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COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

Proposal for a Regulation of the European Parliament and of the Council on guidelines for trans-European energy infrastructure and repealing Regulation (EU) No 347/2013

{COM(2020) 824 final} - {SEC(2020) 431 final} - {SWD(2020) 347 final}

Table of Contents

1 INTRODUCTION: POLITICAL AND LEGAL CONTEXT

1.1 Legal framework

The Regulation on trans-European energy networks (TEN-E), adopted in 2013, lays down rules for the timely development and interoperability of trans-European energy networks in order to achieve the energy policy objectives of the Treaty on the Functioning of the European Union (TFEU)[1] to ensure the functioning of the internal energy market and security of supply in the Union, to promote energy efficiency and energy saving and the development of new and renewable forms of energy, and to promote the interconnection of energy networks.

The TEN-E is a policy that is focused on linking the energy infrastructure – electricity, natural and biogas, oil, CO_2 – of EU countries. The TEN-E Regulation puts in place a framework for Member States and relevant stakeholders to work together in a regional setting to develop better connected energy networks with the aim to connect regions currently isolated from European energy markets, strengthen existing cross-border interconnections, and help integrate renewable energy.

As such, the TEN-E is a central instrument in the development of an internal energy market and necessary to achieve the European Green Deal objectives. To achieve climate neutrality by 2050 and higher levels of greenhouse gas emission reductions by 2030, Europe will need a more integrated energy system, relying on higher levels of electrification based on renewable sources and the decarbonisation of the gas sector[2]. The TEN-E can ensure that the EU energy infrastructure development supports the required energy transition.

The key tools of the current TEN-E guidelines to identify and speed up the implementation of the key infrastructure projects are to address the following problems: a) market and regulatory failures for cross-border energy infrastructure investments also due to asymmetric benefits and costs among Member States, b) too strong focus on national priorities in infrastructure investments decision and the need to align cross-border infrastructure projects with European infrastructure priorities to achieve synergies, and c) insufficient market based financing to address the investments needs in cross-border energy infrastructure.

Under the TEN-E Regulation, the Commission shall ensure that a Union list of PCIs is established every two years. The TEN-E Regulation sets general and specific criteria for the selection of PCIs. PCIs span Member State borders or, while remaining within the territory of a single Member State, address an important bottleneck with significant impact on cross-border trade. Specific selection criteria are defined for each infrastructure category considering specific policy objectives (see Annex 5). While the current framework includes the mid- and long-term decarbonisation objectives, it is not systematically applied to all candidate PCI projects and hence limits the possibility to

[1] Articles 170-172 TFEU

[2] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe's 2030 climate ambition, SWD(2020) 176 final

identify projects that support the energy transition to reach the European Green Deal objectives.

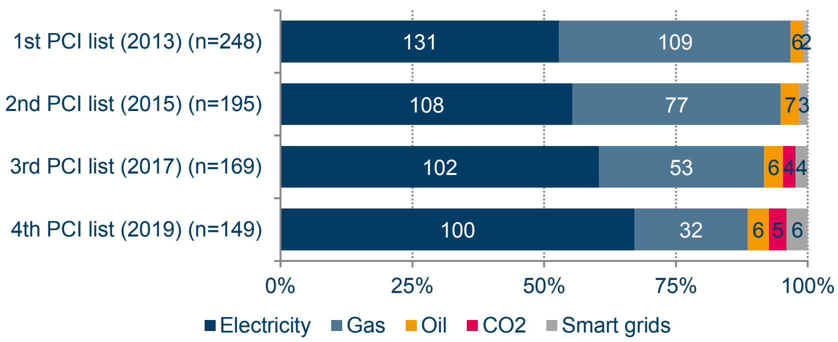
For electricity and gas projects, in order to be eligible for inclusion in the PCI list, projects must be part of the latest available 10-year network development plan (TYNDP). Every two years the European Network of Transmission System Operators (ENTSOs for Electricity and for Gas) establishes first the system needs under different future and disruption scenarios. Then, a cost-benefit analysis (CBA) is performed for every submitted project, assessing their contribution to the system needs. For smart grids, CO_2 networks and oil projects specific assessment methods are used.

Project promoters submit their projects for selection as PCIs. The Regional Groups, chaired by the Commission and including representatives from the Member States, transmission system operators and their European networks, project promoters, national regulatory authorities, as well as the Agency for the Cooperation of Energy Regulators (ACER), assess the projects' contribution to implementing the priorities, the fulfilment of the relevant criteria and their maturity. Stakeholders are invited to take part in these meetings and bring their insight on the infrastructure bottlenecks and on the candidate PCIs into the assessment process. The decision-making power in the Regional Groups is restricted to a body comprising Member States and the Commission.

Based on this assessment, the Regional Groups propose regional lists of PCIs. Based on the agreed regional lists, the Commission adopts the Union list of PCIs in the form of a delegated regulation. When doing so, the Commission ensures compliance with the relevant criteria, cross-regional consistency, and aims for a manageable total number of PCIs. A Member State to whose territory a proposed project relates may not approve its inclusion in the PCI list.

So far, four Union lists of PCIs have been established. The 4th PCI list was adopted in 2019 and entered into force in March 2020. Since the first PCI list the total number of PCIs per list has been significantly reduced and the distribution across the different sectors has changed significantly with electricity PCIs representing two thirds of the total number of projects in the latest PCI lists. Oil, CO_2 and smart electricity grids have represented a minor share (see Figure 1).

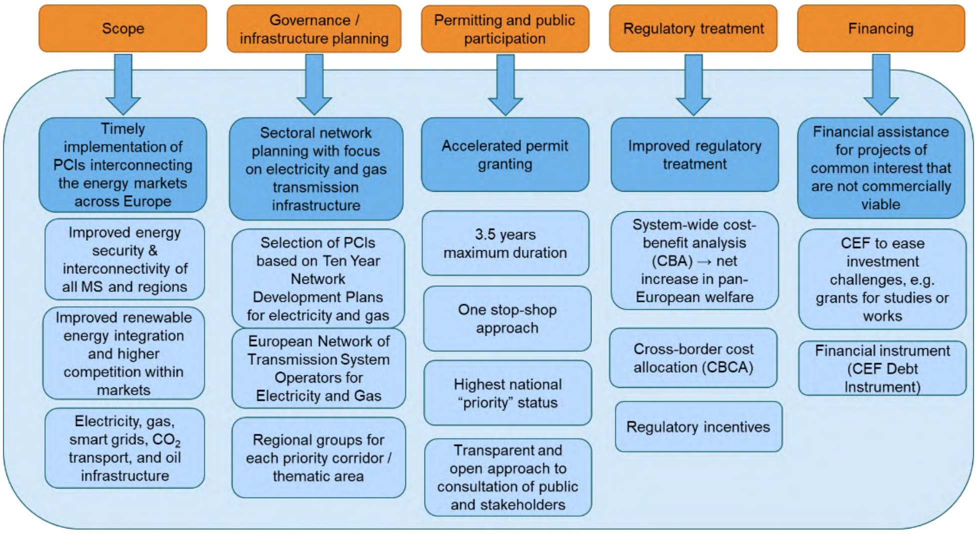
Figure 1: Number of PCIs per infrastructure category per PCI list



There is no automatism between the PCI status and CEF funding. Most PCIs are expected to be commercially viable and financed through regulated network tariffs, CEF funding for works is considered as ‘last resort option’ for the financing of PCIs. CEF is designed to address the gap between the socioeconomic value at regional/European level (such as security of supply, innovation and solidarity) and the commercial viability of projects. CEF promotes cooperation between countries to develop and implement energy interconnection PCIs that otherwise would not happen. This is especially the case for cross-border projects located in countries with smaller population sizes or in a more remote location, where energy tariffs would need to be increased substantially to cover the investment needs.

The key elements of the TEN-E Regulation are summarised in Figure 2 and Annex 5.

Figure 2: Key elements of the TEN-E Regulation



1.2 Benefits of the TEN-E Regulation

The TEN-E Regulation[3] has established a new approach to cross-border energy infrastructure planning. It brings together stakeholders in regional groups to identify and help implement projects of common interest (PCIs) that contribute to the development of energy infrastructure priority corridors and thematic areas.

In addition to an effective and cost-efficient approach to infrastructure planning, the regulation has improved the permitting procedures. It requires Member States to ensure a streamlined permit granting process for PCIs within a timeframe of 3½ year for a permitting decision. They are to receive the highest national priority status and be included in national network development plans. The regulation also provides for regulatory assistance, rules and guidance for the cross-border allocation of costs and risk-related incentives, and provides access to financing opportunities from the Connecting Europe Facility (CEF).

The evaluation of the current TEN-E Regulation shows that it has effectively contributed to connecting Member States networks and removing bottlenecks. Market integration between Member States and competitiveness have improved, as reflected in the progress towards the interconnection targets and the convergence of energy prices across the EU

[3] OJ L 115, 25.4.2013, p. 39-75

(see Annex 5 for more details). The implementation of electricity PCIs will help most Member States reach the 10% interconnection target for 2020. As a result, the EU energy market is more integrated and competitive than it was in 2013. The projects also enable the integration of renewable electricity and power exchange across borders reducing the need to curtailment.

Security of supply, as one main driver behind the current TEN-E Regulation, has been significantly improved through PCIs. By the early 2020s, when the gas PCIs currently under implementation will be in operation, Europe should achieve a well-interconnected and shock-resilient gas grid and all Member States will have access to at least three gas sources or the global liquefied natural gas (LNG) market, a key element to improve the Union's energy security through the diversification of gas sources.

Since its adoption in 2013, TEN-E enabled the implementation of over 40 key energy infrastructure projects and further 75 projects are expected to be implemented by 2022. The financing support provided by CEF of EUR 4.7 billion in total enabled the implementation of 95 PCIs. Since 2014, CEF has provided financing to 149 actions of which 114 (EUR 519 million) for studies and 35 (EUR 4.2 billion) for works. Of the total budget of EUR 4.7 billion, EUR 1.5 billion were allocated to gas projects and EUR 2.8 billion to electricity projects. So far, around one fifth of all PCIs have received CEF financial assistance for studies and/or works[4].

1.3 Political context

Achieving climate neutrality by 2050, starting with a 55% reduction in GHG emissions by 2030, is the key climate objective of the European Green Deal presented by the von der Leyen Commission in December 2019[5]. With the current climate and energy policy framework, the EU is not on track to achieve carbon neutrality by mid-century. The impact assessment carried out for the climate target plan estimates that full achievement of the currently legislated 2030 energy targets would lead to a reduction of 60% below 1990 by 2050[6]. Adopted before the climate neutrality objective, current climate and energy legislation is thus not sufficiently ambitious to deliver a 2030 climate target of at least 55% GHG emission reductions, as proposed by the Commission[7].

Energy production and consumption represent 75% of total EU GHG emissions. To achieve the 55% target and to become climate neutral by 2050 Europe needs to lower its energy consumption and transition to cleaner energy. Energy infrastructure is a key enabler for the energy transition as reflected in the Commission's communication on the European Green Deal and A Clean Planet for all[8]. Infrastructure is a long-lived asset and will therefore need to be consistent with the climate neutrality objective so as to enable rapid and cost-effective decarbonisation of the energy system and more broadly the economy. This will require stepping up electrification of the economy; the average

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[4] See Annex 6 for more information.

[5] The European Green Deal, COM(2019) 640 final

[6] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe's 2030 climate ambition, SWD(2020) 176 final

[7] Stepping up Europe's 2030 climate ambition, Investing in a climate-neutral future for the benefit of our people, COM(2020) 562 final

[8] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0773

annual investments needed for the period 2021-2030 amount to EUR 50.5 billion for the power grid including both the transmission and distribution networks – more than twice the investments in the period 2011-2020[9].

Furthermore, to achieve the levels of renewable energy for a 55% reduction of GHG emissions by 2030, Europe needs to significantly scale up renewable electricity generation. This requires investment in offshore renewable energy, which can bring the scale that is needed. The Commission is planning to adopt an EU strategy for offshore renewable energy in November. In order to achieve the required massive scale up of offshore renewable energy in the whole EU up to 2050, the strategy will also address the issue of coordinating long-term planning and development of offshore and onshore electricity grids, which are assessed as part of this impact assessment. Other on-going policy initiatives of direct relevance include the revision of the TEN-T Regulation[10] and the EU taxonomy for sustainable investments[11], as well as the review of the Renewable Energy Directive envisaged for 2021.

At the same time, the Commission's communication on energy system integration[12] underlines the need for integrated energy infrastructure planning across energy carriers, infrastructures, and consumption sectors. Such system integration addresses in particular the decarbonisation needs of the hard to abate sectors, such as industry or transport, where electrification can be technically or economically challenging. Such investments include emerging technologies such as hydrogen, power-to-gas which are progressing towards commercial large-scale deployment.

Already in March 2019, as part of the political agreement between the European Parliament and the Council on the Connecting Europe Facility for the period 2021-2027, the co-legislators agreed that the Commission should evaluate the effectiveness and policy coherence of the TEN-E Regulation and submit an evaluation to the European Parliament and to the Council by 31 December 2020. The Commission is requested, if appropriate, to accompany the evaluation by a legislative proposal for the revision of the guidelines.[13] Stakeholders as well have called for this revision to align the TEN-E policy framework with the new policy context.

2 PROBLEM DEFINITION

An evaluation of the current TEN-E Regulation was carried out back-to-back with this impact assessment to identify potential shortcomings. The main results can be summarised as follows (for more details see Annex 5):

- The TEN-E Regulation has effectively improved integration of Member States' networks, stimulated energy trade and hence contributed to EU competitiveness,

[9] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe's 2030 climate ambition, SWD(2020) 176 final

[10] https://ec.europa.eu/transport/themes/infrastructure/ten-t/review_en

[11] https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

[12] COM(2020) 299 final

[13] https://www.consilium.europa.eu/media/38507/st07207-re01-en19.pdf, http://www.europarl.europa.eu/doceo/document/TA-8-2019-0420_EN.pdf

as shown in the evidence on interconnection targets and energy prices and their convergence across the EU.

- PCIs in electricity and in particular in gas have strongly contributed to security of supply as a main contextual driver to the design of the TEN-E Regulation. For gas, the infrastructure is now well connected and supply resilience has improved substantially since 2013.
- Regional cooperation in Regional Groups and through cross-border cost allocation is an important enabler for project implementation. However, in many cases the cross-border cost allocation did not result in reducing the financing gap of the project, as intended.
- While permitting procedures have been shortened, long permitting procedures persist in some cases. While the underlying reasons are mainly related to national implementation and outside the scope of the TEN-E Regulation, there are elements that can be improved.
- CEF financial assistance was an important factor, grants for studies helped projects to reduce risks in the early stages of development while grants for works supported projects addressing key bottlenecks that market finance could not sufficiently address.
- While the objectives of the current Regulation remain largely valid, their focus on 2020/30 targets must be upgraded to reflect the new political context and the 2050 climate neutrality objective under the European Green Deal.
- Besides the new political context and objectives, technological development has been rapid in the past decade. This progress should be taken into account in the infrastructure categories covered by the Regulation, the PCI selection criteria as well as the priority corridors and thematic areas.
- The TYNDP process as basis for the identification of PCIs has proven effective. However, while the ENTSOs and TSOs have an important role to play in the process, there is a need for more scrutiny, in particular as regards defining the scenarios for the future, setting long-term infrastructure needs and bottlenecks and assessing individual projects, to enhance trust in the process.

It is worth noting that the evaluation did not look specifically at the issue of offshore grids as this was not a specific objective of the current TEN-E Regulation. As mentioned above, enhancing renewable energy and specifically offshore is a necessary part of the energy transition to achieve climate neutrality by 2050 in a cost-effective manner. The problems defined in this section and the policy options defined in Section 5 build on the results of the evaluation and on the numerous comments received from stakeholders (see Annex 2).[14]

[14] In 2017, a mid-term evaluation of the TEN-E Regulation was completed. In 2019, an evaluation of the TEN-E Regulation was formally launched with the publication of an evaluation roadmap, which was complemented in May 2020 with the publication of an inception impact assessment.

2.1 Problem 1: Type and scale of cross-border infrastructure developments are not fully aligned with EU energy policy objectives in particular as regards the European Green Deal and the climate neutrality objective

The increased 2030 climate target and the 2050 climate-neutrality objective of the European Green Deal and the Communication “A Clean Planet for All” require a profound transition of the European energy system, both on the supply and the demand side. Energy will be produced and consumed in a different manner and in different places than today. The role of electricity will increase radically, but there will also be an increasing role for renewable and low carbon gases.

The Commission’s analysis shows that by 2050 more than 80% of electricity will stem from renewable energy sources, to an increasing extent located offshore[15]. EU renewable electricity production should as a minimum double from today’s 32% share of renewable electricity in the energy mix to around 65% share in 2030[16]. To achieve the European Green Deal objective of climate neutrality 2050 and 55% GHG emission reduction by 2030, the EU needs to significantly scale up the generation of renewable energy. For the upscaled deployment of renewable generation to have real economic, climate and societal value, the relevant grid infrastructure should be in place. Electricity grids are essential to transport renewable energy over medium to long distances, from production sites to the sites of consumption, and for integrating the European energy markets. An annual average investment of EUR 50.5 billion are needed in the electricity transmission and distribution grids, to achieve the 2030 targets alone. This compares to an annual average investment of EUR 24 billion in the period 2011-2020. This means that the grid investment should double from the previous decade.

The Commission’s impact assessment for the 2030 targets shows that the offshore wind capacity in Europe should increase to about 280 GW by 2050 in order to meet the 2030 energy and climate objectives.[17] This represents an increase of about 25 times compared to the current situation. As much as two thirds of the costs of the foreseen upscale in offshore renewable energy is related to infrastructure, a large part of which will be of cross-border nature. Over the last 30 years, about 12 GW offshore wind has been deployed in Europe, mainly as national projects. Continuing with the current deployment pace, offshore wind and related infrastructure would reach about 25 GW in 2050, or 1/10 of the required 280 GW to achieve climate neutrality.

At the same time, all existing scenarios modelling pathways for the achievement of the climate neutrality objective by 2050 require a substantial role for renewable and low-carbon gases in the energy mix, since a 100% electrified energy system is not considered feasible.[18] Therefore, by 2050 the use of unabated natural gas is to be reduced by 66 -

[15] A Clean Planet for all. A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy, COM(2018) 773 final

[16] Stepping up Europe’s 2030 climate ambition, Investing in a climate-neutral future for the benefit of our people, COM(2020) 562 final

[17] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe’s 2030 climate ambition, SWD(2020) 176 final

[18] These scenarios include those in the EU Long-Term Strategy (2018), the TYNDP 2020 scenarios developed by ENTSOG and ENTSO-E (2020), Eurelectric's "Decarbonisation pathways" (2018) or those

71%, with a steep increase of renewable and low-carbon gases, with hydrogen accounting for approximately 46% - 49% of all renewable and low-carbon gases in 2050. However, there is currently very limited dedicated or retrofitted infrastructure in place to transport and trade hydrogen across borders from one Member State to another. By 2030, total investments needs in hydrogen electrolysers are estimated between EUR 24-42 billion. About EUR 65 billion is needed for hydrogen transport, distribution and storage[47].

These forecasts, and in particular the impact assessment accompanying the 2030 climate target plan, show that the energy mix of the future will be very different from the one today. The current energy infrastructure investments are clearly insufficient to transform and build the energy infrastructure of the future. This also means infrastructure needs to be in place to support this European energy transition, including rapid electrification, scaling up of renewable electricity generation, the increased use of renewable and low-carbon gases, energy system integration and a higher uptake of innovative solutions. Given the role of clean hydrogen in the decarbonisation and as energy carrier and storage for an integrated energy system, the lack of dedicated energy infrastructure for hydrogen would negatively affect the pathway to climate neutrality, especially for the decarbonisation of the industry sectors that have limited decarbonisation options available.[19]

Trans-European cross-border energy infrastructures have to make a more important contribution to build and establish the cross-border infrastructure necessary for achieving climate neutrality. A recent JRC study assessing the impacts of replacing coal with non-CO2-emitting resources, mainly onshore wind power, by 2030 concludes that, in a power system largely based on renewables electricity, interconnectors are “a definitive enabler, not only of market integration, but also of a path towards a renewables-based power system”[20]. Investments to upgrade the electricity interconnections between European regions, within the EU but also with neighbouring countries, by 53 GW would have the potential to reduce the carbon footprint of the European power system by more than a quarter in 2030. A more interconnected power system would require the deployment of significantly less renewable generation capacity as well as significantly less thermal backup capacity. These findings confirm earlier studies pointing to the need and benefits of a more interconnected energy systems to enable a decarbonised power system[21]. Concerning the future gas infrastructure needs, the Commission’s hydrogen strategy

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developed for DG ENER in the framework of the study "Impact of the use of the biomethane and hydrogen potential on trans-European infrastructure" (2019).

[19] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe’s 2030 climate ambition, SWD(2020) 176 final

[20] Kanellopoulos K., Kavvadias K., De Felice M., Wind and other CO2-free assets replacing coal in 2030, EUR 30343 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21440-3, doi:10.2760/007407, JRC121605, p. 2

[21] Kanellopoulos K., Scenario analysis of accelerated coal phase-out by 2030A study on the European power system based on the EUCO27 scenario using the METIS model, EUR 29203 EN,PublicationsOffice of the European Union, Luxembourg, 2018, ISBN 978-92-79-81888-2,doi:10.2760/751272, JRC111438; Faunhofer ISI (2014): Optimized pathways towards ambitious climate protection in the European electricity system (EU Long-term scenarios 2050 II), Final Report.

concluded that for the required deployment of hydrogen a large-scale infrastructure network is one important element that only the EU and the single market can offer.[22]

A study on infrastructure needs, commissioned by the Commission, concluded that total investment needs in the trans-European transmission energy infrastructure are around EUR 200 billion, in the period between 2021 and 2030.[23] The upgrade of the electricity interconnections between European regions by 53 GW, as set out above, would require total investments of between EUR 35 and 70 billion by 2030.[24] The upscale of offshore renewable energy in Europe by 2050 has an estimated cost of EUR 800 billion of which EUR 530 billion EUR is related to grid infrastructure. To reduce the costs as much as possible, a strong focus on rational grid development is key.

The evaluation showed that the current TEN-E Regulation has made an important contribution in advancing cross-border energy infrastructure and in meeting energy policy objectives, and in particular security of supply. While the share of electricity PCIs has constantly increased since the first PCI list (see Figure 1), the share of the different sectors does not fully reflect future needs. Although transmission networks for offshore renewables are eligible under the current TEN-E Regulation and despite a priority corridor for offshore grid in the Northern Seas, very few offshore grid PCIs have been selected so far. The number of PCIs on smart electricity grids has never exceeded six. Gas PCIs have focussed on natural gas projects with no role for renewable and low carbon gases, including hydrogen.

Problem driver 1.1: TEN-E infrastructure categories do not sufficiently reflect the Green Deal and technological progress

The infrastructure categories eligible for PCI status under the current TEN-E Regulation do neither reflect the European Green Deal objectives and the related infrastructure needs nor technological progress made since 2013. This prevents the uptake of PCIs that are necessary to achieve the climate neutrality objective under the European Green Deal. In the gas sector, hydrogen networks are currently not eligible for PCI status, for which nearly all stakeholders considered EU-wide coordinated planning relevant for a cost-efficient transition to renewable and low-carbon gases.[25] In addition to the technological advancement in renewable and low-carbon gases, digitalisation, automation, and other innovations, including the electrification of the transport sector, have made important progress. Smart grid solutions, including demand response, have developed considerably over the past years because of the acceleration of the digital transformation of the energy sector and will play a crucial role in enabling renewable energy integration[26]. The need to update infrastructure categories to adapt to future challenges was widely shared among

[22] A hydrogen strategy for a climate-neutral Europe, COM(2020) 301 final

[23] Ecofys (2017): INVESTMENT NEEDS IN TRANS-EUROPEAN ENERGYINFRASTRUCTURE UP TO 2030 AND BEYOND, Final report, http://publications.europa.eu/resource/cellar/431bc842-437c-11e8-a9f4-01aa75ed71a1.0001.01/DOC_1

[24] Kanellopoulos K., Kavvadias K., De Felice M., Wind and other CO2-free assets replacing coal in 2030, EUR 30343 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21440-3, doi:10.2760/007407, JRC121605

[25] Most stakeholders who responded to the targeted survey consider that hydrogen is relevant for the TEN-E framework and required at large scale.

[26] International Energy Agency (2017): Digitalisation and Energy, OECD.

the stakeholders[27], who consider that the current set-up is not aligned with today's decarbonisation ambitions nor reflect emerging technologies.

This links directly to the eligibility for CEF financial assistance for which PCI status under TEN-E is a precondition.[28] New infrastructure categories that can make an important contribution to achieve the climate neutrality objective, e.g. hydrogen are less mature and hence need access to financing e.g. for studies to help make the projects "bankable".

The above-referenced JRC study on the implications of a renewables based energy system also shows that cross-border interconnectors with third countries play an increasing role to achieve a decarbonised energy system cost-effectively. The Commission Expert Group on electricity interconnection targets also highlighted the role of interconnectors with neighbouring countries for the better integration of renewable energy sources and security of supply.[29] Under the current TEN-E Regulation projects with third countries are only eligible if they show a physical cross-border impact for at least two Member States which is difficult to demonstrate.[30] At the same time, the TFEU provides for the possibility that the Union may decide to cooperate with third countries to promote projects of mutual interest (PMI)[31] and to ensure the interoperability of networks in the EU's neighbourhood. Such cooperation can help reduce GHG emission in the EU and in third countries, thus contributing to achieving the Green Deal objectives. However, PMIs do currently not benefit from the provisions of the TEN-E framework.

Problem driver 1.2: Lack of a mandatory sustainability criterion in the PCI selection process

The current TEN-E Regulation defines a set of selection criteria for projects that are eligible for PCI status. The specific criteria include sustainability, security of supply, market integration and competition. Electricity and gas PCI candidate projects need to contribute significantly to at least one of these specific criteria. As a result, projects that enable, for example, the increase in gas supply/demand may become PCIs even if they do not demonstrate benefits in terms of sustainability but address security of supply risks. Some stakeholders consider that this poses a risk that infrastructure developments and specifically PCIs may not be on track to achieve EU energy and climate policy

[27] Replies to the targeted survey showed that there is higher disagreement than agreement in the fitness of the current priority corridors and thematic areas to the future challenges. For priority corridors, 36 respondents (of 112) disagree and 32 agree they are fit for purpose for future challenges to the energy infrastructure. As for thematic areas, 46 disagree, while only 15 respondents agree on the prior statement.

[28] Except for cross-border projects in the field of renewable energy for which a new window is foreseen under the new CEF Regulation for the MFF2021-2027.

[29] "Electricity interconnections with neighbouring countries", Second report of the Commission Expert Group, https://op.europa.eu/en/publication-detail/-/publication/785f224b-93cd-11e9-9369-01aa75ed71a1 on electricity interconnection targets

[30] On the previous and current 4th PCI lists, there have been several projects with third countries that fulfilled current conditions, i.e. demonstrating socio-economic benefits for at least two Member States For example, electricity interconnections between Italy and Montenegro, between Italy and Tunisia (ELMED), and from Israel to Greece via Cyprus (Euroasia), the gas interconnection between Bulgaria and Serbia, the Southern Gas Corridor or an oil interconnector between Ukraine and Poland.

[31] Art. 171(3) TFEU: "The Union may decide to cooperate with third countries to promote projects of mutual interest and to ensure the interoperability of networks."

objectives.[32] Building on the conclusions of the Technical Expert Group on an EU taxonomy for sustainable investments[33] this is not an issue for all infrastructure categories considered under the TEN-E framework. A sustainability assessment is not necessary for investments in electricity transmission and distribution networks in the interconnected European grid as well as electricity storage, which are considered as such as substantially contributing to climate change adaptation and mitigation objectives because of the need for electrification to achieve the climate objectives.[34] The expert group concluded that the sustainability in terms of greenhouse gas emissions of new pipelines for new, low-carbon gases including hydrogen should be assessed. In the absence of a mandatory sustainability criterion for such projects, TEN-E would be incoherent with the taxonomy.

Problem driver 1.3: Sectoral bottom-up approach to infrastructure planning

The evaluation of the current framework concluded that the approach to cross-border infrastructure planning is in principle working well and that the central role of the ENTSOs (and TSOs) is justified by their specialised knowledge and expertise in network planning. However, it pointed to shortcomings of a sectoral approach to planning and to the lack of an independent validation of the assessment methodology and underlying assumptions used since TSOs are at the same time the promoters of most of the infrastructure projects submitted to the EU-wide TYNPD (and hence eligible for PCI status). This gives the ENTSOs an incentive to emphasise security of supply risks above e.g. investments in improving the efficiency of the system and hence to higher needs for infrastructure construction. Other actors such as the Commission and ACER have a limited role under current TEN-E Regulation, which cannot prevent that the ENTSOs assume e.g too significant gas/electricity demand for the future, import of fuel and unreasonable technology development. This in turn may lead to the identification of infrastructure gaps that are not realistic and overestimates the potential benefits of the proposed projects. This problem is reinforced by a sectoral planning approach.

Today’s energy system is built on parallel vertical energy value chains, which rigidly link specific energy resources with specific end-use sectors. This is mirrored in a sectoral approach to infrastructure planning where electricity and gas networks are planned and managed mostly independently from each other. Whilst this approach has worked in the past, the Commission communication on energy system integration[35] recalls that this model of separate silos cannot deliver a climate neutral economy by 2050. It is technically and economically inefficient, and leads to substantial losses in the form of

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[32] In the public consultation several environmental NGOs, NRAs and industry stakeholders indicated that the current selection process has resulted in projects being selected that do not have a positive effect on the CO_2 emissions, do not sufficiently support network innovation and include traditional, fossil fuel infrastructure which will ultimately hamper the achievement of climate neutrality. TSOs did not indicate strong opinions on the sustainability criterion.

[33] EU Technical Expert Group on Sustainable Finance: Taxonomy, Technical Report https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf

[34] In addition to substantially contributing to one of the environmental objectives of the Taxonomy Regulation, it must also be demonstrated that an activity does not significantly harm any of those objectives.

[35] COM(2020) 299 final

waste heat and low energy efficiency[36]. The insufficient integration of the energy system hinders the decarbonisation of electricity as well as major energy consuming sectors, notably transport and industry.

The selection of infrastructure projects of common interest in the electricity and gas sectors is based on 10-Year Network Development Plans (TYNDPs). These plans are developed at national level and since 2013 integrated to the EU level for gas and electricity. The EU-wide TYNDPs are elaborated by the European Network of Transmission System Operators for Electricity (ENTSO-E)[37] and for Gas (ENTSOG)[38] which consist of the National Transmission System Operators (see Annex 5 for a more information). The two TYNDPs remain two separate sectorial processes. This represents a significant impediment in the identification of optimal infrastructure solution in cases where e.g. a need identified in the electricity sector could be tackled by a solution in the gas sector. Although the scenarios reflect the 2050 climate-neutrality objectives, the trajectories chosen are debatable and tend to favour in particular high levels of gas demand[39].

A significant number of stakeholders across different stakeholder groups agree that the current sectoral approach to infrastructure planning does not match the needs for system integration and question the adequacy of roles and the coordination with the distribution operators and synergies with other sectors. Stakeholders indicated the wish to weaken the role of the ENTSOs (39%) and to strengthen the role of DSOs (53%) and other stakeholders, such as NGOs (39% - 67% of whom represented industry or civil society). Stakeholders state that the process is geared towards the construction of additional infrastructure[40] and may be at odds with the energy efficiency first principle and not necessarily lead to those PCIs being selected and implemented that are most efficient from a technical, economic and social perspective.[41] The risk of stranded assets exists.

While the current bottom-up infrastructure planning via the TYNDP provides a solid basis for the identification of necessary infrastructure projects onshore, this is not the case for offshore grids. The onshore electricity grid developed over a long period and with an incremental and integrated approach when utilities were the owners of the generation units and networks. The starting point for the development of offshore networks is fundamentally different. An incremental approach, as used for onshore networks, is not sufficient to identify offshore infrastructure needs at the necessary scale as set out above. The bottom-up approach is too fragmented and nationally focused,

[36] In Trinomics et al. (2018), it was stressed that the current setup for selecting PCI projects is partially adequate given the deficiency in accounting for energy efficiency in the evaluation process, although energy efficiency gains are accounted for in the demand levels of the scenarios to be modelled according to the TYNDP 2020 Scenario report.
[37] https://tyndp.entsoe.eu/about-the-tyndp/
[38] https://www.entsog.eu/tyndp#
[39] ENTSO-E/ENTSOG (2020): TYNDP 2020 Scenario Report, https://eepublicdownloads.azureedge.net/tyndp-documents/TYNDP_2020_Joint_Scenario_Report_ENTSOG_ENTSOE_200629_Final.pdf
[40] In the public consultation, a number of stakeholders indicated that ENTSOs role in planning and owning assets ultimately creates a potential conflict of interest that favours TSOs over non-TSOs promoters with a limited role of other technologies or actors.
[41] It is important to note that security of supply requires redundant infrastructure and needs to be taken into account in the context of the energy efficiency first principle.

which leads to a less rational offshore wind development, resulting in higher costs and irrational use of maritime space. Lack of grids and grid connections are perceived as a key barrier to large-scale offshore wind by the industry. Continuing the current practice would not bring along many new offshore wind parks at the required speed[42].

Like for onshore infrastructures, there is also a risk of stranded assets offshore. A coordinated approach allows for developing an optimised offshore grid both with a view to interconnection and to evacuate offshore wind. A recent study[43] has demonstrated that the current practice of nationally developing offshore wind with radial connections to shore, and in parallel develop cross-border interconnectors often is not the optimal way, although this may vary between regions. Hybrid assets in the North Sea region, i.e. interconnectors with offshore production connected to them would reduce costs significantly and make better use of the maritime space, compared to developing interconnections and evacuation of offshore wind separately.

An inadequate framework for offshore infrastructure planning explains the slow progress in the identification of cross-border offshore infrastructure projects, whereas current permitting procedures for offshore projects explain delays in project implementation (see problem driver 2.1).

2.2 Problem 2: Delays in project implementation

Delays in the implementation of the projects of common interest, identified as necessary to achieve the EU climate and energy policy objectives, would jeopardise the accelerated change in the energy system as set out above. The implementation of PCIs still takes too long as projects have to overcome several challenges during the implementation process as is further outlined below. In 2020, 27% of electricity PCIs were delayed by on average 17 months against their initially planned commissioning date and the share of delayed electricity PCIs has been fairly stable (23%-31%) between 2016-2019. This would appear particularly problematic given the increasing role of electricity and resulting infrastructure needs to achieve the 2030 and 2050 GHG reduction targets. As for gas PCIs, in 2020, 38% of all PCIs encountered delays of on average 33 months.[44]

Problem driver 2.1: Long permitting procedures

About 40% of PCIs are still expected to take more than the legal requirement to complete the permit granting procedure.[45] According to ACER, the average permitting durations are 4 years for electricity PCIs and 3.1 years for gas PCIs with some PCIs requiring

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[42] E.g. Navigant/SWECO (2020): Study on the offshore grid potential in the Mediterranean region, ENER/B1/2019-508, Final draft report; ENTSO-E (2020): Position on Offshore Development, https://www.entsoe.eu/2020/05/29/entso-e-position-on-offshore-development/

[43] E.g. Roland Berger (2019; "How to reduce costs and space of offshore development : North Seas offshore energy clusters study, https://ec.europa.eu/energy/studies/hybrid-projects-how-reduce-costs-and-space-offshore-developments_en?redir=1

[44] ACER (2020): Consolidated Report on the progress of electricity and gas Projects of Common Interest, https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/Consolidated%20Report%20on%20the%20progress%20of%20electricity%20and%20gas%20Projects%20of%20Common%20Interest%20%282020%29.pdf

[45] Ibidem.

substantially longer than the foreseen maximum of 3.5 years.[46] However, out of the 18 PCIs that already passed the 5-year mark, 13 had started the permitting process before the entry into force of the TEN-E regulation and therefore did not benefit from the permitting provisions therein due to the transitional provisions and are still in permitting under the applicable national rules.

According to ACER's report, three electricity PCIs were delayed at a permitting stage due to public opposition, while three more are facing lawsuits and court procedures that have resulted in delays as well[47]. Public opposition continues to be one of the key factors for lengthy implementation procedures of PCIs driven by reasons such as insufficient or late use of participatory processes.[48] Lack of public awareness on the specific needs for new infrastructure hampers the acceptance of PCIs and may result in a significant number of objections during consultations, thereby leading to significant additional efforts and delays in the permitting process. Ultimately, public opposition might lead to court claims by organised local communities, landowners and citizens living in the vicinity of potential installations and routing of PCIs. Since the administrative appeals and judicial remedies before court or tribunal do not fall under the foreseen permitting timeline of 3.5 years[49], this causes further delays. For instance, if there is an appeal regarding any of the issued permits, the permitting process is not complete until the appeal is complete and the permits issued are final. The TEN-E Regulation does not currently provide for any means of accelerating project implementation from the perspective of court proceedings. In this respect, a series of stakeholders mentioned that a streamlining of appeals regarding PCIs would also be considered so that the accelerated permitting process becomes truly effective.

Strong regional cooperation is key to implement more cross-border hybrid and joint offshore projects. The permitting experience[50], so far, of offshore cables shows that they often encounter additional delays by comparison to onshore projects due to the need for additional studies, maritime spatial planning and crossing international waters of several countries. Cross-border hybrid and joint offshore projects bring even more challenges as the implementation of the infrastructure needs to be coordinated with the deployment of generation projects. As such, stakeholders called for streamlined permitting procedures for cross-border offshore projects. Delays in permitting leads to delay in infrastructure such as renewable electricity generation and grids that are needed for the energy transition towards climate neutrality in 2050.

Problem driver 2.2: Sub-optimal implementation and insufficient use of cost sharing tools and regulatory incentives

[46] Ibidem.

[47] Ecorys et al. (2020): Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure, Draft final report

[48] Scope et al. (2020) Innovative actions and strategies to boost public awareness, trust and acceptance of trans-European energy infrastructure projects. Draft Revised Interim Report. DG ENER.

[49] Article 10 (6)

[50] Input from National Grid regarding the development of the Viking Cable during the PCI Days, December 2019 edition, the recording is accessible here: https://www.youtube.com/watch?v=uk84QPpEUyY, and input in the stakeholder consultation regarding the development of projects such as the Baltic Pipe.

The TEN-E Regulation introduced a regulatory framework aiming at facilitating the implementation of PCIs, by creating financial and regulatory certainty: the split of costs across borders (cross border costs allocation, CBCA), inclusion of the investment costs into tariffs and additional investment incentives for riskier projects. In practice, these provisions remained underutilised depriving PCIs of the benefits they could have obtained thus delaying or failing to remove barriers to their implementation.

The current CBCA provisions have rarely been used as intended to reduce or eliminate the financing gap but have been applied only for projects requesting CEF funding for works[51], as the CBCA is one of the required documents to be submitted. This is supported by ACER's finding of 70% of all CBCA decisions made up to March 2018 concerning projects with only a single Member State involved[52]. By March 2020, this share decreased to just under 50%.[53] Allocation of costs to non-hosting countries, with the benefits that entails in terms of enabling and accelerating implementation, has only so far occurred for gas PCIs.[54]

Moreover, the manner in which national regulators approach CBCA decisions is very diverse and very often diverts from the principles above as regards the financing of infrastructure. NRAs often only allocate partially the investment costs into tariffs (or not at all) mentioning that the rest of the financing should come from a CEF grant or even issue CBCA decisions conditional upon obtaining CEF grants. This creates regulatory instability for the projects, which cannot obtain financing on the market and are rendered completely dependent on Union financial assistance leading, thus, to hampering their realisation. In addition, viewing the CBCA procedure solely as a precondition to CEF applications[55] deprives the provision of its main purpose, which is creating a framework for the procedure of splitting the costs of PCIs across borders for the purposes of enabling and accelerating their implementation.

An additional issue arises with the application of the ACER CBCA Guidelines from 2015, which are not legally binding. Some NRAs and project promoters apply them and others do not, some choose to apply the most convenient elements. The correct implementation of the CBCA procedure becomes even more relevant in the context of infrastructure to support the development of offshore renewables. The reason is that the constructing countries will not necessarily coincide with the beneficiary countries due to the location of the offshore renewable energy potential in a certain sea basin, maritime spatial planning and environmental restrictions. Without the application of clear CBCA guidelines, the benefits from such projects could be widely split amongst Member States, not reflecting the benefits, and thus make the realisation of the projects difficult.

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[51] Ecorys et al. (2020): Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure, Draft final report.

[52] ACER (2018), Third Edition of the Agency's Summary Report on Cross-Border Cost Allocation Decisions – Status update as of March 2018.

[53] Ecorys et al. (2020): Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure, Draft final report.

[54] Ibidem.

[55] For all cases where CBCA decisions were made, the project promoters consecutively applied for CEF grants. The objective of accessing CEF funding was indicated by stakeholders as more important than the allocation of costs between Member States.

The use of regulatory investment incentives introduced by the TEN-E for projects that incur higher risks has been low and, even though they were crucial for some of the projects, their overall contribution to the advancement of PCIs remains limited, with only eleven PCIs applying.[56] According to ACER only in four cases overall (one electricity, three gas), risk-based incentives have been granted.[57] Stakeholder input has shown that while some TSOs see an added value in these incentives in adjusting the financial risk, regulators refer to the low number of applications to illustrate the lacking need for additional risk-based incentives.

Offshore wind related infrastructure projects will most likely have a higher risk profile than traditional interconnectors[58] also substantiated by offshore energy industry stakeholders and project promoters, and could benefit from a facilitating regulatory regime that starts from an acknowledgement of their inherent higher risk, to be recognised in their regulatory regime. As such, stakeholders called for a clear legal framework for cross-border hybrid projects notably as regards the assessment of benefits and the cross-border allocation of costs. Moreover, the current provisions for investment incentives do not cater for more innovative grid solutions, for instance if they are more OPEX intensive relative to the CAPEX intensive traditional grids.

In sum, the identified problem drivers are largely independent from each other, although reinforcing sustainability during PCI selection can contribute to limit the number of projects that are not fully in line with Green Deal objectives. The problem drivers behind problem 1 are largely driven by a new political context and technological progress. The problem drivers behind problem 2 are mainly related to implementation and the current TEN-E legal framework and to a lesser extent to technological progress (offshore wind). Figure 3 summarises the problems and the underlying drivers.

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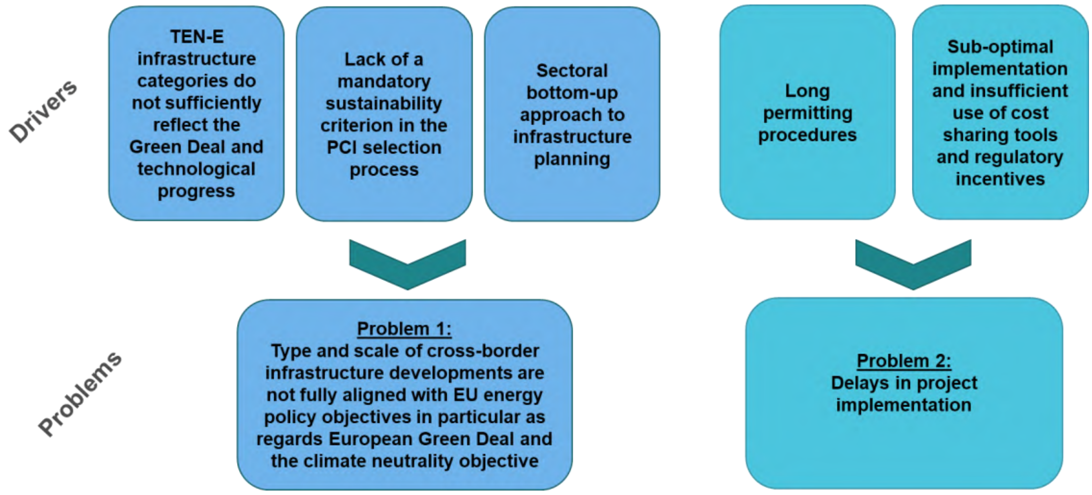
[56] Ecorys et al. (2020): Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure.

[57] ACER (2019). Consolidated Report on the Progress of Electricity and Gas Projects of Common Interest. ACER (2018). Summary report on project-specific risk-based incentives.

58 As resulting from the Study on How to reduce costs and space of offshore development: North Seas offshore energy clusters study, European Commission, Roland Berger GmbH, available at: https://op.europa.eu/en/publication-detail/-/publication/59165f6d-802e-11e9-9f05-01aa75ed71a1/language-en?WT.mc_id=Searchresult&WT.ria_c=37085&WT.ria_f=3608&WT.ria_ev=search and the Study on Baltic offshore wind energy cooperation under BEMIP, COWI , Directorate-General for Energy (European Commission) , Ea Energy Analyses , THEMA Consulting group, available at: https://op.europa.eu/en/publication-detail/-/publication/9590cdee-cd30-11e9-992f-01aa75ed71a1/language-en/format-PDF/source-search

Figure 3: Problems and problem drivers



The initiative is justified by market and regulatory failures also driven by a new policy context, new technological developments, and achievements since the adoption of the current TEN-E Regulation in 2013.

2.3 How will the problem evolve?

The problems and the underlying problem drivers are likely to become even more important in the short and mid-term. Adopted or planned policy initiatives such as the 2030 Climate Target Plan, the revision of the ETS Directive, the Effort Sharing Regulation, the Energy Efficiency Directive, the Renewable Energy Directive, the Energy Taxation Directive and the planned initiative for the decarbonisation of gas are expected to significantly increase the ambition on the mid- and long-term decarbonisation and renewable energy targets, in line with the 2030 55% GHG reduction objective. This will lead to an accelerated pathway to the decarbonisation of the energy system, significantly higher penetration of renewables in power and heating at the expense of fossil fuels, reduction of demand for energy, and hence to a significant increase in the need for an enabling energy infrastructure in place by 2030 and beyond. Without changes in TEN-E Regulation, investments necessary for this transition will happen in a sub-optimal, uncoordinated manner at a higher cost. The gap in cross-border infrastructure investments in line with the decarbonisation objectives is expected to increase, in particular as regards investment related to renewable generation, although there should be a lower demand for gas projects due to the progress in the completion of new gas infrastructure projects and changes in the market framework such as the taxonomy. Investments in technologies that allow moving towards decarbonisation more quickly would not be fully prioritised. Investments in cross-border hydrogen pipelines would not come forward fast enough, offshore wind developments would be incremental, smart grids needed for better functioning of the European network could not be fully exploited. Also, the identification of the future infrastructure needs and their planning would continue to be in silos, without contributing to the integration of the energy system.

Moreover, the Covid19 sanitary crisis reinforces some of the identified problems such as delays in project implementation and access to financing for cross-border infrastructure projects. However, investments in energy infrastructure, in particular in the context of the roll out of renewable energy generation, is a key component of the recovery and resilience fund (RRF). Investments in smart and sustainable energy infrastructure has been identified as a key enabling factor to achieve the European Green Deal objectives and a green recovery in line with political objectives. However, also depending on Member States' objectives, cross-border interconnections are not expected to be financed to a large extent under the RRF.

The taxonomy regulation[59] establishes criteria for determining whether an economic activity qualifies as environmentally sustainable for the purposes of establishing the degree to which an investment is environmentally sustainable. The Commission is currently preparing two Delegated Acts to establish an actual list of environmentally sustainable economic activities by defining technical screening criteria for climate change mitigation and adaptation, which will be adopted by end 2020. These screening criteria are aimed to classify projects as guidance for private investors. Without a review of TEN-E there would be a risk of increasing incoherence with the guidance to private investment as established in the taxonomy regulation.

2.4 Scope of the initiative

Based on the evaluation results, the stakeholder feedback, and the problem analysis, key principles of the current TEN-E Regulation would remain unchanged and are not further analysed in the impact assessment: the TYNDP as such as tool to European infrastructure planning as basis for the PCI selection process (except for smart grids and CO_2 transport networks), and regional cooperation based on priority corridors and thematic areas. Whilst the regional groups and the priority corridors and areas will remain as the key working method to identify and monitor the implementation of PCIs, they would be adjusted to the new scope of the TEN-E Regulation in terms of eligible infrastructure categories. The focus of the initiative is on four impact areas of the current TEN-E framework (see Figure 2): a) scope (infrastructure categories), b) governance/infrastructure planning (planning for offshore grids, and cross-sectoral infrastructure planning/PCI selection criteria), c) permitting, and d) regulatory treatment.

3 WHY SHOULD THE EU ACT?

3.1 Legal basis

Article 170 of the Treaty on the Functioning of the European Union foresees that the Union shall contribute to the establishment and development of trans-European networks, inclosing in the area of energy infrastructure. The Union will need to promote interconnection of national networks. The TEN-E Regulation is based on Article 172 of the Treaty on the Functioning of the European Union which provides for the legal base to adopt guidelines covering the objectives, priorities and broad lines of measures envisaged in the sphere of trans-European networks as set out in Article 171. The guidelines are to identify projects of common interest that are necessary for making the TEN-E fit for purpose. The guidelines also set the conditions under which the EU may financially support the PCIs.

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[59] Regulation (EU) 2020/852 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088, OJ L 198, 22.6.2020, p. 13

3.2 Subsidiarity: Necessity of EU action

Energy transmission infrastructure (including an interconnected offshore grid and smart grid infrastructure) has a European added value due to its cross-border impacts and is essential to achieve a climate neutral energy system. The TEN-E Regulation has provided value and has contributed to achieving results regarding the EU energy market integration, competition and security of supply. A framework for regional cooperation across Member States is necessary to develop cross-border energy infrastructure. Individual Member State regulations and actions are insufficient to deliver these infrastructure projects as a whole.

3.3 Subsidiarity: Added value of EU action

Internal energy market is based on cross-border interconnectors, development of which requires cooperation of two or more Member States, all with their own regulatory framework. The TEN-E Regulation has provided additional value compared to what could have been achieved at national or regional level alone. There is widespread agreement among stakeholders on the EU added value of the Regulation, achieved through regional cooperation, access to financing, improved information and transparency, and improved planning and permitting processes. The majority believe that TEN-E achieved more than could have been achieved at national/regional level (92 %, 79% respectively agree) and that the issues addressed by the TEN-E Regulation continue to require action at EU level (91% agree, 0 disagree) (see Annex 2). Many Member States have benefitted from an increase in security of supply, more competitive markets and more interconnected energy networks. Given the recognition of TEN-E as effective and cost-efficient instrument in the evaluation, the current instrument should be further improved to address the above-identified problems instead of developing a new instrument.

4 OBJECTIVES: WHAT IS TO BE ACHIEVED?

In line with the results of the evaluation, the general objective of the initiative builds very closely on the general objective of the current TEN-E Regulation but develops it further. By referring explicitly to both energy and climate objectives as well as the 2030/50 targets, the revised general objective reflects the new political context and the achievements of the current TEN-E Regulation, e.g. in terms of gas security of supply. The overall objective is to align the TEN-E Regulation with the European Green Deal objectives, and the policy initiatives proposed within its framework and thereby to support the timely transition towards climate neutrality by 2050, starting with a 55% reduction in GHG emissions by 2030 in a cost-efficient manner.

4.1 General objectives

The general objective of the revision is to facilitate the timely development of adequate energy infrastructure across the EU and in its neighbourhood to enable delivering on the EU’s energy and climate objectives in line with the European Green Deal, in particular on the 2030/50 targets including the climate-neutrality objective, as well as market integration, competitiveness, and security of supply at least cost to consumers and businesses. Stakeholders in the targeted survey identified greenhouse gas emission reductions / climate neutrality as the most important challenge in the field of energy infrastructure today followed by the integration of renewable energy sources and energy system integration, both closely linked to greenhouse gas emission reduction.

4.2 Specific objectives

The specific objectives to be pursued by the policy options are to correct the problems and underpinning drivers identified in Section 2, namely to:

- Enable the identification of the cross-border projects and investments across the EU and with its neighbouring countries that are necessary for the energy transition and climate targets
- Improve infrastructure planning for energy system integration and offshore grids
- Shorten permitting procedures for PCIs to avoid delays in projects that facilitate the energy transition
- Ensure the appropriate use of cost sharing tools and regulatory incentives

Figure 4 illustrates how the problems and their underlying drivers relate to the general and specific objectives of the initiative. The last column indicates how the policy options that will be developed in more detail in the next section relate to the problem drivers and objectives.

Figure 4: Intervention logic diagram

Problem/Driver	Objective	Policy option
Problem 1 Type and scale of cross-border infrastructure developments are not fully aligned with EU energy policy objectives in particular as regards European Green Deal and the climate neutrality objective	*General objective (Part 1)* Facilitate the development of adequate energy infrastructures across the EU and in its neighbourhood to enable delivering on the EU's energy and climate objectives, in particular on the 2030/50 targets, as well as market integration competitiveness, and security of supply	
Driver 1.1 TEN-E infrastructure categories do not sufficiently reflect the Green Deal and technological progress	*Specific objective 1* Enable the identification of the cross-border projects and investments across the EU and with its neighbouring countries that are necessary for the energy transition and climate targets	Option A.1: Smart electricity grids and electricity storage Option A.2: Gas infrastructure, hydrogen networks and power-to-gas Option A.3: Projects of mutual interest (PMIs)
Driver 1.2 Lack of a mandatory sustainability criterion in the PCI selection process		Option B.2: Cross-sectoral infrastructure planning
Driver 1.3 Sectoral bottom-up approach to	*Specific objective 2* Improve infrastructure planning	Option B.1: Offshore grids for renewable

infrastructure planning	for energy system integration and offshore grids	energy Option B.2: Cross-sectoral infrastructure planning
Problem 2 Delays in project implementation	*General objective (Part 2)* Facilitate the timely development of adequate cross-border energy infrastructures across the EU at least cost for consumers and businesses	
Driver 2.1 Long permitting procedures	*Specific objective 3* Shorten permitting procedures for PCIs to avoid delays in projects that facilitate the energy transition	Option C.1: Permitting
Driver 2.2 Sub-optimal implementation and insufficient use of the cost sharing tools and regulatory incentives	*Specific objective 4* Ensure the appropriate use of cost sharing tools and regulatory incentives	Option D.1: Regulatory treatment

In addition to the above objectives, the initiative seeks to simplify and improve the efficiency of the TEN-E Regulation as further specified in section 8.2.

5 WHAT ARE THE AVAILABLE POLICY OPTIONS?

Building on the inception impact assessment and the evaluation as well as the issues identified in Section 2 and the objectives set out in Section 4, policy options to address the problems and its underlying drivers, will be presented and discussed for four impact areas of the current TEN-E framework: scope, governance/infrastructure planning, permitting and public participation, and regulation. A preliminary analysis will allow discarding those (sub-)options with the least positive impact. Table 1 provides an overview of the policy options subject to assessment.

Table 1: Overview of assessed policy options

Policy option	Description
A) SCOPE	
Option A.1.	*Smart electricity grids and electricity storage*
Option A.1.0	Business as usual
Option A.1.1	Broadened scope to reflect technological developments
	Sub-option: Inclusion of non-mechanical storage
Option A.2	*Gas infrastructure, hydrogen networks and power-to-gas*
Option A.2.0	Business as usual
Option A.2.1	Exclude all natural gas infrastructure but include hydrogen and P2G
Option A.2.2	Exclude natural gas infrastructure but include hydrogen, P2G and smart gas grids for low-carbon and renewable gases
	Sub-option: Natural gas infrastructure for renewable and low-carbon gases
	Sub-option: Exceptions for natural gas PCIs (advanced implementation)
Option A.3	*Projects of mutual interest (PMIs)*
Option A.3.0	Business as usual
Option A.3.1	Inclusion of projects of mutual interest (PMIs)
B) GOVERNANCE / INFRASTRUCTURE PLANNING	
Option B.1	*Offshore grids for renewable energy*
Option B.1.0	Business as usual
Option B.1.1	Integrated offshore development plans
Option B.1.2	Regional Independent System Operator / Joint Undertaking
Option B.2	*Cross-sectoral infrastructure planning*
Option B.2.0	Business as usual
Option B.2.1	Strengthened governance and sustainability
Option B.2.2	New governance set-up and expansion of scope and role of the TYNDP
C) PERMITTING	
Option C.1	*Permitting*
Option C.1.0	Business as usual
Option C.1.1	Use of urgent court procedures
Option C.1.2	One-stop shop per sea basin for offshore renewable infrastructure projects
D) REGULATORY TREATMENT	
Option D.1	*Regulatory treatment*
Option D.1.0	Business as usual
Option D.1.1	Inclusion of full investment costs

The options set out in this section are those with a significant potential to address the problems identified above. Additional options are set out in Annex 9. These options propose changes or improvements of mainly technical nature and are considered non-essential in view of their potential to address the problem drivers. They do not entail political choices concerning the future TEN-E Regulation.

During the evaluation study and the stakeholder consultations, several issues were subject to a large consensus between stakeholders. They are not re-discussed in detail in this report, as their positive impacts and contribution to the objectives of the initiative are considered well accepted. These issues are the following:

a) **Removal of oil pipelines as infrastructure category and thematic area:**
New cross-border oil pipelines are not in line with the long-term decarbonisation objectives. The Green Deal, and the relevant interim emission reduction objectives, put the transport sector on a more dynamic decarbonisation pathway

then earlier targets[60]. This is expected to drastically reduce oil demand and phase-out all unabated oil consumption. This trend and the already existing crude oil supply infrastructure coupled with the security of supply measures (e.g. emergency oil stocks) does not necessitate the inclusion of oil supply infrastructure in the revised TEN-E.

b) Removal of electricity highways as infrastructure category and thematic area:
Electricity highways are fully covered under the priority electricity corridors. Hence, the removal of electricity highways would not affect the outcome of the PCI selection procedure but simplify the process and remove unnecessary administrative burden.

5.1 What is the baseline from which options are assessed?

In the baseline, the current TEN-E Regulation is assumed to continue. The provisions as described above would continue to apply and constitute the basis of the bi-annual selection of PCIs and their implementation. The Regulation is likely continue to deliver results/outcomes and impacts as shown in the evaluation (see Annex 5) and the expected benefits from future PCIs.[61] While the infrastructure planning and the PCI selection process would not change in substance, a methodology to assess the sustainability criterion for gas projects has been developed and may affect the number of gas projects on future PCI lists under the current TEN-E Regulation. Investments in system integration projects, such as hydrogen or biogas, would happen at local level but the necessary scaling up for an European market to emerge would be hampered because of lack of cross-border cooperation and planning framework. As for permitting, the existing Regional Groups could be used to support better enforcement of the existing provisions, which may improve and ultimately shorten project implementation. These changes are incremental and would not significantly affect the outputs, results/outcomes and impacts as identified in the evaluation. At the same, the significant progress in establishing a resilient gas infrastructure is likely to decrease the number of natural gas candidate PCIs, whereas an increase of electricity candidate PCIs can be expected – within the limits of the current scope of the Regulation. In addition, external factors will affect the PCI process. Adopted or planned policy initiatives such as the 2030 Climate Target Plan, the revision of the Energy Efficiency Directive, the Renewable Energy Directive, and the gas package may enter into force and increase the demand for energy infrastructure. The taxonomy regulation is expected to influence private investments towards more sustainable infrastructure categories. The Covid-19 sanitary crisis is likely to affect the level of investments and may delay project implementation (see also section 2.3).

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[60] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe's 2030 climate ambition, SWD(2020) 176 final

[61] See modelling results in Ecorys et al. (2020): Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure, Draft final report

5.2 Description of the policy options

5.2.1 Scope

5.2.1.1 Smart electricity grids and electricity storage

Option A.1.0: Business as usual

The TEN-E Regulation defines each infrastructure category and a set of general and specific selection criteria for PCI projects. The criteria for a smart electricity grid is exhaustive and very detailed from a technical point of view and are thus difficult to be met at the same time. Only a few smart grid projects have been eligible as PCIs to date, nine in total since the adoption of the first PCI List. Concerning electricity storage the current definition is limited to mechanical storage with 13 storage projects on the current PCI list.

On the cross border criterion for the smart electricity grids, a project needs to demonstrate in detail the involvement of the project promoters (a TSO or a DSO from two or more Member States, or from at least one Member State and an EEA country). Since the concept of "involvement" is not clearly defined in the current Regulation, the current practice has provided further interpretation regarding the necessary support from a TSO level (not being a direct project promoter but supporting it in any case) . Under the current cross border criterion, only large hydro and compressed air storage facilities are eligible for PCI status for electricity storage, prohibiting utilisation of other advanced electricity storage technologies such as batteries.

Option A.1.1: Broadened scope to reflect technological developments

The definition and the description of smart electricity grids thematic area would be updated by including elements regarding innovation and digital aspects that could be considered among the equipment or installations for smart grids. The criteria would be adjusted accordingly to reflect the broadened scope. Whereas the requirement for the involvement of project promotors from two or more Member States remains, it would be clarified that not all involved DSOs and TSOs do not need to be project promoters, but it is important that the relevant TSOs and DSOs are duly informed about and supportive of the project. In addition, smart grid projects at TSO level, not involving DSOs, would also be allowed. The update would also include a specific reference to smart grids enabling charging infrastructure for electric vehicles at the medium to high-voltage level.

Sub-option: Inclusion of non-mechanical storage technologies

The definition of electricity storage would be updated by including elements related to new technologies utilised for electricity storage. Key changes would be to define new criteria to prove significant cross border impact for new non-mechanical storage technologies (for ex. electrochemical storage in batteries or chemical storage in hydrogen). For non-mechanical storage technologies new values for minimum installed power in MW and energy capacity in MWh would be proposed. Those values would be smaller compared to the current values and be based on the latest Commission storage study[62] and would need to be sufficiently high to ensure significant cross-border benefits. The current criteria would remain for mechanical storage facilities.

This would allow the TEN-E frameworks integrate technological progress necessary to support a cost-efficient energy transition.

Stakeholder views: Many stakeholders underline the significance of electricity distribution infrastructure in an interconnected European energy market that increasingly relies on distributed generation and active participation of end consumers[63]. In this context, many stakeholders pointed out a necessary update of smart electricity grids thematic area by including new smart technologies, solutions and concepts. Stakeholders suggested that the current eligibility criteria for storage technologies do not provide sufficient flexibility for the support of different and emerging storage technologies.

5.2.1.2 Gas infrastructure, hydrogen networks and power-to-gas

Option A.2.0: Business as usual

This policy option would keep the status quo regarding the scope of the Regulation with regard to gas infrastructure. Natural gas projects would remain eligible for PCI status and CEF funding, if they contribute to the TEN-E objectives. Hydrogen, power-to-gas facilities and smart gas grids are not in the scope of the regulation and therefore not eligible for PCI status, nor CEF funding, except in case they fall under the new cross-border renewable window of CEF II coming into force under the 2021-2027 MFF.

Retrofitting to allow for hydrogen blends and projects aiming specifically to integrate renewable gases (biogas/biomethane) would remain eligible in principle (as long as they affect the transmission infrastructure) but in practice unlikely to meet all the current selection criteria, since such projects typically do not aim at increasing cross-border transport capacity.

Option A.2.1: Exclude all natural gas infrastructure, but include hydrogen and P2G

Under this policy option, the scope of the TEN-E Regulation would cover only the following projects:

- Dedicated new and repurposed hydrogen networks with cross border relevance (including hydrogen transmission pipelines and related equipment such as compressors; storage facilities; facilities for liquefied hydrogen).
- Power-to-gas facilities and related infrastructure with cross-border relevance (i.e. aiming to supply at least two Member States and consideration of setting a capacity threshold

[62] Artelys/Trinomics/Enerdata (2020): Study on energy storage – Contribution to the security of the electricity supply in Europe, https://op.europa.eu/en/publication-detail/-/publication/a6eba083-932e-11ea-aac4-01aa75ed71a1

[63] Stakeholder views are briefly summarised for each sub-section, for further details on the different stakeholder positions see Annex 2.

Only the above projects would be eligible for PCI status (apart from electricity and CO_2 transportation projects). All infrastructure projects related to the methane gas grid would be excluded from the scope.

Policy option A.2.2: Exclude natural gas infrastructure but include hydrogen, P2G and smart gas grids for low-carbon and renewable gases

In addition to the inclusion of new and repurposed hydrogen networks and P2G (as described in the previous option), a new PCI category would be created for smart gas grids. This would support investments at distribution and/or transmission level to integrate locally produced renewable and low carbon gases (typically biogas and biomethane but also hydrogen) in the network and help manage a resulting more complex system, building on innovative technologies. The candidate projects would consist of a range of investments directed at "smartening" and decarbonising a given gas network. Some of the investments would affect the TSO level, such as for instance compressor stations to enable DSO-to-TSO reverse flow. The following requirements could help ensure project scale and cross-border impact:

- To require the involvement of DSOs and TSOs from at least two Member States (mirroring the cross-border criterion for smart electricity grids).
- To require involvement of one or several DSOs as well as one or several TSOs.
- To establish a threshold, for instance based on the number of consumers and/or energy consumption volume, similar as for smart electricity grids.

Sub-option: Natural gas transport infrastructure for renewable and low-carbon gases

Under this option, natural gas projects would no longer be eligible for PCI status, regardless of their contribution to the TEN-E objectives.

However, an exception could be made for gas infrastructure projects that specifically aim at integrating renewable and low-carbon gases (i.e. biogas, biomethane, synthetic methane produced from hydrogen, or pure hydrogen) into the existing natural gas (methane) transmission network. This exception could comprise one or both of the following project types:

1. Newly built gas transmission infrastructure projects of cross-border relevance aiming to integrate biomethane and synthetic methane into the European gas network;
2. Retrofits of existing natural gas transmission assets for hydrogen admixtures/blends.

While certain investments on the transmission level could also form part of a smart gas grid project, the infrastructure categories under this exception would affect exclusively the transmission level and would not necessarily involve any "smart" elements.

Sub-option: Exceptions for natural gas PCIs at an advanced implementation stage

A further exception could be made (under either of the two policy options) for existing natural gas PCI projects at an advanced stage of implementation to cater for legitimate expectations by the affected promoters. This would mean the following: existing gas PCIs which are already under construction, or will start construction before [the end of 2022][64], or for which a CEF grant agreement for works has been concluded before [the end of 2022], would remain eligible for PCI status under current rules to allow the finalisation of these projects under a preferential treatment. There could be an additional limitation which would make the affected projects eligible under the current rules only for the first list to be adopted under the revised TEN-E.

The choices on the updated gas infrastructure priorities and eligible infrastructure categories will be reflected in the structure and objectives of the affected regional groups and thematic priority areas defined in the TEN-E Regulation.

Table 2: Overview of policy options for gas infrastructure

Gas policy options and infrastructure categories	**A.2.0: Business-as-usual**	**A.2.1: Hydrogen and P2G**	**A.2.2: Green gas infrastructure**
Hydrogen networks	X	✓	✓
Power-to-gas	X	✓	✓
Smart gas grids	X	X	✓
Natural gas infrastructure	✓	X	X
Exception for advanced natural gas PCIs	NA	✓	✓
Exception for natural gas TSO infrastructure to integrate biomethane and synthetic methane	(✓)	X	✓
Exception for natural gas TSO retrofits for hydrogen admixtures	(✓)	X	✓

*Legend: ✓: infrastructure category possibly included in the scope; (✓): included in principle but unlikely to meet (all) PCI eligibility criteria; **X**: excluded from the scope; **NA**: not applicable*

The eligibility for CEF financial assistance would be adjusted to the infrastructure categories of the revised TEN-E Regulation, i.e. expand eligibility to all or some of those categories that were added, while those removed would by default be excluded from CEF

[64] Exact date tbd – but should be sufficiently early before the establishment of the first list under the revised TEN-E Regulation. Counting with a legislative proposal in December 2020 and entry into force of the revised regulation in June 2022 (ambitious timeline of 1.5 years for co-decision), and counting with the 6th list being adopted by end-2023 – requiring sufficient maturity by the end of 2022 seems like a meaningful working assumption for a cut-off date.

financial assistance. For CEF financial assistance for works the same principles as under the current framework (commercial non-viability and externalities) would apply. However, as electrolysers would be already eligible for CEF financial assistance as cross-border projects in the field of renewable energy under CEF II (so-called cross-border RES window), under this option electrolysers would not be eligible for CEF financial assistance under the future TEN-E Regulation.

Stakeholder views: While several stakeholder groups, mainly representing TSOs and industry associations, considered the inclusion of hydrogen infrastructures, smart gas distribution grids as well as power-to-gas important, there was mixed support notably from NGOs. Environmental NGOs in particular, but also some stakeholders representing the electricity sector, were against the inclusion of natural gas infrastructure in the future scope of TEN-E and voiced concerns about the sustainability of the new types of gases.

5.2.1.3 Projects of mutual interest (PMIs)

Option A.5.0: Business as usual

Only projects, which are able to demonstrate socio-economic benefits for at least two EU Member States are eligible for PCI status. Significant cross-border impact needs to be demonstrated by meeting a certain capacity threshold.

Option A.5.1: Inclusion of PMIs under the TEN-E Regulation

The status of projects, which are able to demonstrate significant net socio-economic benefits for at least two EU Member State and at least one third country could be recognised by the revised TEN-E Regulation by introducing specific criteria for such projects. For such projects to obtain a priority status, the conditions of regulatory approximation with the EU would need to be fulfilled, and the projects would need to contribute to the EU overall energy and climate objectives in terms of security of supply, decarbonisation. In addition, the third country, when supporting the priority status of the given project, would also commit to full support of the project in view of complying with a similar timeline for accelerated implementation and other policy support measures, as stipulated in the TEN-E Regulation.

The presented options would not effect the very few projects with third countries which already qualify under the existing PCI eligibility criteria.

This would allow identifying cross-border infrastructure between the EU and neighbourhood countries that is mutually beneficial and necessary for the energy transition and the achievement of the climate targets.

Stakeholder views: There was mixed support among stakeholders to extend the scope of the Regulation to Energy Community countries and other third countries. Support was mainly expressed by TSOs of Member States with borders to non-EU countries as well as non-EU stakeholders. Some stakeholders called for a specific regime for this kind of projects to ensure that similar regulatory standards are complied with.

5.2.2 Governance / Infrastructure planning

5.2.2.1 Offshore grids for renewable energy

The offshore grids for renewable energy is a transmission infrastructure, with dual functionality: interconnection and transport of offshore renewable energy from the offshore generation sites to two or more Member States (thereafter hybrid grids). The offshore grid can also include the Member States internal high voltage transmission infrastructures (new or reinforcements) that demonstrate significant necessity for the transport of offshore renewable energy to the consumption sites, as well as any offshore adjacent equipment or installation essential to operate safely, securely and efficiently, including protection, monitoring and control systems and necessary substations.

Option B.1.0: Business as usual

This option would continue the incremental development of offshore grids observed so far. As regards planning, ENTSO-E would identify and analyse within the Regional Investment Plans (which are part of the ten-Year Network Development Plans package) the necessary regional offshore grid infrastructure. The identification of the infrastructure needs, project proposals and assessment done in line with the latest available Commission scenarios and Member States commitments on offshore renewable energy. This enhanced TYNDP would be the basis for the PCI selection process.

Option B.1.1 Integrated offshore development plans

This option would strengthen the cooperation in offshore infrastructure planning and implementation. It would require Member States within each sea basin to jointly commit to the amount of the offshore renewable deployment for each sea basin[65]. In addition, it would mandate ENTSO-E, with the involvement of the relevant TSOs and in line with the political commitments, to develop offshore plans for time horizons 2030, 2040 and 2050 respectively for all the sea basins. The integrated offshore network development plan is to be coherent with the TYNDP and developed under the Commission's steering and binding opinion. If, based on ENTSO-E's report, a group cannot agree on an integrated offshore network development plan, or ENTSO-E does not develop such plans on time, the Commission may take over, possibly with input from a third party in view of having an integrated offshore network development plan established per sea basin. Finally, this option would include a requirement for the Commission to develop a specific cost-benefit and cost-sharing method for offshore infrastructure that will enable Member States to properly assess the direction they want to take and carry out a preliminary cost sharing procedure.

Option B.1.2 Regional Independent System Operator / Joint Undertaking

This option gives the task of offshore grid planning, including the identification of infrastructure gaps, proposal and implementation and offshore grids, investment per sea

[65] In line with the NECPs, considering also the new ambition of the proposed Climate Target Plan, other national and regional investment plans, renewable potentials, maritime spatial plans and environmental aspects

basin and cross border cost allocation process for offshore infrastructures to a new entity, either a regional Independent System Operator or a Joint Undertaking e.g. per sea basin. A single entity could optimise the grid planning and investment per sea basin more efficiently, than a group of TSOs. The entity would have to take over key responsibilities from the national TSOs.

Options B.1.1 and B.1.2 would allow going beyond the bottom-up approach to infrastructure planning for offshore infrastructure.

Stakeholders view: Stakeholders did not express specific views on the future offshore infrastructure planning regime. However, there was the general view that hybrid assets and meshed offshore wind hubs will be essential for the development of offshore renewable energy in Europe.

5.2.2.2 Cross-sectoral infrastructure planning

Option B.2.0: Business as usual

The current conditions continue to apply without changes. The Electricity and Gas Regulations mandate the ENTSOs to develop every two years their respective 10-year Network Development Plans (TYNDP) and give ACER the power to deliver a non-binding opinion on these plans. The Commission has no direct role in the development of these plans. The sole oversight of the Commission is on the ENTSOs' gas/electricity Cost-Benefit Analysis (CBA) methodologies, which must receive approval from the Commission before their use in the TYNDPs and the PCI selection process.

Sustainability is an integral part of the CBA methodologies for PCI selection. Under the TEN-E framework, sustainability is as optional criterion alongside security of supply, competition or market integration. Although in practice the Cost-Benefit Analysis methodology provides leeway to prioritise some criteria over others, prioritisation is not enshrined in the current TEN-E text. Thus, keeping the current frame would allow a project with negative impact on the sustainability criterion but good results on other criteria be selected as PCI.

Option B.2.1: Strengthened governance and sustainability

This option entails maintaining the current governance of the TYNDPs and the role of the ENTSOs with significant improvements in the Commission and ACER oversight on the TYNDP. This includes in particular three elements. First, a strengthened oversight role for the Commission, through means of binding opinions, on the ENTSOs' scenarios and system needs identification, which are key steps in the process to deliver the TYNDPs and define what infrastructures are needed. This would allow the Commission to safeguard the alignment of the ENTSOs' scenarios to climate and energy targets and Commission scenarios, along with the improved identification of the infrastructure needs.

Second, a reinforced role for ACER in the development of scenarios and in the Cost-Benefit Analysis methodology by mandating the Agency to develop framework guidelines for the ENTSOs' scenarios and approve incremental improvements of the Cost Benefit methodology. Third, a deeper interlinkage between the sectoral TYNDPs to reinforce their contribution to the energy system integration process and increased participation of the DSOs in the planning process.

This option would also require the inclusion of a mandatory sustainability criterion for all gas infrastructure categories with at least one other criterion (market integration, security of supply, competition) at the stage of project selection. This would be applicable to any gas infrastructure category included in the future TEN-E Regulation in line with the principles of the taxonomy. The relevance of each criterion in the ranking of the gas projects would be defined in the assessment methodology for the ranking of the candidate projects. This methodology is discussed and validated by the regional groups as under the current TEN-E Regulation[66].

Option B.2.2: New governance set-up and expansion of the scope and the role of the TYNDP

This option would establish a new governance set-up for the TYNDPs and expand the scope of the TYNDP in order to integrate energy system-wide cost-efficiency. Through a governance reform, a neutral actor (such as the Commission or ACER) would take a leading role in the TYNDPs development. Within this frame, the Commission or ACER would not be responsible of delivering any opinion or approval of the ENTSOs work as in option B2.1. Instead, the neutral actor will be responsible of the entire planning process, meaning developing scenarios and the associated data, run market and network studies to identify infrastructure gaps within electricity and gas sectors, assess the benefits of possible and draft and publish the planning reports. The role of ENTSOs and TSOs would be limited to providing information given their unique expertise in networks. This option would also require the inclusion of a mandatory sustainability criterion for all gas infrastructure categories as per option B.2.1.

Options B.2.1 and B.2.2 would allow overcoming the sectoral approach to infrastructure planning and ensuring that sustainability will be considered during the PCI selection process.

Stakeholders view: ACER and a majority of other stakeholders, while recognising the merits of having the ENTSOs' expertise in the process, asked for a stronger oversight from the Commission and ACER on scenarios, cost-benefit analysis and identification of system needs. There is a large consensus among stakeholders that the importance of sustainability in the PCI selection process of the (decarbonised) gas projects needs to be reinforced. Some categories of stakeholders also underline the importance of maintaining strong weighting for other criteria, in particular security of supply, in a multi-criteria selection approach.

5.2.3 Permitting and public participation[67]

Option C.1.0 Business as usual

The permitting provisions in the TEN-E Regulation, which are very innovative and have already proven their effectiveness with the permitting duration of PCIs decreasing significantly, would remain unchanged.

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[66] See Annex 8 for more information.

[67] For improving the readability of the report, we maintained in the man text only political options, with additional options of a technical nature being include and assessed in Annex 8.

Option C.1.1: Use of urgent court procedures

Administrative appeal procedures and judicial remedies before a court or tribunal do not fall within the time limit prescribed for the permitting process of 3.5. years meaning that their duration, if they happen, adds on to the project implementation delay. To accelerate the completion of the permitting process, Member States, which already have urgent court procedures under national legislation in other domains, would have to ensure that these accelerated litigation procedures are applicable to PCIs under national legislations.

Option C1.2: One-stop shop per sea basin for offshore renewable infrastructure projects

The one-stop shop would issue the comprehensive decisions for the infrastructure elements for offshore projects by coordinating all the national and regional permits to be obtained within the 3.5 years time-limit and ensure that offshore projects do not encounter delays beyond this period. It would enable coordination between the permitting process for the infrastructure and the one for the generation assets and it would act as a single point of contact for project promoters and a repository of existing sea basin studies and plans, which would facilitate the permitting of individual projects. The one stop shop would be comprised of staff from all the already existing national permitting one-stop shops. This option is complementary to the ones mentioned above.

Options C1.1 and C1.2 would allow shortening permitting procedures.

Stakeholder views: While a series of stakeholders pointed to the difficulties with complex and lengthy permitting process for offshore projects crossing several jurisdictions and called for a simplified permitting process, no stakeholder expressed any specific opinion on a possible new one-stop-shop for offshore wind projects. Stakeholders involved in the permitting procedures indicated that several notions in the permitting chapter could be clarified (see additional options in Annex 9). Stakeholders also raised the delay with the court and appeal procedures regarding PCIs and called for streamlines court procedures for PCIs.

5.2.4 Regulatory treatment[68]

Option D.1.0: Business as usual

The current CBCA provisions, which provide the principles and tools to ensure that costs are allocated cross-border in an orderly manner enabling the development of such projects, would be maintained. However, in practice this means that the CBCA procedure would be used only as a pre-requisite for requesting CEF grants for work and the provisions would not reach their potential in enabling projects implementation.

Option D.1.1: Inclusion of full investment costs

[68] For improving the readability of the report, the main text includes only political options, with additional options of a technical nature being included and assessed in Annex 9.

This option aims at ensuring consistency between the CBCA decisions and safeguarding the primary goal of the CBCA. This would entail a two-stage approach in which: (i) The NRAs would allocate all investment costs across borders and include them in full in the national tariffs and, afterwards, if necessary, (ii) assess whether any affordability issues arise as regards the increase in tariffs due to the inclusion of such costs. The NRAs would always assess how much a certain project would cost if it were paid for completely by tariffs and this should be the basis for the affordability test and, ultimately, for calculating any public financing.

This would allow for a better implementation and use of the cost sharing tools.

5.3 Options discarded at an early stage

- **Expand CO_2 infrastructure category to include CO_2 transport by ship and infrastructure necessary for the permanent geological storage of CO_2**

Mainly stakeholders representing the CO_2 industry argued for the inclusion of CO_2 transport by ship and infrastructure necessary for the permanent geological storage of CO_2in the TEN-E Regulation. The transport infrastructure category would be enlarged from only pipeline infrastructure to also include shipping infrastructure, both the facilities necessary to enable shipping as the actual ships themselves, and infrastructure related to CO_2 storage.

However, it is not clear how the inclusion of transport with mobile assets such as ships in the TEN-E Regulation would help the implementation of such projects. There are no regulatory or administrative barriers in relation to cross-border networks that could be addressed by the provisions in the TEN-E Regulation. The key barrier to the deployment of CO_2 infrastructure, including for the geological storage of CO_2 and shipping, is access to financing.[69] The only benefit sought by such projects being eligible for PCI status would be that they may get access to CEF financial assistance. However, the key objectives of the TEN-E is to support the timely implementation of infrastructure projects of cross-border nature where CEF financial assistance is only one element as a last resort financing option. Moreover, such expansion would not relate to transmission networks and interconnections in accordance with the legal base. Other EU and national financing instruments are available to support CO_2 infrastructure for geological storage and shipping such as the Innovation Fund.

- **Projects to reduce methane leakage**

Methane leakage projects would be unlikely to demonstrate cross-border impact. Methane leakage projects consist of retrofits and repairs of different elements of a gas network. They often do not involve capital investments but rather network management and repair methods (more related to operational expenses). The investments involved are often targeted at the distribution level, which is responsible for around 60% of methane emissions from gas operations in Europe. Such investments are therefore per definition

[69] Ecofys (2018): Market testing for low-carbon innovation support to energy intensive industry and to power generation, https://op.europa.eu/en/publication-detail/-/publication/906bea83-b6fe-11e8-99ee-01aa75ed71a1

related to one country's network and aim at improving the efficiency of the network operation and emission savings but do not aim at increasing cross-border capacity, neither do they have indirect effects on cross-border trade or capacities. Therefore, projects specifically aiming at methane leakage reductions do not really fit the intervention logic of the TEN-E Regulation nor under the concept of projects of common interest of a trans-European importance. Based on IEA data, the gas industry itself has cost-effective options to make its contribution to methane emission reductions by deploying best available technologies for the various gas chain elements and processes; and by adopting best practices and implementing leak detection and repair programmes.

- **Removing cross-border requirements for smart electricity projects (inclusion of pure DSO level projects at local level)**

Different stakeholders have called for the eligibility of all smart electricity grid projects, also those with no involvement of TSOs, for PCI status. With 2 400 DSOs in Europe, the potential number of eligible projects would be very high. At the same time, without the involvement of a TSO, it would be difficult, if not impossible, to demonstrate a significant cross-border impact for such projects. It would not be in line with the legal base, which requires a clear link to the transmission level. The required resources for the selection process would be disproportionate in view of the projects that could actually qualify. The inclusion of projects at a DSO level and hence without a (significant) cross-border impact would neither imply more investments at the distribution level nor an easier implementation process for such projects. To the contrary, it may rather create wrong expectations and add unnecessary burden on all parties involved in the PCI selection process.

- **Heat networks as new infrastructure category**

Some stakeholders such as heat network operators argued for the inclusion of smart heat networks in the TEN-E Regulation as this could bring benefits in terms of system integration. However, heat networks are local in nature with no or very limited cross-border impact. There are no heat transmission networks as it is not efficient to transport heat over long distances. European infrastructure planning for the purpose of interconnections and interoperability is therefore not needed for heat networks.

Additional discarded options of more technical nature, also based on the evaluation results and stakeholder views, are included in Annex 7 and relate to the following topics: breaking the link between the CBCA and CEF financing, conditional CBCA decisions, and the easing of environmental and location approvals for PCIs.

6 WHAT ARE THE IMPACTS OF THE POLICY OPTIONS?

The assessment of the impacts of each policy option relies to a large extent on a qualitative approach looking at the main environmental, economic, and social impacts as well as administrative burden, if applicable. It was not possible to quantify the impacts for all options because the specifics of future PCIs would need to be available for that purpose which is particularly challenging for new or emerging infrastructure categories. Moreover, many of the proposed changes are mainly improvements to the current framework, which has been deemed to work relatively well and broadly meet its aims.

Relevant sectoral studies or literature are used to provide a quantitative indication of certain impacts even if their scope is not limited to PCIs. While PCIs as cross-border infrastructure project cover a comparatively small number of energy infrastructure projects and needs in Europe, they constitute key infrastructure projects that enable and trigger additional investments with impacts beyond the direct benefits of the projects of common interest.

The TEN-E Regulation does not impose obligations on economic operators, but it does set requirements on promoters of PCIs, mainly TSOs and DSOs, which decide to apply for PCI status and subsequently become subject to certain obligations, mainly in the form of monitoring and reporting obligations. In addition, the TEN-E Regulation sets obligations on competent national authorities and regulators concerning permitting, regulatory incentives, and public participation as well as on network operators concerning long-term network planning. Consumers are mainly affected through network tariffs to finance investments in the regulatory asset base (RAB).

6.1 Scope

6.1.1 Smart electricity grids end electricity storage

Option A.1.0: Business as usual

To keep the current eligibility criteria would imply that the smart electricity grids thematic area remains restricted and only accessible for a limited number of infrastructure projects. In the case of electricity storage, it would remain limited to large mechanical/hydro storage projects. In the case of smart electricity grids, digitalisation and innovation in the grids creates would not sufficiently reflect recent technologies and hence potential positive *environmental, economic and social impacts* would not be enough exploited (see below). Regulatory frameworks and regulatory practice in the Member States in many cases do not sufficiently support innovative grid investments by the TSOs or even constitute a barrier to such investments.[70]

Option A.1.1: Broadened scope to reflect technological developments

Environmental impacts

The broadened scope for electricity smart grids would support the changing infrastructure and system security needs with a higher uptake of innovation and digitalisation in the grids. Over 90% of distributed renewable energy generation will most likely continue to be connected at distribution grid level[71]. Consumers, mostly connected to the distribution grid, are allowed to provide demand-side flexibility, with 120 GW-150 GW of flexible load available by 2045. The ongoing rollout of smart metering will boost this development. Further synergies with the TEN-T Regulation would help to enhance the future charging infrastructure for electric vehicles and would benefit users of electric vehicles by supporting smart grid projects enabling charging infrastructure for electric vehicles. It is expected that the vehicle stock share of electric cars will increase to up to

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[70] Ecorys 2019, Do currrent regulatory frameworks in the EU support innovation and security of supply in electricity and gas grids.

[71] Eurelectric (2019): The Value of the Grid, https://cdn.eurelectric.org/media/3921/value-of-the-grid-final-2019-030-0406-01-e-h-D1C80F0B.pdf

11% by 2030[72] from currently below 1%. Electric vehicles with "smart charging" could provide capacity for flexibility and demand response. These use cases alone or as elements of virtual power plant platforms could become an important interface between energy and mobility, since digital infrastructure is a key enabler for the energy transition in these two sectors with a significant greenhouse gas reduction potential. While TEN-E would only cover smart grid projects with a cross-border impact, these projects could make a significant impact to ensure interoperability across Member States.

Sub-option: Inclusion of non-mechanical storage technologies

The estimated daily flexibility required to be provided by electricity storage in 2030 is 97 GW for EU-27[73]. Electricity storage provides flexibility to the power system operation and decreases the need for new power lines within the power system[74]. In certain cases energy storage systems can be deployed faster than transmission lines and have a smaller footprint than transmission projects eliminating environmental impacts from construction of those projects[75]. The increased demand of different storage technologies, especially electrochemical (batteries) would support development and usage of new, more advanced storage systems, decreasing the overall impact on the environment.

The inclusion of electric storage in the form of batteries would result in potential emissions associated with the production of batteries. However, the emission factors calculated vary significantly depending on the type of battery in terms of materials and energy density and the source of energy used for its production. However, it is anticipated that the potential environmental impacts could decrease very significantly. In its 2019 Strategic Action Plan on Batteries[76], the Commission points to the importance of improved recycling processes, and an extension of the battery lifetime. Re-use of batteries in stationary applications can reduce environmental impacts over the life- cycle.

Economic impacts

A broadened scope of smart grids would increase the network operational efficiency through the implementation of flexibility features of existing HVDC (High Voltage Direct Connection) cables and the enhancement of the exploitation of demand-response management services based on the increased cross-border data and capacity exchange, together with the provision of ancillary services between the related TSOs and/or DSOs. In addition, cross-border smart electricity grids facilitate the growing penetration of renewable energy sources in the grid and enable a better integration of the behaviours and actions of all users connected to the network across borders.

In the light of changing infrastructure and system security needs, this policy option would contribute to stimulate the use and implementation of new innovative technologies

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[72] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe's 2030 climate ambition, SWD(2020) 176 final

[73] Artelys/Trinomics/Enerdata (2020): Study on energy storage – Contribution to the security of the electricity supply in Europe, https://op.europa.eu/en/publication-detail/-/publication/a6eba083-932e-11ea-aac4-01aa75ed71a1

[74] IEA Energy Storage Study 2020, https://www.iea.org/reports/energy-storage

[75] FLUENCE 2019 White Paper, Redrawing the Network Map: Energy Storage as Virtual Transmission

[76] COM(2019) 176 final

and activities in the domain of digital technologies, which will enhance the already existing positive impact of cross-border smart electricity grids. Development of new standards and technology for the interoperability of smart grid systems with increased reliability and cybersecurity protection would be further supported across borders.

Comprehensive control and monitoring of the grid would reduce the need for curtailment of renewables and enable competitive and innovative energy services for consumers. According to the IEA, investments in enhanced digitalisation would reduce curtailment in Europe by 67 TWh by 2040[77]. Electricity storage could simultaneously reduce the volatility of the electricity prices, reduce the cost of the electricity system increasing energy efficiency and facilitate a higher share of variable renewable energy sources in the energy system[78]. Due to lack of data, it is not possible to quantify the potential cross-border impact for non-mechanical storage projects. However, at this stage it would be difficult for non-mechanical storage technologies (for ex. electrochemical storage in batteries or chemical storage in hydrogen) to meet cross-border criteria to prove a significant cross-border impact. The opportunities provided by energy storage are increasingly supported by the momentum in research and innovation making the European economy more competitive.

This option would allow more market players to get involved in smart electricity projects. The updated eligibility criteria would enable TSO/TSO cooperation in the area of smart grids, where DSO/DSO combinations would still be possible with the respective TSO support. To open the possibility to purely TSO level projects would enhance the number of cross-border smart electricity–grids to be developed under the TEN-E framework, which are unlikely to happen otherwise.

Social impacts

The digitalisation of the grid and metering would facilitate customer participation in all stages of the development and expansion of the energy system by digital tools such as participative geographical systems and new energy market arrangements[79]. This would allow consumers to directly benefit from a more competitive energy market and monetise the flexibility in their consumption patterns.

6.1.2 Gas infrastructure, hydrogen networks and power-to-gas

Policy options A.2 combine different infrastructure categories. The overall impact of these options depends on the impacts stemming from the individual infrastructure categories included under each option.

Option A.2.0: Business as usual

[77] with demand-response accounting for 22 TWh and storage accounting for 45 TWh - IEA 2016

[78] EC report "Role of electricity in energy storage", February 2017, https://ec.europa.eu/energy/sites/ener/files/documents/swd2017_61_document_travail_service_part1_v6.pdf

[79] E.g. ETIP SNET (2018): DIGITALIZATION OF THE ENERGY SYSTEM AND CUSTOMER PARTICIPATION: Description and recommendations of Technologies, Use Cases and Cybersecurity, https://www.etip-snet.eu/wp-content/uploads/2018/11/ETIP-SNET-Position-Paper-on-Digitalisation-short-for-web.pdf

Hydrogen networks, power-to-gas projects, smart gas grids would remain out of scope. Green gas-related transmission infrastructure projects are in the scope but unlikely to meet the cross-border criterion. This option would mean that, as regards gas, the TEN-E would keep its focus on natural gas transmission infrastructure and fail to accommodate renewable and low carbon gas projects. Although the number of natural gas PCIs is expected to decrease in the coming years (see section 5.1), the continued focus on natural gas and failing to stimulate the decarbonisation of the gas sector would significantly weaken TEN-E's potential contribution to greenhouse gas emission reduction.

Environmental impacts

Continued PCI status for new natural gas infrastructure is not compatible with the long-term decarbonisation objectives. A reduction of natural gas demand is expected in all decarbonisation pathways developed by the Commission: even in business-as-usual, demand for natural gas shrinks by 13% between 2015 and 2030 and, by 2050, natural gas is expected to be largely replaced by alternative renewable and low-carbon gaseous fuels in all decarbonisation scenarios[80]. Infrastructure projects create assets with a long lifetime (e.g. a gas pipeline can be used for 50 years or more) and would contribute to a lock in to the use of fossil fuels which is inconsistent with the long-term climate neutrality objective.

Economic impacts

Keeping natural gas PCIs in the scope of the regulation creates risks of financing stranded assets because there is no need for policy support for additional cross-border natural gas infrastructure. The TEN-E framework has been successful in delivering a secure and well-interconnected gas grid in Europe (see section Annex 5), which is largely sufficient to guarantee security of gas supply for consumers and to enable closer market integration. The evaluation report[81] confirms that the existing gas infrastructure allows access for a wide range of supplies and it is resilient in a number of disruption cases. This understanding is also supported REKK's previous modelling[82] along with the ENTSOG TYNDP results[83]. REKK concluded that there are no isolated markets in the EU and the market players can make good use of the substantial LNG terminal and storage capacities when market circumstances are favourable, as in 2019-2020. Today Europe enjoys a resilient gas network, where gas prices are in majority correlated and infrastructure capacities are auctioned and used to provide the necessary flexibility to the market[84]. In a

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[80] IN-DEPTH ANALYSIS IN SUPPORT OF THE COMMISSION COMMUNICATION COM(2018) 773 A Clean Planet for all, A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy, https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf

[81] REKK study concluded that Europe overall benefited significantly from the implementation of the already commissioned PCIs which are estimated to bring more than 132 m€ of socio-economic benefit per year, leading to an increase in trading of 42.5 TWh/year and an increase in LNG flow of around 18.3 TWh/year.

[82] European Commission (2018) Quo vadis EU gas market regulatory framework –Study on a Gas Market Design for Europe, https://ec.europa.eu/energy/sites/ener/files/documents/quo_vadis_report_16feb18.pdf

[83]ENTSO-G (2017), Ten Year Network Development Plan 2017,

[84] See ACER monitoring reports, eg. ACER/CEER: Annual Report on the Results of Monitoring the Internal Natural Gas Markets in 2018

similar vein, ACER's latest monitoring report on the incremental capacity procedure concludes that no market demand seems to exist for additional cross-border gas transport capacity. From 55 non-binding demand assessment phase projects, only five proceeded to the binding stage and none received sufficient market coverage to be realised.[85]

The remaining and already well-identified natural gas infrastructure needs are primarily in the Eastern Baltic Sea region, the Central and South-Eastern part of Europe, and those needs can be addressed by the most advanced gas PCIs in the 4th PCI list. The evaluation study shows that the implementation of the most advanced projects would further reduce price differentials across EU countries. However, the relatively small incremental benefits are also an indication that building even further natural gas projects do not seem justified from a security of supply, market integration or solidarity point of view.[86] Nor would it align well with the more ambitious climate objectives of the European Green Deal.

Following the implementation of the existing gas PCIs, there is no need for support for additional cross-border natural gas infrastructure or LNG terminals. If there is market demand for new capacity, it can be met through the appropriate internal energy market rules (incremental procedure under the Network Code for Capacity Allocation and Congestion Management) but the priority status coming with a PCI label is no longer justified.

Social impacts

Support for stranded assets would inevitably translate into higher tariffs for consumers, thereby rendering the energy transition slower and less affordable.

Option A.2.1: Exclude all natural gas infrastructure but include hydrogen and P2G

Economic impacts

A condition for a widespread use of hydrogen as an energy carrier in the European Union is the availability of dedicated cross-border hydrogen infrastructure. Today, the existing hydrogen networks are not regulated assets; they are typically privately owned pipelines connecting specific production and consumption sites. This is expected to change in the future, as hydrogen use expands and its transportation is expected to happen over longer

[85] ACER: Monitoring update on incremental capacity projects and virtual interconnection points, July 2020, available at: https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20Monitoring%20update%20on%20incremental%20capacity%20projects%20and%20virtual%20interconnection%20points.2020.pdf

[86] REKK modelling concluded that by implementing all the advanced gas projects (i.e. those that have already made a final investment decision) from the 4th PCI list, Europe would have a decrease in price dispersion of about EUR0.69/MWh (reaching EUR0.83/MWh if all PCIs on the 4th PCI list were to be build). Although minor, this decrease in average wholesale price illustrates that on some markets these projects may bring incremental benefits. Regarding trade, all PCIs of the 4th PCI list would decrease the total flow levels on the network by 1%, showing therefore that the European network infrastructure is adequate to serve the demand and PCIs from the fourth list will mostly help only with the better utilisation of the grid by providing shorter routes and route diversification. These messages are also supported by an internal JRC study run in parallel on the same topic.

distances. Hydrogen networks – which may initially be restricted to isolated local distribution grids and later national hydrogen networks – will, starting around 2030, increasingly be connected to create an internal market for hydrogen and offer benefits in terms of competition and security of supply.[87] This may have a profound impact on the pattern of gas flows in Europe: countries with renewable power generation potential, where green hydrogen can be produced, may become hydrogen exporters, while consumption centres would be importers.

There is today no systematic network planning for hydrogen infrastructure at EU or national level. The TEN-E framework could facilitate the European level planning for hydrogen infrastructure. Depending on future developments, the planning and assessment of hydrogen network could either be based on the TYNDP or the TEN-E could require that hydrogen projects to apply for PCI status in the context of a hydrogen network development plan, developed by the affected countries and/or project promoters[88] which would reduce costs. Coordinated planning would allow for a more efficient utilisation of resources and locations, save costs, and speed up implementation. Without coordinated network planning, the resulting infrastructure risks being fragmented along national lines and hindering the emergence of an EU internal market for hydrogen. The location of P2G facilities with a cross-border relevance will be crucial for the planning of hydrogen grids. P2G facilities are also essential enablers for energy system integration, as they will create links between gas and electricity systems, facilitating the decarbonisation of hard-to-decarbonize sectors, such as heavy goods transport or industry.[89]

Future hydrogen networks are expected to consist to a great extent of infrastructure converted to hydrogen from existing natural gas assets, however new production and consumption centres for hydrogen may also require the construction of new assets specifically for hydrogen.[90] It is therefore important to include both of those categories into the TEN-E. The conversion of existing natural gas assets into dedicated hydrogen pipelines is up to 90% cheaper than new build[91], thus this can ensure a more cost-

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[87] For instance, up to 70% of additional demand for green hydrogen projected by German TSOs for 2025 and 2030 is expected to be covere by imports of decarbonised hydrogen from the Netherlands (FNB Gas: Gas Network Development Plan 2020-2030, p. 142). European gas TSOs expect that a European hydrogen backbone would start to emerge from around 2030 and the initial regional clusters would progressively expand into a truly European hydrogen transport network (see European Hydrogen Backbone, report by 11 European gas TSOs, July 2020, available at: https://gasforclimate2050.eu/sdm_downloads/european-hydrogen-backbone/).

[88] This would be on analogy of CO_2 networks which are also not included in a TYNDP. Depending on the infrastructure category, PCI status is not limited to projects that are included in a TYDNP.

[89] See A hydrogen strategy for a climate-neutral Europe, COM(2020) 301 final; and Powering a climate-neutral economy: An EU Strategy for Energy System Integration, COM(2020) 299 final

[90] In existing plans to create a hydrogen backbone in the Netherlands and in Germany, up to 90% of the future hydrogen network is planned to be based on the conversion of no longer needed natural gas assets, the rest would be new infrastructure (see http://www.get-h2.de/en/initiativeandvision/ and https://www.gasunie.nl/en/expertise/hydrogen/hydrogen-projects). The 23 000 km European hydrogen backbone envisaged by 11 European gas TSOs for 2040 would consist 75% of converted natural gas infrastructure, connected by 25% new hydrogen assets (https://gasforclimate2050.eu/sdm_downloads/european-hydrogen-backbone).

[91] European TSOs estimate that while new hydrogen pipelines could cost 10-50% more than similar natural gas pipelines, repurposed hydrogen pipelines would cost only 10-35% of new hydrogen pipelines (European Hydrogen Backbone, report by 11 European gas TSOs, July 2020, available at: https://gasforclimate2050.eu/sdm_downloads/european-hydrogen-backbone/). German TSOs estimate that

effective pathway to the deployment of hydrogen infrastructure and avoid stranded assets in the existing gas network. The rollout of hydrogen infrastructure will require coordinated planning, taking into account the location of supply and demand (see section 6.2.2).

The International Energy Agency (IEA) estimates that the transmission of hydrogen as gas by pipeline is the cheapest option.[92] Transporting renewable energy in the form of green hydrogen via pipeline offers a cost-effective solution to integrate renewable energy into the energy grids. It can also help overcome network bottlenecks in electricity that limit the ability of the energy system to integrate renewable power production.

While today only a few member states have 100% operating hydrogen networks, ongoing developments in this area are likely to affect the whole EU. According to ACER, 11 Member States have or are working on a hydrogen strategy and 4 member states (Germany, France, Netherlands and Poland) are planning to roll out 100% hydrogen networks.[93] Half of the national energy and climate plans (NECPs) mention concrete hydrogen related objectives and national hydrogen strategies, roadmaps, or plans been or are being developed.[94] The industry's vision for a European hydrogen backbone was presented by gas TSOs from 10 European countries: Germany, France, Italy, Spain, the Netherlands, Belgium, Czech Republic, Denmark, Sweden and Switzerland.[95]

Investment in hydrogen infrastructure would have a significant economic impact. The European hydrogen backbone vision presented by the industry estimates that creating a 23 000 km dedicated hydrogen network by 2040 would require a total investment of €27-64 billion based on using 75% of converted natural gas pipelines connected by 25% new pipeline stretches.[96]

The Commission has put forward the strategic objective to install at least 40 GW of renewable hydrogen electrolysers in Europe by 2030.[97] The hydrogen industry has estimated the impact of building such electrolyser capacity (complemented by a further 40 GW electrolyser capacity in neighbouring countries with the aim of exporting green hydrogen into Europe).[98] This electrolyser capacity can produce 173 TWh of hydrogen, which represents around half of today's hydrogen demand in Europe. This would require total investments investment of €25-€30 billion, of which over 85% would be realised in

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investment costs for conversion projects is up to 90% cheaper than for new build (FNB Gas: Gas Network Development Plan 2020-2030, p. 148).

[92] International Energy Agency: The Future of Hydrogen, June 2019, esp. pp, 67-84. For cost estimates of different hydrogen transport options, see also Asset project (funded by the European Commission): Jan Cihlar et al.: Hydrogen generation in Europe: Overview of costs and figures, June 2020, pp. 12-14. ; see also Navigant (2019): Gas for Climate The optimal role for gas in a net-zero emissions energy system, March 2019, table on p. 98

[93] ACER: NRA Survey on Hydrogen, Biomethane, and Related Network Adaptations, Evaluation of Responses Report, July 2020

[94] see Trinomics: Study on Opportunities arising from the inclusion of Hydrogen Energy Technologies in the National Energy & Climate Plans, final report, June 2020, chapter 2

[95] https://gasforclimate2050.eu/sdm_downloads/european-hydrogen-backbone

[96] https://gasforclimate2050.eu/sdm_downloads/european-hydrogen-backbone

[97] A hydrogen strategy for a climate-neutral Europe, COM(2020) 301 final

[98] Green Hydrogen for a European Green Deal – A 2x40 GW initiative, Hydrogen Europe, 2020

the 2025-2030 timeframe[99] and would create between 140,000 and 170,000 jobs for manufacturing and maintenance of 2x40 GW electrolyser capacity up to 2030.

A recent study for the Fuel cells and Hydrogen Joint Undertaking (FCHJU)[100] has estimated the overall accumulated investment in hydrogen technologies in the EU-28 at 70-240 billion EUR up to 2030. Renewable energy supply accounts for 50%-60% of total investments, end user applications account for 20%-30% and electrolysis units account for almost 10%. The investments related to infrastructure, including power and gas grids, refuelling stations and hydrogen storage are 5%-10% of total investments. Depending on the scenario, 7.5 billion or 29 billion EUR of value added can be generated annually in the whole EU-28, by investment in and operation of hydrogen technologies. Most of the value added is expected to be created by building and operating the renewable electricity plants that provide energy to electrolysers. A significant share of value added would also be created by the development of hydrogen transport infrastructure.

Environmental impacts

As mentioned above, the inclusion of hydrogen networks and P2G facilities with cross-border relevance into the TEN-E would ensure a new coordinated and efficient planning to these types of infrastructure. Such a coordinated process can reduce the overall need for infrastructure projects Allowing PCI status conversion projects (existing natural gas assets to be turned into hydrogen assets) will further limit the environmental impact, as it will avoid the need to build new infrastructure and make better use of the existing one.

In general terms, the facilitation of hydrogen and P2G projects would bring environmental benefits because the impact of renewable and low-carbon hydrogen technology is expected to be positive in terms of greenhouse gas emissions: the substitution of fossil fuels by renewable or low-carbon hydrogen would translate into GHG emission reductions in the range of 20-65 MtCO2/a, corresponding to 1.4%-4.5% of the reduction gap at EU-28 level.[101]

P2G based on electrolysis is an important enabler for smart sector integration and the decarbonisation of the gas and hydrogen grids. The source of the hydrogen produced is crucial in terms of the GHG impact. If grid electricity is used, then the climate impact would reflect the CO_2 intensity of the electricity mix. However, if electricity comes from a renewable source, then the hydrogen produced is carbon-neutral.[102] This green hydrogen can be used in gaseous form (and injected in dedicated hydrogen networks or admixed to methane in natural gas networks) or it can be turned into synthetic methane or

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[99] These are electrolyser investment cost only, the figures do not include the investments in solar and wind farms, transport and storage infrastructure, nor end-use applications.

[100] Data from Trinomics: Study on Opportunities arising from the inclusion of Hydrogen Energy Technologies in the National Energy & Climate Plans, Final report, June 2020

[101] Artelys-Trinomics (2020): Measuring the contribution of gas infrastructure projects to sustainability as defined in the TEN-E Regulation, Draft final report

[102] Artelys-Trinomics (2020) has calculated that, when substituting natural gas with hydrogen, 56 tCO2 equivalent per TJ savings are achieved in case hydrogen from renewable sources is used and savings of 48 tCO2 equivalent per TJ are achieved in case the hydrogen is produced from natural gas with carbon capture and storage; by contrast, the climate impact is negative when EU grid electricity used (72 tCO2 equivalent per TJ increase), see table 5 in Annex 8.

synthetic liquid fuels, e.g. kerosene or diesel. Therefore, green hydrogen can play a crucial role in decarbonising end use sectors, such as industry, transport or heating. It can also offer flexibility options for the power grid and seasonal storage options for renewable energy.

The strategic goal is to support renewable hydrogen; however, other forms of low-carbon hydrogen will also be needed in the short-to-medium term to rapidly reduce emissions from existing hydrogen production and support the parallel and future uptake of renewable hydrogen.[103] P2G facilities should contribute to the strategic goal in order to maximize the positive GHG reduction impact, a similar approach would not be appropriate for hydrogen networks, as for reasons of economic efficiency non-discriminatory third party access to such infrastructure could be considered.

Social impact

The inclusion of hydrogen in the TEN-E framework and eligibility for CEF financial assistance would have no impact on consumer prices[104]. Support through TEN-E to these emerging technologies could facilitate upscaling and bringing down costs and hence improve affordability of the energy transitions. Hydrogen-related investments and operations are estimated to generate in 2020-2030 employment of 29 100–103 100 direct jobs (in production and operations & maintenance) and contribute to further 74 100–241 150 indirect jobs.[105]

Option A.2.2: Exclude natural gas infrastructure but include hydrogen, P2G and smart gas grids for low-carbon and renewable gases

The impact of the inclusion of hydrogen and P2G is described above. The additional impacts stem from the inclusion of smart gas grids. Specific impacts of the sub-option on the exception for natural gas transmission projects that enable renewable and low carbon gases (i.e. new cross-border transmission infrastructure for biomethane and/or retrofits for hydrogen blends) are discussed separately.

Economic impacts

Indigenous renewable gas sources are expected to play an important role in the way towards climate neutrality. The most significant current production of renewable gases in the EU are biogas and biomethane[106] with some 17 bcm annually. The Commission estimates that biogas consumption would have to increase between 14-48% in the period 2015-2030 and between 37-378% in the period 2015-2050 to reach carbon neutrality.[107]

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[103] See A hydrogen strategy for a climate-neutral Europe, COM(2020) 301 final

[104] Solidarity and the effect of CEF financial assistance in terms of affordability of PCIs is one element when assessing applications for CEF financial assistance.

[105] Artelys-Trinomics (2020): Measuring the contribution of gas infrastructure projects to sustainability as defined in the TEN-E Regulation, Draft final report

[106] Biogas is about 60% methane, 40% CO2 + some impurities. To enable its injection into the transmission grid, biogas must be treated to meet standardized gas quality requirements. The upgrading of biogas to biomethane requires the removal of CO2 and impurities. If used and, more importantly, stored, the CO2 obtained in production of biomethane from biogas is sometimes argued to create 'negative' emissions.

[107] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe's 2030 climate ambition, SWD(2020) 176 final

After upgrading biogas to biomethane, this gas can be transported, distributed and stored in the existing methane gas grid. Hydrogen can also be blended into the methane grid up to certain limits or subject to adaptations.

The vast majority of today's 500 biomethane plants in the EU are connected to the distribution grid, without the possibility to inject gas into the transmission level, meaning the gas has to be consumed close to its place of production. Some of the green hydrogen is also expected to be injected at DSO level. Smart gas grid projects would aim to tap into this potential by implementing infrastructure facilitating the integration of those locally produced renewable and low-carbon gases into the DSO and TSO grids and making use of modern ICT technologies to help manage a more complex grid. Smart gas grid projects would also include related investments enabling reverse flow to the transmission level, which could ensure that excess local green gas supply is injected into the transmission grid and used elsewhere, enabling the full use of local green gas potential.

The inclusion of smart gas grids would ensure the seamless integration of the transmission and distribution grids that will be increasingly necessary[108] because of the rapidly changing natural gas infrastructure system.

At the same time, smart gas grid projects would not meet the current cross-border criterion for gas transmission infrastructure because they would not aim at creating additional transmission capacity. Instead, the cross-border relevance would come from the requirements to include promoters from at least two Member States in project design and implementation. While projects to enable biogas to be injected from the distribution to the transmission grid are indeed local, they may enable trade with those gases, as the gas transmission grid is already interconnected at EU level. Biomethane and synthetic methane pose in principle no technical problems for their injection into natural gas grids as long as they meet quality standards. At transmission level, investments in grid expansion may be needed in case capacity at certain network sections or interconnection points become insufficient due to a change in the gas flow patterns caused by an increase in biogas production in certain EU regions.

Environmental impact

Gas infrastructure projects may contribute to sustainability by enabling the substitution of fossil fuels with renewable and low-carbon gases in various applications. The exact impact will depend on the amount of renewable and low carbon gases injected into the grid and on the difference between the GHG intensity of the specific renewable and low carbon gas and the substituted fuel. For the substitution of natural gas with biogas, the GHG impact ranges from a 156 tCO2eq per TJ reduction to a 17 tCO2eq per TJ increase in emissions[109].

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[108] Gas distribution projects are not currently in the scope of the TEN-E Regulation.

[109] The assessment takes negative emissions into account. The net CO_2 impact shows the difference between the natural gas CO_2 emissions factor and the emissions factor of a specific renewable or low-carbon gas. For further details: Artelys-Trinomics (2020): Measuring the contribution of gas infrastructure projects to sustainability as defined in the TEN-E Regulation, Draft final report

Specifically on projects that aim to increase the share of hydrogen that can be blended into the natural gas grid: it must be noted that, even when electrolysers run on renewable electricity to produce green hydrogen, the GHG reduction potential is limited by the fact that hydrogen has a lower energy content than methane. Since the calorific value of hydrogen is about 1/3 of the calorific value of natural gas, a 10 vol% H2 admixture is equivalent to only 3.3% of the energy content. This translates into -11.6% CO2 effect for an admixture of 30 vol% hydrogen, providing only relatively limited room for decarbonisation in the medium- to long-term.[110]

Projects that specifically aim at enabling the integration of renewable and low-carbon gases into the gas grid would have to prove significant net GHG savings to be eligible for PCI status. This poses a number of difficulties because fossil and green gas molecules share the same network infrastructure and therefore the GHG reductions would result from a planned increase of renewable and low-carbon gases in a given network, which are enabled, but not directly influenced, by such projects[111]. The project promoter (typically a TSO) has limited ability to influence the gas mix. Under the unbundling rules, a TSO (or DSO) is responsible for network operation but it does not determine what type of gas is injected into its grid because it has to grant equal access to all network users. A network operator can invest in pipeline projects that enable more injections of renewable and low-carbon gases (for instance a transmission pipeline leading to an area with major biogas production potential where there are transmission bottlenecks) but this pipeline will be able to carry biomethane and natural gas alike. Therefore, investments in gas networks can only indirectly reduce GHG emissions by enabling a greener gas mix, while the actual GHG impact will depend on actual gas flows, which is to a large extent beyond the control of network operators. This creates a risk of "greenwashing" as any new gas infrastructure ostensibly built for renewable gases could in practice end up being used for natural gas because it will in the end form part of a given gas network operator's regulated asset base.

Infrastructure types linked more closely to the supply of green gases can contribute more directly to the decarbonisation objectives. For instance, a connecting pipeline linking a biomethane plant to the transmission grid can be expected to transport only biomethane. A P2G facility producing green hydrogen with a view to injecting it into the gas network (together with its connecting pipeline) can be expected to directly contribute to GHG reductions. However, such connecting pipelines and facilities related to gas supply are typically non-regulated assets, meaning they relate to competitive activities and have no regulatory scrutiny of costs.

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[111] Methodologies such as the EIB's Project Carbon Footprint Methodology elaborates on the assessment of GHG emissions and emission variations generated by a wide spectrum of projects, including energy transmission and distribution assets. However, such methodologies would not fit the purpose of the present IA in the case of power lines and gas transmission infrastructure, given that it is based on estimations of CO2 emissions for the entire network and an emissions factors per unit of supply. In most cases, emissions for the current level of supply would go up without the investment. The percentage share of the network assets replaced/rehabilitated is estimated. Carbon footprints (absolute and baseline) are calculated using this percentage share of the total emissions of the network (with and without the project) for the pre-project levels of demand.

To a certain extent, additional requirements could offer some safeguards that the selected gas PCIs do indeed contribute to significant GHG reductions and avoid the risk of creating assets that would continue to be used predominantly for natural gas. This could include a stronger sustainability assessment of candidate PCIs (see section 6.2.2) or a requirement that the projects are presented in the context of credible policy and/or network development plans to roll out renewable and low-carbon gases (see section 6.2.2). However, while this may work for smart gas grids, in other cases such as new infrastructure for renewable gases or retrofits for hydrogen blends (see below sub-option, such safeguards may not entirely address the risk of financing infrastructure that would end up being used primarily for fossil energy in reality.

Social impacts

Access to PCI and CEF funding could limit the effect of related investments on tariffs.

<u>Sub-option</u>: Natural gas transport infrastructure for renewable and low-carbon gases

In addition to the above impacts, the following impacts are relevant for this sub-option. A study for DG Energy[112] has estimated a total technical biogas/biomethane production potential of 1 150 TWh/yr for 2050[113]. This compares to 193 TWh biogas production in 2016, almost a six-fold increase. The full deployment of the biomethane potential identified in the study would have a profound impact on the pattern of gas flows in Europe with flows originating from countries with high biomass potential to centres of consumption. While gas transmission grid capacity in the short- to mid-term is unlikely to present a bottleneck, there would be a need for investment in additional cross-border capacity in the long run[114]. In such a case, the TEN-E framework could add value by prioritizing such possible projects of cross-border relevance (even though it has to be added that in practice there have not been any projects thus far that would have aimed specifically at enabling cross-border renewable gas flows). A methane-heavy 2050 scenario involves higher investment need in cross-border gas networks than a hydrogen-heavy scenario[115]. However, the system-wide costs are also higher, since the production of carbon-free methane from hydrogen increases conversion losses and electricity consumption for the same amount of energy. [116] It should be noted that the biomethane

[112] Trinomics (2019): Impact of the use of the biomethane and hydrogen potential on trans-European infrastructure, Study for DG ENER

[113] This is equal to about 118 bcm, based on a calorific value of 35.17 MJ/m3, see https://unit-converter.gasunie.nl/

[114] See assessment and depiction of the possible effect of hydrogen on gas flows and capacity investments in Trinomics (2019) pp. 102-111.

[115] The study estimates that, by 2050, investment needs in cross-border gas infrastructure would be €5 billion per annum in a hydrogen heavy scenario and €1.2 billion p.a. in a methane heavy scenario, while overall system costs are lower in the hydrogen scenario due to higher efficiency, i.e. smaller conversion losses (see Annex 8 for more details).

[116] Trinomics: Impact of the use of the biomethane and hydrogen potential on trans-European infrastructure, Study for DG ENER, 2019

potential assumed by the study is higher than in the Commission's impact assessment for the climate target plan[117], so the effect depends on those assumptions.

By contrast to biomethane, the blending of hydrogen into the methane gas grid is much more complex and requires careful consideration. Hydrogen can also be directly injected into the natural gas (methane) grid – but only up to strict limits because hydrogen is a different molecule than methane. Industry data show that nearly all network elements at both distribution and transmission level can handle up to 10% hydrogen (with the exception of compressor stations and some other equipment). Going beyond this limit usually requires adaptations.[118] Importantly, blending changes gas quality and prevents the direct use of hydrogen in higher-value applications, such as industry and transport. Therefore, the main bottleneck for blending is not necessarily the transport infrastructure but the end-use applications. While blending may be a relatively low-cost[119] solution in specific circumstances and could lay the ground for scaling up hydrogen use, hydrogen admixture levels beyond 20% would be impractical and have important implications for end users. A number of EU countries do foresee a role for hydrogen blends during a transition period and see a need for EU level coordination to avoid creating barriers for cross-border gas flows[120]. Such projects are unlikely to meet the existing cross-border criterion, as they are not directed at creating additional cross-border transmission capacity. The risk of "greenwashing", as discussed above, is particularly relevant for this sub-option, i.e. new infrastructure for renewable gases or retrofits for hydrogen blends, which are intended to be used for renewable and low carbon gases but may in practice be used (predominantly or exclusively) for natural gas.

Sub-option: Exceptions for natural gas PCIs at an advanced implementation stage

New natural gas PCIs – beyond the most advanced PCI projects on the 4th PCI list – are unlikely to be needed for security of supply or market integration.

If the revised TEN-E Regulation excludes natural gas infrastructure from the scope, all existing PCI projects – including the most advanced ones – would lose eligibility for PCI status. There might be expectations for special treatment for existing PCIs which are still not completed but which will have started construction by the time the first PCI list under the revised regulation enters into force or which will have already received CEF support by that time (as described in the policy option). The implementation of those projects should not be prevented or significantly delayed due to the loss of PCI status which would not affect signed grant agreements for CEF financial assistance.

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[117] To note that the scenarios in the Commission's impact assessment for the climate target plan count with biogas volumes of 56-63 Mtoe by 2050, or around 650-730 TWh (with a conversion factor of around 11.6 TWh / Mtoe).

[118] See Marcogaz: Overview of available test results and regulatory limits for hydrogen admission into existing natural gas infrastructure and end use, October 2019

[119] For instance, French gas operators count with limited costs up to 6-10% blending ratios (Technical and economic conditions for injecting hydrogen into natural gas networks, Final report by French gas network operators, June 2019, see esp. p. 22 for investment estimates). See Annex 8 for more detail.

[120] See ACER: NRA Survey on Hydrogen, Biomethane, and Related Network Adaptations, Evaluation of Responses Report, July 2020

Based on the planned commissioning dates of the existing gas PCI projects on the 4th PCI list, many are expected to be completed by the time when the first PCI list under the revised Regulation would be established[121] (provided there are no implementation delays). However, according to ACER monitoring data, there may still be up to 21 gas PCIs[122] from the current list that are presently less mature and may wish to apply for PCI status under the revised framework. Provided these projects are advanced by then (according to the definition set out in the policy option), they could be captured by this possible exception.

The projects that could benefit from the exception would already need to be well-advanced. For such projects, the loss of PCI status is unlikely to prevent or delay timely project implementation, as they will have either started construction or already secured funding, including through a CEF grant agreement. Therefore, only the implementation of less advanced gas projects (i.e. those that are only planned or still under permitting) would be affected by the loss of PCI status due to the change in the Regulation's scope. However, these projects are unlikely to bring significant benefits according to the evaluation report and other evidence presented in this impact assessment (see above).

6.1.3 Projects of mutual interest

Option A.5.0: Business as usual

Projects, which are not able to demonstrate socio-economic benefits for at least two EU Member States, could be pursued relying on other policy instruments, in particular under the accession and neighbourhood policy, but would not benefit from the provisions of the TEN-E revision and would not have access to CEF financial assistance.

Option A.5.1: Inclusion of PMIs under the TEN-E Regulation

Socio-economic impacts

The inclusion of PMIs in the TEN-E framework would enable the identification of additional projects that demonstrate significant net socio-economic benefits, e.g. in terms of enhancing security of supply and/or contributing to higher share of renewables in the EU and in the neighbouring countries. The requirement from an involved third country that a priority status under the TEN-E is conditioned to project specific regulatory approximation with the EU in terms of internal energy market policies can provide socio-economic benefits by extending the pro-competitive impact of the EU's internal market rules to infrastructure connecting the internal market with third countries, including avoidance of distortion of competition.

Environmental impacts

The inclusion of PMIs under the TEN-E framework would be conditional on the infrastructure projects beyond the EU territory, often in EU's immediate neighbourhood,

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[121] It is assumed that end 2023 is the earliest possible date for the adoption of the first PCI list under the revised TEN-E Regulation.

[122] ACER: Consolidated Report on the progress of electricity and gas Projects of Common Interest, July 2020

being aligned with the EU's energy and climate objectives. In order for the project to benefit from priority status under the TEN-E, there would be a requirement on the involved third country for approximation with the EU also in terms of sustainability, environmental and climate policies, which could contribute to the achievement of the decarbonisation objectives beyond the EU's border while limiting the risk of carbon leakage.

Administrative burden

Building on the current governance model of the TEN-E and PCI process which already foresees the participation of stakeholders from third countries (like project promoters, energy regulatory agencies, ministries, and NGOs), there would be very limited adjustments needed. The requirement of regulatory alignment concerning different EU policies from third countries which have not adopted the EU acquis yet (i.e. those which are not signatories of the Energy Community Treaty), would require the establishment of procedures for monitoring and enforcing these particular provisions vis-à-vis the concerned third countries. The administrative burden would depend on the number and specificities of the projects and countries involved.

6.2 Governance / Infrastructure planning

6.2.1 Offshore grids for renewable energy

Option B.1.0: Business as usual

Environmental impacts

Despite the initiatives that will create more ambition on offshore renewable energy, the continuation of the current framework would not change the incremental progress in developing the necessary offshore grid infrastructure. While this would reduce the impact on maritime space, the required greenhouse gas emissions to reach climate neutrality by 2050 could not be achieved.

Socio-economic impacts

There would be significant costs of delays and lack of leveraging the infrastructure investments needed to meet the 2050 energy and climate objectives, which is a prerequisite for a significant upscale of offshore wind energy in Europe. The European industry would lose its technology leadership in an important future technology market and not exploit the jobs and growth potential in this sector.

Option B.1.1: Integrated offshore development plans

Environmental impacts

An optimised offshore grid would result in two key environmental benefits: first, it would enable the integration of a significant amount of renewable electricity from offshore renewable energy sources into the European power grid and, secondly, the consideration, from the initial stage, of the maritime spatial plans and environmental aspects within the infrastructure planning will allow minimising the environmental impact of the future offshore infrastructure.

The potential greenhouse gas emission reductions from the development of offshore renewable energy, and related infrastructure, have not been quantified yet. However, given the expected deployment the emissions reductions can be considered significant in a mid-term perspective. These would depend on the actual deployment rate and the greenhouse gas intensity of the electricity it replaces. This is influenced by various factors including demand and supply patterns, price sensitivities, localisations, grid congestions. It is expected that the coordinated and optimised grid planning at regional level would reduce the need for landing points. This would have a direct positive environmental impact.

Economic impacts

An efficient market framework and optimised offshore grid planning is likely to bring a higher overall social welfare than the current trajectory. In 2019, a Commission study on hybrid projects in the North Seas by Roland Berger shows possible cost savings of about 10 percent, which would be equivalent to between EUR 300 million and EUR 2500 million for five projects alone, depending of the size of the comparable conventional projects[123].

According to ENTSO-E, holistic planning and coordination of development of on- and offshore transmission systems is a requirement to ensure timely development and low cost for the end consumer concerning offshore grids. Such an approach would limit the expected increase in grid expansion costs for offshore network developments. It would also help to shorten the time required for offshore grid development and hence to keep pace with the shorter lead times for the deployment of offshore wind.[124]

The establishment of an enabling grid planning framework for offshore grids would open up a significant market for the renewable energy industry, in particular in Europe, and partially compensate for the slowdown in renewable development onshore in some regions in Europe. This could have significant positive impacts on turnover and employment by contributing to maintain Europe's technological leadership in this area.

Social impacts

It is expected that the expansion of offshore renewable energy could have a positive effect on employment across the EU. For instance, based on industry estimates, 77,000 people work in offshore wind in Europe today and this is expected to increase to more than 200,000 if the commitments for offshore wind expansion such as in the NECPs are met[125]. According to the European Technology and Innovation Platform for Ocean Energy (ETIP Ocean[126]), with a clear development strategy and by creating the right policy conditions, 400,000 jobs could be created in the EU by 2050 in the ocean energy sector (e.g. wave, tidal, floating solar).

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[123] Roland Berger (2019): Hybrid projects: How to reduce the cost and space of offshore wind projects

[124] WindEurope (2019): Industry position on how offshore grids should develop, https://windeurope.org/wp-content/uploads/files/policy/position-papers/WindEurope-Industry-position-on-how-offshore-grids-should-develop.pdf

[125] EU27 + UK but excluding Norway, Source: WindEurope

[126] https://www.etipocean.eu/

Large TSO investments in offshore grids can lead to a tariff increase, to the detriment of consumers. That is why an appropriate cost-benefit cost allocation is key to stimulate these investments in the most efficient way (see policy option D.1.1).

Administrative burden

The option would build on ENTSOs' existing capabilities on network planning and the resource implications are considered limited for ENTSOs and TSOs. It would require participation in regional group meetings, data collection.

Option B.1.2: Regional Independent System Operator / Joint Undertaking

While the *environmental, economic and social impact* are expected to be similar as under option B.1.2, there would be an initial *administrative burden* in setting up a new entity in the form of Regional Independent System operator or a Joint Undertaking either per regional priority corridors or sea basins. When established, this entity could reduce some of the administrative burden related to planning for the Commission, TSOs and Member States as the entity would take on the responsibility for developing the offshore gird. In addition to the resources for the administrative tasks, the entity would need the necessary network modelling capabilities with significant additional costs.

This option would have significant impacts on all actors involved in the offshore planning. The Regional Independent System operator or Joint Undertaking bodies would not only be responsible for the planning of the offshore infrastructure but it would also decide on the costs to be allocated to each Member State. Member States, TSOs, and NRAs would lose influence in this process. This is also likely to result in higher transaction costs and the risk of non-synchronised planning due to split responsibilities for the offshore and onshore infrastructure planning.

While the role of ENTSOs and TSOs would be significantly weakened for the offshore planning, they would remain the main information providers. This may result in decreased interest in cooperation between the TSOs on the planning level, and possibly in decreased data accuracy and sharing. Given the institutional changes, setting up a Regional Independent System operator or Joint Undertaking bodies would require a rather long lead time also because there is no equivalent body in place that could be used as best practice.

6.2.2 Cross-sectoral infrastructure planning

Option B.2.0: Business as usual

Environmental and economic impacts

While the scenarios and system needs assessments that underpin the TYNDP and the PCI selection process, as carried out by the ENTSOs, are based on DG ENER scenarios and reflect the 2050 climate-neutrality objectives and relevant policy initiatives, the trajectories chosen may favour in particular high levels of gas demand and result in estimations of flows for the different energy carriers that favour the construction of more infrastructure than is actually required for achieving the 2050 carbon-neutrality objective.[127] Therefore, this option may lead to the selection of PCI projects that would not be in line with long-term policy objectives. This would lead to negative environmental and the socio-economic impact, the latter mainly linked to risk of stranded assets. The possibility to repurpose gas pipelines for hydrogen transport and the potential cost savings should only be applied to existing gas pipelines or those that are already under construction / development. Developing new natural gas infrastructure projects with the assumption that they may be repurposed in the future would need to take into account the costs for developing the infrastructure in the first place and hence significantly affect the potential cost advantages of repurposing and bear the significant risk of green washing (see section 6.1.2).

Option B.2.1: Strengthened governance and sustainability

Environmental and economic impacts

An increased oversight by the Commission over the scenarios and system needs identification, a strengthened role for ACER in the methodology to assess the costs and benefits of the projects, as well as an increased role for the DSOs in the planning process is expected to result in more realistic electricity and gas demand assumptions and infrastructure needs identification as well as an improved project assessment. With a better framing of the 2030-2050 assumptions and the inclusion of a mandatory sustainability criterion, the PCI process will only select gas and electricity projects that enable the Green Deal objectives.

The mandatory sustainability criterion in the PCI process would be applied to all gas projects that will be within the future scope of the TEN-E Regulation. Hence, if fossil gas is excluded from its scope, it would apply to other gas categories such as hydrogen, P2G, and renewable gases, if included in its scope. This would have a direct impact on the ranking of the candidate PCI projects, as the projects with little to no sustainability benefits would be ranked lower and the ones that prove to bring high sustainability benefits would be ranked higher. Overall, this option is expected to lead to an optimised interlinked infrastructure planning.

Administrative burden

This option would complement the ENTSOs' current role with an increased Commission and ACER oversight. As such, the administrative burden on the Commission and ACER will increase in line with the additional work related to continuous follow-up of the TYNDPs development. There would be no direct impact on project promoters.

Social impact

Optimizing the infrastructure need identification and projects assessment within the frame of TYNDPs will minimise the impact on network tariffs and final energy prices.

[127] E.g. the ENTSOs 2020 Climate Action scenario assumes 70% gas import in 2050, while giving little to no consideration on how and where such amount of gas is to be fully decarbonized.

Option B.2.2: New governance set-up and expansion of scope and role of the TYNDP

The implementation of this option is expected to deliver similar economic, social and environmental results as policy option B.2.1.

The key difference concerns the *administrative burden*. The transfer of responsibilities also carries significant risks, as specific expertise would need to be built up very rapidly by the Commission and ACER. The Commission, possibly with the help of a third party, would have to, not only approve the results, as in option two, but also coordinate data collections and crosschecks, projects submissions, manage studies and project assessments. It would ultimately lead to parallel structures, as grid planning requires very specific expertise. While the role of ENTSOs and TSOs would be significantly weakened, they would still remain the main information providers which would significantly increase transaction costs and may result in decreased data accuracy and data sharing (as under option B.1.3).

6.3 Permitting and public participation

Option C.1.0 Business as usual

Environmental impacts

The TEN-E Regulation already ensures that PCIs have to abide by the highest standards of environmental protection provided by national and EU law. However, lengthier permitting processes could cause that the environmental assessments performed become outdated and have to be redone.

Social impacts

Citizens would be affected as they would have less access to information regarding the projects due to the fact that project websites are very often outdated. Moreover, citizens would not be able to follow how their input was taken into account.

With lengthier, unclear, permitting processes, citizens are affected, firstly, because such projects do not realize their benefits sooner, including their benefits for consumers (eg. lower energy prices), but also because prolonged permitting procedures can create confusion and uncertainty in the role and effect of public consultations which could become obsolete by the time the permitting process is completed.

Economic impacts and administrative burden

The duration of court procedures, such as appeals, is not included in the maximum duration of the permitting process of 3.5 years. Therefore, such court procedures regarding PCIs can delay the overall implementation of the projects.

The current transitional provisions mention that for projects which submitted their permitting application file before 16 November 2013, the permitting provisions and the priority status do not apply (Chapter III). Several projects are encountering this issue and have not yet completed their permitting process. This has caused significant delays in their implementation and the situation would continue.

Lengthy permitting procedures increase administrative costs both for the project promoter, but also for the national competent authorities and other authorities concerned as certain permits that expire in the meantime might have to be obtained several times before the completion of the entire permitting process.

Option C.1.1: Use of urgent court procedures

The time limits laid down for the permitting process, currently 3.5 years, do not include administrative appeal procedures and judicial remedies before a court or tribunal which delay implementation of the projects in addition to the timeline of the permitting process. Requiring Member States that currently have in place urgent court procedures (e.g. cutting in half court deadlines) in other cases to extend these to PCIs keeps the necessary balance between the rule of law in the Member States and their sovereignty and the acceleration of the implementation of PCIs.

The introduction of the requirement for Member States to ensure that accelerated litigation procedures, where available, are applicable to PCIs under national legislations should be seen in a similar manner, including for the purposes of safeguarding the sovereignty and rule of law of the Member States, as the introduction, as per the current Regulation, of the requirement that PCIs are granted the priority status where this exists under national law: "*Where such status exists in national law, projects of common interest shall be allocated the status of the highest national significance possible…*". Member States that do not have this status do not have the obligation. According to available data, at least 11 Member States[128] have such accelerated/urgent litigation procedures in place that they could extend to PCIs. These procedures are used for a variety of matters from family matters to insolvency proceedings or setting-up or enforcing guarantees on movable or immovable assets. Some of these urgent matters are, in fact, quite complex, but due to their urgent nature require acceleration.

Environmental impacts

The acceleration of court procedures should not have any environmental impacts.

Economic impact and administrative burden

An accelerated accomplishment of the project implementation through faster court procedures decreases costs for both project promoters and competent authorities, while entailing additional costs for national courts who would have to dedicate additional resources to procedures regarding PCIs. However, the Union list of PCIs could contain maximum 220 projects, in accordance with the TEN-E Regulation and, in practice, the actual number of projects has been significantly lower. For example, the 4th Union list contains 149 projects. Therefore, the number of court cases for the entire EU that such projects could generate is not high, by comparison to the frequency of other types of urgent court procedures Member States already have in place.

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[128] Data from two studies prepared for the European Commission by CEPEJ (the European Commission for the Efficiency of Justice) on the functioning of judicial systems in the EU Member States – 2018, https://ec.europa.eu/info/publications/cepej-studies-2019_en, as well as, The Rule of Law Stress Test – EU Member States' Responses to Covid-19, https://democracy-reporting.org/dri_publications/the-rule-of-law-stress-test-eu-member-states-responses-to-covid-19/

An accelerated accomplishment of the permitting process also allows for a faster implementation of the project therefore bringing forward the benefits identified in the CBA. This will have a significant economic impact on regional energy markets, if not, even a European wide impact. The economic impact could be determined based on the CBAs of the projects impacted by the accelerated procedures. No data is currently available for fully capturing the impact. However, in a Working Paper by the Renewable Grid Initiative and ENTSOE, Value of timely implementation from May 2019, calculations were performed as to how much delays cost for an example project, including the "Garenfeld substation" (Germany). A delay of 2 years due to an average court procedure was estimated at a cost of 150 million €[129].

Option C1.2: Creating a one-stop shop per sea basin for infrastructure related to offshore renewable projects

The creation of a one-stop shop per sea basin would enable the acceleration of the permitting process for infrastructure related to the deployment of offshore renewable generation in order for such projects to finish permitting within the maximum limitation of 3.5 years. In practice, offshore projects cross many more jurisdictions than onshore projects as they cross either national waters or the exclusive economic zones of several Member States and, possibly, third countries. This makes their permitting process particularly complex, as they have to follow all the specific rules of these jurisdictions.

Environmental impact

The creation of a one-stop shop per sea basin would bring positive environmental impacts as strategic environmental assessments could be performed at sea basin level. On this basis, environmental assessments for specific projects could be strengthened. Moreover, one entity coordinating the permitting process would also enable a better coordination of the environmental impact assessment across borders.

Economic impact

The creation of a one-stop shop per sea basin would have positive economic benefits as it would lead to the swifter realization of infrastructure related to the deployment of offshore renewable generation which would realize its benefits sooner. There are no specific data allowing the calculation of the economic benefits realised by the swifter implementation of such infrastructure to be brought as example, but the benefits calculated in the example provided Option C1.1. could be taken as an indication.

Administrative burden

The option would considerably diminish the administrative burden and costs for the project promoters who would also benefit and be able to use data from studies already conducted for the sea basin. Project promoters would have to employ fewer personnel

[129] Renewable Grid Initiative and ENTSOE, Value of timely implementation of "better projects", May 2019, Working Paper https://eepublicdownloads.azureedge.net/clean-documents/Publications/Position%20papers%20and%20reports/20190517_RGI_ENTSOE_working_paper_better_projects.pdf

and use less resources than having to deal with every competent authority in all the Member States where the project is located.

The one-stop shop would require very limited additional resources as the assessment afferent to all permits would continue to take place on the basis of the national requirements for the different Member States on the territory of which the project is located. The one-stop shop is not a new institution, but would consist of a secretariat formed of staff from the national competent authorities, with no additional staff required. The one stop-shop would ensure a single point of contact for the project promoters and the coordination of the national one-stop shops. While the creation of the one-stop shop will lead to one off administrative costs for the establishment of the relevant procedures, it could eventually save resources in national administrations as it would avoid parallel national work streams for issuing several (national) comprehensive decisions.

6.4 Regulatory treatment

According to stakeholders, CBCA decisions are the main instrument to improve the regulatory conditions of cross-border projects. While the approach taken to share costs between Member States in relation to benefits is largely appraised, the details of the mechanism reduce its attractiveness. The number of PCIs with a CBCA decision remains relatively low: as of March 2020 only 42 CBCA decisions were issued. This indicates that the desired effect is limited to a small number of projects only, but the contribution to the improvement of the regulatory framework is, however, well appraised. Thus, as issues in the details of the process for CBCAs persist, which are reflected in the low number of cost sharing decisions[130], their removal should lead to an increased and correct use of the CBCA procedure.

Option D.1.0: Business as usual

Environmental impacts

There would be no environmental impacts from maintaining unchanged the CBCA provisions.

Social impacts

CBCA procedures, as currently provided, are underutilized and do not reach their potential in assisting projects' realization. This leads to unrealized benefits for the society on the whole and for citizens directly by the fact that benefits such as energy cost decreases are delayed.

Economic impact and administrative burden

Maintaining the current provisions regarding the CBCA procedure leaves this procedure to be utilized mainly as a prior requirement for accessing CEF financial assistance. Moreover, many CBCA decisions are conditional upon the receipt of CEF financial

[130] Ecorys et al. (2020): Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure, Draft final report

assistance or do not fully allocate all costs of the projects into the tariffs, leaving a financing gap and delaying project realization.

This option would not have an impact on the administrative burden.

Option D.1.1: Inclusion of full investment costs

Environmental impacts

CBCA procedure enables the implementation of PCIs, which have benefits across-borders. In principle, clarifying the CBCA provisions should not have direct environmental impacts.

Economic and financial impacts

The split of investment costs across borders and their full inclusion of investment costs in the tariffs by the CBCA decision would enhance the potential for CEF financial assistance to be used solely as a last resort financing option.

The CEF Regulation provides that: "First, the market should have the priority to invest. Second, if investments are not made by the market, regulatory solutions should be explored, if necessary the relevant regulatory framework should be adjusted, and the correct application of the relevant regulatory framework should be ensured. Third, where the first two steps are not sufficient to deliver the necessary investment in projects of common interest, Union financial assistance could be granted if the project of common interest fulfils the applicable eligibility criteria"[131]. A stable regulatory environment created for a project with full regulatory coverage is therefore a pre-requisite for any project in order for it to have explored both market based financing solutions and regulatory solutions.

Stakeholder views were found to be mixed both on the need to carry out a cross-border cost allocation and on the method to be approach by NRAs. However, several stakeholders indicated that affordability should be key to making a grant decision. As such, the option safeguards the principle of "CEF last resort" whilst taking into account suggestions from stakeholders on improving the CBCA mechanism.

Social impacts

The CBCA will enable the realization of PCIs and in turn the benefits of such projects as identified in the CBA. This would also be taken into account for possible CEF financial assistance. The full extent of such benefits cannot be estimated as there are no data

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[131] Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010 Text with EEA relevance
OJ L 348, 20.12.2013, Recital 48

available, however, the example of costs of delay, as described above in the assessment of Option C.1.1, remains a good indication.[132]

Administrative burden

According to the stakeholder consultation, the costs for NRAs as a result of TEN-E are low the main cost driver is the CBCA process. For most NRAs less than 1 FTE is estimated to be currently involved[133].

This option increases the administrative burden on NRAs, which will have to allocate costs in full and include them in the tariffs. It also imposes on NRAs an obligation to assess the investment requests more thoroughly since all CBCA decisions will be final. However, this option decreases the administrative burden for project promoters and the financial market as the projects will benefit from regulatory stability being able to also obtain financing from the market.

7 HOW DO THE OPTIONS COMPARE?

The options considered are compared against the following criteria:

- **Effectiveness**: the extent to which different options would achieve the objectives;
- **Efficiency**: the benefits versus the costs; efficiency concerns "the extent to which objectives can be achieved for a given level of resource/at least cost";
- The **coherence** of each option with the overarching objectives of EU policies;
- The compliance of the options with the **proportionality principle.**

Table 3 summarises the assessment of each option against these criteria. The effectiveness of the policy options considers the extent to which the objectives, as set out in Section 4, are achieved. Specific measures to simplify and improve the efficiency of the TEN-E Regulation are set out in Section 8.2.

The TEN-E Regulation is a key instrument to achieve the timely development of sufficient energy infrastructures to enable delivering on the EU's energy and climate objectives in line with the European Green Deal, in particular the 2030/50 targets, market integration competitiveness, and security of supply. However, it is important to recognise that it is only one element. A number of other complementary policy measures have already been or need to be put in place at EU and national. These include investments in the necessary infrastructure projects without a significant cross-border impact, investment in research, development and innovation for new technologies, policies supporting renewable energy generation, and initiatives supporting the acceptance of new infrastructure projects.

[132] The CBCA enables the timely implementation of PCIs and hence avoids delays in project implementation. The benefits of a PCI are therefore realised earlier.
[133] Ecorys et al. (2020): Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure, Draft final report

Table 3: Comparison of policy options

Policy option	Description	Effectiveness	Efficiency	Coherence	Proportionality
	A) SCOPE				
Options A.1. Smart electricity grids and electricity storage					
Option A.1.0	Business as usual	o	o	o	o
Option A.1.1	Update of eligibility criteria	++	+	+	+
	<u>Sub-option</u>: Inclusion of non-mechanical storage	+	o	+	-
Option A.2 Gas infrastructure, hydrogen networks and power-to-gas					
Option A.2.0	Business as usual	o	o	o	o
Option A.2.1	Exclude all natural gas infrastructure but include hydrogen and P2G	+	+	+	+
Option A.2.2	Exclude natural gas infrastructure / include hydrogen, P2G & smart gas grids	+	+	++	+
	<u>Sub-option</u>: Natural gas infrastructure for renewable and low-carbon gases	-	o	-	o
	<u>Sub-option</u>: Exceptions for natural gas PCIs (advanced implementation)	-	-	-	-
Option A.3 Projects of mutual interest (PMIs)					
Option A.3.0	Business as usual	o	o	o	o
Option A.3.1	Inclusion of projects of mutual interest (PMIs)	+	o	+	o
	B) GOVERNANCE / INFRASTRUCTURE PLANNING				
Option B.1 Offshore grids for renewable energy					
Option B.1.0	Business as usual	o	o	o	o
Option B.1.1	Integrated offshore development plans	++	+	++	+
Option B.1.2	Regional ISO / JU	++	o	++	-
Option B.2 Cross-sectoral infrastructure planning					
Option B.2.0	Business as usual	o	o	o	o
Option B.2.1	Strengthened governance and sustainability	++	+	+	+
Option B.2.2	New governance set-up	+	-	+	o
	C) PERMITTING				
Option C.1 Permitting					
Option C.1.0	Business as usual	o	o	o	o
Option C.1.1.	Use of urgent court procedures	++	++	+	+
Option C.1.2	One-stop shop per sea basin for offshore renewable projects	++	++	++	o
	D) REGULATORY TREATMENT				
Option D.1 Regulatory treatment					
Option D.1.0	Business as usual	o	o	o	o
Option D.1.1	Inclusion full investment costs	+	+	+	o

Legend: -=small negative impacts; --= large negative impact; 0= no change; + = limited improvement; ++= significant improvement

Smart electricity grids and electricity storage

The assessment in section 6 showed that cross-border smart electricity grids constitute an important infrastructure category to enable the achievement of climate neutrality, market integration, competitiveness, security of supply in a rapidly changing and increasingly digitalised energy system. Nevertheless, this potential is currently not sufficiently exploited which would continue to be the case under BAU. Updating the eligibility criteria for electricity smart grids, whilst safeguarding the cross-border impact with the participation of project promotors from two or more Member States, would significantly increase the effectiveness of the policy instrument by allowing more smart electricity projects to apply for PCI status. It would therefore improve effectiveness by updating an infrastructure category necessary for the achievement of the climate and energy objectives. It would also have a positive impact on the efficiency as it would facilitate the cooperation between DSOs and TSOs by reducing administrative costs. The broadened scope would also improve the coherence of the policy instrument as it would address the digital transition and support the electrification of the transport sector.

However, while the importance of electricity storage has been demonstrated in general terms, the potential cross-border impact could not be fully demonstrated. Therefore, a broadened scope with a sufficiently ambitious cross-border criteria for storage may result in very few projects being selected potentially leading to higher costs than benefits, although this will depend on the exact definition of the cross-border impact as eligibility criterion and technological progress.

Gas infrastructure, hydrogen networks and power-to-gas

The continuation of the current framework would have a significantly negative impact on its effectiveness against the identified objectives. The assessment showed that no new cross-border natural gas infrastructure is needed in the EU due to the already commissioned gas PCIs or those under development as well as due to the expected reduction in demand for natural gas in the context of decarbonisation. Maintaining eligibility for natural gas projects would create unnecessary administrative costs for all actors involved in the PCI selection process as such projects would not be selected for PCI status if they cannot demonstrate benefits against identified needs. It could even entail the risk of financing stranded assets at the cost of consumers through network tariffs. BAU would be in contradiction with the climate neutrality objective, strongly incoherent with other EU policies and be at odds with the objective to create a future-proof TEN-E framework.

Limiting the scope to new and repurposed hydrogen networks and P2G would be fully coherent in view of the infrastructure required in the decarbonisation pathways towards 2050 and the expected role of hydrogen in it. It would also be more effective than the current framework in identifying the projects and investments needed for carbon-neutrality. The inclusion of hydrogen networks with cross-border relevance is necessary for a wider and more cost-efficient role out of hydrogen infrastructure based on European infrastructure planning for hydrogen. While current costs of these technologies are significant, these would not directly affect network tariffs and final consumer prices as long as these are non-regulated assets. Moreover, the inclusion of full conversion of existing natural gas assets would lead to a more cost-effective and more socially affordable pathway to the deployment of hydrogen infrastructure and avoid stranded assets in the existing gas network. In addition, their inclusion under TEN-E could help the deployment of hydrogen in different regions in the EU, also through CEF financial assistance. As regards EU added value, the inclusion of hydrogen networks will facilitate the development of cross-border hydrogen infrastructure and P2G assets of cross-border relevance, which may otherwise not take place. The policy option is proportional, as the prioritized projects would have to prove cross-border impact.

Including in the scope also smart gas grids could increase the effectiveness of the future TEN-E and would help to deliver decarbonisation already in the shorter term (because the emergence of cross-border hydrogen networks is expected as of 2030). The option is coherent with the EU decarbonisation policies and technology-neutrality, as low-carbon and renewable methane gases will play a role in the decarbonisation of the energy system and projects with cross-border relevance can reduce the related costs. The inclusion of smart gas grids would be proportional, as all projects would ensure better integration of renewable and low carbon gases with the transmission level; at the same time such projects have to prove cross-border relevance and EU added value.

In principle, keeping in the scope natural gas transmission projects specifically for low carbon and renewable gases and adding hydrogen blending projects could also contribute to these criteria; however, the coherence and effectiveness of this policy option depends on the ability of such projects to deliver significant net GHG savings. This could be mitigated to a certain extent by safeguards on the projects' sustainability impact but it is unlikely to fully avoid the risk of "green washing" and stranded assets. This is in particular the case for new gas transmission infrastructure built for renewable gases, where the risk that the created assets continue to be used for natural gas would be too big, reducing this option's effectiveness in reaching the policy objective as well as policy coherence. Retrofits of existing natural gas transmission assets for hydrogen admixtures have a limited scope to deliver sustainability benefits because of the lower energy value of hydrogen and the feasibility and cost-effectiveness is lowered by the significant adaptation and investment needs on the end-use side. Furthermore, such projects are unlikely to have significant cross-border impact.

An exception for advanced natural gas PCIs would not be effective, neither coherent with the more ambitious decarbonisation objectives of the climate target plan. Furthermore, such an exception would not be efficient, as the projects captured by the exception should be already sufficiently advanced to ensure their completion even in the absence of a PCI status. Hence, such a provision could be considered disproportionate.

Projects of mutual interest

Under the BAU option, only a limited number of projects with third countries have been identified as PCIs which is unlikely to change and limits the effectiveness and coherence of the current framework. The inclusion of PMIs in the revised TEN-E Regulation would take account of the increasing role of interconnections with third countries. The selection of PMIs within the TEN-E framework would increase the effectiveness of the Regulation since it would expand the scope of eligible infrastructure necessary to achieve EU climate and energy policy objectives. However, this would require project specific regulatory approximation with the relevant EU policies to limit adverse socio-economic or environmental impacts. Procedures for monitoring and enforcement would need to be established. This would entail additional administrative costs which would depend on the number and specificities of the projects and countries involved. However, these additional costs should be outweighed by the significant net socio-economic benefits of these projects. In addition, the inclusion of PMIs would increase the coherence of the TEN-E framework with other policies such as the EU neighbourhood policies and allow extending the scope of benefits accruing from the implementation of the EU's regulatory framework beyond its borders.

Offshore grids for renewable energy

As described in Section 6, the current framework is not effective to identify the projects necessary to contribute to the large role-out of the offshore infrastructure which are a precondition to achieve the offshore renewable generation capacity needed to meet the climate neutrality objective. The current approach to infrastructure planning does not address the specific needs and challenges for offshore grids.

Integrated offshore development plans would significantly improve the effectiveness of the TEN-E framework by departing from a bottom up planning approach to a planning against agreed objectives at regional level whilst integrating aspects of maritime spatial planning and environmental impact. This would address specific situation of offshore grids starting from scratch and spanning across different Member States. An incremental approach to cross-border interconnections building on existing (national) infrastructure networks is not feasible and would not allow to progress at the speed required to reach climate neutrality. Such an approach would also minimise the environmental impact of the future offshore infrastructure. Due to an optimised cross-border grid planning at regional level per sea basin it would reduce overall investments costs and provide an EU added value. This policy option scores highly in terms of policy coherence as it is fully in line with other EU policies such as the Green Deal and the forthcoming Offshore Renewable Energy Strategy.

The establishment of a regional Independent System Operator or Joint Undertaking would in the mid- to long-term be similarly effective to the previous option. However, it would take significant time to establish such a new entity which requires the agreement of all relevant parties involved (Member States, TSOs, NRAs) concerning responsibilities and tasks of such an entity and its financing. This would delay the implementation of a new approach to offshore infrastructure planning. It would also entail significant costs which would be disproportionate and premature at this stage of offshore renewable energy deployment. It would quite significantly interfere with the responsibilities of Member States, TSOs, and NRA and hence appears disproportionate.

Cross-sectoral infrastructure planning

As regards the effectiveness in terms of both supporting the identification of the infrastructure necessary to meet the set policy objectives and achieving an integrated network planning, the continuation of the current TEN-E would perpetuate the sectoral approach to network planning. This would not ensure that only those projects that are necessary for the energy transition and climate targets are identified as projects of common interest.

As compared to offshore grids for which the current infrastructure planning is considered not suited to address the specific challenges and achieve the energy and climate objectives, the situation for onshore infrastructure projects is different. The evaluation of the current TEN-E concluded that the TYNDP process as basis for the identification of PCIs has proven effective, but underlined the need for a more integrated approach to planning across the different sectors and a more balanced approach concerning the actors involved. A strengthened governance with a stronger oversight role for the Commission and ACER to ensure that the key steps in the infrastructure planning process fully reflect the climate neutrality objective and energy system integration would significantly improve the effectiveness of the policy instrument by ensuring a more accurate needs assessment based on a cross-sectoral approach. It would also ensure that this assessment is based on objectively defined scenarios fully in line with decarbonisation objectives as well as the energy efficiency first principle.

A new governance set-up would considerably weaken the role of the ENTSOs with a new actor taking the lead in the TYNDP process. This would require the built-up of significant expertise on infrastructure planning outside the ENTSOs and TSOs. Nonetheless, it would still need to rely largely on the data and expertise of the TSOs. This would result in significant additional transaction and administrative costs and negatively affect the efficiency of the TEN-E. The effectiveness of this options is expected to be slightly lower compared to the previous option which acknowledges the central role of the TSOs and ENTSOs in the infrastructure planning but introduces additional "checks and balances".

Both options include a mandatory sustainability criterion for all gas projects that will be within the future scope of the TEN-E Regulation (fossil gas, hydrogen, P2G, and/or renewable gases). This would have a direct impact on the ranking of the candidate PCIs and hence contribute to the identification of those projects in line with the climate neutrality objective. Such inclusion of a sustainability criterion would also improve the coherence of the initiative with other EU policies such as the EU taxonomy for sustainable investments. The taxonomy as guidance for private investors cannot replace the assessment as part of the PCI selection process which applies specific selection criteria considering all its policy objectives. An improved needs assessment would reinforce the energy efficiency first principle. This approach provides EU added value through an optimised cross-sectoral infrastructure planning at European level based on consistent assumptions. A better planning framework as achieved through this option would also establish an enabling framework to trigger and accelerate necessary investments.

Permitting

As explained in Section 6, business as usual is not considered effective to achieve the timely implementation of PCIs. In terms of efficiency, delays in the implementation of PCIs create exponentially higher costs to society than the administrative burden brought by the permitting process to the project promoters and national competent authorities. Therefore, the use of urgent court procedures in those Member States where such procedures exist would reduce cost and significantly improve efficiency. It is also coherent with EU policies as it allows for a better and swifter implementation of PCIs.

The creation of a one-stop shop per sea basin for offshore energy would entail significant improvements in terms of effectiveness, efficiency, and coherence by enabling the acceleration of the permitting process for infrastructure related to the deployment of offshore renewable generation, in particular if combined with the establishment of integrated offshore development plans (option B.1.1). A one-stop shop would avoid the establishment of up to eight parallel permitting processes for a sea basin.

On permitting, the combination of options C1.1. (Use of urgent court procedures and accelerating the permitting process (Option C.1.2, see Annex 9)) and C1.2 (One-stop shop per sea basin for offshore renewable infrastructure projects) would result in significant improvements.

Regulatory treatment

As regards the BAU option, the continuation of the current framework would not be effective in ensuring the timely implementation of PCIs. As explained in Section 6, the CBCA procedure has so far only been used in the context of a request for CEF grants and the national approaches to CBCA decisions are often inconsistent creating uncertainty for projects promoters and causing delays in project implementation. Costs related to delays in project implementation makes this option less efficient.

By comparison, the inclusion in full of the investments costs into tariffs in combination with clarifying the CBCA provisions, while creating additional administrative burden for NRAs and the Commission, leads to a swifter implementation of projects and faster realisation of their benefits being therefore both more effective and more efficient. The option is also coherent with the EU policies pursued by the perspective PCIs and is neutral as regards proportionality. In addition, the possibility for smart grids projects to obtain a CBCA, the clarification of the CBCA provisions would make the framework more effective by facilitating project implementation. Updating investment incentives to account for the higher risks would enhance effectiveness and efficiency in view of the expected benefits. It would also be coherent with the overall policy objectives and proportionate.

8 PREFERRED OPTION

The options within each group of policy options (A.1, A.2, B.1, B.2) are alternatives except for policy option group C.1 (permitting) and D.1 (regulatory treatment) where the options are complementary. The options on the scope are independent from the options on governance/infrastructure planning. The new planning framework will be applicable to the scope of the revised TEN-E Regulation and hence cover all eligible infrastructure categories not only those that may be affected by this initiative.

8.1 Package of preferred policy options

The assessment and the comparison of the options shows that no single option is sufficient to meet the identified objectives. Therefore, a package of policy options appears as best suited to achieve the specific objectives. The key political choices relate to the future scope and the future approach to infrastructure planning.

Concerning the future scope of TEN-E, the main question is whether to keep natural gas infrastructure as eligible infrastructure category or not. Based on the analysis in sections 6 and 7, the exclusion of methane gas infrastructure appears as the most effective and coherent approach. In that case the future TEN-E would include all those infrastructure categories that are needed to deliver on the EU's energy and climate objectives in line with the European Green Deal, in particular on the 2030/50 targets. As regards the future approach to infrastructure planning, a radical change to infrastructure planning seems not justified in view of the limited additional benefits and the significant increase in transaction costs which reduce efficiency and may make the instrument less effective compared to strengthening the current approach. However, given the specificities both in terms of the current situation and expected contribution to the long-term climate and energy objectives, a more radical change appears justified for offshore grids. A package of preferred options is presented in Table 4.

Table 4: Package of preferred policy options

Policy option	**Description**	**Package of preferred policy options**
Specific objective 1: Enable the identification of the cross-border projects and investments across the EU and with its neighbouring countries that are necessary for the energy transition and climate targets		
Options A.1. Smart electricity grids and electricity storage		
Option A.1.0	Business as usual	
Option A.1.1	Update of eligibility criteria	**X**
	Sub-option: Inclusion of non-mechanical storage	
Option A.2 Gas infrastructure, hydrogen networks and power-to-gas		
Option A.2.0	Business as usual	
Option A.2.1	Exclude all natural gas infrastructure but include hydrogen and P2G	
Option A.2.2	Exclude natural gas infrastructure but include hydrogen, P2G and smart gas grids	**X**
	Sub-option: Include natural gas infrastructure for renewable and low-carbon gases	
	Sub-option: Exceptions for natural gas PCIs at an advanced implementation stage	
Option A.3 Projects of mutual interest (PMIs)		
Option A.3.0	Business as usual	
Option A.3.1	Inclusion of projects of mutual interest (PMIs)	**X**
Specific objective 2: Improve infrastructure planning for energy system integration and offshore grids		
Option B.1 Offshore grids for renewable energy		
Option B.1.0	Business as usual	
Option B.1.1	Integrated offshore development plans	**X**
Option B.1.2	Regional ISO / JU	
Option B.2 Cross-sectoral infrastructure planning		
Option B.2.0	Business as usual	
Option B.2.1	Strengthened governance and sustainability	**X**
Option B.2.2	New governance set-up	
Specific objective 3: Shorten permitting procedures for PCIs to avoid delays in projects that facilitate the energy transition		
Option C.1 Permitting		
Option C.1.0	Business as usual	
Option C.1.1.	Accelerating the project implementation	**X**
Option C.1.2	One-stop shop per sea basin for offshore renewable projects	**X**
Specific objective 4: Ensure the appropriate use of the cost sharing tools and regulatory incentives		
Option D.1 Regulatory treatment		
Option D.1.0	Business as usual	
Option D.1.1	Inclusion full investment costs	**X**

The options pertaining to “offshore grids” and “cross-sectoral infrastructure planning” improve the governance and the infrastructure planning framework to enable the identification of projects necessary for the energy transition and climate targets. There are two main improvements: first, the introduction of an integrated network development plan for offshore infrastructure on the basis of Member States' joint commitments to the amount of the offshore renewable deployment for each sea basin (top down approach for offshore planning); second, adjustments to the roles of the key actors involved in the development of the TYNDP with strengthened oversight from the Commission and ACER on the ENTSOs. Policy options concerning "permitting" and "regulatory treatment" will complement these improvements to facilitate the timely development of the identified PCIs: a) the introduction of a one stop shop for offshore infrastructure per sea basin, b) the access to urgent court procedures, where available, and c) the inclusion of full investment costs in the cross-border cost allocation. Apart from the changes that are specific to offshore grids, the changes will apply to the scope of the revised TEN-E Regulation and all eligible infrastructure categories. Finally, the above benefits will be extended to projects connecting the EU with third countries (PMIs) given their expected increasing role in achieving the climate objectives.

In addition, oil pipelines and electricity highways will be removed as infrastructure categories and thematic areas.

In addition, the following technical options (see Annex 9) would be part of the policy package: accelerating the permitting process (option C.1.2.), increasing the transparency of PCIs (option C.2.1), possibility for smart grids projects to obtain a CBCA (option D.1.2), clarifying CBCA provisions (option D.1.3), and updating investment incentives (option D.1.4).

The package aims to "future proof" the TEN-E Regulation. The options on the future scope of the Regulation cover all technologies necessary for the energy transition and climate targets. The definitions are at the same time specific and sufficiently broad to accommodate technological developments to the extent possible. The PCI selection framework and the new approach to cross-sectoral infrastructure planning sets the key elements in terms of objectives and criteria. The future framework will maintain the role of the regional groups in the selection process to further specify and adjust these elements against new policy priorities and technological developments also considering the regional context.

8.2 REFIT (simplification and improved efficiency)

In order to simplify and improve the efficiency of the TEN-E Regulation the following measures have been identified to reduce compliance and regulatory costs. These are explained in more detail in Annex 10.

a) Reduced reporting obligations

While annual reporting by project promoters needs to be maintained to achieve the required transparency standards and allow the Regional Groups to tackle quickly any implementation issues that the projects may encounter, the annual report of the competent authorities could be transformed into input or additional information into the report of the project promoters. This measure would reduce costs and administrative burden for the project promoters, but in particular for competent authorities which would not need to submit a separate report. The cost saving cannot be estimated as the relevant data are not available, but it is a recurrent cost saving.

b) Reduced monitoring by ACER to once every two years

To simplify the reporting by ACER, their report could be issued once every two years, on time for the Regional Groups, to take it into account for their assessment of the new PCI candidates[134]. Since ACER's report is actually used only once every two years, this option could help simplify the monitoring obligations without any costs and without affecting the projects' implementation. This measure would reduce costs and administrative burden for ACER, for the members of the Regional Groups and the Commission. This measure could generate efficiency gains of approximately 20% of ACER's workload on reporting, equivalent to annual savings of EUR 60 000 (or 0.4 FTE per year).

c) Pre-consultation to become optional

The principles for public participation in the Regulation constitute minimum requirements to ensure early engagement with local communities and stakeholders affected by the construction of a PCI and include a pre-consultation process. In practice, the obligation to consult ahead of the launch of permitting procedure may be adding to existing national procedures. To avoid that two or more consultations are required at an early stage, it is suggested to make the pre-consultation optional, if it is already covered by national rules under the same or higher standards as in the TEN-E Regulation. The cost savings which would occur mainly with project promoters cannot be estimated as the relevant data are not available, but it is a recurrent cost saving.

d) Simplified inclusion in TYNDP for existing PCIs

An electricity or gas candidate project can apply for the inclusion in the Union list of PCIs only if it is included in the latest available TYNDPs, developed biennially by the ENTSOs. This process requires a significant amount of data and legal proofs[135]. Considering that existing PCI projects already delivered the necessary proofs in the previous TYNDP process, an automatic inclusion in the subsequent TYNDPs for such projects, as long as their administrative and technical data did not significantly change, is recommended. The cost savings which would occur mainly with project promoters cannot be estimated as the relevant data are not available, but it is a recurrent cost saving.

9 HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

The actual impacts of the legislation will be monitored and evaluated against a set of indicators tailored to the specific policy objectives to be achieved with the legislation. A review of the effectiveness of the new legislation could take place in 2026, when the second PCI selection process under the new framework should have been completed.

Under the existing TEN-E framework there are already regular reporting and monitoring procedures in place. This well-established monitoring system constitutes an important basis for monitoring the impacts of the legislation.

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[134] This option corresponds to the input of ACER to the stakeholder consultation.
[135] ENTSO-E : https://tyndp.entsoe.eu/promoters-corner
ENTSOG: https://www.entsog.eu/sites/default/files/2019-05/TYNDP%202020_Practical_Implementation_Document_20190502_0.pdf

9.1 Indicators

Building on the existing monitoring, the following indicators have been identified for the specific policy objectives:

- Enable the identification of the **necessary cross-border projects and investments**:
  - the number and types of projects under the defined priority corridors / thematic areas (planned, under construction or commissioned);
  - the installed capacity per project type and priority corridors / thematic areas;
  - the integration of renewable energy sources and reduced greenhouse gas emissions;
  - the interconnection level between Member States;

- Improve **infrastructure planning for energy system integration and offshore grids**:
  - installed capacities for offshore renewable energy generation;

- **Shorten permitting procedures** for projects of common interest
  - the average and maximum total duration of authorisation procedures for projects of common interest;
  - the average duration of court proceedings for projects of common interest;
  - the level of opposition faced by projects of common interest (number of written objections during the public consultation, number of legal recourse actions).

- Ensure the appropriate use of the regulatory framework
  - the number of projects of common interest having reached a cost allocation agreement among TSOs and NRAs based on full cost inclusion;
  - the average duration for reaching an cost allocation agreement;
  - the number and type of projects of common interest having received specific incentives and/or support by NRAs;

All data will be monitored on the basis of regular reports from project promoters and national regulators.

9.2 Operational objectives

Based on the policy options, the following operational objectives have been identified:

Operational objectives	**Indicators**
Implementation of PCIs that support the achievement of the climate neutrality objective by enabling RES integration	Reduced curtailment of renewable energy; doubling the number of smart electricity projects compared to current levels by 2026
Achieve a significant increase in the deployment of offshore renewable energy	At least 10 PCIs to support the deployment of offshore renewable energy by 2026
European approach to infrastructure planning for hydrogen networks	Integration of hydrogen in the TYNDP or establishment of a hydrogen network development plan; at least 5 hydrogen PCIs by 2026
Reduce delays in PCI implementation	Share of PCIs that are delayed in a given year compared to the initially planned commissioning date: reduce share compared to current situation

10 GLOSSARY

Term or acronym	Meaning or definition
ACER	Agency for the Cooperation of Energy Regulators
BAU	Business as usual
CAPEX	Capital expenditure
CBCA	Cross-border cost allocation
CBA	Cost-benefit analysis
DSO	Distribution System Operator
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSOG	European Network of Transmission System Operators for Gas
GHG	Greenhouse gas emissions
ISO	Independent System Operator
JU	Joint Undertaking
LNG	Liquefied natural gas
MS	Member State
OPEX	Operating expense
P2G	Power-to-gas
PCI	Project of common interest
RAB	Regulatory Asset Base
RES	Renewable energy sources
TSO	Transmission System Operator
TYNDP	Ten Year Network Development Plan

ANNEX 1: PROCEDURAL INFORMATION

Lead DG, Decide Planning/CWP references

The Directorate-General (DG) for Energy was leading the preparation of this initiative and the work on the Impact Assessment in the European Commission. The planning entry was approved in Decide Planning under the reference PLAN/2020/6566. It is included in the adjusted Commission Work Programme 2020 COM(2020) 440 final[136]under the policy objective A European Green Deal.

Organisation and timing

The planned adoption date (Q4 2020) included in the Commission Work Programme adopted on 29 January 2020, remained unchanged in the revised version adopted on 27 May 2020 following the COVID-19 crisis. An inter-service steering group (ISG), was established for preparing this initiative composed of the following Commission services: Secretariat General (SG), CLIMA, CNECT, GROW, RTD, NEAR, REGIO, ENV, JRC, MOVE, DEVCO, COMP, SJ. The ISG met five times in the period from January until adoption in December 2020.

Milestones	**Dates**
Publication of the inception impact assessment	11 May 2020
Feedback period on inception impact assessment	11 March – 8 June 2020
Open public consultation and targeted consultation	18 May - 13 July 2020
Online webinars	June 2020
Upstream meeting with Regulatory Scrutiny Board	14 July 2020
Submission to Regulatory Scrutiny Board	25 September 2020
Regulatory Scrutiny Board	21 October 2020
Resubmission to Regulatory Scrutiny Board	9 November 2020
ISC	[*to be added*]

Consultation of the RSB

The Impact Assessment report was first submitted to the Regulatory Scrutiny Board (RSB) on 25 September 2020 and discussed with the Board on 21 October 2020. The RSB delivered a negative opinion on 23 October 2020. The below table summarises how the revised Impact Assessment report addresses the requested improvements.

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136 https://eur-lex.europa.eu/resource.html?uri=cellar%3Af1ebd6bf-a0d3-11ea-9d2d-01aa75ed71a1.0006.02/DOC_1&format=PDF

RSB requested improvements	Changes in the revised report:
(1) The report should clarify the context of the revision. It should present the origins of the TEN-E framework, its current components (thematic areas, priority corridors, regional groupings, PCI selection criteria etc.) and financing. It should more clearly set out the current governance system for trans-European network plans.	Section 1 of the report has been thoroughly revised to clarify upfront the background and key elements of the current TEN-E Regulation. In addition, more details including illustrations on the PCI selection process as well as the TYNDP process have been added in section 3 “Implementation/State of play” of Annex 5 (Evaluation report). A new Annex 6 has been added to provide a more detailed overview on the status of PCIs and the relationship with CEF.
(2) Drawing on the evaluation, the problem analysis should present what has worked well under the existing Regulation and where there are shortcomings. It should detail which institutional issues of the current framework lead to non-alignment with European policy objectives and excessive time requirements for decision-making. It should explain which elements will remain unchanged in the revised Regulation and which will be up for review.	The key conclusions of the evaluation on the successes and shortcomings of the current TEN-E Regulation have been added at the beginning of section 2 and they have been systematically picked up the problem definition. The new sub-section 2.4 clarifies what elements will remain unchanged and which elements are subject for review.
(3) The report should elaborate on the new policy needs emerging from the Green Deal. It should clearly position how the TEN-E framework fits into this context. It should explain the linkages to other related policy initiatives (adopted or being developed), such as the energy efficiency and renewable energy directives and the green taxonomy for investments. The report should discuss the estimated regulatory and investment needs to establish the necessary energy infrastructure to reach the 2030/2050 climate targets, and the contribution from TEN-E.	The problem definition has been revised and restructured to better explain how the TEN-E framework fits into the new policy context of the Green Deal (section 2), language on regulatory and investments needs has been strengthened and completed with additional references (section 2.1). The baseline has been revised to better explain the linkages to other related policy initiatives (adopted or being developed), such as the energy efficiency and renewable energy directives and the green taxonomy for investments and how these affect the identified problems (sections 2.1 and 2.3).
(4) The report should clarify what will be the measures of success of the revised Regulation in contributing to the Green Deal and reducing delays.	Specific success indicators have been added to the indicators (section 9.2).

(5) The report should clarify how the revision intends to ensure technology neutrality. It should specify how the new planning framework will be able to accommodate changes in objectives and technologies. It should assess to what extent the sectoral combinations of options under "scope" are future proof, given that they would be fixed in the Regulation.	The issues of technology neutrality and "future proof" of the initiative have been explicitly addressed in comparison of the options (section 7) in terms of the scope and the governance, both the planning framework and the PCI selection process including the assessment methodologies. It has been highlighted to what extent certain options would be in conflict with making the revsied TEN-E Regulation future proof.
(6) The options should link better with the identified problems and objectives. The report should substantiate why it does not consider a more fundamental revision of the TEN-E approach, to improve the alignment with political objectives and timeliness of the planning process. The report should explain how the introduction of a mandatory sustainability criterion – next to other selection criteria – would ensure that the projects with the highest contribution to sustainability would be selected. The report should better justify why it relegates the discussion of some options to an annex.	In addition to the added clarifications on the TEN-E framework (see point 1) as well as the revised problem definition (see point 2), an intervention logic diagram (Figure 4) has been added to clarify how the objectives and options relate to the problems and underlying drivers. The introduction of a mandatory sustainability criterion has been explained in more detail (section 5.2.2.2 and new Annex 8). The options relegated to an Annex have been revised to focus on those options that are of technical nature. This has been clarified in the report.
(7) The report should better justify why the preferred option is the best response to the identified problems. It should explain how the inclusion of the updated criteria can improve the selection of projects of common interest, if the governance structure continues to be decentralised (with the European Network of Transmission System Operators continuing to initiate and lead the award decisions). It should clarify the role of the Agency for the Cooperation of Energy Regulators in this respect. It should make clear that the proposed solution for eliminating the delays applies only to some Member States. The report should present cost estimates for the proposed changes in the governance framework.	The report has been strengthened to better explain why the package of preferred options are considered best suited to address the identified problems (section 7 and 8, new Table 4) and highlights possible alternatives. The role of ACER and the Commission has been clarified (section 5.2.2). It has been clarified that option on accelerated court procedures would apply to some Member States only (section 6.3.1). The assessment of impacts in terms of administrative burden has been strengthened and cost estimates added (section 6.2).

Evidence, sources and quality

The impact assessment draws on evidence from the evaluation of the Regulation 347/2013 on guidelines for the trans-European energy networks, from the stakeholder input to the extensive consultations carried out in this respect, as well as from the results of a series of topical studies on key elements of the TEN-E Regulation, which will be presented below.

The impact assessment references the outcomes of a mid-term evaluation of the TEN-E Regulation, as well as evaluations and assessments carried out in the framework of other Commission initiatives, such as:

- Stepping up Europe's 2030 climate ambition, Commission staff working document Impact Assessment, SWD(2020) 176 final;
- A hydrogen strategy for a climate-neutral Europe, COM(2020) 301 final;
- Powering a climate-neutral economy: An EU Strategy for Energy System Integration, COM(2020) 299 final;
- EU Technical Expert Group on Sustainable Finance: Taxonomy, Technical Report (2020);
- Commission Expert Group on electricity interconnection targets, Third report of the Public engagement and acceptance in the planning and implementation of European electricity interconnectors (2019);
- A Clean Planet for all - A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy, Commission Communication COM(2018) 773;

Formal conclusions adopted in the framework of the Copenhagen Forum in 2018 and 2019 were also considered in the analysis. The Copenhagen Forum gathers annually representatives of the EU institutions, transmission system operators, project promoters, regulators, energy companies, NGOs and civil society and the financing community to discuss the challenges of developing Europe's energy infrastructure.

ACER's annual consolidated monitoring reports on the progress of electricity and gas PCIs, incremental capacity projects and virtual interconnection points as well other updates on the cross-border cost allocation decisions, project-specific risk-based incentives were equally considered.

Further information was gathered through several support studies previously commissioned to external contractors to support the development of policy options and assessment on:

Investment needs in infrastructure and costs of delays

- Ecofys (2017): Investments needs in trans-European infrastructure up to 2030 and beyond Eurelectric (2019)
- Eurelectric (2019), The Value of the Grid
- Renewable Grid Initiative/ ENTSOE (2019): Working Paper on Value of timely implementation of "better projects"

Market and technical data on different technologies

- Trinomics (2020): Study on Opportunities arising from the inclusion of Hydrogen Energy Technologies in the National Energy & Climate Plans
- Tractebel (2020): Hydrogen generation in Europe
- Trinomics (2019): Impact of the use of the biomethane and hydrogen potential on trans-European infrastructure
- International Energy Agency (2019): The Future of Hydrogen
- Artelys/Trinomics/Enerdata (2020): Study on energy storage – Contribution to the security of the electricity supply in Europe
- International Energy Agency (2020): Energy Storage Study
- EY/ REKK (2018): Quo vadis EU gas market regulatory framework –Study on a Gas Market Design for Europe

Digitalisation and innovation aspects

- Ecorys (2019): Do currrent regulatory frameworks in the EU support innovation and security of supply in electricity and gas grids?
- International Energy Agency (2017): Digitalisation and Energy, OECD
- ETIP/SNET (2018): Digitalisation of the energy system and customer participation Description and recommendations of Technologies, Use Cases and Cybersecurity

Sustainability

- Artelys/ Trinomics (2020): Measuring the contribution of gas infrastructure projects to sustainability as defined in the TEN-E Regulation [to be published]

Offshore grid development

- Navigant/SWECO (2020): Study on the offshore grid potential in the Mediterranean region [to be published]
- Roland Berger GmbH (2019): How to reduce costs and space of offshore development: North Seas offshore energy clusters study
- COWI (2019): Study on Baltic offshore wind energy cooperation under BEMIP

Public acceptance and delays in projects implementation

- Scope et al. (2020) Innovative actions and strategies to boost public awareness, trust and acceptance of trans-European energy infrastructure projects

ANNEX 2: STAKEHOLDER CONSULTATION

In line with the Better Regulation Guidelines and Toolbox notably for "back-to-back evaluations and impact assessments", the Commission carried out a comprehensive consultation based on a consultation strategy that included a range of consultation methods and tools that combined both backward and forward-looking elements. The strategy was designed in line with the intervention logic, placing the focus on relevance, effectiveness, efficiency, coherence, and EU value-added of the TEN-E Regulation.

The consultation strategy aimed to ensure that all relevant evidence were taken into account, including data about costs, about societal impact, and about the potential benefits of the initiative.

In line with the Better Regulation guidelines, the goal of the stakeholder consultation was:

- To collect views, experience and concrete examples from stakeholders that will illustrate particular opportunities, challenges and impacts resulting from the implementation of the TEN-E Regulation with the view to fill any potential information/data gaps, and facilitate the analysis of the different evaluation criteria;
- To solicit opinions on the extent to which the TEN-E Regulation is meeting its objectives.

As a crucial part of the data collection strategy for the evaluation and the forward-looking elements in the impact assessment, a stakeholder mapping exercise has been carried out in order to identify and group the main stakeholders that are involved in and affected by TEN-E Regulation. The consultation targeted stakeholders inside the EU, both at national and European level. In force since 2013, the current TEN-E Regulation has built an established and well-defined group of stakeholders. However, the exercise has been fine-tuned to tailor the identification of those stakeholders that are less known or active taking also into account new technological developments or contextual changes that may have triggered increase interest amongst certain stakeholders on the TEN-E Regulation and its revision.

The stakeholders identified have different roles, intervene at different stages and have various levels of interest. Their input has therefore been taken into account into different parts of the evaluation and the preparation of the Impact Assessment. Table 1 outlines the stakeholder categories and includes a brief explanation of the role and relevance of each group to the consultation. The list ensures a good coverage of all parties affected by the Regulation.

Table 1: Types of stakeholder and their main role and source of relevance in the TEN-E framework

Type of stakeholder	Main role and source of relevance in the TEN-E policy area
EU consumers and EU citizens	EU consumers (both citizens and organized civil society) are key stakeholders for the success of the energy transition and the enabling role of the energy infrastructure policy. Aside from the information on direct benefits and costs resulting from the actual implementation of an infrastructure project, citizens and consumers

	can offer insight on the burden of the overall functioning of the market and specific expectations regarding the implementation of projects and final energy price for electricity and gas.
Non-governmental organisations	NGOs are relevant representative bodies that, within the context of the TEN-E Regulation, generally provide additional views on environmental values and targets. Contact with NGOs will provide a better understanding of the environmental impacts and relevance of the different policy scenarios.
Services in the European Commission and agencies	DG ENER, DG ENV, DG CLIMA, DG CNECT and DG REGIO as well as INEA are main points of contacts for policy initiatives directly relevant for the implementation of the TEN-E Regulation.
European Parliament	In line with Inter-institutional agreements and commitments made by the Commission to this end, the Parliament will be closely informed of the stages of the revision of the TEN-E Regulation,
European Union Regulators	The Agency for the Cooperation of Energy Regulators (ACER) is responsible and/or involved in various tasks under the TEN-E Regulation.
National Regulatory Authorities	National regulators (NRAs) are authorised official public bodies established in most EU Member States with a common aim to exercise regulatory power on specific policy areas. Today, the European Union has energy rules set at the European level, but in practice it has 27 national regulatory frameworks. The relevant NRAs of each country are found in the Board of regulators of ACER. NRAs are significant stakeholders in the establishment of the Energy Union and for the implementation of the TEN-E Regulation.
National Competent Authorities and their local and regional representatives (i.e. Ministries and outermost regions)	The Ministries and outermost regions are the institutions and agencies competent for enforcing EU regulations. In each Member State, there is at least one Ministry responsible for implementing and enforcing the TEN-E Regulation.
European TSO (ENTSO-E and ENTSO-G)/DSO branch organisations	National TSOs and DSOs are represented by branch organisations at European level, such as ENTSO-E (Electricity), ENSO-G (Gas) and DSO Organisations (E.DSO for Smart Grids, Eurelectric, CEDEC, GEODE, Eurogas). These branch organisations will help gaining valuable insights concerning the implications and desires for the TEN-E Regulation and evaluation.
Project promoters, including Transmission System Operators	National companies operating electricity and gas networks and project promoters are responsible for the implementation of PCIs.
Energy producers / Industry	Other important parties that are affected by the TEN-E Regulation are energy producers and (large) industry parties, including ICT companies as well as the offshore renewable energy sector. This

	also includes industry and its associations representing the hydrogen and CCSU sectors.
Academics and thematic experts	Key contacts for a better understanding of the interconnected European energy grid and assessing the different policy scenarios. This group also includes legal experts, which are relevant contacts for data collection in order to prevent the different policy scenarios and get a better understanding of the legal framework of the Energy Union scheme.

The consultation strategy included a combination of consultation methods (i.e. open/targeted) and tools to provide well-reasoned responses and generate the information and evidence necessary to respond to the evaluation questions and inform forward-looking elements in the policy preparation.

In particular, several consultation tools were employed to generate a wealth of information and collect views on several aspects of the TEN-E Regulation, its implementation, enforcement, and effects. These include:

- Online Public Consultation;
- Targeted online survey;
- In-depth interviews;
- (Four) online stakeholder webinars.

A clear delineation has be established between the various consultation tools to best address the target groups and avoid stakeholder fatigue.

An **online public consultation (OPC)** open from 18 May to 13 July 2020 (midnight Brussels time) provided the opportunity to anyone interested in the evaluation and revision of the TEN-E Regulation to contribute. EU Survey was used to manage the OPC. The questionnaire was available in 23 of the official languages of the EU. It was addressed to mainly to citizens and organisations (e.g. NGOs, local government, local communities, companies and industry associations) that have no specialist knowledge of the TEN-E Regulation. This was reflected in the number, structure and wording of the questionnaire. The questions were limited, simple, easy to answer, and included sufficient contextual information to guide the contributor. Moreover, the questionnaire for the open public consultation did not cover all evaluation criteria, but rather non-technical elements on which citizens and the general public can share their views. The questions in the open public consultation aimed to identify the relevance of the TEN-E regulation in terms of its objectives, infrastructure categories, and the PCI features the general public deemed most important. Contributors with specialist knowledge of the TEN-E Regulation (e.g. as a professional for a national competent / regulatory authority, TSO, DSO, company project promoter, energy producer, NGO with specific knowledge on the subject) were invited to fill in a targeted survey. The online public consultation was be accessible on the Commission's Have your say website[137], including links to

[137] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12382-Revision-of-the-guidelines-for-trans-European-Energy-infrastructure

background documents and to relevant webpages, such as the ones dedicated to the TEN-E policy and the European Green Deal.

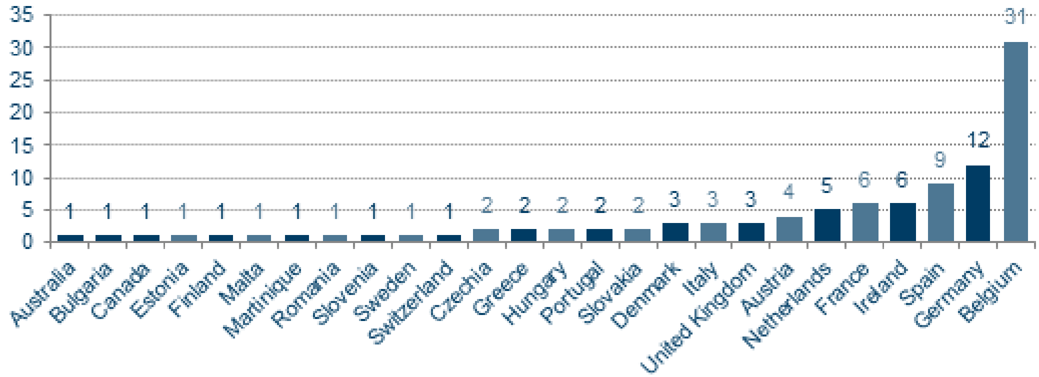
The open public consultation was shortened from the usual 12 weeks to 8 weeks. An evaluation roadmap of the current TEN-E Regulation was launched already in June 2019, setting the context and scope of the evaluation. The nearly 30 replies from the main stakeholder groups, as well as regular contacts with stakeholders indicated that stakeholders are informed and ready to engage in Commission's on-going work in this area. An inception impact assessment was equally launched ahead of the OPC on 11 May facilitating all interested parties to respond to the public consultation. The availability of the questionnaire in all official EU languages and the inclusiveness of the consultation tools ensured open access of all parties to the consultation whilst secured evidence collection through the targeted consultations (targeted survey, webinars, interviews).

The overall number of responses to the OPC questionnaire is 103. In addition, 169 emails were received via a functional mailbox for the consultation. Most of the contributions to the OPC questionnaire were in English (74 contributors chose to respond in English), but contributions were also received in French, German, Slovenian, and Spanish. Out of the 169 received emails received via the functional project mailbox 129 submissions represented identical replies from citizens, out of which 44 in Spanish, Italian, French, German and Portuguese.

The main category of respondents was EU citizens (28 responses), followed by business associations and company/business organisations. The following table outlines the respondents by each category.

Type of respondent	Number	Percentage
Academic/research institution	2	2%
Business association	25	24%
Company/business organisation	22	21%
Environmental organisation	2	2%
EU citizen	28	27%
Non-EU citizen	2	2%
Non-governmental organisation (NGO)	12	12%
Other	5	5%
Public authority	5	5%
Grand Total	103	100%

In terms of the distribution of responses by country, most responses were received from Belgium (31), followed by Germany (12), and Spain (9).

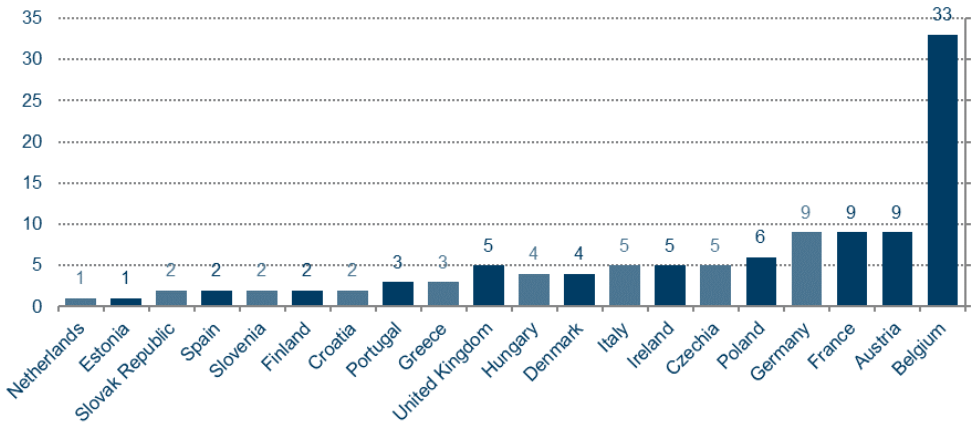


A **targeted consultation** (in English only) was carried out in parallel, specifically addressing project promoters, public authorities (NRAs, NCAs, regional and local governments), other actors of the energy system (e.g. DSOs, energy suppliers), civil society (e.g. local communities, NGOs) wider industry representatives and academics or researchers but was open to everyone.

The overall number of responses received to the targeted online survey is 112. The main category of respondents was Transmission System Operators (27), followed by "other" stakeholders (22) and industry representatives (17):

Type of respondent	Number	Percentage
National Regulatory Authority	4	4%
National Competent Authority	10	9%
Transmission system operator	27	24%
Distribution system operator	10	9%
Energy producer	10	9%
Industry	17	15%
Telecom company	0	0%
Local or regional authority	0	0%
Civil society	11	10%
Research, academia	1	1%
Other	22	20%
Total	112	100%

In terms of the distribution of responses by country, most responses were received from Belgium (33), followed by Austria, France and Germany (9 respondents each). The overrepresentation of Belgium stems from the fact that many of the civil society organisations and industry associations that provided their input to the targeted survey are based in Brussels.



Approximately 46 **in-depth interviews** were carried out with the support of a consultant with key stakeholders of the TEN-E Regulation to provide detailed information and evidence on key aspects that could not be dealt with in length by the targeted questionnaire. The interviews aimed to collect more detailed information than could be collected through the targeted survey and online public consultation. As such, the interviews focused primarily on the effectiveness and implementation of the Regulation, but also touched upon its relevance, coherence, and EU added value.

The interviews were designed to complement the results of the targeted survey.

Four stakeholder webinars took place with the use of online conferencing systems to ensure further outreach to stakeholders and create opportunities for structured feedback. Each webinar will be dedicated to key elements of the inception impact assessment. The webinars will last between 2.5 and 3 hours and will include presentations on the topics addressed, as well as moderated discussions with the online audience. Interactive tools such Sli.Do and/or in-built functions helped taking on questions from the audience.

- The first webinar on 'TEN-E Infrastructure categories to ensure full consistency with the climate neutrality objectives of the Green Deal' took place on 02 June 2020. It was attended by 304 participants and 17 panellists.
- The second webinar on 'Selection procedure and criteria for Projects of Common Interest (PCIs)' took place on 04 June 2020. It was attended by 298 participants and 12 panellists.
- The third webinar on 'TEN-E Regulatory toolbox and criteria for CEF financial assistance' took place on 09 June 2020. It was attended by 284 participants and 9 panellists.
- The fourth and last webinar on 'PCI Implementation: Permitting, monitoring and involvement of stakeholders' took place on 11 June 2020. It was attended by 211 participants and 8 panellists.

In terms of the effectiveness of the TEN-E Regulation in reaching its **objectives**, the replies to the OPC and the targeted survey converged. The majority of respondents of the OPC found that the 'integration of renewable energy sources into the grid' (92%) is the most important objective for trans-European energy infrastructure network[138]. On a positive scale, the objective to achieve ‘a competitive and properly functioning integrated energy market’ was also perceived as relevant by 65% of the contributors. The stakeholders replying to the targeted survey largely confirmed that the TEN-E Regulation has had a positive impact towards meeting its objectives: it has contributed to energy market integration (88%), achieved an adequate level of security of supply (77%), and contributed to competitiveness in the EU energy market (63%). Less agreement was indicated with the statement that the Regulation helped achieve the 2020 climate and energy targets, however (47%). There are no clear trends across stakeholder groups.

OPC respondents’ contributions were more diverse when scoring the relevance of **infrastructure categories** under the TEN-E. Electricity infrastructure (transmission lines and storage) and smart electricity grids ranked first (87 and 83%, respectively) in respondents’ choices as relevant. On the other side of the ranking, ‘geological storage of CO2, LNG) terminals and CO2 networks (for transporting CO2) were deemed relevant to a small extent, mostly justified (via the functional mail) of the consultation by opposition from EU citizens to supporting fossil fuel energy infrastructure.

Whilst there is a broad agreement that the infrastructure categories on the effective support of current infrastructure categories in achieving the overall objectives of the TEN-E Regulation, the input indicate that priority corridors and thematic areas need to be updated to address future challenges and incorporate new types of projects. The stakeholder consultation shows that stakeholders generally agree on broadening the technological scope of the TEN-E Regulation to integrate more technologies supporting a decarbonised energy system, as well as encouraging innovation.

Suggestions included the consideration of new infrastructure categories, as well as discarding existing ones. In general, stakeholders called for the reflection of the role of decentralised electricity production in the revised TEN-E Regulation and the need for a greater cooperation between TSOs and DSOs. Support was received for including cross-sectoral projects, smart gas grid projects and hybrid wind offshore in the scope of the TEN-E. Specifically on gas infrastructure categories, there was an agreement that hydrogen and green gases will be required at large scale with deployment centered around current industrial hydrogen clusters. Additionally, the position of NGOS and RES promoters focused on the transitional role of green gases blending into the current gas pipelines and the need to mainstream the “do no harm principle” thus, calling for the removal of natural gas infrastructure.

[138] TEN-E objectives, as set out in the survey: A competitive and properly functioning integrated energy market; Increased resilience of energy infrastructure against technical failures, natural or man-made disasters, and the adverse effects of climate change and threats to its security; Consumer empowerment - making sure consumers' interests are considered in decisions related to energy infrastructure; Secure and diversified EU energy supplies, sources, and routes; Integration of renewable energy sources into the grid; Increase cross-border interconnections and deepen regional cooperation to transport energy from renewable sources where it is most needed; Giving priority to energy efficiency (putting the ‘Energy efficiency first’ principle in practice); Achieving the EU’s decarbonisation objectives for 2030 and 2050, including climate neutrality under the European Green Deal; Increased digitalisation of the energy infrastructure (e.g. Smart Grids); Energy system integration and sector coupling (integration of the different energy sectors and beyond)

Between 87 and 93 answers to the OPC qualified the facilitation of integration of renewable energy sources into the grid, the contribution to greenhouse gas emissions reduction and ensuring security of supply as important features out of all possible features139 listed for PCIs. The environmentally sound implementation of PCIs and generation of direct benefits to the local communities were considered equally important by the contributors to the open public consultation. The contribution of PCIs towards increasing the competition in the market was seen as positive, although ranked lower.

The replies to the targeted consultation on the **PCI selection criteria** complemented this input. As in the case of the OPC, targeted stakeholders confirmed that the selected PCIs are the most relevant projects to fulfil the TEN-E objectives (48% agree, 26% disagree). In their view, the cost-benefit assessments for the selection of PCIs would benefit from a more appropriate methodology (44%). In general, the roles of different actors in the selection procedure was considered adequate, except for a significant wish to weaken the role of the ENTSOs (39%) and to strengthen the role of DSOs (53%) and other stakeholders, such as NGOs (39% - 67% of whom represented industry or civil society). With regards to the criteria, the general criteria are considered appropriate (48% agree, 38% disagree), whilst the views on the appropriateness of the specific criteria for electricity, gas and CO2 projects were mixed mostly justified by lack of knowledge.

Mirroring the feedback on the relevance of infrastructure categories, various stakeholders indicated that current eligibility criteria do not sufficiently support climate neutrality by insufficiently supporting network innovation and by including traditional, fossil fuel infrastructure. Some of the current selection criteria might be too restrictive for the inclusion of projects at DSO level, in particular: the cross-border impact criteria, and the 10 kV voltage threshold and 20% RES origin for smart grids.

In addition to this, several environmental NGOs and industry stakeholders indicated that the weak assessment of climate impact is causing projects to be selected that do not have a positive effect on the CO2 emissions. A need for revision of the PCI selection criteria in light of the sustainability and climate effect is also echoed by some NRAs. TSOs do not indicate strong opinions on the sustainability criterion. Further input from the targeted stakeholders' on the **governance** of the selection process showed an overwhelming agreement among NRAs, NCAs and TSOs about the role of Regional Groups in enabling regional cooperation (83%). Equally, High Level Groups were deemed to provide added value through strategic steering and political guidance as well as monitoring the PCIs in the priority regions (71%) There is a general agreement among all respondent groups that the current reporting and monitoring procedures on the PCI progress are sufficient to ensure transparency on PCI development (56% agree), but not that PCIs implementation plans and the regular updates ensure timely project implementation (33% agree).

[139] Integration of renewable energy sources into the grid; Contribution to greenhouse gas emissions reduction; Security of supply; Market integration (e.g. to improve infrastructure and increase system flexibility); Increase competition in the market; Innovation; Contribution to increase the energy efficiency of the energy system; Environmentally sound implementation, i.e. compliance with the relevant regulations especially in the area of environment; Generation of direct benefits to the local communities

Several stakeholders pointed to the potential conflicting role of the ENTSOs, as project promoters and developers of the scenarios and CBA methodology over which projects are evaluated, indicated a the perception that the predominant role ENTSOs enjoy in the infrastructure planning is not seen as fully independent. In their view, the current planning involves an unequal treatment of non-TSO promoters and results in a biased nature of the TYNDPs. The solutions put forward would include the involvement and scrutiny of an independent organisation which would enable the development of a hybrid energy system with a multimodal network design and holistic planning for grid connection based on a strong scenario-building and a solid cost-benefit analysis (CBA).

In qualifying the coherence of the TEN-E Regulation Respondents with other policies or initiatives at EU level, stakeholders indicated inconsistencies with regards to the European Green Deal / Long Term Strategy for Decarbonisation (74%identified inconsistencies, especially among civil society, DSOs and energy producers and industry), the Paris Agreement (65% identified inconsistencies, especially among civil society, DSOs and TSOs), and the Clean Energy Package / the Energy Union (55% identified inconsistencies, especially among civil society, DSOs and energy producers).

As such, respondents considered that the TEN-E Regulation is lacking in terms of adequately addressing key emerging issues such as improving energy efficiency and mitigating climate change impacts. According to respondents, the three main (new) challenges to be addressed are greenhouse gas emission reductions / climate neutrality (mentioned by 54), integration of renewable energy sources (mentioned by 50) and energy system integration (mentioned by 47). The two least important challenges are energy financing capacity of TSOs (mentioned by 42) and market fragmentation / market integration (mentioned by 20). In view of emerging issues however, the OPC results show that 77% of the respondents agree that the revised TEN-E Regulation can make an important contribution to the economic recovery in Europe through a green transition in response to the COVID-19 crisis, while 8% disagree with the statement.

Both the targeted survey and the OPC addressed the effectiveness of the implementation provisions, notably as regards **public participation and transparency** in the process of building PCIs. Regarding public participation, 82% of the OPC respondents declared to be aware of Projects of Common Interest (PCI) label and 78% know there is a public participation process in the frame of PCI implementation. The majority (68%) consider the public participation process as useful or useful to a large extent, ranking project websites as the most useful communication channel for providing and exchanging information on PCIs (78% consider it 'Very useful' or 'Useful to a large extent').

The targeted stakeholders drew a similarly positive picture, with more than half of the respondents agreeing increased awareness of PCI projects (51% agree, 17% disagree), improved public participation (41% agree, 12% disagree) and increased trust (37% agree, 38% disagree). Despite of perceived improvements in terms of awareness and trust in the PCI process, the input indicated a limited impact on increasing public acceptance (22% agree, 24% disagree) and on adjustments to the design of the projects following public input during consultations (19% agree, 26% disagree). Nevertheless, most respondents agreed that the requirement for at least one public consultation is enough for increasing transparency and participation (46% agree, 20% disagree). During the webinars, panellists called for increased trust and transparency both in the upstream process of selection of PCIs (TYNDP, PCI process) as well as during project implementation.

Further input on implementation, notably the shortening of **permit granting** durations, indicated mixed views: 20% (completely) agreed, while 36% (completely) disagreed that TEN-E permit granting provisions enabled an accelerated implementation of PCIs compared to the baseline. Similar differences in views were noted about the effectiveness of the one-stop-shops. Limited feedback on the perceived reasons for delays include notably environmental impact assessments and the statutory permit granting procedure.

The evaluation showed that TEN-E reduced the average duration of the permit granting process for transmission PCIs after 16 November 2013 to less than 3 years compared to 9 years prior to Regulation entering into force. However, there was a general call for acceleration and simplification of the permitting procedures is needed, whilst maintaining the highest environmental standards. The close cooperation and interaction with authorities was emphasized as key.

Stakeholder views on the effectiveness of the **CBCA** decision processes in enabling effective investment were mixed, with 25% of the respondents agreeing to the statement, 17% disagreeing and 21% being neutral. A more positive view was expressed as to whether investment incentives enable effective investments in PCIs, with a slight majority (54%) agreeing to the statement.

The input from stakeholders indicated notably the need to re-think the link between CBCA and CEF financing. The CBCA procedures were discussed as such, notably on how to ease the burden and ensure easier access to CEF. Some proposals referred to making smart grids eligible for CBCA. There were several calls for clarity on cost recovery, monetization where possible where relevant and the valorisation of accelerated implementation of PCIs in the CBA. For offshore grids specifically, stakeholders called for a clear legal framework for cross-border hybrid projects notably on CBA/ CBCA.

Stakeholders largely believe that the benefits of the TEN-E Regulation outweigh the costs (53% agree) whilst at the same time indicate that the TEN-E has not reduced such (administrative) costs for project promoters (valid for TSOs - 81% agree, NCAs - 60% agree and NRAs - 50% agree). A few suggestion for lowering the cost were provided, such as fast-tracking PCI selection procedure for existing PCIs, without substantiated analysis of impacts.

There is widespread agreement among OPC and targeted respondents that the TEN-E Regulation has **EU added value** – the majority believe it achieved more than could have been achieved at national/regional level (92 %, 79% respectively agree) and that the issues addressed by the TEN-E Regulation continue to require action at EU level (91% agree, 0 disagree). The main EU added value identified by respondents is access to financing (mentioned by 99), followed by regional cooperation (mentioned by 84) and the implementation of projects that could not have been implemented without TEN-E (mentioned by 67).

ANNEX 3: WHO IS AFFECTED AND HOW?

3.1 Practical implications of the initiative

As indicated in Annex 2, the following key target groups have been identified for this initiative:

- European citizens and consumers
- Non-governmental organisations
- European Union Regulators
- National Regulatory Authorities
- National Competent Authorities and their local and regional representatives (i.e. Ministries and outermost regions)
- European TSO (ENTSO-E and ENTSO-G)
- DSO branch organisations
- Project promoters, including Transmission System Operators
- Energy producers / Industry
- Academics and thematic experts

The below table outlines the practical implications of the initiative for all key target groups identified.

Type of stakeholder per target group	Practical implications
European citizens and consumers	Ensuring the consistency of energy infrastructure planning rules with the climate-neutrality objective will benefit citizens by lowering greenhouse gas emissions through optimal and efficient integrated infrastructure planning, fossil fuels substitution by renewable or low-carbon gases and significant deployment of onshore and offshore renewable energies. An efficient network operation, optimised onshore and offshore grid planning, exploitation of demand-response management services and enhanced digitalisation will bring a higher overall social welfare than the current rules. Comprehensive control and monitoring of the grid will reduce the need for curtailment of renewables and enable competitive and innovative energy services for consumers. The digitalisation of the grid will facilitate customer participation in all stages of the development and expansion of the energy system by digital tools such as participative geographical systems and would support new energy market arrangements. It will facilitate the integration and management of renewable energy produce locally supporting energy consumers turning into energy producers (“prosumers”). Smart electricity grids to support the roll out pf charging infrastructure for electric vehicles would directly benefit users of electric vehicles.

	Appropriate rules for project selection and cost allocation in line with distributed benefits will stimulate investments in the grid in the most efficient way and alleviate the burden on tariffs for consumers. A coordinated process for integrated infrastructure planning can ultimately reduce the overall need for infrastructure projects by designing the infrastructure in an optimal way. Citizens and local communities will benefit from increased transparency in the implementation of projects of common interest, which will create opportunities to understand the value of the energy infrastructure investments and become involved. An accelerated realization of key procedures in the permitting process will also allow for a faster implementation of key project therefore bringing forward the benefits identified in the cost-benefit analysis at national and regional level and avoiding high dispatch costs for consumers associated with delays. Infrastructure enabling the expansion of offshore renewable energy will have a positive effect on employment across the EU.
Project promoters, including Transmission System Operators	Transmission system operators of electricity will be required to strengthen their coordination at transmission level, as well as with distribution network operators, in view of a European approach to an integrated onshore and offshore network planning. TSOs will benefit from the increased efficiency in network operations due to measures to broaden the scope of the smart grids, which will enhance the exploitation of demand-response management services and increase cross-border data and capacity exchange. Project promoters will see a decrease in costs due to the provisions to accelerate permitting processes, including the clarification of cross-border provisions. The establishment of one-stop shops for sea basins would equally create efficiencies for promoters, both in terms of reduced administrative burden as well as in terms of access to existing data and studies conducted for the sea basin. The initiative will increase the cost visibility of a project, creating regulatory stability allowing project promoters to obtain financing from the market. Project promoters will be equally impacted by the strengthened monitoring and transparency in project implementation.
European TSO (ENTSO-E and ENTSO-G)	The creation of a European infrastructure planning framework that reflects the relevant needs will still be based on the TYNDPs but would require higher levels of cooperation and interlinkages between the electricity and gas transmission networks, as a well as involvement of distribution system operators and non-TSOs project promoters and other stakeholders. ENTSOs will see their role limited in key phases of the planning process, such as the development of scenarios and cost-benefit analysis methodologies, due to the

	strengthened role of the Commission and ACER. ENTSO-E's role will increase in view of their new mandate to develop offshore plans for time horizons 2030, 2040 and 2050 respectively for all the sea basins under the Commission's steering and binding opinion.
National Competent Authorities and their local and regional representatives (i.e. Ministries and outermost regions)	The initiative will entail higher cooperation between National Competent Authorities (NCAs) and possible restructuring of existing structures in the context of the development of one-stop shops per sea basin. NCAs will have to ensure the clarity and accessibility of cross-border provisions. This will, in turn, trigger efficiencies for NCAs. Measures that aim at an accelerated accomplishment of the permitting process through faster court procedures as well as REFIT provisions will have positive implications in terms of reducing administrative burden associated with reporting obligations.
National Regulatory Authorities	The role of the NRAs will increase due to the obligation to thoroughly assess the investment requests since all CBCA decisions issued will be final. The consideration and inclusion of the full investment costs in the national tariff and the sequential performance of an affordability assessment will increase the administrative burden on NRAs.
ACER	ACER will have a strengthened role in the approval of the methodology to assess the costs and benefits of projects, which together with the continuous follow-up of the TYNDPs development will entail a limited increase in administrative burden. ACER will equally be impacted by the simplification of monitoring obligations.
Distribution system operators	The role of the distribution network operators will increase thanks to their increased participation in the planning process. Equally, the introduction of new infrastructure categories and the broadening of existing ones will see a bigger role for DSOs as project promoters of PCI projects.
Energy producers / Industry	Broadening the scope to new and innovative infrastructure categories will create a market for those specific technologies. The hydrogen industry has estimated the impact of building 40 GW electrolyser capacity in Europe and 40 GW electrolyser capacity in neighbouring countries with the aim of exporting green hydrogen into Europe.[140] This would require total investments investment of €25-

[140] Green Hydrogen for a European Green Deal – A 2x40 GW initiative, Hydrogen Europe, 2020

	€30 billion, of which over 85% would be realised in the 2025-2030 timeframe[141]. Depending on the scenario, 7.5 billion or 29 billion EUR of value added can be generated annually in the whole EU-28, by investment in and operation of hydrogen technologies. Most of the value added is expected to be created by building and operating the renewable electricity plants that provide energy to electrolysers. Similarly, the establishment of an enabling grid planning framework for offshore grids would open up a significant market for the renewable energy industry, in particular in Europe, and partially compensate for the slowdown in renewable development onshore in some regions in Europe.

3.2 Summary of costs and benefits

The assessment of the **benefits** distinguishes between direct and indirect benefits.

Direct benefits of the package of preferred policy options are mainly related to greenhouse gas emission savings and efficiency improvements at large scale through a more coordinated approach to infrastructure planning at European level and streamlined permitting for offshore developments. These direct benefits encompass both social benefits, e.g. society at large benefits from reduced greenhouse gas emissions and the achievement of the climate neutrality objective[142], and private benefits, e.g. reduced administrative costs related to shorter permitting procedures.

The simplification measures, as discussed in section 8.2, will generate direct benefits through reduced existing recurrent direct costs related to administrative burden as a result of reduced monitoring and reporting obligations. These direct benefits are mainly private benefits for certain stakeholders such as project promoters.

Indirect benefits include sectoral benefits by stimulating market demand for certain innovative technologies and in turn contributing to potentially higher employment rates.

However, the net impact on total welfare and the net impacts on specific groups (i.e. winners and losers) as well as overall affordability is important to inform policymaking.

Costs and benefits should usually be based on market prices (reflecting the opportunity cost of action). However, these are not always available and so other methods may be needed to express impacts in monetary terms or indeed sometimes impacts cannot be expressed in monetary terms

The assessment of the preferred options showed positive impacts in social welfare and economic terms for different categories of stakeholders. However, such impact for the

[141] These are electrolyser investment cost only, the figures do not include the investments in solar and wind farms, transport and storage infrastructure, nor end-use applications.
[142] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Stepping up Europe's 2030 climate ambition, SWD(2020) 176 final

package of preferred policy options could not be fully quantified or monetised as this would have required information regarding the deployment rate for future PCIs or market upscale for new or emerging infrastructure categories which is not available and cannot be estimated with sufficient degree of robustness. Ranges of impact in absolute or relative terms are provided to the extent possible.

It is important to underline that one general selection criterion for each project of common interest is that its potential overall benefits outweigh its costs, including in the longer term.[143]

The below table summarises the direct and indirect benefits for the package of preferred policy options compared to the baseline providing ranges of possible benefits.

I. Overview of Benefits (total for all provisions) – Package of preferred options		
Description	Amount	Main recipient (stakeholder group)
A) SCOPE • Broadened scope to reflect technological developments for smart electricity grids (elements of Option A.1.1; expanding the category on electricity storage would not be proposed)		
Direct benefits		
Reduced transaction costs	Not possible to monetise benefit.	Benefits for project promoters.
Facilitate the integration of renewable energy sources at distribution level	Not possible to monetise benefit.	Benefits for owners of renewable energy generation units at distribution level.
Indirect benefits		
Provision of demand-side flexibility by consumer connected to the distribution grid	Not possible to monetise benefit. Higher penetration of smart grids will allow for 120 GW-150 GW of flexible load available by 2045	Benefits identified for citizens and society as a whole, transmission system operators
Support in the uptake of electric cars	Not possible to monetise benefit.	Benefits identified for citizens and society as a whole
Comprehensive control and monitoring of the grid would reduce the need for curtailment of renewables and enable competitive and innovative energy services	Not possible to monetise benefit. According to the IEA, investments in enhanced digitalisation would reduce curtailment in Europe by 67 TWh by 2040[144].	Benefits identified for citizens and society as a whole

[143] TEN-E Regulation, Art. 4(1)(b)
[144] with demand-response accounting for 22 TWh and storage accounting for 45 TWh - IEA 2016

for consumers.		
• Limit scope to new and repurposed hydrogen network / Power-to-Gas installations (Option A.2.1) as well as smart gas grids and retrofits of existing natural gas transmission assets for hydrogen admixtures/blends with safeguards in place to ensure renewable and low-carbon gases are transported (elements of Option A.2.2; new transmission pipelines for decarbonised gases and inclusion of advanced natural gas PCIs would not be proposed)		
Direct benefits		
Description	Amounts	Comments
GHG emission reduction from the substitution of fossil fuels by renewable or low-carbon hydrogen	Not possible to monetise benefit. In general, GHG emission reduction potential in the range of 20-65 MtCO2/a, corresponding to 1.4%-4.5% of the reduction gap at EU-28 level	Benefits identified for citizens and society as a whole
GHG emission reduction from the substitution of natural gas with biogas	Not possible to monetise benefit. In general, GHG impact ranges from a 156 tCO2eq per TJ reduction to a 17 tCO2eq per TJ increase in emissions	The exact impact will depend on the amount of renewable and low carbon gases injected into the grid and on the difference between the GHG intensity of the specific renewable and low carbon gas and the substituted fuel. Benefits identified for citizens and society as a whole
Increasingly interconnected hydrogen networks will create an internal market for hydrogen and offer benefits in terms of competition and security of supply	Not possible to monetise benefit. Up to 70% of additional demand for green hydrogen projected by German TSOs for 2025 and 2030 is expected to be covered by imports of decarbonised hydrogen from the Netherlands	Benefits for administrations (NCAs), energy producers/ industry
Indirect benefits		
Leveraging investments in hydrogen technologies	In general, depending on the scenario, 7.5 billion or 29 billion EUR of value added can be generated annually in the whole EU-28, by investment in and operation of hydrogen technologies.	Benefits for energy producers/ industry
Job creation generated by hydrogen-related investments and operations	Not possible to monetise benefit. 29100–103 100 direct jobs (in production and operations & maintenance) and contribute to further 74 100–241 150 indirect jobs between 2020 and 2030	Benefits identified for citizens and society as a whole
Job creation generated by installed capacity of renewable hydrogen electrolysers	Not possible to monetise benefit. Between 140,000 and 170,000 jobs for manufacturing and maintenance of 2x40 GW	Benefits identified for citizens and society as a whole

	electrolyser capacity up to 2030.	
Avoidance of stranded assets through the conversion of existing natural gas assets into dedicated hydrogen pipelines	Reduction of up to 90% compared to new build	Benefits for administrations (NCAs), energy producers/ industry
B) GOVERNANCE / INFRASTRUCTURE PLANNING • Integrated offshore renewable development plans per each sea basin for better infrastructure planning and project implementation (Option B.1.1); strengthened governance of the TYNDP planning and preparation and sustainability of the gas infrastructure categories as proposed under the preferred option on "Scope" (Option B.2.1)		
Direct benefits		
Deployment cost savings	10 percent in cost savings, equivalent to between EUR 300 million and EUR 2500 million for five projects alone, depending of the size of the comparable conventional projects	Benefits identified for citizens and society as a whole, project promoters (including transmission system operators), administrations (NCAs)
GHG emission reduction from the substitution of fossil fuels by offshore renewable energy.	Not possible to monetise benefit. Given the expected deployment the emissions reductions can be considered significant in a mid-term perspective. These would depend on the actual deployment rate and the greenhouse gas intensity of the electricity it replaces. This is influenced by various factors including demand and supply patterns, price sensitivities, localisations, grid congestions	Benefits identified for citizens and society as a whole
Indirect benefits		
Job creation in offshore RES sectors (wind, wave, tidal, floating solar)	Not possible to monetise benefit. Approx. 520 000 jobs, as follows: - Increase from current 77,000 jobs in offshore wind to more than 200,000 jobs. - 400,000 jobs in the ocean energy sector (e.g. wave, tidal, floating solar) by 2050	Benefits identified for citizens and society as a whole
C) PERMITTING AND PUBLIC PARTICIPATION • Accelerating the completion of the permitting process though proposing to use preferential treatment for the PCIs on court proceedings (Option C.1.1. without sub-option on shortening of the time limit for the permitting process); one-stop shop per sea basin for offshore renewable projects (Option C.1.2)		
Direct benefits		

Avoidance of delay costs due to court proceedings	A delay of 2 years due to an average court procedure was estimated at a cost of 150 million €[145].	Benefits identified for society at large, but also for project promoters (including transmission system operators), administrations (NCAs)

For assessing the **costs** of the package of preferred policy options, the analysis distinguishes between *direct costs* and *indirect costs*.[146]

The TEN-E Regulation does not introduce any regulatory charges, such as fees, levies, taxes, etc. The package of preferred policy options results in *direct costs* in terms of compliance costs and administrative burden for businesses (mainly project promoters) and administrations (national competent authorities, national regulatory authorities, the Commission, and ACER) in order to comply with substantive obligations or requirements contained therein. The application of the package of preferred options results in *indirect costs* for citizens/consumers, businesses and administrations through an increase in network tariffs to finance investments in the regulatory asset base (RAB). However, CEF financial assistance can alleviate the impact on network tariffs in case a PCI shows significant externalities in terms of security of supply, solidarity, or innovation.

The below table summarises the direct and indirect costs for those actions of the package of preferred policy for which costs have been identified compared to the baseline. It is not possible to estimate these costs for all actions at this stage but they are considered as non-significant. The additional costs would be marginal compared to the current costs which have been evaluated to be in the range of EUR 25 to 50 million and considered low when compared to the benefits.[147]

Additional *enforcement costs* at national and EU level will depend on the implementation.

II. Overview of costs – Package of preferred options						
	Citizens/Consumers		Businesses		Administrations	
	One-off	Recurrent	One-off	Recurrent	One-off	Recurrent

[145] Renewable Grid Initiative and ENTSOE, Value of timely implementation of "better projects", May 2019, Working Paper https://eepublicdownloads.azureedge.net/clean-documents/Publications/Position%20papers%20and%20reports/20190517_RGI_ENTSOE_working_paper_better_projects.pdf

[146] Better Regulation Guidelines, TOOL #58. TYPOLOGY OF COSTS AND BENEFITS

[147] Ecorys et al. (2020) Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure, Draft final report, p. 122

Action (a) Broadened scope for regulated assets (smart grids)	Direct costs				Administrative burden (project promoters): participation in regional group meetings, collection and submission of information required for network planning, monitoring and reporting		Administrative burden: participation in regional group meetings (NRAs), organisation of regional group meetings, monitoring
	Indirect costs		Potential increase of network tariffs		Potential increase of network		Potential increase of network tariffs
Action (b) Establishment of integrated offshore development plans	Direct costs				Administrative costs (mainly TSOs / ENTSOs): participation in regional group meetings, collection and submission of information required for network planning		Administrative burden: participation in regional group meetings (NRAs, ACER), organisation of regional group meetings, monitoring (Commission, ACER)
	Indirect costs		Potential increase of network tariffs		Potential increase of network tariffs		Potential increase of network tariffs
Action (c) Integrated infrastructure plans	Direct costs				Administrative costs related to the coordinated approach (mainly TSOs, DSOs and ENTSOs): data collection, participation in meetings		Administrative costs related to the increased oversight for the Commission and ACER (between EUR 80 000 and 150 000, one additional FTE)
	Indirect costs						

Action (d) One-stop shop per sea basin for offshore renewable projects	Direct costs					Administrative costs to establish the one stop shop	
	Indirect costs						
Action e) Inclusion full investment costs	Direct costs						Administrative costs related to the strengthened obligation on NRAs

ANNEX 4: ANALYTICAL METHODS

In order to quantify the benefits stemming from the implementation of the current TEN-E regulation, in the field of electricity and gas, from its entering into force until the full implementation of the latest PCI list (4^{th} list), the Commission used the REKK model and cross-checked the key outcomes with the internal METIS model run by JRC.

Tools used

REKK used, for this impact assessment two models, one specific for each sector, EEMM (electricity) and EGMM (gas).

The EEMM is a partial equilibrium microeconomic model. It assumes fully liberalised and perfectly competitive electricity markets. 44 markets are modelled, including almost all members of ENTSO-E[148]. Production and trade are constrained by the available installed capacity of power plants and net transfer capacity (NTC) of cross-border transmission lines. In the model one country is one node (with a few exceptions, e.g. it models two markets in Denmark and Ukraine), thus no internal congestion is assumed. The model has an hourly time step, modelling 90 representative hours with respect to load, covering all four seasons and all daily variations in electricity demand. The model used as main inputs for the 2030 the EUCO 32,32.5, the NTC from ENTSOs capacity maps the PCIs data and for the current situation input from the TSOs, NRAs and reports of industry organisations (such as EWEA and Solar Power Europe). For natural gas prices, REKK used its own forecast, prepared by the EGMM model of REKK, differentiated country by country and year by year.
The EGMM is a competitive, dynamic, multi-market equilibrium model that simulates the operation of the wholesale natural gas market across Europe. It includes a supply-demand representation of European countries, including gas storage and transportation linkages. Large external markets, including Russia, Turkey, Libya, Algeria and LNG exporters are represented exogenously with market prices, long-term supply contracts and physical connections to Europe. The timeframe of the model covers 12 consecutive months, starting in April. Market participants have perfect foresight over this period. Dynamic connections between months are introduced by the operation of gas storages and take-or-play constraints of long-term contracts. Given the input data, the model calculates a dynamic competitive market equilibrium for the modelled countries, where all arbitrage opportunities across time and space are therefore exhausted to the extent that storage facilities, transportation, infrastructure, and contractual conditions permit. As a result, the competitive equilibrium yields an efficient, welfare-maximizing outcome. The model used as main inputs for the 2030 the EUCO 32,32.5, the NTC from ENTSOs capacity maps the PCIs data and for the current situation mainly input from the TSOs, and NRAs.

As mentioned above, the crosscheck of the main REKK results was performed using the Commission METIS model run by JRC. The Metis model is a modelling tool that can quickly provide robust insights on complex energy related questions, focusing on the short term operation of the energy system and markets.

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[148]Cyprus and Malta are not modelled in EEMM.

In METIS, the European power system is modelled with an hourly temporal resolution. The power plants are represented as fleets of similar technological characteristics. In METIS, units of the same technology or using the same fuel in each zone are bundled together into the same asset in a cluster model which simulates the dynamic constraints and starting costs in a relaxed (LP) unit commitment, without using binary variables. The main input data are the same as the ones used for in the REKK models. The gas system/market is modelled on a daily time step. The main parameters and constraints describing the market/technological components concern: gas production, pipelines, storages, LNG (both regasification and liquefaction facilities), underground gas storages, gas demands. The main input data are the same as the ones used for in the REKK models.

Baseline cases

The assessment aimed to answer three questions: What did the TEN-E Regulation has achieved until now?, targeting the benefits stemming from the PCIs already commissioned; What did the TEN-E Regulation achieved overall?, covering therefore the PCI already completed and the ones from the fourth PCI list; and What are the benefits of the fourth PCI list?

In line with these questions, the REKK has developed two baselines for year 2020 and 2030 from which they took out/added the relevant group of PCIs:

The Baseline serves as the basis for comparison: this scenario shows what would have been the situation on the electricity markets of Europe without any PCI projects being implemented. For 2020, the Baseline scenario includes the present situation without the PCI projects – thus, interconnector capacities are lower than as of today, capacities of the twelve already commissioned projects are deducted. Similarly, in 2030 the most likely future outcome is included, but same capacities are deducted, and none of the projects from the 4th PCI list are assumed to be commissioned.

In the TEN-E baseline, the possible effect of the already commissioned PCI projects is calculated. For 2020, the present situation is used – meaning the difference between the Baseline and the TEN-E scenarios is exactly the commissioning of the existing PCIs. The same applies to 2030 –REKK took the most likely future market situation, including the already commissioned PCIs, but di not include any project from the 4th list.

In the Future baseline, the effect of the commissioning of all projects from the 4th list are modelled. This means, that the only relevant modelling year is 2030, as the first year of commissioning from these projects is assumed to be 2021. For building up the Future scenario in 2030 REKK used the TEN-E scenario as a starting point, and then included all projects from the 4th list to see how they would affect market outcomes in 2030. When results are compared to the TEN-E Scenario, then the effect of the PCIs from the 4th list can be quantified. While comparing Future and Baseline shows the effect of all – already commissioned and to be commissioned in the future – PCI projects on the European electricity market.

ANNEX 5: EVALUATION REPORT

Since its establishment in 2013, the Regulation on trans-European energy networks laid down rules for the timely development and implementation of key energy infrastructure projects that interconnect Member States, whilst contributing to market integration, security of supply, competitiveness and further integration of renewables.

In March 2019, as part of the partial political agreement between the European Parliament and the Council on the Connecting Europe Facility for the period 2021-2027, the co-legislators agreed on the need to evaluate the effectiveness and policy coherence of the Regulation 347/2013 on the guidelines for trans-European energy infrastructure (TEN-E Regulation) by 31 December 2020[149]. In December 2019 the European Commission published the European Green Deal with an aim to include the climate neutrality objective in 2050 into the proposed European Climate Law. The communication of the European Commission (COM(2019) 640)1 (the European Green Deal) explicitly refers to the need for a review of the TEN-E Regulation to ensure consistency with climate neutrality objectives.

In view of the timeline for the evaluation and revision of the TEN-E Regulation, the Commission opted for a "back-to-back evaluation and impact assessment". The evaluation of the TEN-E Regulation was carried out between January 2019 and September 2020. The evaluation was supported by a study "Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure" commissioned to an external contractor which helped gather, quantify and assess evidence drawn from a range of sources on the performance of the TEN-E instrument to date.The evaluation assessed in a retrospective manner the extent to which the TEN-E Regulation has performed so far in achievingits stated objectives, identifying factors that helped or hindered their achievement. Specifically, it assessed the effectiveness of the Regulation compared to a baseline (i.e. the situation without the Regulation), to appraise whether or not it has had a significant impact and added value.

In short, the evaluation looked at:

- How and why the current TEN-E Regulation has worked well or not so well, and which factors have helped or hampered the achievement of its objectives;
- The impact of the Regulation, particularly in terms of progress towards achieving its objectives.

The "back to back" approach ensured that formative element are drawn from the outcomes of the evaluation to conclude on the extent to which the Regulation will remain fit-for-purpose and relevant in the future] in view of the adopted or planned policy initiatives (the climate target plan, the revision of the Energy Efficiency Directive, the Renewable Energy Directive, and the gas package) which will accelerate the mid- and long-term decarbonisation. The forward-looking elements will looked into how to ensure that enabling energy infrastructure is in place to match the increased decarbonisation and renewable energy deployment ambitions and indicate areas of intervention.

[149] https://www.consilium.europa.eu/media/38507/st07207-re01-en19.pdf
http://www.europarl.europa.eu/doceo/document/TA-8-2019-0420_EN.pdf

In line with the scope and applicability of the TEN-E Regulation, the evaluation covers all Member States. In terms of legal acts covered as part of the evaluation, it does not specifically cover the European Union's funding through the Connecting Europe Facility (CEF) although the evaluation questions seek to identify synergies and complementarities with CEF. Due to its timing but also its wider scope, the evaluation does not fully assess the coherence with the sustainable finance framework (taxonomy) but rather indicate increasing incoherence with the current TEN-E Regulation and CEF financial assistance. The work on two Delegated Acts is currently ongoing with a view to establish by end of 2020 a list of environmentally sustainable economic activities on the basis of technical screening criteria for climate change mitigation and adaptation. Contrary to the scope of the TEN-E regulation which established a method for multi-criteria project selection, the taxonomy Regulation classifies and qualifies economic activities as environmentally sustainable for the purposes of establishing whether or not associated investments are environmentally sustainable.

Five core evaluation criteria were applied to evaluate the performance of the TEN-E Regulation: effectiveness, efficiency, relevance, coherence, and EU added value. Section 4 further describes the method for the evaluation, including the rationale and questions underpinning each of the criteria.

11 BACKGROUND TO THE INTERVENTION

Energy infrastructure is crucial for reaching wider EU energy and climate goals, whilst ensuring access to safe, reliable, affordable and sustainable energy for all Europeans. The TEN-E Regulation is part of a larger regulatory framework adopted to tackle a number of barriers to the implementation of European energy infrastructure and integrated energy networks. In line with the energy policy objectives of the Treaty on the Functioning of the European Union (TFEU), the TEN-E Regulation aims to ensure the functioning of the internal energy market and security of supply in the Union, promote energy efficiency and energy savings and support the development of new and renewable forms of energy the interconnecting energy networks.

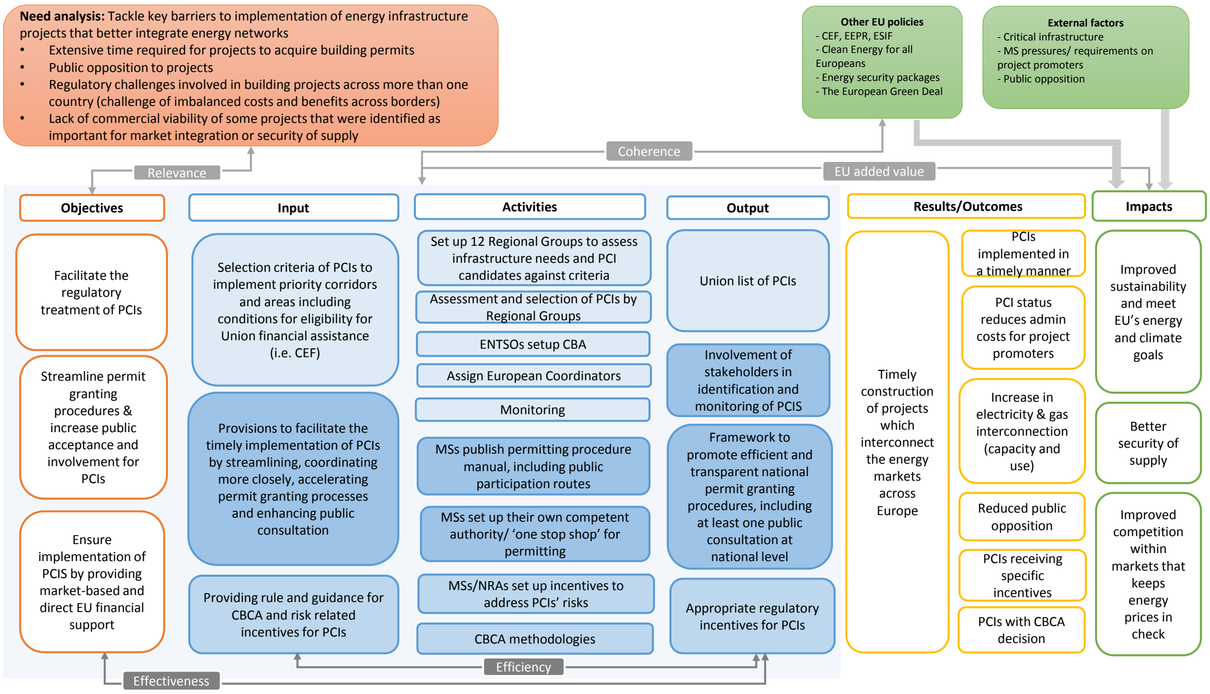
The TEN-E Regulation is based on Article 172 of the Treaty on the Functioning of the European Union. According to Article 171(1), “the Union shall establish a series of guidelines covering the objectives, priorities and broad lines of measures envisaged in the sphere of trans-European networks; these guidelines shall identify projects of common interest”. The goals of the Regulation are the following:

- To ensure the functioning of the internal energy market and security of supply in the Union;
- To promote the development of new and renewable forms of energy, energy efficiency, and energy savings; and
- To promote the interconnection of energy networks.

To achieve these objectives, the TEN-E defines infrastructure priority corridors and priority thematic areas, lays down criteria for the identification of key energy infrastructure projects and builds on regional cooperation to identify and select necessary PCIs in Union-wide lists. The TEN-E Regulation sets out guidelines for streamlining the permitting processes for PCIs as well as increases cooperation and transparency towards the public and wider stakeholder community. Aside from accelerated permitting, PCIs benefit from improved regulatory conditions, cost-allocation and eligibility for financial support from the Connecting Europe Facility (CEF).

The intervention logic, presented in Figure 1, links the objectives of the TEN-E Regulation and input/actions to its outputs, results and impacts. It also visualizes some of the relevant external factors to this regulation.

Figure 1: Intervention logic of current TEN-E framework



The Regulation lays down rules for the timely development and interoperability of Trans-European Energy networks, by providing the following inputs:

1. The identification of PCIs necessary to implement priority corridors and areas falling under the energy infrastructure categories in electricity, gas, oil, smart grid and CO_2 (Chapter II of the Regulation). Specifically, the Regulation: sets out the criteria which PCIs should meet, ensures the adoption every two years by the Commission of a Union list of the proposed PCIs and ensures that a plan is in place to implement the PCI as well as procedures to monitor progress of the project.

2. Provisions to facilitate the timely implementation of PCIs by streamlining, closely coordinating, accelerating permit granting processes, and enhancing public participation (Chapter III). The Regulation assigns the highest national priority status to the PCIs and requires that they are included in national network development plans, requires Member States to designate a national competent authority responsible for facilitating and coordinating the permit granting process for PCIs, requires that the competent authority publishes a manual of procedures

for the permit granting process applicable to PCIs, requires the project promoter to draw up and submit a concept for public participation to the competent authority, and ensure the necessary public consultation is conducted; and sets out a maximum time-limit of 3.5 years for the pre-application and permit-granting procedure combined.

3. Providing rules and guidance for the cross-border allocation of costs and risk related incentives for PCIs. The Regulation requires member States and National Regulatory Authorities to set up incentives to address PCIs' risks; establishes the use of cost-benefit methodologies for PCIs for an energy system-wide analysis, in line with the principles laid out in Annex V of the Regulation and consistent with the rules and indicators set out in Annex IV; and ensures that PCIs benefit from cross-border cost allocation (CBCA) decisions, which assist the sharing of project costs among countries in line with their expected benefits.

The outputs of the Regulation are, therefore, closely linked to each set of activities described above:

1. establishment of relevant cross-border projects within priority corridors and areas and energy infrastructure categories;
2. a framework to promote efficient and transparent national permit granting procedures;
3. appropriate regulatory incentives for PCIs and long-term signals to meet EU priorities;
4. involvement of stakeholders in identification and monitoring of PCIs.

The overall outcome is the timely construction of PCIs, which interconnect the energy markets across Europe. More specifically:

1. PCIs receive permits more rapidly ensuring they are timely implemented;
2. PCIs status reduces administrative costs for the project promoters;
3. There is an increase in electricity and gas interconnection (capacity and use);
4. There is an increased public participation;
5. PCIs receive specific incentives; and
6. PCIs could receive a cross-border cost allocation decision.

As section 3 will further detail, the TEN-E Regulation has been effective in accelerating the refurbishment of the existing energy grid and in deploying new projects to achieve the Union's energy and climate policy objectives. Thanks to a process for identification of infrastructure needs and selection of projects, the TEN-E Regulation has shifted the focus from national priorities to a regional and cross-border approach thus ensuring that infrastructure is built where it is most needed. TEN-E introduced regulatory tools to speed up implementation by incentivising investments by addressing existing asymmetries between the costs and benefits of projects and by providing targeted support to selected projects as last-resort. Under the TEN-E Regulation, four Union lists of Projects of Common Interest formally adopted in 12 Regional Groups were established, allowing for the implementation of 40 PCIs to date with 75 more expected to be implemented by 2022. The TEN-E Regulation ensured that projects with the greatest contribution towards set criteria would benefit from the utmost cooperation and transparency between key stakeholders on the ground.

The adoption of the Green Deal and its climate-neutrality target has triggered a paradigm shift in Union energy and climate objectives. Together with a number of adjacent priorities that support Union's increased climate ambitions (identified in the intervention logic), the Green Deal became of one the main drivers the evaluation and revision of the TEN-E Regulation in view of its inconsistencies with the climate neutrality objective mostly due to the priorities at the time of its enactment. The evaluation showed that the inconsistencies of the TEN-E Regulation with the Green Deal are twofold: on one hand, the scope of the energy infrastructure categories, criteria and the governance of the selection process is not aligned with the Green Deal objectives and latest developments in innovation and technologies. On the other, delays in the implementation of PCIs are still observed, triggering as such the non-delivery of their intended benefits.

The methodology for evaluating the performance of the TEN-E Regulation has been developed to fit the intervention logic. As further detailed in section 4 on Method, an evaluation matrix comprising of a set of evaluation questions and sub-questions per each evaluation criteria was used to guide the evaluation process and define the manner in which questions will be answered and presented.

The evaluation baseline captures the point of comparison for the evaluation, i.e. had the 2013 TEN-E Regulation not been introduced (a business-as-usual scenario). The baseline has been used in the assessment of the replies to the evaluation questions (primarily on effectiveness and efficiency), and in the modelling, which further informs the assessment. The baseline for this evaluation is largely based on the baseline scenario in the 2011 Impact Assessment of the TEN-E regulation. The baseline consists of four components: 1. permit granting procedures in Member States; 2. financing; 3. administrative cost estimates; and 4. infrastructure assessment. The baseline from the 2011 Impact Assessment was used for the analysis of the permit granting procedures in Member States, financing, and administrative cost estimates. For the infrastructure assessment, a different baseline than the one in the 2011 Impact Assessment was considered due to the changes in the market an technological landscape.

The evaluation draws on evidence from the stakeholder input to the extensive consultations carried out in this respect, PCI portfolio and case study analysis and related monitoring reports, modelling, the results of a series of topical studies on key elements of the TEN-E Regulation, as well as conclusions and work stemming from dedicated stakeholder Fora (e.g. Copenhagen Forum).

12 IMPLEMENTATION/STATE OF PLAY

This section outlines how the TEN-E Regulation was implemented to date. In particular, four main activities are considered: the PCI process, permit granting and public participation, regulatory treatment and financing.

The PCI process

Article 3 of the TEN-E Regulation also defines the process for the PCI selection. The TEN-E Regulation distinguishes and targets specific projects that are identified as PCI from an internal energy market perspective. The process of selection and implement of PCIs involves various stakeholders, both at national and European level. Representatives from national competent authorities (NCAs), national regulatory authorities (NRAs)project promoters, including transmission system operators (TSOs), and their European association and agencies (ENTSOs and ACER) are members of regional groups established by the Regulation. The membership of each group is based on a priority corridor or thematic areas and reflects the respective geographical coverage. These regional groups facilitate the cooperation and coordination amongst the stakeholders. They are responsible for the assessment of candidate projects that are proposed by the project promoters, but also for monitoring the execution of PCIs, and for making recommendations to facilitate their implementation. The final decision-making powers are restricted to Member States and the Commission (the Decision-Making Body or DMB). Furthermore, to foster high-level (international) political commitment, support in reaching consensus on regional actions plans and promote a specific goal regarding EU energy network integration, Member States can establish High Level Groups. These groups aim to pursue a specific long-term strategy and their organisation is not outside the scope of the Regulation.

The PCI selection process is based on the National Development Plans (NDPs) and the Ten-Year National Development Plans in electricity and gas (TYNDPs) prepared by the ENTSOs. To ensure consensus, the PCI process involves consultation with multiple stakeholders within the regional groups and via a public consultation. Figure 5 illustrates the PCI selection process and the roles of the various stakeholders in this process.

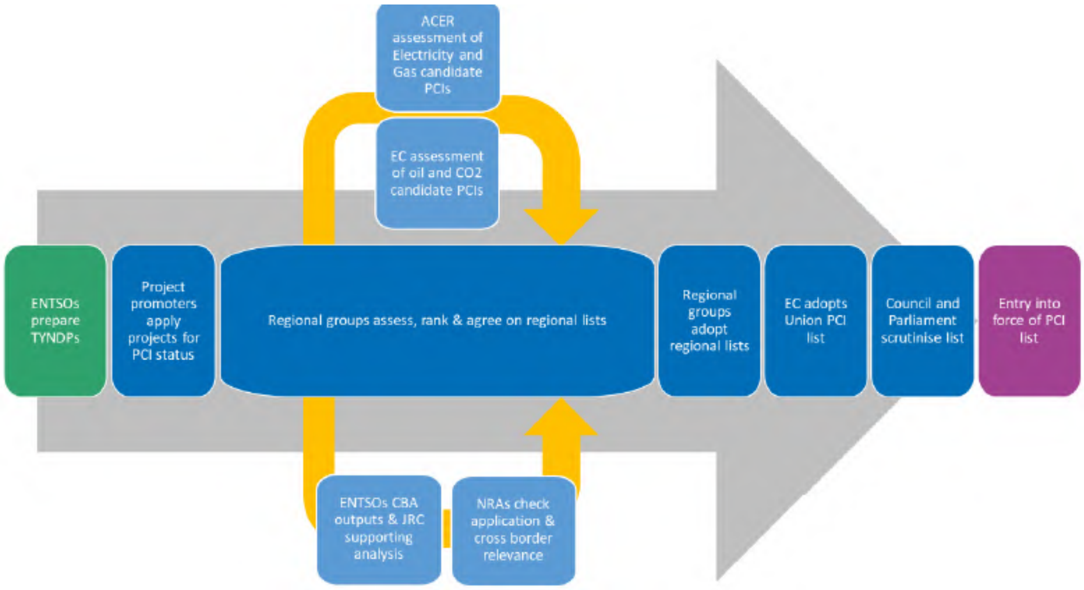


Figure 5: PCI selection process

To become eligible for the PCI status, a candidate project is required to meet the following general criteria:

- the project is considered necessary for at least one of the infrastructure priority corridors and thematic areas;
- the potential benefits of the project outweigh its cost, including in the longer term;
- the project significantly involves EU Member States, indicated by: - involving at least two Member States by directly crossing the border of two or more Member States; - being located in one Member State and having a significant cross-border impact; - crossing the border of at least one Member State and a European Economic Area country.

In addition to those, there are specific criteria that apply to PCIs depending on their infrastructure category.

Table 1: Specific PCI criteria per infrastructure category

Energy infrastructure category	Specific criteria
Electricity	Market integration
	Sustainability
	Security of supply
Gas	Market integration
	Security of supply
	Competition
	Sustainability
Smart grids	Integration and involvement of network users with regard to supply and demand

Energy infrastructure category	Specific criteria
	Efficiency and interoperability in day-to-day network operation
	Network security, system control and quality of supply
	Optimised planning of future cost-efficient network investments
	Market functioning and customer services
	Involvement of users in the management of their energy usage
Oil	Security of supply
	Efficient and sustainable use of resources
	Interoperability
CO2	Avoidance of carbon dioxide emissions while maintaining security of energy supply
	Increasing resilience and security of CO2 transport
	Efficient use of resources and Minimising environmental burden and risks

Source: Regulation (EU) No 347/2013 Article 4

The TEN-E Regulation requires that ENTSO-E and ENTSO-G draft a methodology for the Cost Benefit Analysis (CBA methodology) to assess the projects included in the TYNDPs for electricity and gas projects respectively. According to the Regulation, to be eligible for the PCI status, gas and electricity transmission and storage projects shall be part of the TYNDP. To become a PCI, the project must apply for it in line with the rules and timeline of the PCI selection process. The interlinkage between theprocess for establishing the PCI list and the TYNDP can be summarised as shown on Figure 3.

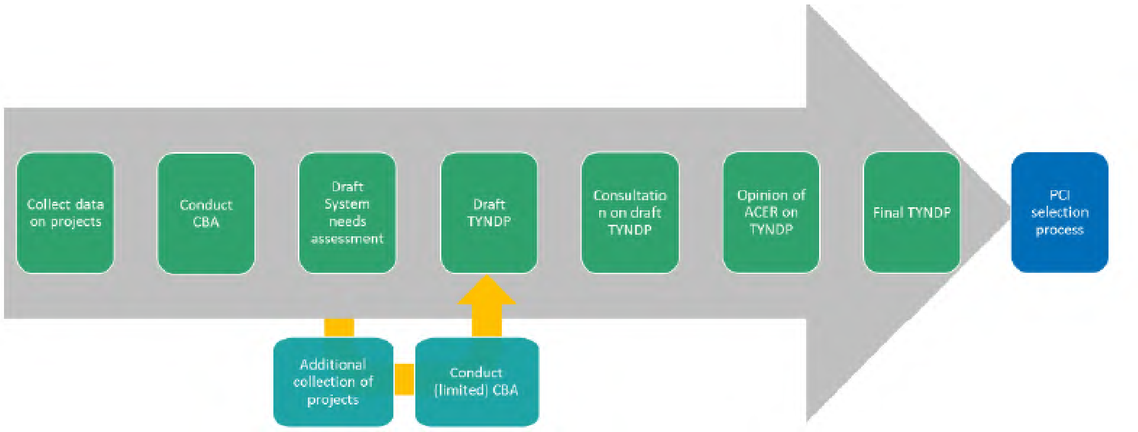


Figure 3: TYNDP and PCI list process

The TYNDP-related approach does not apply to carbon dioxide network, smart grid or oil PCIs. For smart grids, an updated methodology was published by the Joint Research Centre (JRC) in 2017.

The 1st list of PCIs was adopted in October 2013 and contained 248 projects. The 2nd, 3rd and 4th PCI lists contained 195, 173 and 149 projects, respectively. Excluding PCIs that appeared in several lists, the lists comprise 437 unique projects.

Amongst Member States, Poland is most frequently represented in the 4th list with 18 PCIs listed, followed by Lithuania, Germany and Estonia with respectively 15, 12 and 12 PCIs. Outside of the EU, the United Kingdom is most frequently represented with 16 PCIs. Electricity projects are most frequently hosted by the UK (14 PCIs) followed by Lithuania (12 PCIs), gas PCIs are most frequently hosted by Greece (6 PCIs), and Poland is the most dominant host of oil projects (3 PCIs).

Permit granting and public participation

A key objective of the Regulation is to streamline the permit granting process, while ensuring sufficient public participation.

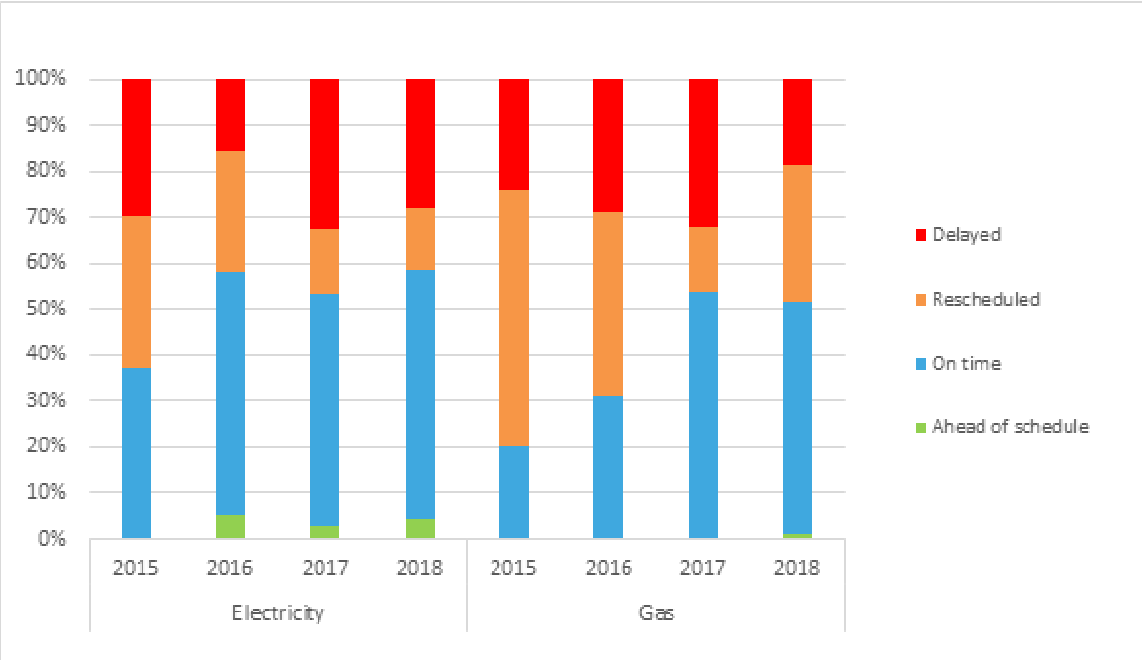
The Regulation allocates a 'priority status' for a project, once selected for the PCI list. PCIs are granted the status of the highest national significance possible in the relevant Member State for consideration especially during permit granting processes. The TEN-Regulation defines and sets out a variety of activities that contribute to the streamlining of the permit granting process. Member States are required to designate a "one-stop shop' (NCA), which shall be responsible for facilitating and coordinating the permit granting process for PCIs and which all Member States have established by 16 November 2013 at the latest. The NCA is the sole point of contact for the project promoter in the process leading to a comprehensive decision for a given PCI, and coordinates the submission of all relevant documents and information.

Member States are required to additionally implement a two-stage permitting process. It consists of a pre-application procedure and a statutory permit granting procedure. It also sets time limits for each stage. The pre-application procedure should take place within one year and six months. The combined process should not take more than 3.5 years, but can be extended by a maximum of nine months on a case-by-case basis.

The progress of PCI implementation is monitored every year by ACER and reported to the Commission and regional groups. Additionally, NCAs from associated Member States report to the regional group on permit granting delays.

Monitoring data, as shown in figure 4, indicates that permit granting procedures have shortened since the the entry into force of the TEN-E Regulation. Current the EU average of 4 and 3.1 years for electricity and gas projects, respectively show significant progress compared to baseline national averages of up to 10 years in 2011. As a central element of the TEN-E Regulation, the establishment of one-stop shops is appraised as an instrument to reduce the complexity and duration of permitting procedures.

Figure 4: PCI implementation progress to date



Source: Underlying data of the ACER monitoring reports. No reliable data available for 2019 since the question was not part of the monitoring format or it was limited to the cases where there was a difference compared to 2018 only.

As section 5 will describe, the effectiveness of permit granting procedures strongly depends on national implementation; experiences of project promoters vary substantially because of national differences in the way TEN-E provisions have been implemented (e.g. as regards the responsibilities of authorities in the permit granting process. The table below outlines the permitting schemes as chosen by Member States to facilitate and coordinate the permit granting process for PCIs.

Table 2: Overview of schemes adopted by Member States

	Integrated	Coordinated	Collaborative
BE			X
BG		X	
CY			X
CZ			X
DE			X
DK	X	X	X
EE			X
EL		X	X
ES		X	
FI			X
FR		X	
HR			X
HU			X
IE			X
IT		X	
LT			X
LU			X
LV			X
MT		X	
NL		X	
PL		X	
PT	X		
RO	X		
SI	X		X
SK			X
SE			X
UK			X

Source: Milieu (2016) Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013. Based on the stakeholder consultation, the implemented permitting scheme in Portugal was updated to "integrated" and for Slovenia – to "integrated" and "collaborative".

In spite of the introduction of targeted provisions, longer permitting durations in the implementation of key projects of common interest are still experienced.

The TEN-E Regulation sets out specific requirements on transparency and public participation. The purpose of the requirements is to improve public engagement and to increase public acceptance of the implementation of PCIs. Project promoters, Member States, NCAs and other involved parties are required to comply with the requirements before submitting the application. As one of the central challenges to energy infrastructure projects in 2011 was the opposition from affected citizens, the TEN-E Regulation introduced an additional public consultation during the permitting process to ensure early consultation of local communities and stakeholders and ultimately improve public acceptance of such projects. Other key transparency provisions include the creation of a dedicated PCI website by project promoters that displays updated relevant information about the project and the publication of a manual of procedures by NCAs that groups all required permitting provisions.

The most recent data on the implementation of the transparency and participation provisions indicated that Belgium, France and Latvia are the only Member States that have adopted specific legislation related to the Regulation on permit granting and public participation. A study by Milieu (2016) show that only four Member States apply the obligation for project promoters to draw up public participation concepts and only eight have held public participation procedures in addition to the one envisaged in the EIA[150]. Although in place, the information available on the dedicated PCI websites vary considerably in terms of detail, scope and accuracy[151].

Regulatory treatment

The Regulation applies to the regulatory treatment of PCIs by setting out rules for establishing methodologies for cost-benefit analysis, guidelines on cost allocations and risk-related incentives.

When at least one Member State, affected by a PCI, estimates net negative impacts, it raises an important barrier for the project promoter(s) to invest in that PCI. The Regulation aims to eliminate this barrier and thereby facilitate investments. This is done by incorporating decisions on the allocation of the costs of such projects across borders by National Regulatory Authorities (NRAs) and by the Agency for the Cooperation of Energy Regulators (ACER) if project promoters submit an investment request, including a request for Cross-Border Cost Allocation (CBCA). This mechanism has also been effective to varying extents. Currently 42 CBCA decisions were made, of which respectively 37 and 30 were reported in ACER's 2019 list of CBCA decisions and ACER's 2018 CBCA monitoring report. Two of the total of 42 CBCA decisions were taken by ACER, where for the remaining 40 were coordinated decisions by NRAs. ACER indicated in their latest summary report[152] on the CBCA decisions that 70% of all CBCA decisions (21 out of 30) concluded before March 2018 concerned projects where the project was built on the territory of one country and the costs were allocated to that same country only. Despite showing a strong decrease in in the latest period from 2018-2020, a relatively large share of these PCIs in one country with one cost carrier remained as of March 2020 (24 out of 42 cases). These PCIs mostly involved internal lines with cross-border impact. Another 30% of CBCA decisions taken until March 2018 (9 out of 30) concerned projects with multiple Member States involved. For 5 out of 9 cross-border PCIs with CBCA decisions, the territorial principle (each country pays the part of the project on its territory) is relevant for the project crossing two countries without

[150] Milieu et al. 2016. Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013

[151] Websites can be accessed through the PCI Interactive map, available at https://ec.europa.eu/energy/infrastructure/transparency_platform/map-viewer/main.html

[152] ACER (2018), Third Edition of the Agency's Summary Report on Cross-Border Cost Allocation Decisions - Status update as of March 2018.

offshore sections. For 2 of these cases all involved countries were estimated to be net beneficiaries, thus the territorial principle was applied to formalise the cost division and to clarify on the costs to be covered by each country's national system tariffs.

Financing

The TEN-E Regulation is based on a three-step logic:

1. As a principle, infrastructure should be paid for through congestion rents. If costs are covered through congestion rents a project can be considered sufficiently commercially viable and therefore no further provisions are applicable;
2. If a network operator is not able to recover the costs of the network through congestion rents, the Regulation establishes the principle that it should be paid for by network users through tariffs for network access. The Cross-Border Cost Allocation (CBCA) provision allows for a (re)allocation of project costs across borders to Members States, where the project has a net positive impact;
3. Finally, if reallocation of costs through CBCA is still not sufficient and a project remains commercially non-viable, PCIs can, under certain conditions, apply for Union financial assistance in the form of grants for studies and grants for works.

The share of congestion revenue effectively spent on maintaining or increasing interconnection capacity increased between 2011 and 2015 (from 18% to 40%)[153].

CEF has provided EUR 3.7 billion to PCIs for 139 actions. A large share of the funding provided has been used for works, and electricity projects have received more grants than gas projects. Smart grid and CO2 infrastructure – which represent smaller numbers of PCIs that also are less mature than electricity or gas transmission projects – only account for marginal shares of CEF grants provided. As indicated in the most recent CEF-Energy Report[154], transmission infrastructure projects attract the largest share of funding.

13 METHOD

This evaluation was supported by a study "Support to the evaluation of Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure" commissioned to an external contractor which helped gather, quantify and assess evidence drawn from a range of sources on the performance of the TEN-E instrument to date.

To provide relevant evidence on the implementation of the TEN-E Regulation, a number of methods were employed to collect primary and secondary data. The data collection included desk research, portfolio analysis, case study analysis, modelling and expert and stakeholder consultations. As mentioned under section 2, the data was collected from literature research, stakeholder input to the extensive consultations carried out in this respect (notably expert interviews, 4 webinars and 2 stakeholder surveys), PCI portfolio and case study analysis and related monitoring reports and modelling.

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[153] Consolidated data is not available for 2016-2019

[154] INEA (2020). Connecting Europe Facility Energy. Supported Actions – May 2020

The evaluation questions were drafted with a strong focus on how the 'activities' of the TEN-E Regulation perform (as listed in the intervention logic) and how they contribute to its output and objectives. Each question has been further ramified into a set of sub-questions.

The evaluation matrix included each set of questions and their sub-questions, as well as assessment criteria; indicators which inform the assessment, data sources and collection methods, analysis and approaches and ability to answer the evaluation question and limitations.

The evaluation questions and sub-questions per each evaluation criteria as used in the evaluation are outlined in the table below.

The main (implementation) provisions of the TEN-E Regulation have been further looked into more detail and a set of questions directly assessing their effectiveness has been developed in order to gather specific evidence on *i) the PCI selection process; ii) permit granting and public participation; iii) monitoring* and *iv) regulatory incentives and CBCA*. The replies to this set of implementation questions have been analysed together with the evidence under the effectiveness criteria.

In the process of data collection and analysis the several challenges and limitations were identified. These are presented below, together with the impact they may have had on the evaluation itself and the corresponding mitigation measures.

Issue or limitation	**Impact**	**Mitigation measure**
Limited information available as part of the desk research	Low	The available information was gathered against the evaluation matrix at an early stage of the evaluation. Therefore, the gaps were identified at earlier stages and missing topics were included in the questionnaires for the targeted survey and open public consultation In addition, further gaps have been identified and addressed as part of the interviewing process.
Fragmented quantitative information on specific PCI technical data	Medium	Desk research revealed that quantitative information on PCIs is fragmented or somewhat difficult to access. Specifically combining monitoring data with CEF funding and historical PCI data is problematic due to inconsistencies in formats and a lack of centralised accessibility. This is why special attention to this information was paid when drafting the questionnaires for the OPC and targeted survey.
Meaningful cost estimates to answer the evaluation	Medium	The questionnaires for the targeted survey and OPC were composed in such a way to address

questions on efficiency		this issue and include questions on the estimates of FTE's and cost drivers for cost items which are considered 'high' or 'too high' according to stakeholders. Further information was requested in the interviews. Results were triangulated between different types of stakeholders.
Divergence from initially planned distribution of interviewees	Medium	The differences in representation of types of stakeholders in comparison to the initially planned representation are taken into account in the qualitative analysis and presented in a way that reflects the share of interviews conducted with the different stakeholder categories.
Data on permitting schemes is potentially outdated. Current information is dispersed and difficult to access.	Medium	The latest study on permitting schemes adopted in Member States dates from 2016. As such, NCAs were further contacted forclarity,and additional information on the schemes currently in place.
Data quality issues project monitoring data	Low	Project monitoring data from ACER was used for the analysis of the portfolio of electricity and gas projects. Several data quality issues were identified, as a result not all data could be used (data quality of recent years improved). Monitoring data is only used when complete and accurate.
Fragmented quantitative information on specific PCI technical data	Medium	Desk research revealed that quantitative information on PCIs is fragmented or somewhat difficult to access. The available and consistent data was filtered where possible , checked against insights from stakeholder interviews and complemented with ACER monitoring data...
Lack of cost estimates to answer all the evaluation questions on efficiency	Medium	A more qualitative assessment of administrative costs was carried out, whilst aiming at the provision of quantitative results to the extent possible.
Modelling: not all benefits can be quantified	Low	In the modelling, socio-economic benefits are quantified but estimates do not reflect all benefits. This has been addressed by explaining socio-economic benefits in the

		annex with the modelling results.

14 ANALYSIS AND ANSWERS TO THE EVALUATION QUESTIONS

This section presents the answers to each set of evaluation questions per criterion in an aggregated manner. The questions, as well as the findings are mentioned under each subsection

Effectiveness

Three main questions have guided the assessment of the effectiveness of the TEN-E Regulation, as presented below:

- How effective has the regulatory approach of the TEN-E Regulation been both in terms of scope and main provisions in contributing to the goals of market integration, security of supply, competitiveness and the climate and energy targets for 2020?
- To what extent has the Regulation' main provisions addressed the needs identified in the Impact Assessment accompanying the Commission proposal in 2011?
- What unintended or unexpected positive and negative effects, if any, have been produced by the TEN-E Regulation? (e.g. in terms of human health, use of resources, and natural ecosystems)?

In terms of the overall goals, the TEN-E Regulation has effectively improved market integration and competitiveness, as shown in the evidence on interconnection targets and energy prices and their convergence across the EU and thus contributed to the overall development towards achieving them. 42 PCIs have been commissioned to date and contributed to this development by creating the interconnection capacities.

As a main contextual driver to the design of the TEN-E Regulation, security of supply has also been improved, to which PCIs in electricity, gas and oil have strongly contributed. For gas, the infrastructure and supply resilience has improved substantially since 2013. Member States are almost exclusively compliant with the N-1 rule and the infrastructure resilient to disruption scenarios. The focus on cross-border projects that increase the interconnection is found to have been an effective contribution to these goals. Modelling indicates strong socio-economic benefits in gas security of supply arising from implemented PCIs (118 m€/yr in 2020 market situation, which was even more substantial in a 2013 market situation scenario (193 m€/yr)). Security of supply of electricity is increased through enhanced interconnectivity with 19 Member States reaching or going beyond the 10% interconnection target for 2020. Modelling shows that electricity PCIs commissioned already deliver substantial benefits that might even increase in the future.

The organisation of PCI selection in Regional Groups under the coordination of the Commission is found to be an important factor, as well as the approach to share costs between Member States to enable projects with benefits across borders. The financing support provided by CEF also contributed to this. 4.7 billion EUR in CEF co-financing have been allocated to 149 actions in relation to 95 PCIs. The grants for studies helped projects to reduce risks in the early stages while grants for works supported projects addressing key bottlenecks.

Analysed data on TEN-E's performance shows a contribution towards EU's energy and climate targets, albeit less significant than compared to the other internal market objectives (market integration, security of supply, competitiveness) due to the historic priorities of the policy and difficulty in devising a robust sustainability assessment of gas PCIs[155]. Electricity interconnection PCIs are key elements for the integration of renewable energy sources into the European market. Although quantitative data on the effect of the TEN-E Regulation in this field is more limited, the modelling shows a reduction of CO2 emissions of 2804 kilotons across EU (or 0.4% decrease) for the year 2020 compared to the baseline resulting from the implementation of electricity interconnection PCIs. Quantified impact of gas PCIs on CO2 reduction is rather negligible. A positive contribution has been qualitatively described during the consultation by TSOs, NCAs Eastern Europe.

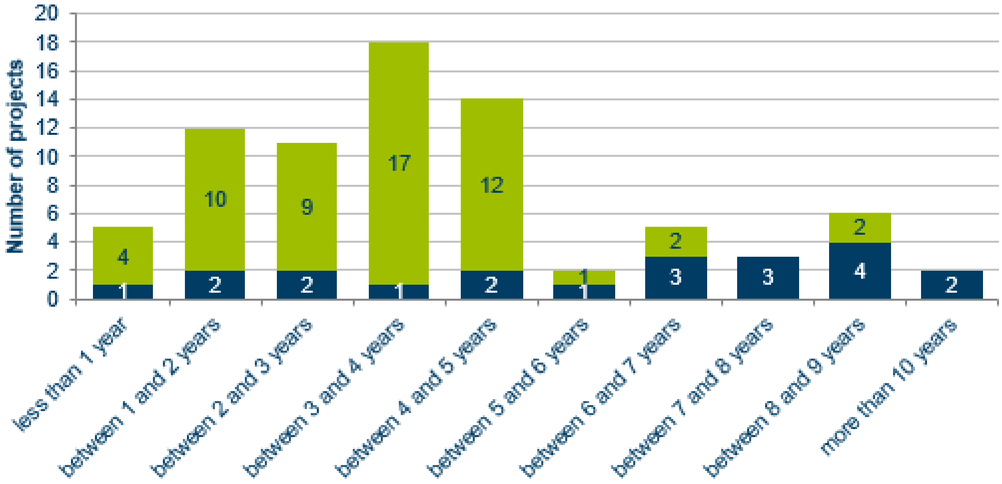
The regulation addressed the needs identified in the 2011 Impact Assessment, as regards the lengthy and ineffective permit granting procedures, regulatory challenges for cross-border projects and difficulties in financing such large infrastructure projects. The specific objectives of reducing permit duration and complexity, advancing the regulatory framework and improving the financing conditions of energy infrastructure projects in a cross-border context have overall been improved since the Regulation entered into force in 2013. However, the positive picture at the level of overall improvement also faces challenges in the specific implementation of the main provisions.

As already indicated under section 3, the duration of permit granting processes in the Member States has shortened compared to the baseline situation. Looking at the overall

[155] For the calculation of sustainability benefits, the information provided by candidate projects in their project fiches includes CO2 emissions and benefits deriving from fuel switch, used as input in the CBA methodology. However, the current underlying assumption in the CBA is that all gas projects would automatically show only positive benefits towards CO2 mitigation, with no negative impact (such as possible increase in CO2 emissions). By only using CO2 savings from fuel-switches from coal to gas without carrying out a detailed analysis of the different situations in the individual countries, other possible sustainability benefits remain invisible and unquantifiable, hampering the robustness of the results of the assessment of such benefits. This was also acknowledged by the Agency for the Cooperation of Energy Regulators (ACER) in its Opinion No 19/2019 of the European Union of 25 September 2019 on the draft regional lists of proposed gas projects of common interest 2019. In this opinion, ACER notes that '*(28) the contribution of the PCI candidate projects to sustainability in general and to meeting the climate change policy goals of the European Union in particular, is not quite clear. ACER believes that the preliminary assessment provided by ENTSOG, which assigned a positive sustainability benefit to each and every candidate project, is tenable only under the specific assumptions that gas will be a substitute of more polluting fuels in the European Union's primary energy mix, and also that the total volume of consumed gas will be within a range that ensures that overall greenhouse gas emissions resulting from gas use will stay below the European Union's policy targets.* Therefore, the lack of detailed data and consistency, did not allow to properly calculate the sustainability benefits.

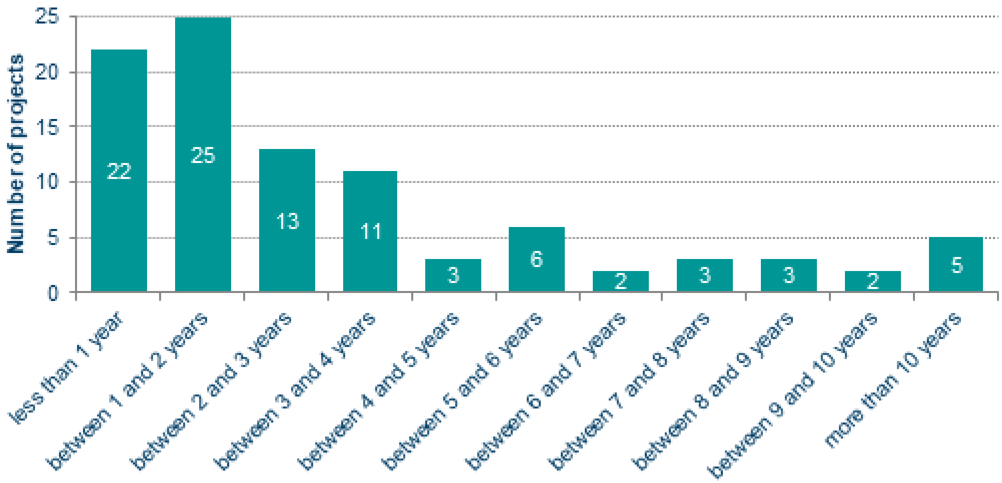
picture, monitoring reports indicate an average duration of 4 years for electricity PCIs and 3.1 years for gas PCIs.

Figure 5: Duration of the permit granting process for electricity PCIs



Source: adapted from ACER 2019 (Consolidated Progress Report).

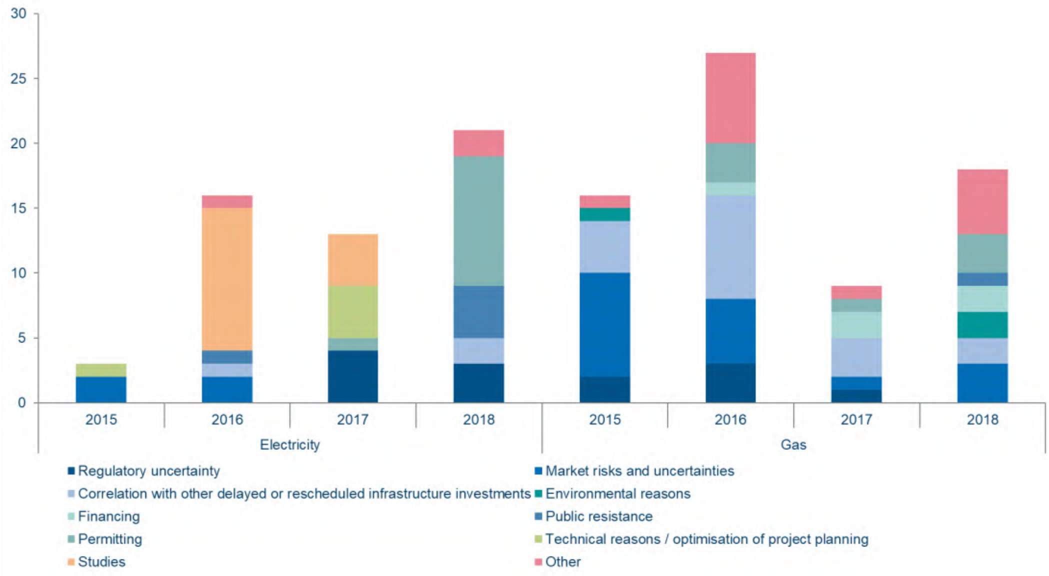
Figure 6: Duration of the expected permit granting process for gas PCIs



Source: adapted from ACER 2019 (Consolidated Progress Report).

The permitting process constitutes one of the main causes for delays for both electricity and gas PCIs. For instance, 25% of electricity PCIs were reported as delayed in the 2019 ACER report. Of these, 46% encountered delays specifically during the permit granting process. These numbers are similar to those provided in the 2018 report but slightly lower than those in the 2017 report, suggesting a slight improvement. For gas PCIs, the picture looks similar - 12 PCIs have been delayed (i.e. 28% of gas PCIs), of which 7 (58%) report the permitting stage as the cause. These results are similar to those reported in 2018.

Figure 7: Reasons for electricity and gas PCI delays



However, longer permitting durations are still observed, including PCIs needing up to 9 years before obtaining the permit according to ACER's latest progress report, which indicates a high difference in permit granting duration between individual projects. The finding of differing permitting durations is strongly supported by the results of the stakeholder consultation which indicate that the effectiveness of permit granting procedures strongly depends on national implementation. Experiences of project promoters vary substantially because of differences in applying TEN-E permitting requirements such as the responsibilities of authorities in the permit granting process. Project characteristics have a substantial influence on the requirements of the permitting process. The nature of PCIs as large projects with cross-border impacts creates strong needs for impact assessment and complex planning documentation according to project promoters. In section 3 we have outlined the permitting schemes as chosen by Member States to facilitate and coordinate the permit granting process for PCIs.

In terms of the effectiveness of the permitting scheme employed, the 2016 ACER progress report156 estimated the duration of permit granting per scheme, which is shown for electricity PCIs in the figure below. This report found that coordinated schemes had the shortest duration for permit granting, followed by a similar duration for integrated, collaborative and multiple schemes157. The table also shows that coordinated schemes were compliant with the 3.5-year time limit, whereas the other types of schemes resulted in durations of the permitting stage slightly above the limit established in Art. 10(2).

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[156] ACER (2016). Consolidated report on the progress of electricity and gas projects of common interest for the year 2015.

[157] Sample size for integrated scheme is too small to provide a robust indication of the duration (ACER 2016).

Table 3: Distribution of permitting schemes for electricity PCIs and expected duration of permit granting depending on the scheme

Permitting scheme	Number of Member States applying the scheme (in 2016)	Number of PCIs (in 2016)	Average expected duration of permit granting (years, in 2016)
Integrated	1	4	3.8
Coordinated	9	24	2.8
Collaborative	15	47	3.6
Multiple schemes	2	21	3.7

Source: ACER 2016, Milieu 2016.

However, the evaluation indicated that the underlying reasons for delays fall outside the direct scope of the TEN-E Regulation and cannot be addressed by the Regulation specifically. While continuously complex national procedures are one cause for this, environmental procedures of PCIs and public opposition causing lengthy court cases against the projects are other reasons for extended permitting times. However, in this case, it is worth highlighting the procedural dimension of environmental obligation as opposed to issues that relate to the substantial provision of the EU environmental legislation. These environmental procedures that were found as reasons for delay are often linked to the need for re-assessment of the project due to its re-routing. The evaluation based on stakeholder input showed that the positive aspects of the projects' compliance with the environmental acquis has been highlighted as mitigating possible environmental and biodiversity impact. This in turn, substantiates the need for early public consultations in timely implementation of any necessary re-assessment and adjustment of projects. At the same time, the delays caused by lengthy court cases do show that the provisions on public participation have increased and ensured opportunities for the public to be involved in the permitting stages of a project, but have not been effective in reducing public opposition to many PCIs.

As regards the effectiveness of the TEN-E Regulation provisions for cross-border cost allocation (CBCA), the evaluation showed varying extents as already referred to under section 3.

There are three ways through which CBCA decisions can support investment decisions:

- By allocating overall project costs to specifically compensate net negative impact for at least one involved party, reducing the barrier to invest for these specific parties;
- By providing clarity on the acceptance of the relevant costs to be covered by national system tariffs in each concerned Member State; and
- By Providing access to (additional) financial support through CEF grants for works.

While the approach taken to share costs between Member States in relation to benefits is largely appraised, the details of the mechanism like time and data requirements as well as its complexity reduce its attractiveness. Therefore, CBCAs prove to be effective in some cases while a question on the valuation of the mechanism remains as it is a step to an application for CEF grants. The complexity of obtaining data, the additional time until an investment decision can be made and the lack of unambiguous results to base the decision on are factors reducing the satisfaction of stakeholders with the process. At the same time, the concept is appreciated in enabling the understanding of the benefits of a project.

The evaluation showed that CBCAs are beneficial in some cases but less effective in others. CBCA processes are often triggered to obtain access to CEF funding and are regularly concluded with no costs allocated across borders. The analysis of the most recent ACER data[158] on CBCA decisions (triangulated with data on the CEF funding) show that these are rarely used to provide additional clarity on the acceptance of the relevant costs to be covered by national system tariffs in concerned Member States. 70% of all CBCA decisions (21 out of 30) taken until March 2018 concerned projects where the project was built on the territory of one country and the costs were allocated to that same country only. Despite showing a strong decrease in in the latest period from 2018-2020, still a relatively large share of these PCIs in one country with one cost carrier remained as of March 2020 (24 out of 42 cases), potentially anticipating CEF-E grants and not necessarily seeking a decision on cost allocation.

Moreover, the results showed that CBCA decisions are rarely used to reallocate costs to compensate net negative impact for at least one involved party, reducing the barrier to invest for these specific parties. With the exception of four cases in 2014 (all gas PCIs), none of the CBCA decisions allocated costs to non-hosting countries. This indicates that almost half of all cases (20 out of 42) involve situations where CBCA decisions did not provide compensation of net negative impact for the hosting country through allocation of overall project costs. Since these projects were internal project with benefits for the one involved party, it can be concluded that for 48% of all cases the only intention for project promoters to have requested a CBCA decision was to gain access to CEF funding.

Ineffectiveness of the CBCA process can result in projects that are not realised due to a lack of funding or may lead to the 'disproportionate' use of EU funding where insufficient consideration was given to funding from tariffs in Member States. Due to its ineffectiveness, project promoters, NRAs and ACER consider CBCAs as an administrative burden with, in many cases, little to no direct benefits[159].

The availability of CEF funding has had the most significant influence on the financing of energy infrastructure projects addressing the third need as identified in the 2011 impact assessment. The funding support offered in the form of grants by the CEF has

158 ACER (2018), Third Edition of the Agency's Summary Report on Cross-Border Cost Allocation Decisions - Status update as of March 2018.

159 Also confirmed by Roland Berger (2016). Cost-Effective Financing Structures for Mature Projects of Common Interest (PCIs) in Energy and Trinomics et al. (2018)

been found important for improving the financing conditions for PCIs[160]. Public grants are described to enable private investment in energy infrastructure by absorbing risks and therefore effectively advancing PCIs. By providing support in early stages, the grants offered for studies contribute to de-risk project development. This, on the one hand, helped to improve project realisation according to project promoters and national authorities, and also contributed to attracting investors. The visibility of the project due to its PCI label and the political support that has been experienced by many project promoters also supports the attractiveness of PCIs to investors. CEF grants for works can also support projects that would not be economically viable otherwise and prevent high increases in tariffs. The additional mechanism of risk-based incentives has been rarely used[161] mostly due to the assumptions from project promoters that NRA do not see higher risks for PCIs or that the regulatory framework allows coping with the risks. As such, I it has not had an effect to improve the financing situation of PCIs so far.

As regards selection criteria, selected PCI projects demonstrated to help fulfilling the current objectives of the TEN-E Regulation as it was conceived in 2013. The evaluation indicates that sustainability benefits were realised to a lesser extent than the other benefits mostly due to the difficulty in devising a robust methodology for assessment of sustainability impacts of gas projects. Some of the current selection criteria might be too restrictive for the inclusion of projects at DSO level, in particular: the cross-border impact criteria, and the 10 kV voltage threshold and 20% RES origin for smart grids. A more flexible definition of the cross-border impact may allow to include relevant projects in one Member State with significant and quantifiable benefits in other Member States (or outermost regions) with regards to the objectives of the TEN-E regulation.

The electricity and gas network planning exercises are eminently related to the PCI selection process. Energy infrastructure needs are identified in the network planning process and potential projects addressing those needs must be evaluated according to the general objectives of the TEN-E Regulation (security of supply, market integration, competition and sustainability). A cost-benefit analysis methodology must be developed by the ENTSOs to assess the projects they shall include in the TYNDP. This CBA is also the basis to evaluate the candidate projects for PCI. In the network planning process, the models of the electricity and gas systems are currently independent, not allowing sufficient consideration of interdependencies between systems. However, the ENTSOs are currently developing an interlinked model with view to develop in the future the network planning process to a “system of systems” approach, including all energy vectors and demand sectors. CBA methodologies are not aligned between electricity and gas, which does not allow a fair comparison between electricity and gas projects, since they can potentially compete to address system needs.

The evaluation brought forward a series of insights that relate to the governance of the network planning exercise. The main finding concerns the lack of adequacy of roles of

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160 Roland Berger (2016). Cost-Effective Financing Structures for Mature Projects of Common Interest (PCIs) in Energy.

161 ACER reports indicate that two requests for such incentives have been made for electricity and four for gas PCIs. In four cases overall (one electricity, three gas), risk-based incentives have been granted

the different agents in the PCI process. The role of the ENTSOs has been found as conflicting with their interests as project promoters. Whilst the evaluation acknowledged that the ENTSOs, as TSO operators, enjoy the necessary expertise and access to system and planning data, a higher degree of stakeholder consultation and validation of ENTSOs underlying planning assumptions (in scenarios and modelling) and CBA methodologies developed may be needed to ensure an energy integrated system approach, where all energy carriers' interdependencies can be captured when evaluating the benefits of projects.

Whilst certain stakeholders indicated that the biennial periodicity of the PCI lists is unnecessarily burdensome and potentially carrying risks for investors in case of loss of the PCI label, the evaluation has not found conclusive data to support the claims. There is no evidence that the specificities of their business models in the case of smart grids and CO2 infrastructure categories would qualify them for a streamlined reassessment in the PCI process and serve as a derogation from the biennial process. Moreover, twos-speed PCI processes for different types of infrastructure categories has been found unmanageable and not serving the scope of the Regulation.

The evaluation concluded that priority corridors and thematic areas need to be updated to address future challenges and incorporate new types of projects. As such, new categories could be considered such as cross-sectoral projects, joint gas-electricity-hydrogen corridors, sector coupling projects, smart gas grid projects, hydrogen, clean gases, digitalization, distribution projects, energy storage, hybrid wind offshore, hybrid solutions, electric priority corridor to South Mediterranean/North Africa, decarbonisation of islands, smart sector integration, electrification of heating and cooling systems, peripheral countries, sector integration technologies and solutions, renewable heating and cooling infrastructures. On the other spectrum, electricity highways and oil priority corridor have been appraised as non-effective.

As for the effectiveness of reporting and monitoring, the evaluation found that ACER's annual monitoring report could be done biennially with every PCI list by only focusing on relevant changes and tackling inefficiencies. The transparency platform and the PCI interaction map are positively valued.

Efficiency

Two main questions have guided the assessment of the efficiency of the TEN-E Regulation, as presented below:

- To what extent are the costs resulting from the implementation of the TEN-E Regulation proportionate to the benefits that have been achieved? What are the major sources of inefficiencies?
- To what extent do the different types of costs resulting from the implementation of the TEN-E Regulation vary based on the approach taken to implement the legislation (while achieving the same results)? Which approach was most efficient?

Although lack of sufficient data impeded the full and harmonised quantification of all the benefits and costs, it is likely that benefits of the Regulation outweigh the costs. Benefits include socio-economic net benefits and market efficiency. The analysis of effectiveness shows that socio-economic net benefits were realised through an increase in security of supply, competition and integration of markets and to a lesser extent sustainability. Modelling shows that net benefits of electricity PCIs increase in scenarios with a higher CO2 price, which in turn shows these projects have benefits in the context of the Green Deal. The market efficiency benefits refer to benefits that improve information availability, increase cost savings, and ensure that a wider range of products or services are provided. The Regulation has resulted in improved transparency. The evidence on the extent to which the Regulation resulted in improved processes and timely construction of projects is, however, mixed and it is strongly linked to the various performance of the different provisions due to national implementation.

The main cost drivers are the PCI selection process and monitoring, the permitting process, stakeholder consultation and costs associated with decisions on CBCA and regulatory incentives. In general, stakeholders view the costs associated with the Regulation to be justified. Opportunities to improve the efficiency of the Regulation are limited but there is potential to reduce the administrative burden for project promoters in the CBCA process, the PCI application process and monitoring. CBCA decisions are considered too burdensome when they are mainly used as a stepping stone for access to CEF grants. Costs for re-application of a project for a new PCI lists and monitoring costs are considered too high by some stakeholders mainly because data requests are considered inefficient. The total impact on costs of any changes to the CBCA process and application/monitoring processes is limited compared to the total benefits and costs of the Regulation and changes can have a negative impact on other objectives of the Regulation.

Relevance

Three main questions have guided the assessment of the relevance of the TEN-E Regulation, as presented below:

- To what extent do the objectives of the TEN-E Regulation still respond to the needs of the EU in relation to energy infrastructure?
- To what extent are the 12 priority corridors still relevant? Do they address current and arising challenges for TEN-E networks (e.g. sector coupling, hydrogen)?
- To what extent are the provisions of the TEN-E Regulation able to respond to new or emerging issues such as the energy and climate targets for 2030, the EU long-term decarbonisation commitment towards carbon neutrality, the energy efficiency first principle, and EU readiness for the digital age?

The Paris Agreement and the European Green Deal involve a significant transformation of the current energy infrastructures into a fully carbon-neutral energy integrated system by 2050. While the initial objectives of the TEN-E Regulation -security of supply, market integration, competition and sustainability- are still relevant, the changes needed in the way we develop energy infrastructure claim for a rebalance of the objectives in order to fulfil the decarbonisation targets and be aligned with the climate-neutrality objectives. Along the pathway towards a decarbonised economy in 2050, energy infrastructure needs will gradually evolve as emerging technologies are deployed and the sectors gradually interlink and switch to sustainable sources. There must be a realistic planning of the network from its current state to the targets in 2050. In the analysis performed based on desk review and the stakeholder's consultation, many emerging technologies were identified to be necessary in the future energy infrastructure. The following technologies are currently not specifically addressed by the TEN-E regulation: decarbonisation of gas – hydrogen, green gas infrastructures, retrofitting of existing gas networks, bidirectional gas flow projects, energy system integration – power-to-gas, smart system integration, gas smart grids, digitalization, electric vehicle charging infrastructures, decarbonisation – carbon storage, RES deployment and integration – hybrid offshore wind, meshed wind hubs.

In view of increasing its relevance, , sustainability will need to be prioritised amongst the objectives of the TEN-E Regulation. In view of the necessary growing shares of intermittent renewable energy generation, their integration whilst ensuring security of supply is becoming increasingly more relevant. Moreover, further alignment of sustainability aspects of energy infrastructure projects would have to be explored with the sustainable finance framework, once completed. The flexibility needs of the system can also be addressed by energy system integration, potentially an additional objective per se in the regulation.

Some TEN-E provisions do not facilitate the deployment of emerging technologies that are necessary in the context of the European Green Deal and which will inevitably gain predominance in the future energy infrastructure investments in Europe in the next decades. The methodologies developed by the ENTSOs, including scenario development, modelling and CBA assessment, as the basis of the PCI selection process, are currently undergoing major changes towards coordinated multi-sectorial planning and smart sector coordination approach. The methodologies need to be adapted to include all new emerging technologies and have a holistic view of the energy system. Some PCI selection criteria may hinder deployment of emerging technologies. In particular, smart grid projects, according to Annex IV.1.e of the Regulation, have a voltage threshold of 10 kV that leaves out essential installations of these projects. Additionally, the 20% requirement of RES generations in the network can limit the deployment of smart grids in regions with lower penetration of RES capacity. The permit granting process, as conceived by the TEN-E regulation, seems to be only effective for large transmission infrastructure projects. Concepts such as the one-stop-shop and provisions in Article 10 related to the duration and implementation of the permit granting process cannot be adequately applied to smart grid projects, as it has been confirmed by all smart grid project promoters who took part in the stakeholder consultation.

Coherence

Four main questions have guided the assessment of the coherence of the TEN-E Regulation, as presented below:

- Three main questions have guided the assessment of the coherence of the TEN-E Regulation, as presented below:
- Are the measures set out within the TEN-E Regulation mutually reinforcing or are there any overlaps, inconsistencies, or incoherencies (when read in isolation)?

- How does the legislation interact with other EU/ national/ international initiatives (e.g. actions in the field of environment, single market, climate action) which have similar objectives?

- How well does the legislation fit with and complement other EU policies (e.g. Regional Policy, Research and Innovation, Environment) but also other elements of EU energy policy (e.g. internal market design, renewable energy framework, energy efficiency first principle, Union energy and climate targets for 2030, the EU long-term decarbonisation commitment, European Green Deal)?

Evidence obtained during the evaluation process identified limited concerns around the internal coherence of the TEN-E Regulation although a number of points have been identified concerning the implementation of certain elements such as insufficient flexibility to adapt to rapidly evolving policy areas, potential conflicts on legal drafting around cost allocation, insufficient precision on the definition of 'maturity' and limited clarity on the process for the Commission's publication of TYNDP Guideline updates.

The TEN-E Regulation is largely consistent with the legislative and policy environment that was in place at the time of its introduction. However, the current TEN-E is not consistent with the current legislative and policy environment, which has been triggered by the various changes under the Clean Energy Package. Inconsistencies include "mechanistic" examples (such as alignment with renewable energy and interconnector targets), but also more nuanced examples such as PCI selection which is not currently aligned with the intended policy goals behind the Clean Energy Package (such as greater roles for DNOs).

The TEN-E Regulation requires substantial revision to bring the Regulation into line with the priorities within the European Green Deal, and to bring greater synergies with other sectoral instruments such as the TEN-T Regulation to drive decarbonisation by fostering a more cross-sectoral approach. Evaluation findings as well as evidence drawn from stakeholder consultations strongly support an ambitious, long-term approach when redefining the scope of the TEN-E Regulation.

Some inconsistencies with national-level legal frameworks were identified. This seems mainly related to national-level implementation and compliance in a limited number of member states which have reported difficulties in their national-level legal frameworks as opposed to a systemic issue with the TEN-E Regulation.

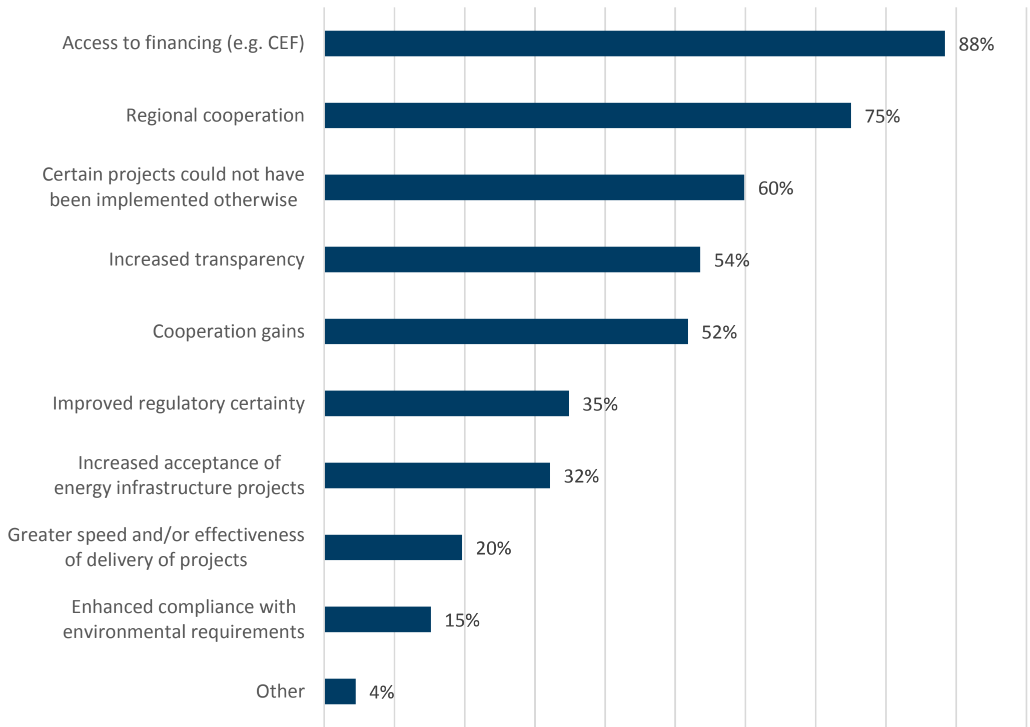
EU added value

The evaluation concluded that the TEN-E Regulation has provided added value compared to what could have been achieved at national or regional level. The benefits of the TEN-E Regulation, already referred to under the assessment of effectiveness and efficiency, backed by input from stakeholders confirmed the added value arising from an increase in security of supply, more competitive markets and more interconnected energy networks.

The implementation of over 40 key energy infrastructure projects since its enactment helped most Member States reach the 10% interconnection target for 2020 and achieve a well-interconnected and shock-resilient gas grid. As such, the EU energy market is more integrated and competitive than it was in 2013 and the Union's energy security improved. Access to targeted financing under CEF enabled the implementation of 95 PCIs which have had otherwise difficulties in accessing financing under market rules.

. Various stakeholders confirmed the added value of the TEN-E Regulation, pointing to the importance of regional cooperation in implementing cross-border projects, transparency regulatory certainty and access to financing..

Figure 8: The EU added value of the TEN-E Regulation as indicated by stakeholders



The TEN-E Regulation fosters the development of cross-border energy infrastructure in the EU. Thus, it promoted cooperation among Member States, which might not have occurred without the coordinated action at the EU level. The common approach of benchmarking projects to one another were instrumental in enabling cooperation and transparency. In addition, national and regional level legislation covers cross-border cooperation in the EU assists projects that have cross-border relevance.

15 CONCLUSIONS

Since 2013, energy interconnections have increased across the EU as a result of the implementation of the TEN-E Regulation and PCIs in all regions. Increased interconnection effectively improved the integration of Member States' networks, which in turned made the EU energy market more integrated and competitive than it was before the application of the TEN-E Regulation. Wholesale prices for electricity decreased and converged in almost all Member States. Gas prices also converged. An increase in security of gas supply has been achieved substantially since 2013 through new interconnections and LNG terminals. PCIs have demonstrated to help fulfilling the current objectives of the TEN-E Regulation as it was conceived in 2013. However, the do not reflect the renewed climate ambitions and the climate neutrality objective nor the latest technological developments. This progress should be taken into account in the infrastructure categories covered by the Regulation, the PCI selection criteria as well as the priority corridors and thematic areas.

The PCI identification and selection process within the Regional Groups has been found effective in improving cooperation and enabling decisions on cross-border projects on the basis of a regional and European approach. The TYNDP process has proven effective as a first step for the identification of PCIs. However, while the ENTSOs and TSOs have an important role to play in the process, there is a need for more inclusiveness and scrutiny of the main inputs and assumptions to enhance trust in the process.

The cross-border cost allocation mechanism is an important enabler for project implementation. However, in many cases the cross-border cost allocation did not result reducing the financing gap of the project, as intended.

While permitting procedures have been shortened, long permitting procedures persist in some cases. However, the underlying reasons are mainly related to national implementation and outside the scope of the TEN-E Regulation.

CEF financial assistance granted to 95 projects were an effective enable of their implementation. Grants for studies helped projects to reduce risks in the early stages of development while grants for works supported projects addressing key bottlenecks that market finance could not sufficiently address.

The evaluation found that the benefits of the Regulation outweigh the costs proving its efficiency. TEN-E Regulation brought socio-economic benefits through an increase in security of supply and more integrated and competitive energy markets. The Regulation also contributed to improved information availability, coordination and transparency.

The initial objectives of the TEN-E Regulation -security of supply, market integration, competition and sustainability- remain relevant. However, the increased climate ambitions under the Paris Agreement and the European Green Deal call for a rebalancing of the objectives in order to fulfil the decarbonisation targets and contribute to climate-neutrality.

The evaluation showed limited evidence as to concerns around the internal coherence of the TEN-E Regulation, other than potential mechanistic changes and a lack of flexibility in adapting to rapidly evolving policy areas.

The TEN-E Regulation delivered results which could have not otherwise been achieved by action at Member State level, proving EU added value.

ANNEX 6: PCIS AND CEF FINANCIAL ASSISTANCE

Projects of common interest (completed):

PCI number	Regional group/ sematic area	Name of the PCI
1.1.1	NSOG	1.1.1 Interconnection between Gezelle (BE) and the vicinity of Richborough (UK)
1.1.2	NSOG	1.1.2 Internal line between the vicinity of Richborough and Canterbury (UK)
1.1.3	NSOG	1.1.3 Internal line between Dungeness to Sellindge and Sellindge to Canterbury (UK)
1.3.2	NSOG	1.3.2 Internal line between Niebüll and Brunsbüttel (DE)
1.4.2	NSOG	1.4.2 Internal line between Audorf and Hamburg/Nord (DE)
1.4.3	NSOG	1.4.3 Internal line between Hamburg/Nord and Dollern (DE)
1.5	NSOG	Denmark — Netherlands interconnection between Endrup (DK) and Eemshaven (NL) [currently known as “COBRAcable”]
1.7.3	NSOG	1.7.3 Interconnection between Coquelles (FR) and Folkestone (UK) [currently known as "ElecLink"]
2.2.2	NSI West Electricity	2.2.2 Internal line between Lixhe and Herderen (BE)
2.2.3	NSI West Electricity	2.2.3 New substation in Zutendaal (BE)
2.3.1	NSI West Electricity	2.3.1 Coordinated installation and operation of a phase-shift transformer in Schifflange(LU)
2.5.1	NSI West Electricity	2.5.1 Interconnection between Grande Ile (FR) and Piossasco (IT) [currently known as “Savoie-Piemont” project]
2.5.2	NSI West Electricity	2.5.2 Internal line between Trino and Lacchiarella (IT)
2.6	NSI West Electricity	PCI Spain internal line between Santa Llogaia and Bescanó (ES) to increase capacity of the interconnection between Bescanó (ES) and Baixas (FR)

2.8	NSI West Electricity	Coordinated installation and operation of a phase-shift transformer in Arkale (ES) to increase capacity of the interconnection between Argia (FR) and Arkale (ES)
2.12	NSI West Electricity	Germany — Netherlands interconnection between Niederrhein (DE) and Doetinchem (NL)
2.16.2	NSI West Electricity	2.16.2 Internal line between Pedralva and Vila Fria B (PT)
2.24	NSI West Electricity	Internal line between Horta-Mercator (BE)
2.25.1	NSI West Electricity	2.25.1 Internal lines Mudejar — Morella (ES) and Mezquite-Morella (ES), including a substation in Mudejar (ES)
2.25.2	NSI West Electricity	2.25.2 Internal line Morella-La Plana (ES)
3.1.3	NSI East Electricity	3.1.3 Internal line between St. Peter and Ernsthofen (AT)
3.11.5	NSI East Electricity	3.11.5 Internal line between Mirovka and Cebin (CZ)
3.13	NSI East Electricity	Internal line in Germany between Halle/Saale and Schweinfurt to increase capacity in the North-South Corridor East
3.15.1	NSI East Electricity	3.15.1 Interconnection between Vierraden (DE) and Krajnik (PL)
3.15.2	NSI East Electricity	3.15.2 Installation of phase shifting transformers on the interconnection lines between Krajnik (PL) — Vierraden (DE) and coordinated operation with the PST on the interconnector Mikułowa (PL) — Hagenwerder (DE)
3.19.1	NSI East Electricity	3.19.1 Interconnection between Villanova (IT) and Lastva (ME)
3.22.5	NSI East Electricity	3.22.5 Interconnection between Villanova (IT) and Lastva (ME)
4.1	BEMIP Electricity	Denmark — Germany interconnection between Ishøj/ Bjæverskov (DK) and Bentwisch (DE) via offshore windparks Kriegers Flak (DK) and Baltic 1 and 2 (DE) [currently known as "Kriegers Flak Combined Grid Solution"]
4.4.1	BEMIP Electricity	4.4.1 Internal line between Ventspils, Tume and Imanta (LV)

4.5.1	BEMIP Electricity	4.5.1 LT part of interconnection between Alytus (LT) and LT/PL border
4.5.5	BEMIP Electricity	4.5.5 Internal line between Kruonis and Alytus (LT)
5.2	NSI West Gas	PCI Twinning of Southwest Scotland onshore system between Cluden and Brighouse Bay. (United Kingdom)
5.7.1	NSI West Gas	5.7.1 Val de Saône pipeline between Etrez and Voisines (FR)
5.7.2	NSI West Gas	5.7.2 Gascogne-Midi pipeline (FR)
5.11	NSI West Gas	Reverse flow interconnection between Italy and Switzerland at Passo Gries interconnection point
5.13	NSI West Gas	PCI New interconnection between Pitgam (France) and Maldegem (Belgium)
5.14	NSI West Gas	PCI Reinforcement of the French network from South to North on the Arc de Dierrey pipeline between Cuvilly, Dierrey and Voisines (France)
5.16	NSI West Gas	PCI Extension of the Zeebrugge LNG terminal.
6.3	NSI East Gas	PCI Slovakia – Hungary Gas Interconnection between Vel'ké Zlievce (SK) – Balassagyarmat border (SK/HU) - Vecsés (HU)
6.5.5	NSI East Gas	6.5.5 "Compressor station 1" at the Croatian gas transmission system
8.1.1	BEMIP Gas	8.1.1 Interconnector between Estonia and Finland "Balticconnector",
8.2.3	BEMIP Gas	8.2.3 Capacity enhancement of Klaipeda-Kiemenai pipeline in Lithuania

Additional information on on-going PCIs and their status of implementation can be found on the **PCI Transparency Platform**: https://ec.europa.eu/energy/infrastructure/transparency_platform/map-viewer/main.html.

More details concerning PCIs included on the current 4th PCI list can be found in the technical document published alongside the 4th PCI list: https://ec.europa.eu/energy/sites/ener/files/technical_document_4th_pci_list.pdf.

Projects of common interest and CEF financial assistance

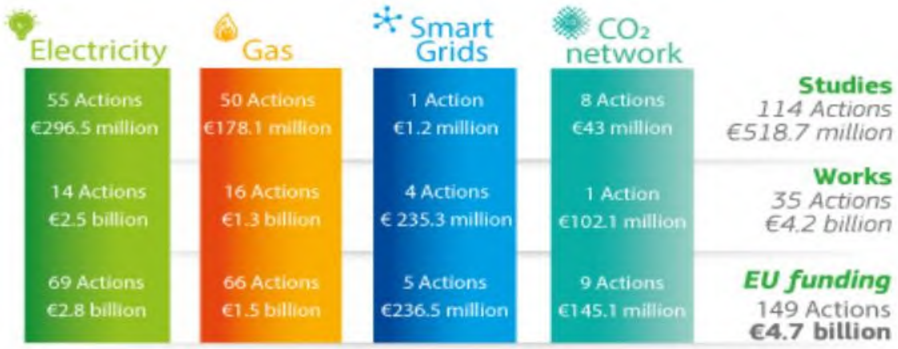
The status of project of common interest is awarded to projects that provide highest European added value and that contribute the most to the implementation of the strategic energy infrastructure priority corridors and areas. The majority of the PCIs are expected to be commercially viable and financed through network tariffs. CEF support is exceptional because most CEF funding for works is considered as 'last resort option' for the financing of PCIs. A three-step logic applies to investments in PCIs. First, the market should have the priority to invest. Second, if investments are not made by the market, regulatory solutions should be explored, if necessary the relevant regulatory framework should be adjusted, and the correct application of the relevant regulatory framework should be ensured. Third, where the first two steps are not sufficient to deliver the necessary investments in projects of common interest, Union financial assistance could be granted if the project of common interest fulfils the applicable eligibility criteria

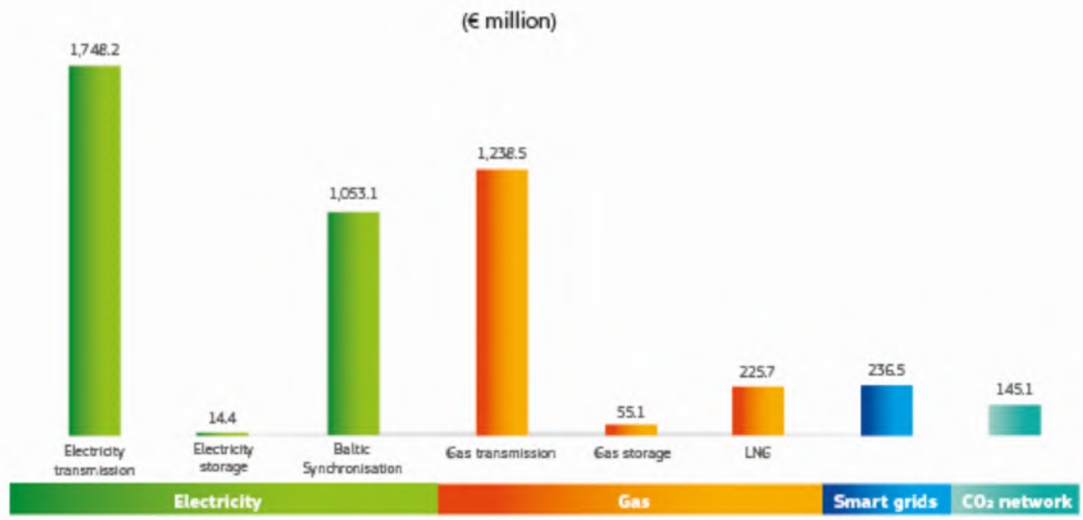
CEF support may be awarded to those PCIs which are not viable under the existing regulatory framework and market conditions and provide significant externalities (such as security of supply, innovation and solidarity). CEF promotes cooperation between countries to develop and implement energy interconnection PCIs that otherwise would not happen. This is especially the case for cross-border projects located in countries with smaller population sizes or in a more remote location, where energy tariffs would need to be increased substantially to cover the investment needs.

The selection process for CEF funding is independent from the selection process for PCI status. PCI status is a pre-condition for applying for CEF (with exception of the new window for cross-border renewable projects) and some elements of the PCI selection process such as the project specific CBA and the cross-border cost allocation decision are part of the CEF evaluation process. However, the selection process for CEF is based on an evaluation with external experts against award criteria as set out in the relevant work programme and call for proposals. CEF was subject to separate evaluation and impact assessment in preparation of CEF proposals for the MFF2021-2027.

Since 2014, CEF has provided financing to 149 actions of which 114 (EUR 519 million) for studies and 35 (EUR 4.2 billion) for works. Of total budget of EUR 4.7 billion, EUR 1.5 billion were allocated to gas projects and EUR 2.8 billion to electricity projects. So far, around one fifth of all PCIs have received CEF financial assistance for studies and/or works. This is illustrated in the below figures.

Figures 1 and 2: CEF financial assistance per sector (201-2020)


Electricity
Gas
Smart Grids
CO₂ network
55 Actions
€296.5 million
50 Actions
€178.1 million
1 Action
€1.2 million
8 Actions
€43 million
Studies
114 Actions
€518.7 million
14 Actions
€2.5 billion
16 Actions
€1.3 billion
4 Actions
€ 235.3 million
1 Action
€102.1 million
Works
35 Actions
€4.2 billion
69 Actions
€2.8 billion
66 Actions
€1.5 billion
5 Actions
€236.5 million
9 Actions
€145.1 million
EU funding
149 Actions
€4.7 billion


(€ million)
1,748.2
14.4
1,053.1
1,238.5
55.1
225.7
236.5
145.1
Electricity transmission
Electricity storage
Baltic Synchronisation
Gas transmission
Gas storage
LNG
Electricity
Gas
Smart grids
CO₂ network

ANNEX 7: ADDITIONAL DISCARDED OPTIONS

- **Breaking the link between the CBCA and CEF financing**

Different stakeholder groups mentioned that the requirement to submit a CBCA decision should no longer be mandatory for obtaining CEF financial assistance for works as it was perceived as an unnecessary burden. ACER considers that the CBCA could still be a mandatory step before a CEF application if the project has benefits widely spread between many Member States, but not in case CEF grants would be requested for affordability reasons. In such case, ACER considers that a simple confirmation from the national NRA would suffice.

However, this option was expressed by stakeholders wishing to have easier access to CEF financing, and does not take into account the aim and the limited nature of EU funds. As mentioned in the Preamble of the CEF Regulation, CEF financing is a last resort measure and projects should be realised primarily on the basis of the regulatory environment and, secondly, seek financing from the market. The CBCA decision ensures that the regulatory path has been explored for the projects which may by itself alone ensure the realisation of the projects.

Moreover, the CBCA decisions ensure that possible CEF beneficiaries will be developed under a stable regulatory regime leading to their successful realization. This is necessary before the projects apply for any CEF financing. Furthermore, the CBCA decision ensures that the project CBA and its results have been checked and coordinated with TSOs and NRAs in Member States where the project shows benefits. This helps to make the data reliable also for the purposes of the evaluation of a possible CEF financial application. Therefore, the CBCA decisions are necessary to have been obtained before any project applies for Union financing from CEF Energy.

- **Conditional CBCA decisions**

A series of stakeholders, particularly NRAs and ACER, mentioned that it is very difficult to assess the investment requests submitted by the project promoters and decide in a definitive manner as regards cross-border cost allocation and the inclusion of the investment costs of the project in the tariffs. This is due to that fact that they do not know what amount of Union financing the project will receive, if any. Therefore, they propose to introduce the possibility for CBCA decisions to be drafted as conditional decisions that can be amended, adapted or revoked altogether after the results of the request for CEF financing.

This is already happening as some CBCA decisions were prepared considering the possible aspects of the CEF financing. However, conditional CBCA decisions pose a risk for the allocation of Union financing as the projects might ultimately not be realised if the NRAs change their mind or consider the financing awarded too low. This creates regulatory instability for the projects rendering them completely dependent on a certain percentage of Union financing and unable to seek resources on the financial market. This goes against the principle that CEF financing is a last resort option. CBCA decisions need to be final in order to provide sufficient legal and economic clarity and certainty on the investment conditions and expected costs to be borne for the project promoters and Member States.

- **Easing environmental and location approvals for PCIs**

When providing input on the permitting procedures in the TEN-E Regulation a series of project promoters mentioned that the permitting of PCIs will not be accelerated while they are required to obtain the same environmental and location permits at the same standards with other similar projects that are not PCIs. They, therefore, request that some of the requirements for environmental and location permitting are removed or eased for PCIs.

However, NGOs, citizens and local communities point out that public acceptance is closely linked to their effect on the environment and climate impact. Easing the requirements for such permits is both outside the scope of the TEN-E Regulation and would not ensure that these projects duly comply with environmental requirements and the conditions for establishing the optimal location. This could also create public opposition and, ultimately, delay the permitting process.

The TEN-E Regulation already provides for the streamlining of the environmental assessment procedures and for ensuring the coherent application of environmental assessment procedures required under Union law for PCIs. The Commission issued non-binding guidance[162] to support Member States in defining adequate legislative and non-legislative measures to this end and they had the obligation to assess, on the basis of the non-binding guidance, what measures to take.

162 https://ec.europa.eu/environment/eia/pdf/PCI_guidance.pdf

ANNEX 8: INTRODUCTION OF A MANDATORY SUSTAINABILITY CRITERION

Under the current TEN-E framework, the gas and electricity PCI candidates must contribute to at least one of the following specific criteria: market integration, security of supply, competition (only for gas) and sustainability.

Options B2.1 and B.2.2 provide for the upgrade of the sustainability criterion from an optional in the current TEN-E framework to a mandatory criterion. This change will result in automatic inclusion of the sustainability criteria in the PCIs assessment methodology and will as such affect the ranking of the candidate PCI projects. The actual impact of the mandatory sustainability criterion on the final ranking will depend on the methodologies used in the assessment process. These methodologies are developed for each PCI selection process considering inter alia data availability and the needs identified for each region in the Regional Groups as under the current framework. The full assessment methodology of the last PCI selection process is publicly available on EC CIRCABC platform[163].

The Commission seeks to have the same methodologies across the RGs within each category of infrastructure e.g. one methodology for all the electricity RGs and one for all the gas RGs. In this process the initial draft of the methodologies are developed within the framework of the Cooperation Platform, which consists of representatives of the European Commission (DG Energy), the Agency for the Cooperation of the Energy Regulators (ACER) and the European Network of Transmission System Operators (ENTSOs). The Cooperation Platform provides technical support to the work of the Regional Groups. The final assessment methodologies to be used for the ranking of the candidate PCI projects must be validated by the RGs members (Member States, National Regulators, ENTSOs and the Commission), in line with the roles and responsibility each party has in the process.

163

Electricity 4th PCI assessment methodology: https://circabc.europa.eu/ui/group/3ba59f7e-2e01-46d0-9683-a72b39b6decf/library/c1b40471-8605-45c3-8540-04451ed31094?p=1&n=10&sort=modified_DESC

Gas 4th PCI assessment methodology: https://circabc.europa.eu/ui/group/3ba59f7e-2e01-46d0-9683-a72b39b6decf/library/563f3273-e6a7-4d2f-b157-76a6514cf4ee?p=1&n=10&sort=modified_DESC

ANNEX 9: ASSESSMENT OF ADDITIONAL POLICY OPTIONS

This Annex sets out additional policy options of technical nature which relate to permitting and public participation (C) and Regulation (D) as follows:

C) Permitting and public participation
C.1.2. Accelerating the permitting process
C.2 Public participation
C.2.0 Business as usual
C.2.1 Increasing the transparency of PCIs
D) Regulatory treatment
D.1.2 Possibility for smart grids projects to obtain a CBCA
D.1.3 Clarifying CBCA provisions
D.1.4 Updating investment incentives

These options are explained in more detail below followed by a short assessment of their potential impacts.

Permitting

Option C.1.1: Accelerating the permitting process:

This option would include the following **sub-options**:

a) *Clarifying the applicable procedure for projects falling between legal regimes*

The transitional provisions regarding the permitting process meaning that all PCIs can benefit from maximum time-limit of 3.5 years and from the one-stop shop would be removed. Moreover, any permits already obtained would remain valid and be integrated in the procedure. The provisions on 'priority status', where such status exists in national law, would apply to all PCIs regardless of when they started permitting.

b) *Acceleration of permit granting*

The permitting provisions and the two permitting phases would have enough built in flexibility to cater also for the acceleration of the permitting process for projects that do not require all the permits of large infrastructure projects such as smart grids projects which often do not require an EIA or a building permit.

The outcome of a completed permitting process under the TEN-E Regulation is the issuance of a comprehensive decision[164] for the project. Member States would have to

[164] According to Article 2(2) of the TEN-E Regulation, the comprehensive decision is defined as follows: *the decision or set of decisions taken by a Member State authority or authorities not including courts or tribunals, that determines whether or not a project promoter is to be granted authorisation to build the*

ensure that any additional requirements or legislative amendments introduced during the permit granting process would not affect the length of the permitting process started before the amendments of the legislation. In view of ensuring a consistent application, the revised TEN-E Regulation would also adapt the definition of the comprehensive decision to clarify that the issuing of this decision means that the project is ready to begin procurement procedures and construction in the respective Member States. This would ensure that no additional requirements are added on top of and outside the permitting process.

c) *Making procedures accessible cross-border*

Competent authorities would be obliged to coordinate and find synergies with neighbouring countries in developing their manual of procedures and in the permit granting procedures of individual PCIs without exceeding the 3.5 years time-limit. In addition, the competent authorities would have to make available, as much as possible, the manuals in all languages of the neighbouring Member States.

<u>Assessment:</u>

Amending key provisions aimed at accelerating the permitting process in its current set-up would allow keeping the necessary balance between the rule of law in the Member States and their sovereignty and the acceleration of the implementation of PCIs. Permitting is a process that is to a large extent national or even local in nature.

The environmental assessment of PCIs is unaffected by the permitting provisions of the TEN-E Regulation because this is out of the scope of the Regulation.

The suggested amendments in this option entail a better coordination between competent authorities for projects crossing the border of more Member States as well as a facilitation of the permitting process cross-border. This coordination will allow also a better coordination of the assessment of the environmental impacts of the projects leading to improved measures to tackle any environmental concerns that may be cross-cutting issues in more Member States.

Permit granting procedures have shortened for PCIs compared to the pre-TEN-E situation. The average duration is 4 years for electricity and 3.1 years for gas PCIs compared to durations of more than 6 years in some Member States prior to the entry into force of the TEN-E Regulation. The introduction of a one-stop shop provides a good approach to reducing the complexity of the permitting process, but the effectiveness depends strongly on the national implementation and existing permitting requirements in the Member States.

As regards electricity projects, delays in project implementation have two direct consequences for the EU achieving its carbon reduction targets: the missing grid capacity

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energy infrastructure to realise a project without prejudice to any decision taken in the context of an administrative appeal procedure.

hinders the further growth and integration of RES, while the resulting grid congestion must be resolved by expensive and CO2 intensive redispatch measures.

The longer and more complicated the permitting process of a PCI is, the higher the costs are incurred by the project promoter and the national competent authorities. Currently, an estimated 0.5 FTE per year is given for the administrative costs for reporting and compliance to the PCI monitoring procedure. The stakeholder consultation concluded that the permitting process and the organisation of stakeholder consultation are amongst the main cost drivers that provide unacceptable costs for project promoters. However, the high administrative burden of the permitting process is considered not to be due to TEN-E, but rather relate to issues on a national level, although three TSOs specifically pointed out that the requirements of the Regulation add another bureaucratic layer on top of the national system.

An accelerated permitting process decreases costs for both project promoters and competent authorities. An accelerated permitting process also allows for a faster implementation of the project therefore bringing forward the benefits identified in the CBA. This will have a significant economic impact on regional energy markets, if not, even a European wide impact. The economic impact could be determined on the basis of the CBAs of the projects impacted by the accelerated procedures. No data is available at the moment for calculating fully the impact, but the example described in rthe assessment of option C.1.1. remains valid.

The permitting process and the provisions regarding public participation have a dual social impact. On the one hand, society and citizens benefit from the implementation of PCIs which increase competition, security of supply and market integration. On the other hand, the construction of large infrastructure projects affect local communities by changing the landscape, affecting tourist areas, affecting crops etc.

In a similar manner as the economic impact, an accelerated permitting process also allows for a faster implementation of the project therefore bringing forward the benefits to society identified in the CBA.

Public participation

Option C.2.0: Business as usual

Under the current provisions of the TEN-E Regulation, the project promoter or competent authority is obliged to establish and regularly update the projects website with relevant information about the PCI under its competence.

Option C.2.1: Increasing the transparency of PCIs

This option would introduce an obligation on the project promoters, as the owner of the information regarding the implementation of the PCIs to publish and update dedicated webpages in all languages of the Member States crossed or impacted by the PCIs. This will affect their subsequent applications to become PCIs as the powers of the Regional Groups as regards the monitoring of the implementation of PCIs are increased (see the REFIT option of adding a criteria for the PCI selection process in this regard). The minimum information to be included in the project websites would continue to be listed in an annex of the TEN-E Regulation.

Stakeholder views: Stakeholder generally agreed that the transparency and participation provisions introduced for PCIs are perceived to have increased public awareness of PCIs and trust in the process. All communication tools employed by project promoters during PCI implementation (project websites, information leaflets, meetings to discuss PCIs and provision of information in writing) were considered useful. More specifically, stakeholders considered PCI websites as important for ensuring transparency.

Assessment:

Public participation

Option C.2.0: Business as usual

Opting for business as usual would indicate that current provisions on transparency and participation would still apply with no further scrutiny nor monitoring discretion of the Regional Groups. Only 14% of the respondents to the open public consultation consider that current TEN-E provisions triggered an improvement in the transparency of the planning and building process of any PCIs in comparison to other energy infrastructure projects. Most respondents (54%) could not answer if such improvements existed, whilst 28% of the respondents (company/business organisations, EU citizens, NGOs) considered that there is no improvement, or there is an improvement only to a small extent.

Options C.2.1 Increasing the transparency of PCIs

The implementation of key PCIs can be faced with opposition during the permit granting process from local communities, landowners and citizens living in the proximity of installations and routing of PCIs.

Article 9 and Annex VI of the TEN-E Regulation introduced the obligation for project promoters to conduct at least one public consultation to inform stakeholders and help to identify the most suitable location or routing for the project. The provisions further called on project promoters to establish and regularly update a website with relevant information regarding project's consultation planning, status of the implementation progress and contact details in view of conveying comments and possible objections. Open access to information such as the economic and social benefits, costs or environmental impact of projects and early consultation of those affected was sought to address concerns and increase acceptance of the PCIs.

Whilst the majority of stakeholders' confirmed the increased awareness of the projects thanks to the provisions introduced by the Regulation, they did not consider that it would necessarily lead to public acceptance. It was also reported that the websites of some PCIs provide limited or outdated information and are often unclear whether or to which extent the input from the local community was taken into account. While the consulting the public is considered to be an important and necessary tool, there is a considerable room for improvement in order to ensure the transparency and legitimacy of the process.

By increasing oversight of the obligation to ensure transparency of PCIs through monitoring within the Regional Groups, the project promoters are incentivized to provide open access to updated and transparent information on the key aspects of PCI implementation.

Recent studies[165][166] found an important connection between the early involvement of the public in energy infrastructure planning and lower opposition to projects because of an improved understanding of the infrastructure needs. Transparent and accessible information about the need for new energy infrastructure at a European grid level can contribute to reducing public opposition[167].

In their third report on "Public engagement and acceptance in the planning and implementation of European electricity interconnectors"[168] the Commission Expert Group on electricity interconnection targets found that early engagement could turn opposition into an opportunity for transparency and information over costs and benefits of different alternatives. Coupled with a two-way dialogue on what technical solutions can be accepted at the local level and promoter's flexibility for adjustments, stakeholder participation can be turned into an active process delivering better and more accepted project. Best practices show that full transparency and involvement of local communities, activists and non-governmental associations deliver collaborative solutions on the ground that mitigate the environmental impacts of projects.

Opposition from local communities affected by PCIs hinders the delivery of their intended economic and market efficiency benefits to society.

The results of the evaluation confirmed stakeholders' opinion that the transparency and public participation provisions of the Regulation proved to be a valuable instrument for building connections with local communities and potentially affected groups and increased the opportunities for the public to be informed and participate in the PCI permitting process. Increased transparency of decision-making processes coupled with meaningful consultations create new opportunities for stakeholder engagement that carefully consider and address opinions, concerns and needs of citizens and impacted communities. *Administrative burden*

The policy option would not add to the existing administrative burden associated with the TEN-E compliance for project promoters, estimated at 1.5 FTE based on the available information from the evaluation and stakeholder contributions.

[165] Ecorys et al. (2019), Do current regulatory frameworks in the EU support innovation and security of supply in electricity and gas infrastructure?
[166] Scope et al. (2020) Innovative actions and strategies to boost public awareness, trust and acceptance of trans-European energy infrastructure projects. Draft Revised Interim Report. Provided by DG ENER.
[167] Trinomics (2018). Evaluation of the TEN-E Regulation and Assessing the Impacts of Alternative Policy Scenarios. Final Report.
[168] https://ec.europa.eu/energy/sites/ener/files/documents/3rd_report_on_public_acceptance_b5.pdf

As a general note, the majority of stakeholders consider the cost associated with the organisation of public participation activities as acceptable.

Regulation

Option D.1.2: Possibility for smart grids projects to obtain a CBCA

This option would introduce the possibility to obtain a CBCA for smart grids projects. Such a provision was supported by stakeholders as it would help smart grid projects that encounter issues with splitting costs across borders.

Assessment:

Option D.1.2: Possibility for smart grids projects to obtain a CBCA

This option will benefit smart grids projects that may have an issue in splitting costs across borders and where this would be necessary. However, due to the nature of such projects, there are not many smart grids projects that will encounter this issue and might require a CBCA, therefore the impact of the option is not so high overall. The option will enable and accelerate the implementation of some smart grids projects, but there are no data to assess how many these would be. The option, nevertheless, could be easily implemented and does not bring any costs or administrative burden, being therefore a no regret option.

Option D.1.3. Clarifying CBCA provisions

This option aims at the clarification and clarification of the CBCA procedure with the aim of ensuring consistency between CBCA decision and their more extensive use. The following elements are proposed to be implemented:

i. Clarify the notions that are currently either not defined in the TEN-E Regulation or that have led to differences in interpretation[169],

ii. Require that the project promoters use the same scenario for their CBA part of investment request as the one used in the PCI selection process and that they update the CBA with the latest developments regarding the project.

iii. Moreover, in the context of the offshore renewable energy development, the need to coordinate the CBCA for the infrastructure projects with the financing, market and political arrangements of the generation projects was discussed extensively by

[169] Clarify the procedure to be followed for submitting the investment request and requirements, maturity, "concerned NRA", "significant net positive impact", "The national regulatory authorities may decide to allocate only part of the costs, or may decide to allocate costs among a package of several projects of common interest."; "relevant NRA", the content and minimum information that the CBCA decision needs to contain.

stakeholders as well as Member States. In order to address this, the Commission could issue a binding guidance in the form of an implementing regulation on how the CBCA process could be coordinated with the development of the generation projects. As part of this guidance, the Commission could also include detailed rules as regards the CBCA procedure in general (similar as the current ACER Guidelines). This would end the discussion on the selective application of these Guidelines, which are currently not legally binding.

Assessment:

Environmental impacts

CBCA procedure enables the implementation of PCIs, which have benefits across-borders. In principle, clarifying the CBCA provisions should not have direct environmental impacts.

Economic and financial impacts

The clarification of the provisions regarding the CBCA procedure will enable a more extensive and enhanced use of the CBCA procedure for allocating costs across borders. This will enable the swifter implementation of projects, which will bring benefits sooner.

The impact of a Commission guidance on how the CBCA process could be coordinated with the development of the generation projects in an offshore context that would include also detailed rules as regards the CBCA procedure in general (similar as the current ACER Guidelines) is two-fold. One type of impact refers to bringing clarity and simplifying the CBCA procedure by making binding certain rules that have been selectively applied so far. The second type of impact regards the clarification of the complex process for the development of offshore hybrid assets which comprise interconnectors and generation parks connected to such interconnectors. While the assets themselves are subject to different types of legal regimes and manner of functioning, all their afferent regulatory, financial and market aspects are deeply interrelated. Therefore, clarity is necessary on how to deal with overlapping benefits and costs for the two types of assets in order to ensure the creation of a net benefit for the various involved parties and to advance their development. The elaboration and issuing of the guidance brings administrative burden for the Commission, but helps ease considerably the burden on project promoters, RES generation developers and Member States, while also helping to reach the offshore RES potential of the EU.

Social impacts

The CBCA will enable the realization of PCIs and, in turn, the benefits of such projects as identified in the CBA. This would also be taken into account for possible CEF financial assistance. The full extent of such benefits cannot be estimated as there are no data available, however, the example of costs of delay, as described above in the assessment of Option C.1.1, remains a good indication.[170]

Administrative burden

According to the stakeholder consultation, the costs for NRAs as a result of TEN-E are low the main cost driver is the CBCA process. For most NRAs less than 1 FTE is estimated to be currently involved[171].

This option increases the administrative burden for project promoters as they will have to update their CBA, but decreases the administrative burden for NRAs who will have more straightforward procedures to follow.

Option D.1.4. Updating investment incentives

In order to increase the impact of the investment incentives provisions and make them more operational, in particular for offshore wind related infrastructure projects, a specific reference could be included in the legislation mentioning hybrid offshore infrastructure, (which is likely to incur the highest risks, compared to the radial connection or internal lines) as high risk projects. In addition, an obligation for NRAs to update their manual on investment incentives and include a specific chapter for offshore assets could be inserted (minimum requirements for such a manual could be included in an Annex to the revised TEN-E) as well as an obligation to update the manual as regards OPEX intensive projects.

Assessment:

A stable regulatory environment created for a project with full regulatory coverage is a pre-requisite[172] for any project in order for it to have explored both market based financing solutions and regulatory solutions. The use of investment incentives is very relevant in this context as they could assist with the adjustment of the regulatory framework necessary for the development of certain higher risk projects.

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[170] The CBCA enables the timely implementation of PCIs and hence avoids delays in project implementation. The benefits of a PCI are therefore realised earlier.

[171] TEN-E Evaluation Report, page 116

[172] The CEF Regulation provides that: "First, the market should have the priority to invest. Second, if investments are not made by the market, regulatory solutions should be explored, if necessary the relevant regulatory framework should be adjusted, and the correct application of the relevant regulatory framework should be ensured. Third, where the first two steps are not sufficient to deliver the necessary investment in projects of common interest, Union financial assistance could be granted if the project of common interest fulfils the applicable eligibility criteria"

ANNEX 10: REFIT (SIMPLIFICATION AND IMPROVED EFFICIENCY)

In order to simplify and improve the efficiency of the TEN-E Regulation the following measures have been identified to reduce compliance and regulatory costs.

a) Reduced reporting obligations

Reporting and monitoring serve to identify and tackle delays in the implementation of PCIs. Monitoring also allows the identification of the projects that are stalling without justified reasons and the projects do not comply with EU law or in relation to which false information was provided. At the same time, monitoring and reporting serves to ensure transparency of the projects' concept and development by also allowing the Commission maintained Transparency Platform to be regularly updated.

However, some stakeholders were critical of the monitoring and reporting mechanism under the TEN-E Regulation. On the one hand NGOs and the public mentioned that there is not enough transparency because the Transparency Platform is not always up to date regarding the status of the PCIs and PCI websites sometimes do not exist, are not updated or do not contain all the information required by the TEN-E Regulation. On the other hand, project promoters and competent authorities mentioned that the reporting obligations are too burdensome, as they have to report annually, maintain their websites continuously updated, but also answer constant requests for information from the Commission or ACER.

While annual reporting by project promoters needs to be maintained to achieve the required transparency standards and allow the Regional Groups to tackle quickly any implementation issues that the projects may encounter, the annual report of the competent authorities could be transformed into input or additional information into the report of the project promoters. In practice, the project promoters would draft their report, submit it to the relevant competent authorities in the Member States where the project is located. The competent authorities, would then add, without the possibility to amend, any relevant information they hold as regards the on the progress or delays in the implementation of the PCI and the reasons for such delays. The competent authorities would then transmit the report at the same time to ACER, the Regional Group and Commission.

The Commission can use the information in the report to update the Transparency Platform. The Transparency Platform would also be regularly updated throughout the year by retrieving information from the project websites which (in line with the Option C.2.1 regarding public participation) the project promoters would be obliged to keep continuously updated. The Transparency Platform could also have a feature that allows retrieving information on the status of the project at a certain point in time. This will allow the possibility to compare and assess the progress of the projects.

Pursuing this measure would reduce costs and administrative burden for the project promoters, but in particular for competent authorities would not need to submit a separate report. The cost saving cannot be estimated as the relevant data are not available, but it is a recurrent cost saving.

b) Reduced monitoring by ACER to once every two years

According to the TEN-E Regulation, on the basis of the monitoring reports that the project promoters submit every year to ACER, it has to issue a monitoring report evaluating the progress achieved and make, where appropriate, recommendations on how to overcome the delays and difficulties encountered. However, these monitoring reports are used only once every two years with the occasion of the elaboration of the Union list of PCIs for evaluating their progress since the last Union list. PCIs that have not progressed and cannot objectively justify the lack of progress may not be included in the next Union list. Therefore, to simplify the reporting by ACER, their report could be issued once every two years, just in time for the Regional Groups, to take it into account for their assessment of the new PCI candidates[173]. Since ACER's report is actually used only once every two years, this option could help simplify the monitoring obligations without any costs and without affecting the projects' implementation. Moreover, pursuing this measure would reduce costs and administrative burden for ACER, for the members of the Regional Groups and the Commission. The cost saving has been estimated at 0.4 FTE per year.

c) Stronger role of monitoring and reporting obligations in the PCI selection process

In order to ensure that projects are developing according to their implementation plan without any undue delays and in full compliance with national and EU law and that project promoters duly abide by their reporting and transparency obligations[174] these elements could be included as a selection criterion in the TEN-E Regulation to be applied for the subsequent PCI lists where the projects apply. Abiding by reporting and transparency obligations and the progress of the project from one Union list to the next could be added as one of the additional criteria that each Regional Group has to give consideration to (under Article 4(4) of the TEN-E Regulation).

This option does not have any budgetary or administrative implications, but aids in the implementation in practice of the measures described under b) and c) above which do have administrative and budgetary implications. In addition, this option allows a thorough monitoring by the Regional Groups as to how projects implement EU law provisions, in particular environmental law and public procurement, therefore avoiding any breaches and public opposition.

d) Pre-consultation to become optional

The principles for public participation set out in the Regulation constitute minimum requirements to ensure early engagement with local communities and stakeholders

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[173] This option corresponds to the input of ACER to the stakeholder consultation.
[174] Including their obligation to maintain a constantly updated website with all necessary data.

affected by the construction of a PCI and include a pre-consultation of relevant stakeholders. In practice, the obligation to consult ahead of the launch of permitting procedure may be adding to existing national procedures.

This is confirmed by the results of the consultation, where a large proportion of survey respondents (46%) agreed that one public consultation is sufficient for increasing transparency and participation. This opinion was particularly popular among TSOs, industry representatives and NCAs. A fifth of the respondents, primarily comprised of civil society representatives and energy producers, disagreed with this opinion. It is noteworthy to add that several respondents explained that the public consultation provision under the Regulation was, in their opinion, redundant as the national legal frameworks of their Member States as well as the public participation requirements of the environmental impact assessments carried out in the permitting process already made public consultations obligatory. As such, this provision was seen by some as adding to the complexity of the permit granting procedure as shown on below

To address this and avoid that two or more consultations are required for the purposes of informing stakeholders about the project at an early stage, identifying the most suitable location or trajectory and the relevant issues to be addressed in the application file, it is suggest to make the pre-consultation optional if it is already covered by the national rules under the same or higher standards as in the TEN-E Regulation. However, the project promoter should be obliged to take into account the opinions expressed in the consultation and demonstrate how it has done so. The cost savings which would occur mainly with project promoters cannot be estimated as the relevant data are not available, but it is a recurrent cost saving.

e) Simplified inclusion in TYNDP for existing PCIs

An electricity or gas candidate project can apply for the inclusion in the Union list only if is included in the latest available TYNDPs, developed biennially by the ENTSOs. Therefore, a project promoter, must submit or resubmit (in case it already is included in the PCI list) every two years its project to both TYNDP and PCI processes. While the submission process for candidate projects for the PCI selection process was already simplified by having all the necessary data for the PCI process being delivered to the Commission directly by the ENTSOs, there is scope for further simplification for the TYNDP process.

In contrast to the PCI selection process, which is run by the Commission, the TYNDP processes are run by the ENTSOs, which set administrative and technical criteria for inclusion of projects in the TYNDPs. This process requires a significant amount of data and legal proofs[175]. Considering that existing PCI projects already delivered the necessary proofs in the previous TYNDP processes, an automatic inclusion in the subsequent TYNDPs for such projects, as long as their administrative and technical data

[175] ENTSO-E : https://tyndp.entsoe.eu/promoters-corner
ENTSOG: https://www.entsog.eu/sites/default/files/2019-05/TYNDP%202020_Practical_Implementation_Document_20190502_0.pdf

did not significantly change, is recommended. This would reduce the burden on the project promoters and also on the ENTSOs having in mind that around 56% of 2018 TYNDP electricity projects became part of the 4th PCI list. The cost savings which would occur mainly with project promoters cannot be estimated as the relevant data are not available, but it is a recurrent cost saving.