The European Strategy for the Green Transition

8. Promoting the EU's Approach to Sustainable Infrastructure at the Global Level

8.1 The European Strategy for the Green Transition

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The European Union plans to become a carbon-neutral economy by 2050, in line with its commitments to global climate action under the Paris Agreement.[1] This strategy is known as the European Green Deal,[2] and in addition to reaching net-zero emissions it aims at ensuring that economic growth is decoupled from the use of resources. The complexity of this challenge requires a contribution from all the sectors of the economy, and multiple solutions will be needed to achieve this long-term objective. The deployment of low-carbon technologies will need to be backed by energy efficiency measures, in addition to actions focused on final energy consumption, targeting users' behaviour and demand management. In parallel to these environmental goals, which are at the heart of the European Green Deal, the EU is also

[1] European Commission, Climate Action, "2050 long-term strategy".

[2] European Commission, "A European Green Deal. Striving to be the first climate-neutral continent".

strongly pushing for a just transition, ensuring that all citizens are provided with an equitable access to energy and mobility, and that no one is left behind in the process. The European Green Deal aims at supporting the EU in becoming the first climate-neutral bloc in the world by 2050. In addition to climate action, it also includes other policy areas: clean energy, eliminating pollution, sustainable industry, mobility and agriculture, building and renovating, from farm to fork and biodiversity.[3]

The European Green Deal was presented by the European Commission's (EC) newly appointed President Ursula von der Leyen in December 2019, but in the months that followed the Covid-19 pandemic hit European countries hard, diminishing interest in the plan in light of the pressing need to support the EU economies hurt by the pandemic. However, a large majority of countries supported a combination of measures to couple support for economic recovery with the fight against climate change. In July 2020, the European Council agreed on a massive EU recovery fund of €750 billion, to support Member States in reacting to the economic and social damage caused by the Covid-19 pandemic.[4] This stimulus, named NextGenerationEU, also aims at supporting EU countries in their shift towards more sustainable and resilient economies and societies, thanks to the deployment of clean energy and digital technologies. The core of the NextGenerationEU is the Recovery and Resilience Facility,[5] an instrument that will allow Member States to access €672.5 billion in loans and grants that will be used to support reforms and investments after the approval of national recovery and resilience plans. Each plan will have to include at least 37% of expenditure on climate investments and reforms, and a minimum of 20% of expenditure to foster the digital transition.

Finally, a specific strategy has been developed for the transport sector. The transport sector is responsible for a quarter of CO_2

[3] Ibid.: Policy areas.

[4] European Commission, "Recovery Plan for Europe".

[5] European Commission, "The Recovery and Resilience Facility".

emissions in the EU, and it represents the only sector where emissions have regularly increased in recent decades. In 2020, the European Commission launched its European Sustainable and Smart Mobility Strategy,[6] with 82 initiatives in 10 key areas, and proposing a number of specific milestones between 2030 and 2050 related to various transport segments and modes. These milestones include at least 30 million zero-emission cars on European roads by 2030 (in addition to a large-scale deployment of autonomous vehicles), and a carbon-neutral short-haul collective travel by the same year. Zero-emission market ready technologies are expected by 2030 for marine transport and by 2035 for large aircrafts. By 2050, in addition to expecting almost all road transport to be zero-emission, the strategy explicitly mentions "a fully operational, multimodal Trans-European Transport Network (TEN-T) for sustainable and smart transport with high-speed connectivity".

Infrastructures, Industry and Technologies

The path towards a low-carbon society requires a systemic approach, encompassing energy generation, conversion, transmission and distribution, as well as final energy consumption in industries, buildings and transportation. The deployment of clean technologies, in addition to a strategic development of the relevant supply chains, will also require new infrastructures and upgrading and improving existing ones. A key element of the EU decarbonisation strategy is a massive upscale of low-carbon renewable-based electricity generation combined with a strong increase in the electrification of all final sectors.

Many EU countries have already invested in significant deployments of renewable power generation, mostly in solar

[6] European Commission, Mobility and Transport, Mobility Strategy, "A fundamental transport transformation: Commission presents its plan for green, smart and affordable mobility".

and wind power. As of 2019, EU-27[7] member countries have a wind power capacity of 167 GW (up from 71 GW in 2009) and a solar power capacity of 120 GW (up from 17 GW in 2009).[8] However, if the EU is to reach its decarbonisation targets, both sources still need to show additional upscaling in the coming decades. According to the ENTSOs[9] EU scenarios,[10] total wind power will need to reach 390-400 GW by 2030 and 530-610 GW by 2040 (of which 80-140 GW offshore wind, up from 12 GW in 2019). Solar power deployment will also need to continue at a strong pace, reaching 270-410 GW by 2030 and 400-685 GW by 2040, depending on the scenarios. In addition, other low-carbon sources for power generation will also need to play an important role, including hydro, bioenergy, geothermal and fossil-based plants equipped with carbon capture and storage (CCS). An additional contribution could come from nuclear power in some countries, though the overall role of nuclear in the EU is still unclear in the long-term, mainly due to different and potentially changing strategies and opinions in Member Countries. Indeed, the energy mix is a prerogative of Member Countries.

Electricity from renewables, renewable gas (either via bio-methane or synthetic methane produced from electrolysis) and decarbonised gas (hydrogen produced via pre- or post-combustion carbon capture and storage from natural gas) may all play a role in a future low-carbon energy system.

Over the next decades, the EU could also benefit from harvesting the huge and still untapped offshore wind potential available

[7] EU-27 refers to the EU without the UK which had left the Union on the 31st of January 2020.

[8] Eurostat data: https://ec.europa.eu/eurostat/data/database.

[9] ENTSOs is the combination of both ENTSO-E and ENTSO-G, respectively the association of European electricity and natural gas transmission system operators. In the framework of their last Ten-Year Network Development Plans, which have been developed jointly in 2020, ENTSO-E and ENTSOG have defined two top-down future scenarios that are consistent with the efforts of the EU-27 to reduce emissions to net- zero by 2050.

[10] Entsog Entsoe, *TYNDP 2020 Scenario Report*, June 2020.

in Northern Europe. The European Union has an enormous deep offshore potential, with high-quality winds in the North Seas, which includes the North Sea, the Baltic Sea and the Irish Sea. According to a 2019 study[11] by the International Energy Agency, the EU offshore holds the potential to satisfy 11 times the present EU electricity demand.

The availability of high-quality energy transmission networks (electricity, gas, hydrogen) is of paramount importance to optimise the matching between energy generation and energy consumption, together with the development of smart and digital solutions and energy storage options. In addition, and specifically for electricity networks, distribution grids need to be upgraded to guarantee the flexibility and capacity required by additional power demand in final sectors. Specifically to support electric mobility and the increase of electric vehicle shares, a wide deployment of public charging infrastructure will be required, especially in dense urban environments. Some consumer groups, environmentalists and carmakers argue that the EU should reach 1 million public EV chargers by 2024, and 3 million by 2029,[12] up from the existing 225,000 charging points as of 2020.[13]

The final step of this strategy is the support towards higher electrification rates of final uses. The most significant applications are building heating, via heat pumps, and electric mobility. This will require dedicated policy support towards new technologies, which are not yet competitive with fossil-based solutions in most countries. Policies that are able to quantify and internalise the cost of environmental impacts and externalities, such as the EU Emissions Trading System

[11] International Energy Agency (IEA), Data and Statistics, *Global Offshore Wind Outlook*, 2019.

[12] "EU should target 1m EV public chargers by 2024, say carmakers, environmentalists and consumer groups", *Transport and Environment*, 10 February 2021.

[13] European Alternative Fuels Observatory

(ETS),[14] are of paramount importance in this process. And so are policies that are able to support citizens in shifting towards cleaner technologies, by limiting inequality and energy poverty.

However, to reach full decarbonisation, some sectors will not be easy to electrify. Therefore, other solutions are required, including hydrogen or CCS. This will be particularly true for industries that require very high-temperature heat, and some transport segments such as shipping and aviation, where the current and expected energy densities provided by electric batteries will not be enough to meet the required level of performance.

In addition to deploying infrastructure for energy generation, transmission and final consumption, the EU is also developing strategies and specific industrial policies to develop and improve some of the key industrial sectors required for a low carbon transition. EU industrial policies include actions targeted towards key sectors for the energy transition, including the Raw Materials Alliance, the Battery Alliance and the Clean Hydrogen Alliance. These strategies have the objective of facilitating interactions between different stakeholders in EU countries and supporting the development of competitive supply chains in sectors that are crucial for the energy transition. This takes into account security-of-supply considerations for certain critical components needed for the energy transition, and economic considerations including domestic job creation. In some cases, such as for electric batteries, the EU aims at becoming one of the world leaders in sustainable manufacturing and use of such a key enabling technology.

Finally, it is important to remember the roles of energy efficiency and energy demand management. Developing a sustainable and decarbonised energy system is not only a matter of technological shift; it also needs to involve a new paradigm of energy consumption, which must aim at reducing demand and increasing efficiency. Such a new paradigm will require non-technical actions that affect regulations, energy markets as well

[14] European Commission, "EU Emissions Trading System (EU ETS)".

as citizens education and behaviours. As demonstrated in some EU countries (e.g. the yellow vests – *gilets jaunes* – movement in France), it is important that the different strata of citizens are actively involved in such a challenging transition, to ensure an effective, equitable and just energy transition and to ensure that no one feels left behind.

Geopolitical Implications

The European Green Deal also encompasses relevant geopolitical dimensions. Due to its global scope, energy has always gone hand in hand with international relations. The ultimate EU goal to become the first climate-neutral continent by mid-century will impact the EU's energy dependence, which currently relies on oil and gas imports (mainly from Russia, North Africa and – to a minor degree – some Middle Eastern countries). Due to limited availability of domestic hydrocarbons, the EU has historically relied on energy imports, significantly shaping its energy security concerns. Today, the EU imports 87% of the oil and 74% of the natural gas it consumes.[15] The biggest energy security concerns are related to natural gas, notably *vis-à-vis* Russia, which represents the bulk of EU gas imports, mainly through pipelines. In contrast, Norwegian energy imports, though not negligible, are not considered problematic from a security of supply perspective. Gas trade relies very heavily on the availability of transport infrastructure, the control of which yields power. While oil is a truly global market, in Europe gas is mainly a regional market based largely on pipelines from Russia, Norway, Algeria, Libya and Azerbaijan. Only recently, thanks to the combination of the establishment of a functioning and interconnected internal European gas market, and of the large scale development of a global LNG trade, which allows

[15] M. Leonard, J. Pisani-Ferry, J. Shapiro, S. Tagliapietra, and G. Wolf, *The geopolitics of the European Green Deal*, Bruegel and European Council on Foreign Relation, Policy Contribution, no. 4/21, February 2021.

gas to slowly becoming more globally interconnected, has the European security of supply risk related to gas declined.

With the implementation of the European Green Deal, the nature of the EU's energy interdependence will progressively undergo important changes. In the medium term the EU may need to increase gas imports to meet its energy demand because of the implementation of climate policies (due to the necessary phasing out of coal-based power generation, which has twice as high CO_2 emissions for each kWh produced) and the reduction of domestic gas production. In the longer term (beyond 2030) the EU fossil fuel demand and, consequently, imports are expected to shrink significantly, affecting its traditional suppliers in North Africa (i.e. Algeria and Libya), Norway and Russia. Compared to those countries, other major oil and gas exporters, such as those in the Middle East, will suffer less from European decarbonisation policies both due to low EU imports from the region and their more diversified export portfolios, in particular to Asian countries, where energy demand (including fossil) is still expected to grow extensively for some time, reflecting expected economic growth rates. The commitment to a higher share of renewables in the EU energy mix serves thus not only the pursuit of carbon neutrality, but also the increase of EU's energy resilience and security of supply.

However, the EU may be exposed to several potential new security concerns over new energy sources and materials. At the domestic level, these include potential instability of the electricity grids as they rely more and more on variable renewable sources, while internationally they may interfere with the supply chains of critical equipment and materials such as rare earth elements (REEs). Indeed, clean energy is not immune to energy and geopolitical (inter)dependence. The European Green Deal will surely reduce European dependence on fossil fuels, but it will amplify European dependence on components for renewable energy, from minerals to manufacturing.

Currently, the EU is between 75% and 100% reliant on imports for most metals essential to clean energy technologies.

For example, China provides 98% of the EU's supply of REEs, Turkey provides 98% of the EU's supply of borate, and South Africa provides 71% of the EU's needs for platinum and an even higher share of the platinum group metals iridium, rhodium, and ruthenium[16]. The EC estimated that for EV batteries and energy storage, the EU would need up to 18 times more lithium and 5 times more cobalt in 2030, and almost 60 times more lithium and 15 times more cobalt in 2050 compared to the present. To address these potential supply issues, the EC launched the European Raw Materials Initiative in 2008. In 2020, the EC outlined the necessity to engage in strategic partnerships with resource-rich third countries to enhance supply diversification, foster recycling processes to reduce dependency on primary critical raw materials, and strengthen domestic sourcing and processing in the EU.[17]

The EU is committed to lead in key sectors of the future low-carbon economy. In March 2020, the EC launched a New Industrial Strategy for Europe, which lays the foundations for an industrial policy that is intended to make EU industry more competitive globally in key sectors and enhance Europe's strategic autonomy.[18] This strategy envisages the use of industrial alliances as a key component for the achievement of the proposed goals. Among great powers, there is a growing competition to become technological and industrial leaders for the energy transition. Currently, China holds a dominant role in the production of low-carbon energy sources: it produces more than 70% of the world's solar modules and it is home to nearly half of the global wind turbine manufacturing capacity.[19]

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[16] European Commission, Brussels, COM(2020) 474 final, "Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability", 3 September 2020.

[17] Ibid.

[18] European Commission, COM(2020) 102 final, "A New Industrial Strategy for Europe", Brussels, 10 March 2020.

[19] "The geopolitics of energy: Out with the old, in with the new?", *forum*, The Oxfrod Institute for Energy Studies, no. 126, February 2021, p.14.

In May 2021, the Commission updated the 2020 EU Industrial Strategy in response to the economic, industrial, energy and geopolitical consequences of the Covid-19 pandemic. The pandemic has explicitly brought to light important European vulnerabilities regarding critical and strategic supply chains. Therefore, the new main theme is the reduction of technological and industrial dependencies from external actors, primarily China. The EU aims at increasing its strategic autonomy through the establishment of new and diversified supply chains, fostering domestic industrial and technological capacity, as well as strengthening its green and digital transitions, mainly within the framework of the Next Generation EU.[20]

Hydrogen illustrates this new, dual essence of energy geopolitics within the global energy transition. The EU seeks to become a leading player in hydrogen to meet its climate targets and it also sees hydrogen as a sector in which to enhance its technological leadership. In July 2020, the EU launched its Hydrogen Strategy, which envisages an important role in the future European energy mix. To support this target, the European Commission foresees massive investments (up to €180-470 billion by 2050) for green hydrogen and a much smaller amount (€3-18 billion) for blue hydrogen, stressing its political priorities. Hydrogen has drawn major political support in Europe both at the continental and national level. The EU is committed to become a technology maker rather than being a technology taker. Its goals for hydrogen are shaped by its painful experience in solar PV manufacturing, which was developed in Europe at high cost only to later move to China.[21]

The EU may encounter some obstacles in producing all its green hydrogen needs, due to limited available renewable energy resources compared to its energy demand and its high

[20] European Commission, Com(2021) 350 final, Communication from the Commission to the European Parliament, The Council, the European Economic and Social Committee and the Committee to the Regions, Brussels, 5 May 2021.
[21] S. Amelang, "Who will be the Hydrogen superpower? The EU or China", *EnergyPost.eu*, 31 August 2020.

population density. From an energy efficiency point of view it makes more sense to use the limited renewable energy potential to fully decarbonise the power sector first, while at the same time importing green (i.e. renewable energy based) hydrogen from better endowed regions. Several EU countries have plans to import green hydrogen produced from cheap renewable energy sources in regions with a very high solar radiation (e.g. the deserts of North Africa and the Middle East). While the EU could in part take advantage of the already existing energy infrastructure from these countries to import cleaner energy sources to meet its ambitious climate and energy targets, there are also plans to build a dedicated infrastructure to reach an import capacity of 40GW of hydrogen to Europe by 2030.[22]

The EU supports the development of clean energy technologies in its Southern and Eastern neighbourhoods. These areas present a favourable renewable potential; for example, North African countries hold significant solar and wind resources. By supporting clean energy technologies in these areas, the EU could meet a multiple objective: achieving collectively and effectively a broader decarbonisation, ensuring cost efficient clean energy imports, and contributing to the socio-economic development of its neighbourhood regions, thus promoting stability and peace as well as limiting migration pressures. At the same time, the EU would also enhance its soft power and geopolitical footprint in these vital neighbourhood areas, which are strategically relevant for European countries and where other extra-EU countries are trying to increase their influence.

The EU is committed to be a leading power in the fight against climate change. However, given the global nature of the threat, the EU needs to engage with other countries in order to affectively achieve its goal. This is why the EU pursues a proactive global "climate diplomacy".

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[22] A. van Wijk and J. Chatzimarkakis, *Green Hydrogen for a European Green Deal A 2x40 GW Initiative*, Brussels, Hydrogen Europe, 2020.

Conclusion

The EU has emerged at the vanguard of global climate and energy policy. Its climate ambition has not been weakened by the unprecedented health and economic crisis; on the contrary, the EU announced a reinforced emissions reduction target of 55% (from 40%) by 2030 below 1990 levels.

The strong political commitment surely represents a major opportunity for the decarbonisation of the European economy and society. The EU and its Member States have focused and aligned their economic stimulus plans to climate and decarbonisation measures. In this sense, the European countries have reiterated their political will to rescue and rebuild their economies to reflect their climate promises. The renewed role of the public sector, on the heels of the Covid-19 crisis, presents a major opportunity to boost such a major transformation. Moreover, the EU is working on the European Climate Law, which sets the target of net zero greenhouse gas emissions by 2050 as a legal obligation for the EU and its Member States. Nonetheless, achieving carbon neutrality by 2050 still requires massive and substantial changes to be implemented. Translating the general political commitment on decarbonisation into actual implementation still faces some challenges. Firstly, energy is a shared competence between the European institutions and Member States. This may slow down the implementation of the necessary policies and actions to reach net zero target because of specific socioeconomic and political considerations at the local level. Some countries, which depend on polluting energy sources for their energy and economic system or simply have different socio-economic priorities, may express their opposition, hindering the overall success. Moreover, some sectors and portions of the population may manifest their discontent towards climate-friendly policies, as already shown in the case of the *Gilets Jaunes* movement in France. Since energy decarbonisation is a policy-driven process, popular turmoil may undermine political commitment.

The ongoing major transformation in the European power

sector represents a successful and encouraging example; however, it is not enough. The EU will need to increase renewable energy sources to replace coal in the next two decades. Moreover, to achieve its climate targets, the EU needs to step up efforts in all sectors, especially in transport and in hard-to-abate sectors. Transport emissions have continuously risen over the last decades, making it important to specifically tackle emissions from this sector, which account of about a third of total EU emissions. However, massive investment is needed to deploy the necessary infrastructure to electrify the transport sector. Furthermore, an additional effort will be essential to decarbonise heavy industry, underpinned by rising carbon prices and development of hydrogen technology. Nevertheless, a surge of EU carbon prices, compatible with decarbonisation pathways, poses a challenge to European industry competitiveness compared to other regions if they do not implement the same kind of carbon pricing. To offset this issue and to pursue a proactive climate diplomacy, the EU is considering the introduction of a carbon border adjustment mechanism (CBAM). However, this option has already encountered (geo)political issues and opposition from major world's economies, with the no exception of Europe's ally, the US, which considers a carbon tax as a last resort.

The European Green Deal represents an opportunity for the EU to enhance its geopolitical role in the energy transition. EU Commission President von der Leyen expressed her ambition to lead a "geopolitical Commission", and climate certainly represents an opportunity in this sense. With the US and China also aspiring to become the leading global powers in the energy transition and in key economic, technological and industrial sectors of the low-carbon economy, the competition in developing low carbon technologies and to access and control critical mineral resources needed for the energy transition may create new rivalries among global powers.

The EU will need to step up its climate diplomacy efforts if it is to succeed in bringing other major economic powers and the rest of the world along a cooperative and mutually beneficial decarbonisation path.