



EUROPEAN
COMMISSION

Brussels, 18.5.2022
COM(2022) 230 final

ANNEXES 1 to 3

ANNEXES

to the

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

REPowerEU Plan

{SWD(2022) 230 final}

ANNEX 1

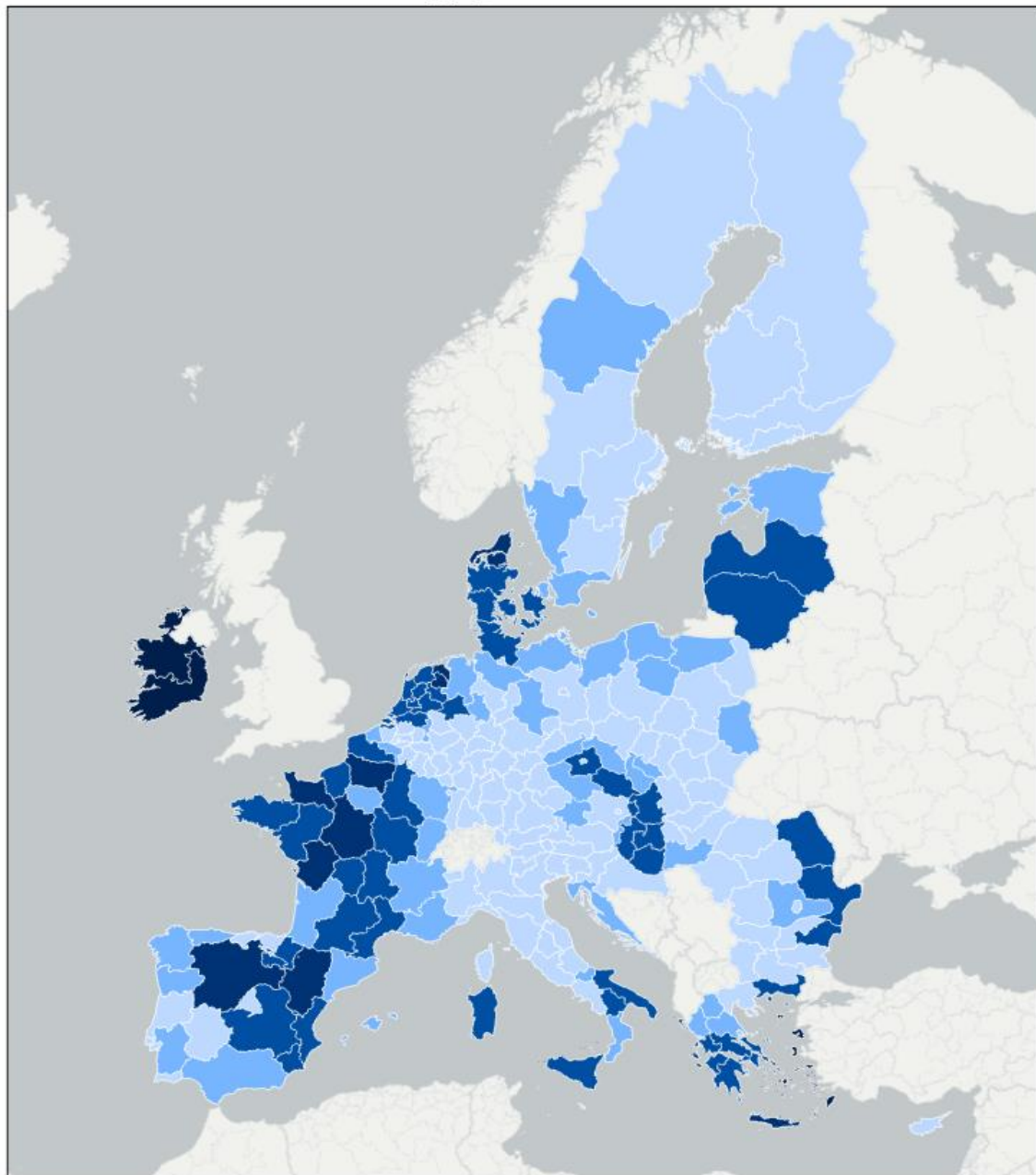
STARTING POINT: ALL FIT FOR 55 MEASURES WILL REDUCE EU GAS DEMAND BY 116 BCM, OR 30% REDUCTION			
RePOWER PLAN	Equivalent GAS SAVED	JOINT EU AND MS RePOWER EU ACTIONS	INVESTMENT NEEDS (EUR)
SAVINGS			
Citizens : Behavioural change	10 bcm	EU Save Energy communication Play my part campaign	-
Residential sector: energy efficiency and heat pumps	37 bcm	EU Save Energy communication Higher 13% EED target by amended EED Ecodesign and energy labelling requirements for solar PVs heat pumps Potential Important Projects of Common European Interest (IPCEI) focused on breakthrough technologies and innovation	56
Industry: energy efficiency and electrification	12 bcm	Higher 13% EED target by amended proposal Higher 45% RES target by amended proposal Innovation fund RRF chapter	41
Curtailment		EU coordinated demand reduction plan	-
FUEL DIVERSIFICATION			
LNG and pipeline gas	50 (LNG) + 10 bcm (pipeline)	Diversification obligation Joint Gas and Hydrogen Purchasing EU IT tool for demand aggregation and infrastructure transparency MoUs with partner countries Adoption of the storage proposal RRF chapter	
Biomethane	17 bcm	Biomethane action plan RRF chapter	37
Renewable Hydrogen	+ 14 Mt of additional H ₂ /ammonia of which 8 Mt replace natural gas equivalent to = 27 bcm 10 Mt is imported and about 4 Mt of additional domestic production	RFNBO sub-targets in line with higher RED targets Hydrogen Valleys Regulatory framework: Delegated acts on definition and standards Imports: Joint Gas and Hydrogen Purchasing Vehicle and International Hydrogen Partnerships Industrial Capacity: Electrolyser Declaration Innovation fund RRF chapter	27 bn is direct investment in domestic electrolyzers and distribution of hydrogen in the EU. (excludes the investment of solar and wind electricity needed to produce renewable hydrogen, and it excludes the investments for the imported hydrogen)
RENEWABLE ELECTRICITY			
Solar & Wind	21 bcm ¹	Higher 45% RES target by amended RED PPA guidance Solar strategy Solar roof top initiative by amended RED RRF chapter Solar alliance	86 bn EUR

¹ In the scenario around 12 bcm is achieved through 4 Mt of additional domestic hydrogen production and 9 bcm through additional substitution of gas in the power system. These bcm savings are distributed in the table in other sectors.

		Potential Important Projects of Common European Interest (IPCEI) focused on breakthrough technologies and innovation	
Permitting		Legislative proposal on permitting amending RED EC recommendation	-
SMART INVESTMENTS AND REFORMS			
Infrastructure		Integrated EU-wide infrastructure gaps and needs assessment for gas, electricity and hydrogen	29 bn (power grids) + 10 bn (power storage) + 10 bn (gas) Oil for security of supply 1,5 bn [hydrogen infrastructure see Staff work document]
RRF		Revised RRF proposal close to EUR 300 billion (225 bn loans+ up to 72 bn grants) RRP guidance	
Innovation Fund		Revised Innovation Fund proposal rolling out carbon contracts for difference Dedicated RePowerEU call in Autumn 2023 Dedicated RepowerEU funding windows	
CEF		Dedicated RePowerEU calls, starting May 2022	
Reform		European semester Country-specific recommendations Permitting PPA guidance RRF chapters	

ANNEX 2 – maps

Renewable energy potential - Wind onshore



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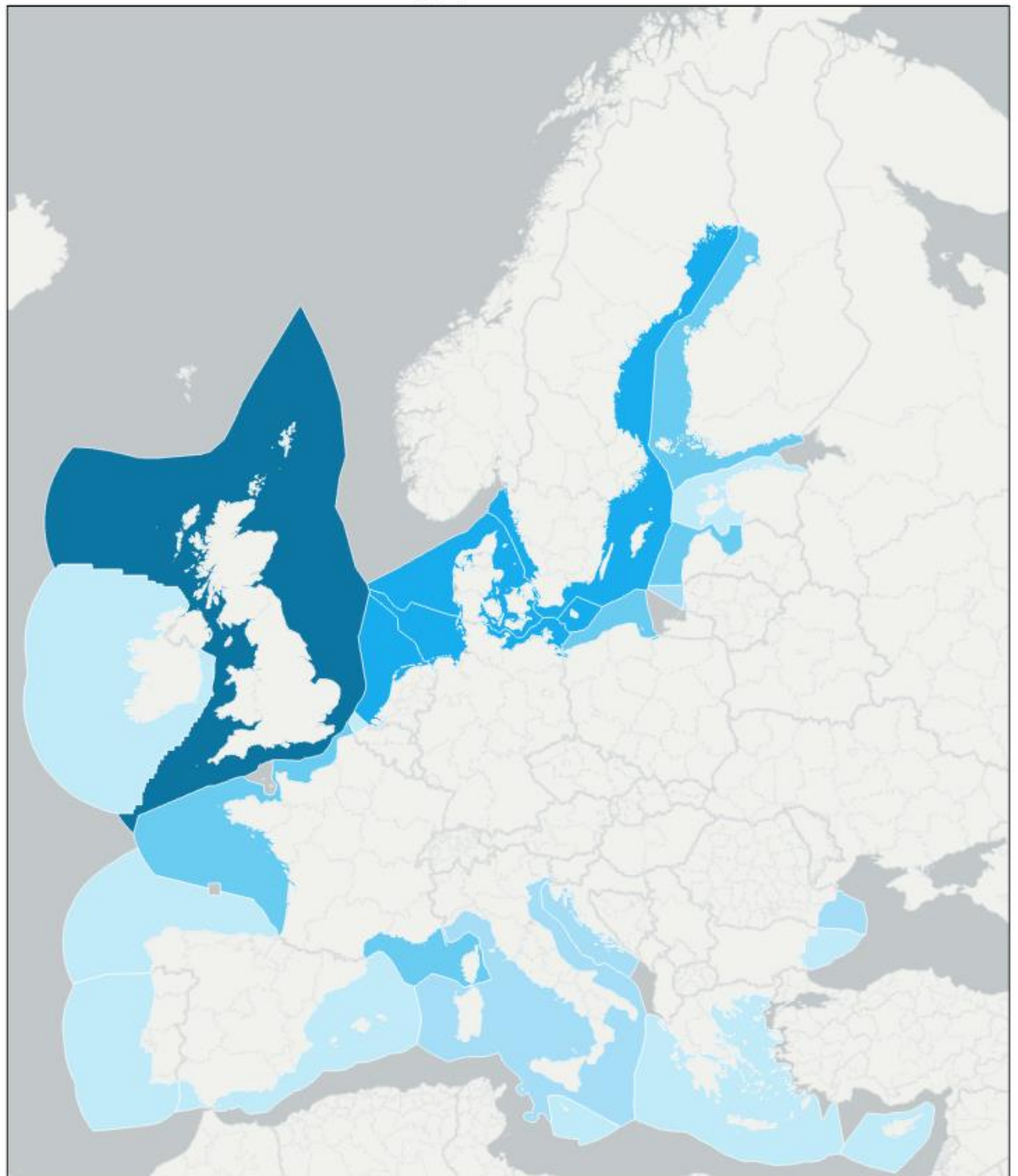
Wind Onshore - Potential production in GWh/km2 (ENSPRESO)

- 1
- > 1 - 2
- > 2 - 5
- > 5 - 7.5
- > 7.5 - 12

EIGL 2022

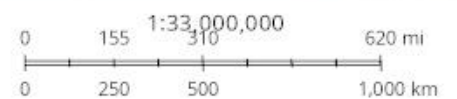
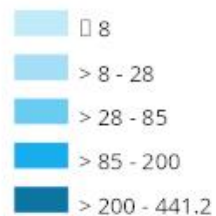
EIGL 2022. Basemap source: ESTAT/OSM contributors. Information on the terms of use of the data layers: <https://ec.europa.eu/energy-industry-geography-lab> JRC, 2022

Renewable energy potential - Wind offshore



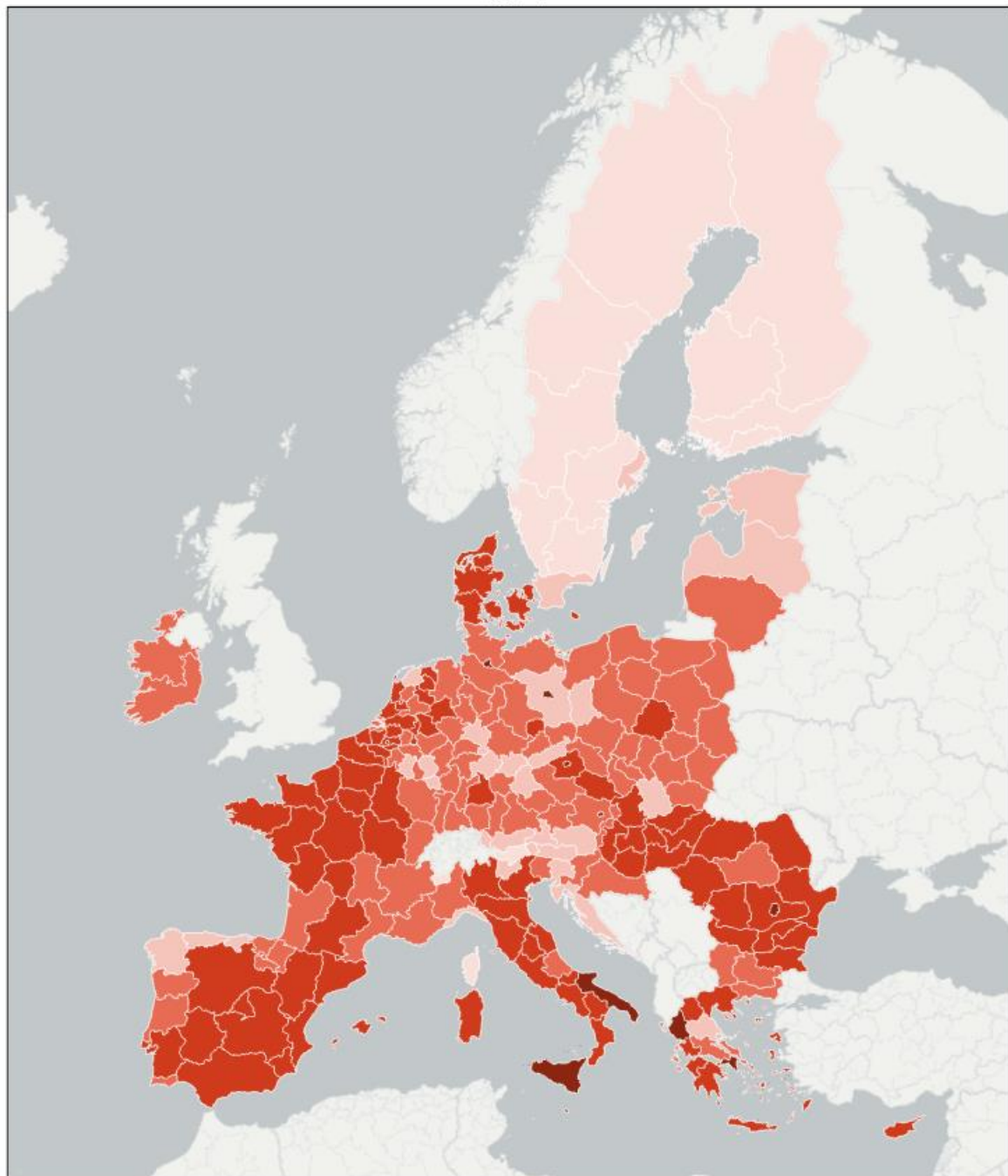
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Wind Offshore - Potential production in TWh (ENSPRESO)



EIGL 2022

Renewable energy potential - Solar



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Solar - Potential production in GWh/km2 (ENSPRESO)

- 1
- > 1 - 2
- > 2 - 3
- > 3 - 5
- > 5 - 96

EIGL 2022

JRC, 2022
EIGL 2022. Basemap source: ESTAT/OSM contributors. Information on the terms of use of the data layers: <https://ec.europa.eu/energy-industry-geography-lab>

ANNEX 3

Infrastructure needs for gas

Achievements of the TEN-E framework to establish resilient European electricity and gas networks

The TEN-E Regulation has established a new approach to EU-wide infrastructure planning based on regional cooperation with Member States and relevant stakeholders to identify projects of common interest (PCIs) that contribute to the development of energy infrastructure priority corridors and thematic areas. It also requires Member States to streamline permit granting procedures for PCIs and provides access to financing from the Connecting Europe Facility (CEF) to enable their timely implementation.

Since the TEN-E Regulation was established in 2013 gas PCIs have helped to establish a more resilient European gas infrastructure based on more diversified supplies. Gas PCIs have contributed to reduce bottlenecks in the European gas infrastructure, diversify supply sources as well as counterparts and routes. Once the ongoing PCI projects are implemented all Member States will have access to at least three gas sources or the global liquefied natural gas (LNG) market.

In 2022 alone, PCIs with a total additional gas transmission capacity of 20 bcm/year have been or will be commissioned, e.g. the gas interconnector between Poland and Lithuania (the GIPL pipeline), the Poland-Slovakia interconnector, the Baltic Pipe between Poland and Denmark, the Greece-Bulgaria pipeline (IGB). LNG terminals in Cyprus (2 bcm/year) and Alexandroupolis Greece (5 bcm/year) are due to be operational in 2023. Moreover, several gas PCIs are expected to be completed in the coming years which include several storage projects in South Eastern Europe (Greece, Romania, Bulgaria) as well the LNG terminal in Gdansk in Poland (at least 6 bcm/year).

It is thanks to these projects, many of which have benefitted from financial support through the Connecting Europe Facility, that Member States are able to react to recent supply cuts in a spirit of solidarity.

In addition to significant improvements in the European gas infrastructure, key electricity interconnectors have been kick started also through CEF grant for works, e.g. the Biscay Bay electricity interconnector between France and Spain to increase the interconnection capacity with the Iberian Peninsula, the Celtic interconnector between France and Ireland and the EuroAsia interconnector between Greece and Cyprus which both will end the isolation from the Union's electricity grid of Ireland and Cyprus respectively supporting the integration of renewable energy sources and enhancing security of supply. Moreover, the synchronisation of the electricity grids of the Baltic States, the last Member States having electricity systems still dependant on third countries, is well underway for completion at the latest by 2025. Support under the TEN-E policy as well as financially, under CEF for over EUR 1.2 billion, have been essential to set the project on track.

The accelerated implementation of electricity PCIs² will be crucial for a better interconnected system that will enable to increase the share of renewable energy sources and reduce renewable energy curtailment significantly faster in line with the REPowerEU objectives.

ENTSOG assessment of additional gas infrastructure needs

The REPowerEU communication announced that the Commission would assess as a matter of priority whether measures and investments are needed in hydrogen-ready gas infrastructure and interconnections to overcome bottlenecks to the full use of the EU's LNG capacity. The Commission has requested ENTSOG to support this assessment with the purpose of identifying any remaining gas infrastructure gaps that require immediate alleviation under the REPowerEU plan.

The ENTSOG assessment³ analysed to what extent infrastructure bottlenecks exist in the European gas network in case of an end to Russian gas flows to Europe using two different demand scenarios (current demand and 2030 demand assuming full implementation of fit for 55 proposals with a 27% lower gas demand compared to today which is expected to be even lower with the implementation of REPowerEU) and assuming different levels of infrastructure development⁴.

The assessment shows that it will be possible to fully compensate the end to Russian gas imports by a combination of demand reductions as envisaged by the Commission's fit for 55 package⁵, a ramp up of domestic production of biogas and fossil-free hydrogen in particular, and rather limited additions of gas infrastructure beyond what is already included in the current 5th PCI list. Mitigating the few remaining bottlenecks will also increase the European gas system's resilience and flexibility.

As regards the geographic distribution of needs, it is clear that the biggest challenge would be to meet demand in Central and Eastern Europe, but also in the northern part of Germany, if RU gas imports cease. The assessment, which was subsequently discussed with Member States in a regional context, has shown that different possible solutions exist to address the Russian supply dependency, mostly in geographic proximity to the needs and requiring cooperation between two or more Member States.

Additional gas infrastructure needs per region

Baltic Sea region

The three Baltic States and Finland are significantly dependent on Russian gas, whilst Poland shows a lower extent of dependence to such imports.

² The current 5th PCI list includes in total 67 electricity PCIs.

³ Covering all EU Member States and several third countries i.e. North Macedonia, Bosnia Herzegovina, Serbia, UK.

⁴ Level 0 = current infrastructure, level 1 = advanced projects (FIDs+ advanced PCIs), level 2= level 1+additional LNGs and TAP expansion.

⁵ Even with current demand and domestic supply levels, the projects identified would mitigate Russian dependence almost fully, with a remaining 5% dependence in CZ, SK, HU, RO and BG.

Projects such as the Balticconnector between Estonia and Finland, the enhancement of the interconnection between Latvia and Estonia, the Klaipeda LNG Terminal, and the Świnoujście LNG Terminal have already ensured market integration and decreased dependence on Russian gas in a region historically dependent on a single supplier. The situation is expected to significantly further improve with the recent launch of the interconnector between Poland and Lithuania (GIPL), and imminent completion of the expansion of the Świnoujście LNG Terminal, the Baltic Pipe, bringing for the first time gas from the Northern Seas to the region through Poland, the enhancement of the interconnection between Lithuania and Latvia and the enhancement of the Inčukalna UGS. The link between the Baltic Sea region and Central-Eastern Europe will be completed in the 2nd half of 2022 with the interconnection between Poland and Slovakia. The region has also benefited to the greatest extent from grants from the Connecting Europe Facility for Energy.

In the short term, the assessment showed that the **temporary rented floating storage regasification unit (FSRU) to be installed in either Estonia or Finland** later in 2022 can significantly reduce dependence on Russian gas. Latvia has also been invited to join the project development.

In the medium to longer term, the assessment has clearly established that the region around the Baltic Sea would benefit from the development of a **second LNG terminal in Poland, in Gdansk** (completion in 2026 which could be accelerated to 2025) which is a project on the 5th PCI list. The project could alleviate also any additional needs of the Baltic States, by freeing up capacity in the Klaipeda LNG terminal in Lithuania to serve any additional remaining needs in the Baltic States and Finland.

Western Europe

Most Western European countries show no or minimal dependence on Russian gas already today. However, Germany is strongly exposed to dependence on Russian gas, especially its northern market area where demand is concentrated. In the absence of Russian gas imports, the infrastructure bottlenecks are related to insufficient pipeline capacity from West to East as well as insufficient import capacity, including LNG infrastructure.

Unlike most European countries, Spain and France odorise gas in the transmission system. Therefore, infrastructure and regulatory limitations prevent South-Western countries from cooperating with countries in North-Western as well as Central and Eastern Europe; no significant gas capacities are available from France to Germany.

In the short term, the assessment has clearly shown that the **additional FSRU in Eemshaven (NL) and FSRU Wilhelmshaven (DE) and an additional LNG terminal in Germany (Brunsbüttel)** will alleviate infrastructure limitations in North-Western Europe. In general, it will be important to avoid overcapacity in LNG import infrastructure that could become stranded assets in the future.

In the mid-term, the assessment and the discussions have concluded that the development of a **deodorisation unit enabling gas flows from West to East between France and Germany** would remove a key bottleneck to reduce Russian gas dependence in Central Europe. In

combination with **gas infrastructure reinforcements to increase export capacity from Belgium to Germany** this would enable full utilisation of the LNG capacities in Western Europe to address dependence on Russian gas also in the Central and Eastern European regions.

An additional cross-border infrastructure project on the Iberian Peninsula should be further assessed in view of its long-term potential to tap into the important renewable hydrogen potential of the Iberian Peninsula, as well as Northern Africa, and whether it could become the first element of the hydrogen backbone considering the Hydrogen Accelerator.

Central and South – East Europe

In Central and South – East Europe, including the Energy Community, most of the countries show significant dependence on Russian gas taking into account today's gas demand.

In South – East Europe, key gas priority infrastructure projects became operational in the course of 2020-2021, including notably the Trans-Adriatic Pipeline, the 1st phase of the BRUA pipeline corridor and the Krk LNG terminal. The remaining priority infrastructure investments in the region which are set to be finalised in 2022 are the rehabilitation, modernization and expansion of the Bulgarian transmission system, the new interconnector between Greece and Bulgaria (IGB) which in its first operational phase will offer bidirectional capacity of 3 bcm/y. The interconnector Serbia - Bulgaria (IBS) which aims at creating bidirectional interconnection of 1,8 bcm/y, as well as the construction of the FSRU in Alexandroupolis, which will provide import capacity at the level of 5.5 bcm/y, are currently expected to be completed in the second half of 2023. Furthermore, the expansion of the underground gas storage facility in Chiren, Bulgaria, is planned for 2025.

The assessment has shown that, in the medium term, South East Europe would benefit to some extent from the FSRU terminal in Poland (PCI project on the 5th PCI list) while the main benefits will occur in the Baltic Sea region. Transportation of natural gas from Gdansk to the SEE region and Ukraine would require the accelerated construction of the North-South Gas Corridor in Eastern Poland. The assessment of ENTSOG has also shown that, in the medium term, an **expansion of the capacity of the LNG terminal in Krk** will further help mitigating Russian supply dependence, but to reap these benefits, it would be necessary to **enhance the Croatian transmission grid towards Slovenia and Hungary**. Further supplies to the region could come through full scale **TAP expansion**, but upgrading TAP would require accelerated additional infrastructure investments in the Italian transmission grid (**Adriatica Line and Mattagiola – Massafra pipeline** which are PCI projects on the 5th PCI list). If the Italian transmission network is reinforced, it would enable increased flows from the South to the North of Italy which would be relevant for additional flows from TAP, EastMed, and Northern Africa. Furthermore, **expansion of Interconnector Greece - Bulgaria (IGB phase II)**, could further mitigate dependence further notably in Bulgaria and in the entire SEE region by allowing to increase flows from TAP and LNG terminals in Greece.

Furthermore, the ENTSOG assessment has shown that projects of common interest and additional projects recognised by the REPowerEU plan, if implemented, would provide

additional benefits also to the Energy Community Contracting Parties, whose needs would be fully satisfied. With the completion of Projects recognised by the flagship 5 of the Economic Investment Plan for Western Balkans (EIP projects), the Energy Community Contracting Parties will have access to various alternative sources and routes. The implementation of the EIP projects would need to be assessed on a case-by-case basis in order to avoid the risk of stranded assets.

Member States should ensure that the identified projects are implemented as quickly as possible in line with the needs and timeline of the REPowerEU Plan. In particular, identified projects, alongside PCIs, should be allocated the status of projects of highest national significance and priority ensuring rapid implementation. The Commission will be ready to facilitate this.