EUROPEAN
COMMISSION

Strasbourg, 18.10.2022
COM(2022) 552 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Digitalising the energy system - EU action plan

{SWD(2022) 341 final}

1. TOWARDS A DIGITALISED, GREEN AND RESILIENT ENERGY SYSTEM

To end the EU's dependence on Russian fossil fuels, tackle the climate crisis and ensure affordable access to energy for all, the European Green Deal and REPowerEU require a deep digital and sustainable transformation of our energy system. For example, we need to install solar photovoltaic (PV) panels on roofs of all commercial and public buildings by 2027 and on all new residential buildings by 2029[1], install 10 million heat pumps over the next 5 years[2] and replace 30 million cars with zero-emission vehicles on the road by 2030.[3] Reducing greenhouse gas emissions by 55% and reaching a share of 45% renewables in 2030 can only happen if the energy system is ready for it.

To achieve these objectives, Europe needs to build an energy system that is much smarter and more interactive than it is today. Energy and resource efficiency, decarbonisation, electrification, sector integration and decentralisation of the energy system all require a tremendous effort in digitalisation. Digitalisation of the energy system is a policy priority and one where the European Green Deal and the Digital Decade Policy Programme 2030 for Europe go hand-in-hand as a twin transition. Globally, the EU promotes the twin transition through the Global Gateway Strategy[4].

About EUR 584 billion of investment in the electricity grid will be required, between 2020 and 2030, in particular in the distribution grid. A substantial part of these investments will need to be in digitalisation. The International Energy Agency (IEA) estimated that, globally, demand-side responses could avoid USD 270 billion of investments in new electricity infrastructure[5]. Another study estimates that around EUR 170 billion investments in digitalisation will be needed out of a total of around EUR 400 billion[6] investments in the distribution grid over the period 2020-2030. Making the smartest use possible of our energy grid will also ensure the best use of our territory when ramping up renewables investments.

Investing in digital technologies such as smart IoT devices and meters, 5G and 6G connectivity, a pan-European energy data space powered by Cloud-edge computing servers, and digital twins of the energy system facilitates the clean energy transition, while bringing benefits to our everyday life. For example, they can help us visualise our real time energy consumption and receive tailored advice on how to reduce it. Digital tools can automatically control room temperatures, charge electric cars, and manage appliances in order to benefit from the lowest energy prices, while preserving a comfortable and healthy indoor environment. With digital tools, public authorities can also better map, monitor, and address energy poverty, while the energy sector can better optimise its operations and prioritise the use of renewables.

Digitalisation is already underway in the energy sector, as it is in many other sectors: electric vehicles, PV installations, heat pumps and many other new devices are equipped with smart technologies that generate data and enable remote control. The number of active IoT devices

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1 EU Solar Energy Strategy COM(2022)221

2 REPowerEU Communication COM(2022)230 final

3 Sustainable and Smart Mobility Strategy COM(2020)789 final

4 The Global Gateway JOIN(2021) 30 final

5 International Energy Agency, Digitalization and Energy, 2017 - https://iea.blob.core.windows.net/assets/b1e6600c-4e40-4d9c-809d-1d1724c763d5/DigitalizationandEnergy3.pdf

6 Figure for the EU+UK. Source: Connecting the dots: Distribution grid investment to power the energy transition - Eurelectric – Powering People

in the world is expected to grow rapidly and surpass 25.4 billion in 2030[7]. 51% of all households and SMEs in the EU are equipped with smart electricity meters[8]. EU digital and energy policies already guide digitalisation of energy as issues like data interoperability, security of supply and cybersecurity, privacy and consumer protection cannot be left to the market alone and its proper implementation is key.

But more is needed if we want to fully exploit the potential of digital technologies and accelerate the digitalisation of our energy system while addressing the challenges it brings, respecting privacy and data protection, and ensuring a fair transition that leaves no one behind. Sharing data across the energy value chain, and linking these data with weather models, mobility patterns, financial services and geographic location systems through ever-more powerful computing capacity will make innovative services at new levels of precision and adequacy possible and contribute to growth and jobs in the EU.

It will enable financial institutions to unlock private investments that support the energy transition and will enable consumers to actively manage their energy consumption or generation and benefit from direct participation in the market. This requires a strategic vision and concrete actions in the following areas:

- promote connectivity, interoperability and seamless **exchange of data** between different actors while respecting privacy and data protection;
- foster **more and better coordinated investments** in the electricity grid as the enabler for a smarter and more resilient energy system and a EU-wide coordinated plan for the accelerated deployment of the necessary digital solutions;
- empower **consumers,** including the most vulnerable or with low digital skills, to benefit from new ways to engage in the energy transition or from better services based on digital innovations, whilst being protected against high energy prices online as they are currently off-line;
- enhance **cyber-security** – which requires a continuous effort and investment;
- address **energy consumption of digital technologies** and promote greater efficiency and circularity;
- design an effective governance, through **structural and joint planning** by public authorities in cooperation with the private sector, **learning** of all actors involved, as well as continuous **support for R&I**.

2. TOWARDS AN EU FRAMEWORK FOR SHARING DATA TO SUPPORT INNOVATIVE ENERGY SERVICES

The key enabler for a digitalised energy system is the availability of, access to, and sharing of energy-related data based on seamless and secure data transfers among trusted parties. Better coordinating these exchanges and building an EU coordination framework to strengthen interoperability among different systems and technical solutions will make it possible for more innovative services to enter the market. Generally applicable principles will also need to be

[7] https://www.cbi.eu/market-information/outsourcing-itobpo/industrial-internet-things/market-potential, 7 June 2022

[8] Estimate based on Smart Metering Benchmarking Report (March 2020), European Commission, Directorate-General for Energy, Alaton, C., Tounquet, F., Benchmarking smart metering deployment in the EU-28 : final report, Publications Office, https://data.europa.eu/doi/10.2833/492070.

strictly upheld, including those on EU data sovereignty, cybersecurity, data privacy, consumer acceptance and interoperability.

That is why **Europe needs a common European energy data space**[9], and will need to **start its deployment no later than 2024**. The deployment of an appropriate data sharing framework for energy could facilitate the participation on the wholesale markets of more than 580 GW of flexible energy resources that make full use of digital solutions by 2050[10]. It is estimated that this would cover over 90% of the overall flexibility needs in the EU electricity grids. Enabling the smart and bidirectional charging of electric vehicles (EVs), the participation of virtual power plants in the energy markets and exploiting the potential of energy communities, smart buildings and smart heating using heat pumps could contribute the largest share of that flexibility. Moreover, car batteries can be used to store surplus energy and dispatch it when needed, by tracking when the vehicle is in its garage, anticipating periods of non-use, and monitoring how much spare capacity can be made available.

The existing European regulatory framework for energy already prepared the ground, and the Fit-for-55 proposals put forward specific provisions on data exchanges. More generally, the proposed Data Act[11] lays down new rules on who can use and access data generated in the EU across all economic sector and clarifies users' right to freely access and use the data generated by their products, including the right to share these data with third parties. Additionally, the Data Governance Act[12] aims to foster the availability of data by strengthening the data sharing mechanisms and increasing trust in data intermediaries.

Implementing the above legislation and making data exchanges happen effectively and efficiently will require a coordinated approach guided by the public authorities. The framework for data sharing is not just about standardisation, it requires a complex set of legal and operational arrangements, as well as technical requirements and guidelines. Strong coordination is needed to ensure coherent and smooth processes at European level, which complement, coordinate, and add value to the national initiatives. Therefore, **the aim of this action area is to establish a common European energy data space[13] and to ensure a solid governance for it, in the form of a coordinated European framework for sharing and using the energy data.** A preparatory phase will be completed by 2024, with the deployment starting immediately after. The indicative timetable and the steps needed towards this goal are presented below.

2.1 Strategic EU coordination

9 The European Data Strategy (COM(2020) 66 final) announced the creation of Common European data spaces in nine sectors, including energy.

10 'Digitalisation of energy flexibility', report by the Energy Transition Expertise Centre (EnTEC), https://op.europa.eu/en/publication-detail/-/publication/c230dd32-a5a2-11ec-83e1-01aa75ed71a1/language-en.

11 COM(2022) 68 final.

12 COM(2020) 767 final.

13 A common European data space brings together relevant data infrastructures and governance frameworks, in order to facilitate data pooling and sharing. It will include the deployment of data sharing means and services, data governance structures, and will improve the availability, quality and interoperability of data. More details are provided in the Commission Staff Working Document on common European data spaces (SWD(2022) 45 final).

To further promote the digitalisation of the energy sector, the **Commission will formally re-establish the existing Smart Grids Task Force (SGTF)[14]. The group will be renamed the 'Smart Energy Expert Group'** and will have greater responsibilities and involve all Member States and additional relevant stakeholders.

Within this Smart Energy Expert Group, **the Commission will set up, by March 2023 at the latest, the 'Data for Energy' (D4E) working group.** This group will bring together the Commission, the Member States and the relevant public and private stakeholders for contributing to building the European framework for sharing energy-related data. D4E will help strengthen the coordination at EU level on data exchanges for the energy sector, defining the driving principles and ensuring consistency across different data-sharing priorities and initiatives. Furthermore, D4E will support the Commission in developing and rolling out a common European data space for energy. Thus, the governance and the main building blocks of the upcoming data space will be designed and managed in partnership.

D4E will focus its work on developing a portfolio of European high-level use cases[15] for data exchanges in energy that are key to deliver on the objectives of the Green Deal and the Digital Decade. The high-level use cases that will be addressed from the outset include: flexibility services for the energy markets and grids; smart and bi-directional charging of electric vehicles; and smart and energy-efficient buildings, including boosting private and public investments and harnessing the proposed solar rooftop initiative. Additional high-level use cases can be considered later in the process, whenever needed.

D4E will further develop those priority areas by producing the implementing details and deliverables needed as building blocks for the future common European energy data space, and will propose them to the Commission for endorsement and to act upon. In doing so, D4E will capitalise on other initiatives and work streams that are being undertaken at the European level[16]. In particular, for smart and bi-directional EV charging, the Commission will define, by 2023, a joint work programme for D4E and the Sustainable Transport Forum[17] with the aim to ensure alignment between the energy and mobility data spaces, supporting system integration and providing cross-sectoral services. Additionally, D4E will closely cooperate with the Expert

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[14] The Smart Grids Task Force is an informal expert group that advises the Commission on policy and regulatory frameworks for developing and rolling out smart grids (https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?do=groupDetail.groupDetail&groupID=2892).

[15] The concept of high-level use cases refers to the main priority areas to be addressed. Each high-level use case will, in practice, encompass several use cases that will describe in more details the relevant actors, processes and data flows for each specific business and operational arrangement.

[16] These include the current work of the Smart Grids Task Force, the ongoing work for a Network code on demand side flexibility (https://www.acer.europa.eu/sites/default/files/documents/Media/News/Documents/2022%2006%2001%20FG%20Request%20to%20ACER_final.pdf), the work related to the Commission proposal for a Regulation on the deployment of alternative fuels infrastructure (https://eur-lex.europa.eu/resource.html?uri=cellar:dbb134db-e575-11eb-a1a5-01aa75ed71a1.0001.02/DOC_1&format=PDF) and the results obtained by the Sustainable Transport Forum, as well as the activity and products of the Expert group on European financial data space (https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=3763) and the Energy Efficiency Financial Institutions Group (EEFIG) (https://eefig.ec.europa.eu/index_en).

[17] In particular the working group 'Common Data Approach for Electromobility and other Alternative Fuels (STF on Data)' that focuses on mapping the policy and technical elements needed to put in place an open data ecosystem for electromobility (https://transport.ec.europa.eu/transport-themes/clean-transport-urban-transport/sustainable-transport-forum-stf_en).

Group on the European financial data space for developing use cases of common interest to channel more private financial resources to the energy transition.

D4E will also help the European Commission to implement the governance of the common European data space for energy. This will be done in close coordination with the European Data Innovation Board[18] and the emerging governances of the other European data spaces, to ensure consistent approaches and embed interoperable processes from the outset. Seamless data flows across the energy data space, as well as between energy and other data spaces[19], are instrumental to create value added along and across European value chains. Furthermore, the Data Spaces Support Centre[20] will provide guidance to the upcoming sectoral data spaces, and support their creation by making available relevant technologies, processes, and tools. The guiding principles and recommendations of the European Interoperability Framework[21] will inform the processes of ensuring cross-sectoral interoperability and in line with the upcoming Commission proposal for a reinforced interoperability cooperation.

2.2 Immediate results and building blocks to support the process

D4E will be set up in parallel with several other initiatives that will mutually reinforce each other. For all initiatives, it is important that consumers have a smart electricity meter installed in their home. This is still not the case in many Member States[22] and makes it even more pressing to step up efforts to more widely deploy smart metering. The Commission urgently calls on those Member States who have not yet achieved full rollout of smart meters to speed up their efforts and increase their national objectives with regard to this rollout, in particular while updating their National Energy and Climate Plans. Where a cost-benefit analysis concluded against the rollout of smart meters, the Commission calls on Member States to revisit and re-run these analyses, in light of the Green Deal and REPowerEU.

When advising the Commission, D4E will factor in the activities that support enhanced data exchanges. These initiatives include:

- Adoption by the Commission of an **implementing act on interoperability requirements, and non-discriminatory and transparent procedures for access to metering and consumption data** (as provided for by the Electricity Directive, Article 24);
- Preparing **implementing acts on interoperability requirements, and non-discriminatory and transparent procedures for access to data required for demand response and customer switching** (as provided for by the Electricity Directive, Article 24);

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18 Expert group that will be established according to the provisions of the proposed Data Governance Act.

19 Such as the data spaces dedicated to mobility, construction and buildings, and the financial sector.

20 The Data Spaces Support Centre is being set up with the support of the Digital Europe Programme (https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/digital-2021-cloud-ai-01-suppcentre).

21 https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/3-interoperability-layers.

22 At the end of 2020, in 11 Member States the installation rate of electricity smart meters to householders had reached more than 80%; Denmark, Estonia, Spain, Finland, Italy, and Sweden recorded a 98% rollout rate or higher, followed by Luxembourg, Malta, the Netherlands, France and Slovenia, with rollout rates between 83% and 93%. Smart metering rollout plans and actual rollout rates diverge widely, suggesting that a number of EU consumers will not have access to smart meters in the near future (source: ACER/CEER Market Monitoring Report 2021).

- Promoting a **code of conduct for energy-smart appliances to enable interoperability and boost their participation in demand response schemes**[23].

The EU Research and Innovation, and Digitalisation programmes will continue to play a key role. Thus, the Commission intends to support, through the **Digital Europe Programme**[24], the deployment of a common European energy data space. This will build on the demonstrations and results that will be developed by a set of projects funded by **Horizon Europe**[25], as well as on the use cases that will be developed by D4E. Additionally, the Horizon Europe programme supports key research and innovation projects and initiatives[26] that provide valuable inputs on best practices and recommendations, including concrete deliverables such as tools and methodologies. These inputs will, on the one hand, enhance the interoperability of the solutions proposed by Horizon Europe projects and, on the other hand, could be further scaled up and used to develop the high-level use cases and bridge the identified market gaps towards the deployment of a fully-fledged data space. By doing so, the Commission will guide the work of D4E with the results brought forward by projects and programmes that pilot energy data spaces and common models for both data exchanges and interoperability.

Europe is already investing in next generation energy systems and smart grids by deploying emerging digital technologies, including digital twins, decentralised intelligence, and edge computing. These are just a few examples of the smart use of data available within digitalised energy systems, and illustrates the importance of data sharing and energy data spaces. Large amounts of data collected in smart cities and communities in local data platforms (through smart devices connected to the Internet of Things, smartphone apps, social media, etc.) allow for the creation of many services for energy and infrastructure optimisation, building and facility management, scenario planning and disaster management in a district or city. Numerous examples exist across the Union of how digitalisation is applied locally[27]. The Commission encourages Member States, regions, cities, and industry to exchange best practices and coordinate on wider deployment and on standardisation to accelerate the green transition and reinforce the European energy ecosystem.

3. PROMOTING INVESTMENTS IN DIGITAL ELECTRICITY INFRASTRUCTURE

Smart and digital energy infrastructure is a key requirement for all the high-level use-case priorities. The electricity grid needs to interact with many actors or devices based on a detailed level of observability, and hence availability of data, to enable flexibility, smart charging and smart buildings. The EU's electricity network has become increasingly digitalised in the last decade, but the speed of transformation needs to increase significantly. Coordination and cooperation will help to ensure the best value for money in driving change across the EU and

[23] This will facilitate the aggregation of flexibility coming from smart assets in households and companies. For more details see: https://ses.jrc.ec.europa.eu/development-of-policy-proposals-for-energy-smart-appliances.

[24] This includes proposed support for the deployment of a common European energy data space with a budget of EUR 8 million, and support by and cooperation with the Data Space Support Centre for interoperability across data spaces (e.g. mobility, smart communities).

[25] The Horizon Europe 2021 Work Programme supports 5 projects with a budget of EUR 40 million that aim to establish the ground for deploying a common European data space for energy (https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl5-2021-d3-01-01).

[26] Such as projects that are cooperating under the Bridge initiative to provide policy advice with regard to smart grids: (https://bridge-smart-grid-storage-systems-digital-projects.ec.europa.eu/).

[27] See examples in the Staff Working Document accompanying this Communication.

contributing to an efficient digitalisation of the electricity grid. As stated above, to achieve the ambitious targets of both the "Fit for 55" legislative package and the REPowerEU plan, EUR 584 billion of investment in the electricity grid will be required, between 2020 and 2030. Estimates are that around EUR 170 billion investments in digitalisation will be needed out of a total of around EUR 400 billion investments in the distribution grid over the period 2020-2030.

Against this background, the Commission announces today that it **will support the EU transmission system operators (TSOs) and distribution system operators (DSOs) to create a digital twin of the European electricity grid**: a sophisticated virtual model of the European electricity grid. The aim of the digital twin is to enhance the efficiency and smartness of the grid as a way to make not only the networks, but the energy system as a whole, more intelligent. The creation of a digital twin will be achieved through coordinated investments in five areas: (i) observability and controllability; (ii) efficient infrastructure and network planning; (iii) operations and simulations for a more resilient grid; (iv) active system management and forecasting to support flexibility and demand response; and (v) data exchange between TSOs and DSOs. The digital twin will not be created in one go but will be a continuous investment and innovation effort for years to come. Throughout this process, synergies with upcoming initiatives on virtual worlds, such as the metaverse, will be ensured. As a first step, the European Network of Transmission System Operators for Electricity (ENTSO-E) and the EU DSO Entity will sign a **Declaration of Intent** to kick-start the development of a digital twin of the EU-wide electricity grid with a comprehensive consultation of grid users and other stakeholders on concrete deliverables. The Commission intends to support ENTSO-E and the EU DSO Entity as well as concrete investments by system operators through various means including Horizon Europe.

Fostering investments in smart energy grids requires a comprehensive framework, but many Member States' regulations do neither appear to incentivise digitalisation nor innovation.[28] To foster investment in the smartness of the European electricity grid, and in the digital twin in particular, a coordinated approach is also needed that helps national regulators to determine what constitutes efficient investment in digitalisation and to provide incentives to system operators. Therefore, the Commission will aim to ensure that by 2023 a regulatory framework that is fit for purpose to attract and guide such investment is in place. In particular, **the Commission will support the European Union Agency for the Cooperation of Energy Regulators (ACER) and the national regulatory authorities (NRAs) in their work to define common smart grid indicators, as well as objectives for these indicators, so NRAs can monitor smart and digital investments in the electricity grid annually as of 2023**[29] and **measure progress towards the creation of the digital twin**[30].

These actions, and the digitalisation of energy infrastructure more generally, have and will be supported through various instruments at EU level. The revised TEN-E Regulation provides for greater opportunities to support cross border smart electricity grid. It updated the definition of smart electricity grids and its related category for cross-border smart electricity grid PCIs as well as simplified the selection criteria and the role of project promoters. CEF Digital will

[28] Position on incentivising smart investments to improve the efficient use of electricity transmission assets, ACER, November 2021.

[29] The common indicators will also provide guidance on the transposition of Article 59.1(l) of the Electricity Directive.

[30] As both actions will happen in parallel and common smart grid indicators will be defined in the same 5 areas as those for coordinated investments to create the digital twin.

develop concepts and carry out feasibility studies, potentially leading to implementation projects, for pan-European Operational Digital Platforms. Supporting the European cyber-secure digital twin of the electricity grid, these shall provide digital technologies and connectivity for retrofitting the existing energy and transport infrastructures with the required cross-border digital infrastructure.

In addition, digitalisation of national and regional administrative services can help to streamline permit processes for grid development[31] by making it possible to communicate online and by supporting the activities of the permitting national competent authorities and single points of contact[32]. The Commission will open the technical support instruments for this goal. Member States can request, via their coordinating authorities, assistance from the technical support instruments.[33]

4. BENEFITS FOR CONSUMERS: NEW SERVICES, SKILLS AND EMPOWERMENT

Consumers are front and centre in our efforts to digitalise the energy system. Digitalisation brings benefits to households and SMEs in the form of innovative data-driven services that enable them to, for example, better manage their bills, know their energy consumption in real time, share electricity they generated themselves with their neighbours or sell it back to the market, or save energy (and money) which is one of the cheapest, safest, and cleanest ways to address high prices and reduce our reliance on fossil-fuel imports from Russia. Digital inclusion should ensure that also the most vulnerable citizens, those with low incomes and living in remote regions have affordable access to new digital technologies and tools, and are enabled to benefit from the digitalisation of the energy system.

Digital information about the energy consumption of appliances (through the European Product Registry for Energy Labelling[34]) or in the home (through smart meters) can help consumers in their efforts to reduce energy use, provided that such digital tools are made available to all consumers at an affordable price. Sustainable design of digital devices and clear information about their environmental footprint, repairability and recyclability can help to reduce raw material use and foster transition towards circularity. But interoperability is key. For example, the first results of the DRIMPAC project[35] showed that making it easy for small energy consumers to participate in demand response through a unified interoperability framework can lower their energy bills by 20%, driven among other things by a 15% reduction in energy consumption.

4.1 A legal framework that empowers and protects consumers

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32 For example, via the creation of electronic application portals and common repositories of permitting-related relevant data for energy infrastructure and renewable projects, one-stop shops for project developers or by increasing transparency on the availability of grid capacities to uptake additional renewable projects in specific local areas.

33 https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/technical-support-instrument/technical-support-instrument-tsi_en

34 https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/product-database_en

35 Unified Demand Response Interoperability framework enabling Market Participation of Active energy Consumers. For more information see: CORDIS Results Pack on digitalization of the energy system – A thematic collection of innovative EU-funded research results.

It is essential to ensure that digitalisation does not undermine the framework of consumer protection already established in the internal market in electricity. Protections that exist off-line will continue to exist online, that is to say in the digital age. This includes rights to accurate billing and clear contractual conditions that are well known in advance. Equally, the potential for Member States to establish regulated prices, notably for vulnerable customers and the energy poor, should not be negatively affected by digitalisation.

The EU legal framework lays down the rights of consumers, but implementation is slow. This is not just a matter of detailed market rules[36], interoperability or data exchange. Consumers also need to be able to retain control over who can access their data. Under the proposed Data Act,[37] data sharing requires consent from the consumer for third-party access to its data. This is key to ensuring consumer's trust, choice, and privacy, in line with the principles and objectives set forth in the proposed European Declaration on Digital Rights and Principles.[38]

Consumer protection needs to be adequately ensured in light of the digitalisation of the energy sector. This is particularly relevant with regards to data-driven commercial practices that could exploit the behavioural biases of consumers or otherwise prevent them from making informed choices. The Electricity Directive addresses the issue of consumers' rights in relation to bundled products or services. General EU consumer protection legislation, such as the Unfair Commercial Practices Directive[39], Consumer Rights Directive[40] and Unfair Contract Terms Directive,[41] aims to ensure that consumers have access to clear information and are not subjected to misleading or aggressive commercial practices online or offline. In order to ensure that the existing legal framework remains fit for purpose, the Commission has launched a **Fitness Check of EU consumer law on digital fairness**. This evaluation will examine whether the existing rules are adequately tackling issues that are also relevant in a more digitalised energy sector, such as consumer vulnerabilities in the digital environment, manipulation of choice, difficulties with contract cancellations, etc.

4.2 Digital tools designed for and with consumers

In 2021 only 54% of the people had basic digital skills[42] but in a digitalised energy market many more will need these skills. This will help them to make informed choices and ensure that they do not miss out on opportunities to become more competitive, or to save energy costs. For example, mastering digital skills will help SMEs and households to understand how to engage in demand-response, how to optimise their own use of electricity produced on-site, or what is entailed by charging an electric vehicle.

Not all consumers are able or interested to participate in the energy transition in the same way or to the same degree of involvement. It is therefore important that nobody is left behind in the digital transition and therefore create consumer-focused digital tools designed to meet the needs, skills, conditions, habits and expectations of different categories of market participants.

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36 In particular, the ongoing preparatory work for a possible network code on demand-side flexibility.
37 COM(2022) 68 final
38 COM(2022) 28 final
39 Directive 2005/29/EC concerning unfair business-to-consumer commercial practices in the internal market.
40 Directive 2011/83/EU on consumer rights.
41 Council Directive 93/13/EEC on unfair terms in consumer contracts.
42 Digital and Economic Index (DESI) 2022 results, p. 14 of European Analysis 2022 retrieved from https://digital-strategy.ec.europa.eu/en/policies/desi

The tools created should reflect the reality of demographic change with increasing numbers of older consumers who need to be specifically supported in the digital transition.

The Commission has recently launched, under the Smart Grids Task Force, a new activity to further investigate the potential engagement of consumers with digital tools and technologies and recommend actions to reinforce the role of consumers' flexibility and empowerment in the energy market. To support this new activity, **the European Commission will ensure that key R&I projects work together to identify, by mid-2023**, **strategies to engage consumers in the design and use of accessible and affordable digital tools** and to identify indicators to assess engagement over time.

Working with Member States, the European Commission will also develop by 2023 a common reference framework including an open source reference implementation for a consumer application that allows them to make voluntary reductions in energy consumption and helps them in reducing their energy costs. This will lead to a standardised reference application that will be developed in close collaboration with energy providers and will draw from applications and services already available in the market.

On this basis, Member States will be encouraged to make available such apps to provide the consumer with more customised energy savings tips and advice based on generic information about different appliances as well as locally available consumption and weather data. These apps could also provide them with all the information necessary to navigate the energy crises (e.g. financial support, advice services or support in case of disputes with energy providers). As it evolves, the level of intelligence of such apps will be increased by using accurate data about individual and collective electricity consumption obtained from smart household devices, smart plugs, smart meters and other intelligent monitoring and measuring devices, and by incorporating artificial intelligence. For the development of such apps, based on the reference framework developed with Member States, the European Commission will make funding available through the Digital Europe programme.

4.3 Energy communities and local energy initiatives

Digital tools play an important role in developing collective self-consumption schemes and energy communities. Collective energy schemes that involve a whole community, village or town can allow such consumers to connect and scale-up collectively their potential interaction with the electricity system. For example, such schemes could allow a community to: (i) better monitor how the community is performing in terms of energy consumption, or (ii) share solar panels or otherwise engage in energy sharing or peer-to-peer trading of electricity produced from joint investment projects that can make them less dependent on high electricity prices set in the wholesale market. The Commission will seek to make the best use of digital tools to support energy communities and schemes for the local consumption of locally produced electricity. The Commission will also seek to promote the sharing of knowledge on existing digital tools, with programs tailored to the needs of different demographic groups. To achieve these goals, the Commission will:

- In the context of the Energy Communities Repository project, **identify and shortlist digital tools** and **produce guidance on energy sharing and peer-to-peer exchange arrangements.** These tools and this guidance will improve the understanding and skills of policy makers, regulators and local communities so they can build up and support information and communications technology (ICT) and data-driven business models.

- **Develop a first-of-its-kind experimentation platform** to test and simulate energy communities in combination with innovative activities such as blockchain-based energy trading. This experimentation platform could also help to better understand behavioural responses to price signals to optimise benefits for communities and identify potential legal, regulatory, fiscal or technical barriers.

4.4 A skilled workforce to accelerate the digital transition.

There is a risk that new data-driven services and innovative technology solutions will not be implemented fast enough if there are not enough skilled workers and trained professionals to help deploy them[43]. Integrating energy transition-related topics into mainstream education and training is a challenge across the EU. This could hamper the deployment of clean energy technologies and hinder the growth and competitiveness of the sector. Building on the 2020 Skills Agenda, the Council Recommendation on ensuring a fair transition towards climate neutrality, and the ongoing blueprint for sectoral cooperation on skills for digitalisation of the energy value chain[44], the European Commission will support the establishment – by end 2023 – of **a large-scale partnership on the digitalisation of the energy value chain as part of the EU's Pact for Skills**. Synergies will be exploited with the upcoming large-scale partnership on onshore renewables, the large-scale partnership in the digital ecosystem, the Digital Skills and Jobs Community, the initiatives for digital skills in energy under the Digital Europe Programme[45], and other relevant sectorial skills alliances and related initiatives.

More generally the Commission is carrying out a structured dialogue with Member States to accelerate commitments and reforms in the area of digital education and skills. To build on this process and the numerous other Commission's actions in this area, the Commission has proposed that 2023 be the Year of Skills.

5. STRENGTHENING CYBERSECURITY AND RESILIENCE IN THE ENERGY SYSTEM

Cybersecurity is an essential requirement for the reliability of the increasingly digitalised energy system. It plays a key role for the energy system to remain secure and robust against cyber incidents and major attacks, covering the whole value chain of the energy system, from production and transmission to distribution and the consumer, including all the digital interfaces along this path.

The requirements for - and costs of - addressing cybersecurity risks need to be approached in a way that ensures an accessible and competitive market for new services and products. In addition to the critical role of large electricity generation and transport infrastructure (both existing and new, such as offshore wind farms and grids as mentioned in the strategy on

[43] Based on the results of the public consultation, the Commission has identified shortcomings in skills development and the lack of adequate skilled workers as the most important barrier to the uptake of digital technologies (Synopsis Report available in Have Your Say).

[44] The blueprint for sectoral cooperation on skills is one of the key initiatives of the new skills agenda for Europe. Under the blueprint, stakeholders will work together in sector-specific partnerships, also called sectoral skills alliances. Partnerships from each project will develop a sectoral skills strategy to support the overall growth strategy for the sector at EU level (to be further rolled out at national and regional level).

[45] EU funding for training opportunities for acquiring digital skills in energy is available in the Digital Europe Programme, open call DIGITAL-2022-SKILLS-03

offshore renewable energy[46]), more decentralised generation and consumption of energy that are IoT connected increase the 'attack surface' of the entire energy system, and thus increase cyber-related risks.

The EU has a systemic approach to strengthen the cybersecurity of energy networks. This approach combines energy-specific measures building on the cross-sector cybersecurity framework. The reviewed Directive concerning measures for a high common level of security of network and information systems across the Union (NIS 2 Directive) is planned to be adopted soon. It defines the energy sector as one of the EU's critical infrastructures, and provides for cyber-security obligations related to supply chain security and risk-management measures.

In addition, the NIS 2 Directive offers the possibility of carrying out coordinated risk assessments of critical supply chains, and the Council in its Conclusions on the development of the EU's Cyber Posture, invited the Commission, High Representative and the NIS Cooperation Group to carry out by the second quarter of 2023 'a risk evaluation and build risk scenarios from a cybersecurity perspective in a situation of threat or possible attack against a member state or partner countries'. After consulting the NIS Cooperation Group and ENISA and other relevant stakeholders, and **building where appropriate on this risk evaluation and risk scenarios**, the Commission will identify the specific ICT services, systems or products that might be subjected to coordinated risk assessments with priority. In this context, the Commission will pay due attention to **risks in the renewable energy and grid supply chain, including offshore wind.** Such assessments should cover both technical and non-technical risk factors, such as undue influence by a third State on suppliers and service providers, building on the factors identified in the EU coordinated risk assessment of the security of 5G networks

To increase the resilience to cybersecurity-risks in the electricity system, the Commission (with ACER, ENTSO-E and the EU DSO Entity) intends to **propose a delegated act in the form of the network code for cybersecurity aspects of cross-border electricity flows**, stemming from the requirements of Article 59(2)(e) of the Electricity Regulation, including rules on common minimum requirements, planning, monitoring, reporting crisis management, aiming for its adoption in early 2023. Similarly, with the proposal to amend the Security of Gas Supply Regulation[47], the Commission aims to adapt the gas system to new risks, such as cyber-attacks, and the Commission intends to once this amendment is adopted, propose **a delegated act on the cybersecurity of gas and hydrogen networks**.

In parallel, the Commission is proposing a Council Recommendation to **improve the resilience of critical infrastructures** in a number of priority sectors, including energy, against possible physical, cyber or hybrid attacks. The Proposal will address areas such as a harmonised approach to identify critical energy infrastructure, the exchange of information, and enhanced capacity to anticipate, prepare for, respond to, and quickly recover from any disruptions thus strengthening the resilience of critical energy infrastructure. Lastly, the Commission adopted a legislative proposal on the **Cyber Resilience Act** that would lay down harmonised cybersecurity rules for the placing on the market of products with digital elements in the Union and duty of care for the whole lifecycle of these products, as well as corresponding rules on market monitoring and surveillance. These requirements would be objective-oriented, technology-neutral and future proof. As relevant, the Act would also cover devices embedded in the energy supply cycle; for example, digital industrial control systems used for frequency

[46] COM(2020) 741 final

[47] Proposal to amend the Gas Security of Supply Regulation, December 2021 (EU) 2017/1938.

control in the electricity grid. The Cyber Resilience Act will not only enhance the baseline security of the digitalised devices but will also help to increase the trust among the different operators. The Commission will therefore promote best use of those schemes by stakeholders.

6. ENERGY CONSUMPTION OF THE ICT SECTOR

Although it brings overall net benefits to our economy including by enabling emissions reductions[48], the ICT sector accounts for approximately 7% of global electricity consumption and it is forecasted that this share will rise to 13% by 2030. This electricity use at worldwide level is currently comparable to the cumulated electricity consumption of the entire population taken together in Germany, France, Italy, Spain and Poland, and thus requires comprehensive planning given the demand it puts on our electricity grid[49]. Ensuring that the growing energy needs of the ICT sector are met in synergy with the climate neutrality objective is therefore an essential part of the twin green and digital transition. It is important to address: (i) the energy and resources consumption over the full ICT value chain; and (ii) key emerging additional sources of ICT-related energy consumption. Solutions already exist, such as re-using waste heat from data centres, or moving towards circular models (longer lifetimes, reparability, reuse and recyclability). On new technologies like high-performance and quantum computing, the Commission will pay close attention to their energy consumption and is committed to drive investments towards the most energy-efficient solutions.

6.1 Design, production, use and end-of-life

The proposed framework of the **Ecodesign for Sustainable Products Regulation (ESPR)[50]** aims at (i) establishing **EU rules to ensure that only 'circular' products are put on the EU market** (i.e. products that are more durable, can be easily reused, repaired and recycled, and consist as much as possible of recycled materials); (ii) creating a framework for **digital product passports** that provide minimum information, amongst other things, of energy-related aspects; and (iii) setting **mandatory minimum sustainability requirements on public procurement of products**, for a selection of product groups including electronic and ICT products. To address the energy consumption of ICT devices in operation, the Commission

48 In 2022, the European Commission launched the European Green Digital Coalition (EGDC) which currently includes 34 signatories committed to working together with experts and academia on science-based methods to measure the net environmental impact of digital solutions across priority sectors, including the energy and power sectors. By the end of 2022, 18 real-life case studies will be examined to help validate and refine the iterative development of the net environmental impact methodology across sectors. The first calculations of environmental effects of green digital solutions for energy systems, as well as draft guidelines for deployment of digitalisation with enabling effects, will be available in 2023.

49 In addition, the energy footprint of ICT represents 3-5% of global carbon emissions, which puts it on a par with the aviation industry's emissions[49]. Most recent analysis suggests that the energy consumption of consumer devices in 2020 accounted for roughly 50% of the overall energy consumption of ICT technologies, with the two next largest contributors being respectively the production of ICT devices (~20%) and the operation of data centres (~15%).[49] However, this picture is expected to change dramatically by 2030, as the overall energy consumption of ICT technologies is expected to increase by 50% over this decade. The top three contributors in 2030 would then be the operation of consumer devices (33%), the operation of data centres (30%) and the operation of networks (27%).

50 Proposal for a Regulation establishing a framework for setting Ecodesign requirements for sustainable products and repealing Directive 2009/125/EC, COM(2022) 142 final

will **develop an energy-labelling scheme for computers**,[51] addressing the different uses of computers such as (i) office work; (ii) gaming; and (iii) graphic design and video editing respectively. The Commission's eco-design working plan 2022-2024 also announced new rules covering product groups currently not regulated, such as smartphones and tablets, that contribute to improving their durability and reparability.[52] Green Public Procurement or green purchasing helps stimulate a critical mass of demand for more sustainable goods and services which otherwise would be difficult to get onto the market.

6.2 Energy consumption of telecommunication networks

More and more ICT devices are being connected, both to each other and to the internet. Over 60% of overall internet traffic is used for video streaming, with online gaming and social networking the second and third largest sources of traffic. In 2019, the Commission raised in its communication *Shaping Europe's digital future* the possibility of introducing '*transparency measures for telecoms operators on their environmental footprint'* at EU level[53]. More recently, the proposed Declaration on European Digital Rights and Principles emphasises that 'everyone should have access to accurate, easy-to-understand information on the environmental impact and energy consumption of digital products and services, allowing them to make responsible choices'[54]. The Commission will work, in consultation with the scientific community and stakeholders towards boosting transparency by **developing common indicators for measuring the environmental footprint of electronic communications services,** building on the work already carried out by regulators and electronic communications providers. The greater sustainability of certain telecommunication networks can be considered when assessing public support.

An **EU Code of Conduct for the sustainability of telecommunications networks** can help to steer investments towards energy-efficient infrastructures. The Commission will work towards establishing such an EU Code of Conduct by 2025 building on the work done for measuring the environmental impact of electronic communications services.

In addition, as part of this action plan, the Commission will fund a study and prepare a **communication and awareness-raising campaign** on the responsible energy consumption of day-to-day digital behaviours (such as video streaming, the responsible use of emails, or the archiving of digital files).

6.3 Energy consumption of data centres

The Commission has set the strategic goal of ensuring that data centres are climate-neutral, energy-efficient and resource efficient by 2030. More and more calculation tasks and storage capacities are being carried out over the cloud or High-Performance Computers (HPC). This has meant that data centres have become a core infrastructure element of ICT systems, and the energy consumption of EU data centres is expected to increase over 200% between 2020 and

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[51] It should be noted that electronic displays, the only category of electronic devices having an energy consumption higher than desktop and laptop computers, are already targeted in the EU by an existing energy labelling scheme.

[52] See https://ec.europa.eu/info/news/ecodesign-and-energy-labelling-working-plan-2022-2024-2022-apr-06_en

[53] See https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en

[54] COM(2022) 28 final

2030[55]. In 2018, data centres accounted for 2.7% of electricity demand in the EU[56]. The Commission takes due note of the significant energy-efficiency improvements the data-centre industry has made in recent decades. But to make the twin digital and green transitions happen, public authorities or system operators should not be put in the position of having to choose between attracting better telecoms networks and (hyperscale) data centres on the one hand, and ensuring that businesses and households can access electricity on the other hand. The Commission has already acknowledged the strategic role of data centres in the Digital Strategy, which states the aim of achieving *"making these infrastructures climate neutral and energy efficient by 2030".*[57] This was supplemented by the target of putting in place 10,000 climate-neutral, highly secure edge nodes by 2030.[58] The Commission has already taken a number of actions to reach these objectives[59]. In addition to these actions, the Commission will do the following:

i) By 2025 the Commission will introduce an **environmental labelling scheme for data centres,** building on the **monitoring and reporting requirements for energy consumption for data centres** as proposed in the review of the Energy Efficiency Directive (EED)[60]. This labelling scheme can facilitate further decision-making at national and EU level to ensure that data centres operating in the internal market are energy efficient and sustainable.

ii) The Commission will explore introducing **separate reporting lines for indirect greenhouse gas emissions stemming from the purchase of cloud computing and data centre services in EU sustainability standards** under the Corporate Sustainability Reporting Directive;

iii) The Commission will improve **requirements on the operating conditions of servers and data storage products** and consider **an energy label for servers and data storage products** through the **revision of the Ecodesign rules for servers and data-storage products.**[61]

iv) The Commission will promote reuse of waste heat from data centres to heat homes and businesses as part of the revised Energy Efficiency and Renewable Energy Directives as well as through **guidance provided in the National Energy and Climate Plans** of Member States, to ensure that these centres play a positive role for the communities around them.

v) The Commission also intends to fund R&I in systems that can store waste heat produced by data centres during summer season to warm households and businesses in winter. To support these initiatives, the Commission will launch a study end of 2022 on optimising the overall integration of data centres in the energy and water systems.

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55 To this respect, it can be noted that while the share of cloud data centres accounted for 10% of data centres' energy consumption in 2010, it increased to 35% in 2018 and is expected to rise to 60% in 2025. See https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=71330.

56 It will reach 3.21% by 2030, if development continues on the current trajectory: https://digital-strategy.ec.europa.eu/en/library/energy-efficient-cloud-computing-technologies-and-policies-eco-friendly-cloud-market

57 COM(2021) 118 final

58 See https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

59 Through, most notably, the EU Code of Conduct on Data Centre Energy Efficiency, an important number of studies and research projects, regulation (EU) 2019/424 on the Ecodesign of servers and data storage products, the EU Taxonomy for Sustainable Finance, which includes criteria for data centres, as well as the European Chips act.

60 Directive (EU) 2012/27 on energy efficiency, Article 11(10)

61 Regulation (EU) 2019/424

6.4 Energy consumption of cryptocurrencies

Just as their use has grown significantly, the energy consumption of cryptocurrencies has more or less doubled compared to 2 years ago[62], reaching around 0.4% of worldwide electricity consumption[63]. In harnessing the use of cryptocurrencies and other blockchain technologies in energy markets and trading, care must be taken to use only the most energy efficient versions of the technology. Most of the energy consumption is linked to the relatively outdated proof-of-work consensus mechanism, which is nevertheless used by the most popular cryptocurrency (Bitcoin).[64] As Europe currently represents only around 10% of global Proof-of-work mining activities, international cooperation is needed to tackle the issue of the high energy consumption of Proof-of-work mining in a globally impactful way.

In addition to measures addressing data centres and cloud services (see section above), the proposal for a Regulation of Markets in Crypto Assets (MiCA) on which a political agreement was reached by the co-legislators on 30 June 2022 will require actors in the crypto-asset market to disclose information on the environmental and climate footprint of crypto-assets. The European Securities and Markets Authority will develop draft regulatory technical standards on the content, methodologies and presentation of information regarding principal adverse environmental and climate-related impacts.[65] In addition, the Commission will **develop a report by 2025 that includes a description of the environmental and climate impact of new technologies in the crypto-asset market.** The report will also include **an assessment of policy options to mitigate adverse impacts on the climate of technologies used in the crypto-asset market, in particular in relation to consensus mechanisms.**

In the meantime, given the current energy crisis and the heightened risks for the coming winter, the Commission urges Member States (i) to implement targeted and proportionate measures to **lower the electricity consumption of crypto-asset miners**, in line with the proposed Council Regulation on an emergency intervention to address high energy prices, and (ii), also in a longer term perspective, to put an end to tax breaks and other fiscal measures benefitting crypto-miners currently in force in certain Member States. In case there is a need for load shedding in the electricity systems, the Member States must also be ready to stop crypto-assets mining.

On 15 September 2022, Ethereum, the second largest cryptocurrency in the world, completed its long-awaited switch to proof-of-stake consensus mechanism, which the company estimates would reduce Ethereum's energy consumption over 99%. If so far only cryptocurrencies with a smaller market cap have used the mentioned consensus mechanism that uses less energy, then this switch shows that the crypto world can move towards a more efficient system. But we need to go the extra mile for this to happen. To reduce energy consumption, the Commission will promote "environmentally friendly" consensus mechanisms through the European Blockchain Services Infrastructure as gold standard in Europe and the world.

The Commission will cooperate internationally with, and build on the technical expertise of, standardisation bodies to develop an **energy-efficiency label for blockchains.**

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62 Based on June 2022 data.

63 See Cambridge Bitcoin Electricity Consumption Index: https://ccaf.io/cbeci/index.

64 See for instance https://www.bloomberg.com/professional/blog/why-bitcoins-energy-problem-is-so-hard-to-fix-quicktake/#:~:text=1.,which%20keeps%20a%20running%20estimate. Modern blockchain consensus mechanisms require much less energy to operate than the one used in Bitcoin (e.g. "proof of stake").

65 The final MiCA text was agreed by co-legislators on 30 June 2022.

7. AN EU-WIDE COORDINATED APPROACH

Digitalisation is an ongoing process changing society and the energy system. It needs careful planning at all levels and a dedicated dialogue and political guidance on how best to deliver on the EU's digital and green policy objectives. The speed and global nature of digitalisation means that the following should be prioritised: (i) supporting twin transition synergies through the EU's main frameworks for Member State planning for the twin transitions and EU funding tools; (ii) a closer cooperation at EU-level between public authorities as well as between energy and digital stakeholders across the entire energy value chain, and (iii) closer cooperation at international level with like-minded countries and international organisations.

7.1 Supporting REPowerEU and the recovery from the COVID19 pandemic

In their Recovery and Resilience Plans (RRPs), Member States recognised the potential of synergies between the Green Deal and the Digital Decade Policy Programme 2030. For example, many RRPs referred to using digital solutions to: (i) accelerate the decarbonisation of energy networks; (ii) integrate smart meters in energy systems; or (iii) upgrade the smartness of the electricity grids[66]. The Recovery and Resilience Facility (RRF) also has the potential to be a key tool to help deliver on the REPowerEU plan as it is an agile instrument to address challenges in a wide range of policy areas over a medium-term horizon.

In May 2022, the Commission made a legislative proposal to add REPowerEU chapters to the the national Recovery and Resilience Plans, to support the specific reforms and investments required to implement REPowerEU.[67] Therefore, in the context of the ongoing dialogues between the EU and the Member States on how the RRPs can help delivering on the REPowerEU objectives, the Commission **invites Member States to outline, where appropriate measures in the field of digitalisation of the energy system**.

7.2 Synergies between the EU's energy and digital agenda

Going forward, it is essential to exploit synergies between the green and digital transitions in the two main instruments at EU level that guide the European Green Deal and the Digital Decade Policy Programme 2030, namely: (i) the National Energy and Climate Plans (NECPs) – and in particular their updates due by June 2024 to reflect the increased ambition of the revised 2030 framework; and (ii) the national Digital Decade roadmaps. These synergies include the use of data and tools for energy system integration and planning. They also concern the optimal integration of digital infrastructure such as data-centres and cloud infrastructure into the overall energy and heating systems, in coexistence with competing uses of that system, for example through energy-efficient data centres and the reuse of their waste heat for businesses and households, as well as allocating spectrum in telecommunications networks to smart energy grid solutions. How to exploit fully such synergies will be considered in the guidance for Member States' updates of their NECPs, that the Commission intends to publish later this year.

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66 Recovery and Resilience Scoreboard. Thematic Analysis: Digital public services, European Commission, December 2021.

67 Commission Proposal COM(2022) 231 final, amending the Regulation as regards REPowerEU chapters in recovery and resilience plans, and the guidance on RRPs in the context of REPowerEU.

Moreover, the Commission **will use the Smart Energy Expert Group to set up a structured high-level dialogue with national representatives on 'Digitalisation of energy: state of play, progress, opportunities and challenges'**. The expert group will launch a complementary analysis between the Commission and Member States based on both the NECPs and the cooperative dialogues foreseen for the national Digital Decade roadmaps. This analysis will seek to draw up a common agenda, trajectories and milestones to improve the digitalisation of the energy system through a coherent planning and monitoring framework.

To help quantify the benefits of digitalising the energy system, the Commission will continue the close cooperation with the European Green Digital Coalition, on developing tools and methodologies for estimating and measuring the net impact of enabling digital technologies, e.g. in the energy sector.

The Commission will also build on the exploratory work and expertise of the Body of European Regulators for Electronic Communications, and consider setting up platforms to coordinate and cooperate across energy and telecoms to facilitate the clean energy transition. Cooperation in this area will also help digitalise the energy system. For example, ComReg, the statutory body responsible for the regulation of electronic communications in Ireland, in 2019 already announced that most of its 400-MHz Band spectrum was awarded to smart-grids solutions.

7.3 Connecting local and regional innovators

Building a shared vision and pathway for digitalising the energy system will only be successful if the EU and its Member States can build on innovation ecosystems where many digital and energy actors at European, national, regional and local level cooperate. EU-level support can help this cooperation by speeding up innovation and the entry-to-market of digital solutions. Therefore, the **Commission will create the 'Gathering Energy and Digital Innovators from across the EU' (GEDI-EU) platform for structural cooperation** between, on the one hand, the **European Digital Innovation Hubs** (EDIHs) and the **Artificial Intelligence Testing and Experimentation Facilities** (AI TEFs) established under the Digital Europe Programme that focus on energy[68], and on the other hand, the EU network of innovators and research institutions in the energy sector set up under the **Strategic Energy Technology Plan (SET Plan)[69]**. The platform will cooperate closely with cities as beneficiaries, investors and incubators of digital technologies in the energy sector, for example through the cooperation of smart cities and communities.

The activities of the platform will aim at (i) drawing up a common agenda of priority needs and mutual interests; (ii) supporting knowledge communities, through vertical (EU-local) as well as horizontal (local-local) and cross-sectoral sharing of best practices and enhancing skills; and (iii) strengthening interoperability of new products or services based on co-design by innovators on the platform to facilitate market-uptake across the EU. The platform will report to the Smart Energy Expert Group and also promote sharing of best practices and recommend future measures, for example in expert workshops and an annual high-level event.

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68 34 out of the 136 EDIHs that will be co-funded via Digital Europe and will start in September 2022 will focus (but not exclusively) on the digitalisation of the energy sector. This number may grow in 2023.

69 Namely the European Technology & Innovation Partnership – Smart Networks for Energy Transition (ETIP SNET), the European Research Area Co-fund (ERA) Net Smart Grids Plus and the European Energy Research Alliance (EERA). In addition, the platform will also build on the activities of the European Partnership for Clean Energy Transition under the Horizon Europe Cluster on Climate, Energy and Mobility.

7.4 Building international partnerships for the green and digital transition

Interoperable technical standards, cyber-security, data protection and other key features of digitalisation of the energy system must be ensured globally, in international fora and in cooperation with partner countries. Team Europe will need to be well coordinated and set out its plans clearly to help avoid incompatible standards and shape a global consensus on the choice of technologies and services where innovation happens rapidly.

Innovative digital energy technologies can boost both sustainable development globally as well as the EU´s competitiveness as fostering international collaboration creates new global value chains for components and services, and help spread a European, values-basedapproach to standards, products, and services. To advance the green and digital transition with partner countries through bilateral contacts, **the Commission will integrate digital and green aspects in energy-related projects, partnerships and cooperation agreements**. In particular, the countries of the European Economic Area, the United Kingdom, Japan and the United States could be cooperation partners.

The Commission will continue to participate actively in multilateral, international fora, such as the UN[70], G7, the Clean Energy Ministerial, Mission Innovation, and the International Smart Grid Action Network (ISGAN). It will also build on the important work of the IEA and the International Renewable Energy Agency (IRENA). In doing this, the Commission will seek to strengthen international cooperation and promote digitalisation of energy as a horizontal issue or by promoting specific solutions. The Commission will also promote international cooperation, in particular through joint research and innovation activities supported under Horizon Europe and build on existing experiences, such as the EU-India High-Level Platform on Smart Grids[71].

7.5 Financial support for faster uptake of digital energy technologies

To ensure that innovation in digital technologies - and innovation enabled by digital technologies - are taken up in the energy sector, continuous and targeted support for their development and use is key.

It is critically important to ensure public and private support for R&I at EU level and in Member States, and finding synergies between both. The SET Plan can help to find these synergies. The review of the SET Plan scheduled for next year will address the enabling role of digital technologies. **The Commission calls on Member States to: (i) increase their R&I support for the testing and piloting of digital technologies in the energy sector; and (ii) promote cooperation between digital and energy stakeholders through the national R&I programmes.**

At EU level, the Commission intends to include in the **Horizon Europe work programme for 2023-2024 a flagship initiative to support digitalisation of the energy system, which addresses the key priorities of this action plan**. In addition, Horizon Europe will support the uptake of digital technologies to promote the competitiveness of clean energy technologies in the EU, notably by using digital technologies to support improved performance or reduced technology costs. Also, the EU Climate-neutral and Smart Cities Mission to establish 100

[70] Coalition for Digital Environmental Sustainability (CODES) www.sparkblue.org/CODES

[71] EU-India High Level Platform on Smart Grids - Florence School of Regulation (eui.eu)

climate neutral cities by 2030 will be supported by funding the development of Digital Twins of cities that will include energy infrastructure. Where possible, the Commission will promote/support the use of Open Source to ensure accessibility and market uptake. Furthermore, the European Innovation Council (EIC) supports start-ups and scale-ups that develop and apply digital technologies in the energy sector in 2022 and 2023. With regard to cybersecurity, the newly established European Cybersecurity Competence Centre[72] and the Network of Cooperation Centres co-funded by Horizon Europe, the **Digital Europe Programme** and Member States, aim at increasing capacity building, innovation and investments. The Digital Europe Programme also supports operators of critical infrastructures (including energy).

The **cohesion policy** supports investments by Member States, regions and local authorities. Financial assistance will target the digital transformation across sectors, including energy, with a particular focus on smart energy systems and smart grids. **Copernicus**, the Earth Observation component of the Union Space Programme and Destination Earth, provides environmental data that enable for example better siting and operation of renewable energy generation.

The **LIFE Clean Energy Transition (CET) sub-programme** supports the development of smart energy services' solutions to empower citizens and communities in the energy system, to allow for a better control of energy consumption and thus to trigger behavioural changes and demand for building renovations. In addition, the LIFE CET sub-programme supports the market uptake and integration of solutions able to improve the smartness of the EU building stock and its integration in a digitalised energy system to fully exhaust the optimisation and flexibility potential of buildings and building systems. This includes addressing gaps linked to the availability of data, interoperability, user acceptance and skills.

8. CONCLUSION

The Russian invasion of Ukraine and current high energy prices have only increased the need and speed to ensure that the EU increases both its independence from Russian fossil fuel imports and its strategic sovereignty and security in creating a digital energy system. As the electrification and decarbonisation of the EU energy system is accelerating, increasing its digitalisation is essential to achieve the Union's 2030 and 2050 climate targets in a cost-effective way. This Action Plan lives up to the ambition stated in the Strategic Foresight Report on the twin green and digital transitions that digital technology helps to create a climate-neutral and resource-efficient society, while ensuring that everybody can benefit from this transition.

As indicated in this Action Plan, this will require both medium-term and long-term actions as well as framed governance. It will involve multiple stakeholder communities, businesses and international partners and it will require clever use of limited public funding and more private investments. There is no transition towards clean energy without a plan for digital. Therefore, the Commission invites the European Parliament and the Council to endorse this action plan and contribute to its swift implementation.

[72] European Cybersecurity Competence Centre: https://digital-strategy.ec.europa.eu/en/policies/cybersecurity-competence-centre

ANNEX: DIGITALISING THE ENERGY SYSTEM: KEY COMMISSION ACTIONS AND INDICATIVE TIMELINE

The Commission will:

An EU framework for sharing data	
Formally establish the 'Smart Energy Expert Group' and set up 'Data for Energy (D4E)' as one of its permanent working groups.	Q.I 2023
Establish the governance of the common European energy data space.	2024
Adopt an Implementing Act on interoperability requirements and procedures for access to metering and consumption data.	Q.III 2022 (Submission to comitology)
Prepare the ground for adopting Implementing Acts on interoperability requirements and procedures for access to data required for demand response and customer switching.	Q.III 2022 (start of activity)
Promote a code of conduct for energy-smart appliances to enable interoperability and boost their participation in demand response schemes.	Q.IV 2023
Intend to support the deployment of the common European energy data space through a Digital Europe Programme call for proposals.	2024
Promoting investments in digital electricity infrastructure	
Support EU TSOs and DSOs to create a Digital Twin of the European Electricity grid.	as of 2022
Support ACER and the National Regulatory Authorities in their work to define common smart grid indicators.	By 2023
Support under CEF Digital the development of concepts and feasibility studies for pan-European Operational Digital Platforms.	By 2024
Ensuring benefits for consumers: new services, skills and empowerment	
Ensure that key R&I projects work together to identify strategies to engage consumers in the design and use of digital tools.	Q.II 2023
Identify and shortlist digital tools and produce guidance on energy sharing and peer to peer exchanges for the benefit of energy communities and their members as part of the Energy Communities Repository.	2023-2024
Develop an experimentation platform to test and simulate energy communities.	2023-2024
Support the establishment of a large-scale partnership as part of the Pact for Skills.	End of 2023
Strengthening cybersecurity and -resilience in the energy system	
Propose a delegated act on the cybersecurity of cross-border electricity flows.	Q.I 2023
Propose a delegated act on cybersecurity for gas networks (subject to confirmation after the outcome of the legislative procedure).	Subject to confirmation
Controlling the energy consumption of the ICT sector	
Develop an energy-labelling scheme for computers and evaluate a possible revision of the eco-design regulation on servers and data storage products. Explore the possibility to develop common indicators for measuring the environmental footprint of electronic communications services.	Q. IV 2023
Establish an EU Code of Conduct for the sustainability of telecommunications networks.	Q. IV 2025
Fund a study and prepare a communication and awareness raising campaign on the responsible energy consumption of day-to-day digital behaviours.	2022-2023
Propose binding obligations and transparency requirements, as well as provisions to promote the reuse of waste heat, for data centres.	Q.IV 2022
Explore and prepare the introduction of an environmental labelling scheme for data centres.	2025
Develop an energy efficiency label for blockchain.	2025

An EU-wide coordinated approach	
Create a platform ‘Gathering Energy and Digital Innovators from across the EU’ (GEDI-EU).	2022
Intends to provide financial support for R&I and market uptake of digital technologies in the energy sector, through the Digital Europe Programme, LIFE, cohesion policy and a flagship programme for Digitalisation of Energy in Horizon Europe.	2023-2024
Develop, in cooperation with the European Green Digital Coalition, tools and methodologies to measure the net impact of enabling digital technologies in the energy sector, on the environment and climate.	2023-2024