ENTSO-E response to the EC consultation on Future climate and energy policy - a Strategy for long-term EU greenhouse gas emissions reductions

1. Long term greenhouse gas emissions reductions: in your opinion, what are the biggest opportunities and challenges

The power system of tomorrow is one of flexibility, of the co-existence of centralised and decentralised power generation, of hardware and software, and of emerging regions, and where the active customer plays a central role in providing services to the power system while benefitting from the energy transition. Innovation and technology development become a cornerstone of the pathway to reduce fossil primary energy, diversify the energy sources and develop a flexible and integrated system, from generation to networks and demand, but also to transform the changes of the energy sector in an economical and industrial opportunity for Europe in the medium term.

New actors and new services are needed to optimise flexibility at local, national, regional and European levels. Network operators, at transmission and also distribution level, have a key role in facilitating the orchestration of new transactions over the whole value chain. With the increasing number of interfaces, interactions and transactions at every stage of the system and between systems, power networks will continue to be central in this evolution, and will remain a fundamental pillar of this transformation where sectors will need to further couple across electricity, gas, heating, transport and digital. All of these trends will be accentuated further on, particularly with a huge amount of RES projected by 2030 and beyond and the active participation of customers in the energy transition.

Transforming the European energy system into an integrated one will rely on the integration of storage, on the use of ICT to integrate different technologies and development of market services, on new links between electricity, gas and heat networks to increase flexibility, solidarity and sustainability of supply, and the same time allow further penetration of RES and reduction of greenhouse gas emissions. The TSOs still need to continue maintaining security, system stability, resilience while ensuring economic efficiency as new options arise for acquiring various services in a more cost-effective manner within this new architecture of the power system.

Europe needs to continue to invest in and develop the right infrastructure to integrate successfully, efficiently, and safely, the growing share of RES. Interconnectors contribute to ensuring adequacy through the sharing of resources in Europe and they are the basis of a secure and reliable power system in the mid and long-term term. Grid reinforcement and cross-border development should thus keep in pace with renewable energy sources' development to enable RES integration and prevent RES curtailment as well as operational security challenges to the system. Ensuring adequate grid infrastructure is in the core of a well-integrated European energy market. Electricity grids must be also prepared to embed the transition to sustainable transport, regarding both the increasing deployment of electric vehicles and transport electrification, the evolution of batteries and storage solutions and the creation of efficient charging station networks. New technical developments such as smart charging, bidirectional power flow capabilities and congestion management will be of crucial importance to support the decarbonization of the economy by providing flexibility to the power system while maximizing RES integration

The system complexity and thus challenges and risks are increasing from a consumer point of view as the active customer will be increasingly put into the centre of this new digital power system. A holistic system view should be taken to ensure that wholesale and retail markets are linked and that the whole energy system

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is optimised to achieve the decarbonisation at least cost. A significant challenge from a societal point of view will be to find appropriate tools and measures to address energy poverty in order to ensure that digitalisation, decentralization, and decarbonisation trends in the energy transition go together with further democratisation and ensuring access to energy to all consumers. The differences among Member States regarding renewables' share, energy mix choices, geographical potential, the accessibility of various RES technologies and the ability of citizens to afford new solutions and to reap the benefits of the internal energy market should also be considered in the future strategy of greenhouse gas emissions' reduction for a the clean energy transition within the pan-European interconnected power system.

An appropriate market framework is needed to allow both TSOs and DSOs to efficiently procure flexible resources in a way that supports prosumers' active participation in wholesale markets and ancillary services at both the TSO and DSO level and to enable the effective participation of active customers in the various markets. Stronger TSO-DSO cooperation and coordination will be instrumental to unlock the participation of all resources (including distributed connected ones) in all markets and to unlock the full potential of customers in the electricity markets. A holistic system view should be taken to ensure that wholesale and retail markets are linked and that the whole energy system is optimised to achieve the decarbonisation at least cost. There should be overarching market design principles and an appropriate framework to enable all markets and processes to ensure full-value deployment of Distributed Flexibility resources (DFR) for their owners and to unlock DFR potential. Only then will active participation from DFR increase liquidity in electricity balancing and congestion management processes, and drive costs down for customers through ensuring a coherent and integrated wholesale and retail market that allows for cross-border features. Distributed flexibilities should be able to be used where they provide the most value to the whole electricity system, through a single flexibility marketplace for both balancing and congestion management to allow TSOs and DSOs alike to access all bids, enable coordination, simplify access to all markets for DFR and ensure all possibilities for DFR to participate in all processes collecting the maximum value for their flexibility.

Strong European cooperation, with an important role for regions, will be equally important for addressing the opportunities and challenges related to Europe's energy transition, while ensuring strong European leadership in research and innovation.

In order to achieve the 2030 targets for RES and energy efficiency – both of which are non-binding at MS level – it is of utmost importance that the EC monitors and evaluates closely each MS's National Climate and Energy Plan as per the Energy Union Governance Regulation.

2. How can opportunities and challenges (in particular related to carbon intensive sectors or regions) be addressed? What key economic transformations should the EU pursue to achieve a low carbon and resilient economy?

Europe must reach its ambitious decarbonisation objective and succeed in the deployment of variable renewables while keeping the costs of transforming the system as low as possible and guaranteeing the continuous secure access to electricity. To solve tomorrow's challenges, Europe should pursue the parallel development of all possible solutions, including putting prosumers at the center of the system, changing the role of historic generators, digitalising the system, promoting storage and smart demand technologies, finding new efficiencies wherever possible, and developing new electricity interconnectors, all through a coordinated, pan-European approach to electricity system planning.

The energy system will increasingly become a network of networks where customers will be at the centre. In

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addition to digitalisation, the coupling between electricity, gas, heat and e-mobility, plus the emergence of a digital grid on top of the physical one will offer new options for optimisation across sectors and between the local, national and regional levels towards the pan-European level. More research and innovation in techniques and processes enabling market integration and coordination as well as automation will be required in order to meet new challenges associated with greater energy cross-border exchanges, the development of local markets and active customers' participation in the power system, which is in the basis of a competitive, low-carbon and resilient European economy. The future strategy for decarbonization should look into enabling these developments through putting into place the appropriate policy, legislative and regulatory instruments and anticipating the challenges and risks that might arise in the meantime.

Sector coupling will have increasing importance across areas, networks, commodities in the energy transition and will affect all levels as electricity networks connect countries, leading to regional and pan-European solidarity and economies of scale. The increased share of renewables in the power system requires back-up and flexibility. This flexibility can be reached by coupling sectors (horizontal coordination) and enhancing coordination between transmission and distribution level (vertical coordination). In addition, the usage and planning of the networks should be optimised through coupling sectors by coupling their functionalities (power to gas, e-mobility); coupling transmission and distribution by coupling the different geographic scales and the resources they provide (at local/national/European level). E-vehicles will further bring flexibility to the network, with the right usage, infrastructure and a holistic system approach. In addition, active system management as a new paradigm, which applies equally to distribution and transmission, will help the optimal use of resources regardless of their connection points, or the user of the grid and the location, and provide for a smart integrated energy network. Such considerations should be taken into account within the future decarbonization strategy.

Digitalisation of the grid and development of smart grids increasingly impacts both DSOs and TSOs and their interactions within the internal energy market and the system operation and management, and it should be addressed for the whole system. Digitalisation provides solutions to both DSOs and TSOs and drives further innovation with respect to new services, solutions, products and markets, which will support both levels, while at the same time it will challenge and transform the existing context of the internal energy market, data management and governance. In addition, digitalisation makes it possible for the end-users to become active market participants with their self-generation and demand flexibility, along with new market players. With the increasing digitalization trends, information exchange and data management are becoming increasingly important to build an efficient integrated European electricity market: substantial efficiency gains in grid operation and planning, lower market access barriers, ensuring transparency in consumers' usage and creating new market opportunities will be equally important from a system perspective.

3. What are the biggest opportunities, including for the wider economy? What are the biggest challenges, including as regards public acceptance or the availability of land and natural resources, related to these future developments?

An integrated & holistic approach is needed with long-term objectives to achieve the energy transition to meet key challenges for the power system including modernization of the network to adapt to the rapidly changing environment and to establish synergies among different energy operators; the take-off of the storage and conversion of energy into different vectors, the increasing necessity of system flexibility, also enabled by demand response, the security of supply and the affordability of the electricity services, the optimization of the energy system at a local/urban level and up to regional. The interaction and collaboration of TSOs and

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DSOs will be essential for the energy transition.

Interconnectors will continue to play a crucial role to enable the integration of the various sources in a cost-efficient and effective way across borders. ENTSO-E's TYNDP 2018 estimates that failing to properly develop the European grid beyond 2020 would induce severe limitations in cross-border exchanges, heterogeneous distribution of renewables across Europe, and significant splits between regional market prices and fragmentation, and significant price differences. ENTSO-E's TYNDPs identify where investments in electricity system would help deliver the Energy Union, and bring benefit to all Europeans. The TYNDP 2030 scenarios have the potential to ensure the demand covered by RES in 2030 to be 48 to 58%, resulting in €2bn to 5bn annual savings in generation costs due to TYNDP projects; and 65 to 75% CO2 emissions reduction compared to the 1990 levels. At the 2040 horizon, the potential for savings through building infrastructure based on the latest TYNDP scenarios is even greater: 65 to 81% of the demand covered by renewables in TYNDP 2040 scenarios; 80 to 90% CO2 emissions reduction by 2040 scenarios compared to the 1990 levels; 3 to 14€/MWh reduction in marginal costs of electricity generation with an optimal grid; 58 to 156 T Wh avoided dumped renewable energy.

Ensuring public participation in climate and energy planning and its implementation and achieving broad societal consensus on the specific measures and instruments necessary for this transition, including also the role of infrastructure, is crucial. While optimising the system and integrating RES into the market should be key objectives, the long-term decarbonization strategy should be reflective of the need to further develop the power system and address regulatory measures to facilitate infrastructure implementation and specifically foster public acceptance.

In the context of the energy transition, TSO-DSO cooperation and coordination is increasingly more critical as the DSOs will be also fulfilling new roles and responsibilities. Removing barriers and facilitating the use of flexibility at the various levels should be ensured through an appropriate regulatory framework and a level playing field for market parties, fostering new services and valuing flexibilities. In this context, customers should have the right to participate in all markets and to be the owners of their data. The future policy and framework should be designed to enable and support those objectives.

The future strategic framework should enable new business models to develop, so that the energy market can fully benefit from technological innovation while ensuring a level playing field. An even greater focus should be put on promoting innovation and R&D activities to enable the benefits of new technologies to get to consumers. In addition, regulation for research and innovation activities for regulated entities, such as TSOs and DSOs, should be adapted to the energy transition. The type of innovation or transformation that is required in the current context of Europeanisation, digitalisation, and modernisation of the electricity grids in Europe further requires a longer-term strategy for innovation that spans several regulatory periods. Policy, legislative and regulatory frameworks should be further adapted to incentivise mainstreaming of measures for increasing public acceptance, fostering innovation in the electricity sector and also taking into account new developments such as sector coupling, e-mobility, digitalisation, etc. and their impact on both the power and the gas system in order to support the overall strategic objectives of decarbonisation at least cost.

The energy transition and digitalization will require a more integrated approach across various sectors. Sector coupling will be a key vehicle for increased speed and ambition in decarbonizing the European economy. This relates to synergies and greater flexibility within the energy sector (electricity, gas and heating) while creating a closer connection and synergy with other sectors which experience greater decarbonization challenges such as the heavy industry, transport and agriculture. Conversion technologies such as P2G/X and storage will be key enablers in this regard for the integration of large amounts of RES-E. The future strategic framework should reflect these new trends related to access to data and the digitalization across sectors, the increasing interplay between TSOs and DSOs (on both gas and electricity sides) and should allow for both appropriate sector-specific regulation and removal of barriers to further sectoral integration where further efficiencies and synergies can be explored at pan-European level.

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4. On which cross-sectoral domains should R&D efforts focus in the coming decades? Is there a particular need for large scale deployment of certain innovative technologies? Is there a different role for authorities and private sector in support R&D and Innovation?

A stronger focus is needed on fostering research, development and innovation & putting the right incentives in place from a system perspective, with a view to supporting EU leadership in the energy transition. The European industry and utilities should enhance their leading-edge capability through continuous and focused investments in research and innovation at the European level along with cooperative actions, bringing this integration into the existing system. As the transmission and distribution networks will continue to be the backbone of the electricity and energy systems of the future by acting as integrators of low carbon technologies, the power system should be a priority of energy research and innovation with a corresponding budget and incentives which support this type of activities at both national and European level. In parallel with funding, regulation for research and innovation activities for regulated entities, such as TSOs and DSOs, should also be adapted to the energy transition by ensuring that R&D spending is recognised in network tariffs and that there is stronger support for innovation and R&D.

European coordination on research and innovation should be further strengthened to maximize synergies and avoid redundancies. EU research and innovation funding is critical in order to stimulate and attract further private investment to leverage the benefits of innovation for society. Better complementarity must be ensured between regulatory frameworks and research and innovation support schemes (e.g. EC funding).

In addition, further measures should be explored to address the challenge of reconciling and ensuring the coexistence of different lifecycles and developments of digital projects and infrastructure projects. Future regulatory frameworks should also asses the need for innovation from a societal point of view, taking into account in addition to TSO cost-efficiency, criteria such as stakeholder benefits, cross-border pan-European benefits, and European and regional dimensions should be considered as well.

There is a need for a long-term strategy for TSO R & I activities at both national and European levels which will further ensure consistent collaboration between TSOs and other stakeholders in pursuit of a fully integrated energy system and facilitate the uptake of projects into the market applications and the market uptake of grid technologies. Innovation at all levels will be central to this new system of systems. System operators will need new solutions to ensure frequency and voltage stability, leading to new responsibilities for market participants. These new challenges will not only require technological solutions, but also a higher level of regulatory and policy coordination at regional and pan-European level, as well as innovation in market design to increase flexibility in the system.

Adequate transmission infrastructure is the most cost-efficient enabler to achieve Europe's climate and energy-policy goals (a competitive Internal Energy Market, security of supply and decarbonisation of the energy mix) and to enhance solidarity between Member States. Joint planning in ENTSO-E's Ten-Year Network Development Plans is important but not sufficient. An appropriate framework should be in place to foster to foster investments to flow in R&D projects.

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5. Do you have an example that you think is of particular importance to underline the role of such local and private sector actors in supporting the low carbon economy and energy transition?

The active engagement of local authorities, civil society organisations, investors, and the general public is of critical importance to support the energy transition, and RES integration cost-effectively and securely while also addressing issues such as energy poverty and access to energy. Ensuring public participation in climate and energy planning and its implementation and achieving broad societal consensus on the specific measures and instruments necessary for this transition, including also infrastructure, is crucial in order to enhance public support for the grid development projects needed to deliver the energy transition and to speed up their implementation. Delays in transmission network development, mostly caused by public opposition, result in significant loss of welfare while there is a number of possibilities for collaborative approaches between civil society and local communities to design and deliver better projects. Current regulatory frameworks should be adapted to provide more flexibility for grid operators to employ the most effective and locally suitable measures for that and the right cost recovery mechanisms and incentives for enhanced stakeholder engagement and facilitate faster project implementation locally.

In addition, the potential of cities and various types of consumers and new actors to develop innovative solutions and provide flexibility services to the transmission grid in order solve operational challenges should be fully enabled and utilized in order to contribute to decarbonizing the energy system.

6. Which adaptation measures are of particular importance for your sector and why?

Getting prepared for risks to the power system has always been a key concern for TSOs as the energy transition requires efficient and effective cooperation across neighbouring countries. Even where markets and systems function well, the risk of an electricity crisis (as a result of extreme weather conditions, malicious attacks or a fuel shortages) cannot be completely excluded. Extreme weather events could potentially also impact the integrity of the physical infrastructure that connects markets across borders and thus even the flows between countries. Risks to power systems can have a local, regional or pan-European scope. Local disturbances may spread rapidly across borders if not properly managed in a coordinated way. This requires preparations for coordinated action on international level, depending on the specific situation. Therefore, national and European risk preparedness processes have to build upon and complement each other.

Europe's TSOs have strong and binding cooperation among each other, but close cooperation among EU Member States is key to assess and prepare for different risks and crisis situations. The Risk Preparedness Regulation as part of the Clean Energy Package strengthens further this cooperation and gives policy makers a common framework as well as new tools and measures to better prepare to face crisis situations and mitigate various risks and at the least cost for society (namely regional and national crisis scenarios and regionally-coordinated risk preparedness plans at national level on the basis of common pan-European methodologies as developed by ENTSO-E).

In the longer term, it is important that the EU decarbonization strategy further reflects and builds upon the need for enhanced regional energy cooperation uniting both the political, regulatory and technical perspectives in respective regional forums to facilitate coordination of policies at regional level over the medium to long-term on matters such as meeting EU climate and energy targets, regional plans for interconnectors and national reinforcements, adequacy solutions and risk preparedness actions, market

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development and market integration of RES, cross-sector solutions for Power to Gas and Power to Heat conversion, risk preparedness plans and cooperation among others. A concerted effort is required at all levels (local, national, regional, pan-European) to achieve the EU decarbonization objectives in the long-term.

7. Additional comments:

From a societal perspective, empowering consumers through the right education, skills and access will help them both participate actively in the energy transition and contribute to it while also reaping the benefits of the Energy Union. To prepare for these new developments, while ensuring that the customer is protected and can benefit from the new developments, there should be additional focus on education and skills development in the energy transition. The system complexity and thus challenges and risks are increasing as the active customer is increasingly put into the centre of this new digital power system. Raising awareness of risks and opportunities will be crucial to facilitate further consumer empowerment and protection while also enabling consumers to participate in the different markets and provide various services to the benefit of the electricity system. In addition, policymakers should look into means of addressing energy poverty in order to ensure that digitalisation and decarbonisation trends in the energy transition go together with further democratisation and ensuring access to energy to all consumers and that nobody is left behind in the energy transition.

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