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Subject:	European Missions - Highlights from the EESC Opinion on the Communication of the European Commission COM(2021)609: Powerpoint presentation (Research WP meeting 10.02.2022)

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European Missions

Highlights from the EESC Opinion on the Communication of the European Commission COM(2021)609

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EC COM(2021)609: European Missions

European Economic and Social Committee

Within the COM(2021)609 the EC lists and addresses five priority EU Missions:

1. Adaptation to climate change
2. Cancer
3. Restore our ocean and waters by 2030, including sanitation
4. 100 climate-neutral and smart cities by 2030, including smart villages
5. A soil deal for Europe

While the EESC added some comments on these five EU Missions, the EESC Study Group (SG) added five additional missions, which the SG felt were equally important for the EU:

Develop and pursue missions and measures to:

1. keep up with USA and Asia in global competition in the areas of research, technology and innovation (RTI)
2. cope with the challenges linked to the EU's ageing society
3. define strategies for the successful integration of the high number of migrants coming into the EU
4. improve emergency preparedness
5. cope with the needs of patients with non-communicable diseases (NCD)

Mission 1 - Adoption to Climate Change

With almost all Green Deal measures, prices for electricity, fuel, domestic heating etc. increase for EU citizens.

Examples of new technologies that will certainly play a very important role in reducing CO_2 emissions include:

- decarbonisation of electricity generation;
- decarbonisation of CO_2-emitting industries, e.g. the steel industry, the cement industry, etc.;
- carbon capture and storage (CCS) and, for example, sewage treatment plants;
- storage of electric power on a very large scale for low specific costs;
- e-mobility;
- smart grids and high-voltage power grids;
- smart cities, etc.

Mission 1 - Adoption to Climate Change

Regarding global competition in RTI with USA and Asia:

- Asia (China, South-Korea etc.) have massively invested in RTI in the last 20 years and outperformed the EU.
- The EU has to substantially speed up its efforts in R&I, especially regarding the fast transformation of R&D results into innovative products in the area of KETs (Key Enabling Technologies) and FETs (Future Emerging Technologies) like Artificial Intelligence, Machine Learning, Robotics, 5G mobile communication, chip production and Digital Business Models in general etc.
- According to the recently published 2021 EU Industrial R&D Investment Scoreboard, China has increased its R&D investments from 2020 to 2021 by +18.1%, the USA has increased its R&D investments from 2020 to 2021 by +9.1%, whereas the EU 27 have decreased their R&D investments by -2.2%.
- Asia (China and Korea), too, are very aggressive in terms of global patent applications and they outperform Europe by an order of magnitude in patents.

Mission 1 - Adoption to Climate Change

Regarding EU´s TWIN TRANSITION, especially EU´s GREEN DEAL
The necessary measures e.g.:

- **Decarbonisation of electricity generation**
- **Decarbonisation of CO_2-emitting industries, e.g. the steel industry, etc.**
- **Carbon capture and storage of CO_2 (CCS)**
- **Storage of electric power on a very large scale for low specific costs etc.**

are easily listed on paper, however, implementing them is a great challenge, given the huge scale needed for all 27 EU Member States.

Several studies show that it will be very difficult to achieve EU´s GREEN DEAL by 2050 and it will be even more difficult to achieve the new defined intermediate goal "FIT for 55"
(i.e. a reduction of the CO_2-emissions by 55% in 2030 compared to 1990).

The real problem of the de-carbonization of the EU and the globe, is that the 8 billion people on earth currently consume a GIGANTIC AMOUNT OF ENERGY, 85% of which is fossil!

Mission 1 - Adoption to Climate Change

Some facts regarding the de-carbonization of the EU on the example of EU´s largest industry country, Germany, which are scarcely communicated (if at all):

According to the German AGEB (AG Energiebilanzen e.V) the energy consumption in Germany in 2020 has been:

Source of Energy	absolutely in PETAJOULE (PJ)	absolutely in TWh	in %
Renewable	696	193	7,7%
Natural Gas	2185	607	24,3%
Mineral Oil	3396	943	37,8%
Electricity	1800	500	20,0%
Coal and others	896	249	10,2%
TOTAL	8973	2494	100,0%

Electricity in 2020 accounted for only about 20%, i.e. only 1/5 of the total energy consumption in Germany (80% in 2020 has been based on fossil energy), thus electricity will have to be increased by a factor of approx. 5, according to the GREEN DEAL, to achieve 100% de-carbonization by 2050.

Mission 1 - Adoption to Climate Change

Since the efficiency of some electricity-based technologies (but not all) is higher than that of fossil fuels, detailed engineering calculations show that the multiplier factor needs not to be 5, but less.

There are many studies with a substantial variation in their prognoses regarding the amount of renewable electricity needed in 2050: The value varies between 650 TWh and 1400 TWh.

A good average estimate is 1000 TWh in 2050, and at least half of this additional renewables needed in 2035 ("FIT for 55") .

In 2035 (or earlier) all coal power plants shall be closed in Germany, i.e. the generation of electric power will be fully de-carbonized in 2035, however many energy intense industries (e.g. the steel industry, the cement industry) will be only partly de-carbonized in 2035.

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- **Germany will need renewable electricity in the magnitude of 1000 TWh (+/- 20%) p.a. in 2050**
- **To achieve that, Germany will need a massive increase in wind-turbines and PV**
- **According to many studies (which very considerably) Germany will need <u>additional</u> 35.000 wind-turbines of the large 5000 kW nominal capacity until 2050 (+/- 30%)** see e.g. https://www.naturschutz-energiewende.de/wp-content/uploads/2020-03-17_KNE-Wortmeldung_-Flaechenverf%C3%BCgbarkeit-fuer-die-Energiewende.pdf
- **A wind turbines (nominal power 5000 kW) has a total height 200 m and has 2500 productive hours per year and thus produces approx. 12,5 GWh p.a.**
- **That means the commissioning of 1250 new, large wind turbines per year, or 4 large wind turbines EVERY DAY until 2050!**

All engineering calculations done by di.bruno.lindorfer@liwest.at. Possible errors, if any, are his responsibility, only.

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Mission 1 - Adoption to Climate Change

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- **In the year 2021 Germany has put approx. 450 new, large wind-turbines in operation.**
- **So if Germany continues with the same low performance, as it did in 2021, it will take 35.000 / 450 = 78 years!**
- **To achieve the goal of 1250 new wind-turbines every year, Germany would have to increase the construction speed of wind-turbines by a factor of 3 compared to 2021**
- **According to engineers, this is very challenging, and** achieving the newly defined intermediate goal "FIT for 55" in just 8 years from now (2035), is even more challenging!
- **One limiting factor are the material resources, another limiting factor is the lack of electrical technicians (money is NOT the bottle neck).**

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Mission 1 - Adoption to Climate Change

Material resources needed for wind-turbines:

- The tower of a 5000 kW wind-turbine (height 150 m) has a weight of approx. 2800 tons (mainly steel) and the foundation weighs approx. 4000 tons concrete.
- Both, the production of steel as well as the production of concrete, emit large amounts of CO_2. Engineering calculations yield that approx. 6600 tons of CO_2 are emitted throughout the production of the materials of a single 5000 kW wind turbine.
- As calculated on the previous slides, Germany does need 35.000 additional, large wind turbines until 2050, which means:
- This means that for the production of these 35.000 large wind turbines
  - 231 Millions of tons of additional CO_2 are emitted
  - 105 Millions of tons of additional steel are needed (this would be the total steel production of all German steel industry of approx. 3 years!)
  - 140 Millions of tons of additional concrete are needed

Dr. Höber from the university of Leoben, Austria, has published a study in the Austrian journal PROFIL in May 2021, claiming that for the global de-carbonization (as agreed upon in the Paris Climate Agreement) 350 million tons of copper would be needed, globally. The annual global production of copper amounts to 25 Million tons, i.e. the global de-carbonization would eat up the total global copper production for 14 years. No other industry would get a kilogram of copper in these 14 years.
He writes in the PROFIL, thus the global de-carbonization until 2050 seems impossible.

e-Mobility (what is not widely known):

GIGANTIC AMOUNTS of ROCK and ORE have to be moved for global e-mobility

A Li-ion battery pack for a typical higher power electric car (150kW+) weighs about 500kg.
Such a Li-ion battery contains approx. 12 kg of lithium, 30 kg of nickel, 20 kg of manganese, 15 kg of cobalt, 100 kg of copper, 200 kg of aluminum etc.
In order to produce such a Li-ion battery, 10 tons of lithium-salt must be processed for the lithium, 15 tons of ore for cobalt, 12 tons of copper-ore etc.
In total, about **200 tons** of earth and ores have to be excavated for a single car battery (source: Bengt Karlsson in ÅBO Stories).
Approximately **90 million** new passenger cars are currently being manufactured globally

This means that for global e-mobility 90 million x 200 tons = 18.0 billion tons of rock and ores (= 18 trillion kg) that have to be dug up EVERY YEAR for the raw materials for the batteries for the e-cars

18.0 billion tons of rock is a gigantic amount of mass and the giant excavators needed to dig up it need a gigantic amount of diesel and emit a gigantic amount of CO2!
This is what nobody does tell the public about e-mobility.

Mission 2 - Cancer

The EU 27 must work together on improving diagnosis, therapy, access to personalised medicines, treatment and prevention – as was already emphasised in the EESC's opinion on *Europe's Beating Cancer Plan* in June 2021.

Additional EU Mission 2 – Coping with the challenges of the EU's ageing society

Older people and vulnerable people have different needs from young people: they need more and new medicine (for dementia, Alzheimer's disease, etc.), more medical care, more social care, and special training and education

European care strategy

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Mission 3 – Restore our Ocean and Waters by 2030

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Research and clean water technologies, including waste water mining, sanitation and sewage treatment are key for this mission.

See also UN SDG 6

Additional EU Mission 3 – Strategies for the successful integration of the high number of migrants coming into the EU

Innovative concepts for educating and training migrants are needed.

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Mission 4 - 100 Climate-Neutral and Smart Cities by 2030

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- More than 65% of the global population lives in large cities.
- Highly-skilled engineers will be needed in the future.
- "ageing society“
- Increasing "emergency preparedness" through R&D is very important.
- “Blackout” - The root cause for the increasing vulnerability of Europe's power supply is the increasing share of unpredictable and unplannable renewable electric power, such as wind turbines and solar power

Additional EU Mission 4 – Emergency Prepardness

Emergency Preparedness

Many emergencies within recent years have shown that modern societies are relatively vulnerable, thus increasing "emergency preparedness" through R&D is very important:

- Disasters in the nuclear power plants in Chernobyl and Fukushima etc.
- Electricity blackouts and communication blackouts
- Shortages of and steep price increases in all energy sources, including natural gas
- Shortages of and price increases of globally traded goods also by problems in global transport (ship accident in the Suez Canal 2021)
- Thunderstorms and massive floods, with many hundreds of people killed
- Pandemics, such as the COVID-19 pandemic

Emergency Preparedness

- Cyber-attacks (with the massively growing digitalisation of everything in public life, private life and business, the threat of cyber-attacks is growing rapidly).
- Eastern and Southern Europe barely escaped a huge power blackout on 8 January 2021.
- The root cause for the increasing vulnerability of Europe's power supply is the increasing share of unpredictable and unplannable renewable electric power, such as wind turbines and solar power
- Europe is not very well prepared for blackouts: In the event of a blackout, the energy supply to private households and industry breaks down immediately, communication breaks down within minutes or hours, the supply of drinking water breaks down within a short time etc.
- **Recovering from a major electricity blackout is not an easy task.**

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Mission 5 – A Soil Deal for Europe

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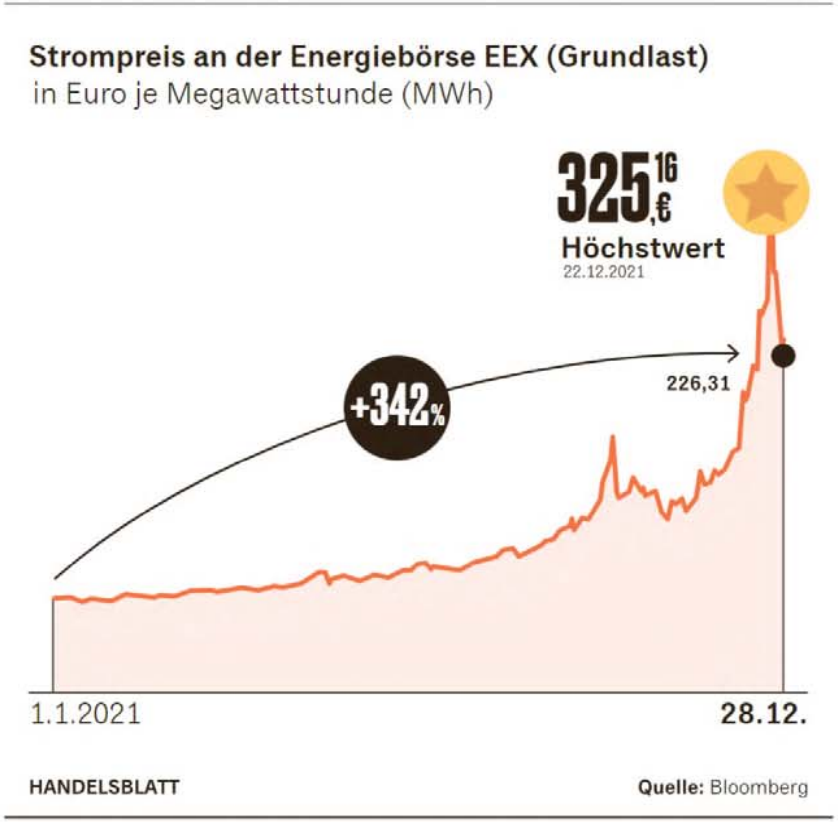
- Along with clean water healthy soil to grow the basic ingredients for food is the most important resource
- R&D is needed to research and develop climate neutral agriculture for the sustainable production of food
- 10% of the EU's budget for agriculture and farming is spent on R&D; the EESC recommends increasing this figure to a minimum of 20%

Price of Electricity

Price of Electricity within the EU 2021



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Digital Data Tsunami

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HANDELSBLATT 16.5.2019:

Starting from 2025 the global Data-Tsunami is expected to explode

According to a report in the HANDELSBLATT dated 16. May 2019, the digital data tsunami is expected to "explode" due to mobile computing from 2025 onwards to approx.
2142 Zetta-Byte in 2035 (=2142x10^{21} Byte)

This digital data tsunami will cause a steep increase in electric power consumption

Source: HANDELSBLATT, 16. May 2019

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Global CO2-Emissions G20 2010 until 2020

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Global CO2-Emissions from 2010 to 2020 have increased the most in:
India: +40%
Turkey: +34%

In China, CO2 emissions have increased by +21%.

In Europe, CO2 emissions have fallen by -25%

In USA the CO2 emissions dropped by
-19%

Global (world) CO2 emissions increased only slightly by +3%.

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