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The EU's Renewables Expansion Challenge Towards 2030

Mobilizing for a Mission Almost Impossible

Center for Energy
& Climate

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Abstract

Only eight years are left to expand by almost three times the current total installed wind and solar energy capacity in the European Union (EU) in adding around 600 GW, and so reach the highly-ambitious 2030 targets. This requires a mobilization whose scale is immense – amidst times of unprecedented crises and uncertainties.

Yet the EU is still aligned with a business-as-usual deployment trajectory. This research note thus aims at ringing an alarm bell about the magnitude of the challenge ahead, and the fact that the mission looks impossible without a war-type mobilization, given that beyond declarations, actual deployment levels observed are still way below required levels, although a welcome uptick has taken place recently, notably in Poland and the Netherlands. Yearly deployment rates will have to increase by a minimum of three times, in a global context which is much more difficult to navigate.

But failure is not an option: deploying these renewable energy sources (RES) is a matter of sovereignty, and will be decisive to the EU's energy, economic and climate security, especially when facing the consequences of a phase out of Russian energy supplies, and a decrease of EU's thermal or nuclear power generation assets.

In past years, Europe's leading power sector companies (utilities) have not driven the investment wave into RES in most European economies, and when investing in RES, they have largely looked for opportunities elsewhere, such as in Latin America or North America. RES investments have been driven by hundreds of smaller, often new players, and increasingly by investment funds. To meet the 2030 targets, the leading utilities, and the former oil and gas majors, now becoming energy majors, will have to step up investment on a very large scale. Hence this memorandum focuses on their role in meeting the 2030 targets.

- The good news is that these power utilities and energy majors are now committed to directing much larger shares of their profits towards investments in the RES sector. This research finds that a total of 630 GW additional investments in RES have been pledged by the EU's Top 20 power utilities worldwide, and another 227 GW by European energy majors by 2030. This is close to the total wind and solar capacities that the EU plans to have installed by 2030, and a clear sign that an unprecedented strategic shift is underway.

- But most of these players operate at on global scale and do not specify where the investments will be located. Yet for the 2030 objectives to be met, these investments must concentrate on Europe. The EU stands in competition with huge RES investment opportunities in the UK (which targets +90 GW by 2030), North Africa, the Middle East, the United States, Brazil, India or Taiwan, Australia, Japan or South Africa. Ramping up green hydrogen/ammonia imports, as envisaged in the REPowerEU plan, will also require large RES investment overseas. Like in the oil & gas industry, the offshore wind industry is witnessing heavy equipment and a skilled workforce now operating on a global scale, and becoming increasingly scarce.
- In total, close to 700 GW of additional RES must be deployed in the European power sector (including the UK & Norway) by 2030. If the leading European power companies and energy majors deliver 70% of their committed investments in RES, out of which 70% is directed to the EU and the UK, then one can expect they could add about 420 GW of RES capacity to the European power system[1]. This would be a major contribution to the EU and the UK's 2030 targets. It would represent about 60% of the deployment effort required. In a business-as-usual scenario where other players maintain the same deployment trend as over 2011-2021, they would add about 140 GW by 2030. A conservative assumption is that they actually double their efforts, which would allow the gap to be filled (+280 GW) and the European targets to be met.

Public authorities must now make this mission possible by removing urgently multiple barriers and challenges, so that these investments take place in Europe. Ramping up RES is a strategic imperative but cannot hide the fact that the decarbonization of the power system is a wider challenge, with coal probably being used longer than expected, and significant investments being required in grid expansion and flexibility solutions.

The EU and Member States must now establish an enabling framework that is consistent with the new 2030 targets, but also address supply chain concerns by securing a robust RES manufacturing base locally, at a critical moment, given recent inflation in raw material prices, and the risk of a deeper fragmentation of the world economy. Cooperation with the UK and Norway is essential as the potential for interconnection and coordination is immense, but also with Ukraine, Morocco, Tunisia, Egypt and Israel.

1. A 70% share of their global investments targeting the EU and the UK is 10 points more than the trend observed over 2015-2021, as power companies from Central Europe, which have now become very involved, are expected to deploy capacities in their region only.

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Introduction

The EU's 2018 REDII Directive set an ambitious target of reaching 32% renewable energy sources (RES) in final energy consumption in the EU, by 2030. This target was widely seen as extremely ambitious at the time. Yet, the need to foster the EU's climate ambitions and speed up the transition to a net-zero future has triggered a new proposal from the European Commission (EC), which is now envisaging a 40% target by 2030 as proposed in the Fit for 55 package (compared to only 22% in 2021). This implies 65% of power generation coming from renewables. EU lawmakers are currently eyeing an even higher RES target in final energy consumption of 45% for 2030. Such a transformation would involve the reconfiguration not only of the European power and energy systems, but to a growing extent, of societies, economies and landscapes. This transformation is now not only vital for the environment and climate, but also for EU's energy security and its ability to phase out Russian energy imports as soon as possible. Moreover, boosting RES is a unique opportunity of reindustrialization.

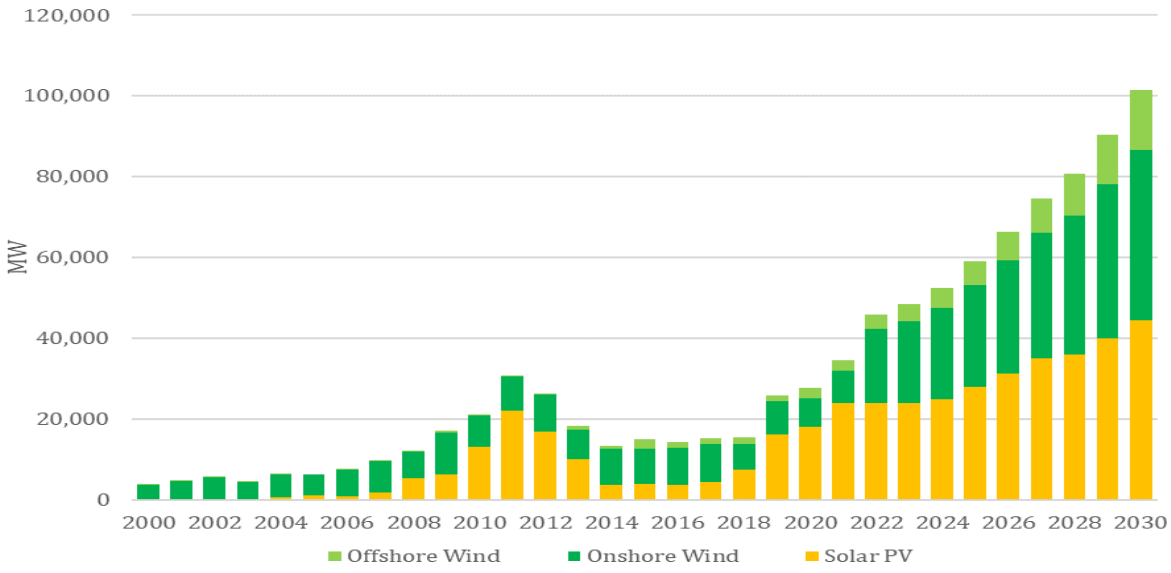
So far, the development of RES has primarily involved hundreds of project development companies across Europe of all sizes and ambitions, operating in areas such as decentralized solar PV or onshore wind power. These companies have done an incredible job so far, and several of them have even grown into businesses with turnovers in the hundreds of millions of euros, within 15 years. Citizen communities are also increasingly active. Moreover, investment funds have also focused on renewable projects, in a clear sign that the industry is mature and attractive. To meet the 2030 objectives, the EU's leading power utilities and energy majors, which have been overall minor RES players in Europe so far, need to fully enter the battle in committing massive resources, especially when market tightness is generating exceptional revenues.

This *Note* aims to analyze and compare the roles of the EU's Top 20 largest power utilities and energy majors (international oil & gas companies accelerating their diversification) in the deployment of RES in the EU. It also focuses on latest market trends and on the policies required to achieve the 2030 targets. The aim is to understand if and *how* the 2030 targets can be met.

The Scale and Pace of the Required Transformation Defies Gravity

To reach the 40% RES target by 2030, the EU needs to install an additional 350 GW of wind and 250 GW of solar power by 2030: i.e., a total increase of about 600 GW by 2030, or about 75 GW per year. This is a factor of between 3 and 5 times more compared to deployment levels seen in recent years. As a matter of comparison, total installed capacity in the EU by end of 2021 was 189 GW for wind and 165 GW for solar power. In fact, this means installing 40% more solar and wind than the existing capacity, and this in just a few years.

Figure 1. Added RES capacity in the period 2000-2021 in the EU and projections of the required new annual capacity additions to reach the 40% RES target by 2030



Source: Ifri estimates based on Eurostat data and EU Fit-for-55 target.

Figure 2. Key figures for the deployment of solar and wind power in the EU, 2021 and 2030

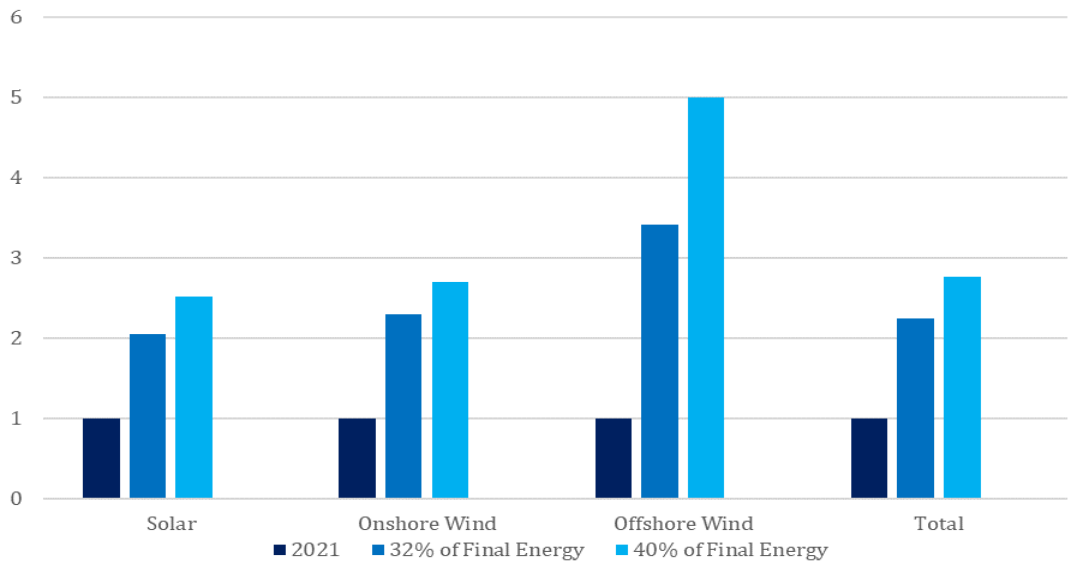
	End 2021	2030 under Fit for 55 proposal	Difference 2021-2030
Total installed solar power in the EU	165 GW	413 GW	*+248 GW*
Total installed onshore wind power in the EU	173 GW	443 GW	*+270 GW*
Total installed offshore wind power in the EU	16 GW	100 GW	*+84 GW*
Total wind and solar power in the EU	*354 GW*	*956 GW*	*+602 GW*

Source: Ifri estimates based on Eurostat data and EU Fit-for-55 target.

Yet the EU is still aligned with a business-as-usual deployment trajectory – four years after the 2018 IPCC report on the impacts of global warming of 2°C versus only 1.5°C; three years after the 2019 European elections and the subsequent Green Deal; and one year after the adoption of the EU's Climate Law. This deployment effort could represent about €440-600 billion in investment in RES generation capacities, coming on top of about €300-350 billion in total for grid investments required by 2030.[2] Such rapid transformation of the EU power generation fleet will also require timely investments in low-carbon flexibility solutions, which will become key in the near future[3].

2. Ifri estimates based on ENTSO-E for REN investments costs, and ENTSO-E & Eurelectric data on grid expansion costs. The cost assumptions for wind and solar power are based on ENTSO-E's "Global ambition" and "Distributed Energy" scenarios. The lower and higher bound depend on the path chosen to net-zero, whether by a development of centralized generation or an active participation of consumer leading to small-scale solutions and decentralization.
The costs of cross-border reinforcements are a conservative estimate of ENTSO-E, representing the cost-efficient investments that can be made between 2025 and 2030. The 2025 reference grid only depends on investments already made before 2020.
For internal grid reinforcements and according to Eurelectric's study, about 27% of investments account for supporting electrification of key sectors (buildings, industry and transports), 25% for modernizing ageing assets, 23% for renewable mass integration, 15% for digitization and automation, and 10% for resilience.
3. See notably S. Nies, "The EU's Plan to Scale Up Renewables by 2030: Implications for the Power System", *Briefings de l'Ifri,* Ifri, April 12, 2022, available at: www.ifri.org.

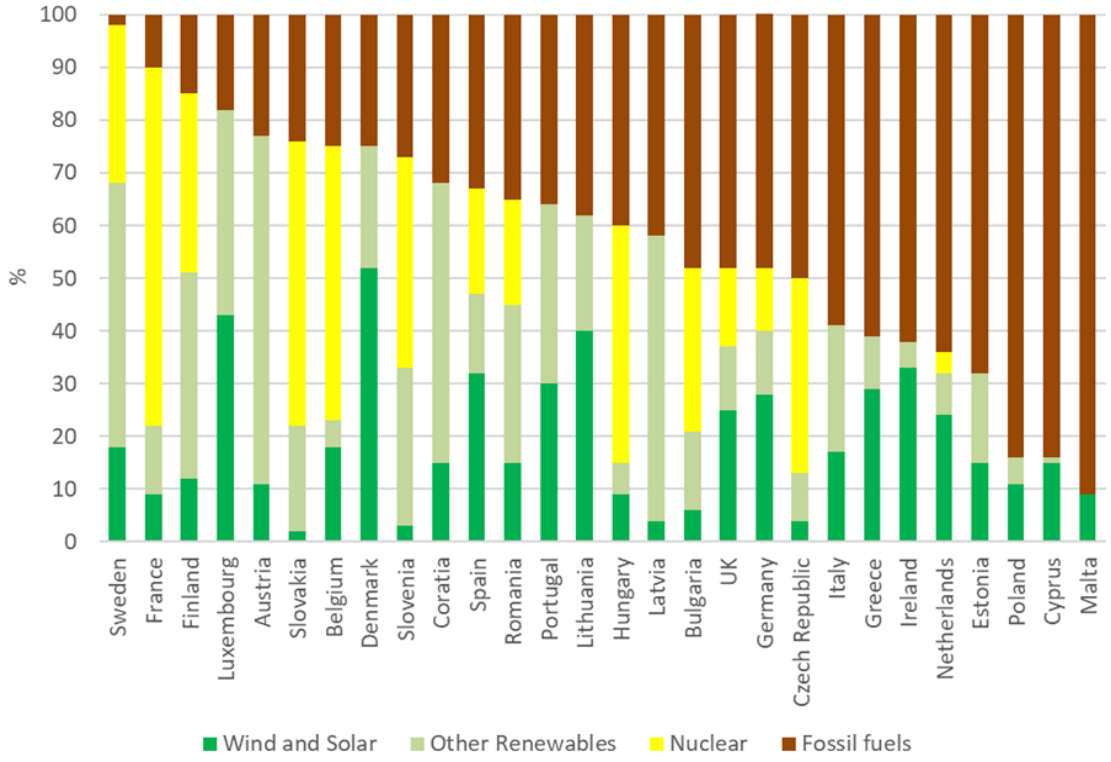
Figure 3. Multiplying factor of the increase of installed renewables by 2030 in the different scenarios



Source: Ifri estimates based on Eurostat data and EU Fit-for-55 target.

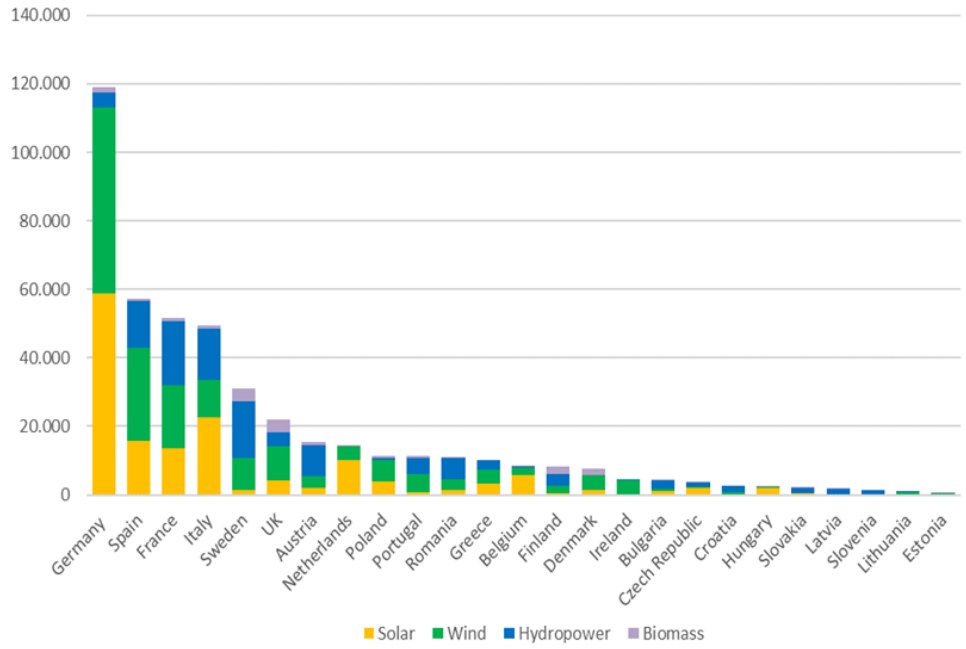
Moreover, the challenge is to deploy these RES not just in a few Member States with the best resource potential and eco-system, but across all EU power systems. While EU targets are not set for individual states, the objective remains to decarbonize the EU power sector in the most homogeneous and distributed way possible. The 2021 situation highlights the huge discrepancies among Member States, with regards to the role of RES in power generation, total installed capacities and 2021 additions. Overall, Germany, Spain, Portugal, France, Italy and Sweden have been the most dynamic markets for RES deployment so far, but this is not to say the job is being done there. While there is a clear discrepancy in Central Europe, the case of Poland highlights that political will and conducive regulatory frameworks can rapidly trigger investments at scale.

Figure 4. EU Member States and the UK share of electricity generation by sources in 2021 (in%)



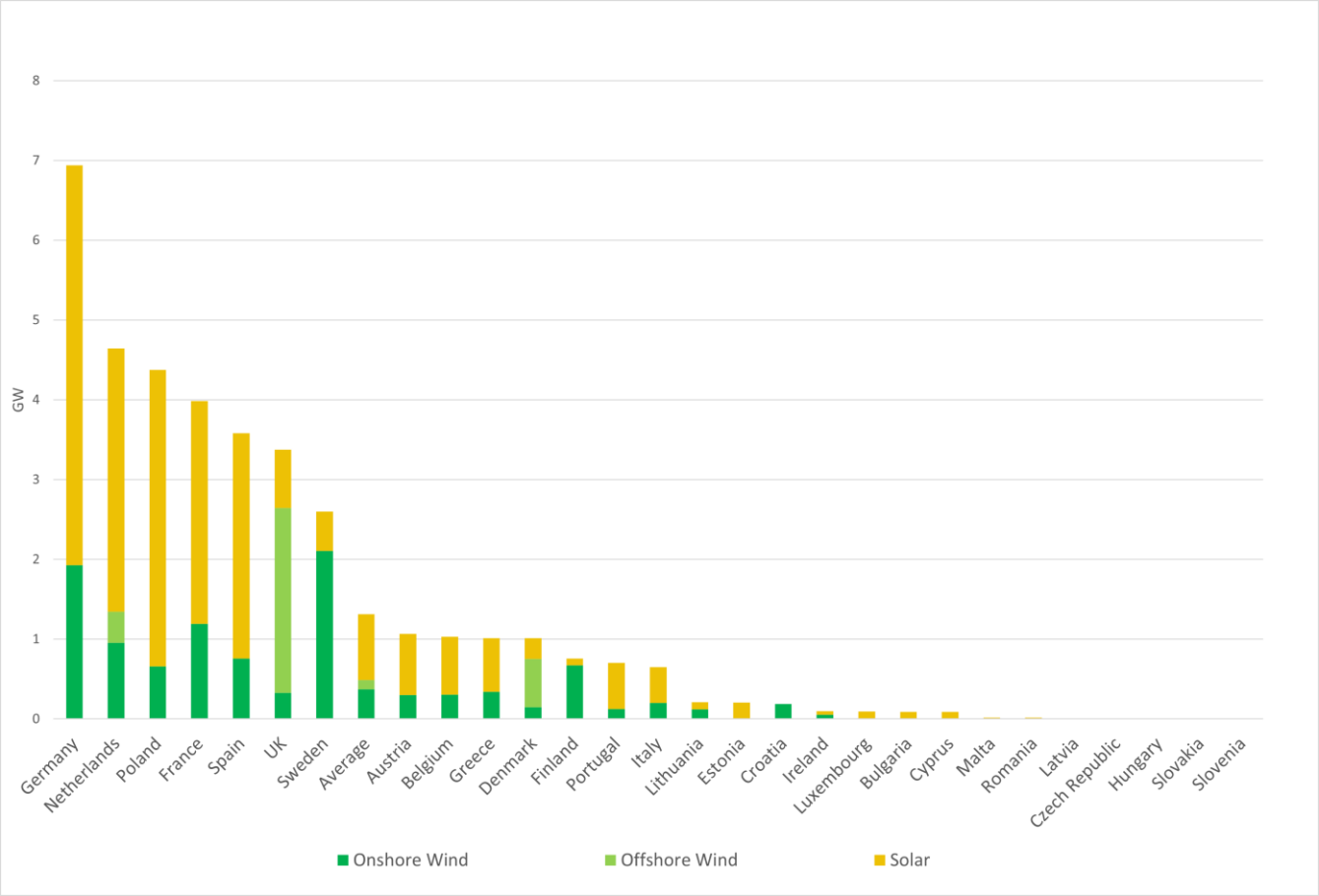
Source: Eurostat.

Figure 5. Installed RES capacities by EU Member States and the UK in 2021



Source: Eurostat.

Figure 6. RES capacity added in 2021 in the EU Member States and the UK

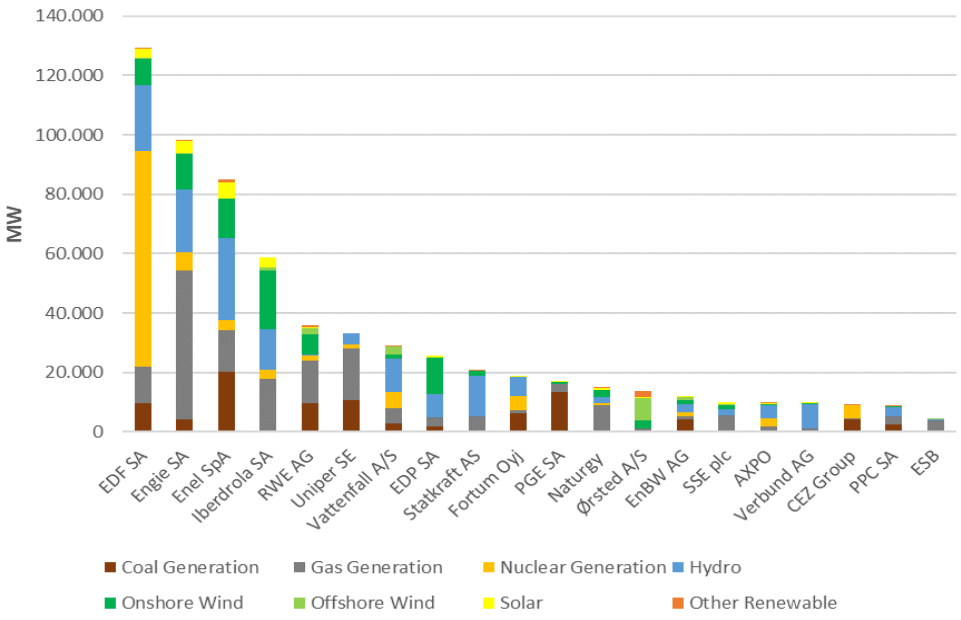


Source: Eurostat.

The EU Top-20 Power Sector Companies Have Become Global RES Players

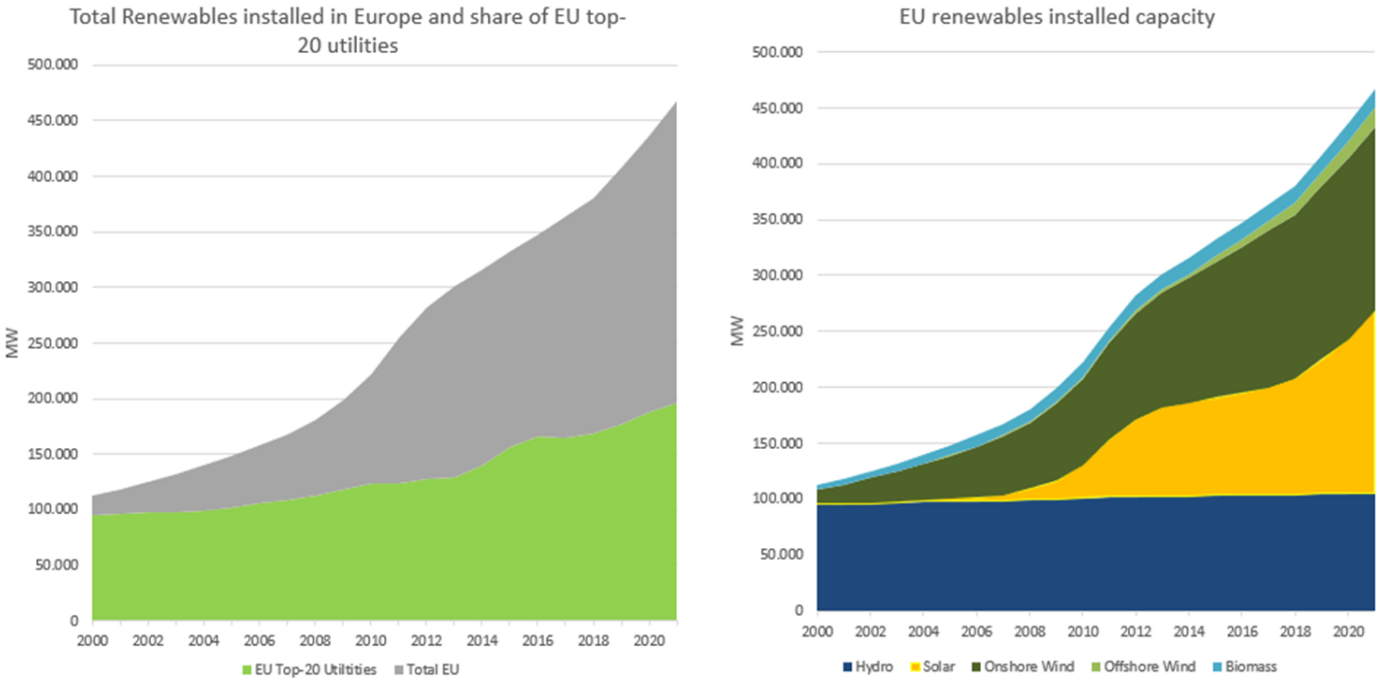
This analysis focuses on the 20 most relevant companies in the electricity sector (power utilities) by market capitalization, electricity generation capacity and geographical relevance. They will play a key role in stepping up capacity deployment to meet the 2030 targets. Many of these power sector companies are still at least partly owned by their respective governments (Vattenfall 100%, EDF 84%, CEZ 70%, Fortum 51%, Enel 24%), and have now one common destination: decarbonization and making profits in a low carbon energy system.

Figure 7. Global installed capacity of the EU Top-20 companies by technology in 2021



Source: Ifri estimates based on utilities' financial reports, sustainability disclosures and quarterly publications.

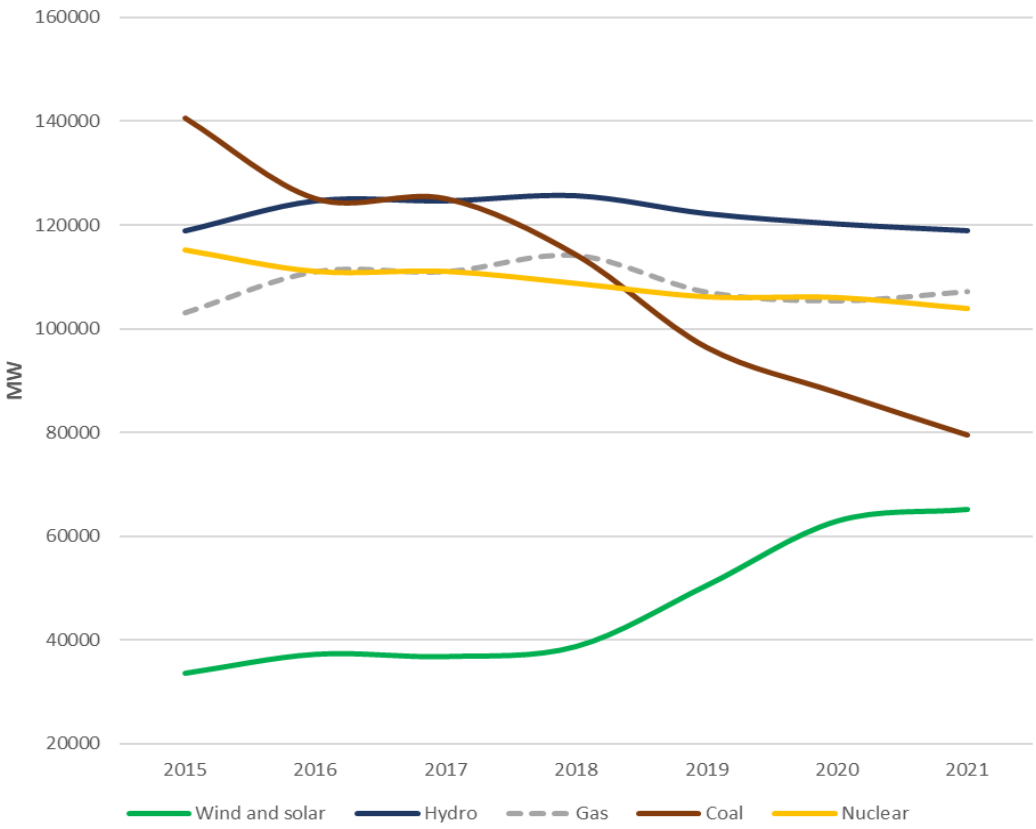
Figure 8. Evolution of the role of EU Top-20 power utilities in the EU renewable deployment, and evolution of the renewables expansion by type, 2000-2021



Source: Ifri estimates based on Eurostat and utilities' annual and quarterly reports.

In 2015, the Top-20 EU power sector companies had an installed capacity in Europe of 511 GW in which coal was the dominant technology with more than 140 GW, followed by hydro with 120 GW, and nuclear power with 115 GW. Wind and solar power accounted for only 33 GW, mostly onshore wind. The research shows that utilities so far have largely focused on maintaining their assets and in expanding in regulated transmission activities. Coal has been an exception from 2018 onwards, when EU ETS prices jumped above €20 per ton, thus favoring the switch from coal to gas, and installed coal generation capacity was reduced by more than 60 GW. This trend has now been temporarily stopped, at least for the coming few years, given the current gas crisis and the return of positive clean-dark spreads. The other exception is the slight decline in nuclear power, mostly driven by the politically motivated nuclear phase out in Germany and some closures in France and Sweden. Natural gas capacity has remained constant, since the bulk of new installations was executed between 2005 and 2012. Hydropower is a key legacy asset for the EU Top-20 that own 82% of the total installed capacity in the EU (see figures 9 and 10). In spite of its high profitability, its potential is now limited, with only limited capacity increases and a few pumped-hydro projects under way.

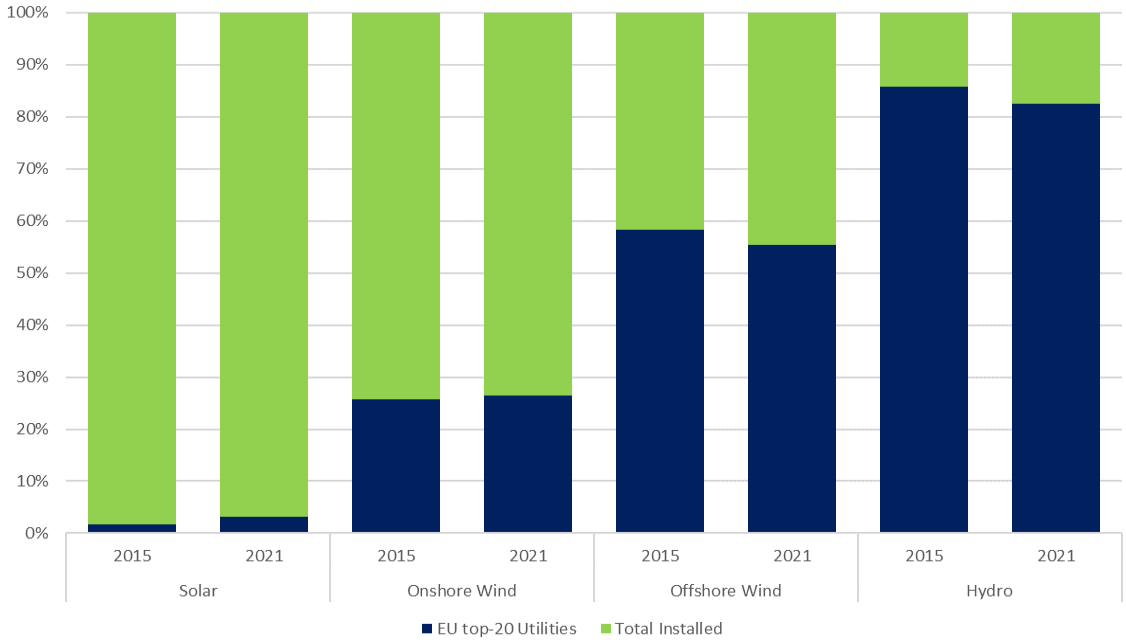
Figure 9. Evolution of the EU Top-20's power generation fleet in Europe, 2015-2021



Source: Ifri estimates based on Utilities' financial reports, sustainability disclosures and quarterly publications.

The case for wind and solar power deserves a deeper analysis. While the EU Top-20 power companies doubled their installed capacity of RES in the period 2015-2021, growing from 33 GW to 67 GW, they were unable to maintain leading positions and market share. By 2021, the EU Top-20 power companies accounted for only 3% of the total solar PV power installed in the EU – partly explained by the fact that residential and commercial rooftop installations represent about 60% of the total capacity – and 27% in the case of onshore wind power. Offshore wind power is currently a niche sector with high capex, long-term returns, and technological complexity. This is a sector where the Top-20 power companies perform the best, with a dominant position of 55% of EU-wide installed capacity.

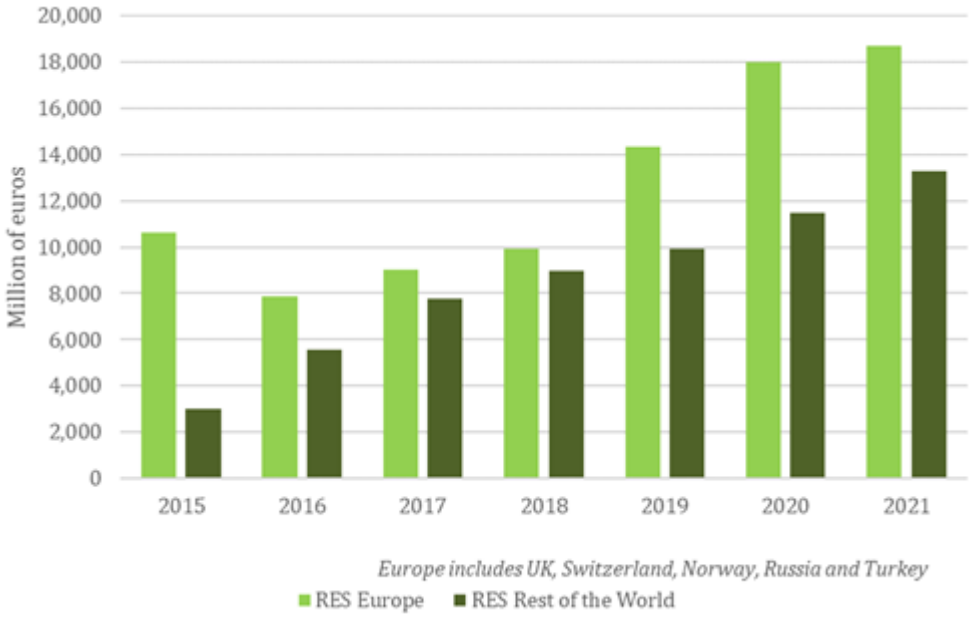
Figure 10. Share of installed capacity in solar, wind and hydro power by EU Top-20 power utilities, 2015 and 2021 in the EU



Source: Ifri estimates based on Eurostat and Utilities' annual and quarterly reports.

A key element to understanding this outcome is the geographical investment strategy on RES developed by the EU Top-20 power companies between 2015 and 2021. This research shows that they have multiplied their annual investments in RES outside of Europe by a factor of 4, notably Enel, EDF, Engie, Iberdrola and EDP, with 40% of their total wind and solar power installed capacity by 2021 being outside Europe. This trend is more predominant among the biggest utilities, which have focused their expansion on the Americas, where the utilities expanded through acquisitions of hydropower plants in Latin America, and the development of solar and wind projects in the United States and key markets such as Brazil, Chile, Peru and Mexico. Reasons for this surge include: regulatory uncertainties in the EU, high growth and return perspectives in non-EU-markets following the 2009 crises when electricity demand was rising and wind and solar conditions were exceptional, the support from multilateral banks, the development of efficient local equipment manufacturing industries, and the overall objective of diversifying activities into other regions of the world.

Figure 11. Investment in RES in Europe and abroad by the EU Top-20 power utilities



Source: Ifri estimates based on Eurostat and Utilities' annual and quarterly reports.

Between 2015 and 2018, investment in RES by the EU Top-20 power companies stagnated in Europe, reaching record lows in 2016, and not recovering until 2019. These four years of investment stagnation seem to highlight the lack of attractiveness of the European regulatory and market framework, characterized by: low wholesale prices with slower economic growth, low carbon prices, low gas prices, limited ambitions by Member States, limited shareholder pressure, regulatory uncertainty (such as in Spain, or Germany). In short, there have been few incentives in place. With the 2020s starting, however, more planets seem to be aligning: a coming end to the over-generation capacity in Europe, high carbon prices, clear and ambitious targets, lower cost technologies, a mature financial sector and a strong appetite for corporate power purchase agreements (PPAs), all of which are game changers. Investment in RES has picked up again, a clear sign that technologies are ripe, that the sector is financially attractive and that these technologies are of strategic importance.

Yet at a time when massive investments are needed in the Europe, there are also massive and attractive opportunities beyond, in North Africa, the Middle East, the US, South Africa, Taiwan and Japan to name a few. Moreover, Norway, part of the European Economic Area, will most likely see soaring deployment for offshore wind after 2030, and possibly already in the 2025-2030 period should electricity demand ramp up, hydro availability become increasingly volatile and export through cables resume. Lastly, the EU is to import large volumes of hydrogen and derived products

by 2030, suggesting that even more RES investments will have to be delivered outside Europe, as not all will come from gas combined with carbon capture and storage. Yet the very same Top-20 power utilities, alongside the energy majors, would also be involved in investing in many of these green hydrogen projects abroad, in partnerships with local companies, which may further put their ability to realize these numerous projects at strain.

The Road to 2030: Delivering on EU-Based Investments while Finally Phasing out Coal

The EU Top-20 power utilities are expected to boost their investment in RES in the next eight years, following years of low investment in this segment. The Top-20 companies analyzed here have established combined objectives of reaching 630 GW of RES installed worldwide by 2030, which implies almost tripling capacity installed annually over the last five years: i.e., shifting from 14 GW/year to 39 GW/year.

According to plans published, utilities expect to develop solar PV power on a massive scale, with agreed targets of reaching some 120 GW by 2030, up from 20 GW in 2021 or 2 GW in 2015. This is a seismic shift in a sector historically dominated by small, highly specialized developers, and a clear sign that solar power is becoming strategic in size.

So far, EU Top-20 power utilities have focused their solar PV expansion outside Europe, in less mature markets with world-class solar resources and more opportunities to develop large-scale projects. Their presence in onshore wind will grow steadily, while offshore wind power, in Europe, the United States and Asia, is expected to be one of the main drivers of growth for Iberdrola, EDF, Enel and Engie. Companies that have grown by specializing in offshore wind power, such as Ørsted and Vattenfall, expect to continue maintaining their leadership in the segment – unless their ability to attract capital is diminished, compared to companies with more diversified portfolios. It is also noteworthy that former coal companies such as RWE and PGE have aggressive expansion plans.

Utility-scale batteries could also be a key market for EU Top-20 power companies that may benefit from their expertise in market functioning and trading units to integrate storage technologies in their new greenfield solar and brownfield onshore wind plants. With Germany being the fastest growing market in utility scale and domestic batteries, RWE and EnBW aim to become European leaders by 2030. Equally, EU power companies have announced aggressive strategies to deploy low-carbon hydrogen with differentiated approaches: Iberdrola and Enel are betting on green-hydrogen; EDF has published a hybrid strategy based on nuclear and renewables, while RWE is planning investment in blue hydrogen, combining fossil fuels and carbon capture.

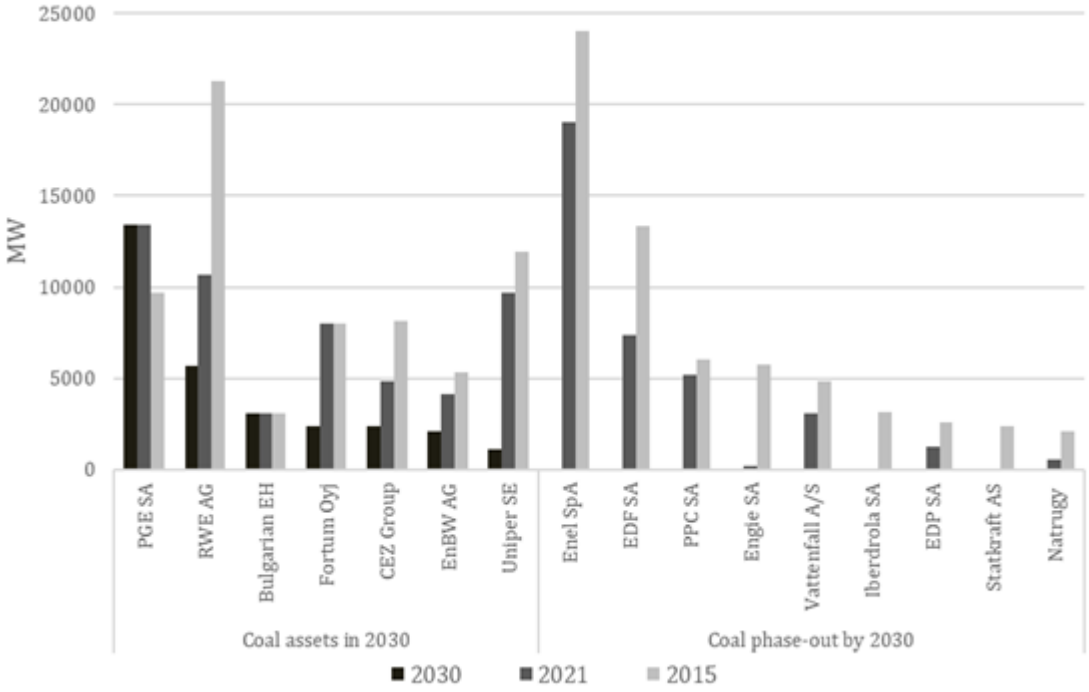
This new strategic focus on RES also comes as these companies have already reduced their installed coal capacity – down by -62% between 2015-2021. This reduction was driven mostly by permanent closures but often through asset transfers to non-listed companies exposed to fewer ESG reporting rules, as is the case of the Czech EPH holding, which since 2014 has acquired 7 GW of coal assets from power utilities.[4] Voluntary phase outs will remove most of the coal-fired capacity by 2030, leaving only six utilities left with coal assets then, a number that would drop if the accelerated coal phase out in Germany is materialized in 2030. In fact, Germany's RWE and Uniper will need to deal with early closures of coal-fired generation plants that were recently commissioned, which triggers the issue of financial compensation.

While the phase out of coal is highly likely in most of Western Europe by 2030, in spite of some Member States pushing back exit targets due to the war in Ukraine and its impacts on energy markets (in France, Greece, Italy and Spain), perspectives differ in Central and Eastern Europe. Public utilities with integrated mining activities are the most reluctant to phase out coal in the medium term, as is the case of PGE, CEZ Group, Bulgarian Energy Holding and the Romanian Complexul Energetic, demonstrating the importance to integrate socioeconomic factors into the EU energy transition. These public utilities will own the main coal assets beyond 2030, with expected coal phase out dates for Romania in 2032, Czech Republic in 2033, Bulgaria in 2038 and Poland in 2049. In 2022, PGE will transfer all its coal generation assets into a new public utility called NABE, a process that is being considered by other utilities.[5] This process could further accelerate the decarbonization of EU Top-20 power utilities, but with no real effect on overall EU emissions. Indeed, in 2021, electricity production from coal in the EU increased by 18% due to record natural gas prices, a persistent drought in Southern Europe and anomalous wind power production in the North Sea. The geopolitical crisis resulting from the Russian invasion of Ukraine may reduce the political and social pressure on coal in the short-term, improving the economic prospects of a generator fleet that has been under-utilized in recent years, and extending its operating life. The evolution of carbon prices, and coal markets, will also determine the financial viability of coal assets which were struggling to remain competitive under the higher carbon prices (while becoming profitable again with the soaring wholesale prices).

4. F. Černoch, J. Osička and S. Mariňák, "The 'Coal Villain' of the European Union? Path Dependence, Profiteering and the Role of the Energetický a průmyslový Holding (EPH) Company in the Energy Transition," Energy Research & Social Science, Vol. 76, 2021, available at: https://doi.org.

5. A. Easton "Poland to Buy Coal Assets from Utilities, Create State Energy Company in 2022", SP Global, April 2021, available at: www.spglobal.com.

Figure 12. Installed coal-fired capacity in 2015, 2021 and expected capacity in 2030, by a selection of EU utilities

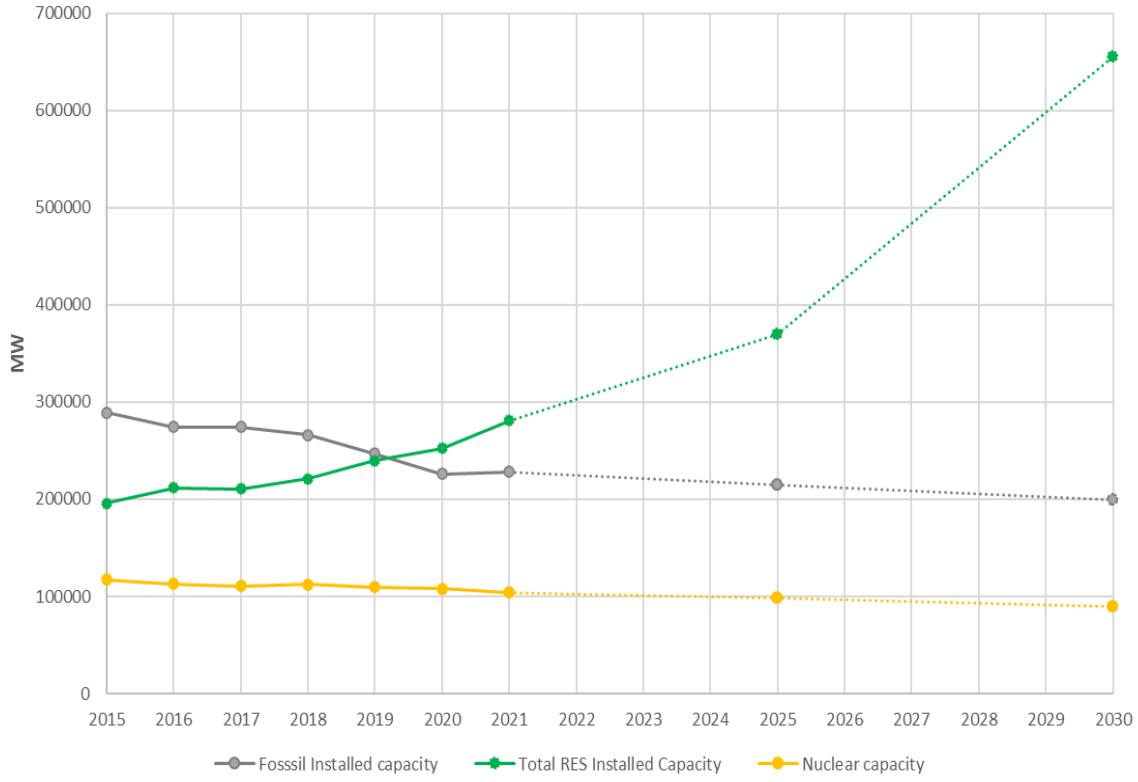


Source: Ifri estimates based on Eurostat and Utilities' annual and quarterly reports.

Against this backdrop, the future of gas capacity and its utilization remain uncertain. European power markets will have to remunerate adequately thermal assets, mostly natural gas CCGT plants, that will ultimately run less and less hours, but will still play a critical role, in spite of soaring gas and carbon prices. European power utilities are designing plans to reduce the carbon intensity of their natural gas fleets, including the blending of low carbon gases; hydrogen/ammonia and/or biomethane, integrating carbon capture systems and increasing efficiency to its technical maximum.[6] Natural gas assets are one of the missing points in many of the utilities' decarbonization strategies. While natural gas power generation is likely to remain significant in the EU power systems, its decarbonization options and price stability are not so straightforward. Overall, Germany's plans to develop up to 25 GW of additional gas-fired power generation look unrealistic, especially in the event of a brutal termination of Russian gas supplies. Hence, it remains to be seen what business models conducive to investments into flexibility will be secured in a European electricity system with much more intermittent generation: interconnections will matter increasingly, but not be enough and storage and demand-response solutions will have to be developed.

6. S. Cornot-Gandolphe, "Un nouvel élan pour le captage, stockage et utilisation du carbone (CCUS) en Europe", *Études de l'Ifri*, Ifri, September 2021, available at: www.ifri.org.

Figure 13. Evolution of the global power generation fleet for the EU Top-20 power utilities in 2015-2021, and expected installed capacity in 2030 (MW)



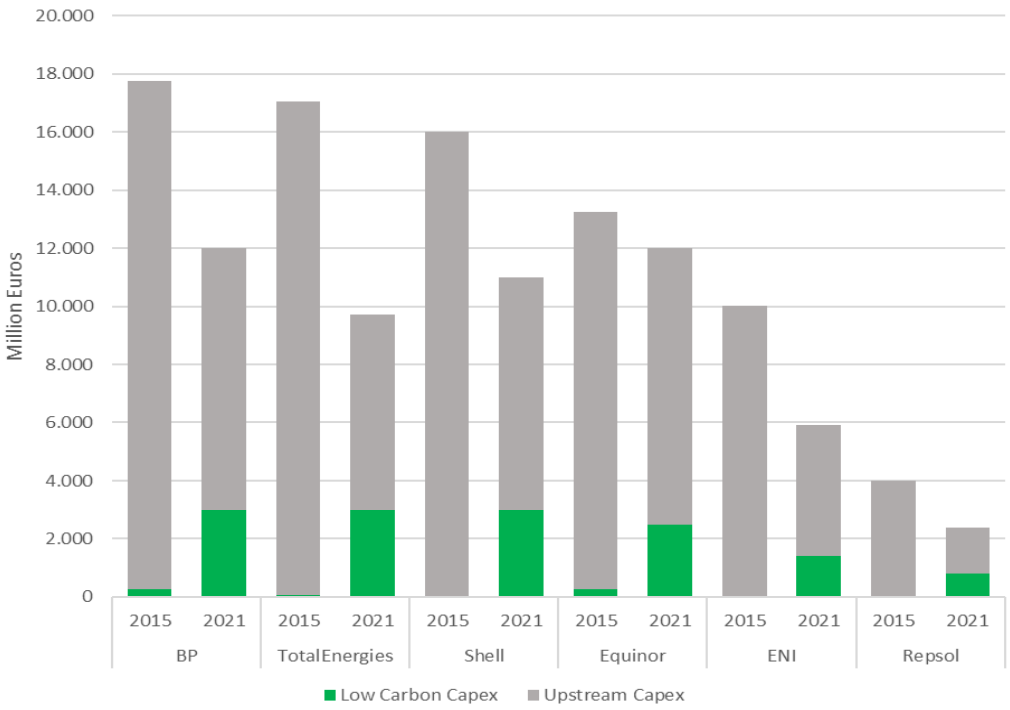
Source: Ifri estimates based on annual and quarterly reports of the EU Top-20 utilities.

Strategic Shifts by the Energy Majors Are a Game Changer

In 2020, the main European energy majors declared their intentions to become net zero in scope 1 and 2, and for some, even scope 3 emissions by 2050, a turning point for the European energy landscape. During this decade, oil and gas majors are poised to become key players in the electricity sector, with ambitious plans targeting mostly solar and offshore wind power in Europe and the Americas. This will redefine the EU electricity market, bringing new investment muscle and expertise in key areas. More precisely, the oil and gas majors will become direct competitors with EU Top-20 power companies in the same niche sectors in which they have a competitive advantage: large-scale wind and solar projects, notably offshore wind power, and green hydrogen.

A proof of this is the fact that in the 2015-2021 period, the European oil and gas majors ramped up their capital investments in renewables, reaching around 30% of their total capex, with an upstream, cash flow engine, expected to finance the transformation of their assets. Meanwhile, upstream oil & gas capital spending has been halved, partly driven by a low-price environment and lower production costs, but mostly by stakeholders' pressures to reduce carbon intensity. In fact, the current energy prices will test the ability of the energy majors to create value beyond their traditional core businesses through new low-carbon investments, and to stick to their decarbonization pathways while avoiding locking their investment in oil and gas projects with long-lead times. Investors continue to seek clarity regarding emissions reduction in this industry (scope 3), along with a clear strategy for the energy transition. It remains to be seen how energy majors will come to terms with the lower profitability of offshore wind investments compared to oil and gas (unless electricity prices remain high). Yet with rising CO_2 prices and a likely global expansion of CO_2 pricing in the coming decade, shareholder pressure, approaching peak oil demand, and their own decarbonization commitments, the majors have no choice but to strive for leadership in this segment.

Figure 14. Capital expenditure of European energy majors in upstream oil & gas and low-carbon projects, 2015 and 2021



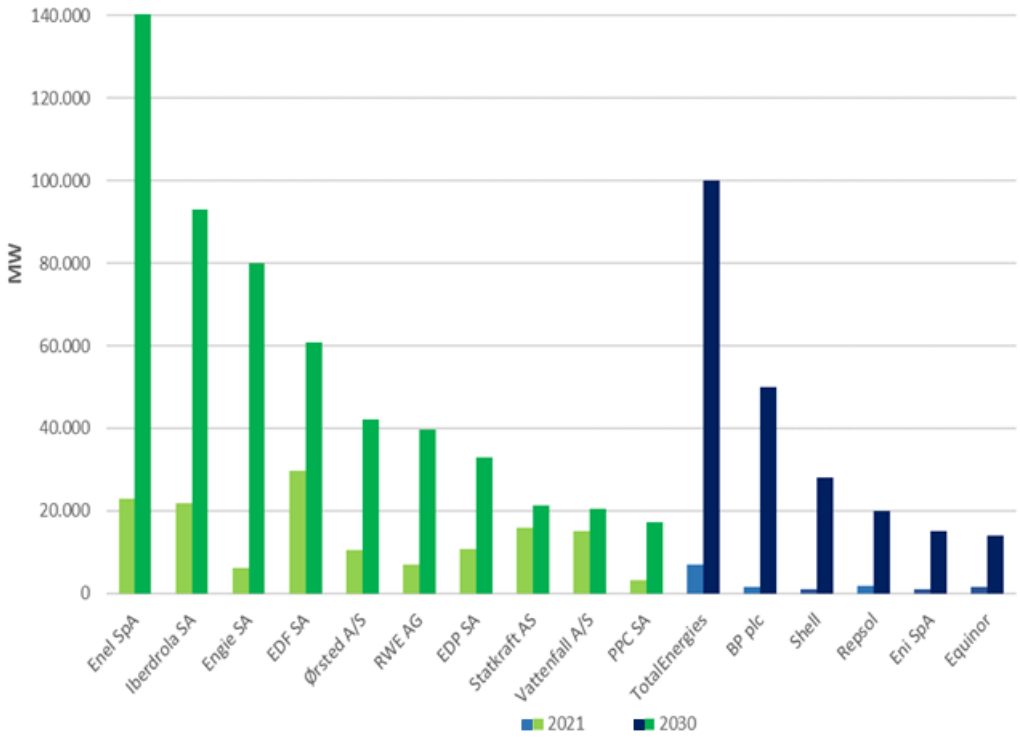
Source: Ifri estimates based on the annual and quarterly reports from European energy majors.

By 2030, the European energy majors are expected to become multi-energy companies with a significant market share of EU low-carbon power generation. Their contribution will be essential to achieving the REDII targets. At first, their expansion in the renewables sector is expected to focus on large-scale projects in which their experience and human skills can bring some competitive advantage, such as offshore wind power and low-carbon hydrogen. The high capex, long-term returns, and technological challenges of these projects will be the main barriers of entry for independent and small players. The oil and gas sector has a long history of cooperation and alliances to mitigate risks and maximize technical capabilities, and interesting alliances have emerged, such as those recently announced by Iberdrola-Shell and Ørsted-Repsol for the development of offshore wind power. These energy majors in the making are stronger than ever, with huge cash stockpiles from soaring oil and gas profits, which boost their investment capacities.

These large actors can play a key role for decarbonizing the petrochemical, steel and cement sectors, which will require a substantial amount of decarbonized electricity for direct use, or for hydrogen production. They will also further invest in other key technologies such as carbon capture, advanced mobility solutions such as car sharing and rapid-charging stations, as well as electricity storage and hydrogen solutions,

although the value creation of these investments is yet to be proven. This capital-intensive growth will compete directly with their need to maintain their payouts to investors, primarily through dividends, but also via buybacks, and it will require consistency and credibility. If conducted appropriately, the energy majors will very likely end this decade with a very diversified portfolio that will allow them to navigate the expected volatility of their traditional core upstream and downstream assets. However, this transition will not be painless, considering the challenges ahead for the refining industry in Europe, expected reskilling issues, the increasing costs of oil and gas projects when high prices may also ease again, and lower returns of renewable projects.

Figure 15. Selection of EU Top-20 power utilities and energy majors' expected installed RES capacity, 2021 and 2030 (per their global plans)



Note: Estimations for Iberdrola, EDP and Shell based on their 2025 targets.

Source: Ifri estimates based on annual and quarterly reports from utilities and energy majors.

Amidst Opportunities, the Market Environment Is Full of Uncertainties, while the Fall in Costs is Over

The renewables market is now largely mature, with many large players in competition for the large, capital intensive and cutting edge projects, as deployment costs have fallen spectacularly over the past years. Contracts for difference have replaced feed-in tariffs for solar and wind power, and there has been a rise in projects developed without state support. Developers have been able to deploy cash from their own balance sheets or raise capital from banks (typically for 10 to 17 years with some reluctance for long term finance due to Basel 4 rules), as well as from insurance or reinsurance companies for longer term finance.[7]

Overall, a fundamental challenge has been the low rate of return from renewable projects which have become very secure investments, and the beginning of a new era in the industry, as costs rise again. There are growing uncertainties about inflation, volatility in metal prices (notably for copper and the much needed cables and grids), rising cement costs, low availability of offshore materials such as specialized ships, supply chain bottlenecks aggravated by the situation in China, land-lease or acquisition costs, and policy regulation, all of which add to the already strong problems in the market, due to long development lead times and administrative barriers. Average returns are on a downward trajectory for offshore wind power for example, falling from 5-8% to 4-8%[8], with 4-5% being the rule according to various market participants interviewed – and quite uncertain adjustment trajectories forthcoming.

On the one hand, much higher wholesale prices offer greater return prospects for projects without support schemes (which have contracts for difference typically below €50/MWh for wind for example), but on the other hand, risks and development costs are rising too. Overall, the era of falling deployment costs is over. In addition, grid connection costs are also expected to increase due to inflationary pressures.

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7. Following Basel 4 rules, the EC has allowed insurance and reinsurance companies to provide longer term loans in order to cover that gap in the market. For this reason, there is a growing trend of reinsurance companies financing large infrastructure projects, some at fixed rate (like MunichRE for example). Investment funds have entered the equity segment.

8. See for example: Equinor, “2022 Capital Markets Update”, available at: www.equinor.com.

Demand for corporate PPAs is booming, with prices going up by 27% since the start of 2022 on an annual basis according to one tracker, close to €65/MWh for wind on average and to €50/MWh for solar[9], and as industry sources confirmed, the trend is going upwards, with several deals in the range of €70-80/MWh in Europe. This offers another opportunity for the RES industry, by providing visibility about the financial viability of projects and helping secure their funding. The development of a strong market for PPAs, both physical and financial, has been important, largely tied to wind projects. Spain is currently the leading country in its development (about 1/3 of the market), mainly due to the obligation to include 10% of the consumption of the electro-intensive players under PPAs and the possibility of combining them with public subsidies. While corporate PPAs will rise notably in France or Italy, PPAs open to wider consumers will also develop. It is very likely that the development of PPAs in the rest of Europe will be made more flexible and encouraged, notably via guarantee funds, now that energy costs pose a real risk for energy-intensive industries, whose decarbonization is essential to compete under the umbrella of the EU ETS system.[10] Industries now seek not only to source low carbon electricity, but look decisively for stable and predictable supply costs.

Companies with strong and large balance sheet financing are well placed to succeed in these uncertain times, as are those with a proven ability to develop synergies, create economies of scale and optimize the design, operation and maintenance of their assets. Other opportunities to improve the rate of return will come from the optimization of project design, operation and maintenance using data and artificial intelligence.

For onshore and offshore wind power, a clear challenge comes from the growing pressure on the supply chain industries, with Vestas, Siemens Gamesa and GE seeing booming orders and huge growth prospects, though profits are not following suit. This is explained by pressure from project developpers to squeeze prices, turbine makers' own price cuts to amortize their production capacities and the need to always improve performance with very little time to amortize R&D costs, as the technology is changing fast. The companies have largely contributed to the success of the wind deployment in Europe so far as their equipment has always become more cost-performant. Another explanation is the large increase in steel supply costs for example, which cannot necessarily be passed on to developers that signed contracts before present crises. Financially-weak equipment suppliers or a further consolidation in this segment will not help meet the 2030 targets: hence the need to foster, for example, the valuation of local production and ESG criteria in tenders. A tougher "bidding war" would be

9. LevelTen Corporate PPA Price Index, Q1 2022, available at: www.leveltenenergy.com.
10. C. Mathieu, "The EU's Carbon Border Adjustment Mechanism: A Piece in the Industry Decarbonization Puzzle", *Briefings de l'Ifri*, Ifri, March 9, 2022, available at: www.ifri.org; S. Nies, "The EU's Plan to Scale Up Renewables by 2030: Implications for the Power System", *op. cit.*

detrimental to the sector, as it might squeeze supply chains further, hence the need to ramp up the pipeline of large projects and to develop long-term predictable development plans. Providing cheap credits for project equipment manufacturers to expand their European operations could also be an option.

The Key Role of European and National Policy-Makers to Unleash RES Investments

The EU's Fit-for-55 package implies a turning point for the energy sector, and all forces are ready to be thrown into the investment and deployment battle: power utilities, energy majors, independent producers and project developers, investment funds, banks and citizens. There is in fact room for everyone, given the scale of the capacity additions required by the new EU targets. Yet this huge war-type effort will only be possible if policy-makers create the right conditions to develop attractive financing mechanisms, fast project developments and strong legal guarantees. Against this backdrop, the 2013-2018 period must also be analyzed to learn the lessons for everything that needs to be fixed in an emergency, in order to unleash these investments. As when solar power deployment collapsed due to poor regulation in several key markets, every year lost puts meeting the targets at risk. Furthermore, the annual drop in installed capacity of offshore wind power after 2015 demonstrates that linear growth should not be taken for granted and that public policies should guarantee a stable framework in the long term. Investor confidence should be central as EU policymakers seek to adjust the electricity market rules and control the influence of gas in the electricity price setting mechanism.

While technologies are now more mature and competitive than ever before, and while even floating offshore wind will most likely experience a similar cost decrease as seen with fixed bottom wind, times are also incredibly difficult for the renewable industries: supply chain and logistics challenges, inflation, and rising equipment costs make developments more complicated and costly. Some are addressed in contracts which can have indexation clauses, but risks and uncertainties are growing. Decisive action is required on the following fronts:

- Longer term coordinated planning and large land allocations: this is particularly important for maritime areas, where larger zones must be defined, often in coordination with neighboring countries. This is critical for investors to have predictability and to be able to plan for industrial local content and economies of scale & synergies in the project design. This also matters decisively for optimizing very expensive grid planning and development.

- Administrative simplifications: permit granting must be accelerated, as requested by the REDIII proposals, as time lags mean higher costs and less projects. There needs to be real benchmarking in place, and a permanent review of improvements, as this issue becomes critical. The ministries and various agencies dealing with renewables must be provided with adequate human resources to facilitate and accelerate planning, validation, public debates and decision-making.
- Public acceptance: this is a critical issue in many countries, and can be addressed with standardized concertation procedures and inclusive processes, the financial involvement of local communities, a stronger focus on local jobs and content creation via the non-price criteria in tenders, and by political representatives clarifying that these infrastructures are of strategic importance.
- Regulatory predictability: the electricity market design & ETS reforms must guarantee the system remains market driven and generates sufficient revenue certainty for investors in generating new assets and flexibility solutions.
- Skills and manpower: deploying 600 GW of capacity will require generating hundreds of thousands of new jobs with the required skills, spread all across Europe. This job growth is essential at a time when jobs in the automotive or steel industries are decreasing. This relates to education but also to reskilling. In a recent survey of utility managers, 85% of respondents recognized that the ability to reskill their workers quickly was crucial to their success over the next three years. Yet only 57% agree their organization had a robust plan to achieve such reskilling, with problems being more acute in critical skills like digitization.[11]
- Securing supply chains: the EU should accelerate efforts to re-establish a meaningful solar PV manufacturing capacity and boosting support to the scale up of innovation in this field, while taking urgent steps to secure access to critical raw and processed materials in an increasingly tight global market dominated by non-EU stakeholders. In addition to mobilizing public funds to leverage private investments, the EU should create a level playing-field between EU-made and imported PV products, by mainstream mandatory carbon footprint disclosures for larger tenders, as introduced in France. Likewise, tougher requirements for the recycling of wind turbine blades should be progressively introduced into tenders, so that the problem is fixed by 2030. Last but not least, Member States need to ensure the entire value chain is aligned, notably for offshore wind power, where new port infrastructures for service vessels, for example, will have to be developed.

11. "If Tech Powers the Future, Who Powers the Tech? Power and Utilities Digital Transformation and the Workforce Survey", EY, February 2021, available at: https://assets.ey.com.

- Ending ideological approaches: as the EU aims to accelerate its decarbonization process and build resilience with low carbon technologies as the war is raging in Ukraine, the time for discussions has run out on whether one needs renewables only, renewables and natural gas, renewables versus nuclear, and whether these technologies should be banned altogether, as they harm landscapes and biodiversity. To succeed in meeting the 2030 targets and to ensure EU's energy and economic security, all low carbon technologies are needed, and the key discussion should be how to organize an efficient system integration on the one hand, and how to ensure long term investments into low carbon flexibility solutions on the other.

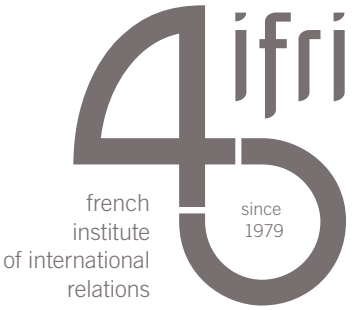
Conclusion

With European power sector companies and energy majors preparing to step up their game, chances to meet the super-ambitious 2030 targets are improving, provided these investments are effectively realized in Europe and supply chain concerns can be addressed.

The entire eco-system must be urgently aligned and coordinated to facilitate investments and accelerate deployment rates. The unprecedented mobilization must be paired with major investments in grids, as well as demand and supply-side flexibility solutions for the short, medium and longer term. Addressing electricity market design failures in times of soaring gas prices, developing market and regulatory incentives to deploy these solutions at scale and facilitating project delivery will be key to securing investor confidence and ensuring the European market is sufficiently attractive, compared to other investment locations.

In terms of technologies, the new frontier will be floating offshore wind power, with Equinor, Shell and TotalEnergies notably being frontrunners, and a large potential in the Atlantic, Mediterranean and North Sea. High deployment costs are set to decrease as scale and trust in the technology develop. At the same time, the solar PV industry will move to both large, utility-scale projects and more decentralized solutions (a boom in rooftop solar is expected). Prospects risk being challenged by the dependence on Chinese-made equipment and the related issues of carbon footprints, supply chain resilience and forced labour concerns. Introducing ESG footprint criteria could be a good tool to boost a large, new solar industry in the EU (possibly also with Chinese investment, if realized per EU norms and rules), that will concentrate on the most advanced technologies.

While the EU-Top 20 power generation companies, and the energy majors, now have a critical role to play, so too have policy-makers. Some of the most urgent requirements involve: accompanying the rise of floating offshore wind power; a new European solar industry; facilitating repowering operations; accelerating procedures and keeping objectives steady. Lastly, citizens must be made fully part of this mission which is overwhelming, but not impossible.



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