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Accompanying the document

COMMISSION DELEGATED REGULATION

Amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as regards the Union list of Projects of Common Interest

{C(2021) 8409 final}

1. Introduction

Energy infrastructure is a key enabler in achieving the EU's energy and climate objectives at lowest cost. Interconnected infrastructure is the best guarantee of security of supply, essential for integrating renewable energy sources and therefore key for keeping prices at check.

The development of well-interconnected and interoperable Trans-European Energy Networks (TEN-E) is therefore a long-standing policy of the European Union, aiming to connect Member States' networks to meet the energy policy objectives and, importantly, to strengthen cohesion, develop solidarity and cooperation across the EU.

Over the years, the policy on Trans-European energy infrastructure has boosted the vision of creating a single energy market, a market that is not merely an accumulation of national energy markets. The implementation of the EU infrastructure policy together with the adoption of common market rules has resulted in establishing an energy market which ensures security of supply, facilitates the seamless flow of electricity and gas and brings these goods to final customers at least cost.

With climate change becoming a reality, the necessity to decarbonise our energy system has become more prominent and pressing. In this new perspective and with respect to energy goals, the EU has responded by launching an ambitious policy agenda the foundations of which are laid down in the Green Deal[i]. The key objective of the Green Deal is to decarbonise the EU economy and thus make the EU the world's first climate neutral continent by mid-century.

To arrive there, a revision of our energy policy is required. In this respect and to meet those goals, the Commission put forward a number of legislative proposals to make the EU 'fit for 55' and deliver the transformational change needed across our economy, industry and society.

As part of this new policy context, our approach on energy infrastructure also needs to evolve in order for our infrastructure tools, both regulatory and financial, to help on the path towards climate neutrality. In December 2020, the Commission, therefore, brought forward a proposal to review the TEN-E Regulation.

The revision is a further step change and ensures that the TEN-E infrastructure framework becomes a key enabler to implementing the Union's decarbonisation objectives for 2030 and 2050. The new proposal for the TEN-E Regulation takes into account the EU emissions reduction objectives' by promoting further integration of renewables, supports the uptake and scale up of new energy technologies, ensures an increased flexibility in the electricity system and provides for repurposing of existing infrastructure.

This revision builds on the strengths of the current TEN-E Regulation, which puts forward a coherent and cost-efficient approach with respect to cross-border infrastructure planning. The TEN-E Regulation is the Union's principal tool in enhancing market integration and competition, strengthening the energy security of supply aspect, promoting the integration of renewable electricity and a driver to accomplish the European Green Deal milestones.

The TEN-E Regulation puts in place a framework for Member States and relevant stakeholders to work together to identify infrastructure relevant gaps and bottlenecks and projects and measures to remove these. It lays down the criteria and the process to select Projects of Common Interest (PCIs). Moreover, the TEN-E Regulation puts in place a "toolbox" to speed up the implementation of the PCIs through an innovative approach to accelerate permitting and to provide for regulatory incentives. In addition, the Connecting Europe Facility (CEF) provides, where relevant, the necessary financial assistance in order to help the implementation of PCIs.

Pursuant to the TEN-E Regulation provisions, the Commission adopts, every two years, as a delegated act, the Union list of PCIs. To put together the Union list, the Commission launches a procedure that involves Member States, transmission system operators, regulators, project promoters, sectoral organisations and non-governmental organisations representing civil society. The process of selecting the PCIs ensures transparency and fairness.

Since 2013, four Union lists of PCIs have been adopted. The last list of 2019 contains in total 151 projects. On November 19th 2021, the fifth Union PCI list was adopted including 98 projects. The key issue to underline in relation to the fifth Union list is that it reflects, to the extent possible under the current framework, the policy priorities related to meeting the EU's climate neutrality goals and the clean energy transition. In this sense, notably the 5th Union list of PCIs does not contain any new gas infrastructure projects, nor any projects related to oil infrastructure and, thus, firmly shifts the priority to infrastructure most supportive of the decarbonisation aims.

2. Achievements and Impacts

Assessing the deliverables, as of today, of the TEN-E Regulation as well as of previous infrastructure tools, major progress has been realised with delivering on key energy infrastructure objectives.

This has been possible because the TEN-E Regulation has a number of strengths. According to the Regulation, the planning of the cross-border energy infrastructure takes input from the Ten Year Network Development Plans for Electricity and Gas (TYNDP), as put together by the ENTSO-E and ENTSOG respectively. This ensures a European level planning field. The process starts with a regional infrastructure needs identification, ensuring the identification of regional gaps whereas infrastructure solutions are necessary. The regional perspective is taken into account through the key role that the regional groups play in project identification and selection. The regional needs' identification as well as the European level approach ensure the EU relevance of the process that could not be achieved only by national or regional level planning. Therefore, the procedure envisaged to adopt the Union's PCIs allows for the selection of the most important projects that contribute most to the achievement of the EU energy policy objectives.

Over the last nine years, since the entry into force of the first Union PCIs list, sixty PCIs have been completed (present number for all categories). A considerable number of PCIs is also close to completion.

The table below is a brief overview of the projects commissioned as from 2013 until 2019, the year that the fourth Union PCIs list was adopted[ii] .

Table 1. PCI project list summary

Type	PCI list	Type	Added capacity	CAPEX (million €)
Electricity	Commissioned	Interconnection	10.43-12.3 GW	7301
Gas	Commissioned	Interconnection LNG	52 GW 4.4 GW	1954 208

2.1 Electricity

The Union's energy infrastructure policy has been instrumental in achieving further market integration, alleviating infrastructure bottlenecks, relieving or reducing the energy isolation in specific areas and facilitating integration of electricity produced by renewables into the European network. This concerns, in particular, the integration of electricity from variable renewable sources, which requires increased flexibility of the future energy system. In this respect, the Union lists of PCIs contain a significant number of projects, both interconnectors and storage facilities, which help meet this objective and make the grid ready for increased ambition. Modelling results indicate that commissioned PCIs by 2020 provide the capacity necessary to reduce the amount of curtailed renewable generation in all regions. The completion of electricity PCI projects so far has contributed to reducing such curtailed generation by 1.1 TWh. Under the assumption that electricity interconnections included in all Union PCI lists will be commissioned by 2030 a reduction by 4.067 TWh of curtailed renewable capacity is expected. This figure is not considering the impact of the interconnections in question on relieving internal network congestions. The highest benefit is expected in the Iberian Peninsula.

Assuming that the curtailed electricity would replace gas-fired power generation the total benefit is estimated at EUR 305million, more precisely the EUR 263million is related to the reduced actual production costs, whilst the remaining EUR 42million corresponds to gains to be achieved due to reduced CO2 emissions[iii].

Major PCIs that will enable the feeding of RES produced electricity into the Union's grid and facilitate market integration have been completed or are to be completed in the next few years.

In the North South Interconnections Corridor, and in particular in the South-West of Europe region, the interconnection between Aquitaine (FR) and the Basque country (ES), also known as Biscay Bay project, will connect the Iberia Peninsula and France with a nominal capacity of 2,000 MW. Already in 2015, with the support of the European Energy Programme for Recovery, a new 320 kV underground interconnection between France and Spain (Baixas - Sta Llogaia) was completed and doubled the existing interconnection capacities. The project connects the renewable energy sources to the network and contributes to the integration of the French and Spanish markets, as well as to reinforce the security of electricity supply on a regional, national and European level.

In the Northern Seas region, the interconnector between Ireland and France (the Celtic Interconnector) will provide a first connection between Ireland with the rest of the EU. The "North Sea Wind Power Hub" will help develop hybrid offshore wind capacity and related offshore and onshore infrastructure, contributing to meet the objectives set out in the EU strategy on offshore renewable energy adopted in November 2020.

In the region of the Baltic Sea, the commissioning of electricity interconnections between the Baltic Region and its European Neighbours and in particular Finland, Sweden and Poland has already allowed ending the isolation of the Baltic Region and the coupling of the Baltic electricity market the Nordic market. Moreover, the Harmony Link Project undersea high-voltage cable between Lithuania with Poland, which is currently under development, is essential in ensuring synchronisation of the Baltic States with the Continental Europe Network by the end 2025. The extensive infrastructure in place and under development will

not only bring benefits in relation to enhancing the broader region's security of supply, but will also help integrate an increasing share of renewables into the grid.

In the same area, one flagship achievement of the TEN-E electricity is the completed Kriegers Flak interconnection. The project connects a number of offshore wind farms into the power grids of Germany and Denmark. The increased interconnection capacity enabled the flow of electricity produced by renewable energy sources into the European Network. This interconnection improves the overall reliability of the network and has a positive impact on setting prices at wholesale market.

Moving down to the South of Europe, the 200 MW capacity undersea cable built between Malta and Italy has relieved Malta's energy isolation from the EU market. The project in question is another important accomplishment of the EU infrastructure policy, and in particular of the support provided by the European Energy Recover Plan of 2010. Malta is no longer an electricity island.

To help the efficient integration of renewable energy, a number of electricity storage projects are labelled as PCIs. For example, the hydro pumped storage Riedl at the German-Austrian border is planned upstream an existing hydro power plant. The project will enable the integration of RES produced electricity into the regional system and will increase system flexibility.

The completion of PCIs has enabled a majority of Member States to already achieve the EU interconnectivity level of 15% by 2030, as set out in the Regulation on the governance of the Energy Union[iv] 2018/1999 and replacing the previous target of 10% by 2020. The interconnection target is the comparison of total import transmission capacities to the installed capacity in each Member State.

2.2 Gas

Over the last ten years, the landscape of the European gas market has significantly changed. The market design together with the increased gas interconnection capacity has resulted in major improvements in the volumes of gas traded on the European hubs. The deployment of new interconnections has given the ability to traders and consumers to use gas from different sources and routes. According to the report of the Commission's Joint Research Centre (JRC), the calculated increase in trade by commissioned gas PCIs, adding up imports and exports, is 186.4TWh. The latter is the positive footprint that the TEN-E regulation and the relevant PCIs left on the gas market.

The gas supply crisis in 2009 showed the risks of dependence on a single supply source and route. At the time, Member States in the Eastern and South Eastern part of the Union had very limited alternatives to importing gas from Russia due to the lack of interconnectors between the countries of the region, with other parts of the EU and the lack of access to LNG facilities. Since then, the TEN-E framework has supported investment in cross-border gas infrastructure and LNG terminals in the Baltic, Central-Eastern and South-East European region.

Key infrastructure projects have come online, such as the Świnoujście Liquefied Natural Gas Terminal in Poland, the Romania-Hungary interconnector (BRUA phase 1), the gas interconnection between Estonia and Finland (the so called Balticconnector), the Trans-Adriatic Pipeline (or otherwise TAP) which gives access to EU consumers to Azeri gas, the Krk LNG Liquefied Natural Gas Terminal in Croatia. A number of PCI projects are in advanced stage of development nearing completion, namely the gas interconnector between Poland and Lithuania (the GIPL pipeline), the Poland-Slovakia interconnector, the Greece-Bulgaria pipeline (or otherwise IGB).

Moreover, the construction of further projects has started, such as the Baltic Pipe, linking Poland to Denmark and the North Sea. The LNG terminals in Cyprus and in Alexandroupolis Greece are due to be commissioned by the end of 2022 and December 2023, respectively. The new infrastructure opens or enhances supply corridors and strengthens the regional security of supply. It will increase market competition in the regions' concerned.

Once the ongoing PCI projects are implemented, the resilience of the EU gas grid will improve significantly. All EU countries will have access to LNG and – in the overwhelming majority of cases – to at least three gas supply sources.

2.3 Impact of infrastructure enhancement on prices

Electricity Prices

Our policies aim to create a market that delivers electricity to consumers from wherever is produced, at all times and at the least possible cost. An integrated EU energy market is the most cost-effective way to ensure secure and affordable energy supplies to EU citizens. To this end, increasing interconnection capacity contributes to a more integrated European market with more competition between suppliers and market efficiency which results in more competitive prices. On another note, as electricity generated by renewables has very low operating costs, the further deployment of renewable capacity will put downwards pressure on prices in the wholesale market.

According to the findings of the JRC technical report on the impact assessment of the TEN-E Regulation[v], published in October 2021, the completed electricity PCI projects and other PCIs due to be constructed by 2030 relieve congestion on all interconnections, increase cross border trade capacity and of course enhance market integration. Indeed, the increase of the available cross-border capacity is calculated at around 16% in both scenarios for 2020 and 2030. Evidently, removing congestion and further market integration result in a significant effect on prices.

The JRC report estimates that if all PCIs are commissioned by 2030, the average wholesale prices will decrease by 2.5%.

Furthermore, the report indicates that due to electricity PCIs divergences of wholesale electricity prices will be reduced by about 3% in 2020 and by more than 55% in 2030. This analysis is based on assumptions set out in PRIMES model.

This policy approach keeps prices in check by creating competition and allowing consumers to choose energy suppliers.

Gas prices

Gas price convergence within the Union has significantly improved over the last years as an outcome of regulatory, market and infrastructure developments. The level of interconnectivity among EU countries' gas networks is sufficient to promote market integration and allows for market access to a variety of supply sources and counter partners in most EU countries[vi].

It should be pointed out that the Central Eastern Europe is the region which has witnessed the most profound transformation due to investing heavily in infrastructure projects. Market integration and functioning, in this region, is much improved and price differentials between countries begin to narrow. For example, price spreads, over the years, compared to TTF (Netherlands Title Transfer Facility) Dutch hub have significantly dropped. These spreads are currently in the range of 2 EUR/MWh to 3 EUR/MWh whilst at the Hungarian - Slovenian border the price convergence is around 0.3 EUR/MWh. The latter is explained by the fact that

capacity storage facilities have improved and access to Ukrainian underground facilities has become easier[vii].

Projections made in the JRC report indicate that the impact of the commissioned gas PCIs on gas prices is less pronounced compared to price reductions in the wholesale electricity market. More specifically, the implementation of gas PCIs by 2030 will lead to price reduction between -0,17 Euro/MWh an – 0,98 Euro/MWh on average. This can be explained by the fact that gas is a commodity traded on global market and therefore gas prices are driven by supply and demand.

3. Financial support to infrastructure projects through the European Economic Recovery Program and the Connecting Europe Facility (CEF)

The European Energy Recovery plan of 2010 is the first dedicated financing tool that the European Union established to support key energy infrastructure investments. Through this instrument, the Commission granted EUR 1.67 billion to 43 infrastructure projects, both electricity and gas, complementing the significant investments of cohesion policy in such infrastructures. The projects selected assisted in better integrating the energy network and reduced energy market isolation in certain regions of the Unions.

The Connecting Europe Facility (CEF) for the energy sector provides financial support for studies and the construction of PCIs. Since its launch in 2014, CEF Energy financial assistance of EUR 4.7 billion has been provided to 149 cross-border infrastructure actions supporting the implementation of 107 PCIs. A total of EUR 4.2 billion have been provided to finance works and EUR 508 million to support studies. Both for works and studies, the PCIs that received the largest share of funding are in the electricity sector (including smart grids) (58%). CEF co-funding for studies and works has supported projects of common interest with an estimated overall investment volume of more than 60 billion.

Under the new EU budget for 2021-2027 and the revised CEF Regulation, the CEF will continue to contribute to support the achievement of the TEN-E policy objectives through the financing of PCIs as well as cross-border projects in the field of renewable energy with EUR 5.83 billion. The first Work Programme under the new Regulation, adopted in August 2021, provides EUR 2.4 billion for the period 2021-2023. In addition, complementary to the support provided by CEF, cohesion policy programmes will continue to help Member States and regions with substantial investments in the needed energy infrastructure in line with the Union's objectives.

4. The fifth (5th) Union list of Projects of Common Interest PCI

The fifth Union list of PCIs is the last list to be adopted under the policy framework established by the current TEN-E regulation. The elaboration of the list took into account the background of the European Green Deal and its impact on energy policy. In this respect, the regional groups reflected the clean energy transition in the project selection and assessment. For example, the oil Regional Group decided together that, in view of the Union's climate neutrality objective and in line with the Green Deal, no oil PCIs should be proposed for the 5th Union PCI list. With regard to electricity, the list contains fifty transmission and nine storage projects. The projects are selected with the aim to fill the remaining infrastructure gaps, and allow the smooth transition towards climate neutrality. This compares to 67 electricity projects, this figure also included the electricity storage projects in total 6, on the current PCI list. The lower number can be explained, on the one hand, by the completion of a number of interconnection projects, and on the other hand by the change in status of the UK

from a Member State to a third country, which led to the ineligibility of a significant number of projects that were PCI on the 4th list.

The number of gas PCIs is reduced to 20 projects. This reduction signifies 40% less gas PCIs compared to the 32 gas projects on the 4th Union list of PCI. All the projects, apart from one, are located in the Eastern part of the EU, notably in the priority corridors North-South East Interconnections and the Southern gas corridor, and in the Baltic Sea region. This underscores the assessment that the EU gas grid is much better interconnected and shock-resilient and that only minor infrastructure gaps remain, mainly in the Eastern parts of Europe.

Moreover, the large majority of these projects are already well underway, many already under construction and expected to be completed in the next few years. The shorter list demonstrates on the one hand the accomplishment of an already resilient EU gas grid and the EU's resolve to phase out support for fossil fuel infrastructure in coherence with the logic underpinning the Commission's proposal for a new TEN-E framework, under which natural gas infrastructure will no longer be eligible for PCI status.

The fifth Union list of PCIs includes five smart grid projects and six CO2 network projects. Their relative importance as a share of all projects on the PCI list is expected to grow and these projects are expected to play an increasing role in the future.

The selected smart grid PCIs will bring an important number of benefits, including increased cross-border capacities, improved efficiency of the networks, cross-border data coordination, higher uptake of renewable energies and safer grid management, among others. These five projects have a significant cross-border impact and benefit numerous countries, namely Austria, Check Republic, Croatia, Germany, Hungary, Romania, Slovenia and Slovakia. Indeed, smart grid projects in border regions there can be a significant added value of a cross-border approach, allowing to benefit from local complementarities across borders in areas such as renewable energy production or storage solutions. The smart grid PCIs can play an important role in charting the way ahead.

4.1 Administration, methodology and timeline – steps to adopt the fifth Union list of PCIs

The fifth Union list of PCIs adopted in November 2021 was prepared following a rigorous, open, transparent and inclusive process involving numerous organisations. The identification and selection process of PCIs is based on regional cooperation and was managed by the regional groups established under the TEN-E Regulation. The members of the regional groups for electricity, smart grids, and gas consist of representatives of the Commission, the Member States, National Regulatory Authorities (NRAs), Transmission System Operators (TSOs), European Networks of Transmission System Operators for Gas and Electricity (ENTSOG and ENTSO-E), the Agency for the Cooperation of Energy Regulators (ACER). The regional groups for oil and carbon dioxide transport projects comprise representatives of the Commission, the Member States, and project promoters.

All the meetings[viii] held following the relevant requirements that the TEN-E Regulation set out, they were web-streamed and open to all the relevant stakeholders (acting in the field of energy, consumers representatives, environmental protection organisations). In addition, all the material presented in the meetings along with the needs and assessment methodologies were made available to all on a Commission held platform[ix].The Commission encouraged the delivery of input along the process including the infrastructure needs identification, the development of the PCI assessment methodologies and the assessment of the PCI candidates. In addition to the Regional Group meetings, the Commission held numerous bilateral

meetings with the interested stakeholders and project promoters, which allowed for in depth and constructive discussions on the PCI process, projects characteristics and their potential impact on the society.

In line with the Inter Institutional Agreement[x] between the European Parliament, the Council of the European Union and the European Commission, the meetings of the regional groups were also opened to the European Parliament and information related to the preparation of the delegated act containing the fifth Union list of PCIs were shared before adoption.

All parties involved in the PCI process brought their knowledge and expertise with regard to the underlying methodologies for assessing regional infrastructure needs and individual candidate projects aiming to attain the Union's energy policy objectives.

The PCI process was launched in October 2020 and concluded in November 2021 with the adoption of the delegated act. The delegated act will be submitted to the European Parliament and the Council for the two months scrutiny period, as laid down in the TEN-E Regulation.

The PCIs identification process started with the recognition of the specific and most pressing infrastructure needs and bottlenecks in the electricity and gas priority corridors that could not be effectively addressed by more efficient use of the existing infrastructure and/or market measures, and thus require an investment in new infrastructure. The lists of the infrastructure needs prepared and agreed on by the regional groups with the involvement of the broad spectrum of stakeholders, constituted the basis of the 2021 assessment process of the PCI candidates.

In line with the TEN-E framework, the candidate projects in the electricity and gas sectors must be part of the latest 10-year network development plans (TYNDP), namely the 2020 TYNDP.

The calls for electricity and gas PCI candidates took place between 25 November 2020 and 7 January 2021. An online public consultation with National Regulatory Authorities on all the candidate projects took place, between 19 January-19 March and 4 February-19 March, respectively.

For Smart Grid and the CO2 candidate projects, the calls were announced on 12 January 2021 with end date on 8 March 2021. The submission window was followed by two parallel public online consultations on the candidate PCIs. The consultations held between 24 March 2021-16 June 2021 and 26 March 2021 - 18 June 2021 respectively.

For oil, the Thematic Area members agreed not to open the call for any candidate projects.

Each regional group carried out a comprehensive assessment of candidate PCIs proposed for each priority corridor. Projects were assessed with regard to their compliance with the general criteria - laid down in Articles 4(1) of the TEN-E Regulation – including, their contribution to the objectives of the corridor and their cross-border dimension. Subsequently, the regional groups assessed the projects' contributions to the specific criteria - laid down in Article 4(2) of the TEN-E Regulation - according to the dedicated assessment methodologies agreed by the regional groups. The needs identification methodology and the project candidates' assessment was carried out using the same methodologies for the gas and electricity groups respectively, resulting in a consistent identification and assessment of the projects in each sector.

In the priority thematic area of smart grid deployment, the Commission's Joint Research Centre carried out the Cost Benefit Analysis (CBA) using input from the project promoters in accordance with the agreed assessment framework.

The process of assessing the PCI candidates per priority corridor and priority thematic area ended on 9 November 2021. On that date, the decision-making bodies of the regional groups drew up the regional lists of the PCI candidates.

4.2 Key challenges addressed in the fifth Union list of PCIs

Electricity

As outlined above, the commissioning of PCIs has enabled the achievement of the EU energy policy objectives. However, there are still some open issues to cope with in the upcoming years. Enhancements in the cross-border electricity capacity as well as support in developing smart grids infrastructure, in some regions of the EU are still required and the fifth Union list of PCIs aims to contribute to this effect. The electricity PCIs selected in the list will respond to the challenges identified per corridor.

Despite progress in increasing the electricity interconnection level between the Nordic countries with the Baltic States, transmission capacity is still needed to ensure a well-functioning regional electricity market. Existing PCIs, such as the third interconnection between Finland and Sweden and internal line reinforcing the Nordic grid are expected to be implemented by 2025 and achieve this objective.

The three Baltic States remain synchronously connected to the Russian/Belarussian IPS/UPS system hampering their full integration in the European electricity market and grid. The synchronisation of the Baltic States with the continental European network by 2025 is a flagship project of the Energy Union and political priority of the Commission. Synchronisation is key to ensuring secure, affordable and sustainable energy for the Eastern Baltic Sea Region. Synchronisation investments in the three Baltic States are well underway and a financial support of over €1 billion has already been granted. The related investments include grid reinforcements in the Baltic States' national grids and in Poland, as well as the construction of the Harmony Link High-Voltage Direct-Current undersea cable between Lithuania and Poland.

In certain areas of the EU electricity market, loop flows have an impact in market operation inflicting additional costs related to security of supply and costs stemming from reducing the available trade capacity. Investing in projects to remove or limit the bottlenecks is one of the tools to reduce the impact of the phenomenon. In particular, investment in making the use of the existing grid more efficient should be pursued as priority, following the 'efficiency-first' principle. This may be done, for example, by installing smart grids, introducing technologies that enable utilising the networks more efficiently, power flow control, automation technologies and processes, or dynamic security assessment tools. Project promoters may demonstrate such efficiency gains in the TEN-E process as contributing significantly to the criteria required for their respective energy infrastructure categories. At national level, regulatory authorities shall provide appropriate incentives to TSOs and DSOs to increase efficiencies, foster market integration and security of supply, support efficient investments and facilitate innovation in the interest of consumers.

The EU infrastructure policy looks after this issue to the extent possible by including in the Union lists of PCIs, projects that help reduce loop and transit flows. In this regard, two major PCIs, notably the SuedOstLink of 2GW, with a potential to increase capacity to 4 GW, and the SuedLink with a capacity of 4 GW will substantially increase the internal North South transmission capacity in Germany. This will result in reducing unintended load flows and relieve grids in neighbouring countries. Both projects improve the

load flow accommodation resulting from high wind RES electricity generated in the Northern part of Europe. Equally important to this effect are internal reinforcements in Austria and the Czech Republic as well as the internal line in Poland.

To achieve the energy sector decarbonisation target by 2040 and climate neutrality by 2050, a substantial increase of renewable generation and a thorough transformation of the energy system overall are necessary. Furthermore, the uptake of the increased and variable amount of RES generated electricity is increasing the decentralisation of energy production, the intermittency in supply and growing the need for grid balancing. To tackle these challenges, energy systems with the ability to rapidly respond when needed have to be developed. Further to that, networks should demonstrate higher flexibility for both generation and demand, be smarter and facilitate more system integration. Consequently, the Union's electricity grid needs upgrades to maintain grid resiliency, efficiency, flexibility and stability.

In doing so, the expansion and the strengthening of the electricity network is a prerequisite. The latest TYNDP 2020 envisages 93 GW of additional cross-border electricity exchange needed by 2040.

Moreover, in border regions a cross-border approach could have a significant added-value , allowing to benefit from local complementarities across borders in areas such as renewable energy production or storage solutions. Smart grid PCIs can play an important role in charting the way ahead.

For those few Member States who have not yet reached the interconnectivity level, the Commission will continue to promote the achievement of the 15% interconnection target for Member States lagging behind to increase their respective interconnection capacity. It is estimated that if PCIs, selected in the fourth Union list of PCIs, will be commissioned by 2030 only four Member States cannot reach the target: namely, Poland, Spain, Greece and Italy[xi]. Last but not least, enhancing the interconnection capacity will assist Member States accomplish the EU decarbonisation objectives.

The withdrawal of the United Kingdom from the EU has resulted in the physical isolation of Ireland from the EU energy union, as no longer directly connected to the continental European Electricity Grid. This confirms the importance of the Celtic interconnector, planned for commissioning in 2026, which will connect Ireland to France and contribute to support the development of renewable energy in both Member States and the EU. Furthermore, the loss of PCI status of the projects connecting Ireland to Northern Ireland and Great Britain has an impact on the functioning of the single wholesale electricity market for the whole island of Ireland. Therefore, it should be stressed that the candidate projects for interconnection with Great Britain and with Northern Ireland remain very relevant for the Irish electricity system and the Commission agrees with Ireland on the continued importance of the projects concerned, independently of their PCI status.

Gas

The TYNDP 2020 shows that the existing EU gas infrastructure is resilient to supply shocks and can support most of the fuel switch to gas and integrate renewable and decarbonised gases necessary to reach net-zero 2050. The remaining targeted infrastructure gaps can be addressed in the next five years by projects already initiated[xii].

The European gas infrastructure today is much better prepared to face and manage a possible supply disruption than ten years ago. The Commission expects that – thanks to the already implemented gas PCIs and those that are close to implementation – Europe should achieve a well-integrated and shock-resilient gas grid in the first half the 2020's.

In this context, the 5th PCIs process identified a number of bottlenecks in the gas infrastructure, in particular, on specific cases in East and South-East Europe and the Baltic countries. Those remaining challenges can be addressed by the already identified gas infrastructure priorities, currently under implementation.

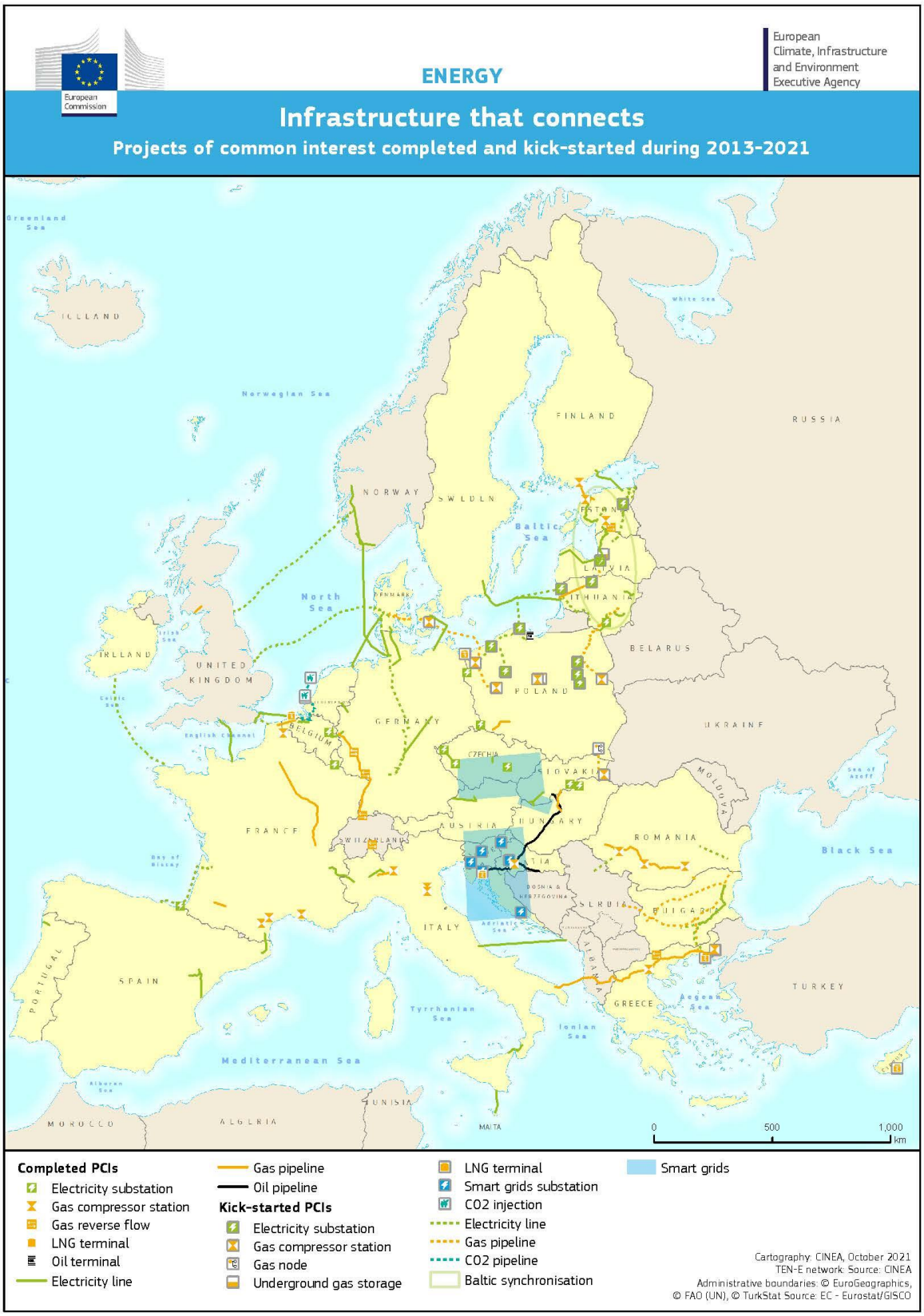
In Western Europe, due to the overall well integrated gas infrastructure, limited specific infrastructure needs were identified. Therefore, only one PCI has been identified for this priority corridor: the pipeline project between Malta and Italy that aims to end Malta's physical isolation from the European gas network.

In the region of the Baltic Sea, the BEMIP Gas Corridor has already achieved its purpose and ensured that the Baltic States and Finland are well integrated and connected with the internal energy market and the region benefits from competition and a diversified portfolio of supply sources. The construction of the four remaining projects is well underway and expected to be completed shortly (GIPL – 2022, Baltic Pipe – 2022, LV-LT Interconnector – 2023 and the Inčukalns underground gas storage – 2025). Moreover, Finland and the Baltic States are soon to complete the first gas market merger in the EU.

In the Eastern European region, the remaining priorities are to reinforce still missing interconnections, increase gas storage capacity and provide reliable access to LNG throughout the region. This assessment is underscored by the proposed reduction of the PCI projects in NSI East from 18 to 11.

The Southern Gas Corridor has partly achieved its mission through the completion of the Trans-Adriatic Pipeline. This project – along with the upstream pipelines that it connects to – enables consumers in South-East Europe and Italy to access Azeri natural gas for the first time. However, there are still system development needs related to the gasification of Cyprus through an LNG import terminal. The Eastmed gas pipeline would enable the EU to access gas from the Eastern Mediterranean offshore fields.

The map below depicts the PCIs electricity and gas projects completed by the end of 2020. It also gives an overview of the respective projects kick-started in last years.


European Commission
ENERGY
European Climate, Infrastructure and Environment Executive Agency
Infrastructure that connects
Projects of common interest completed and kick-started during 2013-2021
Greenland Sea
ICELAND
Norwegian Sea
FINLAND
RUSSIA
NORWAY
SWEDEN
Baltic Sea
ESTONIA
LATVIA
LITHUANIA
North Sea
DENMARK
IRELAND
UNITED KINGDOM
BELARUS
POLAND
GERMANY
BELGIUM
UKRAINE
CZECHIA
SLOVAKIA
FRANCE
AUSTRIA
HUNGARY
ROMANIA
Black Sea
SWITZERLAND
SLOVENIA
BOSNIA & HERZEGOVINA
SERBIA
BULGARIA
ITALY
SPAIN
PORTUGAL
GREECE
TURKEY
Aegean Sea
Tyrrhenian Sea
Ionian Sea
Mediterranean Sea
MOROCCO
ALGERIA
TUNISIA
MALTA
0
500
1,000
km
Completed PCIs
Electricity substation
Gas compressor station
Gas reverse flow
LNG terminal
Oil terminal
Electricity line
Gas pipeline
Oil pipeline
Kick-started PCIs
Electricity substation
Gas compressor station
Gas node
Underground gas storage
LNG terminal
Smart grids substation
CO2 injection
Electricity line
Gas pipeline
CO2 pipeline
Baltic synchronisation
Smart grids
Cartography: CINEA, October 2021
TEN-E network: Source: CINEA
Administrative boundaries: © EuroGeographics, © FAO (UN), © TurkStat Source: EC - Eurostat/GISCO

5. Addressing future infrastructure challenges through a revised TEN-E Regulation

Since 2013, the TEN-E Regulation has effectively contributed to connecting Member States' networks, removing bottleneck, improving market integration and competitiveness as well as enabling the integration of RES electricity. Security of supply, as one main driver behind the current TEN-E Regulation, has been significantly improved through the commissioning of certain PCIs, in particular in the gas sector.

The European Green Deal brings about a notable transformation of the current energy sector into a fully carbon-neutral energy integrated system by 2050. Namely, the Green Deal outlines the requirements for the decarbonisation of the Union's energy sector. To this end, the EU has adopted a comprehensive update of its energy policy framework. The Clean Energy for all Europeans legislative framework[xiii] together with the 'fit for 55'package[xiv] are setting out the energy policy targets and propose a wide range of initiatives and actions to design the future energy system.

The energy system of the future relies on the deployment of cleaner and more innovative technologies. To reach this goal, the exploitation of the remaining potential for the further deployment of renewable energy is necessary to reach climate-neutrality. In particular, as pointed out in the EU offshore strategy[xv], the investment needs for the large scale deployment of offshore renewable energy technologies by 2050 are estimated to almost EUR 800 billion, around two thirds of which are associated to grid infrastructure and a third to developing offshore generation. Apart from the upscaling of investment, this will also require a new and more integrated approach to the planning of offshore grids, and a more favourable framework for the development of hybrid projects combining transmission and generation assets.

Moreover, the energy system also requires deeper energy system integration going beyond electrification. To meet increased climate ambition, further deployment of renewable and low-carbon fuels, notably clean hydrogen, will be needed which will require the setting up of a suitable internal market framework to address the regulatory and investment challenges. It is inevitable that the new approach also entails new infrastructure-related challenges. The existing and additional gas infrastructure will play a significant role with respect to the upcoming energy sector decarbonisation. Gas pipelines could be re-purposed for transporting hydrogen or hydrogen fuels and underground gas storage facilities will facilitate the energy system integration as can accommodate low-carbon gas.

To address the upcoming energy system perspectives, we must today rethink, design and plan the network of the future.

While the initial objectives of the TEN-E Regulation remain and it has proven effective in many ways, fully addressing the challenges identified above and aligning the European Union infrastructure policy with the European Green Deal requires some adaptations in the legal framework.

Therefore, in December 2020, the Commission adopted a proposal to revise the TEN-E framework[xvi] with the aim to enable the identification of the cross-border projects and investments that are necessary for the energy transition.

The focus of the revised TEN-E framework shifts further on the electrification of the energy system to enable the integration of higher shares of renewable energy sources. Fossil fuel infrastructure categories are no longer eligible as PCI, whereas new categories for new and renewable gas such as dedicated hydrogen pipelines are introduced. In addition, dedicated provisions for offshore renewable energy sources, improved infrastructure planning for

energy system integration and offshore grids as well as accelerated permitting procedures for PCIs are expected to facilitate the energy transition.

As regards energy infrastructure linking the EU to its neighbours, the revised TEN-E Regulation introduces a new category of projects of mutual interest, which aims at supporting key infrastructure projects and improving interoperability of networks between the EU Member States and third countries. Such category will increase effectiveness and coherence of the TEN-E framework and accelerate the identification and implementation of essential projects for connecting the Union with its neighbourhood. A case that merits particular attention in this context is Ireland as a small isolated system that has temporarily lost its direct connection to the EU internal market through Brexit.

Subject to the timely conclusion of the co-legislation process, the revised TEN-E framework will be the legal base for the adoption of the sixth Union list of PCIs anticipated by the end of 2023.

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[i] Communication from the Commission on the European Green Deal, COM (2019) 640 final, December 2019

[ii] JRC technical support to the impact assessment of the TEN Regulation, year 2021

[iii] JRC technical support to the impact assessment of the TEN-Regulation 2021

[iv] Regulation 2018/199 of the European Parliament and of the Council on the Governance of the EU and climate action

[v] JRC technical support to the impact assessment of the TEN Regulation, year 2021

[vi] Reference ACER 2019 market monitoring report

[vii] ACER 2021 monitoring report

[viii] In line with the TEN-E Regulation, the ranking of the projects is confidential to the Regional Groups.

[ix] Circabc (europa.eu)

[x] Agreement on Better Law-Making and the Framework Agreement on relations between the European Parliament and the European Commission

[xi] Ecorys and others, Final report 2021, support to the evaluation of the TEN-E Regulation

[xii] Reference https://www.entsog.eu/tyndp#entsog-ten-year-network-development-plan-2020

[xiii] Clean Energy for all Europeans package, May 2019

[xiv] Fit for 55: Delivering the EU's 2030 Climate Target on the way to climate neutrality, COM (2021) 550 final

[xv] An EU strategy to harness the potential offshore Renewable Energy for a climate neutral future, COM (2020) 741 final, November 2020

[xvi] Proposal for a Regulation of the European Parliament and of the Council on guidelines to for trans-European energy infrastructure and repealing Regulation (EU) No 347/2013, COM (2020) 824 final