

TOP CATEGORIES

Investment Focus: energy transition technologies

Page 8

"Investments Landscape"

Page 18

"Investment Focus: Energy Transition Technologies"

Page 33

"Experts' views"

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Contents

Preamble	4
Energy: State of Play	6-7
Investments Landscape	8
REPowerEU and Flagship Investment Programmes	8-11
Energy Investments in Greece	12-17
Investment Focus: Energy Transition Technologies	18
Hydrogen	18-23
Energy Storage - Batteries	24-25
Offshore Wind	26-27
Accelerating Transition - Threats and Opportunities	28-31
Synopsis	32
Experts' views	33
REPower EU investments: Accelerating Energy Transition by leveraging RRF funds and beyond	34-37
Historic opportunity for Greece to become an energy hub for the Balkans and the Southeast Med	38-41
Designing the REPowerEU investments for Greece	42-45
The REpowerEU Action Plan opportunity and the necessary investments towards a net-zero carbon economy	46-49
Schneider Electric's 10-point action plan to strengthen the REPowerEU proposals	50-53

Preamble

In this issue of InFocus, we are analysing the respective investment landscape at the European level, presenting also key initiatives in Greece.

Our overview of the current state-of-play in the Energy sector is followed by information on key investment schemes, such as the REPowerEU and RRF, as well as strategic plans at national level, including Greece's NECP, the Ten-year Network Development Plan of IPTO and developments on the Decarbonisation Fund of the Greek Islands. At a technology level, we are focusing on three key emerging solutions: hydrogen, batteries and offshore wind, and present key developments in the respective investment activities. Finally, some further thoughts are expressed considering the threats and opportunities posed by an 'accelerated transition', and how investments may be affected by these.

In a similar fashion as our first InFocus issue, our members are offering invaluable insights into how the private sector and key stakeholders respond to the current investment challenges.

From soaring utility prices to uncertainty in power supply and geopolitical complexities, Energy matters have monopolized everyday life. The 'energy transition' agenda, promoted in recent years for securing a sustainable future, has taken even more radical shapes and forms and is being implemented as a matter of urgency. Nevertheless, a prerequisite for change to happen, especially at the scale dictated by the current Energy context, is substantial investments across the sector's spectrum.



Energy: State of Play

The Energy sector is going through unprecedented changes, with Europe at the epicentre and global repercussions affecting existing policies and plans. The geopolitical developments in Russia, the imposed sanctions by Europe and the drop in supply of all hydrocarbons (natural gas, Brent oil and refinery products), as well as metals and rare earths (iron, nickel, palladium, uranium), have created an explosive mix of high energy costs and an apparent supply/demand deficit. The Ukraine war and the inability to influence the energy consequences have had adverse effects on Europe's geopolitical position and economy. The crisis surfaced fundamental weaknesses of the European energy policy, including long-term dependencies and divisions within.

The above context has resulted in natural gas prices hovering around €300/MWh and wholesale electricity over €600/MWh, causing great turmoil in governments about necessary fiscal reforms to deal with the respective inflationary pressures. An indication of things to come is the latest statement by Gazprom, whereby natural gas pricing in the forthcoming winter is expected at the level of €400/MWh, which would mean wholesale electricity prices of €800-900/MWh for Greece.

In this context, it is interesting to see the approach of American LNG producers in the previous decade, who adopted a more flexible policy in combination with long-term contracts and spot volumes, which proved rather insightful. The price difference between

the American and European gas allowed US to have huge profits and plan new investments that will take effect from 2023. Accordingly, state producers, like Qatar, saw their value and profits increase significantly in the global energy arena due to the crisis.

At the same time, the cost of RES has increased in the last year (supply chain issues, inflation, raw materials cost), but still remains competitive when compared to conventional power production technologies within the current crisis. RES received a significant boost with the REPowerEU programme, and despite the temporary revival of carbon, their adoption is expected to accelerate at an international level, as more and more countries realise these technologies are the only way to move towards energy security and reduced costs.

In the case of electrical power, more specifically, the recent high temperature and dry conditions in Europe, in combination with the aging infrastructure (especially in the case of nuclear) resulted in the following reality: in the period Jan-Jul 2022, in comparison with the same period in 2021, nuclear power was reduced by 12% in Europe, hydropower was reduced by 20%, while the natural gas contribution to the electricity mix increased by 4% and that of lignite by 11%. In parallel, wind and PV power productions increased by 16% and 23% respectively, which however was not enough to counterbalance the reduced production of nuclear and hydro (incurred because of the drought).



France, traditionally an energy exporter with cheap electricity, ended up having the highest electricity prices in Europe at the end of July 2022, as it lost part of its nuclear capacity due to technical issues and was struggling to meet the high demand.

Based on the above it is evident that the new escalation in power prices came sooner than expected by most analysts. Europe will need to handle critical circumstances, with energy efficiency taking a pivotal role. Germany has made a start with the implementation of emergency measures for energy savings in buildings and industry, and other countries are expected to follow suit. It remains to be seen whether this approach for mandatory measures will evolve into a long-term policy and an energy efficiency culture, which in any case is predicated within REPowerEU.

Instrumental to the energy transition and reforms sought are brave investments of scale, driven by the EU and states, but also by the private sector. The most important such funding schemes and investment plans are presented next, in an effort to draw an informative picture of the respective landscape.

Investments Landscape



REPowerEU and Flagship Investment Programmes

In the shadow of the Russia – Ukraine war, which has resulted in a fundamental change in the geopolitical balance of power and in the European energy policy, Europe has had to redefine its energy policies and its strategic priorities, while European end-users are already being called upon to change the way they source and consume their energy.

The REPowerEU Plan identifies close to €300 billion of financing (around €225 billion in loans and €75 in grants). The European Commission estimates that meeting the REPowerEU targets will require an additional €210 billion of investment by 2027, while saving almost €100 billion per year just by reducing fossil fuel imports.

More specifically:

- €37 billion are needed to increase biomethane production by 2030,
- €29 billion in the electricity grid by 2030 to enable greater use of electricity,
- €10 billion to import sufficient quantities of LNG and pipeline gas by 2030,
- €1.5-2 billion for security of oil supply,

-€56 billion for energy efficiency and heat pumps by 2030,

-€41 billion for adapting the industry to restricted use of fossil fuels by 2030,

-€113 billion for renewables (€86 billion) and hydrogen infrastructure (€27 billion) by 2030.

To support REPowerEU, €225 billion is already available in loans under the Recovery and Resilience Facility (RRF). In addition, the Commission proposes to increase the RRF's financial envelope with €20 billion in grants from the EU Emissions Trading Scheme (ETS) allowances, currently held in the Market Stability Reserve. As a result, the ETS could be a useful tool not only for the reduction of EU emissions, but also for contributing to achieving energy independence. Under the current cohesion policy will already support decarbonisation and green transition projects with up to €100 billion, investing in renewables, hydrogen and infrastructure. An additional €26.9 billion from the Cohesion Funds could be made available in voluntary transfers to the RRF. Another €7.5 billion from the Common Agricultural Policy is also available

through voluntary transfers to the RRF. The Commission will double the funding available for the 2022 large-scale call for the Innovation Fund this autumn to around €3 billion.

[To put things in to perspective, in 2021, clean energy technologies worldwide, including CCUS, low-carbon fuels, electrified transport, electrified heat and renewable energy and battery storage attracted approximately 750 billion dollars. Renewables cover 7% of energy R&D spending by globally listed companies, while North America and Europe lead the race of investments in energy R&D.]

The Trans-European Energy Networks (TEN-E) have helped to create a resilient and interconnected gas infrastructure within the EU. Additional infrastructure, whose investment is estimated at around €10 billion, is needed to complete the existing list of Projects of Common Interest (PCI) and to fully compensate for the future loss of Russian natural gas imports. The substitution needs of the next decade is hoped that can be met without tying up fossil fuels, creating idle assets or hampering Europe's climate ambitions.



Accelerating electricity PCI will also be essential for adapting the electricity grid to future needs. The Connecting Europe Facility (CEF) will support this initiative, and the Commission is launching a new call for proposals with a budget of €800 million.

Most of the proposed measures require either implementation and delivery at national level, or coordination between EU countries. Therefore, the extent to which countries commit themselves will be decisive for the successful outcome of the initiative.

As mentioned above, the RRF is at the heart of the REPowerEU project, supporting coordinated planning and financing of cross-border and national infrastructure and other energy-related projects. The Commission proposes to make targeted amendments to the RRF Regulation to incorporate specific REPowerEU funds into existing MS (Member States) Recovery and Resilience Plans. Country-specific recommendations put forward in the 2022 European Semester Cycle will contribute to this process.

The REPowerEU chapter to be included in the MS Recovery and Resilience Plans will incorporate specific reforms and investments that support

the following REPowerEU objectives:

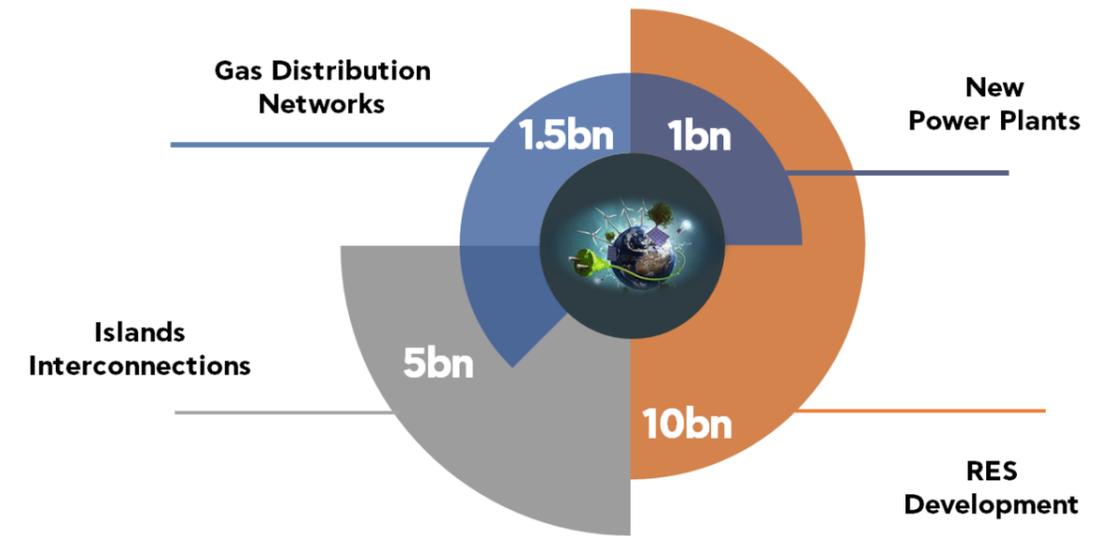
- improving the energy infrastructure and its relevant facilities to ensure immediate security of oil and gas supply, enabling the diversification of energy sources for the benefit of the Union;
- improving the energy efficiency of buildings, reducing carbon dioxide emissions, increasing the production and use of biomethane and green or renewable hydrogen and increasing the share of RES penetration;
- addressing national and cross-border bottlenecks in energy transport and supporting zero-carbon transport;
- supporting the above objectives through accelerated training of the workforce in "green skills", as well as supporting value chains in key materials and technologies linked to the green transition.

The European Plan gives directions for the prioritization of interventions in buildings using heat pumps and energy efficiency methods, to minimize both their energy consumption and their carbon footprint, issues that are currently a stumbling block for the EU's energy security and decarbonization targets.

Following these directions, the Greek side will submit its proposal by the end of September and will most likely propound the inclusion of electricity interconnection projects, FSU and FSRU Units, hydrogen production and storage projects.

It should not be neglected that all the above initiatives run in parallel with a number of long-established European flagship programmes such as:

- Horizon Europe: the key funding programme for research and innovation with a budget of €95.5 billion.
- Important Projects of Common European Interest (IPCEI), which mobilise state aid mechanisms for strategic projects of scale involving multiple states, and under which more than €11 billion has been awarded since 2019.
- LIFE, EU's dedicated programme for the Environment and Climate Action, which has been running for over 30 years, with a budget of €5.4 billion for the period 2021-2027.
- Interreg, supporting cross-border cooperation and funded by the European Regional Development Fund (ERDF), having committed €10.1 billion in the period 2014-2020.



Major investments in Greece for projects planned to be operational by 2030.

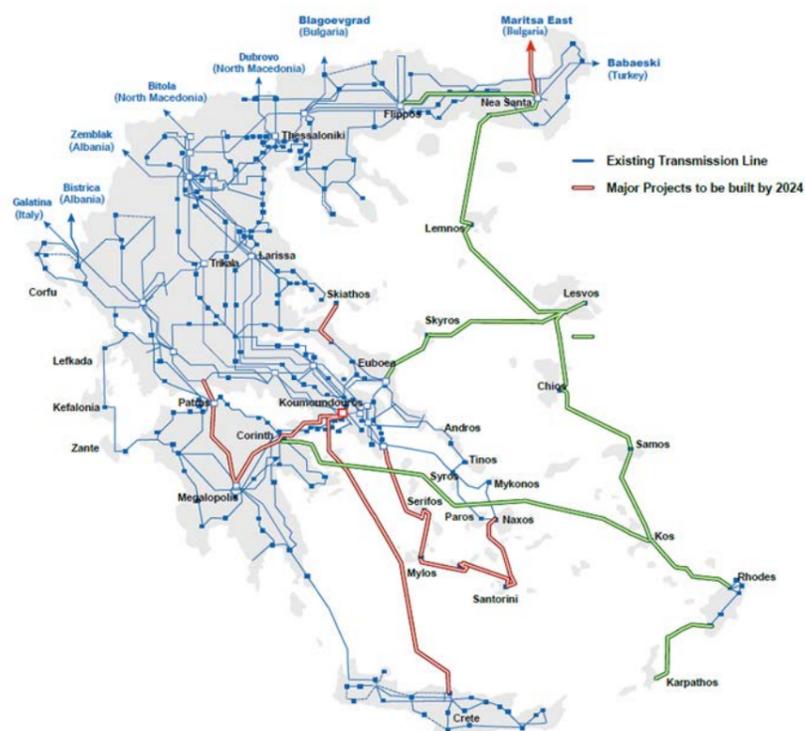
Energy Investments in Greece

The roadmap to redesign the EU energy architecture provides Greece with the short-term potential to be transformed into an energy hub of the region and a strategic gateway for the entry of energy resources into Southeastern Europe. Leveraging its geographical position and natural advantages in terms of wind and solar conditions, Greece is already taking steps in this direction.

Since the country's banking sector has started returning to pre-pandemic levels and has started providing fresh credit and support to the development of the economy, a number of investments and energy-related projects have been announced in the country. Major energy investments of €17,5bn have already been released and planned in 2021, with operation scheduled till the end of 2030, including, but not limited to, Gas Distribution Networks, Island Interconnections, RES Development, and New Power Plants. More specifically, Gas networks, islands interconnections and RES are the most preferable investments due to the predetermined tariffs.

The support of the Greek banking system to the country's Energy sector reached 5,939 loans in 2021. With 1.7% performance, the energy sector is at the bottom of the list of non-performing exposures of the different sectors in the Greek banking system and continues outperforming in terms of both reliability and credibility. Moreover, since 2017, the non-performing exposure of the energy sector, has steadily been dropping by approximately 0.6% annually and the annual rate of non-performing loans is shaped at 1.7% for H1 2020.

IPTO (ADMIE) has been actively expanding its strategic energy investments – up to 5 billion euro by 2030, with its Ten-Year Development Plan including the interconnection of all major Greek islands to the mainland grid to provide high-quality power supply, and also the extension of the existing margin for RES absorption in the energy mix, to allow the decommission and withdrawal of oil-fired power plants, and to exponentially increase its GHG emissions.



Major investments in Greece for projects planned to be operational by 2030.

Project	Description	Construction Date	Completion Date
Crete interconnection			
2nd Phase		2022	2025
Cyclades Interconnection			
4th Phase	Thira - Naxos Interconnection	2021	2023
	Thira - Folegandros - Milos - Serifos Interconnection - Lavrio wire ropes	2022	2024
Dodecanese Interconnection			
1st Phase	Interconnection of Corinth High Voltage Center – Kos and Kos-Rhodes	2025	2027
2nd Phase	Interconnection of Rhodes - Karpathos	2026	2028
	Interconnection of Rhodes - Samos		
Northeast Aegean islands Interconnection			
1st Phase	Interconnection Santas High Voltage Center – Lemnos and Lemnos - Lesbos	2025	2027
2nd Phase	Interconnection of Aliveri High Voltage Center - Skyros- Lesbos- Chios and Kos - Samos	2026	2028
3rd Phase	Interconnection of Lesbos - Skyros and Chios - Samos	2028	2029

More specifically, the interconnection of the 4th Phase of Cyclades Islands, secured 165 million euros of funding from the RRF, while 30 million euros has been allocated to other projects for the upgrade of critical power transmission infrastructure in the Greek mainland.

The Dodecanese and the Northeast Aegean Islands interconnection is expected to receive funding from the Decarbonization Fund of the Greek islands. HEDNO's (DEDDIE's) Ancillary interconnection projects, such as the modernization and innovation of Sub-stations, Distribution Centers, cables, and the grounding of overhead cable connections in islands are also expected to raise approximately 500 million in funding from different country's resources such as the Decarbonization Fund and the Partnership Agreement (2021-2027), so as to radically upgrade Greece's energy infrastructure.

Additionally, HEDNO has already prioritized the construction of new international interconnections on the East and South borders: Greece-Cyprus-Israel and Greece-Egypt interconnections are considered as two of the main flagship projects that contribute to diversifying EU supplies and strengthening Union's energy security. The aforementioned are going to arrogate funding under REPowerEU.

HEDNO's Network Development Plan for the period 2021-2025, includes Investments of approximate 2 billion euros, including the construction or the reinforcement of existing networks, replacement projects, iterative projects, and projects related to

the development and improvement of HEDNO's asset and its better management, to strengthen the resilience of the electricity system.

In line with EU objectives, Greece has set ambitious targets for RES penetration in electricity generation (50% in 2030 and 85% in 2050, from 35% in 2020), as well as for a significant increase in the economy's electrification (c. 45% in 2050, from 27% in 2020). It is already leveraging funds from the RRF and the REPowerEU initiatives to accelerate some of the crucial energy projects. The National Plan for Recovery and Resilience – Greece 2.0 consists of 4 pillars and 18 axes. The axes will be supported by €18.44 billion in grants and €12.73 billion in loans, as well as 59.81 billion of mobilized investment resources. 37.5% of the plan will support climate objectives and 23.3% of the plan will foster the digital transition. Greece 2.0 intends to facilitate the decarbonization of the Greek economy, in particular, and the reforms and investments to be implemented have to be completed by August 2026.

In this analysis emphasis will be given only on the "Green Transition" pillar, which is dedicated to:

- Transition to an environmental-friendly energy model
- Energy upgrade of the building infrastructure and spatial reform
- Transition to a green and sustainable transport system
- Sustainable use of resources, climate change resilience and biodiversity preservation



National Plan for Recovery and Resilience – Greece 2.0		
Green Transition – Components	RRF budget (mil €)	Mobilized Investment Resources (mil €)
Power UP Investments that increase the resilience of the electricity network, its capacity and its energy storage capabilities, thus, allowing for greater penetration of RES in the energy mix. Strong emphasis is placed on electricity interconnections between the islands and the mainland. The component introduces reforms that ensure financial stability and long-term sustainability of the RES-CHP Account and speed up the licensing procedure for new RES plants.	1,200	2,348
Renovate The component includes reforms and investments that promote the renovation and energy efficiency upgrade of buildings, the implementation of urban and spatial planning, and the development of strategic “green” urban regeneration projects.	2,711	5,225
Recharge and refuel This component aims to promote cleaner, smarter and cheaper transportation. It introduces reforms that enable the installation and operation of charging infrastructure for electric vehicles. It also promotes the investments required to establish the roadmap towards meeting the NECP target of 30% share of electric vehicles in the domestic market by 2030.	520	1,305
Sustainable use of resources, climate resilience and environmental protection This component includes three sets of actions, which contribute to all six objectives of the “EU Taxonomy Regulation”: waste management, following the principles of waste hierarchy and circular economy; protect the environment, through reforestation initiatives and actions for the protection of biodiversity; enhancing and upgrading the capabilities of Greece’s civil protection mechanism.	1,763	2,726
Total	6,194	11,604

Overall, ‘Greece 2.0’, offers 6.194 billion euros of the available funding for green transition investments and is expected to mobilize 11.604 billion euros. The Plan includes 48 Projects, involving investments in green technologies, biodiversity, energy efficiency, building renovation, preservation of energy security, circular economy and sustainable development. The green transition projects fall within 9 categories of investments, including but not limited to Green technologies, Green skills, Biodiversity, Energy efficiency, Building renovation, Preservation of energy security, Circular economy, Sustainable development and job creation. According to the scheme, at least 20% of the total budget of the investment plan of a project must relate to green transition investments that contribute to the green tagging of the National Recovery and Resilience Plan. The RRF loan quota, that comes with very favourable interest rates for the investor (min 0.35%) can reach up to 50% matching of the total project budget, and help boot activity in the sector.

The Decarbonization Fund of the Greek island (mentioned above) is another funding mechanism, which is expected to mobilize investments of 5 billion euros. Following EU’s ambitious “Fit-For-55” package and the new

climate law obligations, Greece is making a leap forward, aiming to cut greenhouse gas emissions by 55 percent by 2030, and achieve net-zero by 2050. Since the country has 200 inhabited islands and 101 insular municipalities, which mainly use oil generators for their power, priority has already been given to their green transformation and is one of the central pillars of the Greek government’s plan to decarbonize the country’s economy.

Due to the fact that Greece’s per capita gross domestic product (GDP) was below 60% of the EU average in 2014, the country claimed up to 25 million emission allowances, that has not been allocated for free by the 31st of December 2020. These allowances correspond to approximately 2 billion that will be used for co-financing up to 60% of the decarbonization projects in the Greek islands, including but not limited to interconnections, energy autonomy in buildings projects, cold ironing and res production projects.

It is clear from the above that a plethora of funding routes and leveraging investment opportunities are pursued both at an EU and national level. And the range of possible technological solutions is equally broad – in the next section we analyse three of the most promising: hydrogen, batteries and offshore wind.

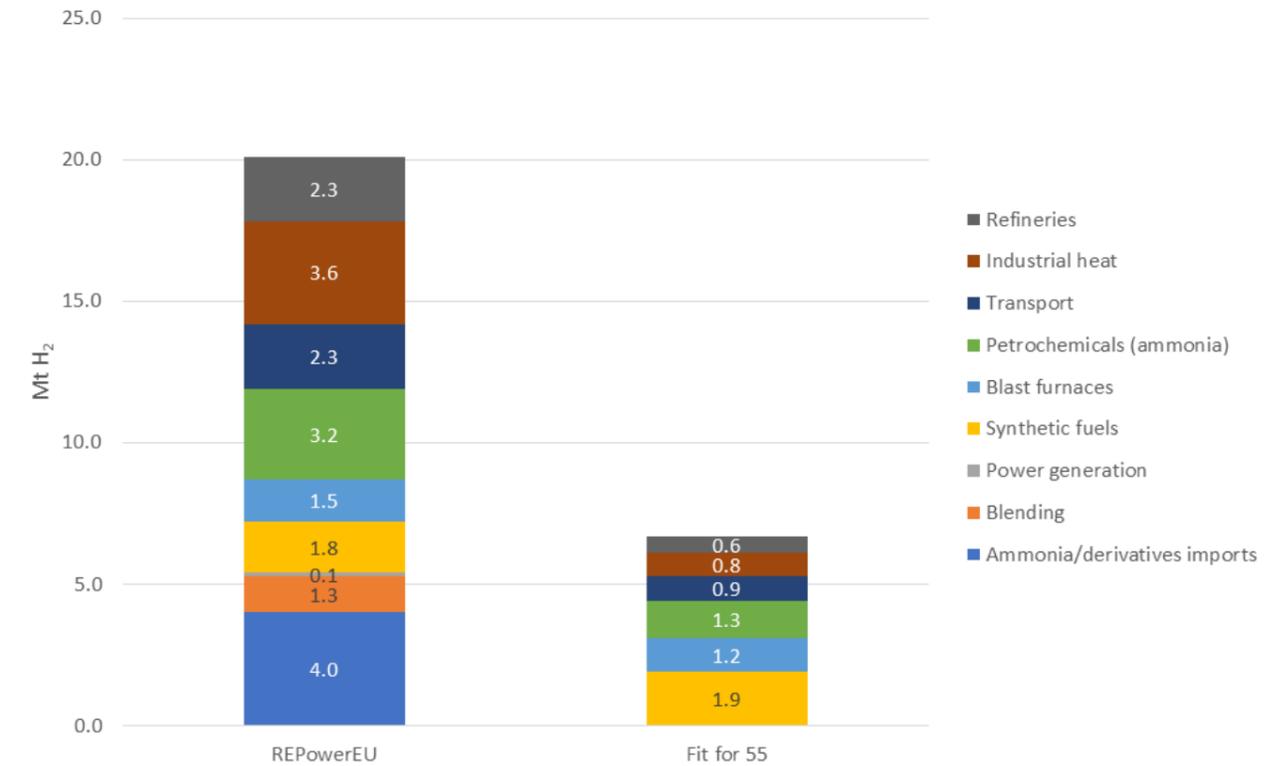
Investment Focus: Energy Transition Technologies

1 Hydrogen

Of all the alternative and emerging energy solutions considered recently, hydrogen has gained significant momentum as a key fuel/energy carrier for the energy transition.

As analyzed above, the EU has put significant efforts into increasing its independence from Russian fuels by 2030 through its RePowerEU plan. In the case of hydrogen, this means new and ambitious targets for its penetration and use². In particular, the EU is aiming to producing 10 million tonnes of renewable hydrogen domestically, while another 10 million tonnes of green hydrogen should be imported³, taking the total to 20 million tonnes of annually utilized green hydrogen by 2030. Based on the RePower EU plan, approximately €27 billion is to be directed to feed the investment needs of hydrogen sector. It is observed that hard-to-abate sectors such as transport and industry alongside ammonia are projected to use approximately 14.6 Mt of hydrogen by 2030.

² https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3131
³ Staff Working Document: Investment needs, hydrogen accelerator and bio-methane plan



H2 use by sector in 2030 according to the REPowerEU targets.³

Nevertheless, to achieve such high production quantities, the manufacturing of related technologies, such as electrolyzers, should also rapidly scale up. Research undertaken by Goldman Sachs estimates electrolyser capacity to reach 27 GW⁴ in 2030⁵. Just as important are the additional renewable electricity needs – and hence respective investments required – of the electrolyzers that will produce the aforementioned 10 million tonnes of green hydrogen, estimated at around 500TWh⁶. Adding to the mix the unprecedented quantities of hydrogen produced, which would require significant expansion and upgrading of hydrogen

transmission, distribution and storage infrastructure, a rather demanding picture for investments is drawn. It is production at this scale of hydrogen, however, that the EU hopes it will help her, alongside biomethane and biogas, to mitigate its dependence on Russian natural gas by 27 bcm, oil by 3.9 Mtoe and coal-related imports by 156 Kt by 2030. In this new context of increased interest in hydrogen and its growing market, hydrogen valleys may play a notable role in shaping the evolution of the hydrogen economy. A hydrogen valley is an ecosystem in which hydrogen is produced, stored and distributed to diverse off-takers.

⁴ Cumulatively considering operational, FID, under construction, feasibility studies
⁵ <https://www.goldmansachs.com/insights/pages/gs-research/carbonomics-the-clean-hydrogen-revolution/carbonomics-the-clean-hydrogen-revolution.pdf>
⁶ <https://ec.europa.eu/docsroom/documents/50014/attachments/1/translations/en/renditions/native>

Through such an ecosystem, the operational capabilities around hydrogen, as well as the benefits of end-users, are demonstrated in a real-life environment. Since hydrogen valleys are projects that involve actors across the hydrogen value chain, institutional collaboration amongst different sectors of expertise is of paramount importance. Currently, there are around 25 hydrogen valleys in Europe, with the European Commission planning to double their number by 2025 through the RePowerEU plan⁷. The EU plans to support this trajectory by increasing the funding for the Clean Hydrogen Partnership (through the Horizon Europe programme) by €200 million. Taking into account that the initial funding under this scheme was over €300 million⁸, the total funding for the expansion of hydrogen valleys is expected to surpass €500 million.

As mentioned earlier in the report, various EU funding schemes are to be mobilized in order to speed up the hydrogen transition. The industrial sector is expected to absorb an additional €1.5 billion through the Innovation Fund 2022 Large Scale Call that will be launched in November 2022⁹, with a total budget of €3 billion. The additional amount will be covered by the revenues of the Emission Trading System (ETS) within

2022 and 2023 respectively. Stefaan Vergote, Head of DG Climate Action stressed that innovative projects, inclusive of hydrogen, will have access to a pool of €30 billion that will be made available through the Innovation Fund over the next decade. This funding scheme can cover either capital and operational costs while eligibility is available for both blue or green hydrogen projects¹⁰.

On top of the above, another €5.4 billion will be provided by fifteen EU member states in the framework of the Important Projects of Common European Interest (IPCEI). This investment will leverage further funding, amounting to €8.8 billion, from the private sector¹¹. The investment will be directed to support 41 projects that take place in 15 EU countries and promote the collaboration of more than 300 partners. The project focus will be on the R&D of various hydrogen-related technologies such as electrolyzers, fuel cells and hydrogen storage and how best to serve the respective end users. Greece is included in both of the thus far approved projects, which have attracted approximately €800 million of funding, after a highly competitive selection process. Their added value will contribute to hydrogen generation, storage, transportation, distribution as well as the utilization of fuel cells¹².

7 Staff Working Document: Investment needs, hydrogen accelerator and bio-methane plan
https://www.clean-hydrogen.europa.eu/media/news/call-proposals-europe-investing-eu3005-million-clean-hydrogen-technologies-2022-02-28_en

9 Staff Working Document: Investment needs, hydrogen accelerator and bio-methane plan
<https://ec.europa.eu/docsroom/documents/50574>

11 https://ec.europa.eu/commission/presscorner/detail/en/IP_22_4544

12 <https://hellas.postsen.com/business/49447/Commission-Approves-54-billion-euros-for-a-joint-hydrogen-project-with-the-participation-of-Greece.html>





Despite the number of the proposed funding mechanisms, investors have stressed their concerns about parameters that could act as inhibitors for the accommodation of these investments¹³. Based on their views published by the European Investment Bank, the developed regulatory framework is characterized by high complexity, mainly due to the plethora of regulations across the hydrogen value chain and the respective EU countries. Additionally, the level of accessibility to financing schemes remains insufficient for early stage-innovations which constitute an important pillar of the EU hydrogen strategy. What is more, the risk associated with large-scale projects is possible to undermine investor's mobility and direct them to invest in other decarbonization technologies, such as renewables. Lastly, hydrogen projects often

lack the necessary holistic approach in project coordination. Given the diversity of the sectors involved in the value chain (i.e. renewables, industry, transport) an integrated approach should be adopted in order to combine the sector-specific features with optimal geospatial locations and thus increase the benefits of the project.

As mentioned above, a key pillar of the hydrogen strategy is cross-sectoral and cross-border institutional collaborations. One leading cross-border collaboration is the Hydrogen Backbone¹⁴. This initiative has been formed by the 31 members of the ENTSO-G network and envisages the transformation of the European gas pipelines towards an interconnected hydrogen infrastructure. The investment needs of the project are estimated to be up to €143 billion while 60% of the

investment will be directed to repurpose the existing pipelines and the rest intended for new infrastructure. In Greece, hydrogen infrastructure plans consist mainly of new infrastructure and a repurposed part that crosses the region of Western Macedonia. Also, the plans foresee interconnections with the neighboring countries of Italy, Albania, Bulgaria as well as Turkey.

Undoubtedly, the list of hydrogen projects is ever increasing across the globe. According to IRENA,¹⁵ HyDeal is the largest green hydrogen project in the world. The scope of the project is to produce 3.6 Mt by 2030 by deploying 95 GW of solar energy and 67 GW of electrolyzers. The activities of the project will take place in three EU countries, namely Spain, France and Germany. The project, apart from the involvement of partners related

to technical-oriented activities, it also involves off-takers, strong financial institutions as well as institutions of public policy signifying the critical role of multi-sectoral collaboration. Taking into consideration its large-scale structure, HyDeal is promising to reach a hydrogen production cost as low as €1.5/kg. The great momentum and interest around H₂ is looking quite strong at present, with the challenges of a so-called 'hydrogen economy' being, of course, appreciated, since it is not the first time in recent decades that a 'hype' around hydrogen has been developed. But there is certainly more maturity now in the technical and investment world to understand that hydrogen can only be part of the energy canvas, which includes also other solutions, such as batteries, the technology in focus in the next section.

¹³ https://www.eib.org/attachments/publications/unlocking_the_hydrogen_economy_en.pdf
¹⁴ <https://ehb.eu/>

¹⁵ https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jan/IRENA_Geopolitics_Hydrogen_2022.pdf

2 Energy Storage - Batteries

Developing efficient and cost-effective energy storage solutions is a key enabler for the green energy transition. New generation of batteries and their up-scale has drawn significant investment interest, and this is the technology in focus in this section.

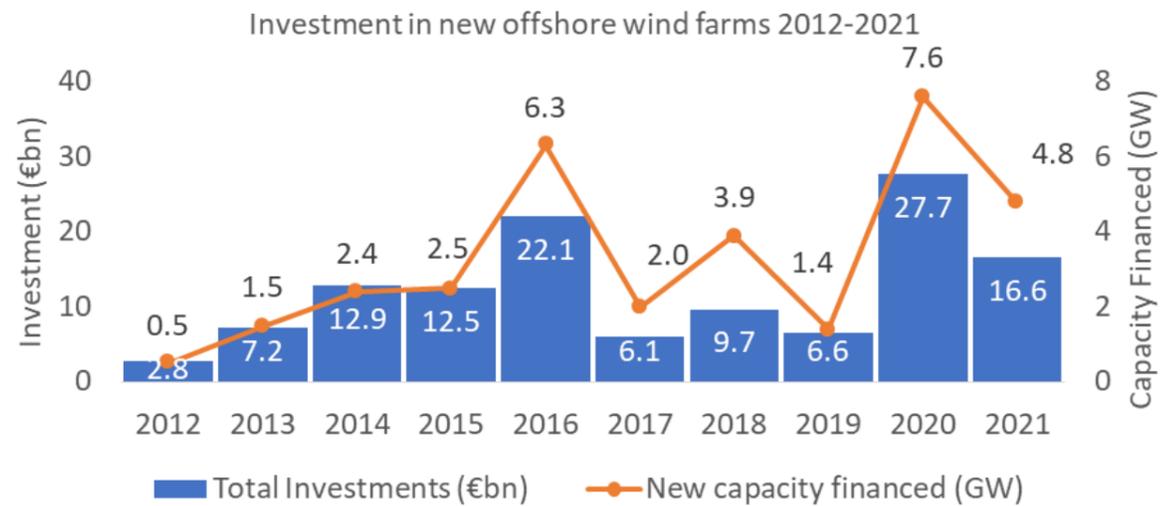
The EU Commission has set up the European Battery Alliance (EBA) since 2017¹⁶, involving EU states, industry and the scientific community, aiming at bringing Europe's battery manufacturing capability to the forefront. The alliance has attracted 440 actors and around €100 billion in investment commitments, with a 'business investment platform'¹⁷ having been developed to facilitate transactions amongst interested parties throughout the battery value chain. More than 180 industrial battery projects are under development in the EU, with roughly a quarter of them focused on the battery cells segment. The EU is therefore at a trajectory of meeting 69% and 89% of its increasing demand for batteries by 2025 and 2030 respectively. The total level of investment along the battery value chain reached €127bn by 2021, with an additional €382bn expected to be adequate for Europe to create a self-sufficient battery industry by 2030 and support 1,000 GWh of demand across sectors (mobility, energy storage systems, last mile etc.).¹⁸

The EC is also supporting investments in batteries through a dedicated IPCEI programme¹⁹, involving two streams: the IPCEI on Batteries and the IPCEI European Battery Innovation (EuBatIn), the latter having a stronger focus on accelerating market entry of innovations. Two IPCEI battery projects have been approved thus far, with the latest involving 12 member states (including Greece) and €2.9bn in state aid²⁰. Through its flagship Horizon Europe programme, the EC allocated €160m to battery research in 2021 and €925m has been budgeted for up to 2027.¹⁸ Another recent notable example of public-private partnership of scale is the BATT4EU, between EC and Batteries European Partnership Association (BEPA), with total budget of €1.85bn, aspiring to establish a best-in-the-world battery innovation ecosystem in Europe by 2030²¹.

The need for a broad range of investment sources, across the value chain, has been widely accepted in the sector, including establishing competitive giga-factory capabilities in the continent. In 2018, the European Investment Bank (EIB) approved a €52.2m loan for the Swedish Northvolt AB²², which has since built Europe's first gigafactory, delivering the first lithium-ion cells to leading European car manufacturers in May 2022²³. A number of OEMs are following suit developing their own lithium-ion battery production lines in Europe, including VW and Tesla, but also Chinese brands, such as BYD and CATL, amounting to a total 1,416GWh of lithium-ion battery cell annual production capacity. These ambitious production plans are not obstacle-free however, faced by supply chain issues and delays (including lithium sourcing), but in any case, picture a dynamic future for investment in the sector.^{24,25}

16 https://single-market-economy.ec.europa.eu/industry/strategy/industrial-alliances/european-battery-alliance_en
17 <https://www.eba250.com/actions-projects/business-investment-platform/>
18 <https://www.innovationnewsnetwork.com/discussing-upgrades-european-battery-value-chain/21399/>

19 <https://www.ipcei-batteries.eu/>
20 https://ec.europa.eu/commission/presscorner/detail/en/IP_21_226
21 <https://bepassociation.eu/about/batt4eu-partnership/>
22 <https://www.eib.org/en/press/all/2018-033-eu-to-support-northvolt-european-battery-project-with-innovfin-backing>
23 <https://northvolt.com/articles/northvolt-delivers/>
24 <https://www.energy-storage.news/nearly-all-lithium-battery-gigafactory-projects-in-europe-face-delays-while-catl-announces-second-facility/>
25 <https://battery-news.de/index.php/battery-atlas/>



Investment in new offshore wind farms 2012-2021.²⁶

3 Offshore Wind

Offshore wind has gained considerable momentum in recent years, driven by technology advancements in the sector and wider acceptance of its key competitive advantages (e.g. greater wind potential offshore, no interference with onshore landscape).

In 2020 Europe invested a hitherto record €27.7bn in offshore wind, corresponding to 7.6 GW of new capacity, whereas in 2021 the respective values were €16.6bn and 4.8 GW. The European countries with the highest investment in offshore wind are UK (€8.8bn), Germany (€4.9bn), France (€2.2bn) and Denmark (€0.7bn), and average expenditure required is estimated at €3.5m/MW, almost three times higher than what is required in the case of onshore wind (€1.3m/MW). Even though investment dropped in 2021, it was a record year for corporate renewable PPAs in general, and in the case of offshore wind 11 PPAs were signed, up from 6 in the previous year.²⁶

In a more recent development to boost investment and strategic support to offshore wind, Germany, Denmark, Netherlands and Belgium have signed a cooperation agreement aiming at a ten-fold increase in regional offshore wind capacity, reaching 65 GW by 2030 and 150 GW by 2050.

Their 'Green Power Plant of Europe' concept is based on the states' inherent characteristics of reliable winds, shallow waters, and proximity to industrial centres, with expected investments from the private sector as high as €135 bn.^{27,28} In parallel, another major North Sea country, Norway, has announced its plans to allocate sea areas for the development of 30 GW of offshore wind capacity by 2040²⁹. Norway, alongside Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Sweden and the EC are also part of the 'The North Seas Energy Cooperation' which facilitates the development of the required offshore cross-border grid.³⁰

It is evident that impressive levels of investment would be required for a wide implementation of offshore wind technology.

But the challenges are not only finance/cost-related. Floating turbines for deep waters (where winds are stronger and efficiency higher) are still maturing technologically and the broader environmental/ecosystem implications (including other human activities, such as fishing) are yet to be thoroughly understood and mitigated.³¹

The above context makes permitting/licensing procedures even more complicated and demanding compared to more mature RES technologies, hence concerted efforts on an EU and national level would be required for the appropriate frameworks to be put in place and encourage new investments. In Greece, the regulatory framework for offshore wind was signed off in August 2022, and the respective investment activities are now expected to start ramping up.

²⁶ <https://windeurope.org/intelligence-platform/product/financing-and-investment-trends-2021/>

²⁷ <https://www.euractiv.com/section/energy/news/germany-denmark-netherlands-and-belgium-sign-e135-billion-offshore-wind-pact/>

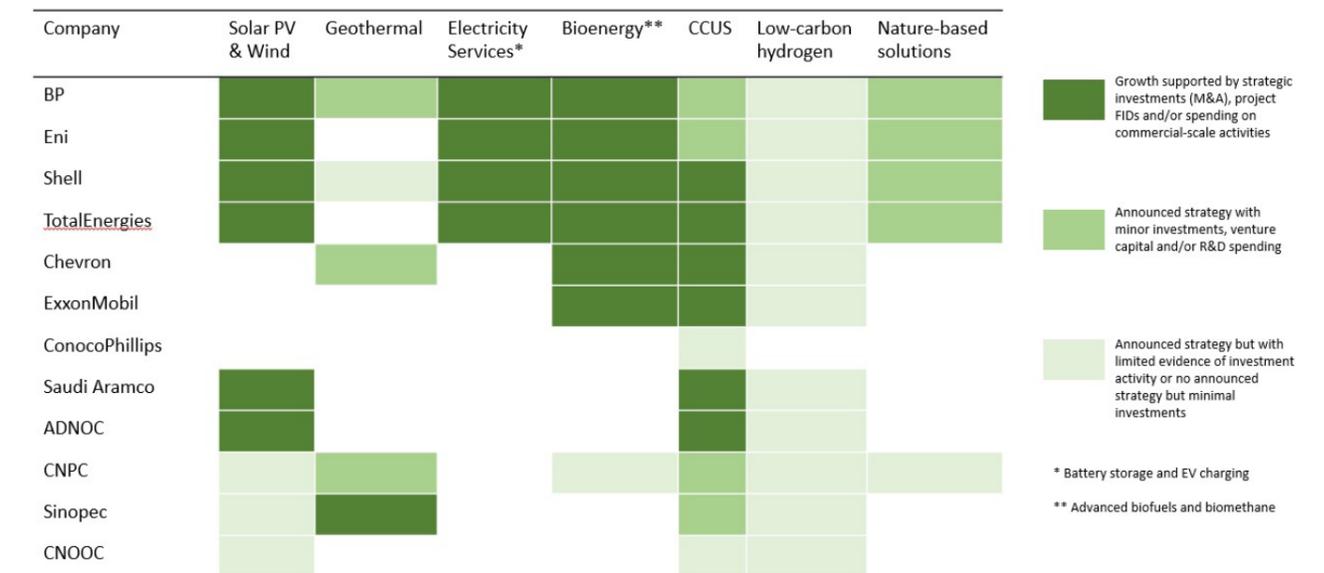
²⁸ https://www.bmwk.de/Redaktion/DE/Downloads/Energie/20220518-declaration-of-energy-ministers.pdf?__blob=publicationFile&v=10

²⁹ <https://www.offshorewind.biz/2022/05/11/norway-launches-30-gw-by-2040-offshore-wind-investment-plan/>

³⁰ https://energy.ec.europa.eu/topics/infrastructure/high-level-groups/north-seas-energy-cooperation_en

³¹ <https://energypress.gr/news/anoigei-o-dromos-gia-ta-thalassia-aiolika-parka-131-erotiseis>

Accelerating Transition - Threats and Opportunities



Selected international oil companies and their diversification activity and investment in alternative businesses.³²

The dramatic events unfolding in the last couple of years, from the pandemic to the war in Ukraine and the accelerated efforts for energy transition, have created a dynamic landscape of threats, but also opportunities, with wider implications on investments in the energy sector.

As the demand for PV, wind and battery technologies increases, so does the price of the respective critical raw materials. So much so recently, that significant concerns have started being voiced about the sustainability of these solutions. Compared to 2020, the increase in prices for 2022 are estimated at 120% for silicon (PV), 100% for steel (wind) and 570% for lithium (batteries). Adding to the mix the fact that Russia is a commodity superpower: 20% of Class 1 nickel, 43% of palladium and 12% of platinum world's supply, second largest producer of aluminium (6%) and cobalt, fourth largest exporter of tungsten), makes the need for investment in the respective supply chains, including mining, refining and processing, even more urgent.^{32,33} On the positive side, oil and gas companies have been presented with significant windfall

profits in the first half of 2022, enabling a potential boost of efforts for a transition to a low-carbon fuel economy. All major oil and gas players have diversification strategies in place already, including PV, wind, geothermal, bioenergy, CCUS, low-carbon hydrogen etc,³² and their investments in clean energy technologies are expected to almost double in 2022.

Apart from big corporates, there are encouraging signs in the start-up world too, with record funds having been raised in 2021 - \$6.9 bn early-stage venture capital funds worldwide (\$2 bn in Europe). Energy storage, hydrogen and RES technologies have been the main drivers, and it is worth noting a shift in early stage mobility investments towards riskier concepts, such as small electric aircraft, compared to more conventional EVs.

From a global perspective, despite the observed substantial growth in clean energy investment, and if the aim for net zero emissions is to be achieved by 2050, the IEA estimates the growth rates of renewables and electricity grids will need to increase by three and six times respectively.³²

For implementing more renewable energy sources in the European energy mix, for altering the structure of the system into one that will include distributed energy sources and bi-directional flows of energy, new types of energy infrastructure and innovative lines of energy products are needed to reform the energy markets. Investing in a more secure, flexible, and interoperable network - infrastructure both at the transmission and distribution level is imperative.

32 IEA World Energy Investment 2022
 33 <https://www.weforum.org/agenda/2022/03/russia-gas-oil-exports-sanctions/>

Infrastructure policy actions involving international and domestic interconnections and development projects, the main challenges are related to management complexity, time delays, and the availability of resources, thus requiring dynamic planning with the ability to integrate the various regulatory-technical challenges. Additionally, by connecting demand, supply and storage capacities over large geographical areas, interconnectors will facilitate the uptake of renewable energy sources while, at the same time, contributing to security of supply.

At the EU level, the accelerated steps promoted by REPowerEU are to be supported mainly by loans and reallocation of existing funds, rather than 'new money'. Attracting private investments, therefore, remains challenging and a number of measures will need to be taken at an EU and state level to that end

(e.g. favourable taxation, state aid provisions). In June 2022, the EC and EIB launched two new model financial instruments in support of the REPowerEU and New European Bauhaus initiatives³⁵. The models will allow relevant stakeholders (authorities, banks, investors) to navigate the available opportunities landscape more effectively, leverage EU funding and EIB co-financing, as well as activate additional resources from commercial banks and the private sector.

In this uncertain and fast-changing macro-economic context, there are clearly significant challenges in accelerating the energy transition, with a plethora of potential solutions being voiced. But the need for substantial levels of investment, often involving new and innovative mechanisms, is unequivocal and as urgent as ever.

34 <https://ihsmarkit.com/research-analysis/repower-eu-targets-eu-energy-independence-limited-funding.html>

35 <https://www.eib.org/en/press/all/2022-281-greener-housing-and-sustainable-living-spaces-the-european-commission-and-eib-launch-blueprints-for-financing-more-energy-efficiency-and-territorial-development-investments>



Synopsis

The present Energy crisis has multiple dimensions and repercussions, calling for decisive political action and brave investments, in the short- as well as in the long-term. The signals for the forthcoming winter, characterized by soaring energy prices, do not leave much room for idleness in the Energy world.

The EU, with its REPowerEU response for disengaging from Russian fossil fuels and accelerating the energy transition, has earmarked €300 billion to that end, and in combination with its other flagship programmes, such as the RRF, PCI, IPCEI, Horizon Europe etc. it is hoped it will rise to the challenge successfully. Greece is successfully participating in a number of the above EU projects and is also ramping up its energy investments, with major infrastructure projects around the transmission/distribution network and interconnections planned, as well as LNG and energy storage initiatives.

Of the number of technological solutions promoted for a successful energy transition, hydrogen (as a fuel/energy carrier), batteries for energy storage and offshore wind have drawn significant attention recently. The utilization of hydrogen, though not a new concept per se, is a significant pillar in REPowerEU for mitigating EU's dependence on Russian fossil fuels, and a utilization as high as 20 million tonnes of hydrogen per annum is envisaged by 2030. New generation of batteries, with their flexibility in end use and scalability, are considered a 'low hanging fruit' solution. However, the EU is only now starting to build some respectable

manufacturing capacity and it will need investments in the 100s of billion euros in order to be self-sufficient in battery supply by 2030. Offshore wind, finally, although technically much more demanding than onshore wind, is showing great signs of growth and investment interest. Permitting/licensing procedures continue to be the critical roadblock, but legislative/regulatory developments, including in Greece, is hoped will accelerate adoption.

The above ambitious plans and investments for accelerating the energy transition are not without their risks of course. Supply chain issues and geopolitical interdependencies in natural resources make budgeting and projections particularly hard, causing uncertainty to investors, especially in the long run. But there have also been big winners in the recent crisis, such as the traditional Oil & Gas corporates, which even though they had already started diversifying their portfolio towards 'greener' activities, their recent windfall profits may help accelerate their transition.

In any case, it is apparent the energy crisis is here to stay (in the short/medium term at least), energy transition has risen to the top of the political agenda and vast amounts of investments need to be mobilized as a matter of high priority. There are positive signs from central government and the private sector, but also significant challenges in achieving the said transition, which one could argue equals almost to a 'paradigm shift'. Our InFocus project will be following developments closely and continue reporting on the most pressing and topical issues in Energy Economics.

Experts' views



REPower EU investments: Accelerating Energy Transition by leveraging RRF funds and beyond

Vassilis Karamouzis

GM - Corporate and Investment Banking, National Bank of Greece



Green transition has been at the forefront of EU's strategy for mitigating climate change and environmental degradation. A set of ambitious policies and targets, such as the European Green Deal, aim to transform the EU area into a resource-efficient and competitive economy, ensuring no net emissions of greenhouse gases by 2050. To achieve this ambitious target, challenging interim targets have been set, such as "Fit for 55" – the pledge to reduce emissions by at least 55% by 2030 compared to 1990 levels. These objectives have become even more pertinent and urgent today, following Russia's invasion of Ukraine, which highlighted EU's strong dependency on Russian fossil fuels. To overcome these hardships and global energy market disruption, EU launched the REPower EU plan, that will deploy RRF existing funds, as well as new funds, to investments that produce clean energy, save energy, and diversify EU's energy supplies.

Clean energy production is the main enabler of the green transition. This means scaling up investments in RES sources (solar, wind, hydro, biogas, green hydrogen, etc.), as well as upgrading of electricity networks and interconnections to make available to consumers the green energy nationwide. Technological improvements and increasing investment in energy storage systems is also required to address the challenges from the intermittent nature of RES energy production. Energy efficiency measures is the second strong enabler of the European Green Deal. The building stock in Europe is among the oldest in the world and accounts for 40% of total energy consumption in EU. Through targeted interventions in energy efficiency improvements for buildings a large amount of energy can be saved. The same applies to transport through production of more fuel-efficient automobiles, as well as through the phasing out of fossil-fuel powered vehicles and replacement with electric vehicles, powered by clean electric energy.

Greece has made notable achievements in the green transition journey, and the Greek banking system has been pivotal in funding this transition. For NBG, green transition is a prerequisite for the transformation and the competitiveness of the Greek economy and thus it is a key pillar of our strategy.

NBG is the leader in RES financing in Greece, with significant market. Our medium-term target is to make over €500 mn of new RES disbursements in the period 2022-2024. For the achievement of this objective, there will be significant assistance from the availability of over € 7bn of RRF funds earmarked for the Greek banking system in this period, that will co-finance, with commercial bank loans, investments in green transition. RRF also requires that at least 38.5% of the RRF loan portfolio of participating banks is granted to green projects, thus creating a strong incentive for them to finance the green transition. The incentives are even stronger for green investors, as RRF can finance up to 50% of a green investment with a long-term loan and a fixed interest rate loan as low as 0.35% currently.

Our Energy Team has already been a recipient of strong investor interest for green transition projects from a wide spectrum of investors, ranging from SMEs that would like to improve their energy balance and carbon footprint to large industrial clients and foreign RES investors that find attractive investment opportunities in the RES potential of Greece.

Notwithstanding this positive outlook for green investments, NBG recognizes the need for transitional compromises and facilitating pathways towards the green energy end-state. Especially in the current macroeconomic and geopolitical context, natural gas is a reliable alternative and should be part of the overall energy mix and the RRF. In this direction, NBG has partnered with Gastrade SA to finance the first FSRU in Greece, a project that will be able to secure about 5.5 bcm of natural gas per annum for Greece and the neighboring Balkan markets. This has been a complex and challenging project, for which NBG has worked closely with Gastrade for almost 5 years to bring it into fruition, but the recent high interest for FSRUs in other countries, such as Germany, Italy and the Netherlands, underscores our strategic choice to stand by this project and make it happen.

We are strongly confident that the setbacks from the recent energy market disruption will be transitional and will be eventually helpful, as they will accelerate the green transition. NBG has the resources and the strong willingness to finance the green transition in Greece and is keen to assist all investors with solid business plans for green projects.

Services framework

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NATIONAL RECOVERY AND RESILIENCE PLAN

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NATIONAL BANK
OF GREECE

Historic opportunity for Greece to become an energy hub for the Balkans and the Southeast Med

**Manos
Manousakis**

Chairman and CEO,
Independent Power
Transmission Operator



It is a fact that we have entered an era of tectonic shifts for Europe's energy landscape. Since the outburst of the pandemic, we have been experiencing an unprecedented energy crisis with a significant ripple effect in the European as well as the global economy that has deteriorated dramatically after the Russian invasion in Ukraine.

These adverse developments demonstrate vividly that it is now more imperative than ever to remain focused on the big goal of phasing out fossil fuels and shift to renewable energy sources as fast as possible and in a more systematic manner, despite the challenges.

Undoubtedly, this would be the only viable solution that can effectively decelerate hikes in energy prices, ensure energy adequacy in the long-term -even during periods of

geopolitical tensions- and mitigate the negative effects of climate change.

Certainly, a pivotal factor for the success of this undertaking is the construction of robust electricity networks that will be able to carry clean energy from geographically dispersed sources to consumers and the industry.

In this critical juncture, Greece holds a historic opportunity to become a strategic energy crossway in the Balkans and the eastern Mediterranean as well as a gateway of green energy to the European continent at large. IPTO's groundwork towards this direction has made this not just a vision but a realistic prospect in the coming years.

Consistent to its institutional role, the Operator spearheads the development of crucial domestic as well as international electricity interconnections aiming to shield the country's

energy adequacy, bolster green transition in the wider region and contribute to Europe's diversification of energy sources.

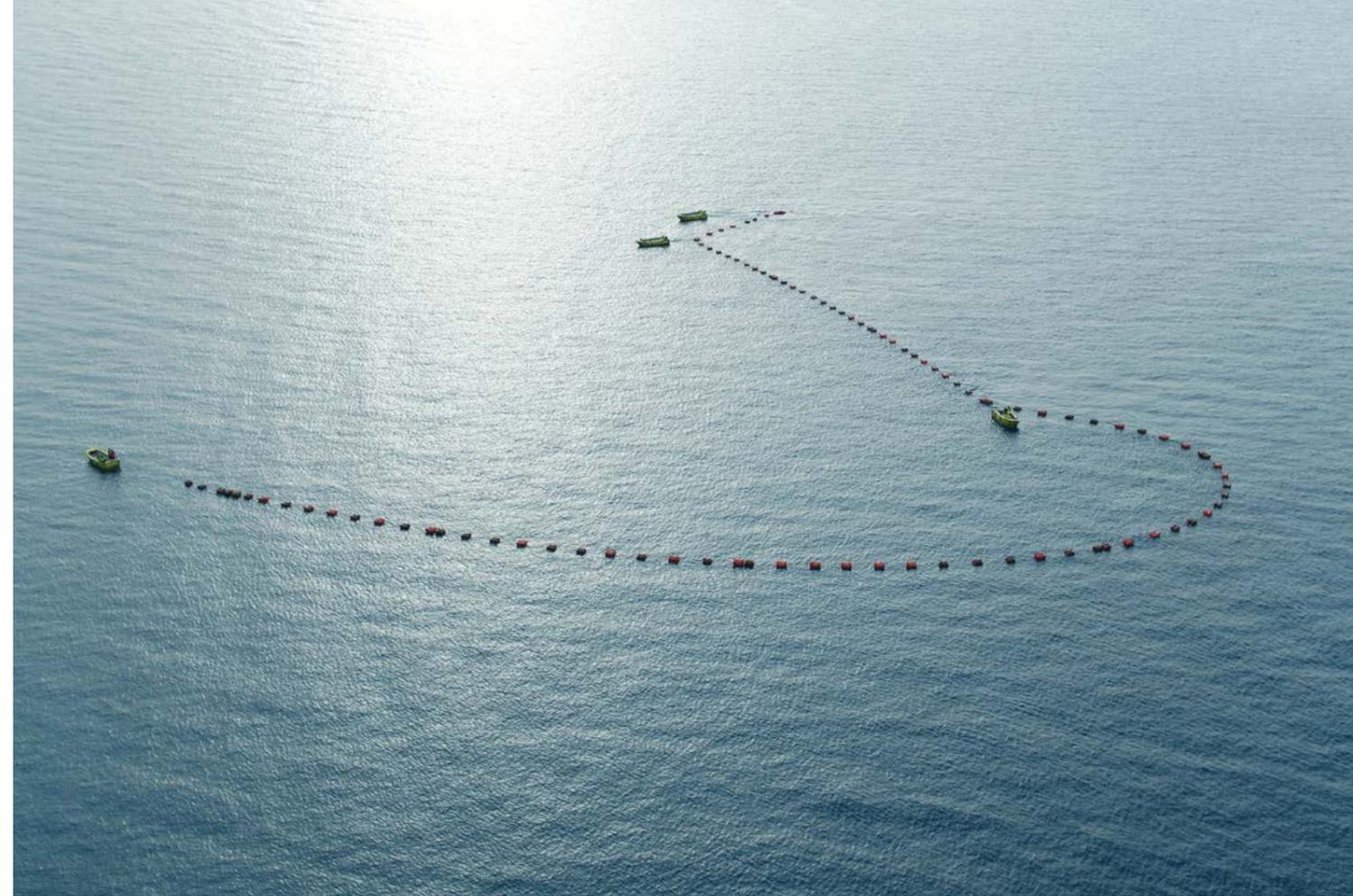
With a 5-billion-euro investment plan up to 2030, IPTO provides for the interconnection of all major Greek islands to the mainland grid, that offer high-quality power supply, extend the existing margin for RES absorption in our energy mix and allow the gradual withdrawal of oil-fired power plants, drastically cutting down CO2 emissions.

An invaluable aid for the implementation of these expensive yet indispensable projects are the European funding mechanisms that have been earmarked for the development of green infrastructure across the EU. Greece is already leveraging funds from the Recovery and Resilience Facility (RRF) and the REPowerEU initiative so as to accelerate these crucial energy projects.

Indeed, the interconnection of the southwestern Cyclades, which is now under construction by IPTO, is a project co-financed by the Recovery and Resilience Facility with 165 million euros while 30 million euros is allocated to another two important projects for the upgrade of critical power transmission infrastructure in mainland Greece.

According to our strategy, we are also prioritizing the construction of new international interconnections on every side of our borders.

Over the past year we have made important steps regarding two flagship projects in the eastern Mediterranean; Greece-Cyprus-Israel and Greece-Egypt interconnections that are going to transform the energy map of the region.



Given the gravity of Greece-Egypt interconnection for Europe's energy security, we are optimistic that the project will secure funding from the REPowerEU, making it possible to launch its implementation phase over the next 12 months.

This interconnection will harness northern Africa's solar and wind potential through the development of RES power plants, intended for transferring clean energy from Egypt to Greece and subsequently to Western and Central Europe.

Meanwhile, IPTO supports the maturation of Greece-Cyprus-Israel interconnection, offering valuable operational capacity to the project promoter EuroAsia Interconnector. More than that, the Operator recently agreed its initial participation in EuroAsia Interconnector's share capital with a 25% stake, with which it will assume control over the project's implementation.

On our northern border, the construction of the new interconnection that will triple the capacity of the existing link with Bulgaria is underway, the studies for a second interconnection with Italy are proceeding intensively and we are considering two new interconnections with Turkey and Albania as well as the upgrading of the existing interconnection with North Macedonia.

Although we are amid an exceptional energy predicament, our efforts must remain focused on expediting these projects, as they will radically upgrade our country's energy infrastructure and strengthen its position as one of the most important energy hubs on the intersection of three continents.



Designing the REPowerEU investments for Greece

Aristotelis Chantavas

Head of Europe Area, Enel Green Power; President, SolarPower Europe



In response to the energy crisis and aiming to rapidly reduce our dependence on Russian fossil fuels by fast – forwarding the clean energy transition, the European Commission published last May the REPowerEU plan. To achieve this goal, additional investments of €210 billion are needed until 2027 and the Recovery and Resilience Facility will be at the heart of this financing. Within REPowerEU, the Commission has already acknowledged the need to assure clean and affordable energy for European citizens and has indicated the acceleration of renewables as the ideal way to accomplish that. Renewable energy is cheap, as technology costs have significantly dropped in recent years, and independent from geopolitical tensions since it is locally produced, therefore it should be in the forefront of the effort to achieve energy independence. This should be considered by Member States

when deciding their REPowerEU investments. Unfortunately, the current crisis is a living proof of the delayed energy transition in Europe. Especially in Greece we have not yet successfully replaced intensely emitting and expensive fossil fuels with renewable energy power plants. In our country's energy mix the use of natural gas represented 40% in 2021 for power production, while RES accounted only for 20% the same year. However, if renewables had been introduced massively earlier, the impact of the energy crisis would have been softer. According to the findings of the Hellenic Wind Association, in 2021, RES reduced the cost of a MWh by €46, saving a total of more than €2.5 billion. Additionally, the Association estimates that for every 10% additional penetration of RES in the energy mix, the price of a MWh in the wholesale market decreases by more than €13.

The "green" and sustainable power in the Renewable Energy sector

Enel Green Power, a global leader in the development and operation of Renewable Energy Sources, has a presence in Europe, America, Asia, Africa and Oceania.

With an uninterrupted presence in Greece since 2008, Enel Green Power applies a new model of sustainable development in the regions where it operates, with the aim of Creating Shared Value with local communities.

As a recognition of its multi-year strategy for Sustainable Development, Enel Green Power has been awarded as one of the "Most Sustainable Companies" in Greece.

THE "GREEN" AND SUSTAINABLE POWER OF ENEL GREEN POWER INCLUDES:

- 59 plants for energy transition in the country**
- 8 projects for sustainability across Greece**
- 481 MWs of total installed capacity in Greece**



In Greece, the investment interest for renewable projects is very high, however there are concrete bottlenecks that have delayed the process so far and those are the main issues that need to be addressed when designing the REPowerEU investments. Recently there have been many initiatives to tackle the renewable deployment barriers with the introduction of new legislations accelerating the permitting procedures. However, the main issue which is lack of grid capacity and proper connection procedures remains unresolved.

The financing should focus on grid expansion and reinforcement investments. The power grid is the backbone of the energy system, and the deployment of clean energy strictly depends on its ability to host the increasing capacity. Grid planning should be aligned with climate neutrality goals. Furthermore, regarding grid connection term procedures, priority should be given to developers that

have the capability and technical know-how to bring renewable projects online fast, in response to the current emergency.

Furthermore, investments should focus on projects which can optimize the performance of the current renewable fleet and the utilization of the power grid capacity. Such projects are repowering of aging renewable plants, hybridization of existing power plants (combination of different renewable technologies) and coupling of renewables with energy storage. Regarding repowering, it can more than double the energy output of aging power plants, the majority of which are located in areas with high resource, under-exploited due to decreased performance of equipment. Furthermore, regarding hybridization, it increases the annual capacity factor of the plant, reduces the stochastic nature leading to lower balancing costs and improves the utilization of the existing grid, since no further grid capacity is required.

Lastly, energy storage is undoubtedly a necessary aspect to ensure security of supply. Coupling batteries with renewable energy plants transforms them in dispatchable generator units which can rapidly respond to energy system needs. It is a fast solution for reliable, sustainable, and affordable energy penetration with significant contributions to energy independence.

To conclude, to make up for the delayed energy transition and development of renewables in Greece, a country with the competitive advantage of rich natural resource, financing should be steered to the above-mentioned investments. This is dictated by the best interest of the citizens, many of whom today face the severe impacts of energy poverty and climate change.

The REpowerEU Action Plan opportunity and the necessary investments towards a net-zero carbon economy

Antonios Xenios

Chief Executive Officer
at EDF Renewables
Hellas



It is a fact that in the last two years, we, as a society, have to face a series of important challenges. Challenges, which in their entirety take on the characteristics of crises that occur, either at global or local level. Since the first quarter of 2020, the COVID-19 pandemic has continued to rage around the world, during both 2020 and 2021 major environmental disasters occurred in Greece, while from October 2021 an unprecedented – in a period of thirty years – energy crisis is taking place. A crisis that was intensified by the war in Ukraine, pushing the prices of fossil fuels (oil and, mainly, natural gas) skyrocketing. A development that had extremely negative consequences for households, industries and the growth prospects of the European continent.

In this context, national and European institutional bodies, as well as the scientific community, propose as a response to the above challenges the undertaking of immediate actions for the transition to a carbon neutral economy. These actions are based on the European Green Agreement, Regulation 2021/1119 as well as the "Fit for 55" set of proposals. Indeed, in May 2022, the above ambitious goals and policies were further enhanced with the REpowerEU Action Plan, whose main pillars are the diversification of energy supply, energy savings and the acceleration of the energy transition. RES are at the forefront of the effort to achieve energy independence in Europe, as the action plan proposes their massive scale-up and acceleration in power generation, industry, transport and buildings.

Although the process of de-carbonization is expected to be difficult and complicated, our country is in an advantageous position due to its abundant renewable potential. The timing is therefore appropriate for making decisions that will lead to a reduction in dependence on fossil fuel imports, through the faster and safer penetration of renewable energy and storage technologies. Therefore, the goal towards a zero emission economy will become achievable through:

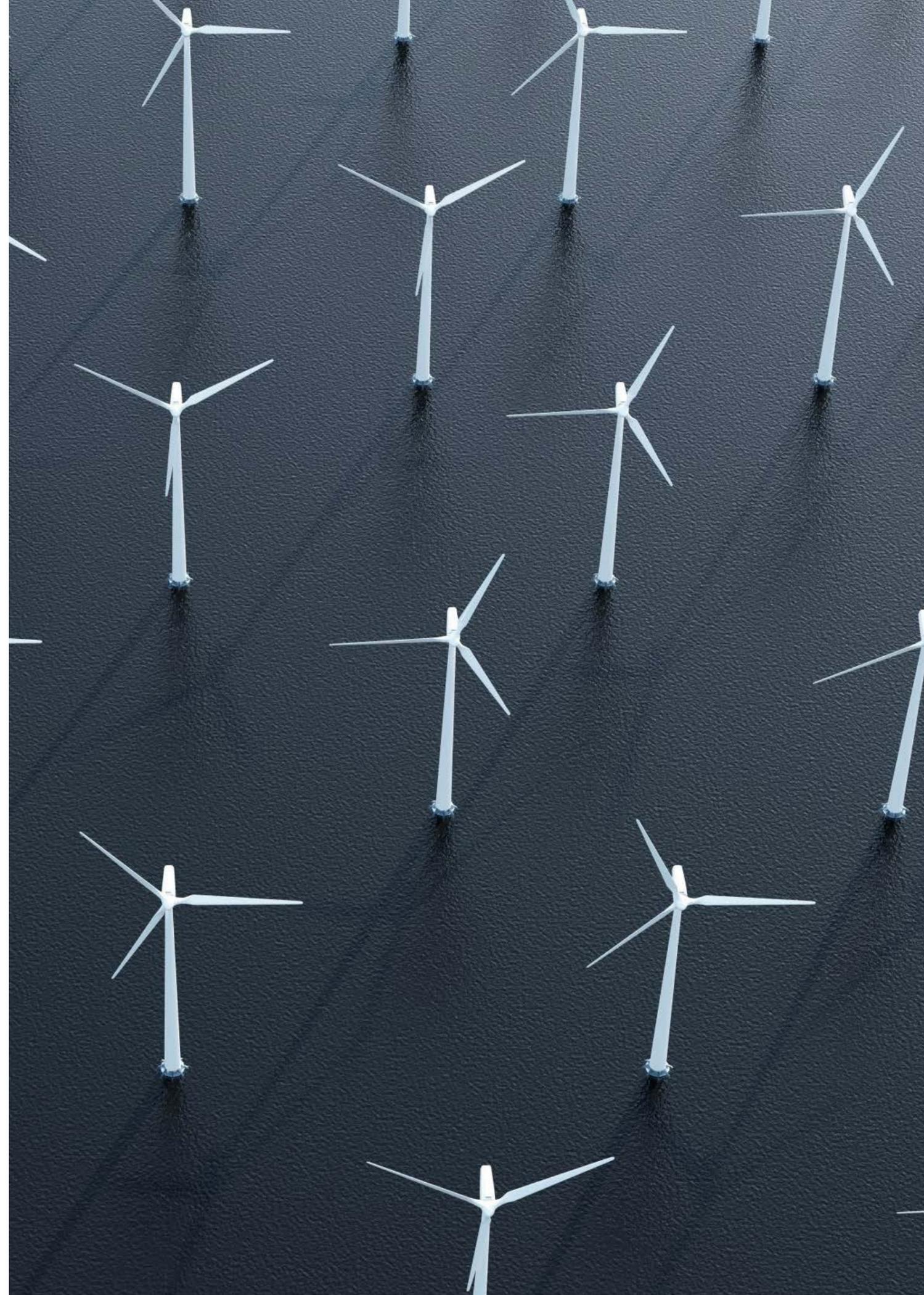
1. Modernization, strengthening and expansion of transmission and distribution electricity networks. Without the necessary increase in grid capacity, the desired rate of increase in RES cannot be achieved, while the solution of curtailments, which is equivalent to wasting green energy, is not sustainable.
2. Installation and integration, in the energy markets, of plants (in addition to standalone storage units) that combine RES with energy storage systems, which absorb energy from the grid. This combination is an excellent solution for converting RES units into controlled and dispatchable units.
3. Exploitation of offshore marine potential.
4. Decarbonization of the non-Interconnected Islands through the penetration of Hybrid Stations.



The role of EDF Renewables Hellas (EDFR Hellas) in the above energy reality is a leading one and is based on the top expertise, know-how and experience it possesses, as a 100% subsidiary of EDF Renewables, one of the largest companies worldwide in the field of renewable energy.

EDFR Hellas has been a leading player in Greece for more than 15 years in the production of green energy by implementing RES projects that contribute to sustainable development. Specifically, the EDF group - through EDFR Hellas directly employing more than 115 employees, currently has projects in operation in our country with a total capacity of 325MW, projects with production licenses of more than 4.5GW, while at the same time it is building 2 new PV plants with a total installed capacity of 110MW.

For EDF Renewables Hellas, there is one goal: a green future. Inspired by its employees, partners and customers and driven by the true potential of the Greek economy, EDFR Hellas aims to expand its portfolio of projects to include innovative technologies, such as energy storage, offshore wind farms and floating photovoltaics.



Schneider Electric's 10-point action plan to strengthen the REPowerEU proposals.

Alexandros Ntalagiannis

Green Deal Initiative Leader & System Application Engineer
Microgrid, Schneider Electric
Greece & Cyprus



Schneider Electric welcomes the European Commission's REPowerEU Action Plan. REPowerEU puts forward strong proposals to diversify our gas supply, invest in renewable energy and deliver energy savings. Energy consumers are driving the transition to a new world of energy that is sustainable, digital and electrified. This is a new world of energy, Electricity 4.0. Investing now in a smart and decentralized energy system would create structural change long before 2027. With this in mind Schneider Electric has published a set of 10 concrete actions the EU can take to achieve both immediate returns and longer-term benefits. These actions are focused around 4 key themes



1. Drive energy efficiency with digital technologies: The best Watt is the Negawatt

When it comes to saving energy, the most rapid gains can be achieved by increasing the use of digital energy efficiency tools, both in buildings (with monitoring and control technologies; Action 1) and in industry (with energy management systems; Action 2). Every additional percentage point of energy savings is equivalent to 2.6 percentage points of Russian gas imports. As major energy consumers, buildings and industry should save 46 and 17 billion cubic meters (bcm) of gas imports respectively. The renovation of non-residential buildings to incorporate digitally enhanced energy efficiency is a "no-brainer" due to the short-term return on investment.

To encourage more widespread adoption of such tools, we recommend that EU regulators integrate into the REPowerEU plan a combination of new legal mandates – notably by reforming the Energy Performance in Building Directive (EPBD) – and additional cost incentives, such as introducing tax breaks on smart meters.

2. Electrification: Electrify end-uses and rethink heat

The electrification of heating in buildings and industry (currently still heavily reliant on burning gas or heating oil) will be equally crucial.

Digitalization synergizes with electrification, especially of heat in buildings (with connected heat pumps; Action 3) and in industrial processes (Action 4) are other no-regret options. Today's technologies could electrify 90% and 78% of heat in those sectors, respectively. The remainder can provide niches for green hydrogen and biogas (Action 5).

Again, here EU policymakers can do more to encourage consumers and other end-users to electrify heating. This can be achieved, for example, by lowering the costs associated with smart heat pump installation.

3. Decentralization: flexibility, resilience and renewables

We also recommend that EU regulators adopt proactive measures to decentralize our energy system. We must decentralize our energy, with self-consumption of rooftop solar (Action 6), demand-side flexibility (Action 7), microgrids (Action 8) and smart EV charging (Action 9). While the REPowerEU plan posits some positive proposals on these issues, we believe they should be a much higher priority at an EU and national level. Again, a mix of new regulatory obligations, tax incentives and planning waivers can boost demand-side uptake of such technologies.

4. Build right from the outset: optimizing energy use

Finally, in addition of retrofitting to compensate for prior inefficiencies, we need to build better from scratch (Action 10), leveraging digital tools to guide the design of new buildings for maximum energy efficiency.

Our research indicates that by adopting appropriate efficiency tools from the outset, the EU can, by 2030, increase energy savings by 20-30% in new commercial buildings, and by 50% in new residential buildings. An ambitious recasting of the EPBD will be fundamental to this process.

TIME FOR ACTION

Europe has the opportunity to turbo-charge its own energy transition, while at the same time improving its long-term competitiveness, and bringing about a greener and more sustainable future for its citizens.

*We can't wait any longer.
The clock is ticking.*

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