factor shall be applied and a separate mass balance shall be used.

↓ 2009/28/EC (adapted)

⇒ new

~~2. The Commission shall report to the European Parliament and the Council in 2010 and 2012 on the operation of the mass balance verification method described in paragraph 1 and on the potential for allowing for other verification methods in relation to some or all types of raw material, biofuel or bioliquids. In its assessment, the Commission shall consider those verification methods in which information about sustainability characteristics need not remain physically assigned to particular consignments or mixtures. The assessment shall take into account the need to maintain the integrity and effectiveness of the verification system while avoiding the imposition of an unreasonable burden on industry. The report shall be accompanied, where appropriate, by proposals to the European Parliament and the Council concerning the use of other verification methods.~~

3. Member States shall take measures to ensure that economic operators submit reliable information ⇒ regarding the compliance with the sustainability and greenhouse gas emissions saving criteria set out in Article 26(2) to (7) ⇐ and make available to the Member State, on request, the data that were used to develop the information. Member States shall require economic operators to arrange for an adequate standard of independent auditing of the information submitted, and to provide evidence that this has been done. The auditing shall verify that the systems used by economic operators are accurate, reliable and protected against

fraud. It shall evaluate the frequency and methodology of sampling and the robustness of the data.

~~The information referred to in the first subparagraph shall include in particular information on compliance with the sustainability criteria set out in Article 17(2) to (5), appropriate and relevant information on measures taken for soil, water and air protection, the restoration of degraded land, the avoidance of excessive water consumption in areas where water is scarce and appropriate and relevant information concerning measures taken in order to take into account the issues referred to in the second subparagraph of Article 17(7).~~

↓ 2015/1513 Art. 2.6(a) (adapted)
⇒ new

~~The Commission shall adopt implementing acts in accordance with the examination procedure referred to in Article 25(3), to establish the list of appropriate and relevant information referred to in the first two subparagraphs of this paragraph. The Commission shall ensure, in particular, that the provision of that information does not represent an excessive administrative burden for operators in general or for smallholder farmers, producer organisations and cooperatives in particular.~~

↓ 2009/28/EC (adapted)
⇒ new

The obligations laid down in this paragraph shall apply whether the biofuels, ~~or~~ ⇒ bioliquids, and biomass fuels ⇐ are produced within the ~~Community~~ ⊗ Union ⊗ or imported.

Member States shall submit to the Commission, in aggregated form, the information referred to in the first subparagraph of this paragraph. The Commission shall publish that information on ~~the transparency platform~~ ⇒ the e-reporting platform ⇐ referred to in Article 24 ⇒ of Regulation [Governance] ⇐ in summary form preserving the confidentiality of commercially sensitive information.

~~4. The Community shall endeavour to conclude bilateral or multilateral agreements with third countries containing provisions on sustainability criteria that correspond to those of this Directive. Where the Community has concluded agreements containing provisions relating to matters covered by the sustainability criteria set out in Article 17(2) to (5), the Commission may decide that those agreements demonstrate that biofuels and bioliquids produced from raw materials cultivated in those countries comply with the sustainability criteria in question. When those agreements are concluded, due consideration shall be given to measures taken for the conservation of areas that provide, in critical situations, basic ecosystem services (such as watershed protection and erosion control), for soil, water and air protection, indirect land use changes, the restoration of degraded land, the avoidance of excessive water consumption in areas where water is scarce and to the issues referred to in the second subparagraph of Article 17(7).~~

↓ 2015/1513 Art. 2.6(b) (adapted)
⇒ new

4. The Commission may decide that voluntary national or international schemes setting standards for the production of biomass products contain accurate data for the purposes of Article ~~17(2)~~ 26(7), and/or demonstrate that consignments of biofuels, ~~or~~ ⇒ bioliquids ⇒ or biomass fuels ⇐ comply with the sustainability criteria set out in Article ~~17~~26(2), (3), (4),

~~and (5) and (6), and/or that no materials have been intentionally modified or discarded so that the consignment or part thereof would fall under Annex IX.~~ ⇒ When demonstrating that requirements set out in Article 26(5) and (6) for forest biomass are met, the operators may decide to directly provide the required evidence at the forest holding level. ⇐ ~~The Commission may decide that those schemes contain accurate data for the purposes of information on measures taken for the conservation of areas that provide, in critical situations, basic ecosystem services (such as watershed protection and erosion control), for soil, water and air protection, the restoration of degraded land, the avoidance of excessive water consumption in areas where water is scarce and on the issues referred to in the second subparagraph of Article 17(7).~~ The Commission may also recognise areas for the protection of rare, threatened or endangered ecosystems or species recognised by international agreements or included in lists drawn up by intergovernmental organisations or the International Union for the Conservation of Nature for the purposes of Article ~~2617(23)~~(b)(ii).

↓ 2009/28/EC (adapted)

⇒ new

The Commission may decide that ⇒ those ⇐ ~~voluntary national or international schemes to measure greenhouse gas emission saving~~ contain accurate data ⇒ information on measures taken ⇐ ~~for the purposes of Article 17(2).~~ ⇒ soil, water and air protection, the restoration of degraded land, the avoidance of excessive water consumption in areas where water is scarce, and for certification of biofuels and bioliquids with low indirect land-use change-risk ⇐ .

~~The Commission may decide that land that falls within the scope of a national or regional recovery programme aimed at improving severely degraded or heavily contaminated land fulfils the criteria referred to in point 9 of part C of Annex V.~~

5. The Commission shall adopt decisions under paragraph 4 only if the ~~agreement or~~ scheme in question meets adequate standards of reliability, transparency and independent auditing. In the case of schemes to measure greenhouse gas emission saving, such schemes shall also comply with the methodological requirements in Annex V ⇒ or Annex VI ⇐ . Lists of areas of high biodiversity value as referred to in Article ~~2617(23)~~(b)(ii) shall meet adequate standards of objectivity and coherence with internationally recognised standards and provide for appropriate appeal procedures.

↓ 2015/1513 Art. 2.6(c) (adapted)

⇒ new

The voluntary schemes referred to in paragraph 4 ('the voluntary schemes') shall regularly, and at least once per year, publish a list of their certification bodies used for independent auditing, indicating for each certification body by which entity or national public authority it was recognised and which entity or national public authority is monitoring it.

In order ⇒ to ensure that compliance with the sustainability and greenhouse gas emissions saving criteria is verified in an efficient and harmonised manner and ⇐ in particular to prevent fraud, the Commission may, ~~on the basis of a risk analysis or the reports referred to in the second subparagraph of paragraph 6 of this Article,~~ specify the ⇒ detailed implementing rules, including adequate ⇐ standards of ⇒ reliability, transparency and ⇐ independent auditing and require all voluntary schemes to apply those standards. ⇒ When specifying these standards, the Commission shall pay special attention to the need to minimize administrative burden. ⇐ This shall be done by means of implementing acts adopted in accordance with the examination procedure referred to in Article ~~25~~ 31 (3). Such acts shall set

a time frame by which voluntary schemes need to implement the standards. The Commission may repeal decisions recognising voluntary schemes in the event that those schemes fail to implement such standards in the time frame provided for.

↓ 2015/1513 Art. 2.6(d) (adapted)
⇒ new

6. Decisions under paragraph 4 of this Article shall be adopted in accordance with the examination procedure referred to in Article ~~2531~~(3). Such decisions shall be valid for a period of no more than five years.

The Commission shall require that each voluntary scheme on which a decision has been adopted under paragraph 4 submit by 6 October 2016 and annually thereafter by 30 April, a report to the Commission covering each of the points set out in the third subparagraph of this paragraph. Generally, the report shall cover the preceding calendar year. The first report shall cover at least six months from 9 September 2015. The requirement to submit a report shall apply only to voluntary schemes that have operated for at least 12 months.

~~By 6 April 2017, and thereafter within its reports in accordance with Article 23(3), the Commission shall submit a report to the European Parliament and to the Council analysing the reports referred to in the second subparagraph of this paragraph, reviewing the operation of the agreements referred to in paragraph 4 or voluntary schemes in respect of which a decision has been adopted in accordance with this Article, and identifying best practices. The report shall be based on the best information available, including following consultations with stakeholders, and on practical experience in the application of the agreements or schemes concerned. The report shall analyse the following:~~

~~in general:~~

~~(a) the independence, modality and frequency of audits, both in relation to what is stated on those aspects in the scheme documentation, at the time the scheme concerned was approved by the Commission, and in relation to industry best practice;~~

~~(b) the availability of, and experience and transparency in the application of, methods for identifying and dealing with non-compliance, with particular regard to dealing with situations or allegations of serious wrongdoing on the part of members of the scheme;~~

~~(c) transparency, particularly in relation to the accessibility of the scheme, the availability of translations in the applicable languages of the countries and regions from which raw materials originate, the accessibility of a list of certified operators and relevant certificates, and the accessibility of auditor reports;~~

~~(d) stakeholder involvement, particularly as regards the consultation of indigenous and local communities prior to decision making during the drafting and reviewing of the scheme as well as during audits and the response to their contributions;~~

~~(e) the overall robustness of the scheme, particularly in light of rules on the accreditation, qualification and independence of auditors and relevant scheme bodies;~~

~~(f) market updates of the scheme, the amount of feedstocks and biofuels certified, by country of origin and type, the number of participants;~~

~~(g) the ease and effectiveness of implementing a system that tracks the proofs of conformity with the sustainability criteria that the scheme gives to its member(s), such a system intended to serve as a means of preventing fraudulent activity with a view, in particular, to the detection, treatment and follow-up of suspected fraud and other irregularities and where appropriate, number of cases of fraud or irregularities detected;~~

~~and in particular:~~

~~(h) options for entities to be authorised to recognise and monitor certification bodies;~~

~~(i) criteria for the recognition or accreditation of certification bodies;~~

~~(j) rules on how the monitoring of the certification bodies is to be conducted;~~

~~(k) ways to facilitate or improve the promotion of best practice.~~

The Commission shall make the reports drawn up by the voluntary schemes available, in an aggregated form or in full if appropriate, on the ~~transparency~~ ⇒ e-reporting ⇐ platform referred to in Article 24 ⇒ of Regulation [Governance] ⇐.

⇓ new

Member States may set up national schemes where compliance with the sustainability and greenhouse gas emissions saving criteria set out in Article 26(2) to (7) is verified throughout the entire chain of custody involving competent national authorities.

⇓ 2015/1513 Art. 2.6(d) (adapted)

⇒ new

A Member State may notify its national scheme to the Commission. The Commission shall give priority to the assessment of such a scheme. A decision on the compliance of such a notified national scheme with the conditions set out in this Directive shall be adopted in accordance with the examination procedure referred to in Article ~~2531~~(3), in order to facilitate mutual bilateral and multilateral recognition of schemes for verification of compliance with the sustainability ⇒ and greenhouse gas emissions saving ⇐ criteria for biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐ . Where the decision is positive, schemes established in accordance with this Article shall not refuse mutual recognition with that Member State's scheme, as regards the verification of compliance with the sustainability ⇒ and greenhouse gas emissions saving ⇐ criteria set out in Article ~~2617~~(2) to (~~75~~).

⇓ 2009/28/EC (adapted)

⇒ new

7. When an economic operator provides proof or data obtained in accordance with ~~an agreement or~~ a scheme that has been the subject of a decision pursuant to paragraph 4 ⇒ or 6 ⇐ , to the extent covered by that decision, a Member State shall not require the supplier to provide further evidence of compliance with the sustainability ⇒ and greenhouse gas emissions saving ⇐ criteria set out in Article ~~2617~~(2) to (~~75~~) ~~nor information on measures referred to in the second subparagraph of paragraph 3 of this Article.~~

↓ new

Competent authorities of the Member States shall be allowed to supervise the operation of certification bodies that are accredited by the national accreditation body and are conducting independent auditing under a voluntary scheme.

↓ 2015/1513 Art. 2.6(e)

~~8. At the request of a Member State or on its own initiative, the Commission shall examine the application of Article 17 in relation to a source of biofuel and, within six months of receipt of a request decide, in accordance with the examination procedure referred to in Article 25(3), whether the Member State concerned may take biofuel from that source into account for the purposes of Article 17(1).~~

↓ 2009/28/EC

~~9. By 31 December 2012, the Commission shall report to the European Parliament and to the Council on:~~

~~(a) the effectiveness of the system in place for the provision of information on sustainability criteria; and~~

~~(b) whether it is feasible and appropriate to introduce mandatory requirements in relation to air, soil or water protection, taking into account the latest scientific evidence and the Community's international obligations.~~

~~The Commission shall, if appropriate, propose corrective action.~~

↓ 2009/28/EC Article 19 1.2.
(adapted)
⇒ new

Article ~~19~~28

Calculation of the greenhouse gas impact of biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐

1. For the purposes of Article ~~26 (7)~~~~17 (2)~~, the greenhouse gas emission saving from the use of biofuel, ~~and~~ bioliquids ⇒ and biomass fuels ⇐ shall be calculated as follows:

(a) where a default value for greenhouse gas emission saving for the production pathway is laid down in part A or B of Annex V ⇒ for biofuels and bioliquids ⇐ and ⇒ in part A or B of Annex VI for biomass fuels ⇐ where the e_l value for those biofuels or bioliquids calculated in accordance with point 7 of part C of Annex V ⇒ and for those biomass fuels calculated in accordance with point 7 of part B of Annex VI ⇐ is equal to or less than zero, by using that default value;

(b) by using an actual value calculated in accordance with the methodology laid down in part C of Annex V ⇒ for biofuels and bioliquids and in part B of Annex VI for biomass fuels ⇐ ; ~~or~~

(c) by using a value calculated as the sum of the factors of the ~~formula~~ ⊗ formulas ⊗ referred to in point 1 of part C of Annex V, where disaggregated

default values in part D or E of Annex V may be used for some factors, and actual values, calculated in accordance with the methodology laid down in part C of Annex V, for all other factors; ☒ or ☒

↓ new

(d) by using a value calculated as the sum of the factors of the formulas referred to in point 1 of part B of Annex VI, where disaggregated default values in part C of Annex VI may be used for some factors, and actual values, calculated in accordance with the methodology laid down in part B of Annex VI, for all other factors.

↓ 2009/28/EC Article 19 1.2.
(adapted)
⇒ new

2. ~~By 31 March 2010, Member States shall~~ ⇒ may ⇐ submit to the Commission ~~a report~~ ☒ reports ☒ including ~~a list~~ ⇒ information on the typical greenhouse gas emissions from cultivation of agricultural raw materials ⇐ of those areas on their territory classified as level 2 in the nomenclature of territorial units for statistics (NUTS) or as a more disaggregated NUTS level in accordance with Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS)⁴⁵ where the typical greenhouse gas emissions from cultivation of agricultural raw materials can be expected to be lower than or equal to the emissions reported under the heading 'Disaggregated default values for cultivation' in part D of Annex V to this Directive, accompanied by a description of the method and data used to establish that list. ⇒ The reports shall be accompanied by a description of the method and data sources used to calculate the level of emissions. ⇐ That method shall take into account soil characteristics, climate and expected raw material yields.

↓ 2015/1513 Art. 2.7(a) (adapted)
⇒ new

3. ~~The typical greenhouse gas emissions from cultivation of agricultural raw materials included in the reports referred to in paragraph 2 in the case of Member States, and, in the case of territories outside the Union, in reports equivalent to those referred to in paragraph 2 and drawn up by competent bodies, may be reported to the Commission.~~

4. The Commission may decide, by means of an implementing act adopted in accordance with the examination procedure referred to in Article ~~3125(23)~~ 26(7), that the reports referred to in paragraphs 2 ☒ and 3 ☒ of this Article contain accurate data for the purposes of measuring the greenhouse gas emissions associated with the cultivation of ⇒ agriculture biomass ⇐ biofuel and bioliquid feedstocks typically produced in those ☒ the ☒ areas ☒ included in such reports ☒ for the purposes of Article ~~17(2)~~ 26(7). ⇒ These data may therefore be used instead of the disaggregated default values for cultivation laid down in part D or E of Annex V. ⇐

~~5. By 31 December 2012 at the latest and every two years thereafter, the Commission shall draw up and publish a report on the estimated typical and default values in parts B and E of Annex V, paying special attention to greenhouse gas emissions from transport and processing.~~

⁴⁵ OJ L 154, 21.6.2003, p. 1.

~~In the event that the reports referred to in the first subparagraph indicate that the estimated typical and default values in parts B and E of Annex V might need to be adjusted on the basis of the latest scientific evidence, the Commission shall, as appropriate, submit a legislative proposal to the European Parliament and to the Council.~~

↓ 2015/1513 Art. 2.7(c) (adapted)
⇒ new

~~57. The Commission shall keep Annex V ⇒ and Annex VI ⇐ under review, with a view, where justified, to the addition of ⇒ or revise ⇐ values for further biofuel ⇒, bioliquid and biomass fuel ⇐ production pathways for the same or for other raw materials. That review shall also consider the modification of the methodology laid down in part C of Annex V ⇒ and in part B of Annex VI ⇐, particularly with regard to:~~

~~the method of accounting for wastes and residues;~~

~~the method of accounting for co-products;~~

~~the method of accounting for cogeneration; and~~

~~– the status given to agricultural crop residues as co-products.~~

~~The default values for waste vegetable or animal oil biodiesel shall be reviewed as soon as possible. In the event that the Commission's review concludes that additions ⇒ changes ⇐ to Annex V ⇒ or Annex VI ⇐ should be made, the Commission ☒ is ☒ shall be empowered to adopt delegated acts pursuant to Article 3225a to add, but not to remove or amend, estimated typical and default values in parts A, B, D and E of Annex V for biofuel and bioliquid pathways for which specific values are not yet included in that Annex.~~

↓ 2009/28/EC (adapted)
⇒ new

☒ In the case of ☒ ~~Any~~ adaptation of or addition to the list of default values in Annex V ⇒ and Annex VI ⇐ ~~shall comply with the following:~~

~~(a) where the contribution of a factor to overall emissions is small, or where there is limited variation, or where the cost or difficulty of establishing actual values is high, default values ~~must~~ ☒ shall ☒ be typical of normal production processes.~~

~~(b) in all other cases default values must be conservative compared to normal production processes.~~

↓ 2015/1513 Art. 2.7(d)
(adapted)
⇒ new

~~68. Where necessary in order to ensure the uniform application of point 9 of Part C of Annex V ⇒ and Part B of Annex VI ⇐, the Commission may adopt implementing acts setting out detailed technical specifications ☒ including ☒ ~~and~~ definitions ⇒, conversion factors, calculation of annual cultivation emissions and/ or emission savings caused by changes above and below-ground carbon stocks on already cultivated land, calculation of emission savings from carbon capture, carbon replacement and carbon geological storage ⇐. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 31 ~~25~~ (23).~~

↓ 2009/28/EC (adapted)
⇒ new

Article ~~20~~29

Implementing measures

The implementing measures referred to in the second subparagraph of Article 26(2)~~17(3)~~ ⇒ and (6) ⇐ , ~~the third subparagraph of Article 18(3), Article 27 18(6), Article 18(8), Article 19(5), the first subparagraph of Article 28(5) ☒ and Article 28(6) ☒ 19(7), and Article 19(8)~~ shall also take full account of the purposes of Article 7a of Directive 98/70/EC.

↓ 2009/28/EC

Article 22

Reporting by the Member States

~~1. Each Member State shall submit a report to the Commission on progress in the promotion and use of energy from renewable sources by 31 December 2011, and every two years thereafter. The sixth report, to be submitted by 31 December 2021, shall be the last report required.~~

~~The report shall detail, in particular:~~

~~(a) the sectoral (electricity, heating and cooling, and transport) and overall shares of energy from renewable sources in the preceding two calendar years and the measures taken or planned at national level to promote the growth of energy from renewable sources taking into account the indicative trajectory in part B of Annex I, in accordance with Article 5;~~

~~(b) the introduction and functioning of support schemes and other measures to promote energy from renewable sources, and any developments in the measures used with respect to those set out in the Member State's national renewable energy action plan, and information on how supported electricity is allocated to final customers for purposes of Article 3(6) of Directive 2003/54/EC;~~

~~(c) how, where applicable, the Member State has structured its support schemes to take into account renewable energy applications that give additional benefits in relation to other, comparable applications, but may also have higher costs, including biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material;~~

~~(d) the functioning of the system of guarantees of origin for electricity and heating and cooling from renewable energy sources and the measures taken to ensure the reliability and protection against fraud of the system;~~

~~(e) progress made in evaluating and improving administrative procedures to remove regulatory and non-regulatory barriers to the development of energy from renewable sources;~~

~~(f) measures taken to ensure the transmission and distribution of electricity produced from renewable energy sources, and to improve the framework or rules for bearing and sharing of costs referred to in Article 16(3);~~

~~(g) developments in the availability and use of biomass resources for energy purposes;~~

~~(h) changes in commodity prices and land use within the Member State associated with its increased use of biomass and other forms of energy from renewable sources;~~

↓ 2015/1513 Art. 2.9(a)

~~(i) the development and share of biofuels made from feedstocks listed in Annex IX including a resource assessment focusing on the sustainability aspects relating to the effect of the replacement of food and feed products for biofuel production, taking due account of the principles of the waste hierarchy established in Directive 2008/98/EC and the biomass cascading principle, taking into consideration the regional and local economic and technological circumstances, the maintenance of the necessary carbon stock in the soil and the quality of the soil and the ecosystems;~~

↓ 2009/28/EC

~~(j) the estimated impact of the production of biofuels and bioliquids on biodiversity, water resources, water quality and soil quality within the Member State;~~

~~(k) the estimated net greenhouse gas emission saving due to the use of energy from renewable sources;~~

~~(l) the estimated excess production of energy from renewable sources compared to the indicative trajectory which could be transferred to other Member States, as well as the estimated potential for joint projects, until 2020;~~

~~(m) the estimated demand for energy from renewable sources to be satisfied by means other than domestic production until 2020;~~

~~(n) information on how the share of biodegradable waste in waste used for producing energy has been estimated, and what steps have been taken to improve and verify such estimates; and~~

↓ 2015/1513 Art. 2.9(b)

~~(o) the amounts of biofuels and bioliquids in energy units corresponding to each category of feedstock group listed in part A of Annex VIII taken into account by that Member State for the purpose of complying with the targets set out in Article 3(1) and (2), and in the first subparagraph of Article 3(4).~~

↓ 2009/28/EC

~~2. In estimating net greenhouse gas emission saving from the use of biofuels, the Member State may, for the purpose of the reports referred to in paragraph 1, use the typical values given in part A and part B of Annex V.~~

~~3. In its first report, the Member State shall outline whether it intends to:~~

~~(a) establish a single administrative body responsible for processing authorisation, certification and licensing applications for renewable energy installations and providing assistance to applicants;~~

~~(b) provide for automatic approval of planning and permit applications for renewable energy installations where the authorising body has not responded within the set time limits; or~~

~~(c) indicate geographical locations suitable for exploitation of energy from renewable sources in land-use planning and for the establishment of district heating and cooling;~~

~~4. In each report the Member State may correct the data of the previous reports.~~

↓ 2009/28/EC (adapted)
→₁ 2015/1513 Art. 2.10(a)
⇒ new

Article ~~23~~30

Monitoring ~~and reporting~~ by the Commission

1. The Commission shall monitor the origin of biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐ consumed in the ~~Community~~ ⊗ Union ⊗ and the impact of their production, including impact as a result of displacement, on land use in the ~~Community~~ ⊗ Union ⊗ and the main third countries of supply. Such monitoring shall be based on Member States' ⇒ integrated national energy and climate plans and corresponding progress ⇐ reports ⇒ required in Articles 3, 15 and 18 of the Regulation [Governance] ⇐, ~~submitted pursuant to Article 22(1)~~, and those of relevant third countries, intergovernmental organisations, scientific studies and any other relevant pieces of information. The Commission shall also monitor the commodity price changes associated with the use of biomass for energy and any associated positive and negative effects on food security. →₁ --- ←

2. The Commission shall maintain a dialogue and exchange information with third countries and biofuel, ⇒ bioliquid and biomass fuel ⇐ producers, consumer organisations and civil society concerning the general implementation of the measures in this Directive relating to biofuels, ~~and~~ bioliquids ⇒ and biomass fuels ⇐. It shall, within that framework, pay particular attention to the impact ⊗ that ⊗ biofuel ⇒ and bioliquid ⇐ production may have on food prices.

~~3. On the basis of the reports submitted by Member States pursuant to Article 22(1) and the monitoring and analysis referred to in paragraph 1 of this Article, the Commission shall report every two years to the European Parliament and the Council. The first report shall be submitted in 2012.~~

↓ 2015/1513 Art. 2.10(b)

~~4. In reporting on greenhouse gas emission savings from the use of biofuels and bioliquids, the Commission shall use the amounts reported by Member States in accordance with point (e) of Article 22(1), including the provisional mean values of the estimated indirect land use change emissions and the associated range derived from the sensitivity analysis as set out in Annex VIII. The Commission shall make data on the provisional mean values of the estimated indirect land use change emissions and the associated range derived from the sensitivity analysis publicly available. In addition, the Commission shall evaluate whether and how the estimate for direct emission savings would change if co-products were accounted for using the substitution approach.~~

↓ 2009/28/EC

~~5. In its reports, the Commission shall, in particular, analyse:~~

~~(a) the relative environmental benefits and costs of different biofuels, the effects of the Community's import policies thereon, the security of supply implications and the ways of achieving a balanced approach between domestic production and imports;~~

~~(b) the impact of increased demand for biofuel on sustainability in the Community and in third countries, considering economic and environmental impacts, including impacts on biodiversity;~~

~~(c) the scope for identifying, in a scientifically objective manner, geographical areas of high biodiversity value that are not covered in Article 17(3);~~

~~(d) the impact of increased demand for biomass on biomass using sectors;~~

↓ 2015/1513 Art. 2.10(c)

~~(e) the availability and sustainability of biofuels made from feedstocks listed in Annex IX, including an assessment of the effect of the replacement of food and feed products for biofuel production, taking due account of the principles of the waste hierarchy established in Directive 2008/98/EC and the biomass cascading principle, taking into consideration the regional and local economic and technological circumstances, the maintenance of the necessary carbon stock in the soil and the quality of soil and ecosystems;~~

~~(f) information on, and analysis of, the available scientific research results regarding indirect land use change in relation to all production pathways, accompanied by an assessment of whether the range of uncertainty identified in the analysis underlying the estimations of indirect land use change emissions can be narrowed and the possible impact of Union policies, such as environment, climate and agricultural policies, can be factored in; and~~

~~(g) technological developments and availability of data on the use, economic and environmental impacts of biofuels and bioliquids produced in the Union from dedicated non-food crops grown primarily for energy purposes.~~

↓ 2009/28/EC

~~The Commission shall, if appropriate, propose corrective action.~~

~~6. On the basis of the reports submitted by Member States pursuant to Article 22(3), the Commission shall analyse the effectiveness of measures taken by Member States on establishing a single administrative body responsible for processing authorisation, certification and licensing applications and providing assistance to applicants.~~

~~7. In order to improve financing and coordination with a view to the achievement of the 20 % target referred to in Article 3(1), the Commission shall, by 31 December 2010, present an analysis and action plan on energy from renewable sources with a view, in particular, to:~~

~~(a) the better use of structural funds and framework programmes;~~

~~(b) the better and increased use of funds from the European Investment Bank and other public finance institutions;~~

~~(c) better access to risk capital notably by analysing the feasibility of a risk sharing facility for investments in energy from renewable sources in the Community similar to the Global Energy Efficiency and Renewable Energy Fund initiative which is aimed at third countries;~~

~~(d) the better coordination of Community and national funding and other forms of support; and~~

~~(e) the better coordination in support of renewable energy initiatives whose success depends on action by actors in several Member States.~~

~~8. By 31 December 2014, the Commission shall present a report, addressing, in particular, the following elements:~~

~~(a) a review of the minimum greenhouse gas emission saving thresholds to apply from the dates referred to in the second subparagraph of Article 17(2), on the basis of an impact assessment taking into account, in particular, technological developments, available technologies and the availability of first and second generation bio fuels with a high level of greenhouse gas emission saving;~~

↓ 2015/1513 Art. 2.10(d)

~~(b) with respect to the targets referred to in Article 3(4), a review of:~~

~~(i) the cost efficiency of the measures to be implemented to achieve the targets;~~

~~(ii) an assessment of the feasibility of reaching the targets whilst ensuring the sustainability of biofuels production in the Union and in third countries, and considering economic, environmental and social impacts, including indirect effects and impacts on biodiversity, as well as the commercial availability of second generation biofuels;~~

~~(iii) the impact of the implementation of the targets on the availability of foodstuffs at affordable prices;~~

~~(iv) the commercial availability of electric, hybrid and hydrogen-powered vehicles, as well as the methodology chosen to calculate the share of energy from renewable sources consumed in the transport sector;~~

~~(v) the evaluation of specific market conditions, considering, in particular, markets in which transport fuels represent more than half of the final energy consumption, and markets which are fully dependent on imported biofuels;~~

↓ 2009/28/EC (adapted)

⇒ new

~~(c) an evaluation of the implementation of this Directive, in particular with regard to cooperation mechanisms, in order to ensure that, together with the possibility for the Members States to continue to use national support schemes referred to in Article 3(3), those mechanisms enable Member States to achieve the national targets defined in Annex I on the best cost benefit basis, of technological developments, and the conclusions to be drawn to achieve the target of 20 % of energy from renewable sources at Community level.~~

~~On the basis of that report, the Commission shall submit, if appropriate, proposals to the European Parliament and the Council, addressing the above elements and in particular:~~

~~for the element contained in point (a), a modification of the minimum greenhouse gas emission saving referred to in that point, and~~

~~for the element contained in point (c), appropriate adjustments of the cooperation measures provided for in this Directive in order to improve their effectiveness for achieving the target of 20 %. Such proposals shall neither affect the 20 % target nor Member States' control over national support schemes and cooperation measures.~~

~~39. In 2018 \boxtimes 2026 $\langle \boxtimes \rangle$, the Commission shall present a Renewable Energy Roadmap for the post-2020 \Rightarrow legislative proposal on the regulatory framework for the promotion of renewable energy for the post-2030 \Leftarrow period.~~

~~That roadmap shall, if appropriate, be accompanied by proposals to the European Parliament and the Council for the period after 2020. The roadmap \Rightarrow This proposal \Leftarrow shall take into account the experience of the implementation of this Directive \Rightarrow , including its sustainability and greenhouse gas saving criteria, \Leftarrow and technological developments in energy from renewable sources.~~

~~440. In 2024 \boxtimes 2032 $\langle \boxtimes \rangle$, the Commission shall present a report reviewing the application of this Directive. That report shall, in particular, address the role of the following elements in having enabled Member States to achieve the national targets defined in Annex I on the best cost-benefit basis:~~

~~(a) the process of preparing forecasts and national renewable energy action plans;~~

~~(b) the effectiveness of the cooperation mechanisms;~~

~~(c) technological developments in energy from renewable sources, including the development of the use of biofuels in commercial aviation;~~

~~(d) the effectiveness of the national support schemes; and~~

~~(e) the conclusions of the Commission reports referred to in paragraphs 8 and 9.~~

~~Article 24~~

~~Transparency platform~~

~~1. The Commission shall establish an online public transparency platform. That platform shall serve to increase transparency, and facilitate and promote cooperation between Member States, in particular concerning statistical transfers referred to in Article 6 and joint projects referred to in Articles 7 and 9. In addition, the platform may be used to make public relevant information which the Commission or a Member State deems to be of key importance to this Directive and to the achievement of its objectives.~~

~~2. The Commission shall make public on the transparency platform the following information, where appropriate in aggregated form, preserving the confidentiality of commercially sensitive information:~~

~~(a) Member States' national renewable energy action plans;~~

~~(b) Member States' forecast documents referred to in Article 4(3), complemented as soon as possible with the Commission's summary of excess production and estimated import demand;~~

~~(c) Member States' offers to cooperate on statistical transfers or joint projects, upon request of the Member State concerned;~~

~~(d) the information referred to in Article 6(2) on the statistical transfers between Member States;~~

~~(e) the information referred to in Article 7(2) and (3) and Article 9(4) and (5) on joint projects;~~

~~(f) Member States' national reports referred to in Article 22;~~

~~(g) the Commission reports referred to in Article 23(3).~~

~~However, upon request of the Member State that submitted the information, the Commission shall not make public Member States' forecast documents referred to in Article 4(3), or the information in Member States' national reports referred to in Article 22(1)(l) and (m).~~

↓ 2015/1513 Art. 2.

⇒ new

Article 2531

Committee procedure

1. ~~Except in the cases referred to in paragraph 2, the~~ The Commission shall be assisted by the ~~Committee on Renewable Energy Sources~~ ⇒ Energy Union Governance Committee ⇐ . That committee shall be a committee within the meaning of Regulation (EU) No 182/2011 of the European Parliament and of the Council⁴⁶ ⇒ and work in the respective sectorial formations relevant for this Regulation ⇐ .

~~2. For matters relating to the sustainability of biofuels and bioliquids, the Commission shall be assisted by the Committee on the Sustainability of Biofuels and Bioliquids. That committee shall be a committee within the meaning of Regulation (EU) No 182/2011.~~

~~23.~~ Where reference is made to this paragraph, Article 5 of Regulation (EU) No 182/2011 shall apply.

Where the Committee delivers no opinion, the Commission shall not adopt the draft implementing act and the third subparagraph of Article 5(4) of Regulation (EU) No 182/2011 shall apply.

↓ 2015/1513 Art. 2.12 (adapted)

⇒ new

Article 2532

Exercise of the delegation

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.

2. The power to adopt delegated acts referred to in Articles ~~3(6)~~ ~~3(5)~~ ~~7(5)~~ ~~5(5)~~ ~~7(6)~~; 19(11), 19(14), 25(6) ~~and~~ ~~28(5)~~ ~~19(7)~~ shall be conferred on the Commission for a period of five years from ~~5 October 2015~~ ~~1st January 2021~~ .

⁴⁶ Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13).

3. The delegation of power referred to in Articles ~~3(6)~~ ~~3(5)~~ ~~7(5)~~ ~~5(5)~~ ~~7(6)~~; 19(11), 19(14), 25(6) and ~~28(5)~~ ~~19(7)~~

may be revoked at any time by the European Parliament or by the Council. A decision of revocation shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in the *Official Journal of the European Union* or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.

4. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement on Better Law-Making of 13 April 2016.

↓ 2015/1513 Art. 2.12 (adapted)
⇒ new

45. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.

56. A delegated act adopted pursuant to Articles ~~3(6)~~ ~~3(5)~~ ~~7(5)~~ ~~5(5)~~ ~~7(6)~~; 19(11), 19(14), 25(6) and ~~28(5)~~ ~~19(7)~~ and ~~28(5)~~ ~~19(7)~~ shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of two months of notification of that act to the European Parliament and the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by two months at the initiative of the European Parliament or the Council.

↓ 2009/28/EC (adapted)

~~Article 26~~

~~Amendments and repeal~~

~~1. In Directive 2001/77/EC, Article 2, Article 3(2), and Articles 4 to 8 shall be deleted with effect from 1 April 2010.~~

~~2. In Directive 2003/30/EC, Article 2, Article 3(2), (3) and (5), and Articles 5 and 6 shall be deleted with effect from 1 April 2010.~~

~~3. Directives 2001/77/EC and 2003/30/EC shall be repealed with effect from 1 January 2012.~~

↓ 2009/28/EC (adapted)
⇒ new

~~Article 27~~33

~~Transposition~~

1. Without prejudice to Article 4(1), (2) and (3), Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with the Directive ~~by 30 June 2021, at the latest~~ ~~by 5 December 2010~~ ~~except for Article 14 and Annexes I, II, IV, VII and VIII~~ ~~by 30 June 2021, at the latest~~ ~~by 5 December 2010~~ ~~except for Article 14 and Annexes I, II, IV, VII and VIII~~. They shall immediately communicate the text of those measures to the Commission.

When Member States adopt ~~⊗~~ those ~~⊗~~ measures, they shall contain a reference to this Directive or shall be accompanied by such a reference on the occasion of their official publication. ~~The methods of making such a reference shall be laid down by the Member States.~~ ~~⊗~~ They shall also include a statement that references in existing laws, regulations and administrative provisions to the Directives repealed by this Directive shall be construed as references to this Directive. Member States shall determine how such reference is to be made and how that statement is to be formulated. ~~⊗~~

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

↓ new

Article 34

Repeal

Directive 2009/28/EC, as amended by the Directives listed in part A of Annex XI is repealed with effect from 1 January 2021, without prejudice to the obligations of the Member States relating to the time-limits for the transposition into national law of the Directives set out in Annex XI, Part B.

References to the repealed Directive shall be construed as references to this Directive and shall be read in accordance with the correlation table in Annex XII.

↓ 2009/28/EC (adapted)

Article ~~28~~35

Entry into force

This Directive shall enter into force on ~~the 20th day following its publication in the Official Journal of the European Union~~ ~~⊗~~ 1 January 2021 ~~⊗~~.

Article ~~29~~36

Addressees

This Directive is addressed to the Member States.

Done at Brussels,

For the European Parliament
The President

For the Council
The President



EUROPEAN
COMMISSION

Brussels, 30.11.2016
COM(2016) 767 final

ANNEXES 1 to 12

ANNEXES

to the

**Proposal for a Directive of the European Parliament and the Council on the promotion
of the use of energy from renewable sources (recast)**

{SWD(2016) 416 final}
{SWD(2016) 417 final}
{SWD(2016) 418 final}
{SWD(2016) 419 final}

ANNEX I

National overall targets for the share of energy from renewable sources in gross final consumption of energy in 2020¹

A. NATIONAL OVERALL TARGETS

| | Share of energy from renewable sources in gross final consumption of energy, 2005 (S ₂₀₀₅) | Target for share of energy from renewable sources in gross final consumption of energy, 2020 (S ₂₀₂₀) |
|----------------|--|---|
| Belgium | 2,2 % | 13 % |
| Bulgaria | 9,4 % | 16 % |
| Czech Republic | 6,1 % | 13 % |
| Denmark | 17,0 % | 30 % |
| Germany | 5,8 % | 18 % |
| Estonia | 18,0 % | 25 % |
| Ireland | 3,1 % | 16 % |
| Greece | 6,9 % | 18 % |
| Spain | 8,7 % | 20 % |
| France | 10,3 % | 23 % |
| ⇒ Croatia ⇐ | ⇒ 12,6% ⇐ | ⇒ 20% ⇐ |
| Italy | 5,2 % | 17 % |
| Cyprus | 2,9 % | 13 % |
| Latvia | 32,6 % | 40 % |
| Lithuania | 15,0 % | 23 % |
| Luxembourg | 0,9 % | 11 % |
| Hungary | 4,3 % | 13 % |

¹ In order to be able to achieve the national objectives set out in this Annex, it is underlined that the State aid guidelines for environmental protection recognise the continued need for national mechanisms of support for the promotion of energy from renewable sources.

| | | |
|-----------------|--------|------|
| Malta | 0,0 % | 10 % |
| Netherlands | 2,4 % | 14 % |
| Austria | 23,3 % | 34 % |
| Poland | 7,2 % | 15 % |
| Portugal | 20,5 % | 31 % |
| Romania | 17,8 % | 24 % |
| Slovenia | 16,0 % | 25 % |
| Slovak Republic | 6,7 % | 14 % |
| Finland | 28,5 % | 38 % |
| Sweden | 39,8 % | 49 % |
| United Kingdom | 1,3 % | 15 % |

~~**B. INDICATIVE TRAJECTORY**~~

~~The indicative trajectory referred to in Article 3(2) shall consist of the following shares of energy from renewable sources:~~

~~$S_{2005} + 0,20 (S_{2020} - S_{2005})$, as an average for the two year period 2011 to 2012;~~

~~$S_{2005} + 0,30 (S_{2020} - S_{2005})$, as an average for the two year period 2013 to 2014;~~

~~$S_{2005} + 0,45 (S_{2020} - S_{2005})$, as an average for the two year period 2015 to 2016; and~~

~~$S_{2005} + 0,65 (S_{2020} - S_{2005})$, as an average for the two year period 2017 to 2018;~~

~~where~~

~~S_{2005} = the share for that Member State in 2005 as indicated in the table in part A,~~

~~and~~

~~S_{2020} = the share for that Member State in 2020 as indicated in the table in part A.~~

ANNEX II

Normalisation rule for accounting for electricity generated from hydropower and wind power

The following rule shall be applied for the purpose of accounting for electricity generated from hydropower in a given Member State:

$(Q_{N(norm)}) / (C_N \cdot [((i) / (N - 14)) \cdot (Q_i / C_i)]^{15})$ where:

| | | |
|---------------|---|---|
| N | = | reference year; |
| $Q_{N(norm)}$ | = | normalised electricity generated by all hydropower plants of the Member State in year N , for accounting purposes; |
| Q_i | = | the quantity of electricity actually generated in year i by all hydropower plants of the Member State measured in GWh, excluding production from pumped storage units using water that has previously been pumped uphill; |
| C_i | = | the total installed capacity, net of pumped storage, of all hydropower plants of the Member State at the end of year i , measured in MW. |

The following rule shall be applied for the purpose of accounting for electricity generated from wind power in a given Member State:

$(Q_{N(norm)}) / ((C_N / C_{N-12}) \cdot [((i) / (N-n)) \cdot (Q_i / (C_j / C_{j-12}))])$ where:

| | | |
|---------------|---|--|
| N | = | reference year; |
| $Q_{N(norm)}$ | = | normalised electricity generated by all wind power plants of the Member State in year N , for accounting purposes; |
| Q_i | = | the quantity of electricity actually generated in year i by all wind power plants of the Member State measured in GWh; |
| C_j | = | the total installed capacity of all the wind power plants of the Member State at the end of year j , measured in MW; |
| n | = | 4 or the number of years preceding year N for which capacity and production data are available for the Member State in question, whichever is lower. |

ANNEX III

Energy content of transport fuels

| Fuel | Energy content by weight (lower calorific value, MJ/kg) | Energy content by volume (lower calorific value, MJ/l) |
|---|---|--|
| FUELS FROM BIOMASS AND/ OR BIOMASS PROCESSING OPERATIONS | | |
| Bio-Propane | 46 | 24 |
| Pure vegetable oil (oil produced from oil plants through pressing, extraction or comparable procedures, crude or refined but chemically unmodified) | 37 | 34 |
| Biodiesel - fatty acid methyl ester (methyl-ester produced from oil of vegetable, animal or aquatic biomass origin) | 37 | 33 |
| Biodiesel - fatty acid ethyl ester (ethyl-ester produced from oil of vegetable, animal or aquatic biomass origin) | 38 | 34 |
| Biogas that can be purified to natural gas quality | 50 | - |
| Hydrotreated (thermochemically treated with hydrogen) oil of vegetable, animal or aquatic biomass origin, to be used for replacement of diesel | 44 | 34 |
| Hydrotreated (thermochemically treated with hydrogen) oil of vegetable, animal or aquatic biomass origin, to be used for replacement of petrol | 45 | 30 |
| Hydrotreated (thermochemically treated with hydrogen) oil of vegetable, animal or aquatic biomass origin, to be used for replacement of jet fuel | 44 | 34 |
| Hydrotreated oil (thermochemically treated with hydrogen) of vegetable, animal or aquatic biomass origin, to be used for replacement of liquefied petroleum gas | 46 | 24 |
| Co-processed oil (processed in a refinery simultaneously with fossil fuel) of vegetable, animal, aquatic biomass or pyrolysed biomass origin to be used for replacement of diesel | 43 | 36 |

| | | |
|---|------------------|------------------|
| Co-processed oil (processed in a refinery simultaneously with fossil fuel) of vegetable, animal, aquatic biomass or pyrolysed biomass origin, to be used to replace petrol | 44 | 32 |
| Co-processed oil (processed in a refinery simultaneously with fossil fuel) of vegetable, animal, aquatic biomass or pyrolysed biomass origin, to be used to replace jet fuel | 43 | 33 |
| Co-processed oil (processed in a refinery simultaneously with fossil fuel) of vegetable, animal, aquatic biomass or pyrolysed biomass origin, to be used to replace liquefied petroleum gas | 46 | 23 |
| RENEWABLE FUELS THAT CAN BE PRODUCED FROM VARIOUS RENEWABLE ENERGY SOURCES INCLUDING WHILE NOT LIMITED TO BIOMASS | | |
| Methanol from renewable energy sources | 20 | 16 |
| Ethanol from renewable energy sources | 27 | 21 |
| Propanol from renewable energy sources | 31 | 25 |
| Butanol from renewable energy sources | 33 | 27 |
| Fischer-Tropsch diesel (a synthetic hydrocarbon or mixture of synthetic hydrocarbons to be used for replacement of diesel) | 44 | 34 |
| Fischer-Tropsch petrol (a synthetic hydrocarbon or mixture of synthetic hydrocarbons produced from biomass, to be used for replacement of petrol) | 44 | 33 |
| Fischer-Tropsch jet fuel (a synthetic hydrocarbon or mixture of synthetic hydrocarbons produced from biomass, to be used for replacement of jet fuel) | 44 | 33 |
| Fischer-Tropsch liquefied petroleum gas (a synthetic hydrocarbon or mixture of synthetic hydrocarbons, to be used for replacement of liquefied petroleum gas) | 46 | 24 |
| DME (dimethylether) | 28 | 19 |
| Hydrogen from renewable sources | 120 | - |
| ETBE (ethyl-tertio-butyl-ether produced on the | 36 (of which 37% | 27 (of which 37% |

| | | |
|--|--|--|
| basis of ethanol) | from renewable sources) | from renewable sources) |
| MTBE (methyl-tertio-butyl-ether produced on the basis of methanol) | 35 (of which 22% from renewable sources) | 26 (of which 22% from renewable sources) |
| TAAE (tertiary-amyl-ethyl-ether produced on the basis of ethanol) | 38 (of which 29% from renewable sources) | 29 (of which 29% from renewable sources) |
| TAME (tertiary-amyl-methyl-ether produced on the basis of ethanol) | 36 (of which 18% from renewable sources) | 28 (of which 18% from renewable sources) |
| THxEE (tertiary-hexyl-ethyl-ether produced on the basis of ethanol) | 38 (of which 25% from renewable sources) | 30 (of which 25% from renewable sources) |
| THxME (tertiary-hexyl-methyl-ether produced on the basis of ethanol) | 38 of which 14% from renewable sources) | 30 (of which 14% from renewable sources) |
| FOSSIL FUELS | | |
| Petrol | 43 | 32 |
| Diesel | 43 | 36 |

↓ 2009/28/EC

| Fuel | Energy content by weight (lower calorific value, MJ/kg) | Energy content by volume (lower calorific value, MJ/l) |
|---|--|---|
| Bioethanol (ethanol produced from biomass) | 27 | 21 |
| Bio-ETBE (ethyl tertio-butyl-ether produced on the basis of bioethanol) | 36 (of which 37% from renewable sources) | 27 (of which 37% from renewable sources) |
| Biomethanol (methanol produced from biomass, to be used as biofuel) | 20 | 16 |
| Bio-MTBE (methyl tertio-butyl-ether produced on the basis of bio-methanol) | 35 (of which 22% from renewable) | 26 (of which 22% from renewable) |

| | | |
|---|--|--|
| | sources) | sources) |
| Bio-DME (dimethylether produced from biomass, to be used as biofuel) | 28 | 19 |
| Bio-TAEE (tertiary amyl ethyl ether produced on the basis of bioethanol) | 38 (of which 29 % from renewable sources) | 29 (of which 29 % from renewable sources) |
| Biobutanol (butanol produced from biomass, to be used as biofuel) | 33 | 27 |
| Biodiesel (methyl ester produced from vegetable or animal oil, of diesel quality, to be used as biofuel) | 37 | 33 |
| Fischer-Tropsch diesel (a synthetic hydrocarbon or mixture of synthetic hydrocarbons produced from biomass) | 44 | 34 |
| Hydrotreated vegetable oil (vegetable oil thermochemically treated with hydrogen) | 44 | 34 |
| Pure vegetable oil (oil produced from oil plants through pressing, extraction or comparable procedures, crude or refined but chemically unmodified, when compatible with the type of engines involved and the corresponding emission requirements) | 37 | 34 |
| Biogas (a fuel gas produced from biomass and/or from the biodegradable fraction of waste, that can be purified to natural gas quality, to be used as biofuel, or wood gas) | 50 | — |
| Petrol | 43 | 32 |
| Diesel | 43 | 36 |

ANNEX IV

Certification of installers

The certification schemes or equivalent qualification schemes referred to in Article 18 ~~14~~(3) shall be based on the following criteria:

1. The certification or qualification process shall be transparent and clearly defined by the Member State or the administrative body they appoint.
2. Biomass, heat pump, shallow geothermal and solar photovoltaic and solar thermal installers shall be certified by an accredited training programme or training provider.
3. The accreditation of the training programme or provider shall be effected by Member States or administrative bodies they appoint. The accrediting body shall ensure that the training programme offered by the training provider has continuity and regional or national coverage. The training provider shall have adequate technical facilities to provide practical training, including some laboratory equipment or corresponding facilities to provide practical training. The training provider shall also offer in addition to the basic training, shorter refresher courses on topical issues, including on new technologies, to enable life-long learning in installations. The training provider may be the manufacturer of the equipment or system, institutes or associations.
4. The training leading to installer certification or qualification shall include both theoretical and practical parts. At the end of the training, the installer must have the skills required to install the relevant equipment and systems to meet the performance and reliability needs of the customer, incorporate quality craftsmanship, and comply with all applicable codes and standards, including energy and eco-labelling.
5. The training course shall end with an examination leading to a certificate or qualification. The examination shall include a practical assessment of successfully installing biomass boilers or stoves, heat pumps, shallow geothermal installations, solar photovoltaic or solar thermal installations.
6. The certification schemes or equivalent qualification schemes referred to in Article 18 ~~14~~(3) shall take due account of the following guidelines:
 - (a) Accredited training programmes should be offered to installers with work experience, who have undergone, or are undergoing, the following types of training:
 - (i) in the case of biomass boiler and stove installers: training as a plumber, pipe fitter, heating engineer or technician of sanitary and heating or cooling equipment as a prerequisite;
 - (ii) in the case of heat pump installers: training as a plumber or refrigeration engineer and have basic electrical and plumbing skills (cutting pipe, soldering pipe joints, gluing pipe joints, lagging, sealing fittings, testing for leaks and installation of heating or cooling systems) as a prerequisite;
 - (iii) in the case of a solar photovoltaic or solar thermal installer: training as a plumber or electrician and have plumbing, electrical and roofing skills, including knowledge of soldering pipe joints, gluing pipe joints,

sealing fittings, testing for plumbing leaks, ability to connect wiring, familiar with basic roof materials, flashing and sealing methods as a prerequisite; or

(iv) a vocational training scheme to provide an installer with adequate skills corresponding to a three years education in the skills referred to in point (a), (b) or (c) including both classroom and workplace learning.

(b) The theoretical part of the biomass stove and boiler installer training should give an overview of the market situation of biomass and cover ecological aspects, biomass fuels, logistics, fire protection, related subsidies, combustion techniques, firing systems, optimal hydraulic solutions, cost and profitability comparison as well as the design, installation, and maintenance of biomass boilers and stoves. The training should also provide good knowledge of any European standards for technology and biomass fuels, such as pellets, and biomass related national and Community law.

(c) The theoretical part of the heat pump installer training should give an overview of the market situation for heat pumps and cover geothermal resources and ground source temperatures of different regions, soil and rock identification for thermal conductivity, regulations on using geothermal resources, feasibility of using heat pumps in buildings and determining the most suitable heat pump system, and knowledge about their technical requirements, safety, air filtering, connection with the heat source and system layout. The training should also provide good knowledge of any European standards for heat pumps, and of relevant national and Community law. The installer should demonstrate the following key competences:

(i) a basic understanding of the physical and operation principles of a heat pump, including characteristics of the heat pump circle: context between low temperatures of the heat sink, high temperatures of the heat source, and the efficiency of the system, determination of the coefficient of performance (COP) and seasonal performance factor (SPF);

(ii) an understanding of the components and their function within a heat pump circle, including the compressor, expansion valve, evaporator, condenser, fixtures and fittings, lubricating oil, refrigerant, superheating and sub-cooling and cooling possibilities with heat pumps; and

(iii) the ability to choose and size the components in typical installation situations, including determining the typical values of the heat load of different buildings and for hot water production based on energy consumption, determining the capacity of the heat pump on the heat load for hot water production, on the storage mass of the building and on interruptible current supply; determine buffer tank component and its volume and integration of a second heating system.

(d) The theoretical part of the solar photovoltaic and solar thermal installer training should give an overview of the market situation of solar products and cost and profitability comparisons, and cover ecological aspects, components, characteristics and dimensioning of solar systems, selection of accurate systems and dimensioning of components, determination of the heat demand, fire protection, related subsidies, as well as the design, installation, and maintenance of solar photovoltaic and solar thermal installations. The training

should also provide good knowledge of any European standards for technology, and certification such as Solar Keymark, and related national and Community law. The installer should demonstrate the following key competences:

- (i) the ability to work safely using the required tools and equipment and implementing safety codes and standards and identify plumbing, electrical and other hazards associated with solar installations;
 - (ii) the ability to identify systems and their components specific to active and passive systems, including the mechanical design, and determine the components' location and system layout and configuration;
 - (iii) the ability to determine the required installation area, orientation and tilt for the solar photovoltaic and solar water heater, taking account of shading, solar access, structural integrity, the appropriateness of the installation for the building or the climate and identify different installation methods suitable for roof types and the balance of system equipment required for the installation; and
 - (iv) for solar photovoltaic systems in particular, the ability to adapt the electrical design, including determining design currents, selecting appropriate conductor types and ratings for each electrical circuit, determining appropriate size, ratings and locations for all associated equipment and subsystems and selecting an appropriate interconnection point.
- (e) The installer certification should be time restricted, so that a refresher seminar or event would be necessary for continued certification.

↓ 2009/28/EC (adapted)
⇒ new

ANNEX V

Rules for calculating the greenhouse gas impact of biofuels, bioliquids and their fossil fuel comparators

A. TYPICAL AND DEFAULT VALUES FOR BIOFUELS IF PRODUCED WITH NO NET CARBON EMISSIONS FROM LAND-USE CHANGE

| Biofuel production pathway | Typical greenhouse gas emission saving | Default greenhouse gas emission saving |
|--|--|--|
| sugar beet ethanol ⇒ (no biogas from slop, natural gas as process fuel in conventional boiler) ⇐ | 61% ⇒ 67% ⇐ | 52 ⇒ 59 ⇐ % |
| ⇒ sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler) ⇐ | ⇒ 77% ⇐ | ⇒ 73% ⇐ |

| | | |
|--|----------------|----------------|
| ⇒ sugar beet, ethanol (no biogas from slop, natural gas as process fuel in CHP plant*) ⇐ | ⇒ 73% ⇐ | ⇒ 68% ⇐ |
| ⇒ sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant*) ⇐ | ⇒ 79% ⇐ | ⇒ 76% ⇐ |
| ⇒ sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant *) ⇐ | ⇒ 58% ⇐ | ⇒ 46% ⇐ |
| ⇒ sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant *) ⇐ | ⇒ 71% ⇐ | ⇒ 64% ⇐ |
| wheat ethanol (process fuel not specified) | 32% | 16% |
| wheat ethanol (lignite as process fuel in CHP plant) | 32% | 16% |
| wheat ethanol (natural gas as process fuel in conventional boiler) | 45% | 34% |
| wheat ethanol (natural gas as process fuel in CHP plant) | 53% | 47% |
| wheat ethanol (straw as process fuel in CHP plant) | 69% | 69% |
| ⇒ corn (maize) ethanol (natural gas as process fuel in conventional boiler) ⇐ | ⇒ 48% ⇐ | ⇒ 40% ⇐ |
| corn (maize) ethanol, Community produced (natural gas as process fuel in CHP plant ⇒ * ⇐) | 56 ⇒ 55% ⇐ | 49 ⇒ 48% ⇐ |
| ⇒ corn (maize) ethanol (lignite as process fuel in CHP plant*) ⇐ | ⇒ 40% ⇐ | ⇒ 28% ⇐ |
| ⇒ corn (maize) ethanol (forest residues as process fuel in CHP plant*) ⇐ | ⇒ 69% ⇐ | ⇒ 68% ⇐ |
| ⇒ other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler) ⇐ | ⇒ 47% ⇐ | ⇒ 38% ⇐ |
| ⇒ other cereals excluding maize ethanol (natural gas as process fuel in CHP plant *) ⇐ | ⇒ 53% ⇐ | ⇒ 46% ⇐ |
| ⇒ other cereals excluding maize ethanol | ⇒ 37% ⇐ | ⇒ 24% ⇐ |

| | | |
|--|--|------------------------|
| (lignite as process fuel in CHP plant *) ⇐ | | |
| ⇒ other cereals excluding maize ethanol (forest residues as process fuel in CHP plant *) ⇐ | ⇒ 67 % ⇐ | ⇒ 67 % ⇐ |
| sugar cane ethanol | ⇒ 70 % ⇐ | ⇒ 70 % ⇐ |
| the part from renewable sources of ethyl-tertio-butyl-ether (ETBE) | Equal to that of the ethanol production pathway used | |
| the part from renewable sources of tertiary-amyl-ethyl-ether (TAEE) | Equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 45 ⇒ 52 ⇐ % | 38 ⇒ 47 ⇐ % |
| sunflower biodiesel | 58 ⇒ 57 ⇐ % | 54 ⇒ 52 ⇐ % |
| soybean biodiesel | 40 ⇒ 55 ⇐ % | 34 ⇒ 50 ⇐ % |
| palm oil biodiesel (⇒ open effluent pond ⇐ process not specified) | 36 ⇒ 38 ⇐ % | 19 ⇒ 25 ⇐ % |
| palm oil biodiesel (process with methane capture at oil mill) | 62 ⇒ 57 ⇐ % | 56 ⇒ 51 ⇐ % |
| waste ⇒ cooking ⇐ vegetable or animal* oil biodiesel | 88 ⇒ 83 ⇐ % | 83 ⇒ 77 ⇐ % |
| ⇒ animal fats from rendering biodiesel ⇐ | ⇒ 79% ⇐ | ⇒ 72 % ⇐ |
| hydrotreated vegetable oil from rape seed | 51% | 47% |
| hydrotreated vegetable oil from sunflower | ⇒ 58 ⇐ 65 % | ⇒ 54 ⇐ 62 % |
| ⇒ hydrotreated vegetable oil from soybean ⇐ | ⇒ 55% ⇐ | ⇒ 51 % ⇐ |
| hydrotreated vegetable oil from palm oil (⇒ open effluent pond ⇐ process not specified) | 40 % | ⇒ 28 ⇐ 26 % |
| hydrotreated vegetable oil from palm oil (process with methane capture at oil mill) | ⇒ 59 ⇐ 68 % | ⇒ 55 ⇐ 65 % |
| ⇒ hydrotreated vegetable oil from waste cooking oil ⇐ | ⇒ 90 % ⇐ | ⇒ 87% ⇐ |
| ⇒ hydrotreated vegetable oil from animal fats from rendering ⇐ | ⇒ 87% ⇐ | ⇒ 83 % ⇐ |
| pure vegetable oil from rape seed | ⇒ 59 % ⇐ 58% | 57% |

| | | |
|---|-----------------|-----------------|
| ⇒ pure vegetable oil from sunflower ⇐ | ⇒ 65% ⇐ | ⇒ 64% ⇐ |
| ⇒ pure vegetable oil from soybean ⇐ | ⇒ 62 % ⇐ | ⇒ 61 % ⇐ |
| ⇒ pure vegetable oil from palm oil (open effluent pond) ⇐ | ⇒ 46 % ⇐ | ⇒ 36 % ⇐ |
| ⇒ pure vegetable oil from palm oil (process with methane capture at oil mill) ⇐ | ⇒ 65 % ⇐ | ⇒ 63 % ⇐ |
| ⇒ pure vegetable oil from waste cooking oil ⇐ | ⇒ 98 % ⇐ | ⇒ 98 % ⇐ |
| biogas from municipal organic waste as compressed natural gas | 80 % | 73 % |
| biogas from wet manure as compressed natural gas | 84 % | 81 % |
| biogas from dry manure as compressed natural gas | 86 % | 82 % |

~~(*) Not including animal oil produced from animal by products classified as category 3 material in accordance with Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules on animal by products not intended for human consumption⁽¹²⁾~~

↓ new

(*) Default values for processes using CHP are valid only if ALL the process heat is supplied by CHP.

↓ 2009/28/EC (adapted)

⇒ new

B. ESTIMATED TYPICAL AND DEFAULT VALUES FOR FUTURE BIOFUELS THAT WERE NOT ON THE MARKET OR WERE ON THE MARKET ONLY IN NEGLIGIBLE QUANTITIES IN ~~JANUARY 2008~~ ☒ 2016 ☒, IF PRODUCED WITH NO NET CARBON EMISSIONS FROM LAND-USE CHANGE

| Biofuel production pathway | Typical greenhouse gas emission saving | Default greenhouse gas emission saving |
|-------------------------------|--|--|
| wheat straw ethanol | 87 % ⇒ 85% ⇐ | 85 % ⇒ 83% ⇐ |
| waste wood ethanol | 80 % | 74 % |

² ~~Not including animal oil produced from animal by products classified as category 3 material in accordance with Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules on animal by products not intended for human consumption~~

| | | |
|--|--|-------------------------|
| farmed wood ethanol | 76 % | 70 % |
| waste wood Fischer-Tropsch diesel ⇒ in free-standing plant ⇐ | 95 % ⇒ 85% ⇐ | 95 % ⇒ 85% ⇐ |
| farmed wood Fischer-Tropsch diesel ⇒ in free-standing plant ⇐ | 93 % ⇒ 78% ⇐ | 93 % ⇒ 78% ⇐ |
| ⇒ waste wood Fischer-Tropsch petrol in free-standing plant ⇐ | ⇒ 85% ⇐ | ⇒ 85% ⇐ |
| ⇒ farmed wood Fischer-Tropsch petrol in free-standing plant ⇐ | ⇒ 78% ⇐ | ⇒ 78% ⇐ |
| waste wood dimethylether (DME) ⇒ in free-standing plant ⇐ | ⇒ 86% ⇐ 95% | ⇒ 86% ⇐ 95% |
| farmed wood dimethylether (DME) ⇒ in free-standing plant ⇐ | ⇒ 79% ⇐ 92% | ⇒ 79% ⇐ 92% |
| waste wood methanol ⇒ in free- standing plant ⇐ | 94 % ⇒ 86% ⇐ | 94 % ⇒ 86% ⇐ |
| farmed wood methanol ⇒ in free- standing plant ⇐ | 91 % ⇒ 79% ⇐ | 91 % ⇒ 79% ⇐ |
| ⇒ Fischer – Tropsch diesel from black- liquor gasification integrated with pulp mill ⇐ | ⇒ 89 % ⇐ | ⇒ 89 % ⇐ |
| ⇒ Fischer – Tropsch petrol from black- liquor gasification integrated with pulp mill ⇐ | ⇒ 89 % ⇐ | ⇒ 89 % ⇐ |
| ⇒ dimethylether DME from black- liquor gasification integrated with pulp mill ⇐ | ⇒ 89 % ⇐ | ⇒ 89 % ⇐ |
| ⇒ Methanol from black-liquor gasification integrated with pulp mill ⇐ | ⇒ 89 % ⇐ | ⇒ 89 % ⇐ |
| the part from renewable sources of methyl-tertio-butyl-ether (MTBE) | Equal to that of the methanol production pathway used | |

C.METHODOLOGY

1. Greenhouse gas emissions from the production and use of transport fuels, biofuels and bioliquids shall be calculated as follows:

↓ new

(a) greenhouse gas emissions from the production and use of biofuels shall be calculated as:

↓ 2009/28/EC (adapted)

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee},$$

where

| | | |
|--------------------------------|--------------|--|
| E | = | total emissions from the use of the fuel; |
| e_{ec} | = | emissions from the extraction or cultivation of raw materials; |
| e_l | = | annualised emissions from carbon stock changes caused by land-use change; |
| e_p | = | emissions from processing; |
| e_{td} | = | emissions from transport and distribution; |
| e_u | = | emissions from the fuel in use; |
| e_{sca} | = | emission savings from soil carbon accumulation via improved agricultural management; |
| e_{ccs} | = | emission savings from carbon capture and geological storage; ☒ and ☒ |
| e_{ccr} | = | emission saving from carbon capture and replacement, and |
| e_{ee} | = | emission saving from excess electricity from cogeneration. |

Emissions from the manufacture of machinery and equipment shall not be taken into account.

↓ new

(b) Greenhouse gas emissions from the production and use of bioliquids shall be calculated as for biofuels (E), but with the extension necessary for including the energy conversion to electricity and/or heat and cooling produced, as follows:

(i) Energy installations delivering only heat:

$$EC_h = \frac{E}{\eta_h}$$

(ii) For energy installations delivering only electricity:

$$EC_{el} = \frac{E}{\eta_{el}}$$

where

$EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.

E = Total greenhouse gas emissions of the bioliquid before end-conversion.

η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual bioliquid input based on its energy content.

η_h = The heat efficiency, defined as the annual useful heat output divided by the annual bioliquid input based on its energy content.

(iii) For the electricity or mechanical energy coming from energy installations delivering useful heat together with electricity and/or mechanical energy:

$$EC_{el} = \frac{E}{\eta_{el}} \left(\frac{C_{el} \cdot \eta_{el}}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

(iv) For the useful heat coming from energy installations delivering heat together with electricity and/or mechanical energy:

$$EC_h = \frac{E}{\eta_h} \left(\frac{C_h \cdot \eta_h}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

where:

$EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.

E = Total greenhouse gas emissions of the bioliquid before end-conversion.

η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual energy input based on its energy content.

η_h = The heat efficiency, defined as the annual useful heat output divided by the annual energy input based on its energy content.

C_{el} = Fraction of exergy in the electricity, and/or mechanical energy, set to 100 % ($C_{el} = 1$).

C_h = Carnot efficiency (fraction of exergy in the useful heat).

The Carnot efficiency, C_h , for useful heat at different temperatures is defined as:

$$C_h = \frac{T_h - T_0}{T_h}$$

where

T_{hv} = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.

T_0 = Temperature of surroundings, set at 273 kelvin (equal to 0 °C)

For $T_h < 150$ °C (423.15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150 °C (423.15 kelvin), which is: 0.3546

For the purposes of this calculation, the following definitions shall apply:

(a) "cogeneration" shall mean the simultaneous generation in one process of thermal energy and electricity and/or mechanical energy;

(b) "useful" heat shall mean heat generated to satisfy an economical justifiable demand for heat for heating and cooling purposes;

(c) "economically justifiable demand" shall mean the demand that does not exceed the needs of heat or cooling and which would otherwise be satisfied at market conditions.

↓ 2009/28/EC
⇒ new

2. Greenhouse gas emissions from ~~fuels, E,~~ ~~shall be expressed in terms of grams of CO₂-equivalent per MJ of fuel, gCO_{2eq}/MJ.~~ ⇒ biofuels and bioliquids shall be expressed as follows: ⇐

⇓ new

(a) greenhouse gas emissions from biofuels, E, shall be expressed in terms of grams of CO₂ equivalent per MJ of fuel, gCO_{2eq}/MJ.

(b) greenhouse gas emissions from bioliquids, EC, in terms of grams of CO₂ equivalent per MJ of final energy commodity (heat or electricity), gCO_{2eq}/MJ.

When heating and cooling are co-generated with electricity emissions shall be allocated between heat and electricity (as under 1(b)) irrespective if the heat is used for actual heating purposes or for cooling³.

Where the greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} are expressed in unit g CO_{2eq}/dry-ton of feedstock the conversion to grams of CO₂ equivalent per MJ of fuel, gCO_{2eq}/MJ shall be calculated as follows;

$$e_{ec} fuel_a \left[\frac{gCO_2eq}{MJ fuel} \right]_{ec} = \frac{e_{ec} feedstock_a \left[\frac{gCO_2eq}{t_{dry}} \right]}{LHV_a \left[\frac{MJ feedstock}{t dry feedstock} \right]} * Fuel feedstock factor_a * Allocation factor fuel_a$$

where

$$Allocation factor fuel_a = \left[\frac{Energy in fuel}{Energy fuel + Energy in co - products} \right]$$

$$Fuel feedstock factor_a = [Ratio of MJ feedstock required to make 1 MJ fuel]$$

Emissions per dry-ton feedstock shall be calculated as follows:

$$e_{ec} feedstock_a \left[\frac{gCO_2eq}{t_{dry}} \right] = \frac{e_{ec} feedstock_a \left[\frac{gCO_2eq}{t_{moist}} \right]}{(1 - moisture content)}$$

↓ 2009/28/EC (adapted)

~~3. By derogation from point 2, for transport fuels, values calculated in terms of gCO_{2eq}/MJ may be adjusted to take into account differences between fuels in useful work done, expressed~~

³ Heat or waste heat is used to generate cooling (chilled air or water) through absorption chillers. Therefore, it is appropriate to calculate only the emissions associated to the heat produced per MJ of heat, irrespectively if the end-use of the heat is actual heating or cooling via absorption chillers.

~~in terms of km/MJ. Such adjustments shall be made only where evidence of the differences in useful work done is provided.~~

4. ~~3.~~ Greenhouse gas emission savings from biofuels and bioliquids shall be calculated as follows ~~☒~~ :

↓ new

(a) greenhouse gas emission savings from biofuels:

↓ 2009/28/EC
⇒ new

$$SAVING = \Rightarrow (E_{F(t)} - E_B / E_{F(t)}) \Leftarrow, \quad (\cancel{E_F} - E_B) / E_F,$$

where

| | | |
|------------|---|---|
| E_B | = | total emissions from the biofuel; and |
| $E_{F(t)}$ | = | total emissions from the fossil fuel comparator ⇒ for transport ⇐ |

↓ new

(b) greenhouse gas emission savings from heat and cooling, and electricity being generated from bioliquids:

$$SAVING = (EC_{F(h\&c,el)} - EC_{B(h\&c,el)}) / EC_{F(h\&c,el)}$$

where

$EC_{B(h\&c,el)}$ = total emissions from the heat or electricity; and

$EC_{F(h\&c,el)}$ = total emissions from the fossil fuel comparator for useful heat or electricity.

↓ 2009/28/EC (adapted)
⇒ new

5. ~~4.~~ The greenhouse gases taken into account for the purposes of point 1 shall be CO₂, N₂O and CH₄. For the purpose of calculating CO₂ equivalence, those gases shall be valued as follows:

| | | |
|------------------|---|-------------|
| CO ₂ | : | 1 |
| N ₂ O | : | 296 ⇒ 298 ⇐ |
| CH ₄ | : | 23 ⇒ 25 ⇐ |

6. ~~5.~~ Emissions from the extraction or cultivation of raw materials, e_{ec} , shall include emissions from the extraction or cultivation process itself; from the collection, ⇒ drying and storage ⇐ of raw materials; from waste and leakages; and from the production of chemicals or products

used in extraction or cultivation. Capture of CO₂ in the cultivation of raw materials shall be excluded. ~~Certified reductions of greenhouse gas emissions from flaring at oil production sites anywhere in the world shall be deducted.~~ Estimates of emissions from ⇒ agriculture biomass ⇐ cultivation may be derived from the use of ⇒ regional ⇐ averages ⇒ for cultivation emissions included in the reports referred to in Article 28 (4) and the information on the disaggregated default values for cultivation emissions included in this Annex, as an alternative to using actual values. In absence of relevant information in the before mentioned reports it is allowed to calculate averages based on local farming practises based for instance on data of a group of farms ⇐ calculated for smaller geographical areas than those used in the calculation of the default values, as an alternative to using actual values.

⇓ new

6. For the purposes of the calculation referred to in point 3, emission savings from improved agriculture management, such as shifting to reduced or zero-tillage, improved crop/rotation, the use of cover crops, including crop management, and the use of organic soil improver (e.g. compost, manure fermentation digestate), shall be taken into account only if solid and verifiable evidence is provided that the soil carbon has increased or that it is reasonable to expect to have increased over the period in which the raw materials concerned were cultivated while taking into account the emissions where such practices lead to increased fertiliser and herbicide use.

⇓ 2015/1513 Art. 2.13 and Annex II.1

7. Annualised emissions from carbon stock changes caused by land-use change, e_l , shall be calculated by dividing total emissions equally over 20 years. For the calculation of those emissions, the following rule shall be applied:

$$e_l = (CS_R - CS_A) \times 3,664 \times 1/20 \times 1/P - e_B,^4$$

where

| | | |
|--------|---|--|
| e_l | = | annualised greenhouse gas emissions from carbon stock change due to land-use change (measured as mass (grams) of CO ₂ -equivalent per unit of biofuel or bioliquid energy (megajoules)). ‘Cropland’ ⁵ and ‘perennial cropland’ ⁶ shall be regarded as one land use; |
| CS_R | = | the carbon stock per unit area associated with the reference land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). The reference land-use shall be the land-use in January 2008 or 20 years before the raw material was obtained, whichever was the later; |
| CS_A | = | the carbon stock per unit area associated with the actual land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). In |

⁴ The quotient obtained by dividing the molecular weight of CO₂ (44,010 g/mol) by the molecular weight of carbon (12,011 g/mol) is equal to 3,664.

⁵ Cropland as defined by IPCC.

⁶ Perennial crops are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice and oil palm.

| | | |
|----------------|---|---|
| | | cases where the carbon stock accumulates over more than one year, the value attributed to CS _A shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier; |
| P | = | the productivity of the crop (measured as biofuel or bioliquid energy per unit area per year) and |
| e _B | = | bonus of 29 gCO _{2eq} /MJ biofuel or bioliquid if biomass is obtained from restored degraded land under the conditions provided for in point 8. |

↓ 2009/28/EC (adapted)

⇒ new

8. The bonus of 29 gCO_{2eq}/MJ shall be attributed if evidence is provided that the land:

(a) was not in use for agriculture or any other activity in January 2008; and

(b) ~~falls into one of the following categories:~~

~~(i) ☒ is ☒ severely degraded land, including such land that was formerly in agricultural use;~~

~~(ii) heavily contaminated land.~~

The bonus of 29 gCO_{2eq}/MJ shall apply for a period of up to ~~10~~ ⇒ 20 ⇐ years from the date of conversion of the land to agricultural use, provided that a steady increase in carbon stocks as well as a sizable reduction in erosion phenomena for land falling under (~~§ b~~) are ensured ~~and that soil contamination for land falling under (ii) is reduced.~~

9. ~~The categories referred to in point 8(b) are defined as follows:~~

~~(a) 'severely~~ Severely degraded land' means land that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded;

~~(b) 'heavily contaminated land' means land that is unfit for the cultivation of food and feed due to soil contamination.~~

~~Such land shall include land that has been the subject of a Commission decision in accordance with the fourth subparagraph of Article 18(4).~~

10. The Commission shall ~~adopt~~ ☒ review ☒ , by 31 December ~~2009~~ ⇒ 2020 ⇐ , guidelines for the calculation of land carbon stocks⁷ drawing on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories — volume 4 ⇒ and in accordance with the Regulation (EU) No 525/2013⁸ and the Regulation (INSERT THE NO AFTER THE ADOPTION⁹) ⇐ .

⁷ Commission Decision of 10 June 2010 (2010/335/EU) on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC, OJ L 151 17.06.2010.

⁸ Regulation (EU) 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC, OJ L 165/13, 18.06.2013

⁹ Regulation of the European Parliament and of the Council (INSERT THE DATE OF ENTRY INTO FORCE OF THIS REGULATION) on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry into the 2030 climate and energy framework and amending

The Commission guidelines shall serve as the basis for the calculation of land carbon stocks for the purposes of this Directive.

11. Emissions from processing, e_p , shall include emissions from the processing itself; from waste and leakages; and from the production of chemicals or products used in processing.

In accounting for the consumption of electricity not produced within the fuel production plant, the greenhouse gas emission intensity of the production and distribution of that electricity shall be assumed to be equal to the average emission intensity of the production and distribution of electricity in a defined region. By derogation from this rule, producers may use an average value for an individual electricity production plant for electricity produced by that plant, if that plant is not connected to the electricity grid.

↓ new

Emissions from processing shall include emissions from drying of interim – products and materials where relevant.

↓ 2009/28/EC (adapted)
⇒ new

12. Emissions from transport and distribution, e_{td} , shall include emissions from the transport ~~and storage~~ of raw and semi-finished materials and from the storage and distribution of finished materials. Emissions from transport and distribution to be taken into account under point ~~6~~ 5 shall not be covered by this point.

13. Emissions from the fuel in use, e_u , shall be taken to be zero for biofuels and bioliquids.

Emissions on non-CO₂ greenhouse gases (N₂O and CH₄) from the fuel in use shall be included in the e_u factor for bioliquids.

14. Emission saving from carbon capture and geological storage e_{ccs} , that have not already been accounted for in e_p , shall be limited to emissions avoided through the capture and ~~⇒ storage~~ ~~⇐ sequestration~~ of emitted CO₂ directly related to the extraction, transport, processing and distribution of fuel ~~⇒ if stored in compliance with Directive 2009/31/EC on the geological storage of carbon dioxide~~ ~~⇐~~ .

15. Emission saving from carbon capture and replacement, e_{ccr} ~~⇒~~ , shall be related directly to the production of biofuel or bioliquid they are attributed to, and ~~⇐~~ shall be limited to emissions avoided through the capture of CO₂ of which the carbon originates from biomass and which is used ~~⇒ in the energy or transport sector~~ ~~⇐ to replace fossil-derived CO₂ used in commercial products and services.~~

↓ new

16. Where a cogeneration unit – providing heat and/ or electricity to a fuel production process for which emissions are being calculated – produces excess electricity and/or excess useful heat, the greenhouse gas emissions shall be divided between the electricity and the useful heat according to the temperature of the heat (which reflects the usefulness (utility) of the heat). The allocation factor, called Carnot efficiency C_h , is calculated as follows for useful heat at different temperatures:

Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change.

$$C_h = \frac{T_h - T_0}{T_h}$$

where

T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.

T_0 = Temperature of surroundings, set at 273 kelvin (equal to 0°C)

For $T_h < 150^\circ\text{C}$ (423.15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150 °C (423.15 kelvin), which is: 0.3546

For the purposes of this calculation, the actual efficiencies shall be used, defined as the annual mechanical energy, electricity and heat produced respectively divided by the annual energy input.

For the purposes of this calculation, the following definitions shall apply:

(a) "cogeneration" shall mean the simultaneous generation in one process of thermal energy and electrical or mechanical energy;

(b) "useful" heat shall mean heat generated to satisfy an economical justifiable demand for heat;

(c) "economically justifiable demand" shall mean demand that does not exceed the needs for heating and which would otherwise be satisfied at market conditions .

↓ 2009/28/EC (adapted)

⇒ new

~~16. Emission saving from excess electricity from cogeneration, e_{ee} , shall be taken into account in relation to the excess electricity produced by fuel production systems that use cogeneration except where the fuel used for the cogeneration is a co-product other than an agricultural crop residue. In accounting for that excess electricity, the size of the cogeneration unit shall be assumed to be the minimum necessary for the cogeneration unit to supply the heat that is needed to produce the fuel. The greenhouse gas emission saving associated with that excess electricity shall be taken to be equal to the amount of greenhouse gas that would be emitted when an equal amount of electricity was generated in a power plant using the same fuel as the cogeneration unit.~~

17. Where a fuel production process produces, in combination, the fuel for which emissions are being calculated and one or more other products (co-products), greenhouse gas emissions shall be divided between the fuel or its intermediate product and the co-products in proportion to their energy content (determined by lower heating value in the case of co-products other than electricity ⇒ and heat ⇐). ⇒ The greenhouse gas intensity of excess useful heat or excess electricity is the same as the greenhouse gas intensity of heat or electricity delivered to the fuel production process and is determined from calculating the greenhouse intensity of all inputs and emissions, including the feedstock and CH₄ and N₂O emissions, to and from the cogeneration unit, boiler or other apparatus delivering heat or electricity to the fuel production process. In case of cogeneration of electricity and heat the calculation is performed following point 16. ⇐

18. For the purposes of the calculation referred to in point 17, the emissions to be divided shall be $e_{ee} + e_e$ + those fractions of e_p , e_{sc} and e_{cc} ⇒ $e_{ec} + e_l + e_{sca}$ + those fractions of e_p , e_{id} , e_{ccs} , and e_{ccr} ⇐ that take place up to and including the process step at which a co-product is

produced. If any allocation to co-products has taken place at an earlier process step in the life-cycle, the fraction of those emissions assigned in the last such process step to the intermediate fuel product shall be used for this purpose instead of the total of those emissions.

↓ new

In the case of biofuels and bioliquids, all co-products that do not fall under the scope of point 17, shall be taken into account for the purposes of that calculation. No emissions shall be allocated to wastes and residues. Co-products that have a negative energy content shall be considered to have an energy content of zero for the purpose of the calculation.

Wastes and residues, including tree tops and branches, straw, husks, cobs and nut shells, and residues from processing, including crude glycerine (glycerine that is not refined) and bagasse, shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials irrespectively of whether they are processed to interim products before being transformed into the final product.

In the case of fuels produced in refineries, other than the combination of processing plants with boilers or cogeneration units providing heat and/or electricity to the processing plant, the unit of analysis for the purposes of the calculation referred to in point 17 shall be the refinery.

↓ 2009/28/EC (adapted)
⇒ new

~~In the case of biofuels and bioliquids, all co-products, including electricity that does not fall under the scope of point 16, shall be taken into account for the purposes of that calculation, except for agricultural crop residues, including straw, bagasse, husks, cobs and nut shells. Co-products that have a negative energy content shall be considered to have an energy content of zero for the purpose of the calculation.~~

~~Wastes, agricultural crop residues, including straw, bagasse, husks, cobs and nut shells, and residues from processing, including crude glycerine (glycerine that is not refined), shall be considered to have zero life cycle greenhouse gas emissions up to the process of collection of those materials.~~

~~In the case of fuels produced in refineries, the unit of analysis for the purposes of the calculation referred to in point 17 shall be the refinery.~~

19. For biofuels, for the purposes of the calculation referred to in point 43, the fossil fuel comparator E_F ⇒ $E_{F(t)}$ ⇐ shall be the latest available actual average emissions from the fossil part of petrol and diesel consumed in the Community as reported under Directive 98/70/EC. If no such data are available, the value used shall be 83,8 ⇒ 94 ⇐ gCO_{2eq}/MJ .

For bioliquids used for electricity production, for the purposes of the calculation referred to in point 43, the fossil fuel comparator E_F shall be 94 ⇒ 183 ⇐ gCO_{2eq}/MJ .

For bioliquids used for ⇒ the production of useful ⇐ heat ⇒ , as well as for the production of heating and/or cooling ⇐ production, for the purposes of the calculation referred to in point 43, the fossil fuel comparator $E_{F(h\&c)}$ ⇐ shall be 77 ⇒ 80 ⇐ gCO_{2eq}/MJ .

~~For bioliquids used for cogeneration, for the purposes of the calculation referred to in point 4, the fossil fuel comparator E_F shall be 85 gCO_{2eq}/MJ .~~

D.DISAGGREGATED DEFAULT VALUES FOR BIOFUELS AND BIOLIQUIDS

Disaggregated default values for cultivation: 'e_{ec}' as defined in part C of this Annex ☒ including soil N₂O emissions ☒

| ↓ new | | |
|--|---|---|
| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
| sugar beet ethanol | 9.6 | 9.6 |
| corn (maize) ethanol | 25.5 | 25.5 |
| other cereals excluding corn (maize) ethanol | 27.0 | 27.0 |
| sugar cane ethanol | 17.1 | 17.1 |
| the part from renewable sources of ETBE | Equal to that of the ethanol production pathway used | |
| the part from renewable sources of TAAE | Equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 32.0 | 32.0 |
| sunflower biodiesel | 26.1 | 26.1 |
| soybean biodiesel | 21.4 | 21.4 |
| palm oil biodiesel | 20.7 | 20.7 |
| waste cooking oil biodiesel | 0 | 0 |
| animal fats from rendering biodiesel | 0 | 0 |
| hydrotreated vegetable oil from rape seed | 33.4 | 33.4 |
| hydrotreated vegetable oil from sunflower | 26.9 | 26.9 |
| hydrotreated vegetable oil from | 22.2 | 22.2 |

| | | |
|--|------|------|
| soybean | | |
| hydrotreated vegetable oil from palm oil | 21.7 | 21.7 |
| hydrotreated vegetable oil from waste cooking oil | 0 | 0 |
| hydrotreated vegetable oil from animal fats from rendering | 0 | 0 |
| pure vegetable oil from rape seed | 33.4 | 33.4 |
| pure vegetable oil from sunflower | 27.2 | 27.2 |
| pure vegetable oil from soybean | 22.3 | 22.3 |
| pure vegetable oil from palm oil | 21.6 | 21.6 |
| pure vegetable oil from waste cooking oil | 0 | 0 |

↓ 2009/28/EC (adapted)

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
|--|--|--|
| sugar beet ethanol | 12 | 12 |
| wheat ethanol | 23 | 23 |
| corn (maize) ethanol, Community produced | 20 | 20 |
| sugar cane ethanol | 14 | 14 |
| the part from renewable sources of ETBE | Equal to that of the ethanol production pathway used | |
| the part from renewable sources of TAME | Equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 29 | 29 |
| sunflower biodiesel | 18 | 18 |
| soybean biodiesel | 19 | 19 |

| | | |
|--|---------------|---------------|
| palm oil biodiesel | 14 | 14 |
| waste vegetable or animal* oil biodiesel | 0 | 0 |
| hydrotreated vegetable oil from rape seed | 30 | 30 |
| hydrotreated vegetable oil from sunflower | 18 | 18 |
| hydrotreated vegetable oil from palm oil | 15 | 15 |
| pure vegetable oil from rape seed | 30 | 30 |
| biogas from municipal organic waste as compressed natural gas | 0 | 0 |
| biogas from wet manure as compressed natural gas | 0 | 0 |
| biogas from dry manure as compressed natural gas | 0 | 0 |

~~(*) Not including animal oil produced from animal by products classified as category 3 material in accordance with Regulation (EC) No 1774/2002~~

↓ new

Disaggregated default values for cultivation: 'e_{ec}' - for soil N₂O emissions only (these are already included in disaggregated values for cultivation emissions in 'e_{ec}' table)

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
|--|---|---|
| sugar beet ethanol | 4.9 | 4.9 |
| corn (maize) ethanol | 13.7 | 13.7 |
| other cereals excluding corn (maize) ethanol | 14.1 | 14.1 |
| sugar cane ethanol | 2.1 | 2.1 |
| the part from renewable sources of ETBE | Equal to that of the ethanol production pathway used | |

| | | |
|--|--|------|
| the part from renewable sources of TAAE | Equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 17.6 | 17.6 |
| sunflower biodiesel | 12.2 | 12.2 |
| soybean biodiesel | 13.4 | 13.4 |
| palm oil biodiesel | 16.5 | 16.5 |
| waste cooking oil biodiesel | 0 | 0 |
| animal fats from rendering biodiesel | 0 | 0 |
| hydrotreated vegetable oil from rape seed | 18.0 | 18.0 |
| hydrotreated vegetable oil from sunflower | 12.5 | 12.5 |
| hydrotreated vegetable oil from soybean | 13.7 | 13.7 |
| hydrotreated vegetable oil from palm oil | 16.9 | 16.9 |
| hydrotreated vegetable oil from waste cooking oil | 0 | 0 |
| hydrotreated vegetable oil from animal fats from rendering | 0 | 0 |
| pure vegetable oil from rape seed | 17.6 | 17.6 |
| pure vegetable oil from sunflower | 12.2 | 12.2 |
| pure vegetable oil from soybean | 13.4 | 13.4 |
| pure vegetable oil from palm oil | 16.5 | 16.5 |
| pure vegetable oil from waste cooking oil | 0 | 0 |

↓ 2009/28/EC (adapted)
⇒ new

Disaggregated default values for processing (including excess electricity): 'e_p = e_{ee}' as defined in part C of this Annex

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO ₂ eq/MJ) | Default greenhouse gas emissions (gCO ₂ eq/MJ) |
|--|--|--|
| sugar beet ethanol ⇒ (no biogas from slop, natural gas as process fuel in conventional boiler) ⇐ | 19 ⇒ 18.8 ⇐ | 26 ⇒ 26.3 ⇐ |
| ⇒ sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler) ⇐ | ⇒ 9.7 ⇐ | ⇒ 13.6 ⇐ |
| ⇒ sugar beet, ethanol (no biogas from slop, natural gas as process fuel in CHP plant*) ⇐ | ⇒ 13.2 ⇐ | ⇒ 18.5 ⇐ |
| ⇒ sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant*) ⇐ | ⇒ 7.6 ⇐ | ⇒ 10.6 ⇐ |
| ⇒ sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant*) ⇐ | ⇒ 27.4 ⇐ | ⇒ 38.3 ⇐ |
| ⇒ sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant*) ⇐ | ⇒ 15.7 ⇐ | ⇒ 22.0 ⇐ |
| wheat ethanol (process fuel not specified) | 32 | 45 |
| wheat ethanol (lignite as process fuel in CHP plant) | 32 | 45 |
| wheat ethanol (natural gas as process fuel in conventional boiler) | 21 | 30 |
| wheat ethanol (natural gas as process fuel in CHP plant) | 14 | 19 |
| wheat ethanol (straw as process fuel in CHP plant) | 1 | 1 |
| ⇒ corn (maize) ethanol (natural gas as process fuel in conventional boiler) ⇐ | ⇒ 20.8 ⇐ | ⇒ 29.1 ⇐ |

| | | |
|--|--|------------------------|
| corn (maize) ethanol, Community produced (natural gas as process fuel in CHP plant) | 15 ⇒ 14.8 ⇐ | 21 ⇒ 20.8 ⇐ |
| ⇒ corn (maize) ethanol (lignite as process fuel in CHP plant*) ⇐ | ⇒ 28.6 ⇐ | ⇒ 40.1 ⇐ |
| ⇒ corn (maize) ethanol (forest residues as process fuel in CHP plant*) ⇐ | ⇒ 1.8 ⇐ | ⇒ 2.6 ⇐ |
| ⇒ other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler) ⇐ | ⇒ 21.0 ⇐ | ⇒ 29.3 ⇐ |
| ⇒ other cereals excluding maize ethanol (natural gas as process fuel in CHP plant*) ⇐ | ⇒ 15.1 ⇐ | ⇒ 21.1 ⇐ |
| ⇒ other cereals excluding maize ethanol (lignite as process fuel in CHP plant*) ⇐ | ⇒ 30.3 ⇐ | ⇒ 42.5 ⇐ |
| ⇒ other cereals excluding maize ethanol (forest residues as process fuel in CHP plant*) ⇐ | ⇒ 1.5 ⇐ | ⇒ 2.2 ⇐ |
| sugar cane ethanol | 1 ⇒ 1.3 ⇐ | 1 ⇒ 1.8 ⇐ |
| the part from renewable sources of ETBE | Equal to that of the ethanol production pathway used | |
| the part from renewable sources of TAEE | Equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 16 ⇒ 11.7 ⇐ | 22 ⇒ 16.3 ⇐ |
| sunflower biodiesel | 16 ⇒ 11.8 ⇐ | 22 ⇒ 16.5 ⇐ |
| soybean biodiesel | 18 ⇒ 12.1 ⇐ | 26 ⇒ 16.9 ⇐ |
| palm oil biodiesel (process not specified) ⇒ open effluent pond ⇐ | 35 ⇒ 30.4 ⇐ | 49 ⇒ 42.6 ⇐ |
| palm oil biodiesel (process with methane capture at oil mill) | 13 ⇒ 13.2 ⇐ | 18 ⇒ 18.5 ⇐ |
| waste ⇒ cooking ⇐ vegetable or animal ¹⁰ oil biodiesel | 9 ⇒ 14.1 ⇐ | 13 ⇒ 19.7 ⇐ |
| ⇒ animal fats from rendering biodiesel ⇐ | ⇒ 17.8 ⇐ | ⇒ 25.0 ⇐ |

¹⁰ Not including animal oil produced from animal by products classified as category 3 material in accordance with Regulation (EC) No 1774/2002.

| | | |
|---|------------------------|------------------------|
| hydrotreated vegetable oil from rape seed | 10 ⇨ 10.7 ⇐ | 13 ⇨ 15.0 ⇐ |
| hydrotreated vegetable oil from sunflower | 10 ⇨ 10.5 ⇐ | 13 ⇨ 14.7 ⇐ |
| ⇨ hydrotreated vegetable oil from soybean ⇐ | ⇨ 10.9 ⇐ | ⇨ 15.2 ⇐ |
| hydrotreated vegetable oil from palm oil (process not specified ⇨ open effluent pond ⇐) | 30 ⇨ 27.8 ⇐ | 42 ⇨ 38.9 ⇐ |
| hydrotreated vegetable oil from palm oil (process with methane capture at oil mill) | 7 ⇨ 9.7 ⇐ | 9 ⇨ 13.6 ⇐ |
| ⇨ hydrotreated vegetable oil from waste cooking oil ⇐ | ⇨ 7.6 ⇐ | ⇨ 10.6 ⇐ |
| ⇨ hydrotreated vegetable oil from animal fats from rendering ⇐ | ⇨ 10.4 ⇐ | ⇨ 14.5 ⇐ |
| pure vegetable oil from rape seed | 4 ⇨ 3.7 ⇐ | 5 ⇨ 5.2 ⇐ |
| ⇨ pure vegetable oil from sunflower ⇐ | ⇨ 3.8 ⇐ | ⇨ 5.4 ⇐ |
| ⇨ pure vegetable oil from soybean ⇐ | ⇨ 4.2 ⇐ | ⇨ 5.9 ⇐ |
| ⇨ pure vegetable oil from palm oil (open effluent pond) ⇐ | ⇨ 22.6 ⇐ | ⇨ 31.7 ⇐ |
| ⇨ pure vegetable oil from palm oil (process with methane capture at oil mill) ⇐ | ⇨ 4.7 ⇐ | ⇨ 6.5 ⇐ |
| ⇨ pure vegetable oil from waste cooking oil ⇐ | ⇨ 0.6 ⇐ | ⇨ 0.8 ⇐ |
| biogas from municipal organic waste as compressed natural gas | 14 | 20 |
| biogas from wet manure as compressed natural gas | 8 | 11 |
| biogas from dry manure as compressed natural gas | 8 | 11 |

⇩ new

Disaggregated default values for oil extraction only (these are already included in disaggregated values for processing emissions in 'e_p' table)

| | | |
|----------------------------------|------------------------|------------------------|
| Biofuel and bioliquid production | Typical greenhouse gas | Default greenhouse gas |
|----------------------------------|------------------------|------------------------|

| pathway | emissions (gCO _{2eq} /MJ) | emissions (gCO _{2eq} /MJ) |
|---|---------------------------------------|---------------------------------------|
| rape seed biodiesel | 3.0 | 4.2 |
| sunflower biodiesel | 2.9 | 4.0 |
| soybean biodiesel | 3.2 | 4.4 |
| palm oil biodiesel (open effluent pond) | 20.9 | 29.2 |
| palm oil biodiesel (process with methane capture at oil mill) | 3.7 | 5.1 |
| waste cooking oil biodiesel | 0 | 0 |
| animal fats from rendering biodiesel | 4.3 | 6.0 |
| hydrotreated vegetable oil from rape seed | 3.1 | 4.4 |
| hydrotreated vegetable oil from sunflower | 3.0 | 4.1 |
| hydrotreated vegetable oil from soybean | 3.3 | 4.6 |
| hydrotreated vegetable oil from palm oil (open effluent pond) | 21.9 | 30.7 |
| hydrotreated vegetable oil from palm oil (process with methane capture at oil mill) | 3.8 | 5.4 |
| hydrotreated vegetable oil from waste cooking oil | 0 | 0 |
| hydrotreated vegetable oil from animal fats from rendering | 4.6 | 6.4 |
| pure vegetable oil from rape seed | 3.1 | 4.4 |
| pure vegetable oil from sunflower | 3.0 | 4.2 |
| pure vegetable oil from soybean | 3.4 | 4.7 |

| | | |
|---|------|------|
| pure vegetable oil from palm oil (open effluent pond) | 21.8 | 30.5 |
| pure vegetable oil from palm oil (process with methane capture at oil mill) | 3.8 | 5.3 |
| pure vegetable oil from waste cooking oil | 0 | 0 |

Disaggregated default values for transport and distribution: ‘e_{td}’ as defined in part C of this Annex

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
|--|---|---|
| sugar beet ethanol (no biogas from slop, natural gas as process fuel in conventional boiler) | 2.4 | 2.4 |
| sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler) | 2.4 | 2.4 |
| sugar beet ethanol (no biogas from slop, natural gas as process fuel in CHP plant*) | 2.4 | 2.4 |
| sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant*) | 2.4 | 2.4 |
| sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant *) | 2.4 | 2.4 |
| sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant *) | 2.4 | 2.4 |
| corn (maize) ethanol (natural gas as process fuel in CHP plant*) | 2.2 | 2.2 |

| | | |
|--|--|-----|
| corn (maize) ethanol (natural gas as process fuel in conventional boiler) | 2.2 | 2.2 |
| corn (maize) ethanol (lignite as process fuel in CHP plant*) | 2.2 | 2.2 |
| corn (maize) ethanol (forest residues as process fuel in CHP plant*) | 2.2 | 2.2 |
| other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler) | 2.2 | 2.2 |
| other cereals excluding maize ethanol (natural gas as process fuel in CHP plant *) | 2.2 | 2.2 |
| other cereals excluding maize ethanol (lignite as process fuel in CHP plant *) | 2.2 | 2.2 |
| other cereals excluding maize ethanol (forest residues as process fuel in CHP plant *) | 2.2 | 2.2 |
| sugar cane ethanol | 9.7 | 9.7 |
| the part from renewable sources of ETBE | Equal to that of the ethanol production pathway used | |
| the part from renewable sources of TAEE | Equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 1.8 | 1.8 |
| sunflower biodiesel | 2.1 | 2.1 |
| soybean biodiesel | 8.9 | 8.9 |
| palm oil biodiesel (open effluent pond) | 6.9 | 6.9 |
| palm oil biodiesel (process with methane capture at oil mill) | 6.9 | 6.9 |
| waste cooking oil biodiesel | 1.9 | 1.9 |

| | | |
|---|-----|-----|
| animal fats from rendering biodiesel | 1.7 | 1.7 |
| hydrotreated vegetable oil from rape seed | 1.7 | 1.7 |
| hydrotreated vegetable oil from sunflower | 2.0 | 2.0 |
| hydrotreated vegetable oil from soybean | 9.1 | 9.1 |
| hydrotreated vegetable oil from palm oil (open effluent pond) | 7.0 | 7.0 |
| hydrotreated vegetable oil from palm oil (process with methane capture at oil mill) | 7.0 | 7.0 |
| hydrotreated vegetable oil from waste cooking oil | 1.8 | 1.8 |
| hydrotreated vegetable oil from animal fats from rendering | 1.5 | 1.5 |
| pure vegetable oil from rape seed | 1.4 | 1.4 |
| pure vegetable oil from sunflower | 1.7 | 1.7 |
| pure vegetable oil from soybean | 8.8 | 8.8 |
| pure vegetable oil from palm oil (open effluent pond) | 6.7 | 6.7 |
| pure vegetable oil from palm oil (process with methane capture at oil mill) | 6.7 | 6.7 |
| pure vegetable oil from waste cooking oil | 1.4 | 1.4 |

↓ 2009/28/EC

| | | |
|---|---|---|
| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions | Default greenhouse gas emissions |
|---|---|---|

| | (gCO _{2,eq} /MJ) | (gCO _{2,eq} /MJ) |
|--|--|---------------------------|
| sugar beet ethanol | 2 | 2 |
| wheat ethanol | 2 | 2 |
| corn (maize) ethanol, Community produced | 2 | 2 |
| sugar cane ethanol | 9 | 9 |
| the part from renewable sources of ETBE | Equal to that of the ethanol production pathway used | |
| the part from renewable sources of TAME | Equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 1 | 1 |
| sunflower biodiesel | 1 | 1 |
| soybean biodiesel | 13 | 13 |
| palm oil biodiesel | 5 | 5 |
| waste vegetable or animal oil biodiesel | 1 | 1 |
| hydrotreated vegetable oil from rape seed | 1 | 1 |
| hydrotreated vegetable oil from sunflower | 1 | 1 |
| hydrotreated vegetable oil from palm oil | 5 | 5 |
| pure vegetable oil from rape seed | 1 | 1 |
| biogas from municipal organic waste as compressed natural gas | 3 | 3 |
| biogas from wet manure as compressed natural gas | 5 | 5 |
| biogas from dry manure as compressed natural gas | 4 | 4 |

↓ new

Disaggregated default values for transport and distribution of final fuel only. These are already included in table of “transport and distribution emissions e_{td} ” as defined in part C

of this Annex, but the following values are useful if an economic operator wishes to declare actual transport emissions for crops or oil transport only).

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO ₂ eq/MJ) | Default greenhouse gas emissions (gCO ₂ eq/MJ) |
|--|--|--|
| sugar beet ethanol (no biogas from slop, natural gas as process fuel in conventional boiler) | 1.6 | 1.6 |
| sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler) | 1.6 | 1.6 |
| sugar beet, ethanol (no biogas from slop, natural gas as process fuel in CHP plant *) | 1.6 | 1.6 |
| sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant *) | 1.6 | 1.6 |
| sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant *) | 1.6 | 1.6 |
| sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant *) | 1.6 | 1.6 |
| maize ethanol (natural gas as process fuel in conventional boiler) | 1.6 | 1.6 |
| maize ethanol (natural gas as process fuel in CHP plant *) | 1.6 | 1.6 |
| maize ethanol (lignite as process fuel in CHP plant *) | 1.6 | 1.6 |
| maize ethanol (forest residues as process fuel in CHP plant *) | 1.6 | 1.6 |
| other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler) | 1.6 | 1.6 |
| other cereals excluding maize ethanol (natural gas as process fuel in CHP plant | 1.6 | 1.6 |

| | | |
|--|---|-----|
| *) | | |
| other cereals excluding maize ethanol (lignite as process fuel in CHP plant *) | 1.6 | 1.6 |
| other cereals excluding maize ethanol (forest residues as process fuel in CHP plant *) | 1.6 | 1.6 |
| sugar cane ethanol | 6.0 | 6.0 |
| the part of ethyl-tertio-butyl-ether (ETBE) from renewable ethanol | Will be considered equal to that of the ethanol production pathway used | |
| the part of tertiary-amyl-ethyl-ether (TAEE) from renewable ethanol | Will be considered equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 1.3 | 1.3 |
| sunflower biodiesel | 1.3 | 1.3 |
| soybean biodiesel | 1.3 | 1.3 |
| palm oil biodiesel (open effluent pond) | 1.3 | 1.3 |
| palm oil biodiesel (process with methane capture at oil mill) | 1.3 | 1.3 |
| waste cooking oil biodiesel | 1.3 | 1.3 |
| animal fats from rendering biodiesel | 1.3 | 1.3 |
| hydrotreated vegetable oil from rape seed | 1.2 | 1.2 |
| hydrotreated vegetable oil from sunflower | 1.2 | 1.2 |
| hydrotreated vegetable oil from soybean | 1.2 | 1.2 |
| hydrotreated vegetable oil from palm oil (open effluent pond) | 1.2 | 1.2 |
| hydrotreated vegetable oil from palm oil (process with methane capture at oil mill) | 1.2 | 1.2 |
| hydrotreated vegetable oil from waste cooking oil | 1.2 | 1.2 |
| hydrotreated vegetable oil from animal | 1.2 | 1.2 |

| | | |
|---|-----|-----|
| fats from rendering | | |
| pure vegetable oil from rape seed | 0.8 | 0.8 |
| pure vegetable oil from sunflower | 0.8 | 0.8 |
| pure vegetable oil from soybean | 0.8 | 0.8 |
| pure vegetable oil from palm oil (open effluent pond) | 0.8 | 0.8 |
| pure vegetable oil from palm oil (process with methane capture at oil mill) | 0.8 | 0.8 |
| pure vegetable oil from waste cooking oil | 0.8 | 0.8 |

↓ 2009/28/EC (adapted)
⇒ new

Total for cultivation, processing, transport and distribution

| ⇒ Biofuel and bioliquid production pathway ⇐ | ⇒ Typical greenhouse gas emissions (gCO ₂ eq/MJ) ⇐ | ⇒ Default greenhouse gas emissions (gCO ₂ eq/MJ) ⇐ |
|--|---|---|
| sugar beet ethanol ⇒ (no biogas from slop, natural gas as process fuel in conventional boiler) ⇐ | 33 ⇒ 30.8 ⇐ | 40 ⇒ 38.3 ⇐ |
| ⇒ sugar beet ethanol (with biogas from slop, natural gas as process fuel in conventional boiler) ⇐ | ⇒ 21.7 ⇐ | ⇒ 25.6 ⇐ |
| ⇒ sugar beet ethanol (no biogas from slop, natural gas as process fuel in CHP plant*) ⇐ | ⇒ 25.2 ⇐ | ⇒ 30.5 ⇐ |
| ⇒ sugar beet ethanol (with biogas from slop, natural gas as process fuel in CHP plant*) ⇐ | ⇒ 19.6 ⇐ | ⇒ 22.6 ⇐ |
| ⇒ sugar beet ethanol (no biogas from slop, lignite as process fuel in CHP plant*) ⇐ | ⇒ 39.4 ⇐ | ⇒ 50.3 ⇐ |

| | | |
|--|--|------------------------|
| ⇒ sugar beet ethanol (with biogas from slop, lignite as process fuel in CHP plant *) ⇐ | ⇒ 27.7 ⇐ | ⇒ 34.0 ⇐ |
| ⇒ corn (maize) ethanol (natural gas as process fuel in conventional boiler) ⇐ | ⇒ 48.5 ⇐ | ⇒ 56.8 ⇐ |
| corn (maize) ethanol, Community produced (natural gas as process fuel in CHP plant) | 37 ⇒ 42.5 ⇐ | 43 ⇒ 48.5 ⇐ |
| ⇒ corn (maize) ethanol (lignite as process fuel in CHP plant*) ⇐ | ⇒ 56.3 ⇐ | ⇒ 67.8 ⇐ |
| ⇒ corn (maize) ethanol (forest residues as process fuel in CHP plant*) ⇐ | ⇒ 29.5 ⇐ | ⇒ 30.3 ⇐ |
| ⇒ other cereals excluding maize ethanol (natural gas as process fuel in conventional boiler) ⇐ | ⇒ 50.2 ⇐ | ⇒ 58.5 ⇐ |
| ⇒ other cereals excluding maize ethanol (natural gas as process fuel in CHP plant *) ⇐ | ⇒ 44.3 ⇐ | ⇒ 50.3 ⇐ |
| ⇒ other cereals excluding maize ethanol (lignite as process fuel in CHP plant *) ⇐ | ⇒ 59.5 ⇐ | ⇒ 71.7 ⇐ |
| ⇒ other cereals excluding maize ethanol (forest residues as process fuel in CHP plant *) ⇐ | ⇒ 30.7 ⇐ | ⇒ 31.4 ⇐ |
| sugar cane ethanol | 24 ⇒ 28.1 ⇐ | 24 ⇒ 28.6 ⇐ |
| the part from renewable sources of ETBE | Equal to that of the ethanol production pathway used | |
| the part from renewable sources of TAAE | Equal to that of the ethanol production pathway used | |
| rape seed biodiesel | 46 ⇒ 45.5 ⇐ | 52 ⇒ 50.1 ⇐ |
| sunflower biodiesel | 35 ⇒ 40.0 ⇐ | 41 ⇒ 44.7 ⇐ |
| soybean biodiesel | 50 ⇒ 42.4 ⇐ | 58 ⇒ 47.2 ⇐ |
| palm oil biodiesel (process not specified ⇒ open effluent pond ⇐) | 54 ⇒ 58.0 ⇐ | 68 ⇒ 70.2 ⇐ |
| palm oil biodiesel (process with methane capture at oil mill) | 32 ⇒ 40.8 ⇐ | 37 ⇒ 46.1 ⇐ |

| | | |
|---|------------------------|------------------------|
| waste vegetable or animal oil biodiesel ⇒ cooking ⇐ | 10 ⇒ 16.0 ⇐ | 14 ⇒ 21.6 ⇐ |
| ⇒ animals fat from rendering biodiesel ⇐ | ⇒ 19.5 ⇐ | ⇒ 26.7 ⇐ |
| hydrotreated vegetable oil from rape seed | 41 ⇒ 45.8 ⇐ | 44 ⇒ 50.1 ⇐ |
| hydrotreated vegetable oil from sunflower | 29 ⇒ 39.4 ⇐ | 32 ⇒ 43.6 ⇐ |
| hydrotreated vegetable oil from soybean | ⇒ 42.2 ⇐ | ⇒ 46.5 ⇐ |
| hydrotreated vegetable oil from palm oil (process not specified) ⇒ (open effluent pond) ⇐ | 50 ⇒ 56.5 ⇐ | 62 ⇒ 67.6 ⇐ |
| hydrotreated vegetable oil from palm oil (process with methane capture at oil mill) | 27 ⇒ 38.4 ⇐ | 29 ⇒ 42.3 ⇐ |
| ⇒ hydrotreated vegetable oil from waste cooking oil ⇐ | ⇒ 9.4 ⇐ | ⇒ 12.4 ⇐ |
| ⇒ hydrotreated vegetable oil from animal fats from rendering ⇐ | ⇒ 11.9 ⇐ | ⇒ 16.0 ⇐ |
| ⇒ pure vegetable oil from rape seed ⇐ | 35 ⇒ 38.5 ⇐ | 36 ⇒ 40.0 ⇐ |
| ⇒ pure vegetable oil from sunflower ⇐ | ⇒ 32.7 ⇐ | ⇒ 34.3 ⇐ |
| ⇒ pure vegetable oil from soybean ⇐ | ⇒ 35.3 ⇐ | ⇒ 37.0 ⇐ |
| ⇒ pure vegetable oil from palm oil (open effluent pond) ⇐ | ⇒ 50.9 ⇐ | ⇒ 60.0 ⇐ |
| ⇒ pure vegetable oil from palm oil (process with methane capture at oil mill) ⇐ | ⇒ 33.0 ⇐ | ⇒ 34.8 ⇐ |
| ⇒ pure vegetable oil from waste cooking oil ⇐ | ⇒ 2.0 ⇐ | ⇒ 2.2 ⇐ |
| biogas from municipal organic waste as compressed natural gas | 17 | 23 |
| biogas from wet manure as compressed natural gas | 13 | 16 |
| biogas from dry manure as compressed natural gas | 12 | 15 |

↓ new

(*) Default values for processes using CHP are valid only if ALL the process heat is supplied by CHP.

↓ 2009/28/EC (adapted)

⇒ new

E. ESTIMATED DISAGGREGATED DEFAULT VALUES FOR FUTURE BIOFUELS AND BIOLIQUIDS THAT WERE NOT ON THE MARKET OR WERE ONLY ON THE MARKET IN NEGLIGIBLE QUANTITIES IN ~~JANUARY 2008~~ ☒ 2016 ☒

Disaggregated default values for cultivation: 'e_{ec}' as defined in part C of this Annex ☒ including N₂O emissions (including chipping of waste or farmed wood) ☒

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
|---|---|---|
| wheat straw ethanol | 1.8 | 1.8 |
| waste wood Fischer-Tropsch diesel in free-standing plant | 3.3 | 3.3 |
| farmed wood Fischer-Tropsch diesel in free-standing plant | 12.4 | 12.4 |
| waste wood Fischer-Tropsch petrol in free-standing plant | 3.3 | 3.3 |
| farmed wood Fischer-Tropsch petrol in free-standing plant | 12.4 | 12.4 |
| waste wood dimethylether (DME) in free-standing plant | 3.1 | 3.1 |
| farmed wood dimethylether DME in free-standing plant | 11.4 | 11.4 |
| waste wood methanol in | 3.1 | 3.1 |

| | | |
|---|---|------|
| free-standing plant | | |
| farmed wood methanol in free-standing plant | 11.4 | 11.4 |
| Fischer Tropsch diesel from black-liquor gasification integrated with pulp mill | 2.5 | 2.5 |
| Fischer Tropsch petrol from black-liquor gasification integrated with pulp mill | 2.5 | 2.5 |
| dimethylether DME from black-liquor gasification integrated with pulp mill | 2.5 | 2.5 |
| Methanol from black-liquor gasification integrated with pulp mill | 2.5 | 2.5 |
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO_{2,eq}/MJ) | Default greenhouse gas emissions (gCO_{2,eq}/MJ) |
|---|---|---|
| wheat straw ethanol | 3 | 3 |
| waste wood ethanol | 1 | 1 |
| farmed wood ethanol | 6 | 6 |
| waste wood Fischer-Tropsch diesel | 1 | 1 |
| farmed wood Fischer-Tropsch diesel | 4 | 4 |
| waste wood DME | 1 | 1 |
| farmed wood DME | 5 | 5 |
| waste wood methanol | 1 | 1 |
| farmed wood methanol | 5 | 5 |

| | |
|---|---|
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used |
|---|---|

↓ new

Disaggregated default values for field N₂O emissions (included in disaggregated default values for cultivation emissions in 'e_{ec}' table)

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
|---|---|---|
| wheat straw ethanol | 0 | 0 |
| waste wood Fischer-Tropsch diesel in free-standing plant | 0 | 0 |
| farmed wood Fischer-Tropsch diesel in free-standing plant | 4.4 | 4.4 |
| waste wood Fischer-Tropsch petrol in free-standing plant | 0 | 0 |
| farmed wood Fischer-Tropsch petrol in free-standing plant | 4.4 | 4.4 |
| waste wood dimethylether (DME) in free-standing plant | 0 | 0 |
| farmed wood dimethylether DME in free-standing plant | 4.1 | 4.1 |
| waste wood methanol in free-standing plant | 0 | 0 |
| farmed wood methanol in free-standing plant | 4.1 | 4.1 |
| Fischer-Tropsch diesel from black-liquor gasification integrated with pulp mill | 0 | 0 |

| | | |
|---|---|---|
| Fischer-Tropsch petrol from black-liquor gasification integrated with pulp mill | 0 | 0 |
| dimethylether DME from black-liquor gasification integrated with pulp mill | 0 | 0 |
| Methanol from black-liquor gasification integrated with pulp mill | 0 | 0 |
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |

↓ new

Disaggregated default values for processing: 'e_p' as defined in part C of this Annex

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
|--|--|--|
| wheat straw ethanol | 5 | 7 |
| wood ethanol | 12 | 17 |
| wood Fischer-Tropsch diesel | 0 | 0 |
| wood DME | 0 | 0 |
| wood methanol | 0 | 0 |
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |
| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
| wheat straw ethanol | 4.8 | 6.8 |
| waste wood Fischer-Tropsch diesel in free-standing plant | 0.1 | 0.1 |

| | | |
|---|---|-----|
| farmed wood Fischer-Tropsch diesel in free-standing plant | 0.1 | 0.1 |
| waste wood Fischer-Tropsch petrol in free-standing plant | 0.1 | 0.1 |
| farmed wood Fischer-Tropsch petrol in free-standing plant | 0.1 | 0.1 |
| waste wood dimethylether (DME) in free-standing plant | 0 | 0 |
| farmed wood dimethylether (DME) in free-standing plant | 0 | 0 |
| waste wood methanol in free-standing plant | 0 | 0 |
| farmed wood methanol in free-standing plant | 0 | 0 |
| Fischer - Tropsch diesel from black-liquor gasification integrated with pulp mill | 0 | 0 |
| Fischer – Tropsch petrol from black-liquor gasification integrated with pulp mill | 0 | 0 |
| dimethylether DME from black-liquor gasification integrated with pulp mill | 0 | 0 |
| methanol from black-liquor gasification integrated with pulp mill | 0 | 0 |
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |

Disaggregated default values for transport and distribution: 'e_{td}' as defined in part C of this Annex

| ↓ new | | |
|---|--|--|
| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
| wheat straw ethanol | 7.1 | 7.1 |
| waste wood Fischer-Tropsch diesel in free-standing plant | 10.3 | 10.3 |
| farmed wood Fischer-Tropsch diesel in free-standing plant | 8.4 | 8.4 |
| waste wood Fischer-Tropsch petrol in free-standing plant | 10.3 | 10.3 |
| farmed wood Fischer-Tropsch petrol in free-standing plant | 8.4 | 8.4 |
| waste wood dimethylether (DME) in free-standing plant | 10.4 | 10.4 |
| farmed wood dimethylether (DME) in free-standing plant | 8.6 | 8.6 |
| waste wood methanol in free-standing plant | 10.4 | 10.4 |
| farmed wood methanol in free-standing plant | 8.6 | 8.6 |
| Fischer - Tropsch diesel from black-liquor gasification integrated with pulp mill | 7.7 | 7.7 |

| | | |
|---|---|-----|
| Fischer – Tropsch petrol from black-liquor gasification integrated with pulp mill | 7.9 | 7.9 |
| DME from black-liquor gasification integrated with pulp mill | 7.7 | 7.7 |
| methanol from black-liquor gasification integrated with pulp mill | 7.9 | 7.9 |
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |

↓ 2009/28/EC (adapted)
⇒ new

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO_{2eq}/MJ) | Default greenhouse gas emissions (gCO_{2eq}/MJ) |
|---|--|--|
| wheat straw ethanol | 2 | 2 |
| waste wood ethanol | 4 | 4 |
| farmed wood ethanol | 2 | 2 |
| waste wood Fischer-Tropsch diesel | 3 | 3 |
| farmed wood Fischer-Tropsch diesel | 2 | 2 |
| waste wood DME | 4 | 4 |
| farmed wood DME | 2 | 2 |
| waste wood methanol | 4 | 4 |
| farmed wood methanol | 2 | 2 |
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |

Disaggregated default values for transport and distribution of final fuel only. These are already included in table of “transport and distribution emissions e_{id} ” as defined in part C of this Annex, but the following values are useful if an economic operator wishes to declare actual transport emissions for feedstock transport only).

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
|---|--|--|
| wheat straw ethanol | 1.6 | 1.6 |
| waste wood Fischer-Tropsch diesel in free-standing plant | 1.2 | 1.2 |
| farmed wood Fischer-Tropsch diesel in free-standing plant | 1.2 | 1.2 |
| waste wood Fischer-Tropsch petrol in free-standing plant | 1.2 | 1.2 |
| farmed wood Fischer-Tropsch petrol in free-standing plant | 1.2 | 1.2 |
| waste wood dimethylether (DME) in free-standing plant | 2.0 | 2.0 |
| farmed wood DME in free-standing plant | 2.0 | 2.0 |
| waste wood methanol in free-standing plant | 2.0 | 2.0 |
| farmed wood methanol in free-standing plant | 2.0 | 2.0 |
| Fischer Tropsch diesel from black-liquor gasification integrated with pulp mill | 2.0 | 2.0 |
| Fischer Tropsch petrol from | 2.0 | 2.0 |

| | | |
|---|---|-----|
| black-liquor gasification integrated with pulp mill | | |
| DME from black-liquor gasification integrated with pulp mill | 2.0 | 2.0 |
| methanol from black-liquor gasification integrated with pulp mill | 2.0 | 2.0 |
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |

Total for cultivation, processing, transport and distribution

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO _{2eq} /MJ) | Default greenhouse gas emissions (gCO _{2eq} /MJ) |
|---|--|--|
| wheat straw ethanol | 13.7 | 15.7 |
| waste wood Fischer-Tropsch diesel in free-standing plant | 13.7 | 13.7 |
| farmed wood Fischer-Tropsch diesel in free-standing plant | 20.9 | 20.9 |
| waste wood Fischer-Tropsch petrol in free-standing plant | 13.7 | 13.7 |
| farmed wood Fischer-Tropsch petrol in free-standing plant | 20.9 | 20.9 |
| waste wood dimethylether (DME) in free-standing plant | 13.5 | 13.5 |
| farmed wood dimethylether (DME) in free-standing plant | 20.0 | 20.0 |

| | | |
|---|---|------|
| waste wood methanol in free-standing plant | 13.5 | 13.5 |
| farmed wood methanol in free-standing plant | 20.0 | 20.0 |
| Fischer - Tropsch diesel from black-liquor gasification integrated with pulp mill | 10.2 | 10.2 |
| Fischer – Tropsch petrol from black-liquor gasification integrated with pulp mill | 10.4 | 10.4 |
| dimethylether DME from black-liquor gasification integrated with pulp mill | 10.2 | 10.2 |
| methanol from black-liquor gasification integrated with pulp mill | 10.4 | 10.4 |
| the part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |

| Biofuel and bioliquid production pathway | Typical greenhouse gas emissions (gCO ₂ eq/MJ) | Default greenhouse gas emissions (gCO ₂ eq/MJ) |
|--|---|---|
| wheat straw ethanol | 11 | 13 |
| waste wood ethanol | 17 | 22 |
| farmed wood ethanol | 20 | 25 |
| Waste wood Fischer-Tropsch petrol | 4 | 4 |
| farmed wood Fischer-Tropsch petrol | 6 | 6 |
| waste wood DME | 5 | 5 |
| farmed wood DME | 7 | 7 |
| waste wood methanol | 5 | 5 |
| farm wood methanol | 7 | 7 |
| The part from renewable sources of MTBE | Equal to that of the methanol production pathway used | |

ANNEX VI

Rules for calculating the greenhouse gas impact of biomass fuels and their fossil fuel comparators

A. TYPICAL AND DEFAULT VALUES OF GREENHOUSE GAS EMISSION SAVINGS FOR BIOMASS FUELS IF PRODUCED WITH NO NET-CARBON EMISSIONS FROM LAND-USE CHANGE

| WOODCHIPS | | | | | |
|---|--------------------|---|-------------|---|-------------|
| Biomass fuel production system | Transport distance | Typical greenhouse gas emission savings | | Default greenhouse gas emission savings | |
| | | Heat | Electricity | Heat | Electricity |
| Woodchips from forest residues | 1 to 500 km | 93% | 89% | 91% | 87% |
| | 500 to 2500 km | 89% | 84% | 87% | 81% |
| | 2500 to 10 000 km | 82% | 73% | 78% | 67% |
| | Above 10000 km | 67% | 51% | 60% | 41% |
| Woodchips from short rotation coppice (Eucalyptus) | 2500 to 10 000 km | 64% | 46% | 61% | 41% |
| Woodchips from short rotation coppice (Poplar - Fertilised) | 1 to 500 km | 89% | 83% | 87% | 81% |
| | 500 to 2500 km | 85% | 78% | 84% | 76% |
| | 2500 to 10 000 km | 78% | 67% | 74% | 62% |
| | Above 10000 km | 63% | 45% | 57% | 35% |
| Woodchips from short rotation coppice (Poplar – No fertilisation) | 1 to 500 km | 91% | 87% | 90% | 85% |
| | 500 to 2500 km | 88% | 82% | 86% | 79% |
| | 2500 to 10 000 km | 80% | 70% | 77% | 65% |

| | | | | | |
|----------------------------------|------------------|-----|-----|-----|-----|
| | Above 10000 km | 65% | 48% | 59% | 39% |
| Woodchips from stemwood | 1 to 500 km | 93% | 89% | 92% | 88% |
| | 500 to 2500 km | 90% | 85% | 88% | 82% |
| | 2500 to 10000 km | 82% | 73% | 79% | 68% |
| | Above 10000 km | 67% | 51% | 61% | 42% |
| Woodchips from industry residues | 1 to 500 km | 94% | 92% | 93% | 90% |
| | 500 to 2500 km | 91% | 87% | 90% | 85% |
| | 2500 to 10000 km | 83% | 75% | 80% | 71% |
| | Above 10000 km | 69% | 54% | 63% | 44% |

| WOOD PELLETS* | | | | | | |
|---|---------|--------------------|---|-------------|---|-------------|
| Biomass fuel production system | | Transport distance | Typical greenhouse gas emission savings | | Default greenhouse gas emission savings | |
| | | | Heat | Electricity | Heat | Electricity |
| Wood briquettes or pellets from forest residues | Case 1 | 1 to 500 km | 58% | 37% | 49% | 24% |
| | | 500 to 2500 km | 58% | 37% | 49% | 25% |
| | | 2500 to 10000 km | 55% | 34% | 47% | 21% |
| | | Above 10000 km | 50% | 26% | 40% | 11% |
| | Case 2a | 1 to 500 km | 77% | 66% | 72% | 59% |
| | | 500 to 2500 km | 77% | 66% | 72% | 59% |
| | | 2500 to 10000 km | 75% | 62% | 70% | 55% |
| | | Above 10000 km | 69% | 54% | 63% | 45% |

| | | | | | | |
|---|---------|------------------|-----|-----|-----|-----|
| | | 1 to 500 km | 92% | 88% | 90% | 85% |
| | | 500 to 2500 km | 92% | 88% | 90% | 86% |
| | Case 3a | 2500 to 10000 km | 90% | 85% | 88% | 81% |
| | | Above 10000 km | 84% | 76% | 81% | 72% |
| Wood briquettes or pellets from short rotation coppice (Eucalyptus) | Case 1 | 2500 to 10000 km | 40% | 11% | 32% | -2% |
| | Case 2a | 2500 to 10000 km | 56% | 34% | 51% | 27% |
| | Case 3a | 2500 to 10000 km | 70% | 55% | 68% | 53% |
| Wood pellets briquettes or from short rotation coppice (Poplar - Fertilised) | Case 1 | 1 to 500 km | 54% | 32% | 46% | 20% |
| | | 500 to 10000 km | 52% | 29% | 44% | 16% |
| | | Above 10000 km | 47% | 21% | 37% | 7% |
| | Case 2a | 1 to 500 km | 73% | 60% | 69% | 54% |
| | | 500 to 10000 km | 71% | 57% | 67% | 50% |
| | | Above 10000 km | 66% | 49% | 60% | 41% |
| | Case 3a | 1 to 500 km | 88% | 82% | 87% | 81% |
| | | 500 to 10000 km | 86% | 79% | 84% | 77% |
| | | Above 10000 km | 80% | 71% | 78% | 67% |
| Wood briquettes or pellets from short | Case 1 | 1 to 500 km | 56% | 35% | 48% | 23% |
| | | 500 to 10000 km | 54% | 32% | 46% | 20% |
| | | Above 10000 km | 49% | 24% | 40% | 10% |

| | | | | | | |
|--|---------|----------------------|-----|-----|-----|-----|
| rotation coppice (Poplar – No fertilisati on) | Case 2a | 1 to 500 km | 76% | 64% | 72% | 58% |
| | | 500 to 10 000 km | 74% | 61% | 69% | 54% |
| | | Above 10 000 km | 68% | 53% | 63% | 45% |
| | Case 3a | 1 to 500 km | 91% | 86% | 90% | 85% |
| | | 500 to 10 000 km | 89% | 83% | 87% | 81% |
| | | Above 10 000 km | 83% | 75% | 81% | 71% |
| Stemwood | Case 1 | 1 to 500 km | 57% | 37% | 49% | 24% |
| | | 500 to 2500 km | 58% | 37% | 49% | 25% |
| | | 2500 to 10 000 km | 55% | 34% | 47% | 21% |
| | | Above 10000 km | 50% | 26% | 40% | 11% |
| | Case 2a | 1 to 500 km | 77% | 66% | 73% | 60% |
| | | 500 to 2500 km | 77% | 66% | 73% | 60% |
| | | 2500 to 10 000 km | 75% | 63% | 70% | 56% |
| | | Above 10000 km | 70% | 55% | 64% | 46% |
| | Case 3a | 1 to 500 km | 92% | 88% | 91% | 86% |
| | | 500 to 2500 km | 92% | 88% | 91% | 87% |
| | | 2500 to 10 000 km | 90% | 85% | 88% | 83% |
| | | Above 10000 km | 84% | 77% | 82% | 73% |
| Wood briquettes or pellets | Case 1 | 1 to 500 km | 75% | 62% | 69% | 55% |
| | | 500 to 2500 km | 75% | 62% | 70% | 55% |

| | | | | | | |
|-----------------------------|---------|------------------|-----|-----|-----|-----|
| from wood industry residues | | 2500 to 10000 km | 72% | 59% | 67% | 51% |
| | | Above 10000 km | 67% | 51% | 61% | 42% |
| | Case 2a | 1 to 500 km | 87% | 80% | 84% | 76% |
| | | 500 to 2500 km | 87% | 80% | 84% | 77% |
| | | 2500 to 10000 km | 85% | 77% | 82% | 73% |
| | | Above 10000 km | 79% | 69% | 75% | 63% |
| | Case 3a | 1 to 500 km | 95% | 93% | 94% | 91% |
| | | 500 to 2500 km | 95% | 93% | 94% | 92% |
| | | 2500 to 10000 km | 93% | 90% | 92% | 88% |
| | | Above 10000 km | 88% | 82% | 85% | 78% |

* Case 1 refers to processes in which a natural gas boiler is used to provide the process heat to the pellet mill. Power for the pellet mill is supplied from the grid;

Case 2a refers to processes in which a woodchips boiler, fed with pre-dried chips, is used to provide process heat. Power for the pellet mill is supplied from the grid;

Case 3a refers to processes in which a CHP, fed with pre-dried woodchips, is used to provide power and heat to the pellet mill.

| AGRICULTURE PATHWAYS | | | | | |
|--|--------------------|---|-------------|---|-------------|
| Biomass fuel production system | Transport distance | Typical greenhouse gas emission savings | | Default greenhouse gas emission savings | |
| | | Heat | Electricity | Heat | Electricity |
| Agricultural Residues with density <0.2 t/m ³ * | 1 to 500 km | 95% | 92% | 93% | 90% |
| | 500 to 2500 km | 89% | 83% | 86% | 80% |
| | 2500 to 10000 km | 77% | 66% | 73% | 60% |
| | Above | 57% | 36% | 48% | 23% |

| | | | | | |
|---|------------------|-----|------|-----|------|
| | 10000 km | | | | |
| Agricultural Residues with density > 0.2 t/m ³ ** | 1 to 500 km | 95% | 92% | 93% | 90% |
| | 500 to 2500 km | 93% | 89% | 92% | 87% |
| | 2500 to 10000 km | 88% | 82% | 85% | 78% |
| | Above 10000 km | 78% | 68% | 74% | 61% |
| Straw pellets | 1 to 500 km | 88% | 82% | 85% | 78% |
| | 500 to 10000 km | 86% | 79% | 83% | 74% |
| | Above 10000 km | 80% | 70% | 76% | 64% |
| Bagasse briquettes | 500 to 10000 km | 93% | 89% | 91% | 87% |
| | Above 10000 km | 87% | 81% | 85% | 77% |
| Palm Kernel Meal | Above 10000 km | 20% | -18% | 11% | -33% |
| Palm Kernel Meal (no CH ₄ emissions from oil mill) | Above 10000 km | 46% | 20% | 42% | 14% |

* This group of materials includes agricultural residues with a low bulk density and it comprises materials such as straw bales, oat hulls, rice husks and sugar cane bagasse bales (not exhaustive list)

** The group of agricultural residues with higher bulk density includes materials such as corn cobs, nut shells, soybean hulls, palm kernel shells (not exhaustive list).

| BIOGAS FOR ELECTRICITY* | | | | |
|--------------------------|--------|------------------------------|---|---|
| Biogas production system | | Technological option | Typical greenhouse gas emission savings | Default greenhouse gas emission savings |
| Wet manure | Case 1 | Open digestate ¹² | 146% | 94% |

¹¹ The values for biogas production from manure include negative emissions for emissions saved from raw manure management. The value of esca considered is equal to -45 gCO₂eq./MJ manure used in anaerobic digestion

| | | | | |
|-----------------|---------------------------------|-------------------------------|----------------|------|
| 11 | | Close digestate ¹³ | 246% | 240% |
| | Case 2 | Open digestate | 136% | 85% |
| | | Close digestate | 227% | 219% |
| | Case 3 | Open digestate | 142% | 86% |
| | | Close digestate | 243% | 235% |
| | Maize whole plant ¹⁴ | Case 1 | Open digestate | 36% |
| Close digestate | | | 59% | 53% |
| Case 2 | | Open digestate | 34% | 18% |
| | | Close digestate | 55% | 47% |
| Case 3 | | Open digestate | 28% | 10% |
| | | Close digestate | 52% | 43% |
| Biowaste | Case 1 | Open digestate | 47% | 26% |
| | | Close digestate | 84% | 78% |
| | Case 2 | Open digestate | 43% | 21% |
| | | Close digestate | 77% | 68% |

¹² Open storage of digestate accounts for additional emissions of methane and N₂O. The magnitude of these emissions changes with ambient conditions, substrate types and the digestion efficiency (see chapter 5 for more details).

¹³ Close storage means that the digestate resulting from the digestion process is stored in a gas-tight tank and the additional biogas released during storage is considered to be recovered for production of additional electricity or biomethane. No emissions of GHG are included in this process.

¹⁴ Maize whole plant should be interpreted as maize harvested as fodder and ensiled for preservation.

| | | | | |
|--|--------|-----------------|-----|-----|
| | Case 3 | Open digestate | 38% | 14% |
| | | Close digestate | 76% | 66% |

* Case 1 refers to pathways in which power and heat required in the process are supplied by the CHP engine itself.

Case 2 refers to pathways in which the electricity required in the process is taken from the grid and the process heat is supplied by the CHP engine itself. In some Member States, operators are not allowed to claim the gross production for subsidies and Case 1 is the more likely configuration.

Case 3 refers to pathways in which the electricity required in the process is taken from the grid and the process heat is supplied by a biogas boiler. This case applies to some installations in which the CHP engine is not on-site and biogas is sold (but not upgraded to biomethane).

| BIOGAS FOR ELECTRICITY – MIXTURES OF MANURE AND MAIZE | | | | |
|---|--------|----------------------|---|-----------|
| Biogas production system | | Technological option | Typical greenhouse gas emission savings | Default g |
| Manure – Maize 80% - 20% | Case 1 | Open digestate | 72% | |
| | | Close digestate | 120% | |
| | Case 2 | Open digestate | 67% | |
| | | Close digestate | 111% | |
| | Case 3 | Open digestate | 65% | |
| | | Close digestate | 114% | |
| Manure – Maize 70% - 30% | Case 1 | Open digestate | 60% | |
| | | Close digestate | 100% | |
| | Case 2 | Open digestate | 57% | |
| | | Close digestate | 93% | |
| | Case 3 | Open digestate | 53% | |
| | | Close digestate | 94% | |
| Manure – Maize 60% - 40% | Case 1 | Open digestate | 53% | |
| | | Close digestate | 88% | |
| | Case 2 | Open digestate | 50% | |
| | | Close digestate | 82% | |
| | Case 3 | Open digestate | 46% | |

| | | | | |
|--|--|-----------------|-----|--|
| | | Close digestate | 81% | |
|--|--|-----------------|-----|--|

| BIOMETHANE FOR TRANSPORT* | | | |
|------------------------------|--|---|---|
| Biomethane production system | Technological options | Typical greenhouse gas emission savings | Typical greenhouse gas emission savings |
| Wet manure | Open digestate, no-off gas combustion | 117% | 72% |
| | Open digestate, off gas combustion | 133% | 94% |
| | Close digestate, no-off gas combustion | 190% | 179% |
| | Close digestate, off gas combustion | 206% | 202% |
| Maize whole plant | Open digestate, no off-gas combustion | 35% | 17% |
| | Open digestate, off gas combustion | 51% | 39% |
| | Close digestate, no off-gas combustion | 52% | 41% |
| | Close digestate, off-gas combustion | 68% | 63% |
| Biowaste | Open digestate, no off-gas combustion | 43% | 20% |
| | Open digestate, off gas combustion | 59% | 42% |
| | Close digestate, no off-gas combustion | 70% | 58% |
| | Close digestate, off-gas combustion | 86% | 80% |

*The savings for biomethane only refer to compressed biomethane relative to the fossil fuel comparator for transport of 94 gCO₂ eq./MJ.

| |
|--|
| BIOMETHANE - MIXTURES OF MANURE AND MAIZE* |
|--|

| Biomethane production system | Technological options | Typical greenhouse gas emission savings | Default greenhouse gas emission savings |
|-------------------------------------|---|--|--|
| Manure – Maize 80% - 20% | Open digestate, no-off gas combustion ¹⁵ | 62% | 35% |
| | Open digestate, off gas combustion ¹⁶ | 78% | 57% |
| | Close digestate, no-off gas combustion | 97% | 86% |
| | Close digestate, off gas combustion | 113% | 108% |
| Manure – Maize 70% - 30% | Open digestate, no off-gas combustion | 53% | 29% |
| | Open digestate, off gas combustion | 69% | 51% |
| | Close digestate, no off-gas combustion | 83% | 71% |
| | Close digestate, off-gas combustion | 99% | 94% |
| Manure – Maize 60% - 40% | Open digestate, no off-gas combustion | 48% | 25% |
| | Open digestate, off gas combustion | 64% | 48% |
| | Close digestate, no off-gas combustion | 74% | 62% |
| | Close digestate, off-gas combustion | 90% | 84% |

*The greenhouse gas emission savings for biomethane only refer to compressed biomethane relative to the fossil fuel comparator for transport of 94 gCO₂ eq./MJ.

¹⁵ This category includes the following categories of technologies for biogas upgrade to biomethane: Pressure Swing Absorption (PSA), Pressure Water Scrubbing (PWS), Membranes, Cryogenic, and Organic Physical Scrubbing (OPS). It includes an emission of 0.03 MJCH₄/MJbiomethane for the emission of methane in the off-gases.

¹⁶ This category includes the following categories of technologies for biogas upgrade to biomethane: Pressure Water Scrubbing (PWS) when water is recycled, Pressure Swing Absorption (PSA), Chemical Scrubbing, Organic Physical Scrubbing (OPS), Membranes and Cryogenic upgrading. No methane emissions are considered for this category (the methane in the off gas is combusted, if any).

B. METHODOLOGY

1. Greenhouse gas emissions from the production and use of biomass fuels, shall be calculated as follows:

(a) Greenhouse gas emissions from the production and use of biomass fuels before conversion into electricity, heating and cooling, shall be calculated as:

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr}$$

Where

E = total emissions from the production of the fuel before energy conversion;

e_{ec} = emissions from the extraction or cultivation of raw materials;

e_l = annualised emissions from carbon stock changes caused by land use change;

e_p = emissions from processing;

e_{td} = emissions from transport and distribution;

e_u = emissions from the fuel in use;

e_{sca} = emission savings from soil carbon accumulation via improved agricultural management;

e_{ccs} = emission savings from carbon capture and geological storage; and

e_{ccr} = emission savings from carbon capture and replacement.

Emissions from the manufacture of machinery and equipment shall not be taken into account.

(b) In case of co-digestion of different substrates in a biogas plant for the production of biogas or biomethane the typical and default values of greenhouse gas emissions shall be calculated as:

$$E = \sum_1^n S_n \cdot E_n$$

where

E = GHG emissions per MJ biogas or biomethane produced from co-digestion of the defined mixture of substrates

S_n = Share of feedstock n in energy content

E_n = Emission in gCO₂/MJ for pathway n as provided in Part D of this document*

$$S_n = \frac{E_n \cdot H_n}{\sum_1^n E_n \cdot H_n}$$

where

P_n = energy yield [MJ] per kilogram of wet input of feedstock n**

W_n = weighting factor of substrate n defined as:

$$W_n = \frac{I_n}{\sum I_n} \cdot \left(\frac{1 - AM_n}{1 - SM_n} \right)$$

where:

I_n = Annual input to digester of substrate n [tonne of fresh matter]

AM_n = Average annual moisture of substrate n [kg water / kg fresh matter]

SM_n = Standard moisture for substrate n***.

* For animal manure used as substrate, a bonus of 45 gCO₂eq./MJ manure (-54 kg CO₂eq. / t fresh matter) is added for improved agricultural and manure management.

** The following values of P_n shall be used for calculating typical and default values:

P(Maize): 4.16 [MJ_{biogas}/kg_{wet maize @ 65 % moisture}]

P(Manure): 0.50 [MJ_{biogas}/kg_{wet manure @ 90 % moisture}]

P(Biowaste) 3.41 [MJ_{biogas}/kg_{wet biowaste @ 76 % moisture}]

***The following values of the standard moisture for substrate SM_n shall be used:

SM(Maize): 0.65 [kg water/kg fresh matter]

SM(Manure): 0.90 [kg water/kg fresh matter]

SM(Biowaste): 0.76 [kg water/kg fresh matter]

(c) In case of co-digestion of n substrates in a biogas plant for the production of electricity or biomethane, actual greenhouse gas emissions of biogas and biomethane are calculated as follows:

$$E = \sum_1^n S_n \cdot (e_{ec,n} + e_{td,feedstock,n} + e_{l,n} - e_{sca,n}) + e_p + e_{td,product} + e_u - e_{ccs} - e_{ccr}$$

where

E= total emissions from the production of the biogas or biomethane before energy conversion;

S_n = Share of feedstock n, in fraction of input to the digester

$e_{ec,n}$ = emissions from the extraction or cultivation of feedstock n;

$e_{td,feedstock,n}$ = emissions from transport of feedstock n to the digester;

$e_{l,n}$ = annualised emissions from carbon stock changes caused by land use change, for feedstock n;

e_{sca} = emission savings from improved agricultural management of feedstock n*;

e_p = emissions from processing;

$e_{td,product}$ = emissions from transport and distribution of biogas and/or biomethane;

e_u = emissions from the fuel in use, that is greenhouse gases emitted during combustion;

e_{ccs} = emission savings from carbon capture and geological storage; and

e_{ccr} = emission savings from carbon capture and replacement.

* For e_{sca} a bonus of 45 gCO_{2eq.} / MJ manure shall be attributed for improved agricultural and manure management in case animal manure is used as a substrate for the production of biogas and biomethane.

(d) Greenhouse gas emissions from the use of biomass fuels in producing electricity, heating and cooling, including the energy conversion to electricity and/ or heat or cooling produced shall be calculated as follows:

(i) For energy installations delivering only heat:

$$EC_h = \frac{E}{\eta_h}$$

(ii) For energy installations delivering only electricity:

$$EC_{el} = \frac{E}{\eta_{el}}$$

where

$EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.

E = Total greenhouse gas emissions of the fuel before end-conversion.

η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual fuel input, based on its energy content.

η_h = The heat efficiency, defined as the annual useful heat output divided by the annual fuel input, based on its energy content.

(iii) For the electricity or mechanical energy coming from energy installations delivering useful heat together with electricity and/or mechanical energy:

$$EC_{el} = \frac{E}{\eta_{el}} \left(\frac{C_{el} \cdot \eta_{el}}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

(iv) For the useful heat coming from energy installations delivering heat together with electricity and/or mechanical energy:

$$EC_h = \frac{E}{\eta_h} \left(\frac{C_h \cdot \eta_h}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

where:

$EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.

E = Total greenhouse gas emissions of the fuel before end-conversion.

η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual energy input, based on its energy content.

η_h = The heat efficiency, defined as the annual useful heat output divided by the annual energy input, based on its energy content.

C_{el} = Fraction of exergy in the electricity, and/or mechanical energy, set to 100% ($C_{el} = 1$).

C_h = Carnot efficiency (fraction of exergy in the useful heat).

The Carnot efficiency, C_h , for useful heat at different temperatures is defined as:

$$C_h = \frac{T_h - T_0}{T_h}$$

where:

T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.

T_0 = Temperature of surroundings, set at 273.15 kelvin (equal to 0 °C)

For $T_h < 150$ °C (423.15 kelvin), C_h can alternatively be defined as follows:

$C_h = 0.3546$ = Carnot efficiency in heat at 150 °C (423.15 kelvin), which is:

For the purposes of this calculation, the following definitions shall apply:

(i) "cogeneration" shall mean the simultaneous generation in one process of thermal energy and electricity and/or mechanical energy;

(ii) "useful" heat shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes;

(iii) "economically justifiable demand" shall mean the demand that does not exceed the needs of heat or cooling and which would otherwise be satisfied at market conditions.

2. Greenhouse gas emissions from biomass fuels shall be expressed as follows

(a) greenhouse gas emissions from biomass fuels E , shall be expressed in terms of grams of CO₂ equivalent per MJ of biomass fuel, gCO_{2eq}/MJ.

(b) greenhouse gas emissions from heating or electricity, produced from biomass fuels, EC , shall be expressed in terms of grams of CO₂ equivalent per MJ of final energy commodity (heat or electricity), gCO_{2eq}/MJ.

When heating and cooling are co-generated with electricity, emissions shall be allocated between heat and electricity (as under 1(d)) irrespective if the heat is used for actual heating purposes or for cooling.¹⁷

Where the greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} are expressed in unit g CO₂eq/dry-ton of feedstock the conversion to grams of CO₂ equivalent per MJ of fuel, gCO₂eq/MJ shall be calculated as follows;

$$e_{ec, fuel_a} \left[\frac{gCO_2eq}{MJ fuel} \right]_{ec} = \frac{e_{ec, feedstock_a} \left[\frac{gCO_2eq}{t_{dry}} \right]}{LHV_a \left[\frac{MJ feedstock}{t dry feedstock} \right]}$$

** Fuel feedstock factor_a * Allocation factor fuel_a*

Where

$$Allocation\ factor\ fuel_a = \left[\frac{Energy\ in\ fuel}{Energy\ fuel + Energy\ in\ co - products} \right]$$

$$Fuel\ feedstock\ factor_a = [Ratio\ of\ MJ\ feedstock\ required\ to\ make\ 1\ MJ\ fuel]$$

Emissions per dry-ton feedstock shall be calculated as follows:

$$e_{ec, feedstock_a} \left[\frac{gCO_2eq}{t_{dry}} \right] = \frac{e_{ec, feedstock_a} \left[\frac{gCO_2eq}{t_{moist}} \right]}{(1 - moisture\ content)}$$

3. Greenhouse gas emission savings from biomass fuels shall be calculated as follows:

(a) greenhouse gas emission savings from biomass fuels used as transport fuels:

$$SAVING = (E_{F(t)} - E_{B(t)}) / E_F(t)$$

where

$E_{B(t)}$ = total emissions from the biofuel or bioliquid; and

$E_{F(t)}$ = total emissions from the fossil fuel comparator for transport

(b) greenhouse gas emission savings from heat and cooling, and electricity being generated from biomass fuels as follows:

$$SAVING = (EC_{F(h\&c,el)} - EC_{B(h\&c,el)}) / EC_{F(h\&c,el)}$$

where

$EC_{B(h\&c,el)}$ = total emissions from the heat or electricity,

¹⁷ Heat or waste heat is used to generate cooling (chilled air or water) through absorption chillers. Therefore, it is appropriate to calculate only the emissions associated to the heat produced, per MJ of heat, irrespectively if the end-use of the heat is actual heating or cooling via absorption chillers.

$EC_{F(h\&c,el)}$ = total emissions from the fossil fuel comparator for useful heat or electricity.

4. The greenhouse gases taken into account for the purposes of point 1 shall be CO₂, N₂O and CH₄. For the purpose of calculating CO₂ equivalence, those gases shall be valued as follows:

CO₂: 1

N₂O: 298

CH₄: 25

5. Emissions from the extraction, harvesting or cultivation of raw materials, e_{ec} , shall include emissions from the extraction, harvesting or cultivation process itself; from the collection, drying and storage of raw materials; from waste and leakages; and from the production of chemicals or products used in extraction or cultivation. Capture of CO₂ in the cultivation of raw materials shall be excluded. Estimates of emissions from agriculture biomass cultivation may be derived from the regional averages for cultivation emissions included in the reports referred to in Article 28 (4) of this Directive and the information on the disaggregated default values for cultivation emissions included in this Annex, as an alternative to using actual values. In absence of relevant information in the before mentioned reports it is allowed to calculate averages based on local farming practises based for instance on data of a group of farms, as an alternative to using actual values.

Estimates of emissions from cultivation and harvesting of forestry biomass, may be derived from the use of averages for cultivation and harvesting emissions calculated for geographical areas at national level, as an alternative to using actual values.

6. For the purposes of the calculation referred to in point 3, emission savings from improved agriculture management, such as shifting to reduced or zero-tillage, improved crop/rotation, the use of cover crops, including crop management, and the use of organic soil improver (e.g. compost, manure fermentation digestate), shall be taken into account only if solid and verifiable evidence is provided that the soil carbon has increased or that it is reasonable to expect to have increased over the period in which the raw materials concerned were cultivated while taking into account the emissions where such practices lead to increased fertiliser and herbicide use.

7. Annualised emissions from carbon stock changes caused by land-use change, e_l , shall be calculated by dividing total emissions equally over 20 years. For the calculation of those emissions the following rule shall be applied:

$$e_l = (CS_R - CS_A) \times 3,664 \times 1/20 \times 1/P - e_B,^{(18)}$$

where

e_l = annualised greenhouse gas emissions from carbon stock change due to land-use change (measured as mass of CO₂-equivalent per unit biomass fuel energy). 'Cropland' (¹⁹) and 'perennial cropland' () shall be regarded as one land use²⁰ ;

CS_R = the carbon stock per unit area associated with the reference land use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). The

¹⁸ The quotient obtained by dividing the molecular weight of CO₂ (44,010 g/mol) by the molecular weight of carbon (12,011 g/mol) is equal to 3,664

¹⁹ Cropland as defined by IPCC

²⁰ Perennial crops are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice and oil palm.

reference land use shall be the land use in January 2008 or 20 years before the raw material was obtained, whichever was the later;

CS_A = the carbon stock per unit area associated with the actual land use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). In cases where the carbon stock accumulates over more than one year, the value attributed to CS_A shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier; and

P = the productivity of the crop (measured as biomass fuel energy per unit area per year).

e_B = bonus of 29 gCO_{2eq} /MJ biomass fuel if biomass is obtained from restored degraded land under the conditions provided for in point 8.

8. The bonus of 29 gCO_{2eq} /MJ shall be attributed if evidence is provided that the land:

(a) was not in use for agriculture in January 2008; and

(b) is severely degraded land, including such land that was formerly in agricultural use.

The bonus of 29 gCO_{2eq} /MJ shall apply for a period of up to 20 years from the date of conversion of the land to agricultural use, provided that a steady increase in carbon stocks as well as a sizable reduction in erosion phenomena for land falling under (b) are ensured.

9. ‘Severely degraded land’ means land that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded.

10. In accordance with Annex V, Part C, point 10 of this Directive guidelines for the calculation of land carbon stocks²¹ adopted in relation to that Directive, drawing on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories — volume 4, and in accordance with the Regulation (EU) No 525/2013²² and the Regulation (INSERT THE NO AFTER THE ADOPTION²³), shall serve as the basis for the calculation of land carbon stocks.

11. Emissions from processing, e_p , shall include emissions from the processing itself; from waste and leakages; and from the production of chemicals or products used in processing.

In accounting for the consumption of electricity not produced within the gaseous biomass fuel production plant, the greenhouse gas emission intensity of the production and distribution of that electricity shall be assumed to be equal to the average emission intensity of the production and distribution of electricity in a defined region. By derogation from this rule, producers may use an average value for an individual electricity production plant for electricity produced by that plant, if that plant is not connected to the electricity grid.

In accounting for the consumption of electricity not produced within the solid biomass fuel production plant, the greenhouse gas emission intensity of the production and distribution of that electricity shall be assumed to be equal to the fossil fuel comparator ECF(e) set out in

²¹ Commission Decision of 10 June 2010 (2010/335/EU) on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC, OJ L 151 17.06.2010

²² Regulation (EU) 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC, OJ L 165/13, 18.06.2013

²³ Regulation of the European Parliament and of the Council (INSERT THE DATE OF ENTRY INTO FORCE OF THIS REGULATION) on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry into the 2030 climate and energy framework and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change.

paragraph 19 of this Annex. By derogation from this rule, producers may use an average value for an individual electricity production plant for electricity produced by that plant, if that plant is not connected to the electricity grid.²⁴

Emissions from processing shall include emissions from drying of interim- products and materials where relevant.

12. Emissions from transport and distribution, e_{td} , shall include emissions from the transport of raw and semi-finished materials and from the storage and distribution of finished materials. Emissions from transport and distribution to be taken into account under point 5 shall not be covered by this point.

13. Emissions of CO₂ from fuel in use, e_u , shall be taken to be zero for biomass fuels. Emissions of non-CO₂ greenhouse gases (CH₄ and N₂O) from the fuel in use shall be included in the e_u factor.

14. Emission saving from carbon capture and geological storage, e_{ccs} , that have not already been accounted for in e_p , shall be limited to emissions avoided through the capture and storage of emitted CO₂ directly related to the extraction, transport, processing and distribution of biomass fuel if stored in compliance with Directive 2009/31/EC on the geological storage of carbon dioxide.

15. Emission saving from carbon capture and replacement, e_{ccr} , shall be related directly to the production of biomass fuel they are attributed to, and shall be limited to emissions avoided through the capture of CO₂ of which the carbon originates from biomass and which is used to replace fossil-derived CO₂ used in the energy or transport sector.

16. Where a cogeneration unit – providing heat and/ or electricity to a biomass fuel production process for which emissions are being calculated - produces excess electricity and/or excess useful heat, the greenhouse gas emissions shall be divided between the electricity and the useful heat according to the temperature of the heat (which reflects the usefulness (utility) of the heat). The allocation factor, called Carnot efficiency C_h , is calculated as follows for useful heat at different temperatures:

$$C_h = \frac{T_h - T_0}{T_h}$$

where

T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.

T_0 = Temperature of surroundings, set at 273.15 kelvin (equal to 0 °C)

For T_h , < 150 °C (423.15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150 °C (423.15 kelvin), which is: 0.3546

For the purposes of this calculation, the actual efficiencies shall be used, defined as the annual mechanical energy, electricity and heat produced respectively divided by the annual energy input.

For the purposes of this calculation, the following definitions shall apply:

²⁴ The solid biomass pathways consume and produce the same commodities at different stages of the supply chain. Using different values for electricity supply to solid biomass production plants and the fossil fuel comparator would assign artificial GHG savings to these pathways.

(a) "cogeneration" shall mean the simultaneous generation in one process of thermal energy and electrical or mechanical energy;

(b) "useful" heat shall mean heat generated to satisfy an economical justifiable demand for heat;

(c) "economically justifiable demand" shall mean demand that does not exceed the needs for heating and which would otherwise be satisfied at market conditions

17. Where a biomass fuel production process produces, in combination, the fuel for which emissions are being calculated and one or more other products ("co-products"), greenhouse gas emissions shall be divided between the fuel or its intermediate product and the co-products in proportion to their energy content (determined by lower heating value in the case of co-products other than electricity and heat). The greenhouse gas intensity of excess useful heat or excess electricity is the same as the greenhouse gas intensity of heat or electricity delivered to the biomass fuel production process and is determined from calculating the greenhouse intensity of all inputs and emissions, including the feedstock and CH₄ and N₂O emissions, to and from the cogeneration unit, boiler or other apparatus delivering heat or electricity to the biomass fuel production process. In case of cogeneration of electricity and heat the calculation is performed following point 16.

18. For the purposes of the calculations referred to in point 17, the emissions to be divided shall be $e_{ec} + e_l + e_{sca}$ + those fractions of e_p , e_{id} , e_{ccs} and e_{ccr} that take place up to and including the process step at which a co-product is produced. If any allocation to co-products has taken place at an earlier process step in the life-cycle, the fraction of those emissions assigned in the last such process step to the intermediate fuel product shall be used for this purpose instead of the total of those emissions.

In the case of biogas and biomethane, all co-products that do not fall under the scope of point 7 shall be taken into account for the purposes of that calculation. No emissions shall be allocated to wastes and residues. Co-products that have a negative energy content shall be considered to have an energy content of zero for the purpose of the calculation.

Wastes and residues, including tree tops and branches, straw, husks, cobs and nut shells, and residues from processing, including crude glycerine (glycerine that is not refined) and bagasse, shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials irrespectively of whether they are processed to interim products before being transformed into the final product.

In the case of biomass fuels produced in refineries, other than the combination of processing plants with boilers or cogeneration units providing heat and/or electricity to the processing plant, the unit of analysis for the purposes of the calculation referred to in point 17 shall be the refinery.

19. For biomass fuels used for electricity production, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(e)}$ shall be 183 gCO_{2eq}/MJ electricity.

For biomass fuels used for useful heat, for heating and/or cooling production, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(h)}$ shall be 80 gCO_{2eq}/MJ heat.

For biomass fuels used for useful heat production, in which a direct physical substitution of coal can be demonstrated, for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(h)}$ shall be 124 gCO_{2eq}/MJ heat.

For biomass fuels, used as transport fuels for the purposes of the calculation referred to in point 3, the fossil fuel comparator $EC_{F(t)}$ shall be 94 gCO_{2eq}/MJ.

C. DISAGGREGATED DEFAULT VALUES FOR BIOMASS FUELS

Wood briquettes or pellets

| Biomass fuel production system | Transport distance | Typical greenhouse gas emissions (gCO ₂ eq./MJ) | | | | Default greenhouse gas emissions (g CO ₂ eq/MJ) | | | |
|---|--------------------|--|------------|-----------|--|--|------------|-----------|--|
| | | Cultivation | Processing | Transport | Non-CO ₂ emissions from the fuel in use | Cultivation | Processing | Transport | Non-CO ₂ emissions from the fuel in use |
| Wood chips from forest residues | 1 to 500 km | 0.0 | 1.6 | 3.0 | 0.4 | 0.0 | 1.9 | 3.6 | 0.5 |
| | 500 to 2500 km | 0.0 | 1.6 | 5.2 | 0.4 | 0.0 | 1.9 | 6.2 | 0.5 |
| | 2500 to 10000 km | 0.0 | 1.6 | 10.5 | 0.4 | 0.0 | 1.9 | 12.6 | 0.5 |
| Wood chips from SRC (Eucalyptus) | Above 10000 km | 0.0 | 1.6 | 20.5 | 0.4 | 0.0 | 1.9 | 24.6 | 0.5 |
| | 2500 to 10000 km | 13.1 | 0.0 | 11.0 | 0.4 | 13.1 | 0.0 | 13.2 | 0.5 |
| Wood chips from SRC (Poplar – fertilized) | 1 to 500 km | 3.9 | 0.0 | 3.5 | 0.4 | 3.9 | 0.0 | 4.2 | 0.5 |
| | 500 to 2500 km | 3.9 | 0.0 | 5.6 | 0.4 | 3.9 | 0.0 | 6.8 | 0.5 |
| | 2500 to 10000 km | 3.9 | 0.0 | 11.0 | 0.4 | 3.9 | 0.0 | 13.2 | 0.5 |

| | | | | | | | | | |
|---|------------------|-----|-----|------|-----|-----|-----|------|-----|
| | Above 10000 km | 3.9 | 0.0 | 21.0 | 0.4 | 3.9 | 0.0 | 25.2 | 0.5 |
| Wood chips from SRC (Poplar – Not fertilized) | 1 to 500 km | 2.2 | 0.0 | 3.5 | 0.4 | 2.2 | 0.0 | 4.2 | 0.5 |
| | 500 to 2500 km | 2.2 | 0.0 | 5.6 | 0.4 | 2.2 | 0.0 | 6.8 | 0.5 |
| | 2500 to 10000 km | 2.2 | 0.0 | 11.0 | 0.4 | 2.2 | 0.0 | 13.2 | 0.5 |
| | Above 10000 km | 2.2 | 0.0 | 21.0 | 0.4 | 2.2 | 0.0 | 25.2 | 0.5 |
| Wood chips from stemwood | 1 to 500 km | 1.1 | 0.3 | 3.0 | 0.4 | 1.1 | 0.4 | 3.6 | 0.5 |
| | 500 to 2500 km | 1.1 | 0.3 | 5.2 | 0.4 | 1.1 | 0.4 | 6.2 | 0.5 |
| | 2500 to 10000 km | 1.1 | 0.3 | 10.5 | 0.4 | 1.1 | 0.4 | 12.6 | 0.5 |
| | Above 10000 km | 1.1 | 0.3 | 20.5 | 0.4 | 1.1 | 0.4 | 24.6 | 0.5 |
| Wood chips from wood industry residues | 1 to 500 km | 0.0 | 0.3 | 3.0 | 0.4 | 0.0 | 0.4 | 3.6 | 0.5 |
| | 500 to 2500 km | 0.0 | 0.3 | 5.2 | 0.4 | 0.0 | 0.4 | 6.2 | 0.5 |
| | 2500 to 10000 km | 0.0 | 0.3 | 10.5 | 0.4 | 0.0 | 0.4 | 12.6 | 0.5 |
| | Above 10000 km | 0.0 | 0.3 | 20.5 | 0.4 | 0.0 | 0.4 | 24.6 | 0.5 |

Wood briquettes or pellets

| Biomass | Transport distance | Typical greenhouse gas emissions (gCO ₂ eq./MJ) | | | | | Default greenhouse gas emissions (gCO ₂ eq./MJ) | | | |
|---------|--------------------|--|--|--|--|--|--|--|--|--|
|---------|--------------------|--|--|--|--|--|--|--|--|--|

| fuel production system | | | | | | | | Non-CO ₂ emissions from the fuel in use | Transport & distribution | Processing | Cultivation | Transport & distribution |
|---|------------------|-------------|------------|--------------------------|------------|-------------|--------------------------|--|--------------------------|------------|-------------|--------------------------|
| | | Cultivation | Processing | Transport & distribution | Processing | Cultivation | Transport & distribution | | | | | |
| Wood briquettes or pellets from forest residues (case 1) | 1 to 500 km | 0.0 | 25.8 | 2.9 | 0.3 | 0.0 | 30.9 | 3.5 | | | | |
| | 500 to 2500 km | 0.0 | 25.8 | 2.8 | 0.3 | 0.0 | 30.9 | 3.3 | | | | |
| | 2500 to 10000 km | 0.0 | 25.8 | 4.3 | 0.3 | 0.0 | 30.9 | 5.2 | | | | |
| | Above 10000 km | 0.0 | 25.8 | 7.9 | 0.3 | 0.0 | 30.9 | 9.5 | | | | |
| Wood briquettes or pellets from forest residues (case 2a) | 1 to 500 km | 0.0 | 12.5 | 3.0 | 0.3 | 0.0 | 15.0 | 3.6 | | | | |
| | 500 to 2500 km | 0.0 | 12.5 | 2.9 | 0.3 | 0.0 | 15.0 | 3.5 | | | | |
| | 2500 to 10000 km | 0.0 | 12.5 | 4.4 | 0.3 | 0.0 | 15.0 | 5.3 | | | | |
| | Above 10000 km | 0.0 | 12.5 | 8.1 | 0.3 | 0.0 | 15.0 | 9.8 | | | | |
| Wood briquettes or pellets from forest residues (case 3a) | 1 to 500 km | 0.0 | 2.4 | 3.0 | 0.3 | 0.0 | 2.8 | 3.6 | | | | |
| | 500 to 2500 km | 0.0 | 2.4 | 2.9 | 0.3 | 0.0 | 2.8 | 3.5 | | | | |
| | 2500 to 10000 km | 0.0 | 2.4 | 4.4 | 0.3 | 0.0 | 2.8 | 5.3 | | | | |
| | Above 10000 km | 0.0 | 2.4 | 8.2 | 0.3 | 0.0 | 2.8 | 9.8 | | | | |

| | | | | | | | |
|--|------|------|-----|-----|------|------|-----|
| Wood briquettes from short rotation coppice (Eucalyptus – case 1) | 11.7 | 24.5 | 4.3 | 0.3 | 11.7 | 29.4 | 5.2 |
| Wood briquettes from short rotation coppice (Eucalyptus – case 2a) | 14.9 | 10.6 | 4.4 | 0.3 | 14.9 | 12.7 | 5.3 |
| Wood briquettes from short rotation coppice (Eucalyptus – case 3a) | 15.5 | 0.3 | 4.4 | 0.3 | 15.5 | 0.4 | 5.3 |
| Wood briquettes from short | 3.4 | 24.5 | 2.9 | 0.3 | 3.4 | 29.4 | 3.5 |
| | 3.4 | 24.5 | 4.3 | 0.3 | 3.4 | 29.4 | 5.2 |

| | | | | | | | | |
|--|------------------|-----|------|-----|-----|-----|------|-----|
| rotation coppice (Poplar – Fertilised – case 1) | Above 10000 km | 3.4 | 24.5 | 7.9 | 0.3 | 3.4 | 29.4 | 9.5 |
| Wood briquettes from short rotation coppice (Poplar – Fertilised – case 2a) | 1 to 500 km | 4.4 | 10.6 | 3.0 | 0.3 | 4.4 | 12.7 | 3.6 |
| | 500 to 10 000 km | 4.4 | 10.6 | 4.4 | 0.3 | 4.4 | 12.7 | 5.3 |
| | Above 10000 km | 4.4 | 10.6 | 8.1 | 0.3 | 4.4 | 12.7 | 9.8 |
| Wood briquettes from short rotation coppice (Poplar – Fertilised – case 3a) | 1 to 500 km | 4.6 | 0.3 | 3.0 | 0.3 | 4.6 | 0.4 | 3.6 |
| | 500 to 10 000 km | 4.6 | 0.3 | 4.4 | 0.3 | 4.6 | 0.4 | 5.3 |
| | Above 10000 km | 4.6 | 0.3 | 8.2 | 0.3 | 4.6 | 0.4 | 9.8 |
| Wood briquettes from short rotation coppice | 1 to 500 km | 2.0 | 24.5 | 2.9 | 0.3 | 2.0 | 29.4 | 3.5 |
| | 500 to 2500 km | 2.0 | 24.5 | 4.3 | 0.3 | 2.0 | 29.4 | 5.2 |

| | | | | | | | | |
|--|-------------------|-----|------|-----|-----|-----|------|-----|
| rotation coppice (Poplar – no fertilisation – case 1) | 2500 to 10 000 km | 2.0 | 24.5 | 7.9 | 0.3 | 2.0 | 29.4 | 9.5 |
| Wood briquettes from short rotation coppice (Poplar – no fertilisation – case 2a) | 1 to 500 km | 2.5 | 10.6 | 3.0 | 0.3 | 2.5 | 12.7 | 3.6 |
| | 500 to 10 000 km | 2.5 | 10.6 | 4.4 | 0.3 | 2.5 | 12.7 | 5.3 |
| | Above 10000 km | 2.5 | 10.6 | 8.1 | 0.3 | 2.5 | 12.7 | 9.8 |
| Wood briquettes from short rotation coppice (Poplar – no fertilisation – case 3a) | 1 to 500 km | 2.6 | 0.3 | 3.0 | 0.3 | 2.6 | 0.4 | 3.6 |
| | 500 to 10 000 km | 2.6 | 0.3 | 4.4 | 0.3 | 2.6 | 0.4 | 5.3 |
| | Above 10000 km | 2.6 | 0.3 | 8.2 | 0.3 | 2.6 | 0.4 | 9.8 |
| Wood briquettes or pellets from | 1 to 500 km | 1.1 | 24.8 | 2.9 | 0.3 | 1.1 | 29.8 | 3.5 |
| | 500 to 2500 km | 1.1 | 24.8 | 2.8 | 0.3 | 1.1 | 29.8 | 3.3 |

| | | | | | | | | |
|---|------------------|-----|------|-----|-----|-----|------|-----|
| stemwood (case 1) | 2500 to 10000 km | 1.1 | 24.8 | 4.3 | 0.3 | 1.1 | 29.8 | 5.2 |
| | Above 10000 km | 1.1 | 24.8 | 7.9 | 0.3 | 1.1 | 29.8 | 9.5 |
| Wood briquettes or pellets from stemwood (case 2a) | 1 to 500 km | 1.4 | 11.0 | 3.0 | 0.3 | 1.4 | 13.2 | 3.6 |
| | 500 to 2500 km | 1.4 | 11.0 | 2.9 | 0.3 | 1.4 | 13.2 | 3.5 |
| | 2500 to 10000 km | 1.4 | 11.0 | 4.4 | 0.3 | 1.4 | 13.2 | 5.3 |
| | Above 10000 km | 1.4 | 11.0 | 8.1 | 0.3 | 1.4 | 13.2 | 9.8 |
| | 1 to 500 km | 1.4 | 0.8 | 3.0 | 0.3 | 1.4 | 0.9 | 3.6 |
| Wood briquettes or pellets from stemwood (case 3a) | 500 to 2500 km | 1.4 | 0.8 | 2.9 | 0.3 | 1.4 | 0.9 | 3.5 |
| | 2500 to 10000 km | 1.4 | 0.8 | 4.4 | 0.3 | 1.4 | 0.9 | 5.3 |
| | Above 10000 km | 1.4 | 0.8 | 8.2 | 0.3 | 1.4 | 0.9 | 9.8 |
| | 1 to 500 km | 0.0 | 14.3 | 2.8 | 0.3 | 0.0 | 17.2 | 3.3 |
| Wood briquettes or pellets from wood industry residues (case 1) | 500 to 2500 km | 0.0 | 14.3 | 2.7 | 0.3 | 0.0 | 17.2 | 3.2 |
| | 2500 to 10000 km | 0.0 | 14.3 | 4.2 | 0.3 | 0.0 | 17.2 | 5.0 |
| | Above 10000 km | 0.0 | 14.3 | 7.7 | 0.3 | 0.0 | 17.2 | 9.2 |
| Wood | 1 to 500 km | 0.0 | 6.0 | 2.8 | 0.3 | 0.0 | 7.2 | 3.4 |

| | | | | | | | | |
|--|------------------|-----|-----|-----|-----|-----|-----|-----|
| briquettes or pellets from wood industry residues (case 2a) | 500 to 2500 km | 0.0 | 6.0 | 2.7 | 0.3 | 0.0 | 7.2 | 3.3 |
| | 2500 to 10000 km | 0.0 | 6.0 | 4.2 | 0.3 | 0.0 | 7.2 | 5.1 |
| | Above 10000 km | 0.0 | 6.0 | 7.8 | 0.3 | 0.0 | 7.2 | 9.3 |
| Wood briquettes or pellets from wood industry residues (case 3a) | 1 to 500 km | 0.0 | 0.2 | 2.8 | 0.3 | 0.0 | 0.3 | 3.4 |
| | 500 to 2500 km | 0.0 | 0.2 | 2.7 | 0.3 | 0.0 | 0.3 | 3.3 |
| | 2500 to 10000 km | 0.0 | 0.2 | 4.2 | 0.3 | 0.0 | 0.3 | 5.1 |
| | Above 10000 km | 0.0 | 0.2 | 7.8 | 0.3 | 0.0 | 0.3 | 9.3 |

Agriculture pathways

| Biomass fuel production system | Transport distance | Typical greenhouse gas emissions (gCO2 eq./MJ) | | | | Default greenhouse gas emissions (gCO2 eq./MJ) | | | |
|--|--------------------|--|------------|--------------------------|--|--|------------|--------------------------|--|
| | | Cultivation | Processing | Transport & distribution | Non-CO ₂ emissions from the fuel in use | Cultivation | Processing | Transport & distribution | Non-CO ₂ emissions from the fuel in use |
| Agricultural Residues with density <0.2 t/m ³ | 1 to 500 km | 0.0 | 0.9 | 2.6 | 0.2 | 0.0 | 1.1 | 3.1 | 0 |
| | 500 to 2500 km | 0.0 | 0.9 | 6.5 | 0.2 | 0.0 | 1.1 | 7.8 | 0 |
| | 2500 to 10 000 km | 0.0 | 0.9 | 14.2 | 0.2 | 0.0 | 1.1 | 17.0 | 0 |
| | Above 10000 km | 0.0 | 0.9 | 28.3 | 0.2 | 0.0 | 1.1 | 34.0 | 0 |

| | | | | | | | | | |
|---|-------------------|------|------|------|-----|------|------|------|---|
| Agricultural Residues with density > 0.2 t/m ³ | 1 to 500 km | 0.0 | 0.9 | 2.6 | 0.2 | 0.0 | 1.1 | 3.1 | 0 |
| | 500 to 2500 km | 0.0 | 0.9 | 3.6 | 0.2 | 0.0 | 1.1 | 4.4 | 0 |
| | 2500 to 10 000 km | 0.0 | 0.9 | 7.1 | 0.2 | 0.0 | 1.1 | 8.5 | 0 |
| | Above 10000 km | 0.0 | 0.9 | 13.6 | 0.2 | 0.0 | 1.1 | 16.3 | 0 |
| Straw pellets | 1 to 500 km | 0.0 | 5.0 | 3.0 | 0.2 | 0.0 | 6.0 | 3.6 | 0 |
| | 500 to 10000 km | 0.0 | 5.0 | 4.6 | 0.2 | 0.0 | 6.0 | 5.5 | 0 |
| | Above 10000 km | 0.0 | 5.0 | 8.3 | 0.2 | 0.0 | 6.0 | 10.0 | 0 |
| Bagasse briquettes | 500 to 10 000 km | 0.0 | 0.3 | 4.3 | 0.4 | 0.0 | 0.4 | 5.2 | 0 |
| | Above 10 000 km | 0.0 | 0.3 | 8.0 | 0.4 | 0.0 | 0.4 | 9.5 | 0 |
| Palm Kernel Meal | Above 10000 km | 21.6 | 21.1 | 11.2 | 0.2 | 21.6 | 25.4 | 13.5 | 0 |
| Palm Kernel Meal (no CH ₄ emissions from oil mill) | Above 10000 km | 21.6 | 3.5 | 11.2 | 0.2 | 21.6 | 4.2 | 13.5 | 0 |

Disaggregated default values for biogas for electricity production

| Biomass fuel production system | Technology | TYPICAL [gCO ₂ eq./MJ] | | | | | | DEFAULT [gCO ₂ eq./MJ] | | | | | |
|--------------------------------|-----------------|-----------------------------------|------------|--|-------------------|----------------|-------------|-----------------------------------|--|-----------|----------------|--|--|
| | | Cultivation | Processing | Non-CO ₂ emissions from the fuel in use | Transport | Manure credits | Cultivation | Processing | Non-CO ₂ emissions from the fuel in use | Transport | Manure credits | | |
| case 1 | Open digestate | 0.0 | 69.6 | 8.9 | 0.8 | -107.3 | 0.0 | 97.4 | 12.5 | 0.8 | -107.3 | | |
| | Close digestate | 0.0 | 0.0 | 8.9 | 0.8 | -97.6 | 0.0 | 0.0 | 12.5 | 0.8 | -97.6 | | |
| case 2 | Open digestate | 0.0 | 74.1 | 8.9 | 0.8 | -107.3 | 0.0 | 103.7 | 12.5 | 0.8 | -107.3 | | |
| | Close digestate | 0.0 | 4.2 | 8.9 | 0.8 | -97.6 | 0.0 | 5.9 | 12.5 | 0.8 | -97.6 | | |
| case 3 | Open digestate | 0.0 | 83.2 | 8.9 | 0.9 | -120.7 | 0.0 | 116.4 | 12.5 | 0.9 | -120.7 | | |
| | Close digestate | 0.0 | 4.6 | 8.9 | 0.8 | -108.5 | 0.0 | 6.4 | 12.5 | 0.8 | -108.5 | | |
| Maize whole | Open digestate | 15.6 | 13.5 | 8.9 | 0.0 ²⁷ | - | 15.6 | 18.9 | 12.5 | 0.0 | - | | |
| | Close digestate | 15.2 | 0.0 | 8.9 | 0.0 | - | 15.2 | 0.0 | 12.5 | 0.0 | - | | |

²⁵ The values for biogas production from manure include negative emissions for emissions saved from raw manure management. The value of e_{sea} considered is equal to -45 gCO₂eq./MJ manure used in anaerobic digestion

²⁶ Maize whole plant should be interpreted as maize harvested as fodder and ensiled for preservation.

²⁷ Transport of agricultural raw materials to the transformation plant is, according to the methodology in COM(2010) 11, included in the 'cultivation' value. The value for transport of maize silage accounts for 0.4 gCO₂ eq./MJ biogas

| | | | | | | | | | | | | |
|----------------------------|---------------|-----------------|------|------|-----|-----|---|------|------|------|-----|---|
| plant ²⁶ | case 2 | Open digestate | 15.6 | 18.8 | 8.9 | 0.0 | - | 15.6 | 26.3 | 12.5 | 0.0 | - |
| | | Close digestate | 15.2 | 5.2 | 8.9 | 0.0 | - | 15.2 | 7.2 | 12.5 | 0.0 | - |
| | case 3 | Open digestate | 17.5 | 21.0 | 8.9 | 0.0 | - | 17.5 | 29.3 | 12.5 | 0.0 | - |
| | | Close digestate | 17.1 | 5.7 | 8.9 | 0.0 | - | 17.1 | 7.9 | 12.5 | 0.0 | - |
| | case 1 | Open digestate | 0.0 | 21.8 | 8.9 | 0.5 | - | 0.0 | 30.6 | 12.5 | 0.5 | - |
| | | Close digestate | 0.0 | 0.0 | 8.9 | 0.5 | - | 0.0 | 0.0 | 12.5 | 0.5 | - |
| Biowaste | case 2 | Open digestate | 0.0 | 27.9 | 8.9 | 0.5 | - | 0.0 | 39.0 | 12.5 | 0.5 | - |
| | | Close digestate | 0.0 | 5.9 | 8.9 | 0.5 | - | 0.0 | 8.3 | 12.5 | 0.5 | - |
| | case 3 | Open digestate | 0.0 | 31.2 | 8.9 | 0.5 | - | 0.0 | 43.7 | 12.5 | 0.5 | - |
| | | Close digestate | 0.0 | 6.5 | 8.9 | 0.5 | - | 0.0 | 9.1 | 12.5 | 0.5 | - |

Disaggregated default values for biomethane

| Biomethane production system | Technological option | TYPICAL [gCO ₂ eq./MJ] | | | | | | DEFAULT [gCO ₂ eq./MJ] | | | | | | | | | | | | | | | | |
|------------------------------|----------------------|-----------------------------------|------------|-----------|-----------|--------------------------------|----------------|-----------------------------------|------------|-----------|-----------|--------------------------------|----------------|--|--|--|--|--|--|--|--|--|--|--|
| | | Cultivation | Processing | Upgrading | Transport | Compression at filling station | Manure credits | Cultivation | Processing | Upgrading | Transport | Compression at filling station | Manure credits | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|-------------------|-----------------|-----------------------|------|------|------|-----|-----|--------|------|-------|------|-----|-----|--------|
| Wet manure | Open digestate | no off-gas combustion | 0.0 | 84.2 | 19.5 | 1.0 | 3.3 | -124.4 | 0.0 | 117.9 | 27.3 | 1.0 | 4.6 | -124.4 |
| | | off-gas combustion | 0.0 | 84.2 | 4.5 | 1.0 | 3.3 | -124.4 | 0.0 | 117.9 | 6.3 | 1.0 | 4.6 | -124.4 |
| | Close digestate | no off-gas combustion | 0.0 | 3.2 | 19.5 | 0.9 | 3.3 | -111.9 | 0.0 | 4.4 | 27.3 | 0.9 | 4.6 | -111.9 |
| | | off-gas combustion | 0.0 | 3.2 | 4.5 | 0.9 | 3.3 | -111.9 | 0.0 | 4.4 | 6.3 | 0.9 | 4.6 | -111.9 |
| Maize whole plant | Open digestate | no off-gas combustion | 18.1 | 20.1 | 19.5 | 0.0 | 3.3 | - | 18.1 | 28.1 | 27.3 | 0.0 | 4.6 | - |
| | | off-gas combustion | 18.1 | 20.1 | 4.5 | 0.0 | 3.3 | - | 18.1 | 28.1 | 6.3 | 0.0 | 4.6 | - |
| | Close digestate | no off-gas combustion | 17.6 | 4.3 | 19.5 | 0.0 | 3.3 | - | 17.6 | 6.0 | 27.3 | 0.0 | 4.6 | - |
| | | off-gas combustion | 17.6 | 4.3 | 4.5 | 0.0 | 3.3 | - | 17.6 | 6.0 | 6.3 | 0.0 | 4.6 | - |
| Biowaste | Open digestate | no off-gas combustion | 0.0 | 30.6 | 19.5 | 0.6 | 3.3 | - | 0.0 | 42.8 | 27.3 | 0.6 | 4.6 | - |
| | | off-gas combustion | 0.0 | 30.6 | 4.5 | 0.6 | 3.3 | - | 0.0 | 42.8 | 6.3 | 0.6 | 4.6 | - |
| | Close digestate | no off-gas combustion | 0.0 | 5.1 | 19.5 | 0.5 | 3.3 | - | 0.0 | 7.2 | 27.3 | 0.5 | 4.6 | - |
| | | off-gas combustion | 0.0 | 5.1 | 4.5 | 0.5 | 3.3 | - | 0.0 | 7.2 | 6.3 | 0.5 | 4.6 | - |

D. TOTAL TYPICAL AND DEFAULT GREENHOUSE GAS EMISSION VALUES FOR BIOMASS FUEL PATHWAYS

| Biomass fuel production system | Transport distance | Typical greenhouse gas emissions (gCO₂ eq./MJ) | Default greenhouse gas emissions (gCO₂ eq./MJ) |
|---|---------------------------|--|--|
| Woodchips from forest residues | 1 to 500 km | 5 | 6 |
| | 500 to 2500 km | 7 | 9 |
| | 2500 to 10 000 km | 12 | 15 |
| | Above 10000 km | 22 | 27 |
| Woodchips from short rotation coppice (Eucalyptus) | 2500 to 10 000 km | 25 | 27 |
| Woodchips from short rotation coppice (Poplar - Fertilised) | 1 to 500 km | 8 | 9 |
| | 500 to 2500 km | 10 | 11 |
| | 2500 to 10 000 km | 15 | 18 |
| | 2500 to 10 000 km | 25 | 30 |
| Woodchips from short rotation coppice (Poplar – No fertilisation) | 1 to 500 km | 6 | 7 |
| | 500 to 2500 km | 8 | 10 |
| | 2500 to 10 000 km | 14 | 16 |
| | 2500 to 10 000 km | 24 | 28 |
| Woodchips from stemwood | 1 to 500 km | 5 | 6 |
| | 500 to 2500 km | 7 | 8 |
| | 2500 to 10 000 km | 12 | 15 |
| | 2500 to 10 000 km | 22 | 27 |
| Woodchips from industry residues | 1 to 500 km | 4 | 5 |
| | 500 to 2500 km | 6 | 7 |
| | 2500 to 10 000 km | 11 | 13 |
| | Above 10000 km | 21 | 25 |
| Wood briquettes or pellets from forest residues (case 1) | 1 to 500 km | 29 | 35 |
| | 500 to 2500 km | 29 | 35 |

| | | | |
|--|-------------------|----|----|
| | 2500 to 10000 km | 30 | 36 |
| | Above 10000 km | 34 | 41 |
| Wood briquettes or pellets from forest residues (case 2a) | 1 to 500 km | 16 | 19 |
| | 500 to 2500 km | 16 | 19 |
| | 2500 to 10000 km | 17 | 21 |
| | Above 10000 km | 21 | 25 |
| Wood briquettes or pellets from forest residues (case 3a) | 1 to 500 km | 6 | 7 |
| | 500 to 2500 km | 6 | 7 |
| | 2500 to 10000 km | 7 | 8 |
| | Above 10000 km | 11 | 13 |
| Wood briquettes or pellets from short rotation coppice (Eucalyptus – case 1) | 2500 to 10 000 km | 41 | 46 |
| Wood briquettes or pellets from short rotation coppice (Eucalyptus – case 2a) | 2500 to 10 000 km | 30 | 33 |
| Wood briquettes or pellets from short rotation coppice (Eucalyptus – case 3a) | 2500 to 10 000 km | 21 | 22 |
| Wood briquettes or pellets from short rotation coppice (Poplar – Fertilised – case 1) | 1 to 500 km | 31 | 37 |
| | 500 to 10000 km | 32 | 38 |
| | Above 10000 km | 36 | 43 |
| Wood briquettes or pellets from short rotation coppice (Poplar – Fertilised – case 2a) | 1 to 500 km | 18 | 21 |
| | 500 to 10000 km | 20 | 23 |
| | Above 10000 km | 23 | 27 |
| Wood briquettes or pellets from short rotation coppice (Poplar – Fertilised – case 3a) | 1 to 500 km | 8 | 9 |
| | 500 to 10000 km | 10 | 11 |
| | Above 10000 km | 13 | 15 |
| Wood briquettes or pellets from | 1 to 500 km | 30 | 35 |

| | | | |
|--|------------------|----|----|
| short rotation coppice (Poplar – no fertilisation – case 1) | 500 to 10000 km | 31 | 37 |
| | Above 10000 km | 35 | 41 |
| Wood briquettes or pellets from short rotation coppice (Poplar – no fertilisation – case 2a) | 1 to 500 km | 16 | 19 |
| | 500 to 10000 km | 18 | 21 |
| | Above 10000 km | 21 | 25 |
| Wood briquettes or pellets from short rotation coppice (Poplar – no fertilisation – case 3a) | 1 to 500 km | 6 | 7 |
| | 500 to 10000 km | 8 | 9 |
| | Above 10000 km | 11 | 13 |
| Wood briquettes or pellets from stemwood (case 1) | 1 to 500 km | 29 | 35 |
| | 500 to 2500 km | 29 | 34 |
| | 2500 to 10000 km | 30 | 36 |
| | Above 10000 km | 34 | 41 |
| Wood briquettes or pellets from stemwood (case 2a) | 1 to 500 km | 16 | 18 |
| | 500 to 2500 km | 15 | 18 |
| | 2500 to 10000 km | 17 | 20 |
| | Above 10000 km | 21 | 25 |
| Wood briquettes or pellets from stemwood (case 3a) | 1 to 500 km | 5 | 6 |
| | 500 to 2500 km | 5 | 6 |
| | 2500 to 10000 km | 7 | 8 |
| | Above 10000 km | 11 | 12 |
| Wood briquettes or pellets from wood industry residues (case 1) | 1 to 500 km | 17 | 21 |
| | 500 to 2500 km | 17 | 21 |
| | 2500 to 10000 km | 19 | 23 |
| | Above 10000 km | 22 | 27 |
| Wood briquettes or pellets from wood industry residues (case 2a) | 1 to 500 km | 9 | 11 |
| | 500 to 2500 km | 9 | 11 |
| | 2500 to 10000 km | 10 | 13 |

| | | | |
|--|----------------|----|----|
| | Above 10000 km | 14 | 17 |
| Wood briquettes or pellets from wood industry residues (case 3a) | 1 to 500 km | 3 | 4 |
| | 500 to 2500 km | 3 | 4 |
| | 2500 to 10000 | 5 | 6 |
| | Above 10000 km | 8 | 10 |

Case 1 refers to processes in which a Natural Gas boiler is used to provide the process heat to the pellet mill. Process electricity is purchased from the grid.

Case 2 refers to processes in which a boiler fuelled with wood chips is used to provide the process heat to the pellet mill. Process electricity is purchased from the grid.

Case 3 refers to processes in which a CHP, fuelled with wood chips, is used to provide heat and power to the pellet mill.

| Biomass fuel production system | Transport distance | Typical greenhouse gas emissions (gCO ₂ eq./MJ) | Default greenhouse gas emissions (gCO ₂ eq./MJ) |
|---|--------------------|--|--|
| Agricultural Residues with density <0.2 t/m ³ ²⁸ | 1 to 500 km | 4 | 4 |
| | 500 to 2500 km | 8 | 9 |
| | 2500 to 10 000 km | 15 | 18 |
| | Above 10000 km | 29 | 35 |
| Agricultural Residues with density > 0.2 t/m ³ ²⁹ | 1 to 500 km | 4 | 4 |
| | 500 to 2500 km | 5 | 6 |
| | 2500 to 10 000 km | 8 | 10 |
| | Above 10000 km | 15 | 18 |
| Straw pellets | 1 to 500 km | 8 | 10 |

²⁸ This group of materials includes agricultural residues with a low bulk density and it comprises materials such as straw bales, oat hulls, rice husks and sugar cane bagasse bales (not exhaustive list).

²⁹ The group of agricultural residues with higher bulk density includes materials such as corn cobs, nut shells, soybean hulls, palm kernel shells (not exhaustive list).

| | | | |
|---|------------------|-----------|-----------|
| | 500 to 10000 km | 10 | 12 |
| | Above 10000 km | 14 | 16 |
| Bagasse briquettes | 500 to 10 000 km | 5 | 6 |
| | Above 10 000 km | 9 | 10 |
| Palm Kernel Meal | Above 10000 km | 54 | 61 |
| Palm Kernel Meal (no CH ₄ emissions from oil mill) | Above 10000 km | 37 | 40 |

Typical and default values - biogas for electricity

| Biogas production system | Technological option | | Typical value | Default value |
|---|----------------------|-------------------------------|--|--|
| | | | GHG emissions (g CO ₂ eq/MJ) | GHG emissions (g CO ₂ eq/MJ) |
| Biogas for electricity from wet manure | Case 1 | Open digestate ³⁰ | -28 | 3 |
| | | Close digestate ³¹ | -88 | -84 |
| | Case 2 | Open digestate | -23 | 10 |
| | | Close digestate | -84 | -78 |
| | Case 3 | Open digestate | -28 | 9 |
| | | Close digestate | -94 | -89 |
| Biogas for electricity from maize whole plant | Case 1 | Open digestate | 38 | 47 |
| | | Close digestate | 24 | 28 |
| | Case 2 | Open digestate | 43 | 54 |
| | | Close digestate | 29 | 35 |
| | Case 3 | Open digestate | 47 | 59 |
| | | Close digestate | 32 | 38 |
| Biogas for electricity from biowaste | Case 1 | Open digestate | 31 | 44 |
| | | Close digestate | 9 | 13 |
| | Case 2 | Open digestate | 37 | 52 |
| | | Close digestate | 15 | 21 |
| | Case 3 | Open digestate | 41 | 57 |
| | | Close digestate | 16 | 22 |

Typical and default values for biomethane

³⁰ Open storage of digestate accounts for additional emissions of methane which change with the weather, the substrate and the digestion efficiency. In these calculations the amounts are taken to be equal to 0.05 MJCH₄ / MJbiogas for manure, 0.035 MJCH₄ / MJbiogas for maize and 0.01 MJCH₄ / MJbiogas for biowaste.

³¹ Close storage means that the digestate resulting from the digestion process is stored in a gas tight tank and the additional biogas released during storage is considered to be recovered for production of additional electricity or biomethane.

| Biomethane production system | Technological option | Typical greenhouse gas emissions (g CO₂eq/MJ) | Default greenhouse gas emissions (g CO₂eq/MJ) |
|-------------------------------------|---|---|---|
| Biomethane from wet manure | Open digestate, no off-gas combustion ³² | -20 | 22 |
| | Open digestate, off-gas combustion ³³ | -35 | 1 |
| | Close digestate, no off-gas combustion | -88 | -79 |
| | Close digestate, off-gas combustion | -103 | -100 |
| Biomethane from maize whole plant | Open digestate, no off-gas combustion | 58 | 73 |
| | Open digestate, off-gas combustion | 43 | 52 |
| | Close digestate, no off-gas combustion | 41 | 51 |
| | Close digestate, off-gas combustion | 26 | 30 |
| Biomethane from biowaste | Open digestate, no off-gas combustion | 51 | 71 |
| | Open digestate, off-gas combustion | 36 | 50 |
| | Close digestate, no off-gas combustion | 25 | 35 |
| | Close digestate, off-gas combustion | 10 | 14 |

Typical and default values - biogas for electricity - mixtures of manure and maize: GHG emissions with shares given on a fresh mass basis

³² This category includes the following categories of technologies for biogas upgrade to biomethane: Pressure Swing Absorption (PSA), Pressure Water Scrubbing (PWS), Membranes, Cryogenic, and Organic Physical Scrubbing (OPS). It includes an emission of 0.03 MJCH₄/MJbiomethane for the emission of methane in the off-gases.

³³ This category includes the following categories of technologies for biogas upgrade to biomethane: Pressure Water Scrubbing (PWS) when water is recycled, Pressure Swing Absorption (PSA), Chemical Scrubbing, Organic Physical Scrubbing (OPS), Membranes and Cryogenic upgrading. No methane emissions are considered for this category (the methane in the off gas is combusted, if any).

| Biogas production system | | Technological options | Typical greenhouse gas emissions (g CO ₂ eq/MJ) | Default greenhouse gas emissions (g CO ₂ eq/MJ) |
|-----------------------------|--------|-----------------------|--|--|
| Manure – Maize 80% - 20% | Case 1 | Open digestate | 17 | 33 |
| | | Close digestate | -12 | -9 |
| | Case 2 | Open digestate | 22 | 40 |
| | | Close digestate | -7 | -2 |
| | Case 3 | Open digestate | 23 | 43 |
| | | Close digestate | -9 | -4 |
| Manure – Maize 70% - 30% | Case 1 | Open digestate | 24 | 37 |
| | | Close digestate | 0 | 3 |
| | Case 2 | Open digestate | 29 | 45 |
| | | Close digestate | 4 | 10 |
| | Case 3 | Open digestate | 31 | 48 |
| | | Close digestate | 4 | 10 |
| Manure – Maize 60% - 40% | Case 1 | Open digestate | 28 | 40 |
| | | Close digestate | 7 | 11 |
| | Case 2 | Open digestate | 33 | 47 |
| | | Close digestate | 12 | 18 |
| | Case 3 | Open digestate | 36 | 52 |
| | | Close digestate | 12 | 18 |

Comments

Case 1 refers to pathways in which power and heat required in the process are supplied by the CHP engine itself.

Case 2 refers to pathways in which the electricity required in the process is taken from the grid and the process heat is supplied by the CHP engine itself. In some Member States, operators are not allowed to claim the gross production for subsidies and Case 1 is the more likely configuration.

Case 3 refers to pathways in which the electricity required in the process is taken from the grid and the process heat is supplied by a biogas boiler. This case applies to some installations in which the CHP engine is not on-site and biogas is sold (but not upgraded to biomethane).

Typical and default values – biomethane - mixtures of manure and maize: GHG emissions with shares given on a fresh mass basis

| Biomethane production system | Technological options | Typical | Default |
|-------------------------------------|--|---------------------------|---------------------------|
| | | (g CO ₂ eq/MJ) | (g CO ₂ eq/MJ) |
| Manure – Maize 80% - 20 % | Open digestate, no-off gas combustion | 32 | 57 |
| | Open digestate, off gas combustion | 17 | 36 |
| | Close digestate, no-off gas combustion | -1 | 9 |
| | Close digestate, off gas combustion | -16 | -12 |
| Manure – Maize 70% - 30 % | Open digestate, no off-gas combustion | 41 | 62 |
| | Open digestate, off gas combustion | 26 | 41 |
| | Close digestate, no off-gas combustion | 13 | 22 |
| | Close digestate, off-gas combustion | -2 | 1 |
| Manure – Maize 60% - 40 % | Open digestate, no off-gas combustion | 46 | 66 |
| | Open digestate, off gas combustion | 31 | 45 |
| | Close digestate, no off-gas combustion | 22 | 31 |
| | Close digestate, off-gas combustion | 7 | 10 |

In case of biomethane used as Compressed Biomethane as a transport fuel, a value of 3.3 gCO₂eq./MJ biomethane needs to be added to the typical values and a value of 4.6 gCO₂eq./MJ biomethane to the Default values.

↓ 2009/28/EC

ANNEX VI

Minimum requirements for the harmonised template for national renewable energy action plans

1. Expected final energy consumption:

Gross final energy consumption in electricity, transport and heating and cooling for 2020 taking into account the effects of energy efficiency policy measures:

2. National sectoral 2020 targets and estimated shares of energy from renewable sources in electricity, heating and cooling and transport:

(a) target share of energy from renewable sources in electricity in 2020;

(b) estimated trajectory for the share of energy from renewable sources in electricity;

(c) target share of energy from renewable sources in heating and cooling in 2020;

(d) estimated trajectory for the share of energy from renewable sources in heating and cooling;

(e) estimated trajectory for the share of energy from renewable sources in transport;

(f) national indicative trajectory as referred to in Article 3(2) and part B of Annex I.

3. Measures for achieving the targets:

(a) overview of all policies and measures concerning the promotion of the use of energy from renewable sources;

(b) specific measures to fulfil the requirements of Articles 13, 14 and 16, including the need to extend or reinforce existing infrastructure to facilitate the integration of the quantities of energy from renewable sources needed to achieve the 2020 national target, measures to accelerate the authorisation procedures, measures to reduce non-technological barriers and measures concerning Articles 17 to 21;

(c) support schemes for the promotion of the use of energy from renewable sources in electricity applied by the Member State or a group of Member States;

(d) support schemes for the promotion of the use of energy from renewable sources in heating and cooling applied by the Member State or a group of Member States;

(e) support schemes for the promotion of the use of energy from renewable sources in transport applied by the Member State or a group of Member States;

(f) specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation taking into account:

(i) biomass availability: both domestic potential and imports;

(ii) measures to increase biomass availability, taking into account other biomass users (agriculture and forest based sectors);

(g) planned use of statistical transfers between Member States and planned participation in joint projects with other Member States and third countries:

(i) the estimated excess production of energy from renewable sources compared to the indicative trajectory which could be transferred to other Member States;

(ii) the estimated potential for joint projects;

(iii) the estimated demand for energy from renewable sources to be satisfied by means other than domestic production.

4. Assessments:

~~(a) the total contribution expected of each renewable energy technology to meet the mandatory 2020 targets and the indicative trajectory for the shares of energy from renewable sources in electricity, heating and cooling and transport;~~

~~(b) the total contribution expected of the energy efficiency and energy saving measures to meet the mandatory 2020 targets and the indicative trajectory for the shares of energy from renewable sources in electricity, heating and cooling and transport.~~

ANNEX VII

Accounting of energy from heat pumps

The amount of aerothermal, geothermal or hydrothermal energy captured by heat pumps to be considered energy from renewable sources for the purposes of this Directive, E_{RES} , shall be calculated in accordance with the following formula:

$$E_{RES} = Q_{usable} * (1 - 1/SPF)$$

where

- Q_{usable} = the estimated total usable heat delivered by heat pumps fulfilling the criteria referred to in Article 7 5(4), implemented as follows: Only heat pumps for which $SPF > 1,15 * 1/\eta$ shall be taken into account,
- SPF = the estimated average seasonal performance factor for those heat pumps,
- η is the ratio between total gross production of electricity and the primary energy consumption for electricity production and shall be calculated as an EU average based on Eurostat data.

~~By 1 January 2013, the Commission shall establish guidelines on how Member States are to estimate the values of Q_{usable} and SPF for the different heat pump technologies and applications, taking into consideration differences in climatic conditions, especially very cold climates.~~

ANNEX VIII

PART A. PROVISIONAL ESTIMATED INDIRECT LAND-USE CHANGE EMISSIONS FROM BIOFUEL AND BIOLIQUID FEEDSTOCKS (gCO_{2EQ}/MJ) ⇒³⁴ ⇐

| Feedstock group | Mean ⇒ ³⁵ ⇐ | Interpercentile range derived from the sensitivity analysis ⇒ ³⁶ ⇐ |
|-------------------------------------|---------------------------|--|
| Cereals and other starch-rich crops | 12 | 8 to 16 |
| Sugars | 13 | 4 to 17 |
| Oil crops | 55 | 33 to 66 |

PART B. BIOFUELS AND BIOLIQUIDS FOR WHICH THE ESTIMATED INDIRECT LAND-USE CHANGE EMISSIONS ARE CONSIDERED TO BE ZERO

Biofuels and bioliquids produced from the following feedstock categories will be considered to have estimated indirect land-use change emissions of zero:

- (1) feedstocks which are not listed under part A of this Annex.
- (2) feedstocks, the production of which has led to direct land-use change, i.e. a change from one of the following IPCC land cover categories: forest land, grassland, wetlands, settlements, or other land, to cropland or perennial cropland ⇒³⁷ ⇐. In such a case a direct land-use change emission value (e_i) should have been calculated in accordance with point 7 of part C of Annex V.

³⁴ (†) The mean values reported here represent a weighted average of the individually modelled feedstock values. The magnitude of the values in the Annex is sensitive to the range of assumptions (such as treatment of co-products, yield developments, carbon stocks and displacement of other commodities) used in the economic models developed for their estimation. Although it is therefore not possible to fully characterise the uncertainty range associated with such estimates, a sensitivity analysis conducted on the results based on a random variation of key parameters, a so-called Monte Carlo analysis, was conducted.

³⁵ The mean values included here represent a weighted average of the individually modelled feedstock values.

³⁶ The range included here reflects 90 % of the results using the fifth and ninety-fifth percentile values resulting from the analysis. The fifth percentile suggests a value below which 5 % of the observations were found (i.e. 5 % of total data used showed results below 8, 4, and 33 gCO_{2eq}/MJ). The ninety-fifth percentile suggests a value below which 95 % of the observations were found (i.e. 5 % of total data used showed results above 16, 17, and 66 gCO_{2eq}/MJ).

³⁷ (††) Perennial crops are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice and oil palm.

ANNEX IX

Part A. Feedstocks ⇒ for the production of advanced biofuels ⇐ ~~and fuels, the contribution of which towards the target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content.~~

- (a) Algae if cultivated on land in ponds or photobioreactors.
- (b) Biomass fraction of mixed municipal waste, but not separated household waste subject to recycling targets under point (a) of Article 11(2) of Directive 2008/98/EC.
- (c) Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households subject to separate collection as defined in Article 3(11) of that Directive.
- (d) Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in part B of this Annex.
- (e) Straw.
- (f) Animal manure and sewage sludge.
- (g) Palm oil mill effluent and empty palm fruit bunches.
- (h) ☒ Tall oil and ☒ ~~Full~~ tall oil pitch.
- (i) Crude glycerine.
- (j) Bagasse.
- (k) Grape marcs and wine lees.
- (l) Nut shells.
- (m) Husks.
- (n) Cobs cleaned of kernels of corn.
- (o) Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin ~~and tall oil~~.
- (p) Other non-food cellulosic material as defined in point (s) of the second paragraph of Article 2.
- (q) Other ligno-cellulosic material as defined in point (r) of the second paragraph of Article 2 except saw logs and veneer logs.
- ~~(r) Renewable liquid and gaseous transport fuels of non-biological origin.~~
- ~~(s) Carbon capture and utilisation for transport purposes, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2.~~
- ~~(t) Bacteria, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2.~~

Part B. Feedstocks ⇒ for the production of biofuels ⇐, the contribution of which towards the ⇒ minimum share established in Article 25(1) is limited ⇐ target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content:

(a) Used cooking oil.

(b) Animal fats classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009 of the European Parliament and of the Council³⁸

↓ new

(c) Molasses that are produced as a by-product from of refining sugarcane or sugar beets provided that the best industry standards for the extraction of sugar has been respected.

↓ 2015/1513 Art. 2.13 and Annex II.3

³⁸ ⇒ ⇐ Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) (OJ L 300, 14.11.2009, p. 1).

ANNEX X

Part A: Maximum contribution from liquid biofuels produced from food or feed crops to the EU renewable energy target as referred to in Article 7 paragraph 1

| Calendar year | Maximum share |
|---------------|---------------|
| 2021 | 7.0% |
| 2022 | 6.7% |
| 2023 | 6.4% |
| 2024 | 6.1% |
| 2025 | 5.8% |
| 2026 | 5.4% |
| 2027 | 5.0% |
| 2028 | 4.6% |
| 2029 | 4.2% |
| 2030 | 3.8% |

Part B: Minimum shares of energy from advanced biofuels and biogas produced from feedstock listed in Annex IX, renewable transport fuels of non-biological origin, waste-based fossil fuels and renewable electricity, as referred to in Article 25(1)

| Calendar year | Minimum share |
|---------------|---------------|
| 2021 | 1.5 % |
| 2022 | 1.85 % |
| 2023 | 2.2 % |
| 2024 | 2.55 % |
| 2025 | 2.9 % |
| 2026 | 3.6 % |
| 2027 | 4.4 % |
| 2028 | 5.2 % |

| | |
|------|-------|
| 2029 | 6.0 % |
| 2030 | 6.8 % |

Part C: Minimum shares of energy from advanced biofuels and biogas produced from feedstock listed in Part A of Annex IX as referred to in Article 25(1)

| Calendar year | Minimum share |
|---------------|---------------|
| 2021 | 0.5 % |
| 2022 | 0.7% |
| 2023 | 0.9 % |
| 2024 | 1.1 % |
| 2025 | 1.3 % |
| 2026 | 1.75 % |
| 2027 | 2.2 % |
| 2028 | 2.65 % |
| 2029 | 3.1 % |
| 2030 | 3.6 % |



ANNEX XI

Part A

Repealed Directive with list of the successive amendments thereto (referred to in Article 34)

| | |
|---|----------------|
| Directive 2009/28/EC of the European Parliament and of the Council (OJ L 140, 5.6.2009, p. 16) | |
| Council Directive 2013/18/EU (OJ L 158, 10.6.2013, p. 230) | |
| Directive (EU) 2015/1513 (OJ L 239, 15.9.2015, p. 1) | Only Article 2 |

Part B

Time-limits for transposition into national law

(referred to in Article 34)

| Directive | Time-limit for transposition |
|----------------|------------------------------|
| 2009/28/EC | 25 June 2009 |
| 2013/18/EU | 1 July 2013 |
| (EU) 2015/1513 | 10 September 2017 |

ANNEX XII

Correlation table

| Directive 2009/28/EC | This Directive |
|--|---|
| Article 1 | Article 1 |
| Article 2, first subparagraph | Article 2, first subparagraph |
| Article 2, second subparagraph, introductory wording | Article 2, second subparagraph, introductory wording |
| Article 2, second subparagraph, point a | Article 2, second subparagraph, point a |
| Article 2, second subparagraph, points b, c and d | — |
| — | Article 2, second subparagraph, point b |
| Article 2, second subparagraph, points e, f, g, h, i, j, k, l, m, n, o, p, q, r, and s | Article 2, second subparagraph, points c, d, e, f, g, h, i, j, k, l, m, n, o, p and q |
| Article 2, second subparagraph, point t | — |
| — | Article 2, second subparagraph, point r |
| Article 2, second subparagraph, points u, v and w | Article 2, second subparagraph, points s, t and u |
| — | Article 2, second subparagraph, points x, y, z, aa, bb, cc, dd, ee, ff, gg, hh, ii, jj, kk, ll, mm, nn, oo, pp, qq, rr, ss, tt and uu |
| Article 3 | — |
| — | Article 3 |
| Article 4 | — |
| — | Article 4 |
| — | Article 5 |
| — | Article 6 |
| Article 5, paragraph 1, subparagraphs 1, 2 and 3 | Article 7, paragraph 1, subparagraphs 1, 2 and 3 |
| — | Article 7, paragraph 1, subparagraph 4 |

| | |
|---|---|
| Article 5, paragraph 2 | — |
| Article 5, paragraphs 3 and 4 | Article 7, paragraphs 2 and 3 |
| — | Article 7, paragraphs 4 and 5 |
| Article 5, paragraphs 5 and 6 | Article 7, paragraphs 6 and 7 |
| Article 6 | Article 8 |
| Article 7 | Article 9 |
| Article 8 | Article 10 |
| Article 9 | Article 11 |
| Article 10 | Article 12 |
| Article 11 | Article 13 |
| Article 12 | Article 14 |
| Article 13, paragraph 1, subparagraph 1 | Article 15, paragraph 1, subparagraph 1 |
| Article 13, paragraph 1, subparagraph 2 | Article 15, paragraph 1, subparagraph 2 |
| Article 13, paragraph 1, subparagraph 2, points a and b | — |
| Article 13, paragraph 1, subparagraph 2, points c, d, e and f | Article 15, paragraph 1, subparagraph 2, points a, b, c and d |
| Article 13, paragraph 2 | Article 15, paragraph 2 |
| — | Article 15, paragraphs 3 |
| Article 13, paragraphs 3, 4 and 5 | Article 15, paragraphs 4, 5 and 6 |
| Article 13, paragraph 6, first subparagraph | Article 15, paragraph 7, first subparagraph |
| Article 13, paragraph 6, subparagraphs 2,3,4 and 5 | — |
| — | Article 15, paragraphs 8 and 9 |
| — | Article 16 |
| — | Article 17 |
| Article 14 | Article 18 |

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| Article 15, paragraphs 1 and 2 | Article 19, paragraphs 1 and 2 |
| Article 15, paragraph 3 | — |
| — | Article 19, paragraphs 3 and 4 |
| Article 15, paragraphs 4 and 5 | Article 19, paragraphs 5 and 6 |
| Article 15, paragraph 6, first subparagraph, point a | Article 19, paragraph 7, first subparagraph, point a |
| Article 15, paragraph 6, first subparagraph, point b (i) | Article 19, paragraph 7, first subparagraph, point b (i) |
| — | Article 19, paragraph 7, first subparagraph, point b (ii) |
| Article 15, paragraph 6, first subparagraph, point b (ii) | Article 19, paragraph 7, first subparagraph, point b (iii) |
| — | Article 19, paragraph 7, second subparagraph |
| Article 15, paragraph 7 | Article 19, paragraph 8 |
| Article 15, paragraph 8 | — |
| Article 15, paragraphs 9 and 10 | Article 19, paragraphs 9 and 10 |
| — | Article 19, paragraph 11 |
| Article 15, paragraphs 11 and 12 | Article 19, paragraphs 12 and 13 |
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| Article 16, paragraphs 9, 10 and 11 | Article 20, paragraphs 1, 2 and 3 |
| — | Article 21 |
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| — | Article 25 |
| Article 17, paragraph 1, first and second subparagraphs | Article 26, paragraph 1, first, second and fourth subparagraphs |

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| — | Article 26, paragraph 1, third subparagraph |
| Article 17, paragraph 2 | Article 26, paragraph 7 |
| Article 17, paragraph 3, first subparagraph | Article 26, paragraph 2, first subparagraph |
| Article 17, paragraph 3, first subparagraph | Article 26, paragraph 2, first subparagraph |
| — | Article 26, paragraph 2, second subparagraph |
| Article 17, paragraph 4, first subparagraph | Article 26, paragraph 3, first subparagraph |
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| Article 17, paragraph 4, first subparagraph, point c | — |
| Article 17, paragraph 4, second subparagraph, | Article 26, paragraph 3, second subparagraph |
| Article 17, paragraph 5 | Article 26, paragraph 4 |
| Article 17, paragraphs 6 and 7 | — |
| Article 17, paragraph 8 | Article 26, paragraph 9 |
| Article 17, paragraph 9 | — |
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| Article 18, paragraph 1, first subparagraph | Article 27, paragraph 1, first subparagraph |
| Article 18, paragraph 1, first subparagraph, point a, b and c | Article 27, paragraph 1, first subparagraph, points a, c and d |
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| Article 19, paragraph 1, first subparagraph, point a, b and c | Article 28, paragraph 1, first subparagraph, point a, b and c |
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| Article 19, paragraph 2, 3 and 4 | Article 28, paragraph 2, 3 and 4 |
| Article 19, paragraph 5 | — |
| Article 19, paragraph 7, first subparagraph | Article 28, paragraph 5, first subparagraph |
| Article 19, paragraph 7, first subparagraph, first, second third and fourth indents | — |
| Article 19, paragraph 7, second subparagraph | Article 28, paragraph 5, second subparagraph |
| Article 19, paragraph 7, third subparagraph, introductory words | Article 28, paragraph 5, third subparagraph, introductory words |
| Article 19, paragraph 7, third subparagraph, | Article 28, paragraph 5, third subparagraph, |

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| Article 19, paragraph 7, third subparagraph, point b | — |
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| Article 23, paragraph 9 | Article 30, paragraph 3 |
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| Article 25, paragraph 1 | Article 31, paragraph 1 |
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| Article 25, paragraph 3 | Article 31, paragraph 2 |
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| — | Article 32, paragraph 4 |
| Article 26 | — |
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