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COVER NOTE

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PART 1/6

COMMISSION STAFF WORKING DOCUMENT

Digital Decade country reports

State of the Digital Decade 2024

Austria

1 Executive summary

Austria brings a positive contribution to the European Union's (EU) Digital Decade objectives and targets, in view of a successful digitalisation that fosters competitiveness, resilience, sovereignty, European values and climate action.

In 2023, Austria made notable progress in the area of gigabit connectivity infrastructure (notably FTTP) and the adoption of cloud technologies. However, some **challenges** persist in high quality gigabit networks coverage and in the adoption of data analytics by enterprises. **The Digital Austria Act sets out the digital measures and principles of the governments' work programme**. This national strategy is well aligned with the Digital Decade targets (such as connectivity, skills, and e-government) and objectives (e.g., cybersecurity, competitiveness, innovation, climate action). The Austrian authorities recognise and actively engage with the transformative impact of digitalisation on economic growth and jobs. The self-assessment of strengths, weaknesses and challenges presented in the roadmap is consistent with the one carried out in the Digital Decade framework. Austria has a skilled population, competitive actors in semiconductors and quantum sectors and very good support system for start-ups. However, broadband connectivity remains underdeveloped and take up of digital technologies by enterprises could be improved. According to the **Special Eurobarometer 'Digital Decade 2024'**[1] , 71% of Austrian citizens consider that the digitalisation of daily public and private services is making their life easier, around the UE average (73%).

Regarding **European Digital Infrastructure Consortiums** (EDICs), Austria is an observing country of the Alliance for Language Technologies European Digital Infrastructure Consortium and is finalising negotiations to become a member of the Local Digital Twins towards the CitiVERSE EDIC (ALT-EDIC, CitiVERSE EDIC, both already set up). Austria also participates in working groups aiming to set up EDICs in other areas, including Mobility and Logistics Data, Cybersecurity Skills Academy, Connected Public Administration, Digital Commons or AGRIfood[2].

The Austrian **Recovery and Resilience plan allocates 36% to digital transformation (EUR 1.3 billion)**[3]**,** with priorities given to gigabit connectivity and digital skills. Under cohesion policy, an additional EUR 80 million (7% of the country's total cohesion policy funding) is allocated to the country's digital transformation[4].

[1] Special Eurobarometer 551 on 'the Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351

[2] Information last updated on 31 May 2024.

[3] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation.

[4] This amount includes all investment specifically aimed at or substantially contributing to digital transformation in the 2021-2027 Cohesion Policy programming period. The source funds are the European Regional Development Fund, the Cohesion Fund, the European Social Fund Plus, and the Just Transition Fund.

Digital Decade KPI [1]	Austria			EU		Digital Decade target by 2030	
	DESI 2023	DESI 2024 (year 2023)	Annual progress	DESI 2024 (year 2023)	Annual progress	AT	EU
Fixed Very High Capacity Network (VHCN) coverage	54.8%	67.6%	23.3%	78.8%	7.4%	100%	100%
Fibre to the Premises (FTTP) coverage	36.6%	41.0%	11.9%	64.0%	13.5%	x	-
Overall 5G coverage	91.7%	96.0%	4.7%	89.3%	9.8%	100%	100%
Semiconductors		NA					
Edge Nodes		30		1 186		x	10 000
SMEs with at least a basic level of digital intensity	64.4%	57.9%	-5.2%	57.7%	2.6%	x	90%
Cloud	28.8%	35.6%	11.2%	38.9%	7.0%	x	75%
Artificial Intelligence	8.8%	10.8%	10.8%	8.0%	2.6%	x	75%
Data analytics	NA	23.9%	NA	33.2%	NA	x	75%
AI or Cloud or Data analytics	NA	47.0%	NA	54.6%	NA		75%
Unicorns		5		263		x	500
At least basic digital skills	63.3%	64.7%	1.1%	55.6%	1.5%	100%	80%
ICT specialists	5.0%	5.3%	6.0%	4.8%	4.3%	x	~10%
eID scheme notification		Yes					
Digital public services for citizens	78.4	80.7	2.9%	79.4	3.1%	x	100
Digital public services for businesses	82.9	82.9	0.0%	85.4	2.0%	x	100
Access to e-Health records	88.2	88.2	0.0%	79.1	10.6%	x	100

[1] See the methodological note for the description of the indicators and other descriptive metrics

National Digital Decade strategic roadmaps

With respect to Austria's contribution to the Digital Decade reflected in its roadmap, it is demonstrating **a low ambition** however, based on this document, intends to allocate **significant effort** to achieve the Digital Decade objectives and targets.

The roadmap is overall coherent and identifies relevant weaknesses but lacks formal national commitments. The Austrian roadmap shows that the target for the KPI on access to a secure e-ID has been already achieved and includes 2030 national targets for 3 KPIs (VHCN, 5G, population with at least basic digital skills) but lacks formal national targets for the remaining 12 KPIs. The three 2030 national targets are aligned with the EU 2030 targets (VHCN and 5G) and 'at least basic digital skills' is more ambitious (100% instead of 80%). Trajectories with annual projections until 2030 are missing for **all targets except VHCN and 5G**. The roadmap covers several objectives of the Digital Decade such as resilience, security, and sovereignty. Other dimensions like the green transition could be further explored.

The total budget of the 60 measures proposed **is estimated to EUR 3.4 bn** (about 0.7% GDP) with priorities set on gigabit connectivity and support to start-ups and unicorns. According with the Austria's roadmap there are currently six unicorns in the country, just one more than the value recorded by dealroom, used as data source in this report. Some aspects require more effort, especially for the digitalisation of enterprises (adoption of advanced technologies).

Recommendations for the roadmap

In this context, Austria should, when submitting adjustments to its roadmap in accordance with Article 8(3) of the DDPP Decision:

- **TARGETS**: (i) Set explicit national targets for 2030 that will contribute to achieve the EU 2030 targets for ICT specialists, FTTP, edge nodes, SMEs with at least a basic level of digital intensity, take-up of data analytics, cloud, and artificial intelligence, unicorns, digital public services for citizens and businesses, and access to e-Health records; (ii) Define the related trajectories with annual projections until 2030 for all targets (except VHCN and 5G).
- **MEASURES**: (i) Add more details on budget and sources of funding for those measures lacking it; (ii) Add measures on edge nodes and take-up of Data Analytics; (iii) Provide more information on the implementation of digital rights and principles (and Digital Decade general objectives), including what national measures contribute to it.

Digital rights and principles

The **Special Eurobarometer 'Digital Decade 2024'** reveals key insights into Austrian perceptions of digital rights. With an 8-point increase, 55% of Austrians believe the EU protects their digital rights, above the EU average of 45%. Confidence in all relevant areas such as freedom of assembly online (65%), digital public services (65%) and privacy friendly technologies (67%), is higher than the EU average. Significant concerns include control over personal data (38%) and the online safety for children (47%). The monitoring of the Declaration on Digital Rights and Principles shows that increasing the profile of the Declaration at national level and fostering better stakeholder engagement could help improve outcomes in the years to come[5].

A competitive, sovereign and resilient EU based on technological leadership

Austria could improve its technological leadership and competitiveness by bridging the gap in connectivity and take-up of technologies by enterprises. The coverage of very high capacity networks (67.6%, EU average: 78.8%) and FTTP (41.0%; EU average: 64.0%) remains the major weakness of the Austrian digital infrastructure but the situation is improving due the implementation of the Broadband Austria 2030 initiative. 5G coverage is very good (96.0%) but take-up lags behind. For both fixed and mobile connectivity, particular attention is to be given to rural areas. The digitalisation of enterprises shows a mixed picture. There are flagship actors in the semiconductors and quantum sectors; public support to start-up is high and the take up of AI by enterprise is good. On the other side, the digitalisation of all SMEs remains average and the take up of data analytics and cloud technologies could be improved. The challenge for Austria is to preserve its frontrunner enterprises while ensuring that digitalisation percolates to all actors of the economy. The Digital Action Plan foresees general directions to ensure digital sovereignty, including data sovereignty. The Austrian Cybersecurity Strategy provides a strategic framework in the domain and will foster the implementation of the NIS2 Directive.

Recommendations – Austria should:

- **CONNECTIVITY INFRASTRUCTURE**: (i) Take appropriate actions to maintain the current sustained FTTP rollout pace and carefully monitor the metrics including rural coverage in order to reach full coverage by 2030; (ii) Ensure sufficient access of new players to spectrum for innovative business-to-business (B2B) and business-to-consumer (B2C) applications and encourage operators to speed up the deployment of 5G stand-alone core networks.

[5] See SWD 'Digital Decade in 2024: Implementation and perspective' with annexes, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325, Annex 4.

- **CYBERSECURITY**: Continue the implementation of the 5G Cybersecurity Toolbox to ensure secure and resilient 5G networks.
- **EDGE NODES**: Propose dedicated measures to support the deployment of edge nodes.
- **SMEs**: Provide a clear strategy targeted at SMEs, proposing more ambitious dedicated support schemes to impulse new dynamics in their digitalisation.
- **AI/CLOUD/DATA ANALYTICS**: (i) Design specific measures to increase the take-up of advanced technologies by enterprises, especially for data analytics techniques and cloud; (ii) Stimulate the adoption of next generation cloud infrastructure and services by companies of all sizes, including by liaising with the Cloud IPCEI Exploitation office and/or the coordinators and the Member States participating in the IPCEI-CIS.

Protecting and empowering EU people and society

Austria can rely on a digitally skilled population but still experiences skills shortages on the job market. The level of digital skills of the population (64.7%) is significantly above the EU average (55.6%). Under the Digital Decade, Austria's ambition stands out as the country aims by 2030 to reach 100% of its population aged 16-74 having at least basic digital skills. Achieving this target will require a sustained progression pace with appropriate support measures. There are 237 000 ICT specialists in Austria (5.3% of employment, above the EU average). Still, Austria experiences challenges related to skills shortages, as also highlighted in the recent European Semester country reports. While measures on improving the digital skills of the population seem effective (mainly at the level of formal education), the use of this advantage to feed the labour market is still to be unlocked.

The state of digitalisation of public services is average and might require acceleration. The roadmap provides for prospective actions to improve its performance in digitalising the public services in the future. Austria has an overall e-Health maturity score of 88.2 in 2023 and remains stable compared to last year's data and still above the EU average. All citizens have access to a secure digital identity (e-ID), but its use should be fostered. Austria is anticipating the implementation of the future European Digital Identity Wallet (EUDI Wallet).

Recommendations – Austria should:

- **BASIC DIGITAL SKILLS**: Explore measures to boost the digital skills of the population that is far from digitalisation (such as low-skilled jobseekers) in order to achieve the very ambitious national target.
- **ICT SPECIALISTS**: Based on the conclusion of the study on professionals in the Digital Skills Offensive, design new targeted measures to increase drastically the number of ICT specialists, including by upskilling/reskilling the labour force and bridging the gender gap.
- **e-ID/KEY DIGITAL PUBLIC SERVICES**: Promote the use of e-ID and digital public services by the citizens. Make use of the conclusions of the 'Study on appropriate channels for digitalisation with maximum benefits' to further digitalise public services in an efficient manner.
- **e-HEALTH:** (i) Make all data types available to citizens through the online access service; (ii) Offer a mobile application for citizens to access their electronic health records; (iii) Increase the supply of health data by onboarding more categories of healthcare providers.

Leveraging digital transformation for a smart greening

In Austria, the awareness of coupling the digital and green transitions is growing but should be backed up by actions in the roadmap. Several measures dedicated to Digital Decade targets contain a green dimension and the 'tech for green' area was identified as a priority for future digital challenges. However, the roadmap lacks dedicated measures on the decarbonation of the ICT sector, including monitoring frameworks.

Recommendations – Austria should:

- Develop a coherent approach to twinning the digital and green transitions. First, promote improvements in energy and material efficiency of digital infrastructures, in particular data centres. Second, support the development and deployment of digital solutions that reduce the carbon footprint in other sectors, such as energy, transport, buildings, and agriculture, including the uptake of such solutions by SMEs.
- Monitor and quantify the emission reductions of the deployed digital solutions in line with the relevant EU guidance and with the support of the methodology developed by the European Green Digital Coalition, in view of future policy development, as well as of attracting relevant financing.

2 A competitive, sovereign and resilient EU based on technological leadership

A sound digitalisation plan could help Austria to strengthen its competitive advantages while overcoming its weaknesses. R&D intensity in Austria was the third highest in the EU (3.2% of GDP in 2022) and ICT investments reached 4.1% of GDP[6] which is also among the highest share in the EU. However, the high level of public and private investment in R&D appears to benefit only a limited number of sectors and actors. Several flagship structures developed in the area of quantum and semiconductors. The start-up ecosystem is growing fast. Also, 5G coverage (96.0%) is among the best in the EU, nearly reaching the Digital Decade target of full coverage by 2030. On the other side, the country sees major weaknesses such as a poor gigabit infrastructure where it lays at the back of the EU pack. The digitalisation of enterprises could be improved as Austria shows a digitalisation of SMEs around the EU average and a poor take up of Cloud and Data Analytics technologies.

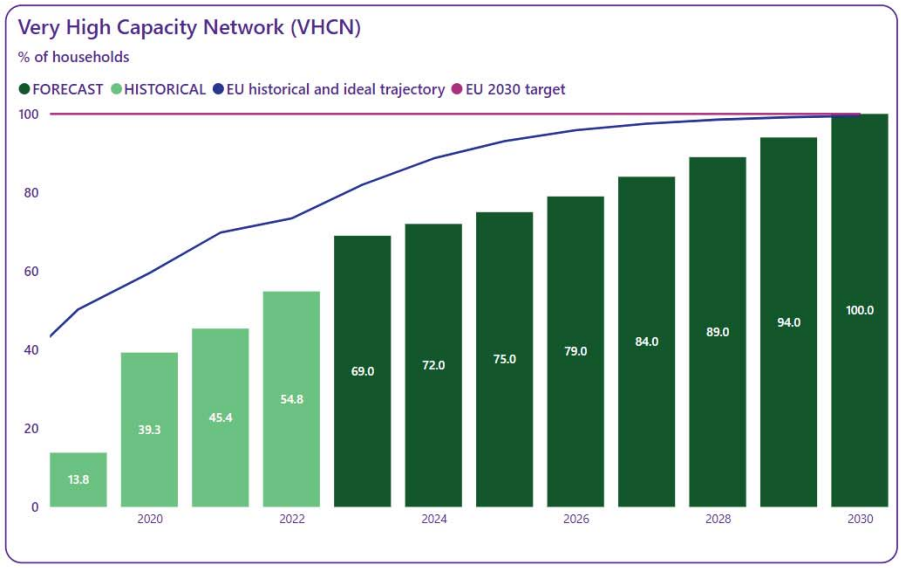
Therefore, the challenge of the digitalisation in Austria is two-fold: preserving its flagship industries and enterprises, while ensuring that digitalisation benefits all actors of the economy (e.g., providing robust broadband infrastructure, increasing the digitalisation of all SMEs). To this end, the Austrian Federal Government launched the Digital Austria Act, a comprehensive plan to reform and revitalize the country's digital landscape to ensure Austria’s prosperity in the future. Priorities are given to, among others, digital connectivity, cybersecurity and cyber-defence, digital transformation of the economy, and digital innovation; all could be contributing to the economic growth and increase the competitiveness of Austria.
The national strategic roadmap presents measures that should help solving the poor broadband issue. It also gives a strong priority to the development of start-ups and innovative businesses.

2.1 Building technological leadership: digital infrastructure and technologies

Austria shows a mixed picture concerning connectivity infrastructures. While the 5G deployment is progressing very well, the very high capacity networks coverage is among the lowest in the EU, but the outlook is improving. Austria is very active in semiconductors and quantum technologies.

[6] From OECD: https://goingdigital.oecd.org/indicator/30

2.1.a Connectivity infrastructure (Gigabit)[7]

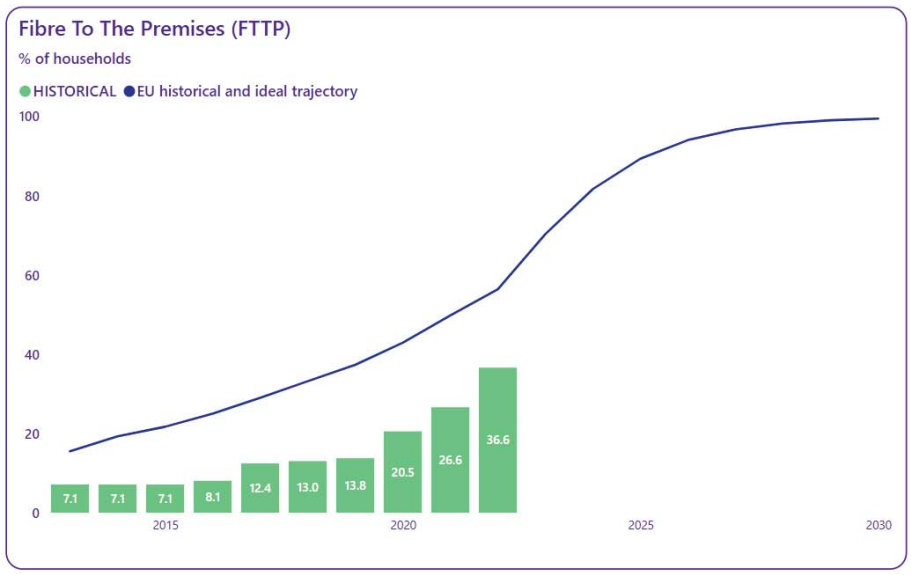


2023 state of play and recent progress

	Country level	EU level
FORECAST	69.0	82.0
DESI 2024	67.6	78.8
AVERAGE ANNUAL GROWTH %	23.3	7.4

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap



2023 state of play and recent progress

	Country level	EU level
FORECAST		70.3
DESI 2024	41.0	64.0
AVERAGE ANNUAL GROWTH %	11.9	13.5

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Austria has scope to improve its performance in VHCN to contribute to the EU's Digital Decade target, but is already showing a very strong dynamic in this area. Austria still has one of the lowest rates of VHCN coverage in the EU at 67.6% (EU: 78.8%). The gap with the EU average is even broader when looking at coverage of rural areas, where Austria has only achieved 35.8% coverage against an EU average of 55.6%. However, Austria's progress in VHCN coverage between 2022 and 2023 was one of the best in the EU, with a year-on year increase of +23.3% in coverage (or +12.8pp). This suggests that Austria is on the path to bridging the gap with the EU average.

[7] All historical values presented in the figures are sourced from the corresponding data sources and not the national roadmaps.

The situation is similar for FTTP, where Austria also has scope to improve its performance to contribute to the EU's Digital Decade target while showing a positive dynamic. Its performance (41.0% coverage) is far below the EU average (64.0%) but the progression between 2022 and 2023 (+11.9% increase in compound annual growth, or +4.4 percentage points) is above the average observed in the EU. The take-up of high-speed broadband is poor with 41.5% of fixed broadband subscriptions above 100 Mbps (65.9% in the EU) and 0% of fixed broadband subscriptions at 1 Gbps.

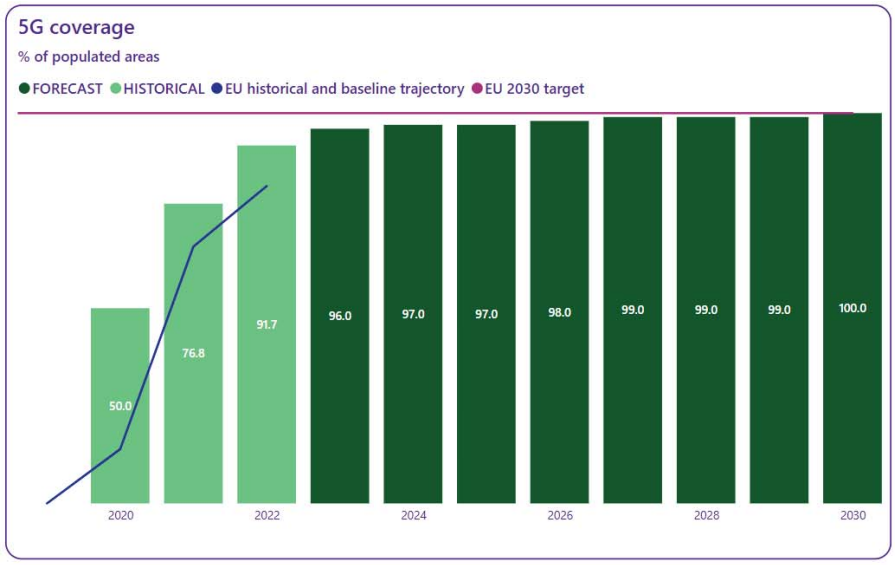
Austria aims to reaching 100% VHCN coverage by 2030, in line with the EU's 2030 target. Given the observed gap (Austria is only at 67.6% currently), this is very ambitious. Nevertheless, achieving this target is necessary to ensure the whole population can benefit from fast broadband connections. The recently observed progress in this area give cause for optimism that Austria will reach this target by 2030, which will require sustained and substantial efforts.

The Austrian authorities have recognised that weakness Gigabit connectivity is a weak point, and they have made it the top priority of the national strategic roadmap. The main measure to support Gigabit deployment in Austria is the Broadband Austria 2030 initiative. This measure alone accounts for 40% of the total budget presented in the roadmap, and is fully funded by the country's recovery and resilience plan. It reflects authorities' awareness of the country's poor performance in this area and is an appropriate response to the recommendation addressed to the country in the 2023 State of the Digital Decade report, in which Austria was asked to accelerate its efforts on connectivity infrastructure.

Coverage of rural areas will be pivotal. As mountainous country, the deployment of physical networks in Austrian rural areas might prove challenging. Achieving 100% coverage by 2030, which Austria has committed in its roadmap, will require those areas to be covered eventually. The recent progress in rural broadband coverage is encouraging. One of the key priorities of the Broadband Austria 2030 initiative is specifically to support the digital transformation with a particular focus on avoiding a digital divide between urban and rural areas.

Austria cut nearly half of the measure to promote gigabit connectivity from its recovery and resilience Plan but the ambition is maintained. During the plan's revision in July 2023, Austria decided to reduce by EUR 435 million the main measure for gigabit networks and replace it with national funds, keeping the overall ambition of the Broadband Austria plan. The Austrian RRP maintains a high allocation of funds to the digital transition, at 36% of Austria's total allocation, well above the minimum target of 20% offset out in the RRF Regulation.

2.1.b Connectivity infrastructure (5G)



2023 state of play and recent progress

	Country level	EU level
FORECAST	96.0	
DESI 2024	96.0	89.3
AVERAGE ANNUAL GROWTH %	4.7	9.8

Average, annual growth is computed between the two most recent available data points. No ideal trajectory, and therefore no EU level forecast, is provided for 5G (see 2023 Communication on EU-level trajectories)

Note: The source of national forecast values is the 2023 country roadmap

On connectivity infrastructure, Austria brings a positive contribution to the EU's Digital Decade target. 5G coverage in Austria (96.0%) is well above the EU average (89.3%). Compound annual growth in 5G coverage is 4.7% a year, but below the observed very high dynamics in the rest of the EU (where average 5G coverage is growing at 9.8% a year). Austria's slower rate of growth in 5G coverage can also be explained by the already comprehensive level of coverage: inevitably the last areas are the most difficult to reach. In addition, 79.1% of Austrian households are covered by the 3.4-3.8 GHz band, an essential band for enabling advanced applications requiring large spectrum bandwidth. Here too, Austria is ahead of the EU average (50.6%). However, only 14.3% of the population possess a 5G SIM card (24.6% in the EU) whereas 94.2 % of the population has taken up mobile broadband.

While aiming at 100% 5G coverage by 2030, the national roadmap does not dedicate any investment to this goal. There is no public funding for the roll-out of mobile coverage in Austria. Therefore, investments must be made entirely by the private sector. Given the already high level of coverage, this strategy might prove sufficient to reach 100% coverage by 2030. However, ensuring the full coverage of certain rural areas will be challenging.

Austria has a sound planning system, implementing its 5G strategy as early as 2018. Since then, the first 5G spectrum auction in the 3.4-3.8 GHz range was completed in 2019 and the multi-band auction in the 700/1500/2100 MHz range took place in September 2020. In 2023, 99.2% of 5G pioneer bands were assigned, making Austria one of the top performer in the EU. To provide market actors with planning certainty, the regulatory authority and the Federal Ministry of Finance, published a timetable for future spectrum assignments in the 2022-2026 spectrum Release Plan. The 26 GHz band will allow the development of edge nodes (see section on edge nodes).

Austria's regulatory authority introduced a bonus system to encourage coverage of rural areas. The Telekom Control Kommission created a bonus system where bidders obtain a discount on the pre-existing bids in return for meeting an obligation to provide additional coverage in rural areas. This incentive system will make 5G available in 1702 cadastral communities (rem.: a subordinate unit to municipalities) that would otherwise not to be covered, or that would only have been covered much later. This 1 702 municipalities represent around 80 % out of in total 2100 cadastral communities in Austria, that have so far been poorly - or not at all served - by 5G.

2.1.c Semiconductors

Austria is one of the major semiconductor players in the EU. According to the Austrian authorities, 90% of industries in the country – and 50% of Austria's GDP – are dependent on semiconductors. Austria is the home of two major players in critical sectors of the global semiconductor supply chain: IMS Nanofabrication and EV Group. With these two firms, Austria has 82% of EU market share in wafer bonding and 95% of EU market share in production multibeam mask writers[8]. This has led Austria to actively seek to protect its industrial champions and to strengthen its own and the EU's position in the global semiconductors market.

Austria has dedicated a sizeable part of its strategic roadmap to semiconductors, mainly through EU-level actions. The roadmap provides for 4 main measures, costing roughly EUR 327million so far (around 9% of the strategic roadmap's total budget). The actions are the following:

- participation in the Joint Undertaking on Key Digital Technologies to strengthen research and development in microelectronics;
- implementation of pillars 1 and 2 of the Chips Act, which aim to strengthen the R&D&I system and support private investment in the production of chips;
- implementation of the Important Projects of Common European Interest (IPCEI) Microelectronics 2021-2024, which aims to promote R&D in innovative technologies and components (with a focus on energy-efficient chips, power semiconductors, smart sensors, advanced optical devices, and composite materials);
- IPCEI Microelectronics 2024-2026, which focuses on promoting highly innovative R&D projects and the first commercial exploitation before the mass production phase.

Austria's dynamic semiconductor industry is a good response to the recommendation addressed in the 2023 State of the Digital Decade report asking for continued actions in this field to help the EU become a strong market player in semiconductors.

2.1.d Edge nodes

The latest studies estimate that there are 30 edge nodes in Austria, a good performance. This represents 2.5% of the total edge nodes reported in the EU, and corresponds roughly to Austria's share of EU GDP. No national trajectory was set for edge nodes in the Austrian roadmap to contribute to the EU target of having 10 000 climate-neutral and secure edge nodes by 2030.

The Austrian national strategic roadmap does not set out a direct support strategy for the deployment of edge nodes, but instead concentrates on framework conditions necessary for this deployment. The roadmap claims that the development and deployment of edge nodes is mainly the responsibility of the creators or operators of communications networks. For this reason, the Austrian authorities will only support the deployment of edge nodes indirectly by: (i) setting favourable network conditions; (ii) setting up the 26 GHz band; and (iii) laying down technical parameters in the Radio Spectrum Regulation. The Austrian authorities have also committed to ensuring the timely implementation of security requirements (e.g., the NIS2 Directive) and will participate in European standardisation bodies to promote consistent national implementation in all Member States.

[8] From Semianalysis: https://www.semianalysis.com/p/austrias-silent-monopolies-on-advanced

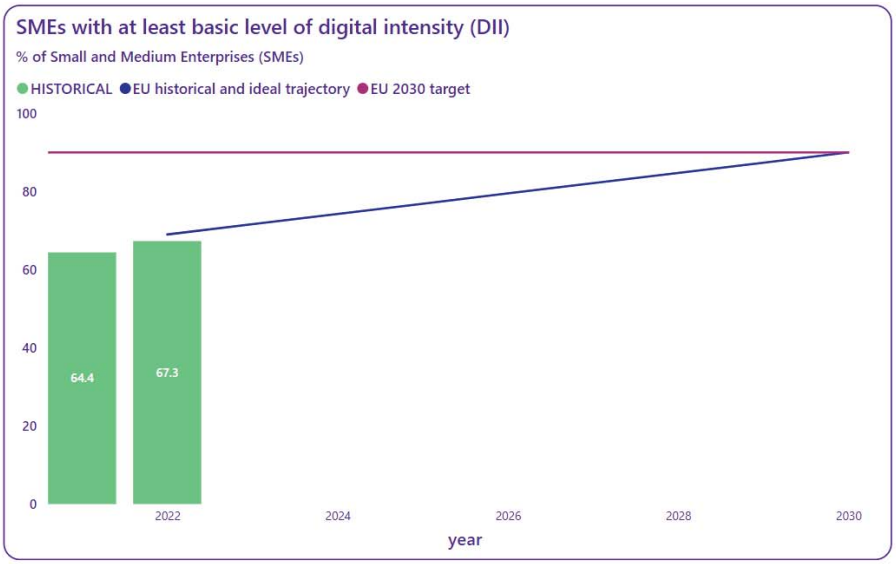
2.1.e Quantum technologies

Austria is taking a leading role in quantum computing with its EU-funded 'Quantum Austria' initiative. This initiative mainly aims to: (i) boost research in quantum sciences; and (ii) apply quantum sciences in creating innovative products and services. The measure is funded by the Recovery and Resilience Facility (with EUR 107 million) and seeks to set up research infrastructures and collaborations to expand the knowledge base for the development of technological concepts for quantum computing, simulation, metrology, and communication. The investment is also expected to strengthen cross-border cooperation and achieve or increase alignment with relevant European initiatives and projects. The first projects under Quantum Austria have been already selected, and 43 projects were awarded a total of around EUR 78 million in funding. Austria is also actively involved in 3 of the 6 interest groups for pilot lines on quantum within the Chips Joint Undertaking (these three areas are photonics, trapped ions, and diamonds). As part of the European Quantum Computing Infrastructure (EuroQCI) initiative, Austria is also setting up a quantum communication infrastructure network with support from the Digital Europe programme.

2.2 Supporting EU-wide digital ecosystems and scaling up innovative enterprises

The digitalisation of Austrian enterprises is average overall, but with some weaknesses in the adoption of advanced technologies. SMEs in Austria have an average level of digitalisation, and the start-up ecosystem benefits from a wide range of public support. Although Artificial Intelligence (AI) is being increasingly adopted by enterprises, the take-up of both cloud and data-analytics technologies by Austrian businesses is poor.

2.2.a SMEs with at least basic digital intensity



2023 state of play and recent progress

	Country level	EU level
FORECAST		71.6
DESI 2024	57.9	57.7
AVERAGE ANNUAL GROWTH %	-5.2	2.6

In the case of DII, the average, annual growth is computed between 2023 and 2021 due to data comparability reasons.

Note 1: DII 2022 is version IV that is not comparable with DII 2021, that was version III. The EU-level ideal trajectory refers to DII version IV, as published in the 2023 Communication on EU-level trajectories

Note 2: The source of national forecast values is the 2023 country roadmap

Austria is making a positive contribution to the EU's Digital Decade target while demonstrating very limited dynamic. Austrian SMEs show a level of digitalisation (57.9%) similar to the EU average (57.7%). However, Austria's indicator in this area decreased from 2021 (the last comparable year for the Eurostat's Digital Intensity Index) by -5.2% per year on average, while the EU indicator for SME digitalisation grew by an average of +2.5% per year. This could be explained by the replacement of the 'Internet of things' usage by 'Data Analytics' in the composition of the index. Indeed, Austria has shown weak results in the take-up of data analytics (see dedicated section below), which could be linked with this decrease. Nevertheless, it is

very unlikely that Austrian SMEs have experienced a decline in their digitalisation levels compared with the other technologies present in the index.

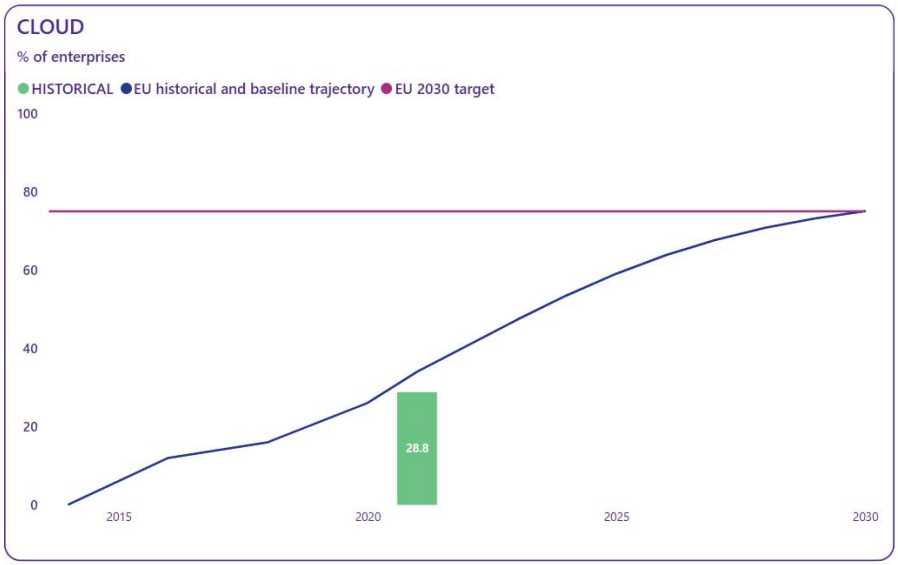
Austria did not set an explicit national 2030 target for the digitalisation of SMEs, nor did it provide a trajectory for improvement. This calls for a revision to explicitly include both targets and a trajectory in this area in the next iteration of the national strategic roadmap. However, the roadmap stresses that the lack of skilled workers and funding (a lack that is difficult to quantify due to the absence of data) in Austrian SMEs requires comprehensive support measures. A clear strategy to address these issues would help to ensure that Austrian SMEs continue to make progress in digitalisation.

SME.DIGITAL is the national programme to support SMEs' digitalisation. It provides incentives for SMEs to design, implement and market digitalisation projects. The programme has two main parts: (i) an advisory part which analyses digitalisation strategies with a focus on enterprises that have not traditionally made use of digital technologies; and (ii) an implementation part supporting new digital investments. Under SME.DIGITAL, Austria is expected to design a new scheme to foster the green transition by supporting digitalisation projects that also contribute to the transformation of SMEs towards environmental sustainability.

Austria also relies on European Digital Innovation Hubs (EDIHs). With these hubs, enterprises have direct access to research and business partners on topics such as AI, cybersecurity, blockchain, big data, industry 4.0 and digital transformation in general. As part of the Digital Europe programme, four EDIHs were set up in Austria by the fourth quarter of 2022, complementing national structures and creating a comprehensive network/ecosystem of digital innovation.

2.2.b Take up of cloud / AI / data analytics.

- **Cloud**



2023 state of play and recent progress

	Country level	EU level
FORECAST		47.3
DESI 2024	35.6	38.9
AVERAGE ANNUAL GROWTH %	11.2	7.0

Average, annual growth is computed between the two most recent available data points

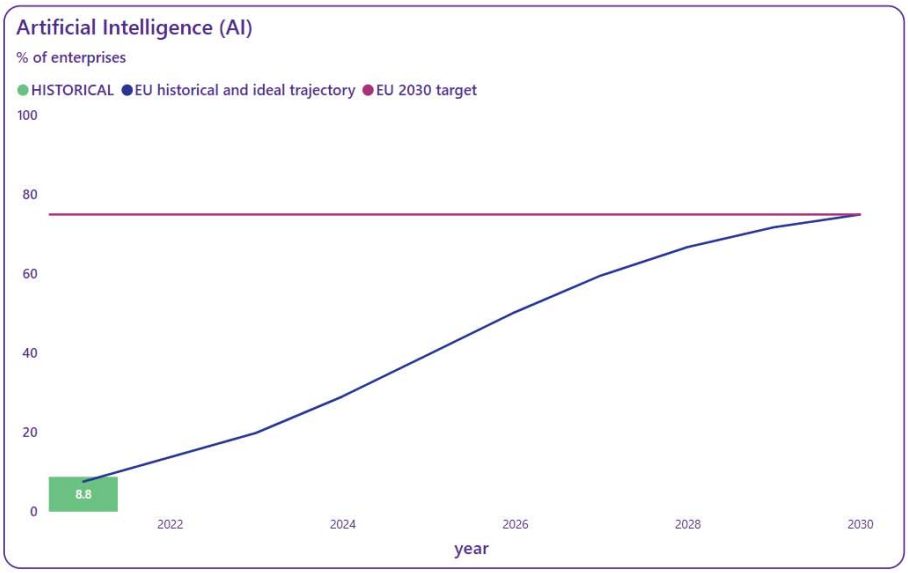
Note: The source of national forecast values is the 2023 country roadmap

Austria has untapped potential to contribute to the EU's Digital Decade target in this area, but shows a very strong dynamic. The take-up of cloud solutions by Austrian enterprises (at 35.6% in 2023) is slightly below the EU average (38.9%) but rose sharply between 2021 and 2022 (+11.2% per year), a faster rate of growth than the EU (+7% per year on average).

Austria has not explicitly set a national 2030 target in this area, and has also not set out a trajectory for the take-up of cloud technologies by enterprises.

The main measure presented in the roadmaps is support for the establishment of a Gaia-X Hub. This measure aims to establish a strong link between Austria's economy (especially SMEs), science, research, society and public administration on the one hand and the international Gaia-X initiative (an initiative to develop a federated secure data infrastructure for Europe) on the other. This measure in the Austrian roadmap seeks to develop digital governance that can be applied to any existing cloud/edge technology stack to achieve transparency, controllability, portability and interoperability for data and services. It will receive funding of EUR 2.4 million. However, this measure seems too limited in scope and resources to help Austria reach the EU target of having 75% of enterprises using cloud technologies by 2030, especially given the current subpar performance of Austria in this area.

- **Artificial Intelligence**



2023 state of play and recent progress

	Country level	EU level
FORECAST		19.9
DESI 2024	10.8	8.0
AVERAGE ANNUAL GROWTH %	10.8	2.6

Average, annual growth is computed between the two most recent available data points.

Note 1: at the end of 2023 ESTAT revised backward the values of AI. The revised value for 2021 at the EU level is 7.6 % (from 7.9 %).

Note 2: The source of national forecast values is the 2023 country roadmap

Austria brings a positive contribution to the EU's digital decade target and shows positive dynamics. In 2023, 10.8% of Austrian businesses were using AI solutions, above the EU average (8.0%).

Austria has not set an explicit national 2030 target for the use of AI by enterprises, nor has it set out a trajectory to follow in this area.

The national strategic roadmap presents a wide set of measures to develop Austria's national AI ecosystem, which also aim at fostering the use of data analytics technologies. Four of these measures are set out in the bullet points below.

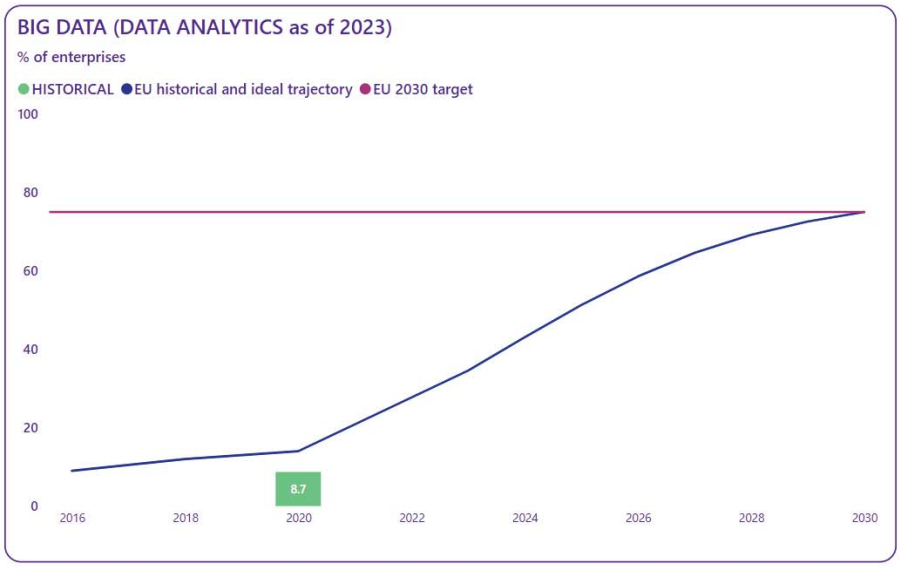
- The national AI strategy is a comprehensive strategy of 64 actions being implemented by the respective ministries. It sets out the framework conditions for the responsible and beneficial use of AI in all areas of life. The strategy emphasises the principle that the use of AI in Austria should be based on fundamental European values, respect for privacy, and respect for the principle of equality, for the greatest possible benefit of all. Some of the key elements in this strategy are: (i) introducing legal clarity without obstructing innovation; (ii) ensuring the country is in line with European activities on AI; (iii) strengthening AI in education and training; (iv) modernising public administration through AI; and (v) improving access to capital and scaling up. The strategy also includes an 'AI of the Future Fund', dedicating EUR 12 million to AI R&D.

- The Data & AI funding programme will support companies in all sectors that invest to improve their processes or change their business model through data use and AI. This new support scheme will start to be implemented in 2025.
- The AI marketplace, supported by AWS, the Austrian promotional bank, acts as a central platform to connect AI service providers with potential users of AI from all sectors. The platform has four main objectives: (1) to act as a one-stop shop for suppliers of AI services and users of AI services in Austria and support the digital transformation of the economy and society; (2) to organise annual networking events to promote practical and cross-sectoral cooperation; (3) to serve as a lighthouse for the innovative AI offering in Austria by organising AI competitions and other initiatives to address specific AI-related issues and promote innovative solutions; and (4) act as an advisory body for companies that want to use AI while searching for the right methods and cooperation partners for these companies.
- AI for Green supports AI technologies that are being newly developed and that make a significant contribution to climate objectives. These AI solutions can help reduce the use of resources and energy, avoiding greenhouse-gas emissions, or preserving natural spaces and ecosystems (see the 'Best Practice' box).

In total, these measures are being supported with some EUR 150 million in funding and constitute an appropriate response to the recommendation in the 2023 State of the Digital Decade report 2023 that called for supporting the development and deployment of advanced technologies, including AI. However, Austria may need to make further efforts to give more support for the adoption of AI technologies, in light of the EU-level target for 75% of businesses to be using AI technologies by 2030.

Austria also relies on EDIHs to foster the diffusion of AI in enterprises. As an interface between businesses, research organisations and experts, the EDIHs are specialised entry points for challenges related to data use and AI. They provide information on: (i) opportunities and the added value of data use; (ii) best practices, use cases and tools for implementing data projects; and (iii) AI start-up packages. As network partners in the EDIHs, SMEs and larger enterprises benefit from the integration of business and data models, as well as from networking with national and international stakeholders. By the end of 2023, around 1 000 SMEs had increased their know-how in the field of smart data use thanks to the EDIHs.

- **Data analytics (Big Data)** [9]



2023 state of play and recent progress

	Country level	EU level
FORECAST		34.6
DESI 2024	23.9	33.2
AVERAGE ANNUAL GROWTH %		

Annual growth cannot be computed in this case because Big Data was replaced by Data Analytics in 2023. The two indicators are not comparable.

Note: The source of national forecast values is the 2023 country roadmap

On the use of data analytics by enterprises, Austria has scope to improve its performance to contribute to the EU's Digital Decade target. Austrian businesses have very low levels of uptake of data analytics (23.9%), well below the EU average (33.2%). Progress in this area cannot be assessed since the indicator's definition has changed in recent year.

Austria did not set an explicit national 2030 target in this area, nor did it set out a trajectory for the take-up of data-analytics technologies by enterprises.

The Austrian roadmap presents a set of measures to foster the simultaneous development/adoption of both AI and data analytics (see AI section below). However, given the rather poor state of adoption of data analytics, targeted measures could improve the country's performance in this area.

- **Take-up by enterprises of cloud or AI or data analytics**

Taking the three technologies together (adoption of either cloud technologies, AI, or data analytics), Austria stands at 47.0%, significantly below the EU average of 54.6%. The below-average performance of Austrian businesses in the adoption of cloud technologies and especially data analytics drags down Austria's performance in this more comprehensive indicator.

Best practice: AI for Green
Austria's 'AI for Green' is a national initiative to harness AI to address the challenge of climate change. AI for Green focuses on exploiting research-intensive AI technology to tackle challenges linked to the energy transition, the circular economy, and green mobility. The specific objective of the 'AI for Green 2023' call for tenders is to support new projects that use AI technologies to make a significant contribution to Austria's climate objectives. This contribution can be in several areas, including: (i) reducing the use of resources and energy; (ii) reducing greenhouse-gas

[9] As of 2023, Big Data was changed by ESTAT, in agreement with all the EU National Statistical Institutes, into Data Analytics and covers a broader range of technologies including Big Data. For this reason, no comparison is possible with previous years.

emissions; or (iii) preserving natural spaces and ecosystems. The AI for Green call for tenders is funded by EUR 12 million in national funding, as part of the broader national strategy for digital and key enabling technologies (2023-2026).

The projects submitted must assess the impact of the application of AI on meeting climate objectives. The design and implementation of the projects must take into account the EU's Artificial Intelligence Act to achieve trustworthy AI. Moreover, the projects must ensure gender equality and diversity.

AI for Green also aims to bring together skills from different disciplines and promote networking between AI and climate/environmental research communities.

2.2.c Unicorns, scale-ups and start-ups

The Austrian start-up ecosystem struggles with low venture capital (VC) financing, but growth in VC financing has recently picked up. The size of the ICT sector in Austria (accounting for 3.6% of GDP in 2020) is below the EU average (5.2%), and VC investments for seed and start-up funding amounted to only 2% of GDP in 2022[10]. However, between 2021 and 2022, VC investments tripled, which was the fastest rate of growth in the EU.

The Austrian roadmap sets out measures to foster VC investment. Aware of the problem with low levels of VC financing, the Austrian authorities designed a range of financing measures. For example, the AWS (national promotional bank) Founding Fund II is dedicating EUR 72 million to: (i) fund high-growth small and medium-sized enterprises; and (ii) improve the access of Austrian start-ups to international investors. AWS provides for additional financing tools like: (i) EUR 1 billion in guarantees for SME innovation/growth projects; (ii) a 'first incubator' tool to support the incubation of innovative business ideas; and (iii) several pre-seed and seed-financing funds that provide financing from the pre-creation to the growth phase of start-ups. Other examples are described in the national strategic roadmap.

Austria's support for start-ups also includes facilitation tools and tools to reduce administrative burden. In order to promote the creation and functioning of start-ups, Austria introduced in 2023 a new legal form for companies: flexible capital companies. In particular, this new legal form should be attractive to international VC investors. Austria has also encouraged the recruitment of specialists for start-ups by: (i) reducing formal requirements for the transfer of shares in the value of a company; and (ii) introducing tax relief on the sale of these assets. Other measures presented in the roadmap provide for access to networking, advisory and coaching services.

All in all, promoting start-ups and unicorns is a clear priority of the Austrian roadmap. In total, the roadmap contains no less than 17 measures (out of 58 in total in the roadmap) dedicated to the Digital Decade target of doubling the number of unicorns by 2030. These 17 measures are targeted with around EUR 1.5 billion in funding (or around 40% of total funding in the Austrian roadmap), making start-ups and unicorns the top priority along with gigabit connectivity. These efforts will contribute greatly to reaching the EU target of doubling the number of unicorns by 2030.

2.3 Strengthening cybersecurity & resilience

As companies increasingly rely on digital technologies, their risk of exposure to cybersecurity incidents is also increasing, so they need to be more prepared in this area. In 2022, 3.4% of enterprises in Austria reported ICT service outages due to cyberattacks from outside (e.g., ransomware attacks and denial of service attacks). This is similar to the EU average (3.5%). In Austria, 27.1% of enterprises reported being

[10] OECD Going Digital Toolkit.

insured against ICT security incidents (which is also in line with the EU average of 25.0%), and 92.5% reported that they used ICT security measures (EU average 91.8%).

The Austrian cybersecurity strategy is the strategic framework for both increasing Austria's digital resilience and ensuring cybersecurity in the digital world. It supports the creation of the basic conditions for safe and value added digitalisation. The main priorities set out in the strategy are: (i) the decentralised allocation of resources; (ii) sustainable capability development; and (iii) the prioritisation of a cooperative, state-level, and international approach. Austria already has several well-established cybersecurity structures in which both the private and public sectors participate, such as the Operational Coordination Structure (OpKoord), the IKDOK, the Cyber Security Steering Group and the Cyber Security Platform. These structures will be strengthened and further developed through the strategy.

The implementation of the EU's NIS2 Directive is an additional factor in spreading cybersecurity practices in enterprises of all sizes, including SMEs. A support programme of the National Cybersecurity Coordination Centre planned in 2023 is helping Austrian SMEs by giving them funding (of up to EUR 10 000) to prepare for the requirements of the new Directive (EU) 2022/2555, while promoting the deployment of innovative cybersecurity solutions. A total of EUR 2 million (50% co-financed by the EU's Digital Europe programme) will be made available to Austrian SMEs for this purpose until the end of 2024. Austria estimates that around 200 enterprises will be reached by this support programme.

Other cross-cutting measures in the roadmap also help to strengthen national cybersecurity. For example, the Austrian authorities recognise that they have a lack of cybersecurity specialists. Measures to help train ICT specialists in the country also include cybersecurity training. On this topic, Austria is an active participant in the EU's Cybersecurity Skills Academy, and proposes to help the Academy by sharing training facilities and services. Several measures to digitalise SMEs also take cybersecurity into account.

3 Protecting and empowering EU people and society

3.1 Empowering people and bringing the digital transformation closer to their needs

Digital skills and public services are high priorities of Austria's digital strategies. The Austrian authorities recognise that digital skills are key to accessing quality jobs and addressing skills shortages. But the authorities also see digital skills as a means of empowering people within a fast-changing society and helping citizens to participate in a modern democracy while leaving no one behind. Austria generally scores above the EU average for indicators related to digital skills, digital public services, and e-health.

One of the main macroeconomic challenges facing Austria is a shortage of skilled workers. The job vacancy rate remains one of the highest in the EU, caused in part by increasing demand for new skills linked to the digital transition. It will be crucial for Austria to use all the tools at its disposal to address this challenge, including the upskilling and reskilling of its population. Austria is already taking action in this area, but despite several measures already in force it will require a sustained effort to increase the digital skills of Austrians and train enough ICT specialists. According to the 2024 Eurobarometer, only 65% of Austrians consider that more education and training to develop skills for using digital services would facilitate their daily use of digital technologies, below the EU average (72%). Efficient digital public services should play a role in relieving the administrative burden faced by enterprises and the general public.

3.1.1 Equipping people with digital skills

3.1.1.a Basic digital skills

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

Austria brings a positive contribution to the EU's digital decade target on basic digital skills and shows positive dynamics. In 2023, according to Eurostat's database (isoc_sk_dskl_i21), 64.7% of the Austrian population had at-least-basic digital skills, above the EU average of 55.6%. This represents a slight yearly progression (+1.1%), and in line with the improvements observed at EU level (+1.5%). Other digital-skills indicators (such as the percentage of people who frequently use the internet (92.0%), the percentage of the public with above-basic digital skills (32.0%), and the percentage of people with basic digital skills in content creation (76.2%, see table 2 in the methodological note)) show that Austria is behind the EU's front-runners, but still in the top half of EU Member States.

Austria aims to ensure that 100% of its population aged 16-74 has at-least-basic digital skills by 2030, well above the EU-level target of 80%. It has set an intermediate target in the national strategic roadmap of ensuring 70% of its population aged 16-74 has at-least-basic digital skills by 2026. Austria is the only EU Member State to have such a high level of ambition on digital skills, but it is already starting from a position above the EU average. However, given the recently observed progress, it is very unlikely that this 100% target can be achieved without sustained efforts.

To achieve its ambitious target, Austria has drawn up 12 different measures to boost the digital skills of its population. This represents 21% of all the measures in its roadmap focused on a single KPI. This confirms the wish of the Austrian authorities to make it a priority to boost the digital skills of Austrians. In terms of budget, it is difficult to assess the magnitude of the impact of these measures since several measures do not have any planned budget for the moment.

Austria has a coordinated strategy with a very explicit name: the Digital Skills Initiative. The national roadmap explains how Austria plans to put in place the framework conditions to deploy the Digital Skills Offensive. This framework starts with: (i) the establishment of an office to pool efforts in the administration (the DKO registry); (ii) the development of the overall strategy through expert consultation; (iii) the establishment of a 3-year programme to implement the strategy; and (iv) the introduction of a national reference framework to provide the basis for transparency and comparability in digital skills. The eight priorities of the Digital Skills Offensive strategy are: (1) to introduce and disseminate a national framework for digital skills; (2) to target group-oriented development of low-threshold offers, (3) to promote skills through 'train-the-trainer' activities; (4) to enable the scaling up of effective measures; (5) to ensure that the public sector sets a good example in building digital skills; (6) to train IT experts; (7) to promote the take-up of AI and cybersecurity; and (8) to take the lead internationally.

Austria is prioritising the digitalisation of its education system at all levels to improve the digital skills of young people. In parallel to the Digital Skills Offensive and its implementation, several actions are already being implemented on the ground focused specifically on young people. The national roadmap sets out actions in the areas of equipment, teacher training and digital education. For example, the Government is already supporting the purchase of digital equipment for students and teachers, providing digital education to 80 000 students per year. And teachers have access to a wide range of online training related to digital education. Courses on digital skills have already been introduced in primary and secondary schools. Austria's digital education aims to prepare students to become active, informed, and competent members of an ever-changing digital society. The holistic approach to digital education ensures that young people are not merely digital consumers, but can also actively shape the digital future.

Given its ambition on digital skills, Austria will be closely scrutinised. The target proposed by Austria of ensuring that 100% of its population aged 16-74 has at-least-basic digital skills by 2030 stands out for its ambition. If it can achieve this target, Austria will be making a solid contribution to the EU-level target of ensuring 80% of Europeans in this age group has at has at-least-basic digital skills by 2030. This contribution will be two-fold: it will increase the sheer numbers of Europeans with at-least-basic digital skills and it will set an example. The 2023 State of the Digital Decade report called on Austria to accelerate its efforts in the area of digital skills and, as far as the digital skills of school pupils are concerned, Austria has responded well to that recommendation. One of the described measures within AT-roadmap is the Digital Skills for All,Digital everywhere, Digital everywhere PLUS Programme, which is implementing nationwide digital literacy programs designed to equip citizens with essential digital skills. These programs should target various age groups, from children to seniors, and cover topics ranging from basic computer use to internet safety and digital communication. In Austria 2024 up to 4500 workshops teaching basic skills for general population are in preparation.

Such measures to address this demographic would be an efficient way to help Austria further increase the digital skills of the whole population. Targeting low-skilled workers would also be a suitable response to the 2023 European Semester's recommendation that called for 'improving labour market outcomes for disadvantaged groups, such as low-skilled jobseekers and people with a migrant background, including by raising their levels of basic skills'.

3.1.1.b ICT specialists

2023 state of play and recent progress

	Country level	EU level
FORECAST		5.4
DESI 2024	5.3	4.8
AVERAGE ANNUAL GROWTH %	6.0	4.3

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Austria brings a positive contribution to the EU's digital decade target and shows a very strong dynamic. ICT specialists in Austria as share of people in employment stand at 5.3%, the highest ever measured, and above the EU average of 4.8%. This represents growth of +6.0% between 2022 and 2023, a rate of growth that is also above the EU average (+4.3%). In absolute numbers, according to Eurostat's database (isoc_sks_itspt), Austria is home to 237 000 ICT specialists, which is 16 000 more than last year. Women accounted for 19.5% of ICT specialists, essentially unchanged since last year (when they accounted for 19.3%) and close to the EU average (19.4%).

Austria did not set an explicit 2030 target for ICT specialists in its national strategic roadmap.
The Austrian authorities recognise that there is a lack of ICT specialists in the country, and are promoting training in enterprises. According to the latest Austrian Infrastructure Report, 2 out of 3 managers complain about having too few ICT specialists in their company. To address this issue, under the Digital Skills Offensive strategy (see the section on basic digital skills), training campaigns were launched supported by three main tools: (1) 'skills cheques' contributing to training for the green and digital transitions; (2) skills projects that are tailor-made for enterprises; and (3) training labs in which companies, research institutions and experts develop and test specific training formats. Austria also actively participates in the EU's Cybersecurity Skills Academy by reporting on skills availability and skills needs in the area of cybersecurity.

Austria aims to have ICT specialists account for 10% of all people in employment by 2030, a target that might prove very difficult given the measures presented in the roadmap. Under the Digital Skills Offensive strategy, Austria has also set out plans for a Digital Innovation School for Graduate Education, which will be a PhD training programme that aims to meet the need for highly qualified digital workers. Graduates of this PhD training programme should be able to lead the way in shaping the digital transformation of the country. Nevertheless, given the few measures presented in the roadmap – and the restricted scope of these measures – it will be difficult for Austria to dramatically increase the number of ICT specialists it trains to

meet the EU-level target by 2030. And recent figures show that Austria is moving in the wrong direction. According to the 2022 PISA results, the proportion of low-achieving pupils in mathematics has continuously increased since 2012. This situation is worrying, as mathematics is a prerequisite for training future ICT specialists. However, Austrian universities were encouraged to strengthen performance in science, technology, engineering, and mathematics disciplines, in particular in the area of information technology and mathematics. The 2023 State of the Digital Decade report called on Austria to accelerate its efforts in upskilling and reskilling its labour force, especially women, and especially in advanced and emerging technologies. In this respect, more targeted measures are warranted to cover these domains.

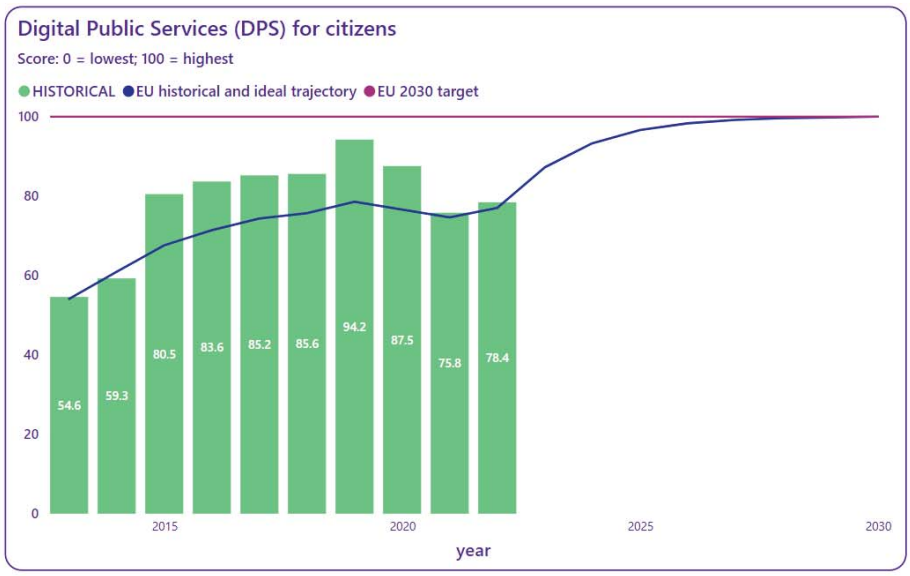
3.1.2 Key digital public services and solutions – trusted, user-friendly, and accessible to all

3.1.2.a e-ID

In Austria, all citizens have access to a secure digital identity (e-ID) notified under eIDAS but the use of this e-ID is not widespread. The Digital Decade's 2030 target of having e-ID in all EU countries by 2030 has therefore been achieved in Austria (the KPI value is already 100% today), as Austrians have access to – and full control over – their identity transactions and transferred personal data. However, According to Eurostat's database (isoc_ied_ieid), only 37.9% of Austrians used their e-ID to access online services for private purposes in the last 12 months, which is below the EU average (40.7%). Austria is already looking at the next step in this area which is the implementation of the European Digital Identity Framework Regulation and the European Digital Identity Wallet, intensive work on which will start once national-level negotiations are completed.

Austria is participating in two pilot projects in this area: POTENTIAL (PilOTs for EuropeaN digiTal Identity wALlet) and DC4EU (Digital Credentials for Europe). POTENTIAL aims to test the deployment of a digital identity wallet to: (i) simplify and secure online procedures for European citizens; (ii) facilitate the processing of procedures by administrative services; and (iii) fight against identity theft. It involves 19 Member States of the EU and Ukraine, including 38 ministries, 34 state operators, 9 research centres, 51 large companies and 12 start-ups. Under DC4EU, the development and testing of the European digital identity wallet will take place over 26 months, divided into two phases: (i) a first phase for testing national solutions, which will run until October 2024; and (ii) a second phase with cross-border tests aimed at securing the interoperable nature of the different solutions. The consortium will benefit from EUR 16 million in European subsidies.

3.1.2.b Digitalisation of public services for citizens and businesses



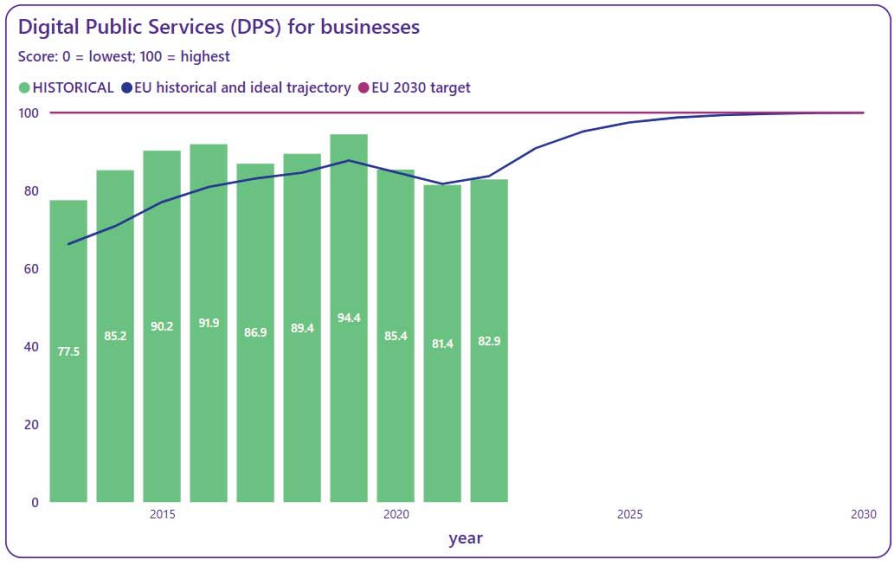
2023 state of play and recent progress

	Country level	EU level
FORECAST		87.2
DESI 2024	80.7	79.4
AVERAGE ANNUAL GROWTH %	2.9	3.1

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap



2023 state of play and recent progress

	Country level	EU level
FORECAST		90.9
DESI 2024	82.9	85.4
AVERAGE ANNUAL GROWTH %	0.0	2.0

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

In digital public services for citizens, Austria brings a positive contribution to the EU's Digital Decade target and shows positive dynamic. Austria performs around the EU average with a score of 80.7 out of 100 on this indicator (EU average: 79.4) and growth of +2.9% between 2022 and 2023 (EU average growth: +3.1%).

In digital public services for businesses, Austria has untapped potential to contribute to the EU's Digital Decade target but is still showing positive dynamic. Austria's performance in the area of public services for businesses is a bit weaker than its performance in the area of public services for citizens. At 82.9, it scores slightly below the EU average (85.4), progress made between 2022 and 2023 (+2.9%) is similar to the EU average (+3.2%). Other indicators for digital public administration show that Austria is broadly in line with

the EU average. For example, 79% (calculated as percentage of internet users) of Austrians use e-government, while the EU average is 75%. The further development of online public services is likely to encourage their use by businesses and the general public. Austria stands out for the mobile-friendliness of its digital public services, where it scores 99.7 (out of 100), one of the best performances in the EU (EU average: 95.3).

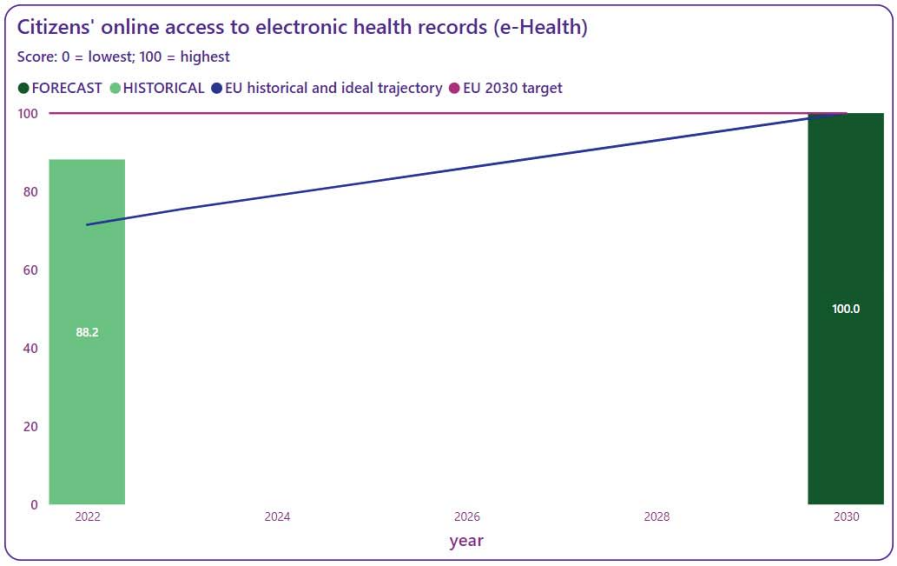
Austria has not set an explicit national 2030 target for the digitalisation of public services for citizens or businesses, nor has it set out a trajectory for future progress in this area.

Involving all levels of Government will be key if Austria is to successfully digitalise its public services. To this end, the Austrian administration has adopted an e-government strategy. The Federal Government, the provinces, cities and municipalities are now cooperating closely to establish a uniform, interconnected, and coordinated approach in e-government.

While the digitalisation of public services for citizens continues, a prospective study will explore the next steps to be implemented in this area. The current range of online services for citizens is being continuously expanded (residence registrations, marriage, e-delivery, etc.). In parallel to this process, a prospective study is underway to identify: (i) the administrative channels most suitable for digitalisation; and (ii) where digitalisation would be the most beneficial for the administration and the general public, with the greatest return on investment. Once the results are released and resources identified, the results of this study will be implemented gradually.

Austria's performance in the digitalisation of public services for businesses may improve once the currently implemented actions are bedded down. The national roadmap details three main actions that are currently being implemented. Firstly, the 'once only' principle is being implemented. This will work to reduce the need for businesses to make multiple notifications to the administration for the same piece of data, significantly relieving businesses from some information obligations. Secondly, the authorities are implementing an efficient e-delivery system to greatly reduce the use of paper communications. And thirdly, the Austrian authorities are updating the Business Service Portal by replacing outdated technological components while ensuring continued stable operations and meeting legal requirements. As stated in its roadmap, the digitalisation of the administration can be seen as a driver for increasing Austria's attractiveness for foreigners, thus overcoming skills shortages and boosting the Austrian economy as a whole.

3.1.2.c e-Health



2023 state of play and recent progress

	Country level	EU level
FORECAST		75.5
DESI 2024	88.2	79.1
AVERAGE ANNUAL GROWTH %	0.0	10.6

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Austria a very strong contribution to the EU's Digital Decade target but demonstrating very limited dynamic. Austria's overall score for the maturity of its e-health system was 88 out of a possible 100 in 2023, unchanged compared with 2022 and above the EU average of 79. Austria has ensured nationwide access to its e-health service. Between 80% and 100% of the population is technically able to access online access services for e-health records through online portals, logging in using an e-ID that is compliant with the eIDAS Regulation. All data categories, except data on medical devices/implants and medical images, are made available to citizens in a timely manner via this portal. Furthermore, 3 out of 11 applicable categories of healthcare provider supply relevant data to this portal. On access opportunities for certain categories of people, Austria scores 100 out of a possible 100 compared to a European average of 77, and the country's e-health systems follow the EU's guidelines for web content accessibility. 64.2% of Austrians sought health information online, which is above the EU average (56.3%).

Austria has not set an explicit national 2030 target for access to e-health records, and has also not set out a trajectory for future progress in this area. However, given its current good performance, the country could plausibly aim to reach the EU target of scoring 100 for e-health maturity by 2030.

Access to e-health records relies on the electronic medical records system (Elektronische Gesundheitsakte, ELGA). According to the Austrian authorities, around 97.5% of the population already has access to their ELGA records, either digitally or via the ELGA offices. The actions presented in the roadmap to further deploy the e-health system thus follow the ELGA annual work programme. This work programme contains measures on: (i) adding data on medical devices, implants, medical imagery, and pictures; and (ii) providing access to the e-Vaccination Passport.

Recommendations from the 2023 State of the Digital Decade report were taken into account by connecting private actors to the ELGA system. The report stated that the most significant limiting factor to full access to e-health records for all members of the public was the fact that only public hospitals and pharmacies were connected to ELGA, and that the private care sector was not. The 2024 ELGA work programme now includes an action to connect new care providers to the system, including private actors (practitioners, clinics, rehabilitation centres and nursing homes). Connection to the ELGA system is also planned for rescue services, health advice hotlines, primary care units and mobile care services.

3.2 Building a safe and human-centric digital environment and preserving our democracy

The Austrian authorities consider that digital and human rights must go hand in hand. Applying a human rights-based approach to digitalisation is at the heart of mitigating risks via better policies. In particular, Austria aims to assess the impact of digital technologies on specific groups of people, such as older people or marginalised groups. Moreover, a human rights-based approach helps to ensure that technological progress is inclusive and does not lead, intentionally or unintentionally, to discrimination. Austria mainly relies on the national implementation of the EU's Digital Services Act (DSA) to ensure this human-rights-based approach is implemented. In 2023, the Federal Parliament passed a legal package to implement the obligations deriving from the DSA, which deals with all kinds of illegal content online. According to the 2024 Eurobarometer survey, 51% of Austrians consider that EU regulation of online platforms may have a strong impact on the misuse of personal data, which is well above the EU average of 46%.

Austria is active in international cooperation in the digital sphere to accelerate developing countries' path to the United Nations' Sustainable Development Goals (SDGs). The Kofi Annan Award for Innovation in Africa seeks to: (i) promote innovation and digitalisation as a key enabler of development; and (ii) contribute to a new partnership between Africa and Europe. Austria is funding this award with an initiative that focuses on digital business models and aims to support African social entrepreneurs in scaling up their digital solutions to achieve SDGs 2 (Zero Hunger) and 3 (Improving health and well-being through digital innovation). Digital innovations can become a turning point in the fight against hunger, involving big data, AI, and other technologies to address agricultural challenges. An award will go to three teams, each of which will receive EUR 250 000 to scale up their digital business models, and Austria will also support award recipients by funding a 12-month accelerator programme.

4 Leveraging digital transformation for a smart greening

The green dimension of digitalisation does not stand out in the Austrian roadmap, but some green elements are present in several measures. The Austrian roadmap contains no dedicated section on the overall topic of the green transition of the ICT sector. However, several measures in the roadmap dedicated to Digital Decade targets contain a green dimension. A good example of this is Austria's 'AI for Green' measure (see the Best Practice box), which will explore AI solutions for the fight against climate change. Also, the SME support programme SME-DIGITAL 4.0 & GREEN will support digitalisation projects to help SMEs become more environmentally sustainable. The start-up ecosystem package, as part of Austria's 'Inno up' initiative, seeks to identify start-ups with appropriate solutions related to, among other things, green technologies.

However, Austria considers the use of digital solutions in the green transition to be a growing priority for the coming years. The Federal Government's 2030 strategy for research, technology and innovation related to digitalisation sets key priorities for the country's future. Among these priorities, the idea of 'tech for green' was clearly identified in the strategy. Actions supporting applied research will aim to make Austria a future champion in the 'tech for green' area.

Austrian enterprises and the Austrian public are sensitive to the green transition of the digital sector. In Austria, 50.8% of enterprises said that they considered the environmental impact of ICT services, or ICT equipment, before selecting them and took some measures to affect the paper or energy consumption of their ICT equipment. This is above the EU average[11]. Austria is significantly better at recycling ICT devices (it recycles 16.7% of smartphones, 13.7% of laptops and tablets, and 19.8% of desktop computers) than the EU average (10.4%, 9.7% and 12.8%, respectively). However, the picture changes somewhat when looking at people's opinion as to how digital technologies can contribute to the achievement of green objectives. According to the 2024 Eurobarometer, only 68% of Austrians consider that digital technologies are important to fight climate change, below the EU average of 74%.

[11] Eurostat

Annex I – National roadmap analysis

Austria's national Digital Decade strategic roadmap

Austria's national strategic roadmap was submitted on 29 November 2023 (link to the roadmap).

The Austrian roadmap mainly lacks an explicit statement of 2030 national targets (as opposed to recalling the EU-level target) and also fails to provide a national trajectory with annual target values until 2030. However, it does set out explicit 2030 national targets for basic digital skills (with a notable commitment to ensure that 100% of the population aged 16-74 has at-least-basic digital skills by 2030), VHCN coverage and 5G coverage.

The below table reflects a best-effort attempt at categorising the measures and budget as presented in the Austrian roadmap:

Digital Decade Target/objective	Budget (EUR Million)	Number of measures
Connectivity Gigabit	1 446.3	1
Connectivity 5G	0.0	1
Semiconductors	327.0	4
Edge nodes	-	-
Quantum computing	107.0	1
SME take up	76.4	2
Cloud/AI/Big Data uptake	182.7	6
Cloud only uptake	-	-
AI only uptake	-	-
Big data uptake	-	-
Unicorns	1 226.7	17
Basic Digital Skills	6.0	14
ICT Specialists	0.0	3
eID	-	-
Key Public Services	28.0	8
e-Health	0.0	3
Objectives	-	-
Total	**3 400.1**	**60**

Austria's roadmap presents a set of main policies and measures contributing to the achievement of each of the Digital Decade targets. The most measures are focused on two areas: basic digital skills and unicorn companies. A very significant and appropriate budget (around 42% of the total budget of the roadmap) is allocated to gigabit connectivity, a dimension on which Austria is lagging behind and which was the subject of a recommendation in the 2023 State of the Digital Decade report. On e-ID the country already reached the target of 100% and on eHealth it shows a very high performance above the EU. The resources allocated to the support of start-ups and unicorn companies also stand out as a priority in the Austrian roadmap. Austria has earmarked a total of EUR 61.25 million per year for eHealth (including electronic health records) up to year 2028.

Most of the budget data are disclosed but some measures lack data on budget allocations. The latest RRF revision was not transposed in the budget sources (EU budget for the Broadband Austria measure).

Austria's roadmap is somewhat weak on measures addressing Digital Decade objectives such as

cybersecurity or the green transition.

The roadmap addresses one of the main weaknesses of Austria which is gigabit connectivity. However, other weaknesses in digitalisation (the take-up of data analytics and cloud computing) and macroeconomic issues (e.g., skills shortages) warrant additional measures. Austria's roadmap also focuses on preserving some competitive advantages such as in semiconductors and quantum computing.

Finally, stakeholders were widely consulted in the drafting of the roadmap.

Annex II – Factsheet on multi-country projects (MCPs) and funding

MCPs and EDICs

In its roadmap, Austria states that it is participating in several multi-country projects, including those to be implemented by EDICs already set up (ALT-EDIC) or prospective EDICs in the making (the Cybersecurity Skills Academy, AGRIfood, Digital Commons, Connected Public Administration, or Mobility and Logistics Data) as well as in the EU Start-up Nations Alliance, which is currently evaluating the best implementation mechanism for the way ahead). Austria is a member of the IPCEI on Microelectronics, and a member of the IPCEI on Microelectronics and Communication Technologies.

EU funding for Digital in Austria

The Austrian Recovery and Resilience plan devotes around EUR 1 340 million (36% of the total allocation) to the digital transformation, of which EUR 1 326 million directly contribute to achieving Digital Decade targets, as estimated by the Joint Research Centre's 'Mapping EU level funding instruments to Digital Decade targets' study. Austria also received EUR 68 million of DD-relevant budget from Cohesion Policy funds[12].

The largest digital measure in the RRP is dedicated to gigabit connections (EUR 438 million). Two large measures contribute to the development of digital skills, namely a measure to provide digital end-user devices to pupils (EUR 172 million) and a measure to promote reskilling and upskilling (EUR 112 million dedicated to digital skills). Austria's activities under the IPCEI on Microelectronics and Connectivity are also supported by EUR 125 million from the RRF. The revision of the RRP from 2023 led to changes in some measures, in particular by: (i) reducing the number of households to be covered by gigabit-capable networks due to increased costs; and (ii) scaling down investment in the Digitalisation Fund for public administration due to insufficient demand. These two changes have reduced the contribution of the amended plan to digital targets, but at 36% of total RRP funding, Austria's digital plans remain ambitious and well above the minimum target set at 20%. However, the measure on gigabit networks will be implemented using national funds. In terms of implementation, Austria received EUR 700 million as its first RRF payment in 2023, following the satisfactory fulfilment of 44 milestones and targets.

[12] Based on an estimation of the possible contribution to the Digital Decade (Joint Research Centre report 'Mapping EU level funding instruments to Digital Decade targets - 2024 update' (Signorelli et al., 2024)).

State of the Digital Decade 2024

Belgium

1 Executive summary

Belgium brings a positive contribution to the European Union's (EU) Digital Decade objectives and targets, in view of a successful digitalisation that fosters competitiveness, resilience, sovereignty, European values and climate action.

In 2023, Belgium made notable progress in terms of the adoption of artificial intelligence by its enterprises and stands out as a frontrunner in providing digital public services. However, **important challenges** persist in the area of basic and advanced digital skills.

As one of Europe's 'innovation leaders', Belgium can count on a combination of high-performing research institutions (such as Imec, which is known for its world-class R&D in semiconductors), and a dynamic **R&D ecosystem** to support the development and uptake of technologies and innovations by enterprises. Belgium's performance on both **digital skills and on connectivity infrastructures shows there is a need to increase efforts** substantially to achieve the EU's 2030 targets and objectives.

According to the Special Eurobarometer survey on the 'Digital Decade 2024'[13], 77% of Belgium's population consider that the digitalisation of daily public and private services is making their lives easier (just above the EU average of 73%).

Concurrently, **Belgium is strongly engaged in several European Digital Infrastructure Consortia (EDICs).** For the already established EDICs, Belgium is the hosting Member State of the **EUROPEUM / Blockchain EDIC** and member of the Networked Local Digital Twins towards the CitiVERSE **(LDT CitiVERSE EDIC),** which seeks to connect local digital twins across Europe. It participates as an observer in the Alliance for Language Technologies **(ALT-EDIC)** addressing the scarcity of European language data available for Artificial Intelligence (AI) solutions. To May 2024, Belgium is also involved in discussions on the preparations of the EDICs on Genome, Digital Commons, and Agri-Food. The country has also expressed interest in participating to the discussions about the setting up of the EDIC for Mobility and Logistics Data[14].

Belgium allocates 27% of its total **Recovery and Resilience Plan** to digital objectives (EUR 1.25 billion)[15]. Under Cohesion Policy, an additional EUR 0.3 billion (13% of the country's total Cohesion Policy funding) is allocated to the country's digital transformation[16].

[13] Special Eurobarometer 551 on 'the Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351
[14] Information last updated on 31 May 2024.
[15] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation.
[16] This amount includes all investment specifically aimed at or substantially contributing to digital transformation in the 2021-2027 Cohesion Policy programming period. The source funds are the European Regional Development Fund, the Cohesion Fund, the European Social Fund Plus, and the Just Transition Fund.

Digital Decade KPI (1)	Belgium			EU		Digital Decade target by 2030	
	DESI 2023	DESI 2024 (year 2023)	Annual progress	DESI 2024 (year 2023)	Annual progress	BE	EU
Fixed Very High Capacity Network (VHCN) coverage	78.3%	96.0%	22.6%	78.8%	7.4%	100%	100%
Fibre to the Premises (FTTP) coverage	17.2%	25.0%	45.7%	64.0%	13.5%	x	-
Overall 5G coverage	29.6%	40.4%	36.2%	89.3%	9.8%	100%	100%
Semiconductors		NA					
Edge Nodes		8		1 186		x	10 000
SMEs with at least a basic level of digital intensity	65.3%	74.5%	6.8%	57.7%	2.6%	90%	90%
Cloud	46.9%	47.7%	0.8%	38.9%	7.0%	75%	75%
Artificial Intelligence	10.3%	13.8%	15.7%	8.0%	2.6%	75%	75%
Data analytics	NA	44.5%	NA	33.2%	NA	75%	75%
AI or Cloud or Data analytics	NA	64.2%	NA	54.6%	NA		75%
Unicorns		7		263		14	500
At least basic digital skills	54.2%	59.4%	4.6%	55.6%	1.5%	80%	80%
ICT specialists	5.6%	5.4%	-3.6%	4.8%	4.3%	10%	~10%
eID scheme notification		Yes					
Digital public services for citizens	81.5	82.3	1.1%	79.4	3.1%	100	100
Digital public services for businesses	87.6	91.6	4.6%	85.4	2.0%	100	100
Access to e-Health records	85.1	100	17.6%	79.1	10.6%	100	100

(1) See the methodological note for the description of the indicators and other descriptive metrics

National Digital Decade strategic roadmap

With respect to **Belgium's** contribution to the Digital Decade reflected in its roadmap, it is demonstrating a **very high ambition** and, based on this document, intends to allocate **some effort** to achieve the Digital Decade objectives and targets.

Belgium's roadmap is coherent overall with the efforts needed across all the dimensions of digitalisation. Belgium has integrated the regional dimension of the DDPP, in particular with a dedicated roadmap for Flanders. Belgium has seized the opportunity of its EU Presidency to foster references to the Digital Decade and the Declaration in Council work, as well as to explore **closer cooperation with its regions**. **The total budget for the 161 measures presented in the country's roadmap is estimated to be EUR 892 million (about 0.2% of GDP).** The Belgian roadmap is a **comprehensive exercise, with most measures ongoing or adopted in 2023 and 2024**, and Belgium has prioritised **the digitalisation of key public services and the promotion of basic and advanced digital skills.** The roadmap includes **national target values** for almost all DDPP targets (except FTTP and edge nodes), all matching the level of ambitions in the EU targets. **Recommendations from the State of the Digital Decade 2023 report were taken on board,** especially on coordination and synergies between private and public actors. Nevertheless, as acknowledged in the roadmap, **several of the measures adopted in response to these recommendations have yet to be further advanced** into solid actions.

Recommendations for the roadmap

Belgium should, when submitting adjustments to its national roadmap in accordance with Article 8(3) of the DDPP Decision:

- **TARGETS:** Propose a target and trajectory for **FTTP and edge nodes**.
- **MEASURES:** (i) Review and update the **budget description** of all presented measures, highlighting EU sources e.g., RRF; (ii) Include more measures and policies that contribute to the **twin transition**; (iii) Provide **more information on the implementation of digital rights and principles** (and Digital Decade general objectives), including what national measures contribute to it.
- **CONSULTATION:** Report with **more detail the results of the consultation process** and include more information about the stakeholders invited.

Digital rights and principles

The Special Eurobarometer 'Digital Decade 2024' highlights key insights into Belgian perceptions of digital rights. With 51% of Belgians believing the EU protects their digital rights, this figure has decreased by 5 percentage points, while remaining above the EU average. Concerns are growing, with 48% worried about children's online safety and 42% about control over personal data. On a positive note, 66% trust in privacy online, and 70% value the freedom of association online, both well above the EU average. The monitoring of the Declaration on Digital Rights and Principles shows that increasing the profile of the Declaration at national level and fostering better stakeholder engagement could help improve outcomes in the years to come[17].

A competitive, sovereign and resilient EU based on technological leadership

Despite progress in its gigabit and 5G networks' coverage, **Belgium remains far below the EU's average for FTTP and 5G coverage**. Nevertheless, Belgium is in leading position and way above the EU average as far as VHCN (gigabit) coverage is concerned. **5G in the 3.4-3.8 GHz band**, an essential band for enabling advanced applications requiring large spectrum bandwidth, covered 14.2% of Belgian households in 2023, far below EU average (50.6%). 5G coverage is however increasing substantially. In January 2024, 87% of the Belgian households could already benefit from 5G. Take-up of high-speed broadband is low, with the share of fixed broadband subscriptions reported at 5.4% for speeds greater than 1 Gbps (compared to the EU average of 18.5%), despite Belgium being above the EU average (72.25% versus 65.9%) for subscriptions to services that provide speeds greater than 100 Mbps.

On the **cybersecurity** front, many initiatives are in place to raise the country's capabilities and preparedness, especially through awareness raising and educational efforts by Belgium's National Cybersecurity Centre. **Belgium's SMEs are making good progress on digitalisation,** with a strong uptake of cloud and data analytics, and very strong progress (above the EU average) in AI. The country is dedicated to and has strong capabilities in R&D such as in **semiconductors.** It is also engaged in partnerships in areas like **quantum computing.** This shows Belgium is well-aligned with the Digital Decade's governance mindset: i.e., collaboration across the EU and joint efforts.

[17] See SWD 'Digital Decade in 2024: Implementation and perspective' with annexes, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325, Annex 4.

Recommendations – Belgium should:

- **CONNECTIVITY INFRASTRUCTURE:** (i) Accelerate efforts to ensure full FTTP and 5G coverage, addressing the remaining issues such as limited speed and service in rural areas; (ii) Ensure sufficient access of new players to spectrum for innovative business-to-business (B2B) and business-to-consumer (B2C) applications and encourage operators to speed up the deployment of 5G stand-alone core networks.
- **CYBERSECURITY**: (i) Continue support its national Centre for Cybersecurity's (CCB) activities, including to raise awareness among enterprises for their internal strategies; (ii) Continue the implementation of the 5G Cybersecurity Toolbox to ensure secure and resilient 5G networks.
- **CLOUD:** Support the broad uptake of the next generation of cloud infrastructure and services under development in the IPCEI-CIS by companies of all sizes, including by liaising with the direct participants to develop a country-specific dissemination strategy reaching beyond the participating organisations.

Protecting and empowering EU people and society

Belgium's regions and its national level, the federal government, have all made it a priority to tackle the digital divide and promote an inclusive, green digital transformation, including through RRF projects. **Belgium is a frontrunner in providing key digital public services and solutions to citizens and enterprises.** A large share of measures and programmes listed in Belgium's roadmap are focused on enhancing **the digitalisation of key public services**, which reflects the country's determination to make progress on these targets. **Belgium's performance on e-government is particularly solid.** In 2023 Belgium was the first Member State to score 100 on the e-Health indicator, well above the EU-27 average of 79. Measures to promote the digitalisation of key public services are balanced, with **a significant focus on skills**. Continuing efforts to reach its 2030 goals will bear fruit, but more work is needed to increase the basic digital skills of Belgians and to address the country's persisting labour shortages in ICT positions.

Recommendations – Belgium should:

- **BASIC DIGITAL SKILLS:** (i) Integrate the **learning of digital skills into all levels of education and training**, notably on AI, cybersecurity, and ethics of technology; (ii) Accelerate efforts to strengthen **adults' participation in up- and reskilling training** and elevate lifelong learning initiatives.
- **ICT SPECIALISTS:** (i) Pursue **academic and industrial partnerships,** lowering barriers to attract and employ digital talent; (ii) Seek to increase the number of female ICT graduates.
- **E-HEALTH:** To improve the quality of service, Belgium could consider going beyond the requirements of the eHealth methodology and monitor the supply of a diverse set of health data by all categories of healthcare providers, as well as establish a feedback system for citizens enabling them to report any limitations in access to their data.

Leveraging digital transformation for a smart greening

Belgium's federal government, regional governments, and enterprises prioritise environmental impacts when adopting ICT strategies and solutions, reflecting a proactive stance toward smart greening. However, **Belgium's performance in environmental innovation and in addressing sustainability objectives could be improved**. Its telecom sector, already, remains committed to further reducing emissions and increasing

energy efficiency. The national regulatory authority (BIPT) **monitors and encourages environmental efforts** among operators, contributing to the industry's overall sustainability.

Recommendations – Belgium should:

- Develop a coherent approach to twinning the digital and green transitions. First, promote improvements in energy and material efficiency of digital infrastructures, in particular data centres. Second, support the development and deployment of digital solutions that reduce the carbon footprint in other sectors, such as energy, transport, buildings, and agriculture, including the uptake of such solutions by SMEs.
- Monitor and quantify the emission reductions of the deployed digital solutions in line with the relevant EU guidance and with the support of the methodology developed by the European Green Digital Coalition, in view of future policy development, as well as of attracting relevant financing.

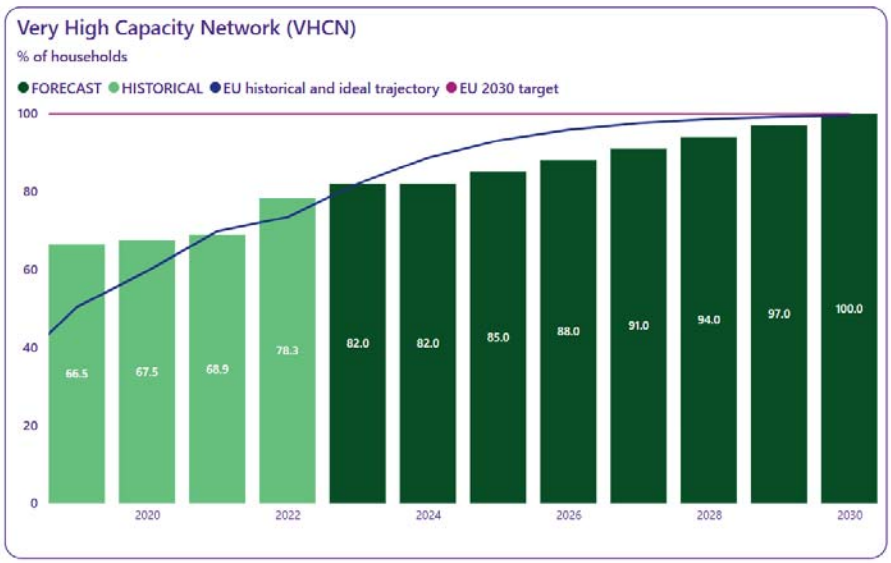
2 A competitive, sovereign and resilient EU based on technological leadership

In 2023, Belgium's digital transformation was marked by progress in its gigabit and 5G coverage. Notwithstanding this progress, Belgium remains far below the EU averages in terms of FTTP and 5G coverage. Nevertheless, Belgium is in leading position and way above the EU average as far as VHCN (gigabit) coverage is concerned. Take-up of high-speed broadband is low with the share of fixed broadband subscriptions reported at 5.4% for ≥1 Gbps, despite being above the EU average (72.25% versus 65.9%) for those ≥100 Mbps. Moreover, compared with other Europeans, Belgian end-users **pay** significantly **more** for small-volume or high-volume packages and for complete bundle packages covering internet, digital TV, mobile, and fixed-line telephony. In 2023, retail prices went up: (i) by mere indexation (i.e., in line with inflation), for fixed internet and bundle subscriptions, and (ii) in conjunction with an increase in the services' allowance, as was the case with mobile subscriptions. The recent entry into the Belgian telecoms market of a fourth mobile operator could reverse this trend by inducing additional competitive constraints on retail prices (helping to bring down retail process), especially if this new entrant also targets fixed broadband. On the cybersecurity front, multiple initiatives are in place to raise the country's capabilities and preparedness, especially through awareness raising and educational efforts by the National authority for cybersecurity, the Centre for Cybersecurity Belgium (CCB). Belgium is among Europe's 'innovation leaders', with an economy structured around competitive and innovative SMEs. This is in part thanks to: (i) widespread uptake of cloud computing and data analytics; (ii) very good progress in AI uptake; and (iii) a very strong R&D system. The country has very good capabilities in R&D, especially in the area of semiconductors. And Belgium's participation in cross-border partnerships in areas like quantum computing is well-aligned with the Digital Decade's governance mindset, which promotes collaboration across the EU and joint efforts.

Belgium's innovation performance relative to the EU average has steadily risen over the last decade, as has its total R&D intensity, which reached 3.43% of GDP in 2022 – well above the EU average of 2.24%. **Belgium's ICT 'weight' as a percentage of GDP** was 4.21% in 2019, growing to 4.32% in 2020 but remaining slightly below the EU average of 4.89% in 2019 and 5.23% in 2020.

2.1 Building technological leadership: digital infrastructure and technologies

2.1.a Connectivity infrastructure (gigabit)

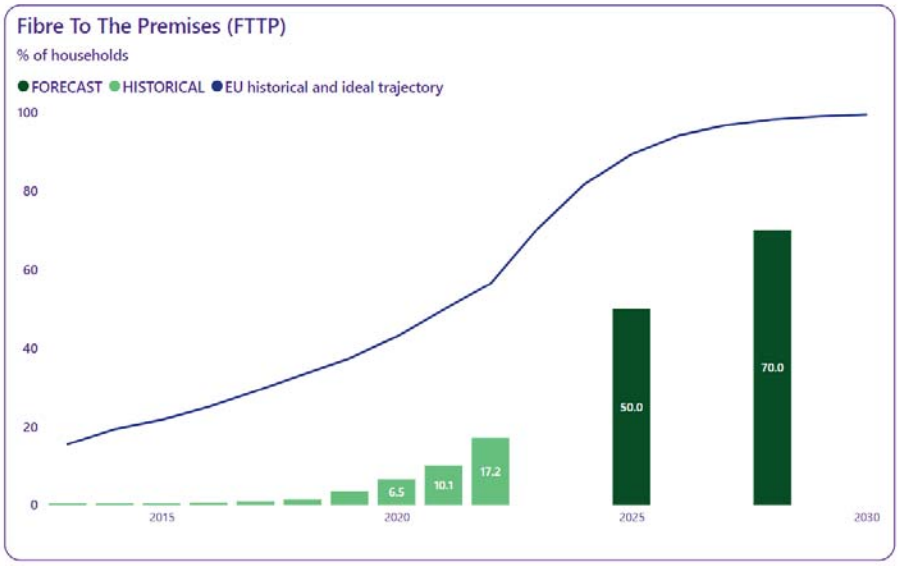


2023 state of play and recent progress

	Country level	EU level
FORECAST	82.0	82.0
DESI 2024	96.0	78.8
AVERAGE ANNUAL GROWTH %	22.6	7.4

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap



2023 state of play and recent progress

	Country level	EU level
FORECAST		70.3
DESI 2024	25.0	64.0
AVERAGE ANNUAL GROWTH %	45.7	13.5

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Belgium is making a very strong contribution to the EU's Digital Decade target for Very High-Capacity Networks (VHCNs), and shows a very strong dynamic in this area. VHCN coverage, which includes both Fibre-to-the-premises (FTTP) and DOCISIS 3.1 cable technology, is particularly high at 96%, with annual growth of 22.6% in 2023. This is due to Belgium benefiting from an extensive cable network, much of it updated to DOCSIS 3.1. The VHCN coverage roll-out is however changing rapidly and the current figure as well as the projected numbers are underestimated as practically all HFC networks in Belgium were upgraded or are currently being upgraded to Docsis 3.1. In contrast, the EU average for VHCN coverage in 2023 was 78.8%. Still, on the take-up of at least 1 Gbps broadband, an important gap remains between Belgium (5.44%) and the EU average (18.52%).

Belgium has scope to improve its FTTP coverage, showing a very strong dynamic in this area lately – deployment is gaining pace and, in 2023, grew at an annual rate of 45.7%, albeit from a rather low base. The country's achievement in making FTTP accessible to 25% of households coverage achievement for FTTP still remains well below the EU average (64%) and places the country as last among EU Member States. Based on the current rate of progress, a national target for 2030 for FTTP could be envisaged as it is provided for 2028 and 2032 by the roadmap. **Several initiatives are in progress or have been announced**, yet with few measures in the roadmap addressing gigabit connectivity. By 2030, this may lead to a real FTTP coverage greater than currently projected for 2032**.**

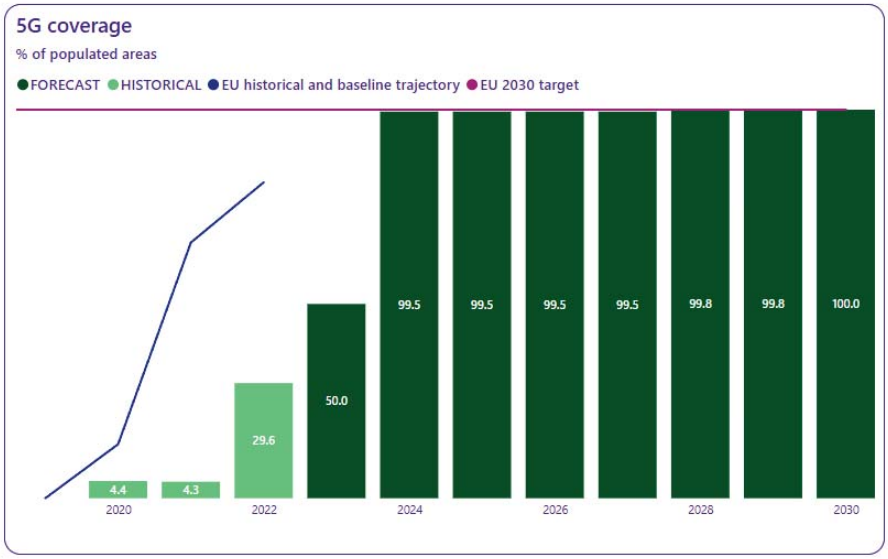
A positive dynamic is observed for various operators on the market, who have made significant efforts to increase coverage of fixed VHCN networks. Announcements of many concrete projects for fibre roll-out were announced, mainly focused on dense and mid-dense areas. Proximus is carrying out an ambitious fibre roll-out plan both directly and indirectly through its joint ventures Fiberklaar and Unifiber, as well as Glasfaser Ostbelgien (FTTP national coverage objective: 70% in 2028, 95% in 2032). Telenet has also kicked-off its fibre plans in its service area (Flanders and parts of Brussels and the Walloon region) in cooperation with Fluvius, through the joint venture 'Wyre' (FTTP regional coverage objective: 70% in 2029, 78% in 2038). Orange Belgium invests **with the objective** that up to 66% of its network footprint (the VOO network) to be FTTP covered by 2040. The fourth entrant on the mobile market, DIGI, has also announced fibre deployment plans and has already started some pilot projects in the Brussels region. This is added to the full Gigabit Hybrid Fiber Coax (HFC) coverage in the existing Wyre and VOO/Orange internet network infrastructure. In addition, the public-private cooperation between Proximus, Ethias and the German-speaking Community of Belgium (through the joint venture 'Glasfaser Ostbelgien') aims at deploying fibre across the entire German-speaking Community by 2026.

Of note, further progress is being made in the deployment of fixed VHCN coverage through the increasing availability of gigabit cable networks, positioning Belgium above the EU average with respect to this indicator. One of the positive effects of the funding mechanism of Belgium's RRP is the enhancement of the deployment of VHCN to white areas seen at federal and regional levels, through the n**ational Broadband Plan.** Two calls for projects were launched in 2022 and 2023, with a total allocated subsidy budget of EUR 26.5 million and the objective to cover the investment gap (up to 60% of the cost) for the deployment of fixed VHCN in currently underserved areas. This will result in connecting more than 15 000 households without current access to 100 Mbps networks. **One important element is the new minimum speed of internet within the universal service**, defined to comply with the notion of 'adequate broadband internet access service'. It is now set at 10 Mbps, but will be raised to 30 Mbps in January 2027.

Belgium has acted on the Commission's 2023 recommendations to step up its efforts on connectivity infrastructure for fixed network deployment, in particular by improving coordination and more efficiently rolling out fibre through its **Broadband Competence Office (BCO)** created in 2022. Since its creation, the BCO has aimed to improve coordination between different stakeholders, continuing the implementation of best practices in the European Connectivity Toolbox. And in 2023, several initiatives were indeed organised to exchange knowledge and good practices between operators, public bodies, experts and the European BCO Network. In addition, **the BCO has taken action in 2023 to increase the harmonisation of permit procedures and to increase transparency**, reducing the barriers to deployment. For example, to increase transparency **the BCO organised regional conferences, created a database with contact information** of public authorities controlling relevant physical infrastructure, and created a website with all the useful and legal information about permits required per region. **All these actions increase transparency and reduce barriers to deployment.**

The Commission has taken note of these efforts to improve transparency and inclusion, as Belgium is committed to ensuring a just and fair digital transformation in which everyone can take part. For instance, **information portals** were built to bring clarity for citizens, such as the fibre information website of **BIPT, Belgium's national regulatory authority**, which shares information on fibre installations, relevant legislation, and planned deployments.[18] In addition, **on regulation, recent changes in the universal service rules are a positive step towards a social internet offer in order to address the digital divide**. A new regime for social tariffs came into force on 1 March 2024, to make fixed internet more accessible for certain categories of beneficiaries. The new system defines two possible types of offers. Major operators are to offer fixed internet either as a stand-alone service for maximum EUR 40 per month, it being understood that the fixed internet has to meet certain minimum technical requirements. Nevertheless, Belgian end-users **pay** significantly **more** than other EU citizens for small or high-volume packages and complete bundle packages covering internet, digital TV, mobile, and fixed-line telephony.

2.1.b Connectivity infrastructure (5G)



2023 state of play and recent progress

	Country level	EU level
FORECAST	50.0	
DESI 2024	40.4	89.3
AVERAGE ANNUAL GROWTH %	36.2	9.8

Average, annual growth is computed between the two most recent available data points. No ideal trajectory, and therefore no EU level forecast, is provided for 5G (see 2023 Communication on EU-level trajectories)

Note: The source of national forecast values is the 2023 country roadmap

Belgium has scope to improve its performance to contribute to the EU's Digital Decade target for 5G coverage, while showing a very strong dynamic in this area. 5G coverage in Belgium (40.4%) is far below the EU average (89.3%). **5G including – but not limited to – the 3.4-3.8 GHz band**, an essential band for enabling advanced applications requiring large spectrum bandwidth, is accessible to only 14.2% of Belgian households in 2023, much below the EU average (50.6%). 5G coverage is however increasing substantially. In January 2024, 87% of the Belgian households could already benefit from 5G.

Since the last reporting period on 5G coverage, the country's annual rate of increase in coverage has grown from 29.63% in 2022 to 36.2% in 2023, overshooting the already high dynamics in the EU (9.8% annual growth). The remaining gap to achieve the EU-vide target by 2030 is significant (60 percentage points). Nevertheless, based on the current rate of progress, and assuming the ongoing efforts will be sustained, Belgium's contribution to this EU target will be very significant. Of note, with 92.6% of individuals using **mobile broadband**, take-up in Belgium has increased in 2023 and remains higher than the EU average of

[18] Belgium's fibre development (FTTP) and coverage can be monitored via the national regulator's interactive map. BIPT: ibpt | Data Portal - FTTH fibre map bipt-data.be

89.9%. However, the share of Belgians using **5G SIM cards** was 13.3% in 2023, well below the EU average of 24.6%.

The reforms that Belgium put in place to support 5G rollout, such as the publication of royal decrees on the 5G spectrum auction and the auction of June 2022, began to bear fruit in 2023 and 2024. These reforms resulted in new entrants to the 5G market. Operators in Belgium are now fully involved in deploying 5G services nationwide. Despite coverage measurements not being yet available, these measurements will be carried out in 2024, and drive tests are also being planned, along with measurements for coverage along railway lines (to ensure train passengers can access 5G). **Addressing the Commission's 2023 recommendation, Belgium recently took measures to strengthen competition** for mobile services by allowing the market entry of a fourth operator with complete spectrum portfolio. To this end, spectrum was reserved for a newcomer. The fourth operator is building additional network infrastructure, and is expected to start providing services to end-users by mid-2024. A nationwide RAN-sharing agreement between Proximus and Orange will **ensure the reuse of existing 5G infrastructure and co-deployment** of new infrastructure. To address local coverage, a Royal Decree and a BIPT decision with technical conditions in 2023 will allow the BIPT to issue private 5G licenses in 2024.

On 5G services, a pilot national funding programme is being developed by the FPS Economy. Following the first call for projects in 2022 launched in July 2022, 20 projects were selected for a total grant amount of approximately EUR 19 million. A second call in 2023 aimed to redistribute part of the remaining initial budget (EUR 24 million), i.e., approximately EUR 5 million.

Other administrative obstacles to the deployment of 5G are being addressed. In particular, radiation limits have been adjusted in Flanders and the Walloon Region while they are increased in Brussels, which should make it possible to reduce the cost of 5G rollout (although Brussels has chosen the lowest BIPT recommended level, which reduces the impact of the measure). 5G deployment in Flanders is proceeding faster than in Wallonia and Brussels. **In 2024, Belgian ICT services provider NRB announced it would sell its spectrum and 5G licence. Proximus will acquire the rights of use for this additional 5G spectrum, enabling it to add more network capacity when needed and to significantly reduce the risk of saturation.** The BIPT approved this, and the effective date of the spectrum transfer took place in May 2024, after the publication of a new call for applications for the 3410-3430 MHz band. The call for applications is to be accompanied by an increase in the Belgian spectrum cap from 100 MHz to 120 MHz.

Belgium is taking action to increase its 5G sovereignty. New 5G infrastructure is being deployed in conjunction with the **switch out of existing or old 4G equipment from non-trusted vendors.** The EU security toolkit's implementation in Belgium has imposed strict rules on the country's operators. In particular, rules on the selection of equipment suppliers are stricter than in other markets.

Belgium has acted on the Commission's recommendations to step up its efforts on connectivity infrastructure in this area to ensure 5G coverage is sufficient to meet market demand through regular assessment. The 2019 consultation did not indicate market demand for the 26 GHz band. And following the multiband auction in 2022, the BIPT organised a new public consultation in Q4 2023, which indicated that the ecosystem in the 26 GHz band was not yet fully developed. It is expected that the need for this band will become more pronounced in 2025-2030, and operators expect to see localised market requirements emerging for it in areas such as e.g., Fixed Wireless Access, e-MBB overlays and low-latency industrial applications. This view that the 26 GHz band is set to see greater demand will be taken on board, and an appropriate regulatory reaction will be developed in the course of 2024.

The **positive effects of the funding mechanism of Belgium's RRP were reflected in the more than 20 Proofs of Concept for 5G use being approved by the Belgian authorities.**

2.1.c Semiconductors

EU funding and cooperation with other Member States enables Belgium to undertake efforts in quantum computing, semiconductors, and edge nodes more efficiently than if it were to undertake these efforts solely with support from its own national funding at federal or regional level.

Belgium plans to explore how the country can contribute to the European semiconductor sector by assessing its current position in R&D for nanochip production, and what can be expected by 2030 in terms of engineering.

With the cutting-edge public-private research centre Imec, Belgium is making an important contribution to semiconductors at EU level. Imec continues to be at the cutting-edge of semiconductor R&D, and R&D in other digital technologies. It has the largest and most advanced R&D cleanroom in the world and remains a key partner of various semiconductor equipment manufacturers for next-generation chips (nanotechnology) suitable for the green transition, and AI (e.g., self-driving cars). Flanders will allocate approximately EUR 200 million of funding to Imec between 2024 and 2036 from a whole range of investors, with the aim to grow deep tech companies in Belgium and in Europe working around the latest semiconductor technology, based on Imec research. **The Flemish Government announced in 2023 that it is investing EUR 750 million into Imec** and specifically in the development of chip technology. This EUR 750 million-investment is running in parallel to the investments under the EU's Chips Act. Belgium's actions to increase investment in chip technology and the deep-tech industry, and ensure funding stimulates the flow of research to the market are **in line with the Digital Decade's objectives of sovereignty, resilience, and competitiveness.** These actions will help strengthen the EU's position in the semiconductor supply chain. In addition, Belgium is committed to engaging in the EU semiconductor board.

2.1.d Edge nodes

Belgium now has eight deployed edge nodes and is currently trying to bring together the right players from the edge-node ecosystem to provide a comprehensive state-of-business assessment in a forthcoming roadmap.

Flanders' Testing & Experimentation Facility (TEF) for Edge-AI focuses on the development of in-memory compute edge applications. It will be a platform where developers of AI hardware can easily test their designs. This facility will allow the European ecosystem for AI chips to find the right components and solutions, and test Proofs of Concepts on AI in real environments so that they find their way to the market more quickly. The TEF project will run until 2026. To fund the TEF, EUR 20 million are allocated from the RRF budget of Flanders, with EUR 3 million from Imec and EUR 23 million from the Digital Europe Programme. The expected impact of this measure is that it will contribute to the EU's goal of having 10 000 edge nodes to facilitate necessary research and innovation in edge-node technology. It will also contribute to the objective of having 20% of chip production in the EU by 2030, as it effectively creates a pilot line as envisioned in the EU Chips Act.

The Walloon region has a similar initiative for testing AI hardware. This initiative seeks to increase complementarity between organisations, cooperation across borders, and standardisation. The Walloon region's initiative is therefore also a multi-country project under Europe's Digital Decade and is aligned with the objectives of the DDPP to engage in collaborations with EU Member States.

2.1.e Quantum technologies

Recent developments are showing that Belgium has been actively supporting digital innovation, at both national and regional levels, with public investments and strategies in high performance computing and quantum technologies.

The **national cybersecurity strategy**, as defined by the Belgian national authority for cybersecurity (CCB), **includes that CCB should monitor trends and report on quantum computing and Post Quantum Cryptography (PQC), including on standardisation**. Therefore, the CCB is currently building up an expertise team that is focusing on quantum computing and PQC, to prepare future initiatives and actions and to help support and initiate a transition roadmap. Concurrently, the CCB takes part in several initiatives and working groups at EU-level on cryptography (such as the European Cybersecurity Certification Group (ECCG) working group on cryptography) and on PQC (as for instance the newly established informal Commission expert group on Quantum Technologies Coordination Group, and relevant developments within the NIS Cooperation Group).

In addition to this, Belgium has several initiatives in high-performance computing and quantum technologies. For example, **Flanders has the Flemish Supercomputer Centre,** which promotes the use of scientific and technical computing in Flemish academia and industry, by providing infrastructure, training, and services. And **Wallonia hosts Lucia, Belgium's most powerful supercomputer.**

Belgium is also member of the European Quantum Communication Infrastructure (EuroQCI) initiative. As part of this initiative, a number of Flemish, Walloon and national organisations have joined forces under the Digital Europe Programme to set up the **project Be-QCI,** which aims to set up the first quantum key distribution network in Belgium, and to mitigate the risks associated with quantum computing. The consortium unites theoretical, experimental, and technical expertise in quantum technology from across the country.

Belgium is also a member of EuroHPC LUMI, which provides researchers across Europe with a tool and platform for developing complicated, advanced technologies, such as AI or quantum computing. In addition, **Belgium is part of the IPCEI on Microelectronics and Communication Technologies (IPCEI-ME/CT)** which was approved on 23 June 2023, and will aim to improve R&D projects to develop several critical technologies such as quantum computing, in various sectors.

2.2 Supporting EU-wide digital ecosystems and scaling up innovative enterprises

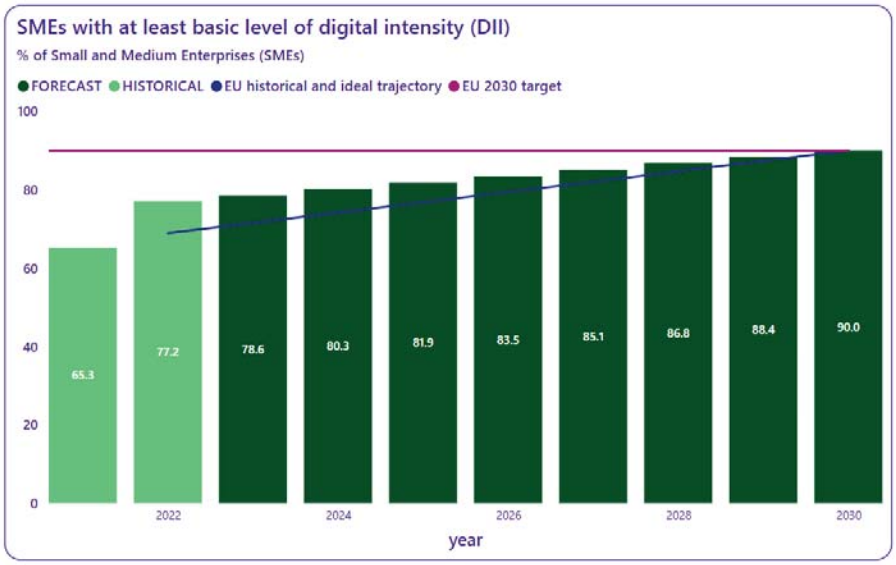
Belgium is on the right track to digitalise its enterprises successfully. It can count on a strong R&D sector but lacks a dynamic to turn innovations into successfully commercial services and applications. To increase smaller companies' digitalisation in Belgium, it will be critical to support programmes for SMEs. By improving such support with guidance and by streamlining incentives to encourage innovations to progress from the lab to the market, Belgium can make a significant contribution to building an even stronger digital ecosystem for European and Belgian SMEs.

Although small firms' adoption of digital technologies tends to be greater in Belgium than the EU average, the gap in adoption of digital technologies between small and large firms in Belgium is larger than in the rest of the EU[19]. Although Belgium has a very strong R&D ecosystem, the commercial focus of the innovation ecosystem remains low, and Belgium's business creation rate is one of the lowest in the EU. There is a persistent innovation gap between research and commercially-financed production. The 2021

[19] Belgium National Strategic Roadmap 2023; OECD Economic Surveys: Belgium 2022 (oecd-ilibrary.org)

Belgian Federal Science Policy report on science, technology and innovation indicates that "although all three regions have a variety of measures to support entrepreneurship and to encourage firms to engage in innovation in place, there is less an emphasis on scale-up and growth"."

2.2.a SMEs with at least a basic level of digital intensity



2023 state of play and recent progress

	Country level	EU level
FORECAST	78.6	71.6
DESI 2024	74.5	57.7
AVERAGE ANNUAL GROWTH %	6.8	2.6

In the case of DII, the average, annual growth is computed between 2023 and 2021 due to data comparability reasons.

Note 1: DII 2022 is version IV that is not comparable with DII 2021, that was version III. The EU-level ideal trajectory refers to DII version IV, as published in the 2023 Communication on EU-level trajectories

Note 2: The source of national forecast values is the 2023 country roadmap

Belgium **brings a positive contribution to the EU's Digital Decade target for the overall digital intensity of SMEs, and showing a positive dynamic in this area.** 74.5% of the country's SMEs have at least a basic level of digital intensity, well ahead of the EU average of 57.7%. Belgium's performance was bolstered by annual growth of +6.8% between 2021 and 20231 (2021 is the last comparable year that used a similar methodology for measuring the digital intensity of enterprises). This is well above the EU average of +2.6% annual growth in digital intensity of SMEs over the same period, and Belgium is forecast to reach its target of achieving 90% digital intensity before 2030.

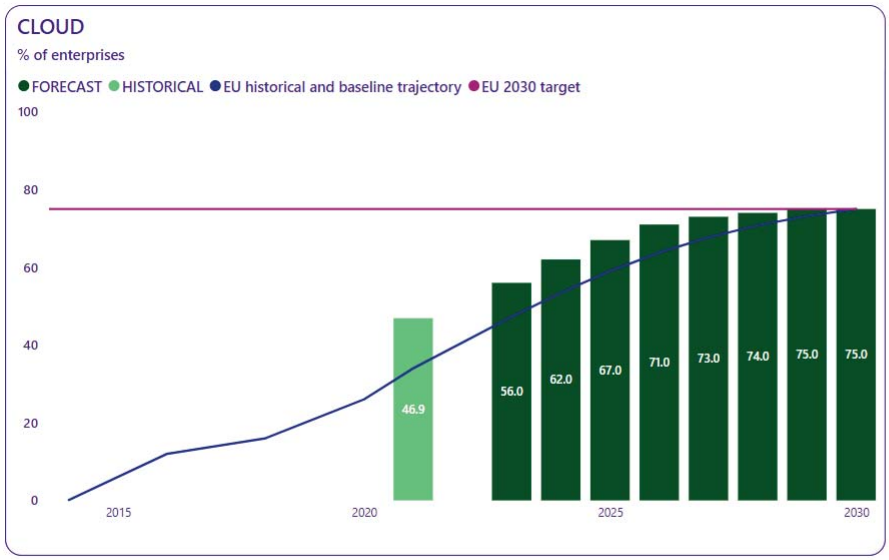
In 2023, 14.5% of Belgian SMEs' turnover was based on e-commerce, against an EU average of 11.9%. 29.4% of Belgian enterprises with e-commerce sales of at least 1 % turnover were selling online in 2023, also well above the EU average (19.1%). In addition, 79% of Belgian enterprises were using social media in 2023, well above the EU average of 61%.

Creating the optimal conditions for the digitalisation of Belgian companies is one of the priorities in the **country's Federal #SmartNation strategy. Many initiatives are also being deployed to support enterprises in Belgium's regions.** These include the **Digital Innovation Journey in Brussels** with SustAIn.brussels, a European Digital Innovation Hub (EDIH) focused on AI and emerging technologies. And in Flanders, the Flanders Technology & Innovation (FTI) was launched as a private limited company (BV) in December 2023 by the Flemish Government and seven private investors. It started operating in 2024, and will bring together companies, knowledge institutions and the Flemish Government to work on technological solutions for societal challenges based on data. FTI BV aims to accelerate investments in these innovations. **This initiative strengthens the digital ecosystem and the coordination of its actors**. Furthermore, **3 EDIHs were launched in Flanders** (DIGITALIS addressing the manufacturing sector, EDIH EBE addressing sustainable energy in building and Flanders AI to advance the use of AI in all business sectors) **and several new projects under the ERDF were granted.**

In 2023, **Wallonia** strengthened its 'Industry of the Future' campaign through its **Future of Industry Programme** (IDF), which seeks to increase businesses' use of digital technology. To start with, 370 companies were contacted and given an initial indication of the IDF Programme. 104 companies were supported in IDF projects (pre-diagnosis, drawing up of an action plan); and 32 companies initiated digital transformation projects in the form of POC. In addition, 79 awareness-raising and training events were organised. In 2023, Wallonia also created the Walhub EDIH, to accelerate the digital transformation of manufacturing companies, as well as and the EDIH CONNECT to support the digitalisation of the construction sector.

2.2.b Take-up of cloud / AI / data analytics

- **Cloud**



2023 state of play and recent progress

	Country level	EU level
FORECAST	56.0	47.3
DESI 2024	47.7	38.9
AVERAGE ANNUAL GROWTH %	0.8	7.0

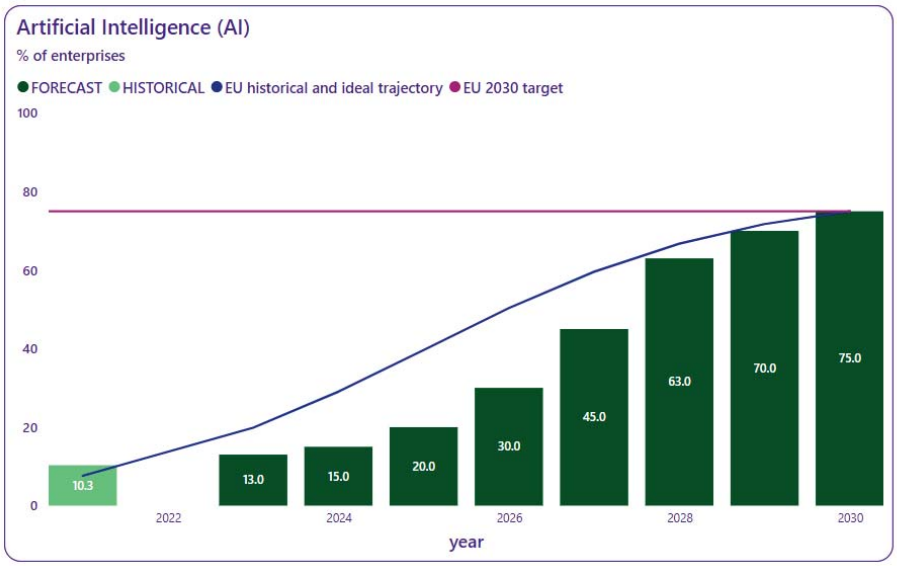
Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Belgium is making a positive contribution to the EU's Digital Decade target for cloud adoption, while demonstrating a limited dynamic in this area. The take-up of cloud solutions by Belgian enterprises (at 47.7% in 2023) is above the EU average (38.9%) and up slightly compared with 2021 (0.8%) while the EU is improving more rapidly (+7%/year on average). Furthermore, large enterprises (hose with more than 249 employees) have already surpassed Belgium's the 75% target as 84.6% of them in Belgium use cloud computing. At the current rate of progress, Belgium will reach its national target of 75% of enterprises using cloud solutions only after 2030. **Small and medium-sized enterprises are as well above the EU average uptake (46.3% versus 37.9%)**.

Belgium is part of the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS) – with indirect partner only – which was approved on 5 December 2023.

- **Artificial Intelligence**



2023 state of play and recent progress

	Country level	EU level
FORECAST	13.0	19.9
DESI 2024	13.8	8.0
AVERAGE ANNUAL GROWTH %	15.7	2.6

Average, annual growth is computed between the two most recent available data points.

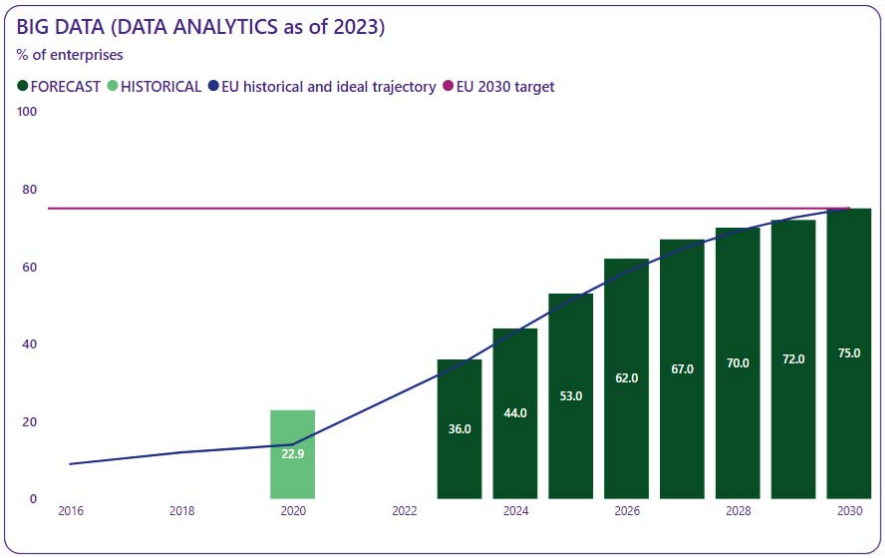
Note 1: at the end of 2023 ESTAT revised backward the values of AI. The revised value for 2021 at the EU level is 7.6 % (from 7.9 %).

Note 2: The source of national forecast values is the 2023 country roadmap

Belgium brings a very strong contribution to the EU's Digital Decade target for AI adoption, and shows a very strong dynamic in this area. 13.8% of Belgian SMEs had adopted AI in 2023, well above the EU average of 8% and with an annual growth of 15.7%, surpassing the EU average of 2.6%. Belgium will reach its target after 2030 at this rate. However, the JRC study's data reflected in Table a2 of the Annex suggests that Belgium is committing **3.2% of its RRF budget to AI-related projects**, against an EU average of 3.7%.

Flanders' Innovation & Entrepreneurship (VLAIO) agency has an annual budget of EUR 15 million for specific actions to increase the uptake of AI in companies. Under the 'implementation of part' of the Flemish AI Action Plan by the VLAIO, companies are encouraged, through various support measures, to make greater use of data-driven digitalisation and AI. Actions aim to inspire, inform, and raise awareness among companies about the potential of the solutions; provide coaching or guidance process; encourage participation a collective process such as starting an R&D project.
The same amount of investment and type of actions exist in the Walloon Region through the programme Digital Wallonia 4 AI. The participation of Walloon companies into the call for projects enabling to define a project/product then fine tuning it to reach the market, has increased tremendously in 2024, demonstrating the importance of the topic and the success of the sensibilisation.

- **Data analytics (Big Data)**



2023 state of play and recent progress

	Country level	EU level
FORECAST	36.0	34.6
DESI 2024	44.5	33.2
AVERAGE ANNUAL GROWTH %		

Annual growth cannot be computed in this case because Big Data was replaced by Data Analytics in 2023. The two indicators are not comparable.

Note: The source of national forecast values is the 2023 country roadmap

On the use of data analytics by enterprises, Belgium is making a very strong contribution to the EU's Digital Decade target. With 44.5% of enterprises already using data analytics in 2023, Belgium is performing well above the EU average (33.2%). Progress on this metric cannot be assessed since the indicator's definition has changed.

- **Take-up by enterprises of cloud or data analytics or AI**

Taking the three technologies together (adoption of either cloud, data analytics, or AI), **adoption by Belgian enterprises stands at 64.2%, ahead of the EU average of 54.6%.**

2.2.c Unicorns, scale-ups and start-ups

According to Dealroom data, **Belgium currently has 7 established unicorns**, most of which are in the biotech sector. Galapagos, Mithra, Argenx and Ablynx are all part of Belgium's internationally and reputed biotech and pharmaceutical ecosystem. **To align with the EU's Digital Decade target of doubling the number of unicorns, Belgium aims to grow this number by one more per year through 2030**.

Belgium's ICT weight as a percentage of GDP was 4.21% in 2019, growing to 4.32% in 2020 but remaining slightly below the EU averages of 4.89% in 2019 and 5.23% in 2020. In 2021, the share of the ICT sector in the creation of growth in Belgium (measured in Gross Value Added) was 4.24% which is still below the EU average of 5.49%.

Belgium's performance in **venture capital investments is mixed.** Seed, start-up and other early-stage investments grew from 6% of GDP in 2020 to 7% in 2021, but decreased to 4% in 2022.

However, Belgium's economy is now one of the fastest growing in the eurozone. The 15 Belgian companies listed in the FT-Statista's 2024 ranking of Europe's 1 000 fastest-growing enterprises means Belgium is now among the top 10 most represented countries in this ranking for the first time.

Belgium participates in or leads 6 EDIHs, including: Wallhub, SustAin.brussels, and Flanders AI.

One important driver of growth for local start-ups is the region of Flanders, where sectors including life sciences, agricultural science and fintech are flourishing. Flanders has top universities and many English

speakers, and it is home to high-margin industries. The Flemish **RRP includes financial and administrative help for start-ups.** Bodies such as **Flanders Investment & Trade (FIT)** provide grants, export advice and introductions to potential investors and customers. The region encourages the building of large ecosystems for companies, with at least 3.2% of Flanders' GDP allocated to R&D, surpassing the EU average of 2.1%. The VLAIO **agency** is actively promoting the growth of start-ups. In the period through 2024, it appointed several structural partners which give advice and coaching to start-ups and scale-ups. Those services receive 70% of their fund from the Flemish region. **Scaleup Vlaanderen** (a consortium of Imec I-start, Sirris and Agoria) has developed a broad mentoring programme for 2024, 'Boost your scaleup | Scaleup Vlaanderen' for innovative digital scale-ups that are on the cusp of accelerating their growth, whether domestically or internationally.

2.3 Strengthening cybersecurity & resilience

Belgium will remain a target for cyber espionage, especially with Brussels being home to many international companies, organisations, and institutions such as the EU's and NATO's. In Belgium, 95.8% of enterprises with 10 or more employees have reported using ICT security measures in 2022. **According to the Digital Decade Eurobarometer**, 87% of Belgium's population acknowledge that improved cybersecurity, better protection of online data, and better safety of digital technologies could significantly facilitate their daily use of those technologies significantly (well above the EU average of 79%).

However, only a third of Belgian enterprises had insurance against ICT security incidents in 2022 (33.1%, albeit above the EU average of 25%), and approximately 50% of all organisations in Belgium do not have an active cybersecurity strategy.

Despite these challenges, Belgium takes a proactive approach to cybersecurity, known as the Active Cyber Protection (ACP), and has an excellent international position in this area. It was ranked first in 2023 on the National Cyber Security Index, a live global index that measures countries' readiness to prevent cyber threats and manage cyber incidents.

In 2023, the CCB's work was recognised with a Publica Award in the 'Security & Safety' category for the Spear Warning project[20]. 2023 also saw the release of significant new projects by the CCB, highlighted as best practices in the box below.

As the cyber threat is global and cannot be addressed solely at the national level, **Belgium considers that international cooperation is an important pillar of a decisive national cybersecurity policy.** Cybersecurity requires a holistic perspective that employs various vectors of international cooperation (diplomatic, military, economic, etc.). Belgium also considers **EU-level collaboration and compliance are key in cybersecurity.** The country remained actively involved in important **EU networks** such as the CSIRT Network and EU-CyCLONe and the Network of National Cybersecurity Coordination Centres throughout 2023. Additionally, Belgium participated in significant **EU cyber exercises** like CySOPex and BlueOLEX during this period.

In line with the 2023 recommendations, greater collaboration between the public and private sectors has been prioritised, and the Belgian authorities have fostered frequent and diverse interactions with regions, universities, and various private entities in the area of cybersecurity (e.g., Cyberwaland, Vlaams

[20] Spear Warning, introduced by the CCB in early 2021, operates within the framework of Active Cyber Protection (ACP), as outlined in the EU NIS2 Directive. It proactively informs companies and individuals about cyber threats, such as vulnerabilities, stolen credentials, and malware, enabling timely action to prevent cyberattacks. Unlike passive methods of information dissemination, Spear Alerts reach users directly via email, letter, or telephone, enhancing the effectiveness of the message.

Cybersecurity Beleidsplan). The CCB, as national authority for cybersecurity, assumes the responsibility for coordinating Belgium's cybersecurity ecosystem, including public services, the private sector, and academia. Exchange of cybersecurity knowledge and insights into evolving cyber threat is facilitated through existing or newly established platforms, enabling experts to share information and experiences directly and foster networking opportunity. This open and structured dialogue enables the CCB to better discern the most pressing needs. Additionally, public-private collaborations such as the Belgian '**Cyber Security Coalition'** play a significant role. Comprising academia, public agencies, and private sector entities, this coalition collaboratively combats cybercrime.

As part of Belgium's RRP, the country's federal ministry of the economy has rolled out several efforts in line with the objectives of the Digital Decade in the areas of digital inclusion, safety and security, and people empowerment. In 2023, it launched four project calls to improve the cyber resilience of SMEs (companies with less than 50 full-time staff), including the self-employed, SMEs active in traditional sectors (i.e., non-technological sectors), and SMEs with low levels of maturity in cybersecurity. The ministry also created **a cyber scan tool** that is especially designed for SMEs and self-employed people. The Belgian platform 'mijnzaakcyberveilig' offers information and resources to help Belgian SMEs and self-employed people to protect their online security.

In 2023, a significant milestone was reached with the establishment of, subsequent preparatory activities for, and final installation of the Belgian National Cybersecurity Coordination Centre (NCC-BE). This is the Belgian component of the wider framework of the European Cybersecurity Competence Centre (ECCC). **The NCC-BE draws up national cybersecurity policies to create a digital environment that it safe and secure for all, thereby addressing the principles of the Digital Decade Declaration.** The NCC-BE also raises awareness across sectors, by organising national campaigns and training.

In 2023 and 2024, the CCB / NCC-BE have focused on raising awareness on cybersecurity, and creating specific graduate programmes in cybersecurity in Belgium to ensure a supply of more skilled cybersecurity professionals in the medium and long term. **The NCC-BE's activities and mission, namely to bring together relevant Belgian stakeholders from industry, academia, SMEs and public entities of the cybersecurity ecosystem, will thus bring important benefits for society and strengthen Belgium's competitiveness.** The NCC-BE shared information on investment and funding opportunities, on the website, on social media and answered individual questions from cybersecurity companies or associations such as V-ICT-OR (Flemish organisation for ICT in local governments).

As a recognised national cybersecurity hub, **the NCC-BE has begun developing a portal to foster community engagement, set to launch in 2024**. The CCB has also actively engaged in cybersecurity meetings with the regions and other federal ministries such as the Ministry of the Economy and the Ministry of Defence to ensure alignment and coherence in activities. To enhance collaboration and alignment of activities concerning cybersecurity in the Digital Europe Programme and Horizon Europe Programme, the NCC-BE organised several meetings with the national contact points (NCPs).

A Cyber Defence Factory was inaugurated in Charleroi in April 2024 by the Ministry of Defence, as the first official establishment of the Belgian military's Cyber Command in a civilian environment. The initiative is part of the '*Quartier du futur*' project in Charleroi, a research campus in the city supported by Belgium's federal RRP and that will develop innovative defence-adjacent projects in all areas of cyber, in collaboration with university, industrial and research partners.

The Walloon region developed in the last few months a new cyber range to help key sectors to simulate cyberattacks on a replication of their system to see the vulnerabilities and be prepared in case of a real

attack. A Cyber Response Team was also validated by the Walloon Government to support 3 sectors (health, schools, and public services) so they can respond to cybersecurity incidents as quickly as possible.

Best practice: CCB's 2023 initiatives around Safeonweb

The Centre for Cybersecurity of Belgium (CCB) operates Safeonweb, a platform dedicated to enhancing online safety for the Belgian population (i.e. media, users, companies, citizens) against cyber threats. Safeonweb encourages public participation in cybersecurity efforts and offers services like reporting suspicious links and messages to combat phishing activities, and spread awareness on cybersecurity. Safeonweb includes different projects branded under the 'Safeonweb' name, targeting both the public (@Home) and organisation (@Work).

- **Safeonweb@Home** uses a mix of communication tools to quickly inform Belgian citizens and advise them on online security and digital threats to reduce the like hood of falling victim to scammers and cybercriminals. The www.safeonweb.be website provides continuous access to cybersecurity advice. This is also done via social media channels, press and our 500 + partners who are representatives from all sectors - public, private, academic – and advertisement (owned, earned and paid). Safeonweb@Home also includes our annual awareness campaign in October. In addition to helping us spread the message, our partners (e.g., the Cyber Security Coalition and Febelfin) also help develop the content of the campaign. Their field expertise has allowed us to refine and clarify the message, so it reaches a maximum number of people undertaking the appropriate actions to protect themselves from all kinds of cybersecurity threats but especially phishing - the real scourge of our time. Part of the SafeOnWeb' s set of services is the Safeonweb mobile app to quickly inform internet users of new phishing attempts and to send out new security tips.
- A recent addition is **Safeonweb@Work**. The goal of this project is to make sure that also Belgian businesses are ready to compete in an increasingly digitalised world. Therefore, and building on the success and recognition of Safeonweb.be for the public, the CCB launched a specialised platform Safeonweb@Work in November 2023. Via this platform, Belgian companies and organisations can register their domains and IP ranges to benefit from the Safeonweb@Work services. The Safeonweb@Work platform uses the existing Early Warning System (EWS), offers a light version so that companies can receive alerts based on the technical information they have registered. On this portal, organisations will also be able to make maturity assessments, and find various advisory documents, tools, support, templates, and references to help them raise their cybersecurity level, such as the CyberFundamentals framework, aiding in data protection and cyber resilience for organisations across sectors.
- Also launched in 2023, the platform includes now the **Safeonweb Browser extension**, which shows you for every website visited if the owner has been validated (Green) or not (Amber). Websites without a validated owner (Amber) should be suited for reading only. To share personal and sensitive information you can expect the owner of the web site to be validated (Green). If a hacker puts malicious content on a website with a validated owner the validation status will change to Amber or Red directly after the first notification. Known malicious or insecure websites are marked as Red.

3 Protecting and empowering EU people and society

Both Belgium's regions and its central Federal Government have all made it a priority to tackle the digital divide and promote an inclusive and green digital transformation. The inter-federal strategy 'Women in Digital' continues to act as a compass for policy action in this area, with various projects, plans, measures, and budgets to pursue the objectives of digital inclusion and solidarity. Many RRF projects fit under this strategy.

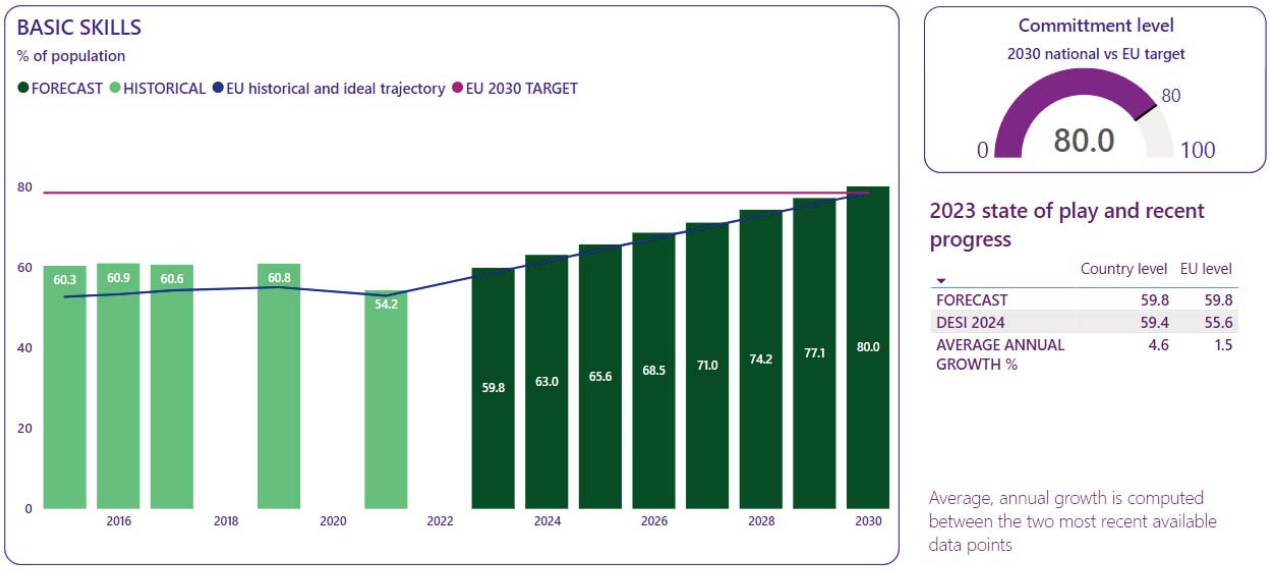
In addition, several of the thematic priorities and events of Belgium's Presidency of the EU Council were relevant to the objectives of the Digital Decade and the Declaration in this area, including: (i) participation; (ii) digital inclusion and skills; (iii) AI trust and transparency; and (iv) digital identity.

Many measures and programmes listed in Belgium's roadmap are focused on digital skills, both basic and advanced. And **many of these are new initiatives** and projects, adopted for 2023, 2024 and beyond, which reflects the country's determination to progress on this target. **Belgium's performance on e-government is especially strong.** And because simply having access to e-services is not the only factor in the uptake of online public services, these measures are balanced with **a significant share of measures related to skills** – demonstrating the country's consistent and coherent approach.

3.1 Empowering people and bringing the digital transformation closer to their needs

3.1.1 Equipping people with digital skills

3.1.1.a Basic digital skills



Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

Belgium brings a positive contribution to the EU's Digital Decade target for basic digital skills, while demonstrating a very strong dynamic. In 2023, 59.4% of the Belgian population had at least basic digital skills. This is above the EU average of 55.6%, but behind the EU's front-runners. However, Belgium is improving rapidly in this area, with an annual growth of 4.6%, compared with the EU average of 1.5%. Belgium is on track to reach its national target before 2030.

Labour shortages nevertheless remain a pressing challenge in Belgium for the digital transformation, in particular given the parallel needs to ensure the green transition and to increase competitiveness. Labour shortages in Belgium are the highest in the EU, with a job vacancy rate of 4.4% in 2023.

On digital skills, Belgium's RRP includes measures equip schools with ICT equipment. Other relevant measures have been implemented outside of the RRP, but their impact is still uncertain. **Belgium's roadmap** includes a large range of measures to increase basic digital skills, improve lifelong learning, and reduce the digital divide.

Belgium's federal ministry of the economy has taken on board the recommendation in the 2023 State of the Digital Decade report on digital skills by organising an inter-ministerial economic commission (IEC) on digital skills This commission focused on acknowledging and identifying all the stakeholders within that particular ecosystem and sharing best practices that might lead to future collaborations or cross-fertilisation of ideas.

Digital inclusion is well-developed within Belgium's administration. The federal ministry of the economy has a department dedicated to promoting digital inclusion. One of their tasks is to implement the inter-federal 'Women in Digital' strategy through calls for projects, studies, etc. To measure the impact and progress of their initiatives and efforts in digital inclusion, KPIs are being developed in close cooperation with the Belgian regions and other federated entities. In addition, Belgium holds an annual 'Women in Digital Day' in April.

Wallonia adopted a **Digital Inclusion Plan** at the end of 2019. This plan includes actions designed to give every Belgian access to both digital training and people capable of helping them with their digital administrative procedures. For instance, an online map (macartonum.be) enables users and intermediaries to identify the 'resource people' closest to them, depending on the help they need. In this Plan, the system of '*Espaces Publics Numériques*' (EPNs, Digital Public Spaces) plays a crucial role. Measures to help existing EPNs have been taken and financial support to create new ones has been launched.

Wallonia is diversifying and increasing its projects to support its citizens because the material obstacles but also the management difficulties remain as preponderant as ever. With the Digital Wallonia strategy, the region has gone a step, beyond simply providing ICT equipment to schools: in 2023, Wallonia launched three calls through the programme to spend EUR 60 million in total, to increase Wi-Fi deployment in the region's schools. The DW4Citizens programme oversees actions linked to digital inclusion, gender, and equity.

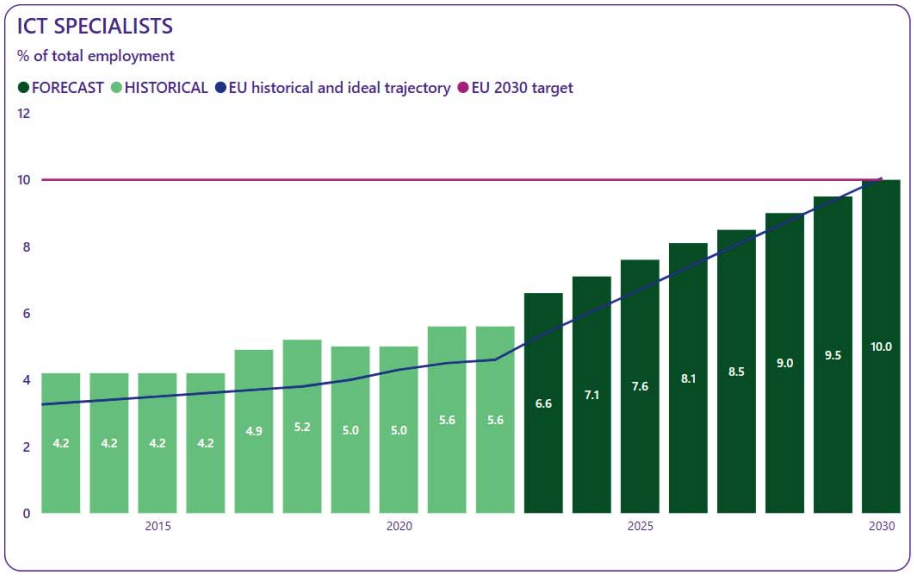
Flanders' new ICT in Education Strategy (Digisprong Action Plan) as part of the Flanders Resilience Strategy, continued to be implemented in 2023. As part of this strategy, major support was given to educational institutions, teachers, and ICT-administrators especially in the fields of: (i) teachers' professional development; (ii) ICT-support at school level; and (iii) better access to (open) digital educational resources. The action plan is ensuring that more than 800 000 devices will be deployed in schools. Its budget is EUR 460 million strong. In addition, a new curriculum reform enacted in 2023 means that **basic digital skills are now a part of compulsory secondary education in Flanders**.

The Brussels Capital Region's digital skills assessment (BCR-Actiris) is a new measure that came into force in September 2023, with the aim of improving the basic digital skills of job seekers, 17.5% of whom do not have an email address. Increasing in digital skills among jobseekers will make them more employable, and increasing the number of unemployed Brussels citizens with basic digital skills will help takle the digital divide in the region.

Best practice: Wallonia's 'Basic Digital Training' Programme

Wallonia's 'Basic Digital Training' Programme started in 2023 and will run through to 2026. Its purpose is to train 3 000 unemployed people each year so they can acquire one or more of the skills listed in the European DigComp reference framework. Trainees and learners will be awarded a certificate of successful training in the skills listed in DigComp. **More new measures were deployed in Wallonia, especially linked to lifelong learning and reducing the digital divide** – in particular, (i) the Lifelong Digital training Programme (linked with Belgium's RRP and running through to 2026 with a budget of EUR 39 200); (ii) a project to set up a digital and technological innovation and training hub (which is receiving 86 800 in funding from the Walloon RRP); and (iii) a project to integrate digital teaching methods in work-linked training courses with the aim of having 30 000 learners and 2 000 trainers trained on the digital platform (which is receiving EUR 6 065 in funding from the Walloon RRP). These projects also include plans to set up new state-of-the-art infrastructures and platforms of excellence. These will focus on developing the skills of the staff managing supercomputers (which will receive EUR 9 700 in funding) and deploying work-linked training for adults throughout their lives (which will receive EUR 27 649 in funding), with objectives to retrain or upskill adults for ICT specialist professions).

3.1.1.b ICT specialists



2023 state of play and recent progress

	Country level	EU level
FORECAST	6.6	5.4
DESI 2024	5.4	4.8
AVERAGE ANNUAL GROWTH %	-3.6	4.3

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Belgium brings a positive contribution to the EU's Digital Decade target for ICT specialists, while demonstrating very limited dynamic.

ICT specialists accounted for 5.4% of the Belgian population in employment in 2023 (273 600 individuals) which is higher than the EU average of 4.8%. In line with the EU average, the number of ICT specialists in Belgium has slowly increased over the past 5 years, with episodes of stagnation and falls. This number is forecast to increase by more than 1 percentage point by 2030 (to 6.6%) which would be slightly above the EU average. Nevertheless, Belgium's target is more ambitious, namely to have 514 000 ICT specialists by 2030 (i.e., 10% of the country's population in employment). **With 272 600 ICT specialists in 2023, Belgium is therefore halfway to achieving its 2030 target.**

The demand for ICT specialists, reflected in the job vacancy rate of the country's ICT sector, remains high. Although the proportion of tertiary education graduates is high overall, **only 3% of the population graduating in Belgium were ICT students in 2022, a slightly greater percentage than in 2021 but still below the EU average of 4.5%. Labour shortages in Belgium can be found mostly in technical occupations,** including jobs requiring qualifications in science, engineering, technology and mathematics (STEM). In 2022, the number of STEM graduates in Belgium was 16.4 per 1 000 inhabitants aged 20-29 versus 23 in the EU.

According to the 2023 European Innovation Scoreboard, Belgium's performance on employed ICT specialists, doctorate graduates in STEM and people with above-basic overall digital skills has not grown between 2022 and 2023 but remains stable. Performance on lifelong learning, on enterprises providing ICT training, and on population with a tertiary education has slightly improved.

In 2023, 28.3% of Belgians had above-basic digital skills which is only slightly above the EU average of 27.3%. What is more, the share of **adults (aged 25-64) participating in life-long learning activities in ICT** (measured by the Eurostat methodology) was 10.3% (versus 10.2% in 2021), below the EU average of 11.9%. It was particularly low among low-qualified people (4% in Belgium versus 4.3% in the EU).

Women represented 19.4% of Belgian ICT specialists in 2023, an improvement on the previous year (18.7%) and in line with the EU average (19.4%). However, the situation remains problematic for girls and women, whose graduation rate in ICT-related subjects is one of the lowest in the EU. Belgium had the lowest share of women tertiary education graduates in STEM in 2021, with 27.4% compared to the EU average of 32.8%.[21] Given these gender gaps and labour shortages, it will be difficult for Belgium to reach its target of having more than half a million ICT specialists by 2030.

Belgium's roadmap includes a large range of measures to increase both the number of ICT workers in the job market and the number of STEM graduates. However, given the starting point and the nature of this target which typically involves long-term investments, it will take some time to evaluate the impact of these actions and measures.

The country has many established and new measures (whether public, private or non-profit) to encourage women to take up ICT-specialist education or ICT jobs. These types of measures are difficult to assess in a quantitative manner and the return on these actions will take some time to evaluate.

In 2023, the federal ministry of the economy launched an ambitious national campaign to promote STEM and ICT education among women, and the results of that campaign exceeded initial expectations.

The Brussels Capital Region launched a new project in 2023 to draw up a regional Web Strategy project by reviewing the entire digital landscape of the Brussels Capital Region. A budget of EUR 12 million is planned to implement the strategy between now and the end of 2026, with the objective of creating and making available new positions attractive to ICT specialists. These specialists will be hired and trained to create a central 'Digital Competence Centre' which will be used by all regional public administrations.

The Walloon region has a coordinated plan which aims to raise awareness of STEM and digital technology and promote job-creating sectors and skills associated with these sectors. It is funded by the Walloon RRP, and its budget is EUR 16 3 million through 2024.

Every year, the CCB supports the organisation of events such as computer-security competitions or 'Challenges' which **nurture the next generation of cybersecurity experts.** It actively promotes the European

[21] European Commission's Digital Scoreboard and https://www.bedigitaltogether.be/

Cybersecurity Skills Framework developed by ENISA to Belgian educational institutions and facilitates collaboration with regions and public/private entities. **The CCB is part of the efforts to set up a European Digital Infrastructure Consortium (EDIC) 'Cybersecurity Skills Academy' under the DDPP.**

3.1.2 Key digital public services and solutions – trusted, user-friendly, and accessible to all

3.1.2.a e-ID

85.85% of Belgian internet users use e-government services, well above the EU average of 75% (DESI 2024). Although Belgium's roadmap does not provide a trajectory for this target, **the country is well on track** to unlock its potential of having 100% of key public services available online by 2030.

In 2023, 77% of Belgium's population had used the existing e-ID solutions to access online services for private purposes in the last 12 months, compared with an EU average of 41.11%. The use of the e-ID to access services provided by public authorities or public services of the country is slightly lower at 59.1% of Belgians, but this is still well above the EU average of 36.14%.

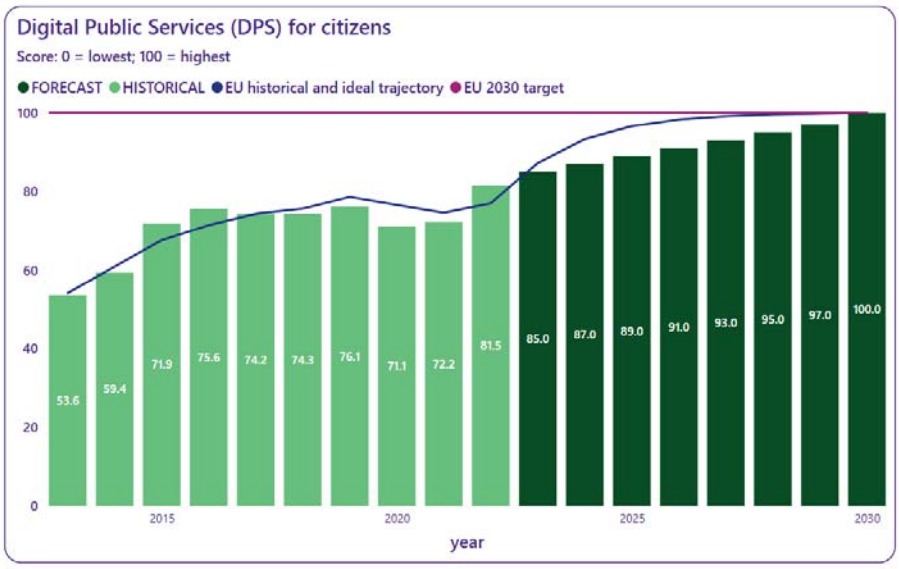
100% of Belgians currently have access to an e-ID means that is notified under eIDAS. Belgium offers six e-ID schemes (e-Cards, itsme®, email OTP, SMS OTP, TOTP and Username/Password). Itsme in particular remains a continued success as Belgium's authentication app, and is a good example of collaboration between the public and private sector. It is now regularly used by 7 million Belgians – about 90% of the active population over the age of 16.

MyGov.be, the Belgian Digital Identity Wallet, was launched in its first version in May 2024 and is now available to each Belgian citizen or resident having an electronic ID card. The MyGov.be digital identity wallet (DIW), in conformity with eIDAS, can also act as an e-ID means to access government services. It includes mobile digital identity authentication, electronic trust services and 'my eBox' (a personal online mailbox in which every Belgian receives official documents). MyGov.be will function as a one-stop-shop for online procedures and transactions with public services. Users will be able to select the features and the data they want to share.

Belgian stakeholders, both public and private, are present in three of the EU's Large Scale Pilots consortia (POTENTIAL, EWC, DC4EU) developing an EU DIW in pilot projects – including in Government ministries and agencies in other EU Member States.

Belgium is the hosting Member State of the EUROPEUM/Blockchain EDIC, which could help promote digital identity wallets and create standards for verifiable credentials. Work in this area could be extended from digital personal identity to company identity. This would further encourage the adoption of DIW and also support the Digital Decade target for the digitalisation of public services.

3.1.2.b Digitalisation of public services for citizens and businesses



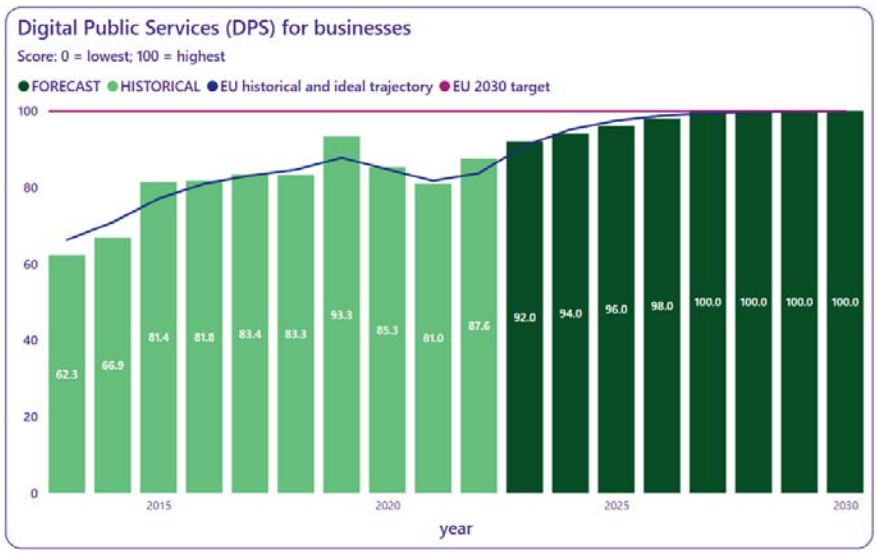
2023 state of play and recent progress

	Country level	EU level
FORECAST	85.0	87.2
DESI 2024	82.3	79.4
AVERAGE ANNUAL GROWTH %	1.1	3.1

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap



2023 state of play and recent progress

	Country level	EU level
FORECAST	92.0	90.9
DESI 2024	91.6	85.4
AVERAGE ANNUAL GROWTH %	4.6	2.0

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

Belgium brings a positive contribution to the EU's Digital Decade targets for the digitalisation of public services. On both public services for citizens (82.3) and businesses (91.6), Belgium ranks above the EU average (respectively 79.4 and 85.4).

Belgium's performance on the digitalisation of public services for businesses is showing a very strong dynamic, with an annual growth of 4.6%, compared with the EU average of 2%. At this rate, Belgium is on track to reach its target of 100% digitalisation before 2030. However, **the country's performance in the digitalisation of public services for citizens is less impressive**, growing at 1.1% a year compared with an EU

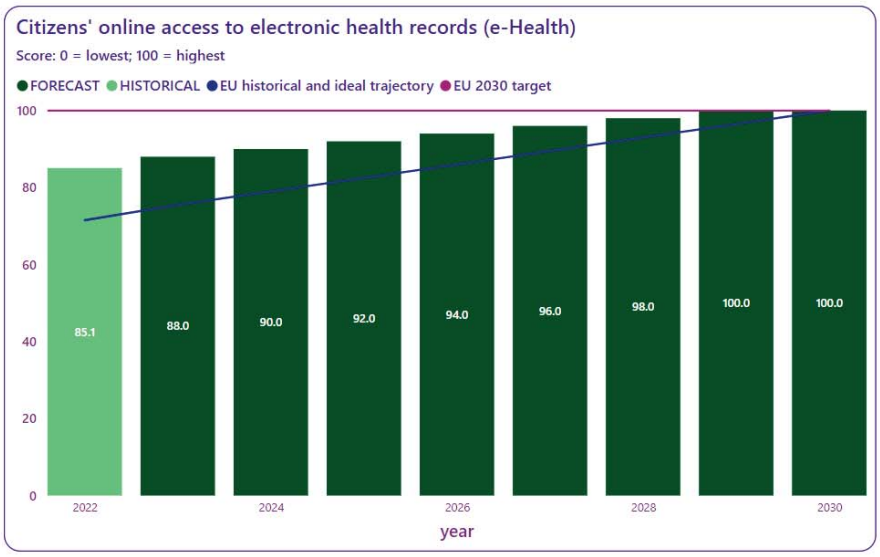
average of 3.1%. This puts at risk Belgium's ability to achieve its target to digitalise 100% of public services by 2030.

This national picture obscures significant regional variation within Belgium. In particular, the online availability of digital public services for citizens in Flanders was 89% in 2023, and the online availability of digital public services for enterprises was 95% (both of which were above the EU average of 79.4% and 85.4% respectively) as measured by the e-Government Benchmark. This strong performance a direct result of the considerable investments the Flemish Government made as part of the Flemish RRP and in the development of new local digital services as part of the 'Municipality without Municipal Hall' project.

Some progress has been made in the digitalisation of public administration, especially e-justice, as part of the RRP. Many measures in Belgium's RRP will contribute to the digitalisation of the public administration and to the reinforcement of the range of online public services. However, so far only the digitalisation of the justice system has started.

At the federal level, the e-Box Citizen & Business continues to improve its user friendliness, and was updated with a system of notifications and reminders. **A new federal law (13 July 2023)** created a legal framework for receiving and sending qualified electronic registered email via the e-Box, and it requires the obligation for certain public services to send registered emails electronically.

3.1.2.c e-Health



2023 state of play and recent progress

	Country level	EU level
FORECAST	88.0	75.5
DESI 2024	100.0	79.1
AVERAGE ANNUAL GROWTH %	17.6	10.6

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

In 2023, Belgium was the first EU Member State to score 100 for the maturity of its e-health system on the e-health indicator, in line with the EU target on access to electronic health records. This compares to a maturity score of 85 in the previous year and is above the EU average of 79.

Centralised, nationwide access to online health records is available in Belgium. 80-100% of the national population is technically able to access online e-health records through both native mobile applications and an online portal (through a web browser), logging in using an e-ID compliant with the eIDAS Regulation. **Belgium scores 100 in the health –data categories, compared with a European average of 74.** All applicable categories of healthcare providers, both private and public, supply relevant data to the system. On access opportunities for certain categories of people such as people with a disability, Belgium scores 100

compared with a European average of 77 and follows the EU's guidelines for Web Content Accessibility. The main improvement made by Belgium's e-health records system between 2022 and 2023 is that health data is now made available more quickly.

In Belgium, rehabilitation centres and geriatric nursing homes do not process electronic health records as this is done by the individual healthcare providers chosen by citizens living in these facilities. Although Belgium does not have nationally provided, native, mobile health application, other applications enabling access to national health data records are made available for free in the app stores by different actors in the ecosystem.

To improve the quality of service, Belgium could consider going beyond the minimum requirements of the e-health methodology to monitor the supply of a more diverse set of health data by ensuring that all categories of healthcare providers supply a wide set of health data to the national e-health records system. Belgium could also set up a feedback system in which citizens could report any limitations in access to their data.

In 2023, 54.7% of Belgium's population said that they sought health information online, which is close to but slightly lower than the EU average of 56.3%.

Belgium has a strong track record when it comes to in the digitalisation of health services. The federal and regional governments are contributing actively to the digital extension of high-quality healthcare. For example, a project is currently underway to digitise health records in **Wallonia. Flanders** has been working on a renewed health data exchange platform called Vitalink, which that exclusively uses international information standards and follows the latest technological principles. Vitalink will launch in 2024 and focuses on three domains: Minimal Dataset, Integrated Care, and Prevention.

With the launch of Alivia in 2023 and 2024, Flanders has a new measure that reflects the region's priority to invest in a digital care and support plan. Alivia aims to contribute to multidisciplinary collaboration and data sharing as part of integrated care. Data from Alivia can be shared between care providers and with the patient, with respect for medical confidentiality and privacy. With Alivia, Flanders wants to improve the flow of digital information between healthcare actors and Government, which is essential to achieve high-quality and efficient care provision throughout the chain of care and welfare. Following its development in 2023, the Alivia programme is being tested in two pilot regions, with the use of a care planning methodology and which will include impact assessment and training. The plan will cost EUR 19 million strong and be rolled out across Flanders in 2025. The objectives of the plan include greater interdisciplinary collaboration, improved care quality, better-informed care teams, better care planning, greater transparency within the care team with guaranteed privacy, and empowered patients through a user-friendly mobile app. **This initiative contributes to: (i) the Digital Decade's objectives, including those related to increasing the accessibility of public services in a trusted and secure online environment; and (ii) the Declaration on Digital Rights and Principles, by putting people at the centre, and by guaranteeing safety, security, and empowerment**.

3.2 Building a safe and human-centric digital environment and preserving our democracy

Hate speech is a growing problem in Belgium. In 2023, a Eurostat survey showed that 31% of the population encountered messages online that were considered hostile or degrading in the previous 3 months (EU average: 33.5%).

Belgium considers it of the utmost importance to adopt a human-centred approach to the EU's digital transformation, in line with the Declaration on Digital Rights and Principles of utmost importance.

According to the Digital Decade Eurobarometer, 80% of Belgian respondents said they thought that **digital technologies will be important for engaging in democratic life** (EU average: 74%). Moreover, Belgian respondents' **satisfaction with how well digital rights and principles are applied in their country tends to be well above the EU average in all aspects.**

Because the Declaration's principles are especially relevant in the domains of AI and the creation of more competitive data markets, **Belgium's EU Presidency placed special emphasis on algorithmic transparency and virtual identity protection.**

In 2023, the CCB, Febelfin and the Cyber Security Coalition joined forces to organise for an annual cybersecurity-awareness campaign. They distributed campaign materials about phishing to more than 600 organisations in order to raise awareness among colleagues, customers, and students.

Belgium's federal administration participates in AI4Belgium, a community that enables Belgians and Belgian organisations to make the most of the opportunities of AI while responsibly facilitating the ongoing digital transformation. This coalition brings together key AI players from the public sector, private sector, academia, and civil society – **reflecting the 'whole-of-government' approach** that is at the heart of the Digital Decade. AI4Belgium works on topics such as the ethical use of AI within public services. **In 2023, AI4Belgium, with the support of policy officials and all stakeholders developed and launched an Ethical AI Assessment Tool. This initiative reflects Belgium's efforts to build on its existing communities to: (i) reinforce the collaboration between various stakeholders; and (ii) to step up its efforts to digitalise the public administration through the responsible use of technologies such as AI.**

The Belgian Government has increased its efforts to ensure the broader participation of citizens in the digital transformation and in public policymaking more broadly. In 2023, the federal ministry with responsibility for IT and training (FPS BOSA) developed **'MyOpinion', a free online platform** designed to consult citizens and spark debate on projects in the public space or of public importance. This platform is an open-source tool, which FPS BOSA offers to any Governmental administration in Belgium that wishes to use participatory processes. The ministry provides the necessary support for users to become familiar with the tool, such as dedicated workshops and communication tips, as well as support on more technical aspects and the maintenance of the platform. **This initiative combines the digitalisation efforts of public administration with a drive to involve the public in more democratic processes such as through participation online**.

In January 2024, a call was published for candidate members to join the Advisory Committee on Ethics in Data and Artificial Intelligence of the **Belgian federal Government**. This announcement invited **interested individuals to apply for this committee**, which will play an advisory role in ethical issues related to data and AI within the federal Government. As a result of the call, **several citizens' assemblies on AI were held for the first time through 2024 as part of Belgium's presidency of the Council, placing a special emphasis on citizens' participation**. The Advisory Committee is one of the Citizen Participation Programme's initiatives. Participants were invited to deliberate on a range of topics including the impact of AI on work, education, and democracy.

These measures reflect Belgium's efforts to: (i) involve people more in the reflections around the digital economy and the integration of technologies in public services and society; and (ii) promote the Declaration's principles such as the values of ethics and transparency.

Best practice: Initiatives in Flanders to empower people in the digital society

Following the AI breakthroughs of 2023, **Flanders' Knowledge Centre for Digital Education Digisprong published several guidelines on the use of AI in educational contexts**. Digitsprong also promoted European guidelines on the ethical use of AI in education. The Flemish Ministry of Education and Training drew up a more comprehensive vision statement on AI in education, in close cooperation with the education sector and the Flemish Knowledge Centre for Data & Society. This vision statement will guide the Flemish educational authorities in their development of specific actions to deal with AI in educational contexts.[22] This initiative reflects efforts by the region to support actors in education, so as to ensure they are equipped to teach in an evolving educational context and are aware of the digital transformation's impact on education. **This action by Flanders contributes to the Digital Decade's objectives, including those related to: (i) empowering the public sector and people; and (ii) ensuring the ethical and transparent integration of technologies like AI into society.**

In 2023, **the Flemish Government also set up an AI Competence Centre to help the Flemish Government to fully harness the potential of AI.** The Centre is tasked with providing guidance on AI ethics, fairness, transparency, and responsible AI practices, and to help set government-wide standards and policies. It will run pilot projects to demonstrate the value of the technology and maintain an overview of the existing AI initiatives and projects within the Flemish Government. It will also raise awareness and train Government employees in the necessary AI-related skills through workshops and training. **This initiative therefore combines digitalisation efforts for the public administration through awareness raising and skilling, thereby fostering the Digital Decade's targets and objectives, while promoting several digital rights and principles of the Declaration.**

As part of the calls under the 'Municipality without Municipal hall' project, the Flemish Government granted a subsidy in 2023 to develop digital solutions to encourage and promote citizens' participation in the formulation of local policy.

By enabling secure and controlled data exchanges, the new Flemish company FTI BV aims to create a reliable way for in which citizens, knowledge institutions, companies and governments to collaborate on innovation. Flanders is positioning itself at the forefront of data technology by embracing and leveraging AI to increase efficiency and address societal challenges. It is doing this by launching a personal data-storage platform—based on the Solid standard—empowering citizens with control over their data sharing, and by showcasing its innovation capabilities with the FTI 'Personal Health data Vault' project.

[22] Guidelines for schools: https://www.vlaanderen.be/kenniscentrum-digisprong/themas/innovatie/artificiele-intelligentie/longread-hoe-omgaan-met-tekstschrijvende-ai-programmas#hoe-reageer-ik-als-leerlingen-ai-gebruiken-zonder-dat-te-vermelden; Ethical guidelines:
https://www.vlaanderen.be/kenniscentrum-digisprong/themas/innovatie/artificiele-intelligentie; Vision statement:
https://assets.vlaanderen.be/image/upload/v1704290407/Ontwerp_visienota_AI_v1_shm13q.pdf

4 Leveraging digital transformation for a smart greening

Belgium has room for improvement in both environmental innovation and measures to create synergies between green and digital policies. Nevertheless, Belgian federal and regional governments, as well as Belgian enterprises prioritise environmental impacts when adopting ICT strategies and solutions, aligning closely with EU norms. Belgium is making some concerted efforts to integrate digital technologies with environmental sustainability, which reflects a proactive stance by the country in moving towards a greener and more digitally advanced future. **Significant strides can be seen in environmental strategies across Belgian regions. Although it is already carbon neutral,** Belgium's telecoms sector remains committed to further reducing emissions and increasing energy efficiency. Regulatory bodies like the BIPT, Belgium's national regulator, actively monitor and encourage environmental efforts among operators, contributing to the industry's sustainability goals.

Measures in the Repower EU chapter of Belgium's RRP are relevant for digital policy as they are linked to the promotion of smart energy systems (including smart grids and ICT systems) and related storage. In particular, Investment I-7.17 aims at optimising energy distribution in Wallonia, through subsidies awarded to two electricity network operators. Investment I-7.20 also aims to develop an offshore energy hub ('energy island') in the Belgian part of the North Sea. Building this energy hub will make it possible to: (i) connect at least 3.15 GW of future offshore wind energy to the onshore electricity grid; and (ii) facilitate the integration and import of more renewable energy in and around the North Sea by connecting to other countries or regions. The implementation of both these measures will be completed by 30 June 2026.

According to the Digital Decade Eurobarometer, 77% of Belgian respondents consider that **digital technologies will be important to help fight climate change** (EU average: 74%) and 81% believe that public authorities should ensure these technologies serve the green transition (EU average: 81%).

According to the 2023 European Innovation Scoreboard**, Belgium shows a mixed performance overall on indicators related to climate change,** with an above-average share of material resources coming from recycled waste materials but a below average score on environmental innovation. Belgium's relative weaknesses lie in environment-related technologies, for which its performance decreased by 12.5 percentage points between 2022 and 2023. 50% of Belgian enterprises of 10 employees or more consider the environmental impact of ICT solutions and devices when choosing these devices, and apply some measures to reduce the paper and energy consumption of ICT devices, compared with an EU average of 48.7%. Recycling is more common in Belgium than in other EU countries on average, with 17% of individuals recycling their desktop computers, 13% their tablets and 12% of individuals their mobile phones (versus 12.8%, 9.7% and 10.4% respectively at EU level).

The environmental and circular-economy priorities are now at the heart of federal and regional strategies and funding programmes.

In April 2023, **the *Plan Air Climat Energie* (PACE)** was endorsed by the regional parliament of **Brussels** to drive the region towards a sustainable future.

Flanders supports Imec SSTS, an ongoing measure to engrain sustainability in the entire global semiconductor value chain by setting up joint research programmes to: (i) reduce the sector's carbon footprint; (ii) reduce water consumption; and (iii) improve the recyclability of semiconductor materials. Flanders is also joined by leading international partners in Imec SSTS, and partially through collaboration with partner entities.

The new Flemish ICT in Education Strategy (Digisprong Action Plan) from the Flanders Resilience Strategy is ensuring that more than 800 000 ICT devices are deployed in schools. Its budget is EUR 460 million. **As part of the Digisprong Action Plan, the Ministry of Education deployed a green IT strategy**, which clarifies where schools can leave their outdated IT infrastructure. To this end, the ministry also concluded agreements with certified organisations that safely collect old IT material and, if necessary, refurbish it. The action plan also encourages sustainable dismantling if refurbishing is no longer possible. Agreements were made to this end with all parties. **A toolbox launched in 2023 guides schools and offers them help** to find partners for the collection, refurbishment or dismantling of their e-waste.

The Walloon Region is pursuing its circular-economy strategy through the Digital Wallonia and Circular Wallonia strategies. As part of these strategies, **the Digital Wallonia4Circular programme** aims to activate digital technologies to accelerate the deployment of the circular economy in the priority value chains identified by Circular Wallonia. The **'Implement IT 4 Circularity'** second call for projects was launched in 2023 and aimed at the plastics, construction and buildings, water cycle, metallurgy (including rare metals and batteries), textiles, food systems, and biobased economy sectors. This opportunity for Walloon businesses to take part in the transition to a circular economy dynamic is thanks to the resources provided for in Wallonia's RRP. In total, 17 projects to the 'Implement IT 4 Circularity' call for a total budget of over €900 000, covering 7 sectors. In December 2023, 9 projects were selected.

These strategies and programmes increasingly acknowledge the growing importance of the link between digital policy and the environment in the use of digital technologies as a facilitator of sustainable development or in support of a more responsible, ecological, and circular digital economy.

Best practice: Reports on Sustainability by Belgium's telecoms sector and the national telecoms regulator BIPT

Belgium's national telecoms regulator BIPT is committed to monitoring the environmental efforts of telecoms operators and making these more visible, in the belief that this will eventually help to reduce the environmental footprint of the telecoms industry. Although the Belgian telecommunications market is already carbon neutral thanks to the emission allowances it has purchased, it is making further efforts to continue reducing carbon emissions. Belgian telecoms players are performing in line with their peers elsewhere in the EU, with the sustained commitment to achieve net-zero carbon emissions based on the Science-Based Targets Initiative (SBTi) by 2040 at the earliest. Belgian telecom operators and data centres continuously invest in improving their energy efficiency and use mostly renewable energy. Most data centre players have committed (or will commit) to either the SBTi or the Climate Neutral Data Centre Pact, aiming to reduce the overall carbon emissions of data centres by 2030.

To help promote the transition towards a more digital and energy-efficient industry, the BIPT published on 29 December 2023, in collaboration with telecom operators, an update of its report on the sustainability of telecom networks in Belgium. The report specifically looks at changes in energy consumption, CO_2 emissions and waste disposal over the past 5 years. The telecoms sector accounts for less than 0.2% of total energy consumption (electricity, oil, gas, etc.) in Belgium. The study shows that a fixed network requires up to 35 times less energy than a mobile network to transmit the same amount of data. **Overall, the telecoms sector accounts for very little of Belgian energy consumption (less than 1%) and its carbon emissions are also limited (less than 1% of Belgian carbon emissions)**. In the past 5 years, energy consumption by telecoms operators has fallen by 9%, CO_2 emissions by telecoms operators have fallen by 19% and the quantity of waste (cables, antennas, servers, smartphones, modems, etc.) has fallen by 48%. The report shows that sustainability is already an important theme for the three examined **major**

telecom operators (Orange Belgium, Proximus and Telenet), which have set many goals and launched many initiatives in the sustainability area.

Annex I – National roadmap analysis

Belgium's national Digital Decade strategic roadmap

On 22 December 2023, Belgium **submitted** its national strategic roadmap, in accordance with Article 7 of the DDPD. Belgium consulted on the roadmap through a series of workshops with stakeholders and the roadmap was subsequently **approved by Government memorandum** and **published.** The roadmap includes **national target values** for almost all targets in the DDPP. No value is assumed for FTTP for which a rough estimate is provided. Belgium does not provide targets for edge nodes.

The roadmap refers to the EU's Declaration on Digital Rights and Principles, and Belgium has been exploring closer cooperation with its regions in these areas, as recommended by the EU's first State of the Digital Decade report of 2023.

The roadmap is coherent overall, with efforts needed across all the dimensions of digitalisation. Looking at the various measures, the recommended actions identified in the first State of the Digital Decade report are broadly well reflected. Nevertheless, Belgium highlights that at the time the roadmap was being written, many of these proposed recommendations had yet to be advanced further into solid actions, because these actions are only in their initial or planning stages. Moreover, the roadmap describes well how its **policies, measures and actions support each of the targets and groups of objectives.**

Most measures set out in the roadmap cover basic digital skills, ICT specialists, the digitalisation of businesses, and the digitalisation of key public services. In comparison, the roadmap contains **fewer measures** supporting connectivity and gigabit internet subscriptions, owing to the distribution or sharing of competences between regional and federal levels.

The table below reflects a best-effort attempt at categorising the measures and budget as presented in the Belgian roadmap.

Digital Decade Target/objective	Budget (EUR Million)	Number of measures
Connectivity Gigabit	46.9	8
Connectivity 5G	79.7	2
Semiconductors	0.2	4
Edge nodes	0.0	1
Quantum computing	12.9	2
SME take up	0.8	16
Cloud/AI/Big Data uptake	142.2	12
Cloud only uptake	-	-
AI only uptake	-	-
Big data uptake	-	-
Unicorns	1.1	8
Basic Digital Skills	542.5	39
ICT Specialists	1.4	24
e-ID	0.0	7
Key Public Services	45.0	29
e-Health	19.1	9
Objectives	-	-
Total	**891.8**	**161**

The measures set out in the national strategic roadmap address some of the main challenges that Belgium is facing (such as on digital skills, digitalisation of public services and of enterprises), which were identified in the roadmap, and covered under the Digital Decade programme recommendations. These measures also represent an intensification of previous efforts, in terms of both: (i) more and new measures to support skills and the digitalisation of businesses and key public services; and (ii) support for the wider objectives of the DDPP (in particular those objectives relating to: digital citizenship; the gender and geographical divide; an inclusive, transparent and open digital environment; and sustainability). However, some objectives such as those relating to competitiveness, sovereignty, leadership, and resilience (including cybersecurity) could benefit from similar emphasis in the roadmap given Belgium's prominent assets. The addition to Belgium's roadmap of measures to increase synergies between private and public actors in several areas of the Digital Decade is to be welcomed, especially as this reflects the first report's recommendations for Belgium to involve stakeholders more through better coordinated approaches.

Annex II – Factsheet on multi-country projects (MCPs) and funding

MCPs and EDICs

Belgium is part of the process for most EDICs, which suggests a high degree of involvement of the country and its regional entities in the DDPP. The country is involved in the three EDICs that have been set up, including: (i) the EUROPEUM/Blockchain EDIC as the hosting Member State; (ii) the ALT-EDIC (Alliance for Language Technologies EDIC), as an observer; and (iii) the Networked Local Digital Twins towards the CitiVERSE EDIC, of which it is a member. To the end of May 2024, Belgium is also engaging in discussions on the set-up of the possible future EDICs on Digital Commons and Agri-Food, within their respective informal Working Groups. The country is developing the Statute and other relevant documents of the possible future Genome EDIC. It has expressed interest in participating to the discussions about setting up the possible future EDIC for Mobility and Logistics Data.

Moreover, Belgium is a member of the **EuroHPC LUMI pre-exascale supercomputer consortium.**

Belgium is part of the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS) – with indirect partner only – which was approved on 5 December 2023. And Belgium is part of the IPCEI on Microelectronics and Communication Technologies (IPCEI-ME/CT) which was approved on June 23rd, 2023, and will aim to improve R&D projects to develop several critical technologies in various sectors.

Six European Digital Innovation Hubs are now active in Belgium, namely sustAIn.brussels, Flanders AI, Walhub, DIGITALIS, EDIH-CONNECT, and EDIH-EBE.

Flanders is engaged in a Sectoral Testing & Experimentation Facilities for AI, including Smart Cities & Communities, Agrifood, and Edge-AI chips. The University of LLeuven is coordinating the Pioneer 2.0 project, which was selected in a call of the Digital Europe programme. A number of Flemish, Walloon and national organisations have joined forces under the Programme to set up the **Belgian-QCI project, the first quantum key distribution network in Belgium.** Furthermore, Flanders is active in healthcare partnerships at EU-level, especially with Interreg Europe and EUREGHA, where cross-border data sharing in healthcare is on the agenda.

Belgium indicated that given the country's size and its building capacity, a cross-border approach would be a better way to handle targets for semiconductors and quantum computing in particular.

EU funding for digital policies in Belgium

EU funds support digitalisation efforts in Member States. According to the Joint Research Centre[23], EUR 1.1 billion of the Belgian Recovery and Resilience plan directly contributes to achieving Digital Decade targets. The largest digital measure in the RRP is dedicated to key public services (EUR 391.2 million). The measures supporting basic digital skills and ICT specialists amount to EUR 132.1 million and EUR 88.1 million respectively.

In addition, out of the Cohesion Policy funds received by Belgium, EUR 149.5 million contributes directly to Digital Decade targets according to the same mapping study.

[23] Based on an estimation of the possible contribution to the Digital Decade (Joint Research Centre report 'Mapping EU level funding instruments to Digital Decade targets - 2024 update' (Signorelli et al., 2024)).

State of the Digital Decade 2024

Bulgaria

1 Executive summary

Bulgaria has scope to improve its performance to contribute the European Union's (EU) Digital Decade objectives and targets, in view of a successful digitalisation that fosters competitiveness, resilience, sovereignty, European values and climate action.

In 2023, Bulgaria has made notable progress in the delivery of online services to businesses, and in its contribution to the development of strategic technologies such as chips and quantum computing. Particularly important **challenges** persist in terms of basic and advanced digital skills, the adoption of technologies by its enterprises, and closing urban-rural divides.

Although Bulgaria continues to perform well on fixed gigabit connectivity, its **5G coverage** remains below the EU average. The **uneven distribution of digital infrastructure in sparsely populated, remote and rural areas** also requires further attention. Bulgaria should promote favourable conditions for the successful digitalisation of its SMEs to **foster technology transfer and accelerate the uptake** of technologies, in particular Artificial Intelligence (AI). The **uptake of digital public services by citizens is still low** and targeted measures are needed to address this. Leveraging its strong performance in connectivity, Bulgaria can accelerate access to digital services for all.

According to the Special Eurobarometer survey on the 'Digital Decade 2024'[24], 73% of the Bulgarian population considers that the digitalisation of daily public and private services is making their lives easier (on a par with the EU average of 73%).

Regarding participation in **European Digital Infrastructure Consortiums** (EDICs), Bulgaria is a member of the established Alliance for Language Technologies European Digital Infrastructure Consortium **(ALT-EDIC),** which aims to address the scarcity of European language data available for AI solutions. To May 2024 and with other Member States, Bulgaria is developing the Statute of the Genome EDIC and the Statute of the Mobility and Logistics Data EDIC within their respective informal Working Groups[25].

Bulgaria's Recovery and Resilience Plan (RRP) dedicates 23.1% of its funding to the digital transformation (EUR 1.3 million)[26]. Under Cohesion Policy, an additional EUR 1.3 billion (13% of the country's total Cohesion Policy funding) is allocated to the country's digital transformation[27].

[24] Special Eurobarometer 551 on 'the Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351

[25] Information last updated on 31 May 2024.

[26] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation.

[27] This amount includes all investment specifically aimed at or substantially contributing to digital transformation in the 2021-2027 Cohesion Policy programming period. The source funds are the European Regional Development Fund, the Cohesion Fund, the European Social Fund Plus, and the Just Transition Fund.

Digital Decade KPI [1]	Bulgaria			EU		Digital Decade target by 2030	
	DESI 2023	DESI 2024 (year 2023)	Annual progress	DESI 2024 (year 2023)	Annual progress	BG	EU
Fixed Very High Capacity Network (VHCN) coverage	85.6%	88.6%	3.5%	78.8%	7.4%	100%	100%
Fibre to the Premises (FTTP) coverage	85.6%	88.6%	3.5%	64.0%	13.5%	100%	-
Overall 5G coverage	67.2%	70.9%	5.4%	89.3%	9.8%	100%	100%
Semiconductors		NA					
Edge Nodes		5		1 186		x	10 000
SMEs with at least a basic level of digital intensity	25.2%	28.4%	6.2%	57.7%	2.6%	60%	90%
Cloud	9.9%	14.2%	19.8%	38.9%	7.0%	15%	75%
Artificial Intelligence	3.3%	3.6%	4.4%	8.0%	2.6%	11%	75%
Data analytics	NA	21.9%	NA	33.2%	NA	9%	75%
AI or Cloud or Data analytics	NA	29.3%	NA	54.6%	NA	35%	75%
Unicorns		0		263		x	500
At least basic digital skills	31.2%	35.5%	6.7%	55.6%	1.5%	52%	80%
ICT specialists	3.8%	4.3%	13.2%	4.8%	4.3%	5%	~10%
eID scheme notification		Yes					
Digital public services for citizens	59.5	67.5	13.4%	79.4	3.1%	100	100
Digital public services for businesses	80.8	91.9	13.8%	85.4	2.0%	100	100
Access to e-Health records	77.2	77.2	0.0%	79.1	10.6%	100	100

[1] See the methodological note for the description of the indicators and other descriptive metrics

National Digital Decade strategic roadmap

With respect to **Bulgaria's** contribution to the Digital Decade reflected in its roadmap, it is demonstrating **a high ambition**, and, based on this document, intends to allocate **significant effort** to achieve the Digital Decade objectives and targets.

Bulgaria's roadmap partly reflects the efforts needed in all the dimensions of digitalisation. The roadmap presents a realistic, comprehensive assessment of the country's state of play and capacity to achieve the Digital Decade targets, aligning its efforts with the recommendations of the 2023 State of the Digital Decade report. **The total budget for the 60 measures presented is estimated to be EUR 2.19 billion (about 2.3% of GDP). Around three fourths of the roadmap's measures presented are new** and are especially focused on **basic digital skills, the digitalisation of businesses, and of key public services**, which reflect Bulgaria's main areas for improvement. There are **fewer measures on targets and objectives related to connectivity**, although the country is a frontrunner in gigabit connectivity. The roadmap **includes targets and trajectories for all KPIs except for** unicorns. Most targets that Bulgaria has set for 2030 are below the **EU's target levels of ambition, with the exception of digital public services and 5G coverage**. Some aspects require more effort, especially targets for basic and advanced digital skills as well as for the digitalisation of enterprises. Bulgaria only refers once to the Declaration on Digital Rights and Principles in its roadmap. **Limited information is provided on the green transition and Bulgaria could strengthen its narrative** on objectives, in particular in the areas of cybersecurity, resilience and sovereignty, and digital inclusion.

Recommendations for the roadmap

Bulgaria should, when submitting adjustments to its national roadmap in accordance with Article 8(3) of the DDPP Decision:

- **TARGETS:** (i) Provide national targets for the following KPIs: unicorns, edge nodes and e-ID; (ii) Present national projected trajectory for unicorns; (iii) Align the level of ambition of the national targets for basic digital skills, ICT specialists, digitalisation of SMEs, take up of advanced technologies (cloud, AI, data analytics) by enterprises.
- **MEASURES:** (i) Clarify the budget description of all presented measures, highlighting EU sources such as the RRF; (ii) Indicate clearly whether the measures are investments or reforms; (iii) Include more targeted, specific measures and policies that contribute to synergising the digital transformation and the green transition; (iv) Provide **more information on the implementation of digital rights and principles** (and Digital Decade general objectives), including what national measures contribute to it.
- **CONSULTATION:** Report with more detail the results of the consultation process and include more information about the stakeholders invited.

Digital rights and principles

The Special Eurobarometer 'Digital Decade 2024' highlights key insights into Bulgarian perceptions of digital rights. While 40% of Bulgarians believe the EU protects their digital rights, their confidence remains below the EU average of 45%. Concerns have grown, with 52% worried about children's online safety, a 12-point increase, and 36% concerned about their online privacy, up 7 points. On a positive note, 63% trust in affordable high-speed internet and the advancement of their digital skills. The monitoring of the Declaration on Digital Rights and Principles shows that increasing the profile of the Declaration at national level and fostering better stakeholder engagement could help improve outcomes in the years to come[28].

A competitive, sovereign and resilient EU based on technological leadership

In the area of digital infrastructure and connectivity, Bulgaria is one of the frontrunners in the EU. It is important for Bulgaria to **address inadequate digital infrastructure coverage in sparsely populated**, remote and rural areas, as this is a persistent challenge for 5G wireless and gigabit connectivity, in particular with public funding, especially in the rural, remote and scarcely populated areas where operators have no commercial drivers in investing in the deployment of VHCN. 5G in the 3.4-3.8 GHz band, an essential band for enabling advanced applications requiring large spectrum bandwidth, covered 45.1% of Bulgarian households in 2023, slightly below the EU average (50.6%). Take-up of high-speed broadband is poor with the share of fixed broadband subscriptions reported at 53.4% for speeds of more than 100 Mbps (below the EU average) and 1% for speeds of more than 1 Gbps. The high prices of gigabit services are an issue, given the low purchasing power of the average user. **Cybersecurity** is an area in which Bulgaria has made regulatory progress, but the country continues to grapple with high cybersecurity risks. According to its roadmap, Bulgaria's digital ecosystem benefits from **established ICT clusters and technology parks, along with access to a skilled workforce and scientific talent.** Despite positive dynamics on SMEs' take-up of cloud and their overall digital intensity, and involvement in AI (such as with the ALT-EDIC, centres of excellence and the creation of BgGPT), the **uptake of digital technologies in the country remains**

[28] See SWD 'Digital Decade in 2024: Implementation and perspective' with annexes, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325, Annex 4.

significantly below the EU average. Areas of the Digital Decade to which the country is expected to contribute significantly include **semiconductors and quantum computing.**

Recommendations – Bulgaria should:

- **COMPETITIVENESS/RESILIENCE:** (i) Stimulate demand in view of reaching full FTTP coverage; (ii) Accelerate efforts to increase 5G coverage; (iii) Ensure sufficient access of new players to spectrum for innovative business-to-business (B2B) and business-to-consumer (B2C) applications and encourage operators to speed up the deployment of 5G stand-alone core networks.
- **DIGITALISATION OF SMEs / TAKE UP OF AI/CLOUD/DATA ANALYTICS:** (i) Accelerate its efforts with more measures aiming to increase SMEs' uptake of technologies, including measures to stimulate investments in technology transfers, such as through more lab-to-market measures, and support to its innovative start-ups; (ii) **Leverage activities as part of the ALT-EDIC and build on its capabilities such as BgGPT** to design new measures aiming at developing the AI ecosystem and fostering AI adoption; (iii) Stimulate the adoption of next generation cloud infrastructure and services by companies of all sizes, including by liaising with the Cloud IPCEI Exploitation office and/or the coordinators and the Member States participating in the IPCEI-CIS.
- **CYBERSECURITY:** (i) **Establish a national cybersecurity infrastructure** to increase the efficiency of cybersecurity measures and integrate cybersecurity into all digitalisation programmes and projects; (ii) Continue the implementation of the **5G Cybersecurity Toolbox** to ensure secure and resilient 5G networks.

Protecting and empowering EU people and society

There have been rapid, positive developments in the field of digital democracy and e-Government over the past 2 years in Bulgaria. **The national scheme for electronic identification is still under construction,** but **regulatory adjustments** introduced in 2023 are considerably improving the situation. **Bulgaria had an overall e-Health maturity score of 77.2 in 2023**, close to the EU average of 79.1. **Despite a positive dynamic, the take-up of online public services by citizens remains below the EU average,** with too few public services provided fully online. Bulgaria has put in place a significant number of measures for training programmes in line with recommendations to upskill and reskill the workforce and address adult learning needs. Nevertheless, **some aspects require more effort**, in particular to improve basic and advanced digital skills, enhance digital inclusion especially for **vulnerable, ageing, or remotely located populations.** There is **room for progress in both raising the population's awareness of its rights and addressing the lack of trust online.**

Recommendations – Bulgaria should:

- **BASIC DIGITAL SKILLS / DIGITAL EDUCATION:** (i) Take additional support measures to compensate for the deficit of basic to advanced digital skills, reviewing the approach on talent retention and providing attractive conditions; (ii) Ensure the implementation of measures that can enhance digital inclusion of vulnerable populations, raise awareness of people about their rights through guidance, and stimulate digital competence/culture from early childhood and throughout working life.
- **ICT SPECIALISTS:** Develop measures including through EU programmes to support companies to hire experts in the least populated areas where technology uptake and the skills gap are

pressing issues.

- **KEY PUBLIC SERVICES:** (i) **e-ID: Further develop and improve the architecture of e-Government, beyond digitisation,** to enhance public procedures' user-friendliness while minimising administrative burden, such as by considering implementing the Once Only Principle; (ii) Continue collaborations with local public or private actors, to address the pronounced regional imbalances which hinder the access to, use and awareness of digital services, in particular regarding the delivery of online services for citizens.
- **E-HEALTH:** (i) Expand the coverage of the online access service to ensure that all citizens can access their electronic health data online; (ii) make the data type of medical images available to citizens through the online access service; (iii) ensure that all data types are made available in a timely manner.

Leveraging digital transformation for a smart greening

Bulgaria has adopted several sustainable ICT practices for its digital transformation. In 2023, several measures promoted the green transition. Some of these measures are ongoing, while others are pending launch or evaluation, and they include measures that focus on the circular economy. Of note, the country aims to become a **world-leading hydrogen valley** – which contributes to priorities of the EU's hydrogen strategy and REPowerEU plan and objectives to achieve climate neutrality. Bulgaria is home to 4 **European Digital Innovation Hubs (EDIHs) with co-funding from Digital Europe Programme and 8 Seals of Excellence,** which play a role in promoting the green and digital development of Bulgarian enterprises. However, there is no comprehensive framework that would make it possible to monitor the impact of digital on the twin transition.

Recommendations – Bulgaria should:

- Develop a coherent approach to twinning the digital and green transitions. First, promote improvements in energy and material efficiency of digital infrastructures, in particular data centres. Second, support the development and deployment of digital solutions that reduce the carbon footprint in other sectors, such as energy, transport, buildings, and agriculture, including the uptake of such solutions by SMEs.
- Monitor and quantify the emission reductions of the deployed digital solutions in line with the relevant EU guidance and with the support of the methodology developed by the European Green Digital Coalition, in view of future policy development, as well as of attracting relevant financing.

2 A competitive, sovereign and resilient EU based on technological leadership

In the area of digital infrastructure and connectivity, and in particular gigabit connectivity, Bulgaria is one of the forerunners in the EU. It is important for Bulgaria to **address the problem of inadequate digital infrastructure coverage in sparsely populated, remote and rural areas** as this is a persistent challenge for 5G wireless and gigabit connectivity. This is particularly the case with public funding, especially in the rural, remote and scarcely populated areas where operators have no commercial drivers in investing in the deployment of VHCN. Take-up of high-speed broadband is poor, with the share of fixed broadband subscriptions reported at 53.4% for speeds of >100 Mbps (below the EU average) and 1% for speeds of >1 Gbps. The high prices of gigabit services are an issue given the low purchasing power of the average internet user in Bulgaria. Furthermore, **cybersecurity** is an area in which Bulgaria has made regulatory progress, but the country continues to grapple with high cybersecurity risks. The end-of-life status of Black Sea submarine cable systems is also noteworthy, as these cables are critical to ensure Bulgaria's digital sovereignty and resilience. According to its roadmap, Bulgaria's digital ecosystem benefits from **established ICT clusters and technology parks, along with access to a skilled workforce and scientific talent.** Despite good recent progress on the take-up of cloud services by SMEs and their overall digital intensity, their **uptake of digital technologies remains significantly below the EU average.** Bulgaria could play an even more active role in the EU's leading initiatives in **semiconductors and quantum computing:** These are areas in the Digital Decade to which the country is expected to contribute significantly in the future.

Bulgaria's **ICT weight as a percentage of GDP** was 6.62% in 2019, growing to 7.37% in 2020, both of which were above the EU averages, a strong indicator of the country's technological progress and its commitment to developing the ICT industry. In 2021, the share of the ICT sector in the creation of growth in Bulgaria (measured in Gross Value Added) was 7.47%, above the EU average of 5.49%. In 2020, the country's ICT sector accounted for 38.4% of business enterprise expenditure on R&D. However, the manufacturing component of Bulgaria's ICT sector represents only 0.23% of GDP. In contrast, ICT services are much more significant, making up 7.27% of GDP. This discrepancy suggests that the Bulgarian ICT sector is highly service-oriented, with a smaller focus on the production of technological goods. In addition, Bulgaria's **R&D intensity** reached 0.77% of GDP in 2022 – far below the EU average of 2.24%. Nevertheless, the country is taking steps to boost innovation and achieve technology leadership in southeastern Europe, an objective that has been included in the country's Foreign Policy Strategy 2024-2030, released in April 2024.

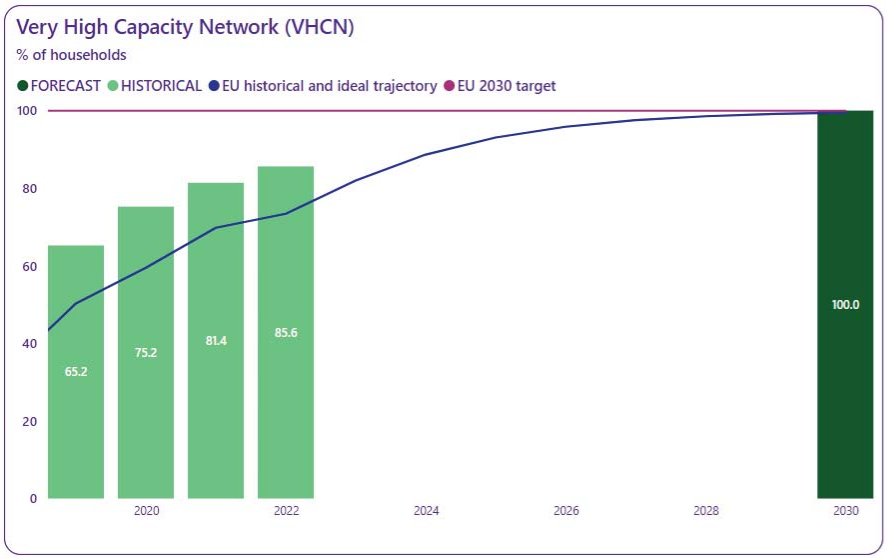
2.1 Building technological leadership: digital infrastructure and technologies

Bulgaria's connectivity and infrastructure make it a leader among Balkan countries. Bulgaria has a well-developed and growing connectivity infrastructure. The internet penetration rate is high, with a significant portion of the population having access to the internet. Broadband services are widely available in urban areas although rural areas lack coverage. Many broadband providers offer high-speed internet services. Bulgaria has a modern telecommunications system and a well-developed mobile network infrastructure, and all mobile operators have also rolled out 5G networks. Several developments in recent years have improved connectivity and will help ensure the country catches up to the EU average for 5G connectivity. These developments include: (i) the introduction of policies supporting the construction of 5G infrastructure; (ii) the 2023 planned updates to the Spatial Development Act; (iii) the granting in 2023 of more spectrum bands; and (iv) recently **reduced spectrum fees**. Bulgaria boasts a large number of data centres and Internet Exchange Points (IXPs), widespread high-speed internet access, and a well-established institutional framework through the Electronic Communications Act and updates to the National broadband Infrastructure plan 'Connected Bulgaria'.

It is important for Bulgaria to address inadequate digital infrastructure in sparsely populated, remote and rural areas, as this is a persistent challenge for gigabit connectivity. Despite high rates of internet penetration, there is limited investment particularly in rural regions. This results in a **strong rural-urban digital divide**. Other hindrances to gigabit connectivity include fragmented infrastructure among small operators, whose coverage is limited to certain regions only, and regulatory requirements for infrastructure deployment. Both administrative delays in the investment process, and insufficiently unified administrative requirements for building high-speed networks also add to the challenge of rolling out digital infrastructure in the country. The end-of-life status of Black Sea submarine cable systems is also noteworthy, as these cables as critical to ensure Bulgaria's digital sovereignty and resilience.

Low take-up of broadband can be explained by low purchasing power – and the high percentage of people at risk of poverty. Compared to the other EU-27 countries, prices for fixed and converged (both fixed and mobile) broadband baskets in Bulgaria are lower than the EU average. No offers were found to be more expensive than the EU average. However, in the specific area of mobile contracts, consumers seeking plans with 1 GB mobile data and 30 calls will find prices slightly higher than the EU average for mobile broadband. **Nevertheless, according to consultations with industry, the monthly fee for gigabit services is high** for the average user; and stakeholders explain that lower prices could negatively affect the investment plans of operators, including in terms of deployment. **The population's concentration in the capital** and a few other large cities are driving coverage priorities to these urban areas, to the detriment of rural and remote areas, where wireless connectivity is unevenly distributed.

2.1.a Connectivity infrastructure (gigabit)

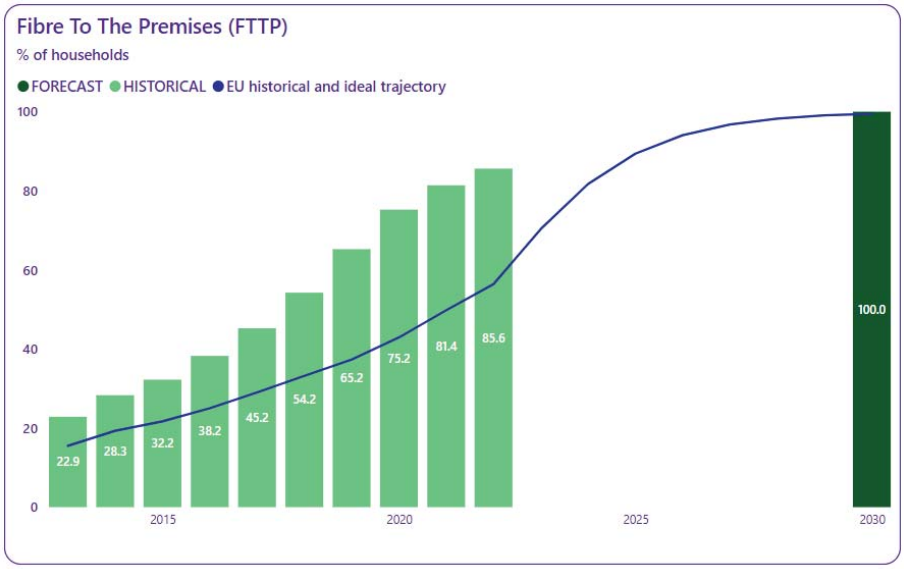


2023 state of play and recent progress

	Country level	EU level
FORECAST		82.0
DESI 2024	88.6	78.8
AVERAGE ANNUAL GROWTH %	3.5	7.4

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap



2023 state of play and recent progress

	Country level	EU level
FORECAST		70.3
DESI 2024	88.6	64.0
AVERAGE ANNUAL GROWTH %	3.5	13.5

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Bulgaria brings a positive contribution to the EU's Digital Decade target for Very High-Capacity Networks (VHCN), while demonstrating limited dynamic. 88.6% of the country's households are already serviced with VHCNs, against an EU average of 78.8%. Taking into account its current rate of progress, Bulgaria would need to intensify its efforts to reach the target by 2030.

Bulgaria brings a very strong contribution to the EU's Digital Decade target for Fibre-to-the-premises (FTTP), while demonstrating limited dynamic. 88.6% of the country's households are connected with fibre, against an EU average of 64%, and with an average annual growth of 3.5%. Taking into account the current rate of progress, which is lower than EU average, reaching the target by 2030 would imply an intensification of efforts here as well. Nevertheless, Bulgaria's goal of reaching this target is ambitious but realistic given: (i) the high and still increasing rate of FTTP coverage; (ii) investments by operators; and (iii) governmental measures. **The gaps to target may be indicators of low demand, and suggest a need for measures to increase digital skills and generate more demand. Due to Bulgaria's rural-urban divide, all the efforts and investments currently being planned may not be enough to bridge these gaps.**

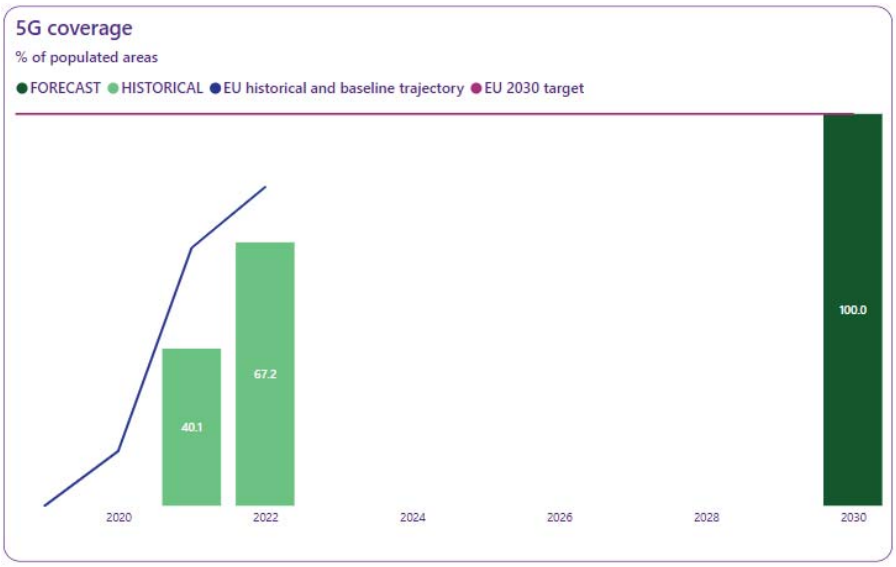
In urban areas, there is widespread availability of such networks (VHCNs, FTTP) provided by a range of alternative operators. The incumbent operator competes with these networks via the deployment of FTTP technologies. As a result, there is strong infrastructure-based competition. However, in rural areas, there is considerably less competition. Even though Bulgaria has made considerable efforts by creating incentives to deploy new infrastructures providing public funding, it remains an extremely difficult task to fully cover these areas. The situation is further complicated by low demand from a substantial part of the population, as only 35.5% of the population has at least basic digital skills.

Bulgaria has included in its roadmap a measure to accelerate its efforts in connectivity and coverage: to support the deployment of VHCNs with a focus on sparsely populated, remote and rural areas. This measure pledges to: (i) ensure that no part of the country or group in society remains without adequate digital connectivity; and (ii) provide better access for businesses to diverse, high-quality, and innovative digital services. The implementation of the measure aims to reduce the digital divide and achieve the digital objective of "all end-users being covered by gigabit connectivity". The measure is part of the investment on "Large-scale deployment of digital infrastructure on the territory of Bulgaria" included in Component 7 'Digital Connectivity' of the RRP. Its implementation runs from 2023 through 2026, and is monitored by the Ministry of Transport and Communications. The planned budget for the measure is EUR 240 million (BGN

470 million) including EUR 200 million (BGN 392 million) from the RRF. It is expected that this measure will ensure access to VHCNs for 350 000 people and build new fibre broadband routes to connect 140 municipal centres.

Another newly added measure aims to develop Bulgaria's backbone fibre network by increasing its transmission capacity and ensuring connectivity to all municipal centres by 2026. This new measure is also part of the investment "Large-scale deployment of digital infrastructure on the territory of Bulgaria" of the RRP. It is funded by the RRF with EUR 69.5 million (BGN 136 million), and complementary public funding and non-recoverable VAT (EUR 13.9 million or BGN 27.2 million) and will provide 265 municipal centres with active equipment access nodes to the state network.

2.1.b Connectivity infrastructure (5G)



2023 state of play and recent progress

	Country level	EU level
FORECAST		
DESI 2024	70.9	89.3
AVERAGE ANNUAL GROWTH %	5.4	9.8

Average, annual growth is computed between the two most recent available data points. No ideal trajectory, and therefore no EU level forecast, is provided for 5G (see 2023 Communication on EU-level trajectories)

Note: The source of national forecast values is the 2023 country roadmap

Bulgaria has scope to improve its performance to contribute to the EU's Digital Decade target for 5G coverage and is demonstrating a limited dynamic in this area. 70.9% of the country's populated areas are covered with 5G, which remains below the EU average of 89.3%. Based on the current rate of progress of 5.4% average annual growth (versus the EU average of 9.8%), it appears that Bulgaria will reach this EU target timely and could go even beyond if efforts are intensified. Furthermore, **5G in the 3.4-3.8 GHz band**, an essential band for enabling advanced applications requiring large spectrum bandwidth, covers 45.1% of Bulgarian households in 2023, slightly below the EU average (50.6%). **Mobile broadband** take-up rate is 79.6%, an increase of 6.1 percentage points compared to DESI 2023, but still below the EU average of 89.94% – placing Bulgaria at **t**he very bottom of this ranking below all other Member States. The share of Bulgarians using **5G SIM cards** was 14.5% in 2023, well below the EU average of 24.6%.

Of note, Bulgaria does not participate in the Joint Undertaking on Smart Networks and Services (SNS JU).

In August 2023, Bulgaria started the update of its National broadband Infrastructure plan 'Connected Bulgaria' to align with the EU targets in this area. The updated plan includes: (i) measures to improve access to high-speed internet in less populated regions; and (ii) investments to introduce 5G networks. Overall, the implementation rate of the previous national broadband plan had been slow (60% in 2019). Mass 4G and 5G deployment and the even distribution of mobile services throughout the country remain issues. This is mainly due to endemic bottlenecks such as slow administration, lengthy formal proceedings, and the fact that spectrum availability had been hindered by military use.

The country boasts **good performance on mobile broadband speeds.** According to the Speedtest Global Index, Bulgaria's 5G performance surpasses that of the major European economies, including Germany, France, Spain, and Italy. The OOkla report from 2023 highlights that all 3 Bulgarian mobile operators (Vivacom, A1, and Yettel) rank within the top 8 European providers in terms of the speed of their services. Notably, Bulgaria has the fifth highest score in Europe for 5G availability, based on a ranking which considers factors such as 5G coverage, tariff structures, and the adoption of capable devices.

The reason why Bulgaria's 5G coverage is below the EU average is primarily due to a lack of spectrum in the 700 MHz band. In 2023, in accordance with the Bulgarian RRP, the Government granted operators the possibility of developing their high-capacity networks in more areas. In particular, the Communications Regulatory Commission (CRC), Bulgaria's national regulatory authority, issued authorisations (licences) to the major mobile network operators so they can use 100% of the 700 MHz and 800 MHz bands – subject to sanitary zones (Decision No. 699/4.10.2023 of the Council of Ministers). Following this decision, Bulgaria made all 5G pioneer bands available, including the 26 GHz band in 2022. Annual fees for spectrum usage were reduced by approximately 40% (twice in total, including in 2023) and changes in the Spatial Development Act were introduced to encourage easier and faster reconstruction activities enabling the optimisation of telecommunication services. A significant jump in 5G deployment by the end of 2024 is expected as a result of these changes, and the gap is closing. All three operators are working to expand their network.

To boost investments, further administrative reforms may be needed to address the bureaucratic hurdles faced by both businesses operating in this sector and interested investors.

Bulgaria is working on the 5G SEAGUL project for uninterrupted 5G and roaming connectivity covering more than 450 kilometres along the motorway from Sofia to Athens. The results of the first phase of the project were presented in April 2024 at the Kulata-Promachonas border checkpoint to the European Commission. The 5G SEAGUL project started in 2023 and is due to be completed in 2025. It is funded by the Connecting Europe Facility under a grant agreement. Bulgarian operator A1 will work on the section between Sofia and the Kulata checkpoint, which is 173 km long, while COSMOTE Greece will provide 5G coverage along about 300 km of the motorway from the Promachonas border crossing to Velestino.

In 2023, another Bulgarian company, CETIN Bulgaria, was selected to receive co-funding under the Connecting Europe Facility (CEF2) programme. The 5G Balkans project will be executed through the period of January 2024-December 2026 and aims to improve the optic connectivity along the cross-border transport corridor Sofia-Serbia (part of the Orient/East-Med TEN-T corridor) by enabling the development of 5G services required for Connected & Automated Mobility (CAM). The Project will contribute to the development of innovative technologies and modern solutions that shall improve the mobility and connectivity in the region, as well as meet the mandatory requirements for the autonomous vehicles scenarios Minimum & Classic. The estimated cost of the project is more than EUR 6.6 million (BGN 13 million), with half of the total being provided by the EU programme. The beneficiaries of the 5G Balkans project are CETIN Bulgaria, CETIN in Serbia and the Technical University of Sofia, while Yettel Bulgaria and Yettel in Serbia are Associate Partners. CETIN Bulgaria will upgrade the existing optic route in Sofia and will build, from end of Sofia (Bozhurishte) to Kalotina, approximately 100 km of new high-speed fixed connectivity. CETIN Serbia will work along the route Kalotina-Dimitrovgrad (Serbia) and will connect the existing base stations to its existing high-speed optic network. The Technical University of Sofia will conduct independent measurements and analysis both on the newly built and the upgraded fibre optic routes and before and after the 5G NR upgrade, as well as test for any potential disturbances within the frequency ranges intended for the future use of road safety applications.

2.1.c Semiconductors

Bulgaria has ambitions to take on an active role in Europe's leading initiatives supporting key technologies and recognises the high potential of the microelectronics sector. The country views its participation in European partnerships, such as through the European Innovation Council, as an essential step to increasing its innovation potential, including in deep-tech and chips. Bulgaria has a long tradition in microelectronics, a strong scientific base, and innovative enterprises, all of which are an advantage in its drive to establish the country as a hub for investments and talent.

Bulgaria has become more involved in the semiconductor sector in recent years, although it is not active in the IPCEI on microelectronics. As specified in both the roadmap and the questionnaire informing the Commission's fact-finding missions, **Bulgaria has taken specific actions to contribute to the EU's objective of doubling its share of global semiconductor production**. One of these actions by Bulgaria is the Council of Ministers' Decision of 20 December 2023, approving a draft Administrative Agreement between the EU's Chips Joint Undertaking (Chips JU) and the country's Ministry of Innovation and Growth, which made the participation of Bulgaria in the JU official. The agreement was signed at the beginning of 2024 and will enter into force after its ratification by the Bulgarian Parliament.

To strengthen the semiconductor supply chain, the Ministry of Innovation and Growth's **Working Group on Semiconductors was created in 2022.** It consists of members of industry, universities, and other institutions, and its goal is to: (i) provide a new impetus to the traditionally well-established Bulgarian expertise in the semiconductor sector; and (ii) to assist the ministry through supranational microelectronics-related initiatives. The Working Group supports the ministry through the exchange of know-how, ideas, and best practices, mapping the potential short-term and long-term opportunities for Bulgaria's semiconductor ecosystem. In this context, the ministry plans to present to the Working Group the issue of setting specific semiconductor targets in the National Roadmap for the Digital Decade and seek its input on this matter.

2.1.d Edge nodes

For edge nodes, Bulgaria proposed an estimated non-linear trajectory and national target based on the Edge Observatory's latest studies. **Bulgaria is starting from a low baseline with 2 edge nodes estimated to be deployed in 2022 (versus 18.5 for the estimated EU average), and has additional 3 estimated to be deployed in 2023 (for a total of 5), but it expects a rapid increase over the years, reaching an estimation of 72 deployments by 2030.** This ambitious goal for rapid future growth implies a strong commitment to advancing digital infrastructure, with edge computing being a key area of focus. The constant gap between Bulgaria's deployment rate for edge nodes and the EU average indicates a slower rate of acceptance or a possible later start in integrating peripheral technologies. The deployment of edge nodes requires increasing investment and gradually building the necessary infrastructure to support a more distributed network architecture. This could lead to improved data-processing capacity and reduced latency for local users.

2.1.e Quantum technologies

Bulgaria's quantum computing capabilities make it a forerunner in the EU for quantum communication technologies and cybersecurity. The country is expected to contribute a lot to those Digital Decade targets and objectives. **Bulgaria is home to the EuroHPC JU's Discoverer, which is one of the 8 supercomputers located across Europe** and is fully operational. Bulgaria is planning to have its first computer with quantum acceleration by 2025.

To this end, Bulgaria is participating in a project to develop a national quantum communications infrastructure (QCI) plan in the context of EuroQCI. The Bulgarian national QCI plan, BG QCI, will seek to

implement the first quantum secure communication links and networks in Bulgaria. These links and networks hold the promise of boosting technological development in quantum communications and cybersecurity.

Bulgaria is also taking part in the EuroCC project series, which aims to set up a network of National Competence Centres (NCCs) in the field of high-performance computing (HPC). The EuroCC project series has been superseded by EuroCC 2 which started in 2023 and will run through 2025. EuroCC 2 will aim to further expand the NCC network while continuing to address the differences in maturity of HPC deployment in Europe. Bulgaria's EuroCC2 NCC has received funding from the EuroHPC JU and the Ministry of Education and Science.

The new Infrastructure Complex for Digital Transformation and High-Performance Computing, developed under the project 'Centre for Excellence in Informatics and ICT' was inaugurated on 19 October 2023 by Bulgaria's Institute of Information and Communication Technologies (IICT-BAS). On this occasion, **the new Bulgarian supercomputer HEMUS was presented.** The construction of this supercomputer is part of a larger complex worth more than EUR 10 million, co-financed with European funds.

Several activities were implemented in 2023 as part of the 2023-2025 'National Plan of the Republic of Bulgaria for Building a Quantum-Communication Infrastructure' by the Centre of Competence for Quantum Communication, Intelligent Security Systems and Risk Management (QUASAR) at the Institute of Robotics of the Bulgarian Academy of Science (IR-BAS). Three of these activities are discussed in the bullet points below:

- Based on the Digital Europe programme, the technical design of an urban connectivity network was completed. This network will connect the laboratories of the QUASAR Centre and three ministries (the Ministry of Interior, the Ministry of Defence and the Ministry of Transport and Communications) with the long-distance Sofia-Kulata route to the border with Greece. The machines needed to create this network (quantum communication platforms) have been delivered and the training materials for the relevant officials to operate them have been prepared.

- As part of the RRP, a quantum communication route was built between the laboratories of the QUASAR Centre and the main operational centre of the telecom operator A1 'Lift'. This route ensures that the laboratories of QUASAR are connected to the Bulgarian ministries and the border with Greece in a real optical terrestrial network by means of dark fibre.

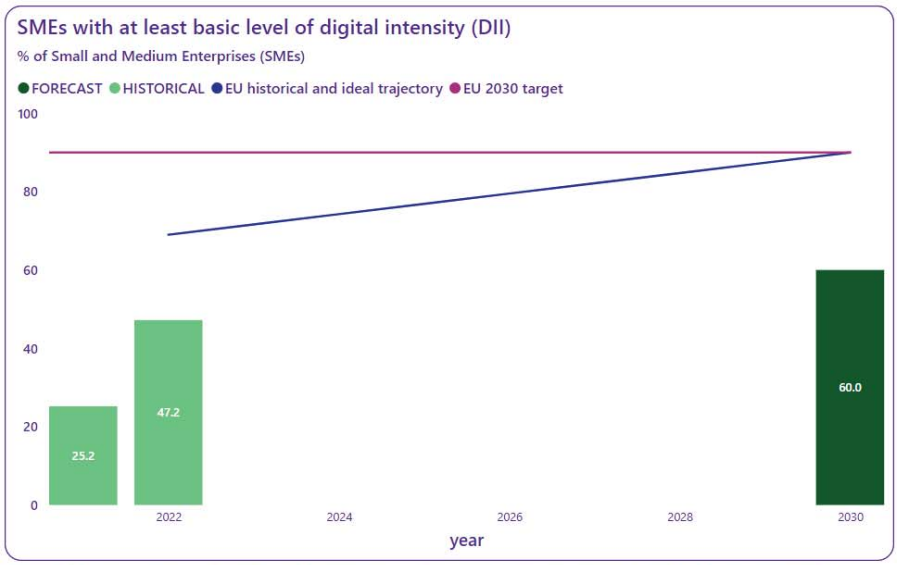
- As part of the Operational Programme 'Science and Education for Smart Growth 2014 – 2020', a training test track for quantum key sharing was built between the two laboratories of the QUASAR Centre in IR-BAS and the Institute for Nuclear Research and Nuclear Energy, which is being used for tests and training before the implementation of quantum communication platforms in the networks of the State administration.

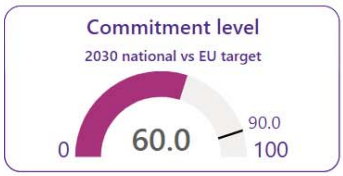
2.2 Supporting EU-wide digital ecosystems and scaling up innovative enterprises

Bulgaria has a long tradition in the IT and electronics sectors, and is still known as the Silicon Valley of Southeastern Europe. According to its roadmap, Bulgaria benefits from **established ICT clusters and technology parks, along with access to a skilled workforce and scientific talent.** There is a strong start-up ecosystem, and telecom companies are increasingly involved in R&D and start-up support. One of the challenges that Bulgaria has still address is the **limited uptake of technologies among SMEs.** There is also a **concentration of ICT businesses in major cities like Sofia, leading to regional disparities.** Bulgaria can leverage strong EU support and funding for ongoing and planned digital transformation projects. The country benefits from: (i) stable demand for ICT products; (ii) evolving online business models; and (iii) opportunities to attract foreign expertise. **Bulgaria has plans to support digital start-ups and scale their**

solutions for local businesses through lab-to-market measures. These measures can drive digitalisation and achieve Digital Decade objectives. However, **the targets presented below are not** supported by **many measures in the roadmap.** Although these lab-to-market measures are important initiatives, read together with the key developments of 2023 they may not be sufficient to boost the adoption of technologies by SMEs in Bulgaria.

2.2.a SMEs with at least a basic level of digital intensity





2023 state of play and recent progress

	Country level	EU level
FORECAST		71.6
DESI 2024	28.4	57.7
AVERAGE ANNUAL GROWTH %	6.2	2.6

In the case of DII, the average, annual growth is computed between 2023 and 2021 due to data comparability reasons.

Note 1: DII 2022 is version IV that is not comparable with DII 2021, that was version III. The EU-level ideal trajectory refers to DII version IV, as published in the 2023 Communication on EU-level trajectories

Note 2: The source of national forecast values is the 2023 country roadmap

Bulgaria has scope to improve its performance to contribute to the EU's Digital Decade target **measuring the overall digital intensity of SMEs, while showing a very strong dynamic in this area.** 28.4% of the country's SMEs have at least a basic level of digital intensity, far below the EU average of 57.7%. This performance represents an average annual growth of 6.2% compared to 2021. 2021 was the last comparable year that used a similar methodology for measuring the digital intensity of enterprises. This average rate of progress is well above the EU average of 2.6%, which suggests that although it is starting from a low base, Bulgaria might well achieve its higher level of ambition for this national target.

In 2023, 3.4% of Bulgarian SMEs' turnover was based on e-commerce, against an EU average of 11.9%. 13% of Bulgarian enterprises with e-commerce sales of at least 1% turnover were selling online in 2023, which is also below the EU average (19.1%). In addition, 13.6% of Bulgarian enterprises were using social media in 2023, well below the EU average of 31.5%.

The Ministry of Labour and Social Policy fosters the digitalisation of SMEs by providing **vouchers for digital training for both unemployed people and employees of SMEs.**

Through the Ministry of Innovation and Growth, included in Bulgaria's RRP and in particular the measure 'ICT solutions and cybersecurity in SMEs', grants will be provided for the deployment of digital technologies in SMEs by the end of 2024. The expected effect of this measure is to integrate digital technologies more into businesses' operations and improve their readiness for the subsequent adoption of Industry 4.0 technologies. Businesses can apply for assistance to roll-out of ICT services and digital marketing solutions, platforms, websites and mobile applications, solutions to optimise management, manufacturing, and logistics processes, and solutions to ensure cybersecurity. The measure is focused on SMEs that are beginning their digitalisation process and supports relevant basic needs. As the measure covers a variety of

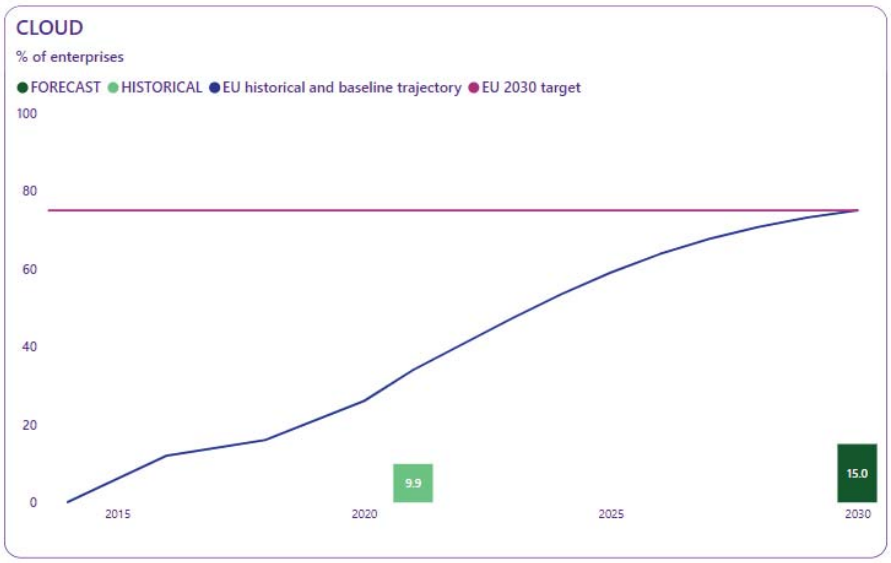
business sectors, all of which have different needs, the areas the measure will apply to will vary, but include many measures that are relevant for the KPI on digital late adopters (e.g., e-commerce sales). Therefore, this measure is expected to contribute directly to the achievement of the digital 'late adopters' target. To help implement this measure, EUR 15.65 million from the RRF was allocated, allowing 1 492 SMEs to receive grants to achieve first and second level digitalisation.

Under the Programme for Research, Innovation and Digitalisation for Smart Transformation 2021-2027 (PRIDST), Bulgaria provides support for the creation of a **network of European Digital Innovation Hubs (EDIHs)** whose task is to provide services to SMEs in the digital field. By 2027, 750 SMEs from the network should benefit from them. Under PRIDST as well, **innovative vouchers to encourage training will be used in Centres of Excellence and Competence Centres** – reaching 650 enterprises by 2027.

These efforts are to be welcomed, but given both Bulgaria's lacklustre performance on this Digital Decade target, and the challenge of digital skills mentioned in the next section, **these measures may not be enough to move the needle.**

2.2.b Take-up of cloud / AI / data analytics

- **Cloud**



2023 state of play and recent progress

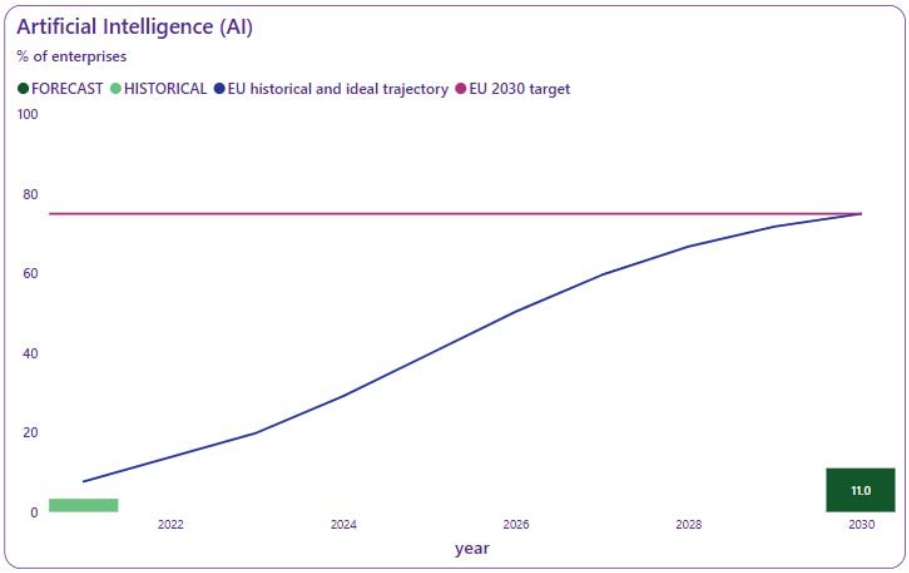
	Country level	EU level
FORECAST		47.3
DESI 2024	14.2	38.9
AVERAGE ANNUAL GROWTH %	19.8	7.0

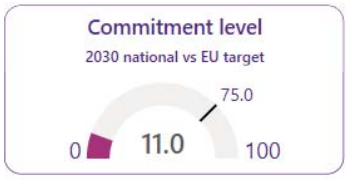
Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Bulgaria has scope to improve its performance to contribute to the EU's Digital Decade target for cloud adoption, while showing a very strong dynamic in this area. Cloud adoption (14.2%) is remarkably low compared to the EU average (38.9%). In its roadmap, the country sets a 2030 target of 15% of cloud adoption, below the EU-level target of 75%. Based on the current rate of progress (19.8% compared to the EU average of 7.0%), a higher level of ambition for this national target could be envisaged. Of note, Bulgaria is not participating in the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS).

- **Artificial Intelligence**





2023 state of play and recent progress

	Country level	EU level
FORECAST		19.9
DESI 2024	3.6	8.0
AVERAGE ANNUAL GROWTH %	4.4	2.6

Average, annual growth is computed between the two most recent available data points.

Note 1: at the end of 2023 ESTAT revised backward the values of AI. The revised value for 2021 at the EU level is 7.6 % (from 7.9 %).

Note 2: The source of national forecast values is the 2023 country roadmap

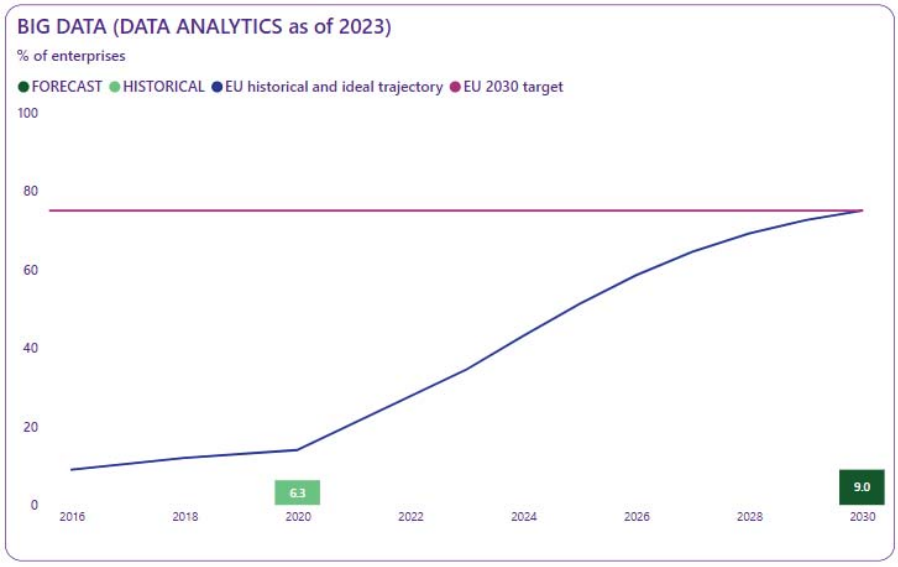
Bulgaria has scope to improve its performance to contribute to the EU's Digital Decade target for AI adoption, while demonstrating a limited dynamic in this area. Against an EU average of 8%, only 3.6% of the country's enterprises had adopted AI in 2023. In its roadmap, Bulgaria sets a 2030 target of 11% of AI adoption, below the EU-level target of 75%. Based on the current average annual growth (4.4%), it appears that, without an intensification of efforts over the coming years, Bulgaria's contribution to this EU target will remain limited.

Twelve EDIHs will help businesses in Bulgaria in their innovative development. Building these 12 EDIHs is one of the Ministry of Innovation and Growth's new measures under the Programme for Research, Innovation and Digitalisation for Smart Transformation, part of the EU's new 2021-2027 programming period. The first 4 innovation hubs are supported by the Commission and receive 50% funding under the Digital Europe programme. Nearly EUR 27 million (BGN 52 million) will be invested in the remaining 8. For this purpose, in 2023 the Ministry opened the procedure 'Funding of European Digital Innovation Hubs selected by the European Commission and awarded with the Seal of Excellence', for which applications are currently underway. Around 750 companies will be able to benefit from the hubs' services for free.

Best practice: BgGPT, Bulgaria's ChatGPT

On 4 March 2024, the Institute for Computer Science, Artificial Intelligence and Technology (INSAIT) of Sofia University launched BgGPT, the first Bulgarian-language artificial intelligence (AI) model of the latest generation, which is available for free use at https://chat.bggpt.ai. The technology is already being deployed by businesses, which report that it can be tuned to their needs within hours with very little computational or financial resources. This marked an important step not only for the Bulgarian state, consumers, public and private organisations but also for the development of Bulgarian scientific organisations and Bulgarian education.

- **Data analytics (Big Data)[29]**



2023 state of play and recent progress

	Country level	EU level
FORECAST		34.6
DESI 2024	21.9	33.2
AVERAGE ANNUAL GROWTH %		

Annual growth cannot be computed in this case because Big Data was replaced by Data Analytics in 2023. The two indicators are not comparable.

Note: The source of national forecast values is the 2023 country roadmap

On the use of data analytics by enterprises, Bulgaria has scope to improve its performance to contribute to this EU Digital Decade target. With 21.9% of its enterprises using data analytics, Bulgaria is performing below the EU average (33.2%). The country has set a 2030 target of 9% for the Big Data indicator, given that at the time of writing the roadmap, the figures for data analytics were not available yet. This value is below the EU-level target of 75%. Progress on this metric cannot be assessed since the indicator's definition has changed.

- **Take-up by enterprises of cloud or data analytics or AI**

Taking the three technologies together (adoption by enterprises of either cloud, data analytics, or AI), **Bulgaria stands at 29.3%, significantly below the EU average of 54.6%** and ranking last among EU Member States. Bulgaria has set its national 2030 target for this indicator at 35%, below the EU target of 75%.

The roadmap appears to have few measures and activities that are relevant for the uptake of cloud, data analytics, or AI. It does include a measure related to 'Activities for the implementation of innovations in enterprises' which targets SMEs and small mid-caps from different economic sectors wishing to deploy an innovation in the thematic areas of the Innovation Strategy for Smart Specialisation (ISSS). The measure runs through 2023-2027 under the Programme 'Competitiveness and Innovation in Enterprises' 2021-2027 (PCIE). The indicated budget is EUR 226 million, of which EUR 38 million will come from national funding, and EUR 188 million from ERDF. The expected impact described in the roadmap is the introduction of innovation into a product or a process by 152 SMEs. However, not every project that will be supported under the measure will have an impact on digitalisation as the thematic area Informatics and ICT of ISSS is just one of the eligible areas.

2.2.c Unicorns, scale-ups and start-ups

Bulgaria had no unicorns in 2023. This is despite Bulgaria having a fintech unicorn **'Payhawk'** (that offers spend management software) however the capital ownership is in the UK (a non-EU country). **For the entire history period, there has been no unicorn enterprise in Bulgaria**, thus no national projected trajectory has

[29] As of 2023, Big Data was changed by ESTAT, in agreement with all the EU National Statistical Institutes, into Data Analytics and covers a broader range of technologies including Big Data. For this reason, no comparison is possible with previous years.

been drawn up. However, the roadmap mentions that business developments in the country will continue to be monitored.

Bulgaria's innovation performance is the second lowest among EU Member States, according to the European Innovation Scoreboard, ahead of only Romania. It is one of six EU countries classified as an 'emerging innovator', the scoreboard's lowest classification of four levels of innovation. Some of Bulgaria's key weaknesses, as highlighted by the scoreboard, include: (i) a lack of government incentives or support for businesses to encourage private investment in R&D; and (ii) low public spending on R&D. Bulgaria's rate of enterprise 'births' and FDI net inflows (of 3.6% of GDP versus 2.1% for the EU) bolster the innovation climate. Nevertheless, the global enterprises with the largest R&D budgets are not present in Bulgaria. In addition, total entrepreneurial activity (TEA) stands at 6%, slightly below the EU average of 6.8%, and Bulgaria has a much higher share of non-innovators that have no interest in innovating compared with the EU (49.6% of Bulgarian enterprises are non-innovators versus 30.7% for the EU average).

Although there are no specific measures to promote the emergence of unicorns in Bulgaria's roadmap, consultations with the Bulgarian authorities during the Commission's fact-finding missions to Bulgaria emphasised that creating a climate that will promote the emergence of valuable technology companies will be the result of a combination of measures related to the development of a favourable environment for attracting investments, and of how successful Bulgaria becomes in attracting and combining the right skills to support the development of its digital economy. These measures will be implemented through the 2030 national development programme, the innovation strategy for smart specialisation, the national strategy for the promotion of SMEs, and other strategies – so that Bulgaria can increase its potential for economic and business growth. **Nevertheless, given the low level of basic and advanced digital skills, it is important to spread support across SMEs and start-ups, to avoid a situation in which only a few businesses benefit from help.**

During the fact-finding missions, the Ministry of Innovation and Growth informed the Commission **of** its work to improve Bulgaria's start-up and technology scene since 2023. The ministry signed an agreement with Romania in October 2023 on a **memorandum of understanding to work together on innovation, digitalisation, start-up development and research.** More agreements are to follow, and a similar agreement with Greece is almost complete, while talks with Slovenia and Croatia are in progress. **Further afield, partnerships** to encourage cooperation in these areas with countries including Finland, Egypt and Georgia are also in the pipeline. The Ministry announced in February 2024 the creation of a new joint technology transfer fund between the European Investment Fund (EIF), Bulgaria and Romania that aims to commercialise university research projects by creating a common pot of money shared between the two countries that can be allocated to the most promising projects. The ministry also announced an agreement with the European Investment Bank and the EIF for a new pilot advisory programme to support Bulgarian start-ups with early-stage investments. The programme will at first focus on helping companies apply for the European Innovation Council's accelerator fund. Part of the agreement covers cooperation between the EIB and United Bulgarian Bank to unlock financing of about EUR 150 million for mid-cap companies.

In February 2024, Bulgaria's Ministry of Investment and Growth also announced the opening of the country's largest laboratory for space research in the city of Varna, as the country pushes for association to the European Space Agency. Bulgaria also has an initiative targeting technology transfer and the development of courses within universities, developed with SMEs and larger enterprises, to jointly solve issues of importance for Bulgaria and the EU. **The entire logic behind the programme is to support the overall tech ecosystem in the country.**

One of the new measures presented in Bulgaria's roadmap is focused on activities to develop and deploy Industry 4.0 technologies in enterprises (with a total panned budget of EUR 194 million including EUR 157.9 million from EU funds). This measure plans support through financial instruments, including in combination with grants, with a varied focus on the final recipients and type of investments, **including equity instruments such as venture debt financing.** The equity instruments will help enterprises at different stages to develop and implement technologies in the field of Industry 4.0., where there is an opportunity to support high-tech companies with unicorn potential.

Under Bulgaria's Programme for Research, Innovation and Digitalisation for Smart Transformation 2021-2027 (PRIDST), **a Technology Transfer Fund is envisaged as a financial instrument.** This fund will provide equity and quasi-equity investments to support technology transfer in Bulgaria in cooperation with research organisations. The purpose of the fund is to support investments in spin-off companies, start-up high-tech enterprises and knowledge-based enterprises as part of industrial start-up systems, the transformation of scientific developments into marketable products and technologies, and the commercialisation and management of intellectual property.

Bulgaria is focusing specifically on equity instruments within its commercialisation fund focusing on innovation for **entrepreneurship and innovation transfer.** In addition, Bulgaria is targeting these enterprise-assistance measures on the northern part of the country, where enterprises are less technologically advanced, to bridge the gap between this region and others.

In 2024, the Ministry also launched an innovation board in 2024, which includes experts from Bulgaria and elsewhere in Europe. The board's aim is to help steer policies related to innovation. One of its first tasks is to help improve technology transfer in Bulgaria.

2.3 Strengthening cybersecurity & resilience

Despite the establishment of cybersecurity institutions such as CERT and the launch of high-level initiatives to fight cybercrime, Bulgaria's digital environment is at risk due to an insufficient focus on cybersecurity in digitalisation programmes and projects, insufficiently efficient measures to ensure cybersecurity, and an undeveloped cybersecurity services market. Cyberattacks and data breaches are frequent, compromising sensitive information and negatively affecting citizens and institutions.

In Bulgaria, 81.9% of enterprises with 10 or more employees have reported using ICT security measures in 2022. Yet, alarmingly, only 4% of Bulgarian enterprises had insurance against ICT security incidents in 2022 (far below the EU average of 25%).

In 2023, the participation of the Ministry of Electronic Governance (Bulgaria's National Coordination Centre) in two international European projects in the field of cybersecurity was approved. The projects are funded under the Digital Europe programme and have a total value of EUR 1.9 million.

The State budget for 2024 includes approximately EUR 19 million (BGN 37 million) in spending allocations for a cybersecurity centre at the State Agency for National Security (SANS), the counterintelligence (internal) security service of Bulgaria.

In September 2023, Bulgaria opened the country's **first Cyber Defence Centre**. The centre is a new defence facility in Sofia to improve the country's cybersecurity capabilities, including through cyber-related education and hands-on training for Bulgarian military personnel. It will provide them with the skills required for identification, deterrence, and defence operations against cyberattacks.

Cybersecurity is one of the priorities of Bulgaria's Programme for Research, Innovation and Digitalisation for Smart Transformation 2021-2027 (PRIDST). The Programme plans to help improve the national

cybersecurity capacities and the skills of the competent authorities. The Ministry of Electronic Governance opened a grant procedure 'Building the central components of national cybersecurity system' with the direct beneficiary being the country's executive agency 'Infrastructure for e-governance'. Eligible activities under the procedure will focus on building and commissioning the central components of the national cybersecurity system and integrating the systems of the first constituents.

In 2023, the Monitoring Committee of PRIDST approved the methodology and criteria for selecting operations for several cybersecurity-related procedures launched in the beginning of 2024. First, **the capacity of National Competent Authorities (NCAs) and their Sectoral Computer Security Incident Response Teams (CSIRTs) will be strengthened** with activities to achieve a high level of cybersecurity in critical sectors. The indicative budget for this first part amounts to EUR 4 million. Second, **a training centre will be established as an element of the National Cybersecurity System,** with activities involving equipping the centre, implementing, and integrating software platforms, trainings, and elaboration of training programmes. The indicative planned budget for this second part is EUR 1 million.

Various training and upskilling programmes are being implemented by Bulgaria's Institute of Public Administration (IPA) to develop the cybersecurity skills of the public sector's civil servants. Most of these programmes are implemented in the frame of the project 'Digital transformation in training – digital competence and learning', which aims to improve digital skills. In 2023, Bulgaria's IPA began integrating digital literacy into the professional development programmes of civil servants. Two e-modules were developed on the topics of cybersecurity policies and the most common cyberthreats, and a specialised training course was held for IT experts from the public administration. One forum on cybersecurity was held. Cybersecurity experts from different levels in the public administration participated. In total, 8 305 civil servants have participated in these different measures[30].

[30] Questionnaire from Bulgaria informs of the detail: Several courses and forums were offered at all levels to improve their understanding of privacy and safety online, including in basic cybersecurity risk assessment in the work environment (274 trainees), the counteraction of disinformation in the EU (133 trainees); the protection of personal data in a digital environment (self-learning e-module with 1 254 trainees); cybersecurity policies and practices in organizations (self-learning e-module with 1 545 trainees); Trojan Horse and Social Engineering (self-learning e-module with 5 714 trainees); cyber threats in the public sector - specifics, analysis and possible approaches to reduce risks (specialized training with 40 trainees); and a forum 'Cybersecurity - network and share experiences' (37 participants).

3 Protecting and empowering EU people and society

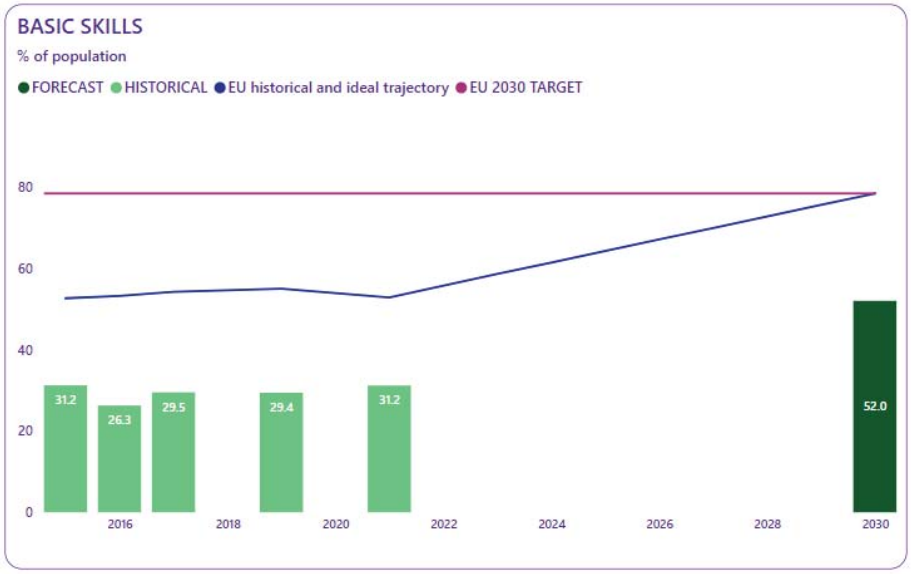
Bulgaria has seen rapid, positive developments in the field of digital democracy and e-Government including **e-health** over the past 2 years. **The national scheme for electronic identification is still under construction,** but **regulatory adjustments** introduced in 2023 have considerably helped the construction of this national situation. **The country is proceeding to implement the 'whole-of-government approach' promoted by the DDPP.** Bulgaria has a strong legal framework supporting digital services online and **a well-developed architecture for e-Government**. **Despite a positive recent dynamic in the area of online public services, the take-up by citizens remains lower than EU average,** with too few public services provided fully online. Online service provision also suffers from **the insufficient digital inclusion** of minorities and people living in remote areas. Although Bulgaria has put in place many training measures sin line with recommendations to upskill and reskill its workforce and to address adult learning needs, **some aspects require more effort, especially regarding ICT specialists.** Bulgaria also suffers from a persistent urban-rural divide in connectivity, an imbalance in the distribution of ICT jobs in the country, and the pressing need to accelerate technology adoption by businesses and people. The country will have to invest more to: (i) improve the level of basic digital skills among Bulgarians; (ii) increase digital inclusion, especially for **vulnerable people, older people, and remotely located populations; and (iii) address the public's lack of trust and awareness of digital tools; and (iv) address cybersecurity issues.** There is **room for progress in raising the population's awareness of their digital rights.** The country has made **significant progress** in this respect, including at the **regulatory level.** It has been also done through **awareness-raising campaigns on child safety online**, as well as by providing **more tools for online participation, safeguards to protect people from illegal content and hate speech online, and formats such as guidebooks and interactive tools.**

3.1 Empowering people and bringing the digital transformation closer to their needs

3.1.1 Equipping people with digital skills

Bulgaria benefits from many universities offering computer science and IT programmes, producing a significant number of engineering graduates annually. **Institutions** like the IICT-BAS High-Performance Computing Centre and the INSAIT Institute contribute to Bulgaria's scientific potential and attract global talent. **The country's education system has been traditionally supportive of STEM, and is home to the highest proportion of female ICT specialists in the EU** (29.1%). Moreover, 4.8% of Bulgarian students were ICT graduates in 2022, just above the EU average of 4.5% but slightly below its performance of 2021 (4.9%). Challenges include **gaps in digital skills, especially in rural areas and among older people**, along with **inadequate awareness of online safety and cybersecurity**. As the capital city region around Sofia accounts for a significant share of the country's GDP, it is where skills are most concentrated, with this trend at risk of becoming further entrenched. Overall, across Bulgaria, there is a shortage of skilled ICT experts, limited ICT training opportunities, and fragmented efforts to address digital skill gaps nationwide. The ageing population also poses challenges to the economy and the need for skilled workers, necessitating strategic interventions for talent retention and skills development. There is a need to **attract and retain external experts and update curricula to include digital skills components across all education levels.**

3.1.1.a Basic digital skills



2023 state of play and recent progress

	Country level	EU level
FORECAST		59.8
DESI 2024	35.5	55.6
AVERAGE ANNUAL GROWTH %	6.7	1.5

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

Bulgaria has scope to improve its performance to contribute to the EU's Digital Decade target for basic digital skills, while showing a very strong dynamic in this area. 35.5% of the country's population is currently equipped with at least basic digital skills, but given the current rate of progress, a higher level of ambition for this national target through 2030 could be envisaged (Bulgaria's target currently only aims to equip 52% of its population with at least basic digital skills by 2030, far below the EU target of 80%). In line with the 2023 State of the Digital Decade Report 2023, which recommended an increase in the level of at least basic digital skills, Bulgaria has been very active in addressing this in the broader population.

Bulgaria's roadmap envisages a host of new measures to improve digital skills. One measure, implemented by the Ministry of Education, aims at increasing the number of young people trained in STEM centres (EUR 14.6 million planned for 38 962 teachers and 20 179 students to be trained). The measure complements the investment 'STEM centres and innovation in education', financed with EUR 245.5 million from the RRF. Another measure aims at developing a platform for adult learning, to provide in digital skills training. It is being led by the Ministry of Labour and Social Policy, with funding of approximately EUR 193 million (BGN 379.5 million) of which EUR 164.7 million (BGN 322.1 million) funded by the RRF. This investment will be used to train 500 000 unemployed and employed individuals at basic and/or intermediate level by mid-2026, in line with the European Digital Competence Framework DigComp2.1. In addition, 100 000 unemployed and employed individuals will have their basic and/or intermediate level of digital skills knowledge validated with the aid of this investment. A network of 760 digital communities is being established across Bulgaria to provide free access to the platform.

However, these measures are in early stages of implementation, and it is difficult to predict how effective they will be, particularly against risks of labour shortages in the country.

Challenges remain in the areas of quality and inclusion in education and training, in particular for Roma. Bulgaria is seeking to address this, as it has indicated in its roadmap: A new measure for the digital transformation of school education, including vocational education and training (VET), implemented under the Education Programme 2021-2027 and led by the Ministry of Education and Science, aims to **increase digital inclusion, including for students from marginalised groups such as Roma,** by improving the digital

competences of participants in the education process and making greater use of augmented reality, virtual reality, and AI in the teaching and training of students. Starting in January 2024, the programme involves a planned EUR 94.5 million (or BGN 184.9 million), with an expected impact of 2 923 trained teachers and education experts; 152 129 trained students trained; and 159 404 trained parents and educational mediators.

The Ministry of Labour and Social Policy is providing a tailored approach to address the specific needs and challenges identified for each vulnerable group on the Bulgarian job market, such as elderly people, people living in remote areas, and minorities in Bulgaria. For example, older people may need training in basic digital literacy, while people living in remote areas may require access to the necessary infrastructure. Two outcomes of the Ministry's approach are: (i) the Minister's approval in 2023 of the curricula for acquiring general digital competences for basic, intermediate, advanced, and highly specialised levels; and (ii) the adoption of a unified certificate for acquired basic, intermediate, advanced, or highly specialised levels of digital skills for adult learners.

A forthcoming contribution planned by the Ministry of Labour and Social Policy is the setting up of 'Digital Clubs', planned for 2025, in locations throughout the country. The creation of these clubs is part of a project to **develop a national virtual platform for online training financed with support from the EU as an investment under the national RRP.** The 'Digital Clubs' will be equipped with broadband internet access and modern computer equipment adapted to work with Bulgaria's virtual platform for e-training. Where necessary, the clients of these Clubs will be supported by mentors to ease up their access to the virtual platform and learning materials, and to facilitate their participation in the online training courses.

As of 21 December 2023, Bulgaria's Employment Agency opened the procedure for accepting applications for the provision of electronic vouchers for free training to help both employed and unemployed people to acquire basic and intermediate digital skills. Under the voucher system, each person is able to choose the type of training and the training provider, as well as whether they will study online or face-to-face. The training will be financed under the National RRP. By mid-2026, the aim is for 500 000 unemployed and employed people to have been trained, and for 100 000 people who have self-acquired digital skills to be able to take an exam and have these skills certified through a validation procedure. Additionally, funds from Bulgaria's national budget are deployed each year for adult training courses (ICT training included) in accordance with the employer's needs, organised by the Employment Agency.

The IPA stepped up its offering of digital skills courses taught to Bulgarian civil servants and actively fostered the networks of public servants involved (e.g., in public innovation, strategic planning, and data governance).

The Ministry of Education is working on upskilling teachers with digital skills, based on a study the second part of which is expected for 2024. The study will provide a detailed analysis of the level of digital skills among teachers, to inform the ministry on gaps in teachers' skills and training needs.

A number of digital upskilling initiatives are also taking place in Bulgaria as public-private sector partnerships. For instance, software developer EPAM Bulgaria is one of the main partners of Sofia University and, in particular, the Faculty of Mathematics and Informatics. EPAM Bulgaria also supported Sofia's Vocational High School of Telecommunications in 2023. This initiative was mentioned by the Bulgarian authorities during the Commission's fact-finding missions.

Furthermore, **in 2023, the Ministry of Innovation and Growth signed a Memorandum of Understanding (MoU) with Intel Corporation to cooperate in the field of AI.** The purpose of the MoU is to provide the necessary training and access to key skills for working with AI. The cooperation with Intel and the inclusion

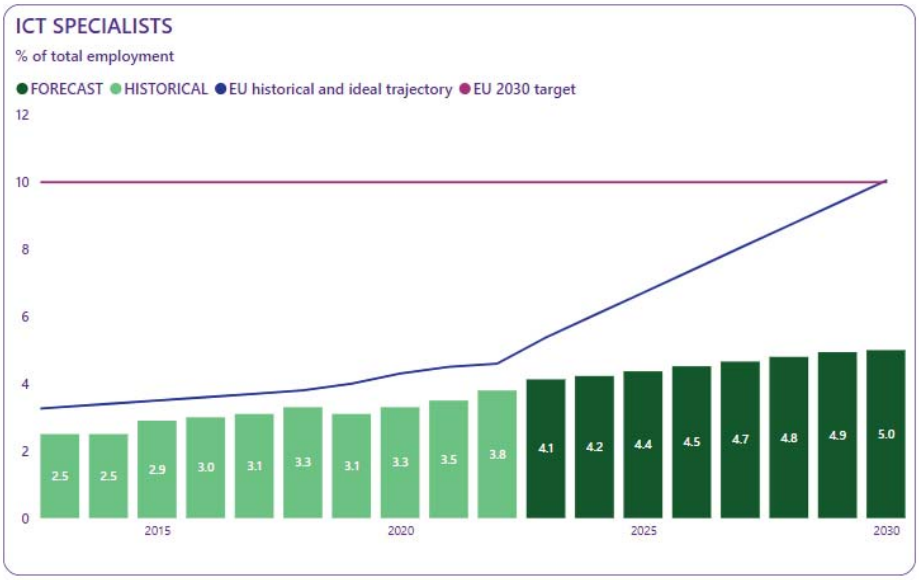
of Bulgaria in the network of countries and ecosystems that work to develop AI and deep-tech technologies are significant. They are expected to enable the faster adaptation and development of business and people to the new environment in the country. This adaptation and development will proceed through the potential of new technologies, including those used to develop the skills needed for competitiveness. The MoU envisages creating a partnership between Government, academia and industry stakeholders through Intel's Digital Readiness programmes. The second step of this cooperation will be to sign an additional agreement by which Intel and the Ministry of Innovation and Growth will implement the Intel's 'AI for Youth' programme in cooperation with the Ministry of Education and Science and other institutions. This Intel programme has trained over 32 000 students aged 13 to 19 in over 21 countries, and will continue to train and certify teachers and mentors from Bulgaria. The Ministry of Innovation and Growth will provide project-management capacity through local executive bodies, both public and private. Local levels of Government are also taking part in the cooperation with Intel, such as in the project between the municipality of Plovdiv on the STEM educational programme 'Skills for Innovation'.

Best practice: The 'Digital Backpack'

Bulgaria's Ministry of Education is leading on policies to ensure universal access to digital education and tools for every child/student in the country's education system. To this end, the ministry provides funding through the national budget for connectivity through the national programme for ICT. The ministry has also worked on the improvement of **a platform launched in 2023 as a cloud-computing service: the Digital Backpack.** It is a national programme developed under the RRP project 'Education for Tomorrow'. It aims to be a single-identity platform for online learning. The Digital Backpack contains a huge volume of nearly 30 000 electronic educational resources (interactive presentations, images, animations, video and audio clips, 3D models, virtual and augmented reality). These are available for free use by students, teachers, and parents. The overall objective of the project is to promote the acquisition of greater digital skills. Other specific objectives of the project are aimed at: acquiring knowledge and skills to work in the digital society; improving access to education, including through the use of easily accessible platforms and mobile applications, etc. The new tool is available on Дигитална Раница (mon.bg) and provides a range of educational materials and lessons on a wide range of topics and subjects. The Digital Backpack is a platform for everyone. For teachers, it is an opportunity to create electronic resources, and over 18 000 teachers have already been trained to work with the Digital Backpack and create educational resources for it. For students, it is an opportunity to enrich their knowledge, and it also allows parents to track their children's results. This service has benefited 2 400 schools that have introduced innovative teaching methods using modern ICT. The Digital Backpack is freely accessible to 1 million users, including administrators, teachers, students, and parents. Access is based on a single sign-in identity, so access and personal data are protected.

BgGPT, the Bulgarian-language AI model developed by INSAIT, launched in March 2024 and will be used in Bulgarian school education and universities. **The Digital Backpack can also be upgraded with BgGPT** and through this, each school can have its own AI system and the ability to personalise education. This is a significant opportunity to develop and improve the quality of the Bulgarian educational system.

3.1.1.b ICT specialists



2023 state of play and recent progress

	Country level	EU level
FORECAST	4.1	5.4
DESI 2024	4.3	4.8
AVERAGE ANNUAL GROWTH %	13.2	4.3

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Bulgaria has untapped potential to contribute to the EU's Digital Decade target for ICT specialists, while showing a very strong dynamic in this area.

The share of ICT specialists in the Bulgarian population in employment was 4.3% in 2023 (126 100 individuals) which is slightly higher than what was forecast (4.1%), and slightly lower than the EU average of 4.8%. Nevertheless, although the EU as a whole has made progress in 2023 with an average growth of 4.3% compared with 2022 for this target, Bulgaria's has increased by 13.2%.

Bulgaria's projected trajectory is expected to leave it with 155 000 ICT specialists in 2030, representing around 5.0% of total employment.

Bulgaria's roadmap pledges that the ICT industry and software sector in Bulgaria will be one of the top three industries in Bulgaria in 5 years, with the ambition to become a leader. However, just 7.7% of Bulgarians have above-basic digital skills against an EU average of 27.3% in 2023. In addition, only 9.1% of Bulgarian enterprises with 10 or more employees provide ICT training, against an EU average of 22.4%.

Women accounted for 29.1% of ICT specialists in 2023, in slight progression since 2022 (+0.2 percentage points) and above the EU average (19.4%). Bulgaria has the highest share of female ICT specialists of all EU Member States. This provides an incentive for Bulgaria to continue its activities to encourage women to become ICT specialists, including the initiatives of private and non-governmental organisations, such as the Bulgarian Digital National Coalition, ICT expert training academies, etc.

Bulgaria's Ministry of Labour and Social Policy has adopted an approach to promote the digital upskilling of the general population based on a platform which targets various **tiers of education,** including basic and advanced levels, **and targeting the ICT specialists already in the country**. The curriculum was developed by Sofia University professors, and its material is free and available on the ministry's portal. The Ministry of Innovation and Growth promotes this platform within its own schemes to target SMEs and seeks to make it as broad as possible, so that **companies can benefit as much as possible from the platform by raising the skills levels of their employees.**

As mentioned in the cybersecurity section of this document, the IPA also offers continuous training, and to improve the skills of the IT and cybersecurity experts in the public administration. The IPA does this via specialised training, fora and professional networks for knowledge and experience sharing.

On 16 April, the Bulgarian Academy of Science (BAS) launched a call for applications for 'Strengthening research potential by attracting and retaining talented researchers' (C2.I2 under the RRP). The main objective of the procedure is to attract and retain researchers with PhD or MSc degrees from both within the country and from the broader EU or European Economic Area who wish to build a professional career in the field of clean or digital technologies. Applicants for – and final recipients of – funding under the procedure are the independent scientific units of the BAS, which will provide their research and material base to the specialists and postdoctoral students.

Best practice: Telerik Academy

Telerik is a software company that was founded by the current mayor of Sofia, Vasil Terziev. Its 'Telerik Academy' is now the leading company for professional training in Bulgaria. In the past 5 years, Telerik Academy has doubled the number of graduates it produces each year and doubled its revenues. Over the same period, Telerik's network of 'partners' (i.e., corporate customers that use Telerik to train their staff) has tripled to over 260 companies.

In 2023 alone, Telerik Academy reported a 30% year-on-year increase in applicants and graduates. Telerik reports 94% trainee satisfaction in its Alpha programmes, and 92% in its Upskill programmes, and 91% of graduates would recommend Telerik Academy to a friend. Behind this success is a team of professionals that grew by 35% (to nearly 50 people) in 2023. In 2023, 6 500 people considered a new career start with the help of Telerik Academy, and the number of applicants and successful programme completers was 29% higher than in 2022. Over the past year, Telerik Academy has implemented 19 programmes (13 Alpha programmes and 6 Upskill programmes) and the increasingly rapid penetration of AI in business has boosted training productivity. According to the company's data, 3 out of 4 customer organisations state that Telerik Academy graduates are better prepared than learners who completed training at other organisations. The main reason for this is the holistic approach of Telerik training, with a focus on practical training and a combination of technical and soft skills. Thanks to individual support and mentoring, trainees receive the appropriate balance between theory and practice that they need to be successful. A new programme, Upskill Data Analyst, has been added to Telerik's course catalogue in response to the growing need for data analytics experts. It will launch in April 2024. In 2023, Telerik Academy received more than 15 awards in recognition of the high standards of its business, products, services, and team. With a learner community of over 160 000 people (current students and graduates), it is one of the most successful educational organisations in the country.

3.1.2 Key digital public services and solutions – trusted, user-friendly, and accessible to all

Bulgaria has a well-developed architecture for e-government and has made good progress in this area in recent years. It can now build on this progress to increase the user-friendliness of public services and reduce friction and paperwork, thereby increasing uptake (especially for enterprises, whose use of online public services remains low).

Bulgaria has a strong legal framework supporting online digital services. The country has made some progress in developing e-governance, with users' access to services supported by shared digital platforms. Bulgaria has improved online availability of these services for business cross-border mobility. Despite a positive recent dynamic **the take-up of e-government services by Bulgarians remains below the EU average**, with too few public services provided fully online and problems of **digital exclusion.** Challenges faced by e-government in Bulgaria include: (i) fragmented IT systems and data management; (ii) limited capacity for digital transformation in the public sector in part due to an undeveloped culture of data sharing in administrations; and (iii) low public trust due to cybersecurity concerns. There also needs to be improvement in the implementation of standards for data sharing, interoperability, and transparency in service delivery. Bulgaria can leverage both its population's use of social media and foreign expertise to enhance digital engagement and innovation. **Active involvement from NGOs and the private sector** can improve digital skills and cybersecurity measures to position Bulgaria as a digital leader. There remain concerns about the **growing digital divide,** especially between urban and rural areas, and ongoing cybersecurity threats leading to data breaches that hinder trust and prevent the uptake of online public services.

3.1.2.a e-ID

Only 35.4% of Bulgarian internet users are e-government users, placing the country second to last and well below the EU average of 75% (DESI 2024). In 2023, 6.09% of Bulgaria's population had used one of the existing e-ID solutions to access online services for private purpose in the last 12 months, compared with an EU average of 41.11%. The use of the e-ID to access services provided by public authorities or public services of the country is slightly lower at 5.36% – well below the EU average of 36.14%.

Bulgaria's national scheme for electronic identification, regulated in the Law on electronic identification, is currently being developed. This will create a public e-ID system, supplementing the private solutions already in operation. The authority for electronic identification is the Minister of Internal Affairs, which issues an electronic identifier to natural persons, through which they are identified in an electronic environment when accessing electronic administrative services. The electronic identifier will be embedded in the citizens'' identity cards, but it can also be provided on another medium, including. in the form of a mobile application. Electronic IDs are expected to start being provided no earlier than mid-2025.

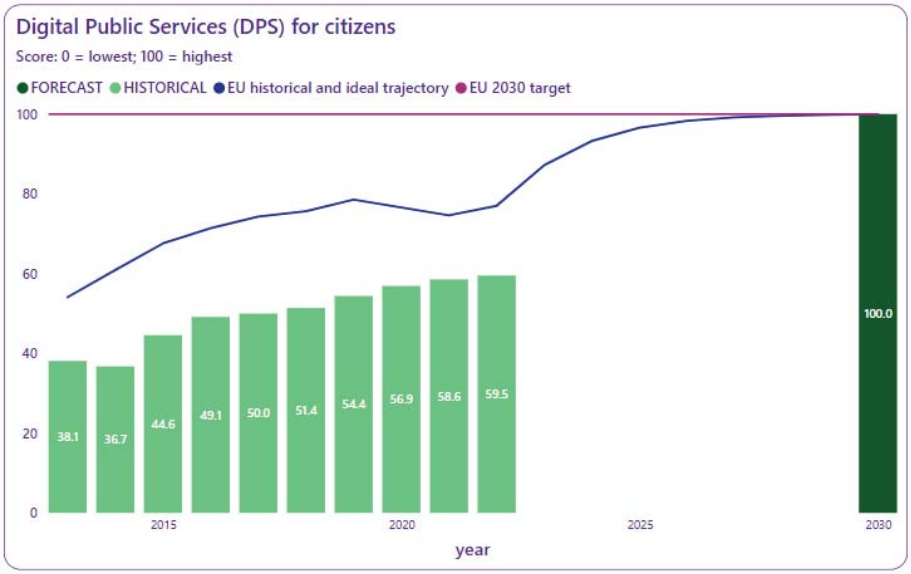
At the national level, the Ministry of Electronic Governance operates a system for electronic authentication (e-Authentication system), with which the information systems of administrative bodies will be integrated using the 'once only' principle. The main advantage of using this system is that it will end the need to upgrade the information systems of the administrations when new means of electronic identification appear (for example, mobile applications, bank cards, etc.).

In 2023, for the purposes of cross-border electronic identification, Bulgaria developed and deployed an eIDAS Node in a production environment in accordance with the requirements of Regulation (EC) No 910/2014. The Bulgarian authorities reused the technical specifications provided by the Commission to develop this eIDAS node. Testing of the Bulgarian eIDAS node with the nodes of other EU Member States is ongoing.

In 2023, Bulgaria's first national e-ID scheme 'Evrotrust e-ID' was officially recognised by the country's Council of Ministers. It was subsequently notified to the Commission in July 2023, listed in the Official Journal of the European Union, and validated by the Commission. This development is part of the Eurotrust Technologies JSC and will pave the way for Bulgarians to have effortless digital access to EU public services. This is a significant step forward in the development of digitalisation in Bulgaria, and opens up opportunities for the expansion of Bulgarian businesses abroad.

The Government policy on encourages the involvement of the private sector in the development of e-identification schemes. In Bulgaria, various private companies offer means of electronic identification based on remote identity verification. In 2023, a scheme based on facial recognition and developed by a Bulgarian provider of authentication services was notified to the Commission in accordance with Article 9(1) of the eIDAS Regulation with a 'substantial' and 'high' level of assurance. The scheme is therefore recognised at EU level, as Bulgarians and Bulgarian companies can identify themselves through it when accessing services in the other Member States of the EU.

3.1.2.b Digitalisation of public services for citizens and businesses



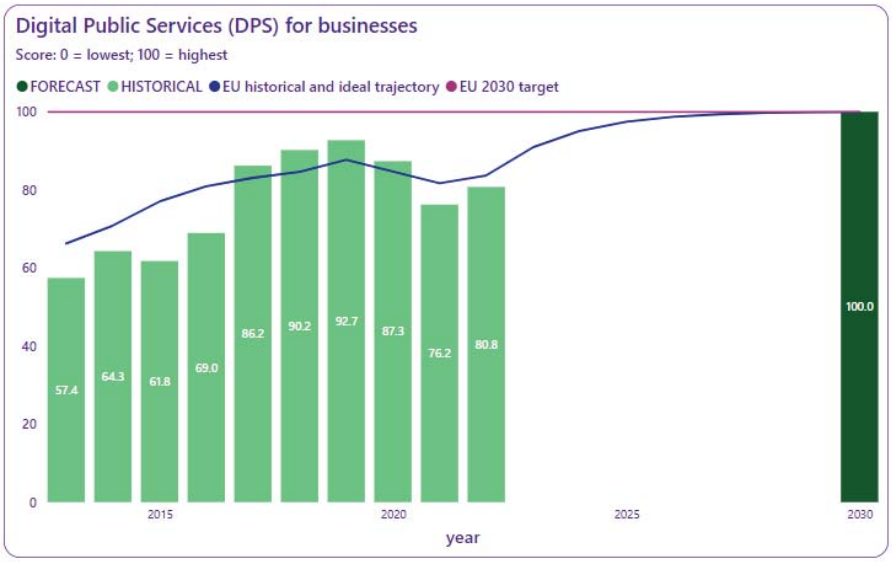
2023 state of play and recent progress

	Country level	EU level
FORECAST		87.2
DESI 2024	67.5	79.4
AVERAGE ANNUAL GROWTH %	13.4	3.1

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap



2023 state of play and recent progress

	Country level	EU level
FORECAST		90.9
DESI 2024	91.9	85.4
AVERAGE ANNUAL GROWTH %	13.8	2.0

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

Bulgaria has scope to improve its performance to contribute to the EU's Digital Decade target for the digitalisation of public services for citizens, while showing a very strong dynamic in this area. Bulgaria ranks below the EU average in absolute value (67.5 versus 79.4). However, the country's speedy progress, at an average annual growth of 13.4% between 2022 and 2023, suggests that it could achieve its target through sustained efforts by 2030. **According to the Digital Decade Eurobarometer, Bulgaria could make more progress to ensure easier online access to all key public services for citizens in Bulgaria.** Less than half (47%) of Bulgarian respondents to this survey considered that online access to key public services was easy in their country, against an EU average of 58%.

Bulgaria is also making a positive contribution to the EU's Digital Decade target for the digitalisation of public services for businesses, and showing a very strong dynamic in this area. The country's 2023 value is close to the EU target value, with a score of 91.9 (above the EU average of 85.4). Moreover, based on the current rate of progress (13.8%), and assuming the ongoing efforts will be sustained, Bulgaria's contribution to this EU target will continue to be very significant.

In its responses to the questionnaire that the Commission issued to Bulgaria before its fact-finding missions to the country, Bulgaria said that it welcomed the objectives of the Digital Decade in aiming for 100% of public services to be provided online by 2030. In its responses to the questionnaire, the country also referred to many steps taken to achieve this. The main change made was the 'serious amendment' of the Law on electronic government, made in September 2023. This law is the main act for regulating relations between administrative bodies, people performing public functions, organisations providing public services, and members of the public when requesting and providing services electronically. The figure and functions of a central data administrator are now regulated in detail in the amended Law. The amended Law also: (i) lays down clear rules for how the register should be built and what it should contain; and (ii) introduces an obligation for administrative bodies to keep the registers and databases assigned to them by law in electronic form. The most significant of this group of amendments is the introduction of general rules for keeping records in electronic form. **The information system for the centralised creation and maintenance of registers, which is created and maintained by the Ministry of Electronic Government, is now also regulated.** Administrative bodies will be able to use the system for creating and maintaining electronic registers that meet the requirements of the law free of charge. Another group of important

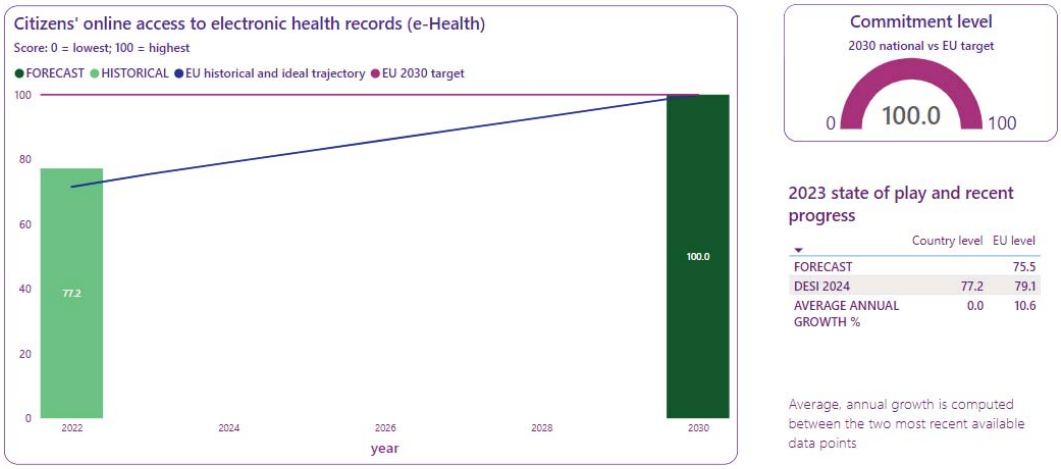
changes is the **obligation to provide services electronically to the public with a reduced fee and the introduction of the figure of an intermediary** when accessing administrative services electronically. The amendments now forbid administrations to require from businesses and members of the public any documents certifying data that are already accessible to the administration in the public registers. This rule had been in place since 2015 but there was a backdoor left in the legislation which was used by administrations to still require certificates attesting to data that the administration already held. The 2023 amendments to the Law officially made data policy a responsibility of the Minister (no ministry in the Government had explicit responsibility for data policy before that). Notwithstanding these changes, this issue of responsibility for data policy needs to be further worked on when the D1 activity of the PRIDST's data pillar produces the national Data Governance Framework in 2024.

Bulgaria's national regulatory authority – the Communications Regulation Commission (CRC) – also introduced two new information systems in 2023, allowing the provision of 9 new electronic administrative services to businesses.

After a few years of infringement procedure, the Open Data Directive (1024/2019) was transposed in Bulgaria's Access to Public Information Law in 2023, greatly increasing the pressure on institutions to make data available. This Law also promotes more active use of the National Platform for Access to Public Information (pitay.government.bg) and requires all newly tendered public information systems to build data interfaces to the Open Data Portal (data.egov.bg) for publishing all data in the scope of the law.

Bulgaria is making progress on integrating the 'whole-of-government approach' promoted by the DDPP. In this regard, an important project that started in 2023 was the renovation and overall extension of the monitoring portal information system, Monitorstat, under the RRP. Before its renovation and overall extension, the portal was mainly used to monitor performance in the cohesion funds, but it will now become the centrepiece of Bulgaria's strategic planning and monitoring efforts at national level. All strategic documents and roadmaps will need to be created and validated through the portal, and a reform was also passed to strengthen the Council of Ministers' role in coordinating strategic planning across line ministries. These documents will be monitored through real-time data by connecting public data sources. These changes to the Government's monitoring and planning system also complement efforts being made by the Government to improve the 'one-stop shop' data-access platform (D4 of Bulgaria's PRIDST programme) which would make it easier to access data. The Bulgarian Government considers the changes to the 'one-stop shop' data-access platform to be greatly significant, and believes that this system is now one of the best platforms of its kind at European level.

3.1.2.c e-Health



Note: The source of national forecast values is the 2023 country roadmap

Bulgaria has an **overall e-health maturity score of 77.2 out of 100 in 2023**, which remains stable when compared to the previous year and slightly below the EU average of 79.1. For 2030, Bulgaria aims to have a score of 100 in e-health, in line with the EU target.

A centralised, nationwide access service is technically available to all Bulgarians. However, in practice **only 40-59% of the national population is technically able to access the online services for e-health records, either through native mobile application(s) or online portal(s) on web browsers by** logging in using an e-ID that is compliant with the eIDAS Regulation. Bulgaria scores 48 out of 100 for the online accessibility of health data, compared with a European average of 74. On access opportunities for certain categories of vulnerable people (older people, people living in remote areas, people with a disability, etc.), Bulgaria scores 88 compared with a European average of 77, and follows the EU guidelines for accessible web content.

Against this background, it is important to accelerate efforts to expand the coverage of the online access service to ensure that all citizens can access their e-health data online. It is also important to make the medical images available to citizens through the online access service (medical images are one of the types of data not currently available on the Bulgarian e-health system). All data types would need to be made available in a timely manner.

In 2023, 43.1% of Bulgaria's population said they sought health information online, which is close to – but slightly lower than – the EU average of 56.3%.

There have been rapid developments in the field of e-health over the past 2 years, with Bulgaria's Ministry of Health having developed **a national centralised system collecting data from all pharmacies, hospitals, labs, surgeons, and practitioners during this time.** The country developed e-health records for all Bulgarians, who now can have e-health prescriptions available on a few mobile applications. **Bulgaria also now has a fully functional National Health Information System (NHIS)** which includes e-prescriptions, check-up lists, vaccination status, etc. Full e-health records are still not available, but they are being actively developed.

In its responses to the questionnaire that the Commission issued to Bulgaria before its fact-finding missions to the country, Bulgaria referred to the further developments it was making to its NHIS, where it collects, processes and stores information on the health status of the population as a whole and for each individual. In 2023, **the implementation of Phase 2 of the project to upgrade the NHIS was completed**. **A**

health information portal was developed and implemented, giving citizens a single-entry point to the NHIS, through which they can access their e-health records. The Health Monitoring and Control System (DWN – Data warehouse) was also implemented, making it possible to analyse and report on the modules and data available in the NHIS. This can support the decision-making process for people managing the NHIS. Based on the data obtained from the medical activities performed, the system produces a set of dynamic and static reports. The total number of electronic examinations registered in the NHIS (for the last 18 months) exceeds 47 million, with an average of more than 130 000 examinations per day uploaded to the system from more than 13 500 medical practices.

In 2023, the Ministry of Electronic Governance and the Ministry of Health developed a mobile application that facilitates access to information and health data for citizens. Through the mobile application, in addition to being able to access information about their health records, Bulgarians can receive prescriptions and other necessary information from their personal doctors about the treatment process. The Ministry of Electronic Governance works actively to provide an accessible environment for all Bulgarians, including people with disabilities. In this regard, the mobile application meets all requirements at the national and European level for making its online content as accessible as possible for all users.

The Ministry of Electronic Governance, together with the Ministry of Health and the Ministry of Education and Science, also announced in 2023 the introduction of the new electronic note for student absences. The long-awaited innovation was met with broad public support. When the electronic medical note is issued, its data is entered into the National Electronic Information System for preschool and school education, from where they are automatically sent to the electronic diaries for excused absences of the respective student. Electronic medical notes also become immediately visible to the parent in the electronic diary. The class teacher, school principal and parent do not need to take any further action. All electronic diaries used in the school education system enable automatic excuses from the school for already reflected absences, and mean that the school knows when a child will be absent in the future if a medical note is already available. Only people with access to the child's health record can see the diagnosis given to the child at the examination. Teachers will not have access to the diagnosis, so sensitive child data will also be preserved.

On 13 March 2024, the Council of Ministers adopted the 2030 National Strategy for e-Health and Digitalisation of the Health System (C12.R2, 2nd payment request). The strategy was designed by the Health Ministry as a sectoral strategic document as part of the policy to develop e-governance in Bulgaria. The adoption of the strategy will contribute to: (i) patient-friendly medical care; (ii) access to cross-border healthcare and real-time access to information; (iii) a reduction in the administrative burden and elimination of paper-based processes; and (iv) an improved regulatory and competitive environment through the introduction of uniform, appropriate, and proportionate rules and standards. On 18 April 2024, the Bulgarian parliament adopted the 2030 national health strategy (C12.R1, M317, second payment request), which now places greater emphasis on a healthcare model that is personalised, science-based and uses digital technologies and innovation.

3.2 Building a safe and human-centric digital environment and preserving our democracy

There have been positive developments in the areas of digital democracy and online safety in Bulgaria.

Bulgaria supports the implementation of the Declaration on Digital Rights and Principles through the actions of its Ministry of Electronic Governance on participation policies. In particular, these actions are carried out based on the **Public Consultation Portal of the Council of Ministers,** the main purpose of which is to promote cooperation in the formulation of policies and development of laws between citizens, businesses, non-governmental organisations and experts in Government institutions. The portal is the main

place to access a variety of information about the planned changes in the policies of the Republic of Bulgaria.

According to the Digital Decade Eurobarometer, and in the context of enforcing EU legislation on the behaviour of online platforms, 29% of Bulgarians said that they considered the problem with the greatest personal impact on **them** to be the **misuse of personal data** (above the EU average of 23%), followed by fake news and disinformation (21% mentioned this, above the EU average of 20%). This is further supported by the fact that only **44% of respondents said they have sufficient privacy online.** Furthermore, only 34% of respondents said that, before the interview with the pollsters, they were aware that these rights that apply offline should also be respected online (much below the EU average of 62%), demonstrating Bulgarians' **limited awareness of their rights**. Data also shows that more can be done to ensure access to a trustworthy, diverse, and multilingual digital environment, including by ensuring more diverse content, less disinformation, and less illegal content, as only 46% of Bulgarians consider that this is currently well applied in their country. There is also **room for progress to ensure safer digital environments and content for children and young people** as only 33% of Bulgarians consider this is the case at present.

In their response to a 2023 Eurostat survey, 23.8% of Bulgarians said that they had been exposed to hostile or degrading online messages in the previous 3 months (EU average: 33.5%). **To protect users from illegal content and hate speech,** Bulgaria's Parliament approved the second reading of several amendments to the Penal Code in July 2023. These amendments include provisions against hate crimes, among them harsher penalties for murder, assault, abduction and denial of employment rights if the motive for the crime is the victim's sexual orientation. **Incitement to hatred through the media or on the internet will now be a crime** when it is motivated by skin colour, national origin and sexual orientation, not just race and ethnicity as the law has provided for up to now. The penalty will be between 1 and 4 years in prison and a fine of approximately EUR 2 500 to 5 000 (BGN 5 000 to 10 000).

In 2023, the project to renovate the Public Consultation Portal was tendered. The portal is now updated, and several user-experience improvements have been made. In addition, the portal now includes **several digital tools to promote more active participation and democracy,** such as: (i) a feature to allow public suggestions on the Open Government Partnership's measures; and (ii) a channel for citizen legislative initiatives to the line ministries. In addition, the Ministry of Education and Science in 2023 introduced the possibility to **anonymously report online irregularities under the national RRP**. Members of the public can submit their alerts quickly and accessibly through an adapted alert button, which features on the official website of the ministry.

Many municipalities in Bulgaria have developed and implemented e-Government policies, which include making use of the internet to provide electronic services and run public consultations. In addition, thanks to public-consultation platforms, state and local authorities often use online platforms to conduct public consultations and collect opinions from the public. An example of such a platform is **'Public Discussion',** where citizens can participate in various debates and consultations on important topics.

Bulgaria has also undertaken many initiatives to ensure the online protection of individuals, promoting public awareness and the understanding of risks, rules, safeguards, and rights on the internet. For instance, a handbook with rules and useful advice for children on safe internet use was produced, along with the guidebook 'The Other Dictionary of the Internet', and a handbook in the field of online undercover operations in the fight against cybercrime. Bulgaria also developed an interactive knowledge test on internet safety, and supported a network of young volunteers who focused on the safe use of the internet as part of the fight against human trafficking.

In 2023, the Bulgarian Government decided to assign the functions of the country's Digital Services Coordinator to the CRC. As part of this reassignment of functions, activities were launched to prepare a **draft amendment to the Law on Electronic Communications** in order to implement Regulation (EU) 2022/2065. The main objective of the reassignment of functions and the draft amendment was **to ensure a safe, predictable, and trusted online environment.**

The Ministry of Electronic Governance implements activities to promote **child safety online**. These activities constitute a cross-cutting policy, and create opportunities for the development of an enabling internet environment, including for businesses and the public. Through the national programme 'Digital Bulgaria 2025' and the roadmap for its implementation, in the priority area 'Enhancing digital competences and skills', children's rights in the digital environment are guaranteed. The measures being implemented as part of Digital Bulgaria 2025 include information and awareness-raising campaigns to: (i) promote digital literacy; (ii) protect children's rights in the digital environment; (iii) reduce risks for – and promote responsible behaviour by – children in the online environment (implemented by the State Agency for Child Protection, the Children's Council and NGOs); (iv) cooperate with academia to introduce and develop media and digital literacy training (implemented by universities, the State Agency for Child Protection and the Ministry of Education); and (v) combat the sexual exploitation and abuse of children through computer systems (implemented by the State Agency for Child Protection and NGOs).

4 Leveraging digital transformation for a smart greening

Bulgaria's progress in the digital transformation is in part a reflection of its adoption of several sustainable ICT practices for its digital transformation. **There is an awareness** in the country of the importance of sustainability and of support for the EU Green Deal at the political and business level. Nevertheless, the **integration of sustainability into the operational practices of highly digital enterprises is not yet widespread, and Bulgaria is lagging behind in climate change-adaptation and mitigation.** Several measures launched in 2023 contribute to the green transition directly and indirectly. Some of these measures are still in progress, about to be launched, or in their evaluation stage. Many measures to promote sustainability are focused on the **circular economy.** Bulgaria aims to become a **world-leading 'hydrogen valley',** which would contribute to the priorities of the EU's hydrogen strategy and the objectives in the REPowerEU plan to achieve climate neutrality. In addition, Bulgaria is home to **12 EDIHs,** many of which are playing a significant role in promoting the green and digital development of Bulgarian enterprises. The 2024 working plan of Bulgaria's Programme for Research, Innovation and Digitalisation for Smart Transformation 2021-2027 (PRIDST includes the specific objective to 'Develop and strengthen research and innovation capacities and the deployment of advanced technologies', in particular through a new measure on **'Technology and knowledge transfer – Green and digital partnerships for smart transformation'.** Finally, Bulgaria adopted a new measure to train teachers in specialised modules covering **skills for the green transition.**

In both its response to the questionnaire that the Commission issued to Bulgaria before its fact-finding missions to the country and the study on the Declaration, Bulgaria referred to a number of sustainable ICT practices in the country. Based on data from the Edge Observatory, Bulgaria also said that a third of its enterprises (33.8%) are implementing measures to reduce the energy consumption of their ICT equipment. However, a slightly higher percentage of Bulgarian enterprises (41.1%) with 10 employees or more said that they consider the environmental impact of ICT solutions and devices when choosing them, and apply some measures to reduce the paper and energy consumption of ICT devices, compared with an EU average of 58.5%. Notably, only 11% of Bulgarian enterprises with a high digital-intensity ranking take environmental impacts into account when choosing ICT services or equipment. Furthermore, recycling is much less common in Bulgaria than in other EU countries on average, with 4% of Bulgarians recycling their mobile phones, 3.4% their desktop computers, and 2% their tablets (versus 10.4%, 12.8% and 9.7% respectively at EU level). According to the **2023 European Innovation Scoreboard**, Bulgaria shows a negative performance overall on indicators related to climate change, with: (i) a lower share than the EU average of material resources coming from recycled waste materials; (ii) a below-EU-average reduction in greenhouse-gas emissions; and (iii) a far-below-EU-average score on environmental innovation. These statistics suggest that although Bulgarian politicians and businesspeople are aware of the importance of sustainability and support for the EU Green Deal, the integration of these concerns into the operational practices of highly digital enterprises is not yet widespread.

Bulgaria's ISSS, its strategy which promotes the development and implementation of innovation in enterprises, focuses on several pillars including clean technologies and the circular economy. As the Commission discovered in its fact-finding missions to the country, several measures launched in 2023 also directly contribute to the green transition, although most measures contribute only indirectly to the green transition. Some of these **measures are still in progress**, some are about to be launched, and some are in their evaluation stage. Many measures are focused on the **circular economy**, which includes digital technologies and focused data on Industry 4.0. The number of the enterprises supported and the effects of such 'green' ICT projects could be tracked and reported after their successful implementation.

The EDIHs supported under PRIDST play an important role in promoting the green and digital development of Bulgarian enterprises. The Ministry of Innovation and Growth plans to support digitalisation by setting up a national network of EDIHs providing services to SMEs (PRIDST, grant funding). The centres have undergone an evaluation process under the Digital Europe programme, and the ministry is now planning for **Bulgaria to have a total of 12 centres**, 4 of which will be co-financed by the Commission and PRIDST. The remaining 8 centres will be awarded with a Seal of Excellence and be fully financed by PRIDST.

To help fight climate change, Bulgaria acknowledges in its roadmap the importance of deploying technologies in the manufacturing process that are both energy efficient and resource efficient. One of the priorities for the sustainable development of the Bulgarian research and innovation ecosystem planned by PRIDST's 2024 indicative annual work programme includes the **specific objective to 'Develop and strengthen research and innovation capacities and the deployment of advanced technologies,' in particular through a new measure on 'Technology and knowledge transfer – Green and digital partnerships for smart transformation'.** The measure will implement strategic projects to encourage SMEs to increase their competitiveness by turning green challenges into opportunities. The Government's aim is to enable sustainable solutions by providing green and/or digital services, creating a market advantage through the introduction/development of green and digital solutions and eco-innovation. This measure is expected to both: (i) help develop a model of knowledge and technology transfer, including the creation of effective partnerships between academia, SMEs, and industry; and (ii) stimulate processes of industrial innovation by bringing together academia, SMEs, NGOs, and public institutions around shared challenges. The budget planned for this measure is EUR 31 million (BGN 60.8 million).

Another new measure included in the roadmap implemented under the education programme, aims to modernise VET. This measure involves training teachers through specialised training on the digital and green transition, blue growth, and Industry 4.0, and will also support the green transition. One of the expected impacts of the measure is to have trained 2 942 teachers by 2027 with a budget of EUR 600 000 (BGN 1.2 million) specifically for teacher-training.

Best practice: Bulgaria's investment in hydrogen

Bulgaria is supporting the uptake of hydrogen in line with the EU's hydrogen strategy and REPowerEU plan as a critical resource to achieve climate neutrality in the EU and reduce its dependence on imported fossil fuels. The country pledged in its roadmap and the study on the implementation of the Declaration to pursue efforts to become one of the first 20 countries in the world with a working hydrogen valley.*

In April 2023, Bulgaria's Council of Ministers approved a national strategy for digital transformation of the construction sector with a 2030 horizon. To support the implementation of this strategy, the Council also adopted the National Roadmap to improve: (i) the conditions for unlocking the potential of hydrogen-technology development; and (ii) mechanisms for hydrogen production and supply. Responsibility for preparing the roadmap was assigned to the Ministry of Innovation and Growth in connection with the implementation of reform C4.R7 'Unleashing the potential of hydrogen technologies and hydrogen production and supply' in the national RRP. Furthermore, over the next 5 to 7 years, Bulgaria will mobilise resources of EUR 3.2 billion under various programmes and projects, which may also include activities to promote the use of hydrogen technologies to help decarbonise the Bulgarian economy.

**Hydrogen valleys are geographical regions that create a hub for the production, distribution, and use of hydrogen, offering more than one end sector or application in different areas of mobility, industry, and energy. The name is a reference to Silicon Valley.*

Annex I – National roadmap analysis

Bulgaria's national Digital Decade strategic roadmap

On 8 April 2024, Bulgaria submitted its national strategic roadmap, in accordance with Article 7 of the Digital Decade Policy Programme (DDPP) Decision. The Bulgarian authorities were consulted on the roadmap through a series of workshops with stakeholders, and the roadmap was subsequently approved by Government memorandum and published.

Bulgaria's roadmap presents a comprehensive and realistic assessment of both its current status with respect to the Digital Decade targets and its capacity to achieve the Digital Decade targets by 2030. The roadmap suggests that the country aligns its efforts with the SDDR 2023 recommendations, and acknowledges several issues highlighted in 2023. Bulgaria's roadmap includes 60 measures – most of which are new. These measures focus in particular on the digitalisation of key public services, followed by promoting basic digital skills, and encouraging the digitalisation of businesses. The roadmap only lists 4 measures under connectivity, and 1 measure on quantum computing.

The roadmap does not provide a target for unicorns. Several 2030 targets are not in line with the EU target. For basic digital skills, Bulgaria's target is lower than the EU's 80% target, and instead only aims at equipping 52% of its population with basic digital skills by 2030. For ICT specialists in employment, Bulgaria's target is lower than the EU's 10% target, and instead aims for ICT specialists to only account for 5% of those in employment by 2030. On SMEs with a basic level of digital intensity, Bulgaria also sets a commitment below the target at EU level, namely for 60% of its businesses to be digitally intense by 2030. On the take-up by enterprises of cloud, or data analytics, or AI, Bulgaria sets its national 2030 target at 35% (versus 75% for the EU's).

Bulgaria only refers once in its roadmap to the Declaration on Digital Rights and Principles. Few measures in its roadmap aim to achieve digital inclusion other than through skills programmes, but good performance on connectivity could accelerate access to digital services in the country. Measures to improve online public services cover a good balance between the objectives of providing: (i) secure, resilient online services; (ii) interoperability; (iii) coordination and strategic leadership; and (iv) human-centred online services for all.

Bulgaria has rolled out several measures to promote overall governance and other support initiatives. One of these measures is a platform to promote cooperation between higher education institutions, research organisations and business. Another of these measures promotes networking, training, initiatives and partnerships to involve social entrepreneurs in social and civic dialogue with local Government institutions, and local communities (local business, citizens' associations, schools, influential citizens (informal local leaders), etc.). These measures are to be welcomed, as they are in line with the SDDR 2023 recommendations encouraging the country to adopt a holistic approach on digital education which involves stakeholders more. Bulgaria was also specifically invited by the Commission to upskill and reskill its workforce and to address adult learning needs. The country responded to this invitation by putting in place several measures to create training programmes for both people in employment and the unemployed.

The roadmap convincingly covers several elements and examples of measures to foster digital leadership and digital sovereignty. A narrative around sovereignty is missing and could have enriched the roadmap. Nevertheless, several specific projects in this area are to be welcomed and include: (i) supercomputing; (ii) research and innovation for SMEs including for smart farming; (iii) cybersecure infrastructure; and (iv) initiatives to enhance fair competition.

The roadmap more comprehensively lists policies under the objectives for: (i) cybersecurity; (ii) digital citizenship; (iii) reducing the gender and geographical divide; and (iv) promoting an inclusive, transparent, and open digital environment. The roadmap contains less information on how the country is planning the

green transition.

The roadmap refers to how the various parts of Bulgaria's governance model dedicated to the DDPP were involved and consulted in the preparation of the document. Bulgaria has set up a solid governance model dedicated to the DDPP, with various coordinated entities (such as inter-ministerial working groups and monitoring committees) involved and consulted in the preparation of the document. A comprehensive effort was made to involve a broad range of stakeholders at all governance and stakeholder levels in drafting the roadmap. Bulgaria's decision to set up a Digital Decade Board at national level suggests a strong political commitment to the Digital Decade from its Government. Although Bulgaria mentions that businesses, NGOs, academia, trade unions, municipalities and more were consulted in the preparation of the roadmap, the results of these talks or exchanges, and the names of these actors, are not included in the roadmap.

The table below reflects a best-effort attempt to categorise the measures and budget as presented in the Bulgarian roadmap.

Digital Decade Target/objective	Budget (EUR Million)	Number of measures
Connectivity Gigabit	327	3
Connectivity 5G	5	1
Semiconductors	-	-
Edge nodes	-	-
Quantum computing	3	1
SME take up	225	8
Cloud/AI/Big Data uptake	909	14
Cloud only uptake	-	-
AI only uptake	-	-
Big data uptake	-	-
Unicorns	-	-
Basic Digital Skills	621	15
ICT Specialists	2	2
e-ID	38	1
Key Public Services	61	12
e-Health	0	3
Objectives	-	-
Total	**2 192**	**60**

Annex II – Factsheet on multi-country projects (MCPs) and funding

MCPs and EDICs

Bulgaria is a member of the established Alliance for Language Technologies European digital infrastructure consortium (ALT-EDIC). The main participant in ALT-EDIC is the national Institute for the Bulgarian language. Bulgaria is an observer to the informal working group of the possible future Innovative Massive Interconnected Public Administration (IMPACTS EDIC). To the end of May 2024, Bulgaria is developing the Statutes and other relevant documents of the possible future EDICs for Genome and the Mobility and Logistics Data, within their respective informal Working Groups. In addition, the country is home to EuroHPC Discoverer, which is one of the eight supercomputers located across Europe. EuroHPC Discoverer is fully operational, with a well-established quantum communication infrastructure including a Centre of Excellence. Bulgaria also cooperates with other countries in multi-country projects including health partnerships, **4 European Digital Innovation Hubs (EDIHs)** with co-funding from Digital Europe Programme, and eight Seals of Excellence.

EU funding for digital policies in Bulgaria

EU funds support digitalisation efforts in Member States. According to the Joint Research Centre[31], out of the total amount of the Recovery and Resilience plan allocated to digital, EUR 903 million of the total RRP directly contributes to achieving Digital Decade targets. The largest digital measure of the RRP is dedicated to VHCN Gigabit (EUR 272.2 million), closely followed by key public services (EUR 238.6 million). The measures to promote basic digital skills and train ICT specialists will receive EUR 179.6 million and EUR 121.4 million respectively, while EUR 272.2 million will support the roll-out of VHCN gigabit connectivity.

According to the same JRC study, out of the Cohesion Policy funds received by Bulgaria, EUR 691.2 million contributes directly to Digital Decade targets according to the same mapping study.

[31] Based on an estimation of the possible contribution to the Digital Decade (Joint Research Centre report 'Mapping EU level funding instruments to Digital Decade targets - 2024 update' (Signorelli et al., 2024)).

State of the Digital Decade 2024

Croatia

1 Executive summary

Croatia brings a positive contribution to the European Union's (EU) Digital Decade objectives and targets, in view of a successful digitalisation that fosters competitiveness, resilience, sovereignty, European values and climate action.

In 2023, Croatia made notable progress in increasing the number of ICT specialists, in the digitalisation of its SMEs, and in the rollout of gigabit connectivity (FTTP networks). However, particularly **important challenges** persist in the digitalisation of government services and in the adoption of AI and data analytics, as well as in increasing connectivity in rural areas.

Croatia's National Digital Strategy for the period until 2032 (DCS 2032) provides the strategic framework for action in line with the Digital Decade. It establishes a set of clear goals for a digital Croatia over the next years, defining the priorities of public policies' implementation in all areas of the digital transformation.

According to the **Special Eurobarometer 'Digital Decade 2024'**[32], 83% of the population consider that the digitalisation of daily public and private services is making their lives easier, proportion which is significantly higher than the EU average of 73%.

Regarding participation in **European Digital Infrastructure Consortiums** (EDICs), Croatia has joined several EDICs including the Language Technologies **ALT-EDIC**, the **Agri-food EDIC**, the Blockchain **EUROPEUM-EDIC** (both already set up**)** and is participating in the working groups aiming to set up EDICs in other areas, including Cancer Images **EUCAIM EDIC**, the **Genome EDIC**, the Connected Public Administration **IMPACTS EDIC**; and the **Cybersecurity Skills Academy EDIC**[33].

Croatia allocates 20% of its total Recovery and Resilience plan to digital (EUR 1.4 billion)[34]. Under cohesion policy, an additional EUR 0.8 billion (9% of the country's total cohesion policy funding) is allocated to the country's digital transformation[35]. The largest investment is dedicated to digital public services for citizens and enterprises (EUR 303 million) and eHealth (EUR 66 million), followed by VHCN gigabit connectivity (EUR 207.5 million) and digital skills (EUR 134.4 million).

[32] Special Eurobarometer 551 on 'the Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351

[33] Information last updated on 31 May 2024.

[34] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation.

[35] This amount includes all investment specifically aimed at or substantially contributing to digital transformation in the 2021-2027 cohesion policy programming period. The source funds are the European Regional Development Fund, the Cohesion Fund, the European Social Fund Plus, and the Just Transition Fund.

Digital Decade KPI [1]	Croatia			EU		Digital Decade target by 2030	
	DESI 2023	DESI 2024 (year 2023)	Annual progress	DESI 2024 (year 2023)	Annual progress	HR	EU
Fixed Very High Capacity Network (VHCN) coverage	61.5%	67.8%	10.3%	78.8%	7.4%	100%	100%
Fibre to the Premises (FTTP) coverage	54.0%	62.1%	15.1%	64.0%	13.5%	100%	-
Overall 5G coverage	82.5%	83.4%	1.1%	89.3%	9.8%	95%	100%
Semiconductors		NA					
Edge Nodes		3		1 186		x	10 000
SMEs with at least a basic level of digital intensity	49.7%	56.0%	6.1%	57.7%	2.6%	90%	90%
Cloud	34.6%	40.7%	8.5%	38.9%	7.0%	75%	75%
Artificial Intelligence	8.7%	7.9%	-4.7%[2]	8.0%	2.6%	20%	75%
Data analytics	NA	51.7%	NA	33.2%	NA	30%	75%
AI or Cloud or Data analytics	NA	65.6%	NA	54.6%	NA		75%
Unicorns		2		263		4	500
At least basic digital skills	63.4%	59.0%	-3.6%	55.6%	1.5%	80%	80%
ICT specialists	3.7%	4.3%	16.2%	4.8%	4.3%	7%	~10%
eID scheme notification		Yes					
Digital public services for citizens	71.1	67.2	-5.6%	79.4	3.1%	100	100
Digital public services for businesses	66.8	66.2	-0.9%	85.4	2.0%	100	100
Access to e-Health records	85.6	85.6	0.0%	79.1	10.6%	100	100

[1] See the methodological note for the description of the indicators and other descriptive metrics
[2] The variation between the two years is not considered statistically significant but in line with the stagnation of this indicator.

National Digital Decade strategic roadmap

With respect to **Croatia's** contribution to the Digital Decade reflected in its roadmap, it is demonstrating **a very high ambition** and, based on this document, intends to make a **significant effort** to achieve the Digital Decade objectives and targets.

In March 2024, Croatia adopted its national strategic roadmap, in accordance with Article 7 of the DDPP Decision, following a consultation with a series of workshops with stakeholders and then published it in Croatia's official journal. The Croatian roadmap includes national targets and trajectories for all Digital Decade targets, except semiconductors. All national target values provided are aligned with the 2030 EU targets**,** except for the ones on the adoption of AI, big data, ICT specialists and 5G, which are lower and justified by the Croatian authorities in view of the national context, starting point and planned measures. Measures in the roadmap are supporting all the Digital Decade targets, although measures on connectivity and digitalisation of business are very likely to fall short of the 2030 target.

Recommendations for the Roadmap:

Croatia should, when submitting adjustments to its national roadmap in accordance with Article 8(3) of the DDPP Decision:

- **TARGETS:** (i) Raise the level of ambition for the targets on for the ICT specialists, AI / data analytics adoption, and 5G.
- **MEASURES:** (i) Include more measures supporting connectivity, digital skills, for cloud, AI, and

data analytics, and in the digitalisation of public services. (ii) Provide a better overview of measures supporting the wider objectives of the programme. (iii) Provide more information on the implementation of digital rights and principles (and Digital Decade general objectives), including what national measures contribute to it.

- **CONSULTATION:** Ensure a wider and more thorough consultation process with relevant stakeholders.

Digital rights and principles

The Special Eurobarometer 'Digital Decade 2024' provides key insights into Croatian perceptions of digital rights. While 56% of Croatians believe the EU protects their digital rights effectively, this figure is above the EU average of 45%. Concerns have increased, with 44% worried about children's online safety and 40% about control over personal data, reflecting a growing awareness of digital risks. On a positive note, 69% trust in the freedom of expression online as well as in online privacy, both above the EU average. The monitoring of the Declaration on Digital Rights and Principles shows that increasing the profile of the Declaration at national level and fostering better stakeholder engagement could help improve outcomes in the years to come[36].

A competitive, sovereign and resilient EU based on technological leadership

In 2023 Croatia brought a positive but limited contribution to the EU's Digital Decade targets for digital infrastructures, particularly evident in terms of Fixed Very High-Capacity Network (VHCN) coverage, which has shown an increase of about 6 percentage points compared to the previous year: 61% in 2022 and 67.8% in 2023. There is still untapped potential with respect to the coverage of rural areas, with 25.5% of rural areas covered compared to an EU average of 55.6%. In terms of Fibre to the Premises (FTTP) coverage, Croatia improved from 54% in 2022 to 62.1% in 2023, but Croatia risks missing the FTTP target for 2030. 5G in the 3.4-3.8 GHz band, an essential band for enabling advanced applications requiring large spectrum bandwidth, covers 40% of Croatian households in 2023, below the EU average (50.6%). In 2023 Croatia started an initiative aimed at the establishment of the Croatian Competence Centre for Semiconductors (CROCCS) as a contribution to the EU's semiconductors target.

The digitalisation of SMEs in Croatia reveals a mixed dynamic, with several indicators close to the EU average (for example e-Commerce where with 11.3% is it close to the EU average of 11.9%) and others where the country performs much better than the EU average (29.5% versus an EU average of 19.1%). Croatia is also among the EU forerunners concerning the use of data analytic by enterprises (51.7 % versus an EU average of 33.20%). Croatia's contribution in the field of unicorns is limited to 2, among the 263 unicorns in the entire EU. Some of the reasons include the low R&D investment (an annual R&D in the ICT sector of only 0.2% of GDP) and the suboptimal access to finance. Croatia is putting in place a number of measures to facilitate access to finance in order to increase the number of unicorns.

[36] See SWD 'Digital Decade in 2024: Implementation and perspective' with annexes, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325, Annex 4.

Recommendations – Croatia should:

- **CONNECTIVITY:** (a) Continue and expand the measures aimed at supporting FTTP rollout, aiming to fully close the rural urban divide, including by supporting the demand of gigabit services; (ii) Ensure sufficient access of new players to spectrum for innovative B2B and B2C applications and encourage operators to speed up the deployment of 5G stand-alone core networks.
- **QUANTUM & EDGE NODES:** Increase efforts in the areas of quantum computing and edge nodes, in view of their importance for competitiveness, resilience, sovereignty, European values and climate action.
- **CLOUD:** Support the broad uptake of the next generation of cloud infrastructure and services under development in the IPCEI-CIS by companies of all sizes, including by liaising with the direct participants to develop a country-specific dissemination strategy reaching beyond the participating organisations.
- **TAKE UP OF AI/CLOUD/DATA ANALYTICS & UNICORNS**: Increase the level of effort to support the unicorns target, including by increasing the level of R&D in the ICT sector, by improving access to finance and by supporting the development and deployment of trustworthy, secure, sovereign advanced technologies and solutions.
- **CYBERSECURITY:** Continue the implementation of the 5G Cybersecurity Toolbox to ensure secure and resilient 5G networks.

Protecting and empowering EU people and society

Croatia is well placed in terms of basic digital skills, with 59% of the population having at least basic digital skills compared with an EU average of 55.6%. There is also a good overall gender balance in the distribution of digital skills. The percentage of the Croatian population with digital content creation skills (81.5%) is well above the EU average of 68.3%. The percentage of ICT specialists in employment in Croatia of 4.3% is below the EU average of 4.8%. Croatia's RRP investment of EUR 176.5 million on "Digital products and platforms" aims at further increasing the percentage of ICT experts in the workforce.

Croatia has scope to improve its performance in the field of digital public services with scores of 67.2 for digital services available to citizens (versus an EU average of 79.4) and 66.2 for digital services for business (versus an EU average of 85.4). Nevertheless, Croatia scores significantly above the EU average for e-Government users, reflecting the good level of digital skills of its population and underlining the relevance of improving the delivery of the services. Croatia is making a positive contribution to the eHealth target.

Croatia is also making a positive contribution in the field of human centred digitalisation, implementing new regulatory solutions that ensure the safe and ethical implementation of digital technologies.

Recommendations – Croatia should:

- **DIGITAL SKILLS:** Continue the efforts on digital basic skills and ICT specialists in view of ensuring sufficient progress towards the 2030 targets.
- **KEY DIGITAL PUBLIC SERVICES:** Take measures to increase the digitalisation of public services and improve the accessibility and user friendliness of its services to citizens and enterprises.
- **e-HEALTH:** (i) Introduce a legal basis and provide the technical functionality for authorised persons to access electronic health data on behalf of others; (ii) Make the data type of medical images available to citizens through the online access service; (iii)) Offer a mobile application for citizens to access their electronic health records.

Leveraging digital transformation for a smart greening

Croatia has taken extensive measures to renew and digitalise its energy system, with Eurostat reporting the country as one of the best-performing Member States in the decarbonization of the energy and transport sectors. Nevertheless, the country's contribution towards the Digital Decade objectives remains limited in the areas of more sustainable energy and more resource efficient digital infrastructure and technologies. This indicates that Croatia has untapped potential to contribute to the EU's digital objective of twinning the green and digital transitions.

Recommendations – Croatia should:

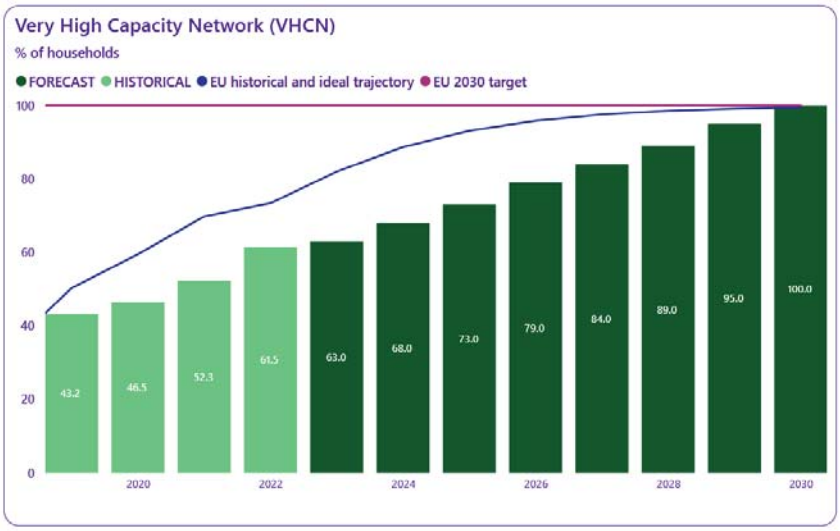
- Develop a coherent approach to twinning the digital and green transitions. First, promote improvements in energy and material efficiency of digital infrastructures, in particular data centres. Second, support the development and deployment of digital solutions that reduce the carbon footprint in other sectors, such as energy, transport, buildings, and agriculture, including the uptake of such solutions by SMEs.
- Monitor and quantify the emission reductions of the deployed digital solutions in line with the relevant EU guidance and with the support of the methodology developed by the European Green Digital Coalition, in view of future policy development, as well as of attracting relevant financing.

2 A competitive, sovereign and resilient EU based on technological leadership

With significant support from EU funds, Croatia is giving increasing attention to digitalisation to improve its productivity and competitiveness. Efforts are dedicated to progressively digitalise all sectors of the economy. Croatia has a particularly strong potential in the field of digital infrastructures, with increasing access to gigabit infrastructure and high access to 5G services, although still suffering from a persistent low penetration of these services and a coverage gap between urban and rural areas. Against this background, the Government is paying increasing – but still insufficient – attention to developing its research and innovation (R&I) capabilities in the area of connectivity and beyond. This is also in line with what is monitored in the Special Eurobarometer 'Digital Decade 2024' survey, which reveals that 89% of Croatians believe that public authorities should build efficient and secure digital infrastructures including connectivity and data-processing facilities (above the EU average of 84%).

2.1 Building technological leadership: digital infrastructure and technologies.

2.1.a Connectivity infrastructure (Gigabit) [37]



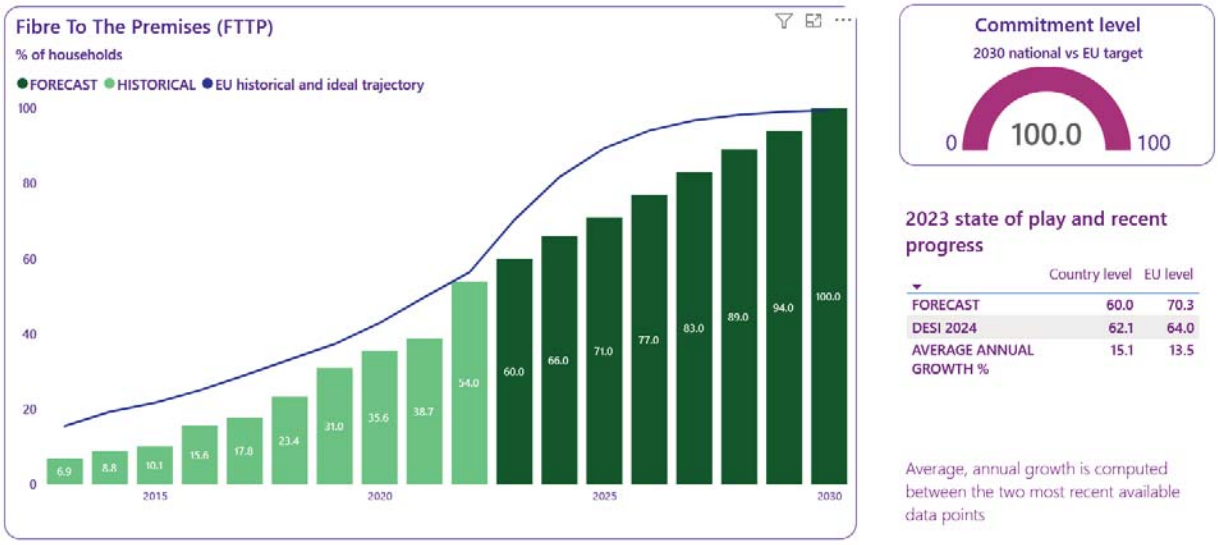
2023 state of play and recent progress

	Country level	EU level
FORECAST	63.0	82.0
DESI 2024	67.8	78.8
AVERAGE ANNUAL GROWTH %	10.3	7.4

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

[37] All historical values presented in the figures are sourced from the corresponding data sources and not the national roadmaps.



Note: The source of national forecast values is the 2023 country roadmap

Croatia is making a positive contribution to the EU's Digital Decade target for Very High Capacity Network (VHCN) coverage and shows a positive overall dynamic in this area compared with the previous year (61% of Croatian households had access to VHCNs in 2022 versus 67.8% in 2023), with double-digit annual growth between 2022 and 2023 (10.3% year-on-year growth). Although still below the EU average (78.8% of households with VHCN access) in 2023, Croatia managed to record growth in the number of households with VHCN access to 67.8%, a level that is almost 4 percentage points above Croatia's own trajectory prediction (63%) for 2023.

Nevertheless, Croatia still has untapped potential to increase coverage of rural areas with VHCNs, which is currently way below the EU average (25.5% of Croatian rural areas are covered versus an EU average of 55.6% rural coverage) and with little year-on-year growth in this area from 2022 to 2023.

In 2023, Croatia also made substantial progress in Fibre-to-The-Premises (FTTP) coverage, moving from a situation where 54% of households had FTTP in 2022 to 62.1% in 2023. In spite of this improvement, Croatia remains slightly below the EU average of 64% for this metric.

In its roadmap, Croatia lists two measures supporting fibre roll-out, both of which run until 2026. More specifically: (i) a measure dedicated to the roll-out of VCHN/fibre networks in white areas, covered under the RRP, with a planned budget of EUR 106 million to be fully implemented by 2025-2026; and (ii) an ERDF measure that will cost EUR 50 million and has a 2030 implementation timeframe.

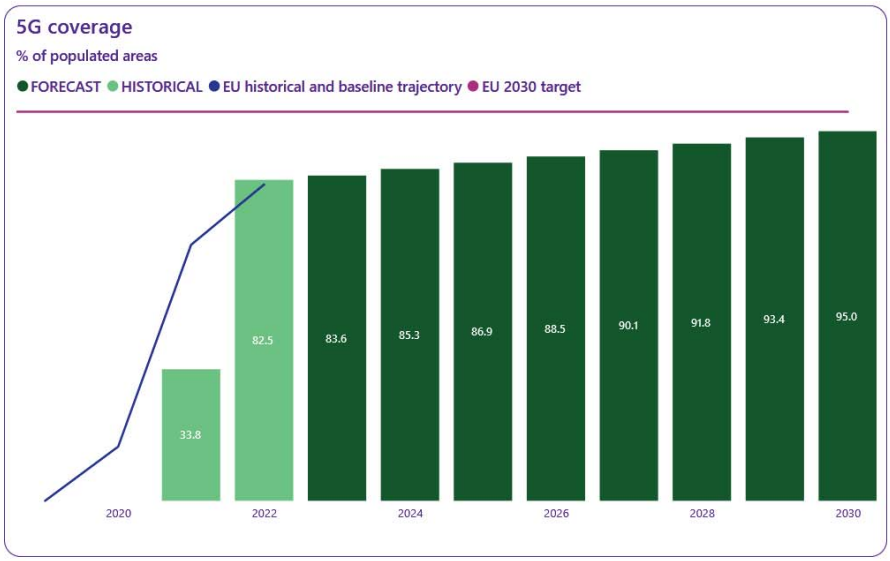
In 2023, the Croatian telecoms regulator (HAKOM) carried out a market analysis of markets M1[38] and M3b[39]. This analysis resulted in: (i) geographical market segmentation for high-capacity networks; and (ii) awards of spectrum in the frequency bands 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, and 2600 MHz. Furthermore, telecoms infrastructure is being built under two ongoing programmes: the framework national programme for the development of broadband access infrastructure (ONP) and the national programme for backhaul broadband infrastructure development (NP-BBI). Both programmes are being co-financed with EU funds and have been continued in 2023 with two calls for proposals.

Data from September 2023 show an 11.1% year-on-year increase in the number of active VHCN subscribers in Croatia, with 406 354 active VHCN subscribers at present. However, VHCN active subscribers as a share of

[38] M1: wholesale call termination on individual public telephone networks provided at a fixed location.
[39] M3b: wholesale central access provided at a fixed location for mass-market products.

overall internet users is still relatively low (37.02%). As for VHCN coverage, the recent rate of increase in Croatia is significant, with 1 042 804 covered premises at the end of 2022, rising to 1 113 770 at the end of June 2023. Despite its 2023 progress in FTTP coverage, Croatia continues to be affected by a persistent urban-rural divide in fixed connectivity and low penetration of VHCN and gigabit services among users. This suggests Croatia needs to take additional action to support the take up of gigabit services and further increase its efforts to deploy gigabit connectivity – especially fibre – to rural areas.

2.1.b Connectivity Infrastructure (5G)



2023 state of play and recent progress

	Country level	EU level
FORECAST	83.6	
DESI 2024	83.4	89.3
AVERAGE ANNUAL GROWTH %	1.1	9.8

Average, annual growth is computed between the two most recent available data points. No ideal trajectory, and therefore no EU level forecast, is provided for 5G (see 2023 Communication on EU-level trajectories)

Note: The source of national forecast values is the 2023 country roadmap

Croatia is making a positive contribution to the EU's Digital Decade target for 5G connectivity. In 2022, 82.5% of Croatia had 5G coverage, a level that was marginally above the EU average of 81.26%. Nevertheless, its year-on-year progress in rolling out 5G to more areas was limited in 2023, with modest growth bringing coverage to 83.4% of Croatia's national territory, but behind the EU average which grew to reach 89.3% coverage in 2023. Croatia is making progress in making 5G spectrum available to market players, and spectrum availability has now reached 100%. This puts Croatia at the top of the EU ranking for making 5G spectrum available alongside two other Member States. In 2023 Croatia also progressed in the deployment of 5G passive infrastructure in rural and sparsely populated areas, with 14 masts being built in 13 white areas. Croatia is also participating in the Connecting Europe Facility (CEF) Digital programme through two projects including Croatian partners which have been selected for co-financing: (i) a project to study the cross-border deployment of 5G between Slovenia and Croatia on the Mediterranean corridor; and (ii) a project to improve the public services of Ploče Port Authority.

In 2023, Croatia's trajectory towards the EU target to have 100% 5G coverage by 2030 reveals untapped potential, demonstrating a limited dynamic (1.1% year-on-year growth in 5G coverage compared with the EU average of 9.8%) and with rural areas suffering the most. Furthermore, despite the significant step of making available 100% of the 5G spectrum, Croatia is still lagging behind the EU average in mobile broadband use, with 82.76% of individuals taking up mobile broadband (compared with the EU average of 89.94%). Croatia's roadmap also reveals a low ambition in 5G coverage up to 2030 (Croatia is only aiming for 95% coverage by 2030 compared with the EU goal of 100% coverage).

2.1.c Semiconductors

Croatia's contribution to the EU objective on semiconductors includes the Innovation Centre Nikola Tesla (ICENT) initiative. This is a strategic partnership between the Government and the Faculty of Electrical

Engineering and Computing at the University of Zagreb (FER), which has begun setting up the Croatian Competence Centre for Semiconductors (CROCCS), which will itself be brought into line with the EU's strategic directive under the European Chips Act.

CROCCS is expected to work as a one-stop-shop for research and development, prototyping, testing, and training in the field of advanced semiconductor technologies. The Croatian roadmap notes that up to EUR 1 million per year will be invested over a 4-year period under the Digital Europe 2021-2027 programme. In 2023, Croatia implemented its planned measure for the target on semiconductors, by grouping and networking relevant stakeholders with the aim of strengthening their competitiveness in the semiconductor market.

2.1.d Edge nodes

Estimates indicate that three edge nodes were deployed in 2023. The roadmap provides no information on how the national contribution to the EU's Digital Decade target for edge nodes will be achieved, and it also provides no indication about how the trajectory towards the EU objective will be supported and maintained. Nevertheless, Croatia acknowledges the importance of achieving this target and is committed to setting up a system to monitor the number of climate-neutral and highly secure edge nodes in the country.

2.1.e Quantum technologies

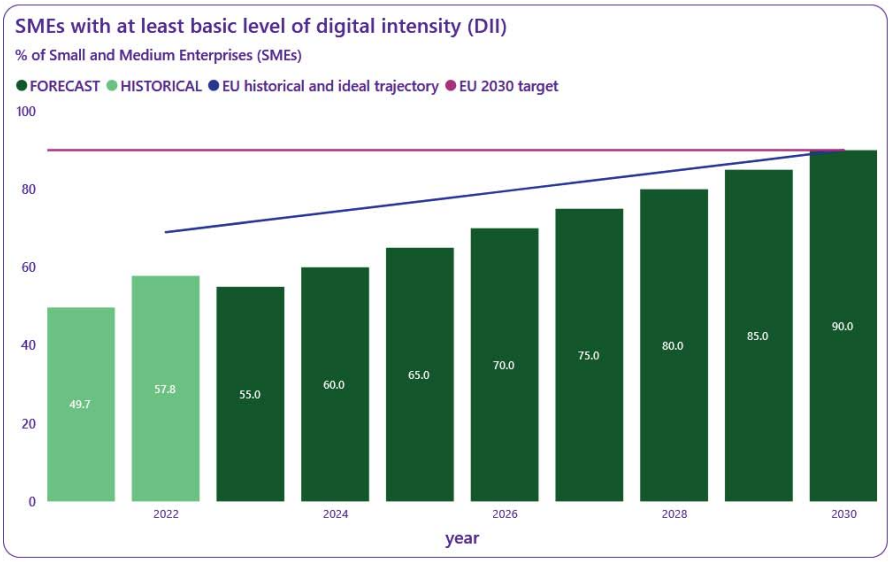
Croatia is implementing the first of two actions aimed at increasing its capacity in the field of quantum computing. 2023 saw the formation of Croatia's first quantum-computing consortium CroQCI. The CroQCI consortium aims to implement a national quantum network by building and testing architectural elements and enabling terrestrial infrastructure with a future space component to create a fully functional quantum network.

The roadmap reveals that Croatia was expected to contribute to the European objective in this field by installing three high-performance supercomputers in 2023. In 2023, Croatia also invested about EUR 10 million to strengthen the skills of supercomputing researchers by: (i) applying state-of-the art scientific research on infrastructure in the field of quantum technologies and supercomputers; and (ii) strengthening collaboration and knowledge spillover between the research community and industry/sector representatives in the field of quantum technologies and supercomputers. These two measures are expected to help develop and upgrade technological and innovation infrastructure (i.e., a network of infrastructure based on the principles of open innovation, which will directly encourage the areas of quantum technologies and supercomputers, namely clean technologies and the green and digital transitions).

Overall, Croatia has untapped potential in the field of quantum computing as it is still at an early stage of its action, having only recently set up the CroQCI consortium to create a national quantum network based on quantum communications.

2.2 Supporting EU-wide digital ecosystems and scaling up innovative enterprises

2.2.a SMEs with at least basic digital intensity



2023 state of play and recent progress

	Country level	EU level
FORECAST	55.0	71.6
DESI 2024	56.0	57.7
AVERAGE ANNUAL GROWTH %	6.1	2.6

In the case of DII, the average, annual growth is computed between 2023 and 2021 due to data comparability reasons.

Note 1: DII 2022 is version IV that is not comparable with DII 2021, that was version III. The EU-level ideal trajectory refers to DII version IV, as published in the 2023 Communication on EU-level trajectories

Note 2: The source of national forecast values is the 2023 country roadmap

Croatia is making a positive contribution to the EU objective on the digitalisation of SMEs. Data reveal a positive year-on-year dynamic in the percentage of Croatian SMEs with at least a basic level of digital intensity. This means that Croatia made modest progress since 2021 towards the EU target (90% of SMEs should have at least a basic level of digital intensity by 2030). The percentage of Croatian SMEs with at least a basic level of digital intensity grew from 49% in 2022 to 56% in 2023, somewhat lower than the EU average of 57.7% but marginally overshooting its national trajectory target for 2023, which was set at 55% for 2023. In the roadmap, the country's national target is fully aligned with that of the EU.

2023 data on the percentage of SMEs exploiting different types of digital technologies reveal a mixed dynamic, including in the field of e-commerce turnover, with Croatia scoring 11.3% versus the EU at 11.9%, while scoring much higher for the percentage of SMEs selling online, with 29.5% of Croatian enterprises selling online against an EU average of 19.1%. Eurostat data from 2022 reveal that only 5.3% of Croatian SMEs had recently searched for ICT specialists compared with the EU average of 7.8%. Also in 2023, about 7.8% of Croatian enterprises said that they had recently recruited or tried to recruit ICT specialists compared with an EU average of 9.5%.

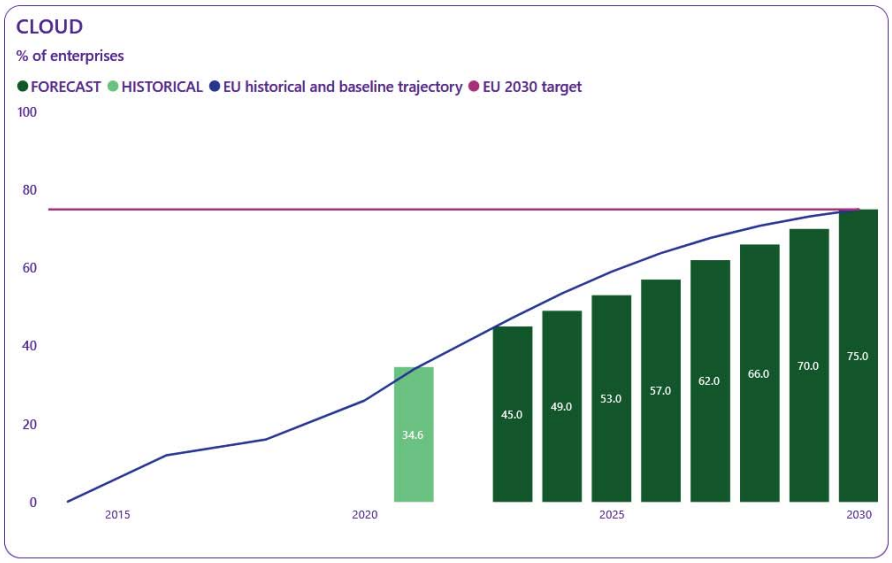
In 2023, Croatia also put in place calls for proposals to improve SMEs' digital capabilities through providing digital products, services or skills to SMEs. So far, a total of 1 612 contracts (through the ERDF) and 949 contracts (through the RRF) have been signed with beneficiaries based on: (i) 3 calls for proposals within the Operative Programme for Competitiveness and Cohesion 2014-2020; and (ii) 2 calls for proposals within the RRF. The total value of the projects that have been granted amounts to EUR 1.75 billion (EUR 63.6 million from RRF) with the amount of non-refundable support at EUR 91.9 million (EUR 29.7 million from the RRF).

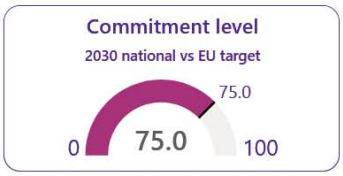
In 2023, Croatia also set up four European Digital Innovation Hubs (EDIHs), with EDIH Adria (as part of the European Digital Innovation Hubs Network consisting of several hundred centres across Europe) responsible for the digital transformation of companies in Croatia's Adriatic area which focus on Artificial Intelligence (AI) and High-Performance Computing. Croatia could increase its ambition to facilitate the growth of

innovative scale-ups with a view to promoting the emergence of more unicorn companies by improving access to finance and by increasing R&D investment in ICT. This R&D investment in ICT would help promote the development and deployment of trustworthy, secure, and sovereign advanced technologies and solutions.

2.2.b Take-up cloud / AI/ data analytics

- **Cloud**





2023 state of play and recent progress

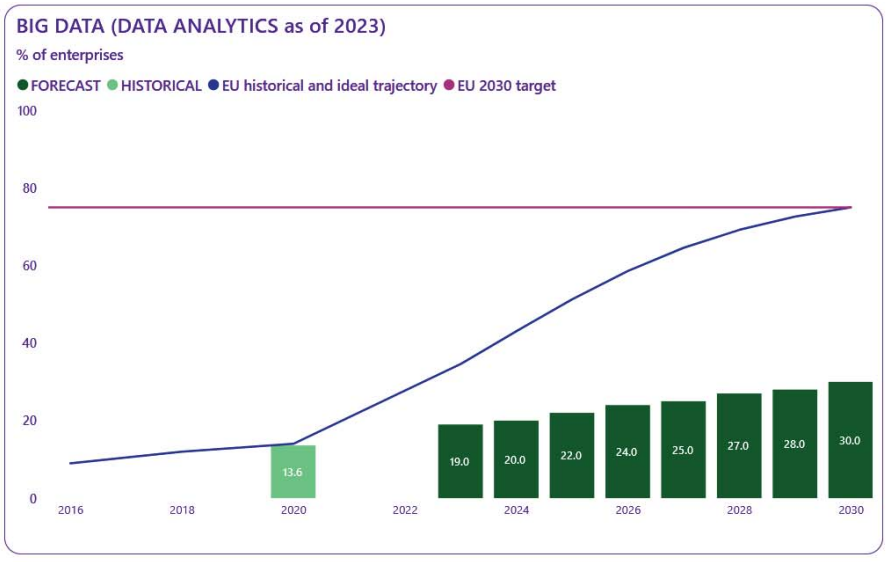
	Country level	EU level
FORECAST	45.0	47.3
DESI 2024	40.7	38.9
AVERAGE ANNUAL GROWTH %	8.5	7.0

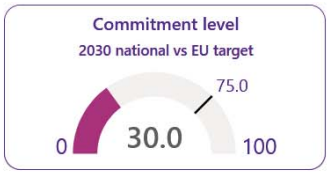
Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

With 40.7% of its enterprises using **cloud solutions** in 2023, Croatia is already above the EU average of 38.9% in this area, although this 40.7% performance is still below the 45% target set out in the country's national roadmap trajectory for the same year.

- **Data Analytics (Big Data)**





2023 state of play and recent progress

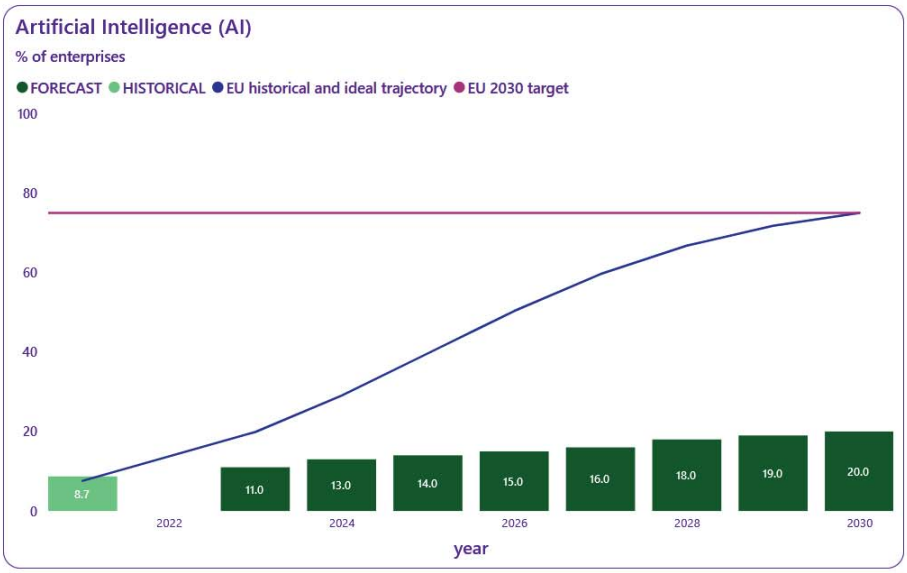
	Country level	EU level
FORECAST	19.0	34.6
DESI 2024	51.7	33.2
AVERAGE ANNUAL GROWTH %		

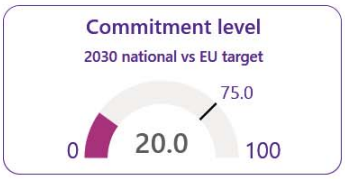
Annual growth cannot be computed in this case because Big Data was replaced by Data Analytics in 2023. The two indicators are not comparable.

Note: The source of national forecast values is the 2023 country roadmap

Croatia is one of the leading countries in the EU for the use of data-analytics tools, with 51.7% of its enterprises using **data-analytics tools** in 2023 against an EU average of 33.2%. This is well above the 19% national roadmap trajectory target for 2023 and reveals the country's low level of ambition in this area, as its target is for only 30% of its enterprises to be using data-analytics tools by 2030.

- **Artificial Intelligence**





2023 state of play and recent progress

	Country level	EU level
FORECAST	11.0	19.9
DESI 2024	7.9	8.0
AVERAGE ANNUAL GROWTH %	-4.7	2.6

Average, annual growth is computed between the two most recent available data points.

Note 1: at the end of 2023 ESTAT revised backward the values of AI. The revised value for 2021 at the EU level is 7.6 % (from 7.9 %).

Data from 2023 reveal that Croatia is bringing a **positive contribution** to the EU's Digital Decade target on **AI,** with about 7.9% of all enterprises in the country adopting AI versus an EU average of 8.0%. This is 2 percentage points behind Croatia's own national-contribution target for 2023 set in its national roadmap of 11%.

- **Take-up by enterprises of cloud or data analytics or AI**

Croatia is making a positive contribution to the EU's Digital Decade targets for the take up of cloud computing, AI or big data. 65.6% of enterprises adopt AI or cloud or data analytics, against an EU average of 54.6%.

However, the Croatian roadmap indicates that the country has more limited ambitions for 2030, with the exception of the adoption of cloud technologies, where the country shares the EU target to ensure 75% of enterprises are using cloud technology by 2030. For example, Croatia's AI target is for only 30% of its enterprises to be using the technology by 2030 (the EU target is 75%), and its target for data analytics is for only 20% of enterprises to be using this technology by 2030 compared with the EU Digital Decade target for this date of 75%.

In 2023, Croatia contributed to this objective by launching calls for proposals under the heading 'Grants for Digitalisation' which will receive EUR 27.3 million of funding under the country's recovery and resilience plan (RRP) for 2021-2026 aimed at SMEs. The purpose of these calls for proposals is to encourage investment in digital tools and equipment to deploy new or significantly improved production processes, service-delivery methods, or organisational practices.

Since mid-2023, grants aimed at innovation and the development and application of new technologies (including digital technologies) were also put in place through the 'Vouchers for Digitalisation' worth EUR 9.95 million.

Croatia has untapped potential for its enterprises to adopt new digital technologies (in cloud and AI), as the country is making a lower contribution in these areas in line with the national trajectories for 2023 but not with the EU targets in these fields. This reveals a low level of ambition in terms of the 2030 targets.

2.2.c Unicorns, scale-ups and start-ups

By already hosting 2 unicorn companies and 1 potential future unicorn company, Croatia is making a positive but limited contribution to the EU target in this area, which is for the EU to have 500 unicorn companies by 2030 (in 2024, there were only 263 unicorn companies in the entire EU). However, Croatia's roadmap reveals an overall low level of ambition, with the country only aiming to have 2 unicorn companies by 2028 and 4 unicorn companies by 2030. Such a limited dynamic may be due to the limited access to finance faced by Croatian tech companies. This limited access to finance is partly reflected in the Eurostat data on R&D, which reveal that Croatia spends only 0.02% of the country's total R&D expenditure on R&D in the ICT sector.

In addition to the two main ongoing actions in the field of unicorn companies, Croatia also signed a new funding agreement with the European Investment Fund in September 2023, setting up the Croatian Venture Capital Initiative 2 (CVCi 2). This new funding agreement is a follow-up of the successful EUR 35 million CVCi fund that was launched in June 2018. This new funding agreement from September 2023 will see a contribution of EUR 60 million from the ERDF-funded Programme for Competitiveness and Cohesion (2021-2027) for Croatia, coupled with EUR 20 million of additional resources and a new EUR 80 million programme to support Croatian start-ups. In addition, about EUR 70 million in grants for start-ups and EUR 210 million in innovation vouchers are targeting newly founded companies to strengthen collaboration between business and the research sector.

Croatia is also encouraging the development of financial instruments for mid-cap and large enterprises to promote their competitiveness and assist them in the green and digital transition.

The new 2029 Smart Specialisation Strategy features thematic priority areas (TPPs), which also contribute to this start-up and scale-up domains. One of these TPPs is helping to launch a 'Digital products and platforms' initiative to help creative industries increase their potential by providing them with IT services, such as customised and off-the-shelf software or software as a service (SaaS).

2.3 Strengthening cybersecurity & resilience

Eurostat data from 2020 reveal that over 90% of Croatian enterprises evaluate cybersecurity risks, take cybersecurity measures, and run staff training on cybersecurity against an EU average of 94%. Similarly, Eurostat data from 2022 show that the number of Croatian enterprises with insurance against ICT security incidents and that experienced such problems was relatively low, at about 7.4% against 25% within the EU-27 area. Croatia has put in place several actions to monitor and mitigate cybersecurity risk for enterprises, public administrations and households that increasingly rely on digital technologies in their everyday lives.

In 2023, Croatia put in place its 'Vouchers for Digitalisation' programme with EUR 9.95 million in funding. One of the aims of the voucher programme is to improve the overall digital skills of Croatian workers to facilitate the digital transformation and develop the skills needed to diagnose cybersecurity threats. In 2023, Croatia's SPAN Security Centre said that, based on its own assessment, about 43% of Croatian companies have drawn up a strategy for encrypting sensitive data, and that there is an average of 19 days of downtime caused by a typical cyberattack on a company.

Furthermore, HAKOM carries out an annual assessment of cybersecurity risks in Croatia with a survey of over 100 000 telecoms customers. HAKOM runs this assessment through telecom operators in line with the recommendations of the National Cyber Security Centre. Croatia also transposed the NIS2 Directives and is taking action to increase cybersecurity skills and awareness among both public and private entities. For example, it set up a single contact centre for all e-public services where customers can receive cybersecurity support. This support is provided in line with the Cybersecurity Act of Critical Service Operators and Digital Service Providers and Regulation (EU) 2019/881 ('the Cybersecurity Act').

In 2023, Croatia set up its national coordination centre for the development of cybersecurity skills as required by Regulation (EU) 2021/887. Croatia plans to join the EU's Cybersecurity Skills Coalition – European Digital Infrastructure Consortium (CSC – EDIC) in 2024. In 2023, Telecom operators such as A1 launched the BoljiOnline campaign, a platform that strives to make the internet a safer and more positive place for everyone.

3 Protecting and empowering EU people and society

3.1 Empowering people and bringing the digital transformation closer to their needs

Digital education and digital inclusion are among the key priorities in Croatia's National Development Strategy, which is part of the Strategic Framework for the Digital Maturity of Schools and the Education System. The importance of digital education and digital inclusion is also reflected in the conclusions of the 'Report of the Republic of Croatia on digital education and skills for citizens and employees' in both the public and the private sectors. Croatia is committed to improving the public's skills in – and knowledge of – digital technologies so they can exploit AI and become more aware of cybersecurity threats so they can build a more inclusive, transparent, and open digital environment, taking into account the needs of an ageing population.

3.1.1 Equipping people with digital skills

3.1.1.a Basic Digital Skills

2023 state of play and recent progress

	Country level	EU level
FORECAST	65.0	59.8
DESI 2024	59.0	55.6
AVERAGE ANNUAL GROWTH %	-3.6	1.5

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

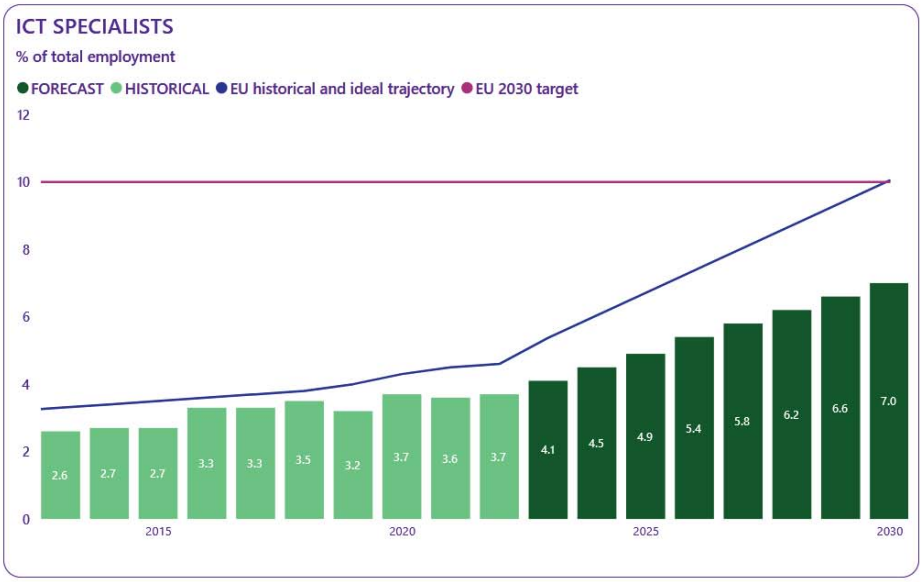
The latest data reveals that the level of digital skills of the Croatian population is most instances well above the EU average. **Croatia is therefore well set to provide a strong contribution towards the EU's target in this field, which is for 80% of the population to have at least basic digital skills by 2030.**

Eurostat data from 2023 reveals that 59% of Croatians between the ages of 16 and 74 have at least basic digital skills (compared with an EU-27 average of 55.6%). This is only a few percentage points behind its national trajectory target of 65% for the same year. When divided by age cohorts, a pattern emerges: the percentage of the population with at least basic digital skills is higher in younger cohorts and lower in older cohorts. At-least-basic digital skills are possessed by about 86.33% of people aged 16-24, but only 17.89% of those aged 65-74. Eurostat data also reveal that 25% of Croatians possess digital skills at a level above basic (compared with the EU-27 average of 27.3%).

In addition, the percentage of men and women with at least basic digital skills in 2023 was roughly the same, with women only 1 percentage point below men. Furthermore, 81.5% of Croatians have at least the basic skills needed to create digital content, which is significantly higher than the EU-27 average of 68.3%.

Considering the progress Croatia has made in recent years, it is expected to make a strong contribution to achieving the EU's 2030 target for basic digital skills.

3.1.1.b ICT specialists



2023 state of play and recent progress

	Country level	EU level
FORECAST	4.1	5.4
DESI 2024	4.3	4.8
AVERAGE ANNUAL GROWTH %	16.2	4.3

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Croatia is making **a positive contribution** to the EU's Digital Decade target on ICT specialists, with year-on-year 0.6% points growth between 2022 and 2023 in the number of ICT specialists employed in Croatia of 4.3% of total employment. This is 0.5 percentage points below the EU's average for ICT specialists in employment of 4.8% but above the target in Croatia's own national trajectory for 2023 of 4.1%. This is mainly because of two reasons: (i) not enough Croatians enter the job market in Croatia from the Croatian education system and abroad; and (ii) Croatian ICT experts often emigrate to other EU countries. Broken down by gender, there has been a change in the percentage of female ICT specialists in Croatia. In 2021, 18.3% of Croatian ICT experts were women (RH DESI 2021 focus), but in 2023, this figure fell to 14.7% (RH DESI 2023), well below the EU average for 2023 of 19%.

The Croatian RRP contributes to the objective of increasing the share of the workforce with ICT skills with three measures under component 'C3.1. R1 Structural reform of the education system' (as part of the National Plan for the Development of the Education System to 2027) which is aimed at strengthening the ICT skills of the Croatian workforce. The Croatian RRP also includes an investment of EUR 176.5 million on 'Digital products and platforms' which aims to boost the number of ICT experts in the country. This measure is expected to increase the number of people with ICT qualifications and skills by creating an enabling framework to attract researchers in the field of science, technology, engineering and mathematics (STEM) and ICT. The measure hopes to achieve this by: (i) encouraging non-formal education and retraining for adults to acquire ICT skills; and (ii) developing research and technology infrastructure.

Croatia is also committed to supporting a greater role for women in the digital world. In 2023, Croatia ran a campaign to encourage and motivate young women to train and work in ICT. Increasing the share of women in ICT is one of the priorities of the digital transformation. Currently only 14.5% of Croatian women are skilled in ICT compared with the EU average of 16.9%. Furthermore, the Croatian Government launched a 2-day promotional campaign in December 2023 to encourage more than 300 high-school graduates to study ICT. This campaign included the participation of seven successful female engineers with ICT diplomas.

Best practice: Women in Digital

Croatia has been taking actions to encourage young women to study and work in ICT. This is one of the priorities of Croatia's digital transformation and forms part of the country's contribution to the Digital Decade targets for 2030. These actions to encourage young women to study and work in ICT have taken the form of a short educational/information campaign '**Women in Digital**' for all high-school graduates in Zagreb. It features a 2-day event at the Kaptol Boutique Cinema in Zagreb, with a set of short interactive lectures on ICT and speakers with an ICT diploma from well-established and successful businesses.

The goal of this campaign is to inspire young women to become better acquainted with the world of ICT technologies and explore the challenges and benefits that this profession can offer to young women. Croatia is well placed in when it comes to the basic skills in digital-content creation of its people (the country ranks 3rd out of 27 EU Member States in this metric), and the current campaign seeks to build on this success by increasing the share of female specialists in the ICT sector.

3.1.2 Key digital public services and solutions – trusted, user-friendly, and accessible to all

3.1.2.a e-ID

Croatia has notified an e-ID to the EU[40]. Eurostat data from 2023 reveal that 36.7% of Croatians had used e-ID as a means of identification in Croatia in the last 12 months against an EU average of 36.1%. The Croatian electronic identity card contains two certificates (one for identification and one for signature) and has been issued to Croatians since 2015 so they can access all e-services offered by the e-Citizens system regardless of the service provider.

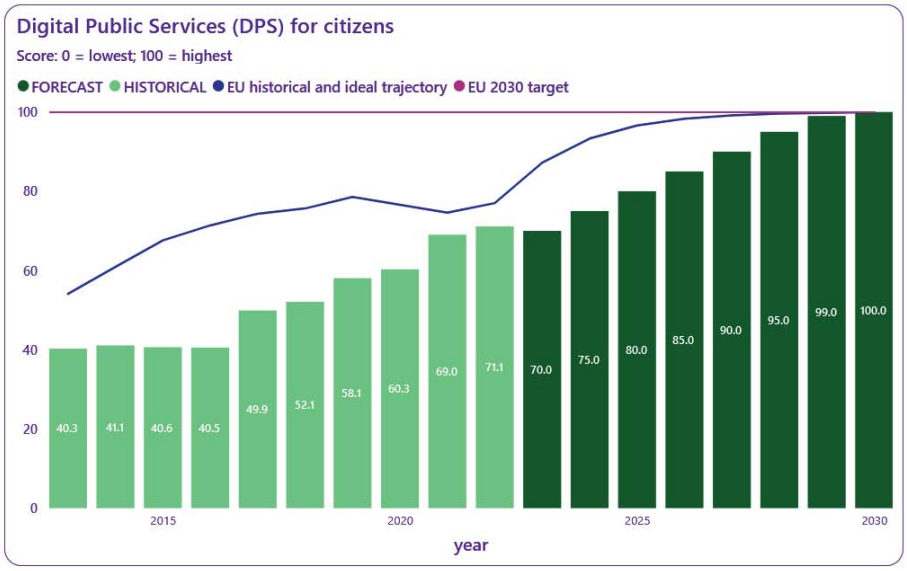
Since September 2023, Croatia has issued a total of 2 111 358 second-generation electronic identity cards, of which 1 649 505 include both e-ID and ID mobile certificates. However, despite its plan to increase the number of users of e-ID of 300 000, Croatia has indicated that the 300 000 target had not been reached by the set deadline of the end of 2023. The European Commission has agreed to prolong the deadline for the full implementation of the 300 000 target until Q2/2026 while adjusting the target for 2023 by issuing 50 000 certificates including remote qualified electronic signature and 1 000 000 additional e-IDs of the second generation.

Croatia's contribution to the eID target, as per its roadmap, is limited to the issuing of a national personal identity card (eOI) in line with the country's National Identification and Authentication System (NIAS) scheme. However, Croatia has not yet been involved in any of the large-scale pilot projects to test the European Digital Identity Wallet under the Digital Europe Programme. The roadmap also confirms that Croatia has a low ambition with trajectory reporting on the first European Digital Identity Wallet attempt scheduled only for 2025.

3.1.2.b Digitalisation of public services for citizens and businesses

Croatia **has scope to improve** its performance to contribute to EU's targets concerning **the digitalisation of public services for citizens and businesses**, while also displaying very limited dynamic.

[40] EUR-Lex - 52023XC0419(01) - EN - EUR-Lex (europa.eu)



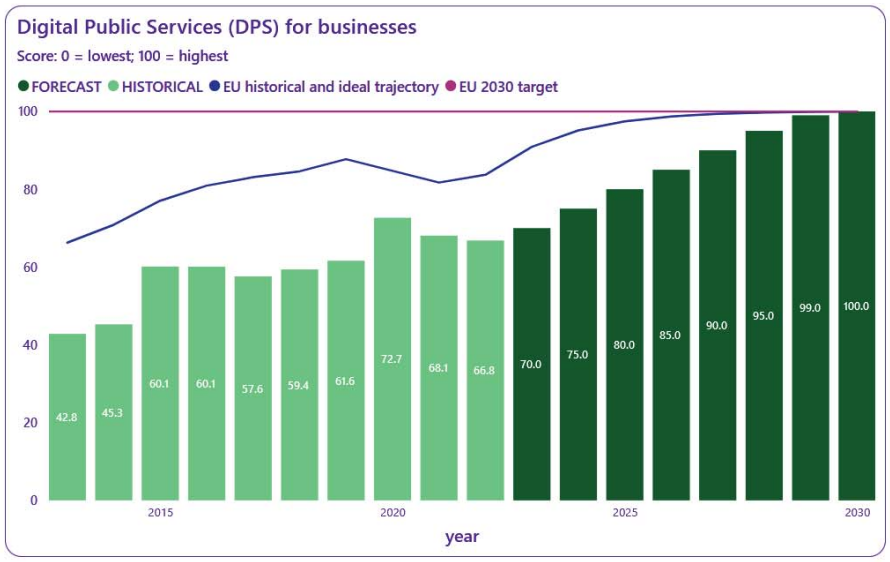
2023 state of play and recent progress

	Country level	EU level
FORECAST	70.0	87.2
DESI 2024	67.2	79.4
AVERAGE ANNUAL GROWTH %	-5.6	3.1

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap



2023 state of play and recent progress

	Country level	EU level
FORECAST	70.0	90.9
DESI 2024	66.2	85.4
AVERAGE ANNUAL GROWTH %	-0.9	2.0

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

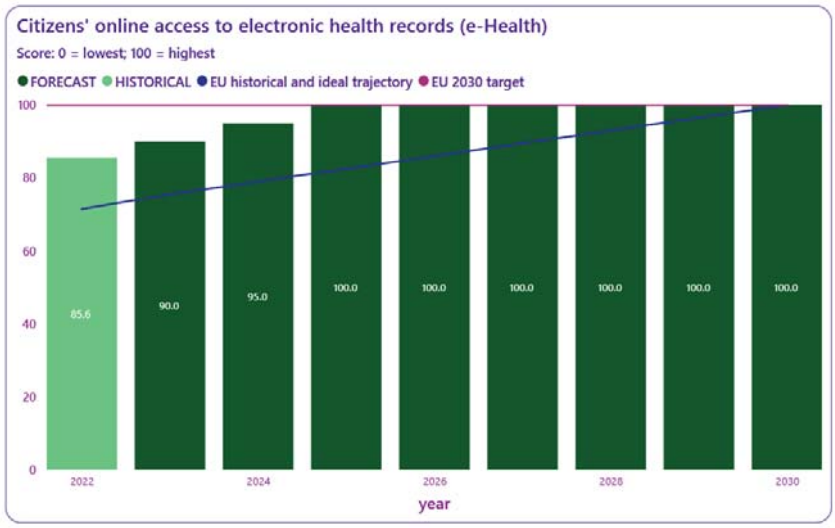
Note 2: The source of national forecast values is the 2023 country roadmap

Despite a positive score on e-Government users (88.5% of citizens against 75% for the whole EU), scores on digital public services are low. Croatia scores 67.2 on digital public services for citizens compared with the EU average of 79.4 and a few points behind the national trajectory for 2023 which stands at 70. Similarly, digital public services for businesses scores 66.2, which also falls below the EU average of 85.4 and a few points behind the national trajectory for 2023 which stands at 70. Croatia also scores well below the EU average in terms of transparency of service delivery, design, and personal data (HR 59.1 vs EU 67) and in terms of pre-filled forms (HR 49.4 vs EU 70.8), with only user support being marginally above the EU average (HR 88.9 vs EU 86.4) and mobile friendliness with 97.8 vs EU 95.3).

On the other hand, the 2024 Eurobarometer survey provides a different picture with an increase of 6% (to 86%) of Croatian citizens accessing public services against an EU average of 83%, while 85% of citizens use electronic tools to access health services against an EU average of 79 %. Also, 83% of citizens thinks that digitalisation of daily public life is making their life easier versus an Eu average of 73%.

Croatia has a mixed performance in the field of on-line public services with untapped potentials in the fields of on-line services for both citizens and enterprises only partly reprieved by a positive contribution in the field of eHealth services. Croatia has **scope to improve its performance** to contribute to the EU's digital decade target for on-line public services and further steps would improve the user-friendliness of online public services, including enhancing support for users.

3.1.2.c e-Health



2023 state of play and recent progress

	Country level	EU level
FORECAST	90.0	75.5
DESI 2024	85.6	79.1
AVERAGE ANNUAL GROWTH %	0.0	10.6

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Croatia is making a positive contribution to the EU's Digital Decade target on e-health aiming at *100 % of Union citizens have access to their electronic health records*, while demonstrating very limited dynamic. Croatia has an **overall e-health maturity score of 85.6 in 2023**, which remains stable when compared to the previous year and above the EU average of 79.1. In 2023, Croatia made progress in the field of eHealth with about 55 % of its citizens seeking health information on the internet and only 1 % point below the EU average of 56 %.

Progress made by Croatia in e-health in 2023 included the implementation of the programme 'Popularisation of Electronic Health Records (EHRs) at the secondary and tertiary level of healthcare'. This programme helped improve hospitals interoperability with the Central Health Information System of the Republic of Croatia (CEZIH), and brought data from the existing national EHRs to hospitals resulting in savings by avoiding the unnecessary duplication of health services (e.g., diagnostic procedures).2023 also saw the establishment of the NetHub entrepreneurial accelerator. This entrepreneurial accelerator is fully dedicated to supporting innovation and entrepreneurship, primarily through development and cooperation with relevant stakeholders. It seeks to exploit the possibilities of digital technologies to support the needs of the health system. In addition, Croatian health authorities implemented the 'eKarton' mobile app (available on Android and iOS) for health professionals at all levels of care, which enables easier, yet still secure, access to EHRs by authorised health professionals.

The first quarter of 2023 also saw the start of the EDIH project AI4Health.Cro. This project is being part managed by the Ruđer Bošković Institute; partner institutions; micro, small, and medium-sized enterprises (SMEs); public bodies; NGOs and companies. All these participants are gathered within the AI4Health.Cro consortium, engaged in e-health innovation processes involving: (i) 'testing before investing' services; (ii) support to find investments, skills and training; and (iii) networking and ecosystems to make progress towards the establishment of a European Health Data Space (EHDS).

Croatia is progressing well in the field of e-health with its CEZIH tool providing members of the public with access to all their health records. Croatia could monitor the use of CEZIH and, if appropriate, take action to improve the efficiency, interoperability and user-friendliness of the system.

3.2 Building a safe and human centric digital environment and preserving our democracy

Eurostat data reveals that Croatia is among the Member States with one of the lowest rates in hate speech towards the various groups of society who believe they are object of some form of discrimination or hate.

The 2024 Eurobarometer survey revealed that about 81% of Croatians use electronic tools to engage in democratic life, 14% points increase with respect to 2023 (against an EU average of 74% in 2023). Similarly, 81% of Croatians also use the internet to help fight climate change against an EU average of 74%. The survey also reveals that Croatians have a similar set of concerns about the misuse use of online platforms including: (i) the misuse of personal data (45% of Croatians had concerns against an EU average of 46%); (ii) fake news and disinformation (46% of Croatians had concerns against an EU average of 45%); and (iii) insufficient protection to minors (30% of Croatians had concerns against an EU average of 33%).The survey also showed that 69% of Croatians consider that their freedom of expression has increased through access to information online (EU average of 61%) and that 66% considered that accessing information online had helped them to exercise their right to free assembly (against an EU average of 59%).

On 21 September 2023, the House of Human Rights NGO, in coordination with Croatia's Government-run Service for Lifelong Education ran a workshop for police officers, deputy state attorneys and state attorney advisers. The topic of the workshop was how to combat hate speech, and it formed part of a wider Government project 'Strengthening the protection system and empowering communities to recognise and combat hate speech in Croatia'.

On 22 September 2023, the Central State Office for the development of the Digital Society organised its fourth online roundtable meeting on 'Digital Accessibility: from law to practice'. At this meeting, the results of the work of associations, public-sector bodies and entities in charge of the implementation and monitoring of the Digital Accessibility Act were presented and discussed by more than 200 stakeholders.

In 2023, the Act for the protection of the rights and interests of consumers (Official Gazette No. 59/23) entered into force. This Act transposed EU Directive (2020/1828) on representative actions for consumer protection. To support this Act, the Ministry of Economy and Sustainable Development made significant efforts to update and maintain the consumer-related website 'Everything for consumers' ('Sve za potrošače'). In 2023, Croatia also developed its 'Price Movement' website which aims to inform the public about changes in retail prices for consumer goods and services.

The Croatian roadmap also indicates that the Government will put three principles at the centre of its action in: (i) the primary and secondary education system; and (ii) digitization of higher education. These principles are: (i) putting people at the centre; (ii) solidarity and inclusiveness; and (iii) sustainability.

The Declaration on Commitment on Women in the Digital World has committed signatory seeks to: (i) foster an active and significant role for women in digital society; and (ii) help to achieve gender equality in the field of IT. It has been signed by 26 EU Member States (including Croatia) and Norway. Furthermore, in 2023 the Central State Office for the Development of the Digital Society implemented measures to educate Government bodies about the 'Safe in Cyber Space' programme, covering cyberspace security risks and real-life examples.

4 Leveraging digital transformation for a smart greening

Eurostat data showed that only 26.5% of Croatian enterprises (of 10 employees or more): (i) considered the environmental impact of ICT services or ICT equipment before selecting them; and (ii) took measures affecting the paper or energy consumption of ICT equipment. This relatively low percentage compared with an EU average of 48.7%.

Furthermore, data also showed that about 9.77% (against an EU average of 10.35%) of Croatians recycle their old mobiles or smartphones, while 15.34% recycled laptops and tablets (against an EU average of 9.68%), and 3.9% recycled old laptops (against an EU average of 12.8%). Croatia is taking action to limit the environmental impact of measures pursuing: (i) Digital Decade objective 3 on digital infrastructures; (ii) Digital Decade objective 4 linked to the production of state-of-the-art semiconductors; and (iii) Digital Decade objective 6 on building the EU's first quantum acceleration computer by 2025.

Croatia has taken a number of measures to promote the green transition. These measures include the revitalisation, construction and digitalisation of the energy system; and the accompanying infrastructure to decarbonise the energy and transport sectors. Other measures to promote the green transition include the setting up of financial instruments under the RRP component 'C1.1. Resilient, Green and Digital Economy', and its subcomponent 'C.1.1.1. Strengthening Competitiveness and the Green Transition of the Economy'. These financial instruments seek to stakeholders increase access to finance by strengthening the activities of the banking sector and other financial intermediaries. Croatia hopes that this will ensure: (i) a faster recovery; (ii) a stronger transition of the economy through the adoption of green and digital technologies; and (iii) a stronger and more resilient Croatian economy.

Croatia is also making a contribution to the green transition by implementing in its RRP 'Component 6.1. R2 Development of a framework to ensure adequate skills in the context of green jobs needed for post-earthquake reconstruction'. Croatia's green agenda also includes the RRP action C1.2. R1-I1 aimed at the 'Revitalisation, construction and digitalization of the energy system and the supporting infrastructure decarbonization of the energy sector. Other RRP actions in support of the environment plan will: (i) develop electric mobility; (ii) introduce a new electronic road-toll system, including the collection of traffic data; and (iii) develop intelligent transport systems, aimed at improving traffic management and mobility.

The Croatian roadmap also reports that several measures were put in place in 2023 to contribute to the green transition including:

- EUR 27 million in grants to promote the digitalisation of micro-enterprises, small enterprises and medium-sized enterprises in the transition to an energy and resource-efficient economy;
- EUR 252 million in grants to companies to help them in the transition to an energy and resource-efficient economy (for a total of 116 contracts);
- more than EUR 400 million to strengthen the electricity grid (as part of C1.2. R1-I1 Revitalisation, upgrading and digitalisation of the energy system for decarbonisation of the energy sector).

The roadmap also reports several initiatives involving the use of digital technologies to support climate action and environmental sustainability. These initiatives include: (i) an MVEP-OECD project for the digital and green transition in the western Balkans; and (ii) AgriFood Croatia, an innovation hub contributing to the EU's drive to create a smart and sustainable digital future for European agriculture and rural areas.

Croatia has taken actions to ensure synergy between the green and digital transition, but there is a lack of a coherent approach in this area. The roadmap needs to be developed with specific measurable actions in a coordinated and coherent way. Croatia's support for the green transition includes: (i) EUR 388 000 for the

revitalisation, construction and digitization of the energy system and supporting infrastructure decarbonization of the energy sector; and (ii) EUR 94.9 million on measures to promote electric mobility.

Annex I – National roadmap analysis

Croatia National Digital Decade Strategic Roadmap

On 12 January 2024 Croatia **submitted** its national strategic roadmap, in accordance with Article 7 of the Digital Decade Policy Programme Decision. In April 2024 the roadmap was **approved by Government memorandum** and the published in Croatia's official journal**.**

The national strategic roadmap includes **national target values** for 12 of the 14 targets of the DDPP. All national target values provided **are comparable the EU targets,** except for ICT specialist and for 1 gigabit services. Moreover, the roadmap includes national projected trajectories and describes policies, measures and actions supporting each of the targets and groups of objectives (except for climate-neutral and secure edge nodes). Most measures in the roadmap are supporting all but one of the Digital Decade targets on semiconductors although measures on connectivity are very likely to fall short of the 2030 target for fixed connectivity if no additional measures will be put in place to close the investment gap with respect to the needs. The roadmap foresees an overall support for digital skills for about EUR 265,1 m, EUR 176,5 m on ICT professionals, EUR 175,73 m on connectivity, about EUR 4m on semiconductors, EUR 9.9 m on quantum computing, EUR 16.6 on the adoption of digital technologies, EUR 160,5 m on the digitalisation of SMEs, EUR 29.862 m on innovative scale ups, EUR 124,5 m on on-line public services, and EUR 0.9m on digital ID.

The table below reflects a best-effort attempt to categorise the measures and budget as presented in the Croatian roadmap.

Digital Decade Target/objective	Budget (EUR Million)	Number of measures
Connectivity gigabit	361.0	4
Connectivity 5G	-	-
Semiconductors	0.0	1
Edge nodes	-	-
Quantum computing	5.0	2
SME take up	160.5	4
Cloud/AI/Big Data uptake	16.6	2
Cloud only uptake	-	-
AI only uptake	-	-
Big data uptake	-	-
Unicorns	29.8	2
Basic Digital Skills	240.3	4
ICT Specialists	176.8	5
eID	0.9	1
Key Public Services	11.6	4
e-Health	115.0	1
Objectives	-	-
Total	**1 117.5**	**30**

The timespan of most measures coincides with the timeframe of implementation of the operational programmes of the structural and cohesion funds and of the RRF program, with most of the budget set out in the roadmap coming from those sources of funding. The policies**,** measures and actions set out in the national strategic roadmap represent mostly a continuation of the existing national digital strategy,

not yet matching the high level of ambition assumed with the national target values.

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Annex II – Factsheet on multi-country projects (MCPs) and funding

MCPs and EDICs

Regarding participation in European Digital Infrastructure Consortiums (EDICs), Croatia has joined several EDICs including the Language Technologies ALT-EDIC, the Agri-food EDIC, the Blockchain EUROPEUM-EDIC (both already set up) and is participating in the working groups aiming to set up EDICs in other areas, including Cancer Images EUCAIM EDIC, the Genome EDIC, the Connected Public Administration IMPACTS EDIC; and the Cybersecurity Skills Academy EDIC.

EU funding for Digital Decade in Croatia

Croatia supports the EU's Digital Decade objectives and targets primarily through a combination of national and European funds. These funds include EUR 906 million from the RRF and EUR 462 million from the Cohesion Funds for a total of about EUR 1.37 bn (according to the Joint Research Centre's study[41]).

The largest investment in the digital transition is the EUR 303 million dedicated to online public services for enterprises and the public. This is followed by the EUR 66 million on e-health, followed by EUR 207.5million on VHCN gigabit connectivity, EUR 134.4 million on digital skills, and EUR 108.9 million on ICT specialists. Support for the adoption of digital technologies will come in the form of: EUR 182.4 million for SME digitalization; EUR 61 million to promote the use of cloud computing; EUR 61 million to adopt data analytics; EUR 182.4 million on unicorn companies; and about EUR 1 million on e-ID. The table below provides an estimate of the EU support to help Croatia achieve the Digital Decade targets.

[41] Based on an estimation of the possible contribution to the Digital Decade (Joint Research Centre report 'Mapping EU level funding instruments to Digital Decade targets - 2024 update' (Signorelli et al., 2024)).