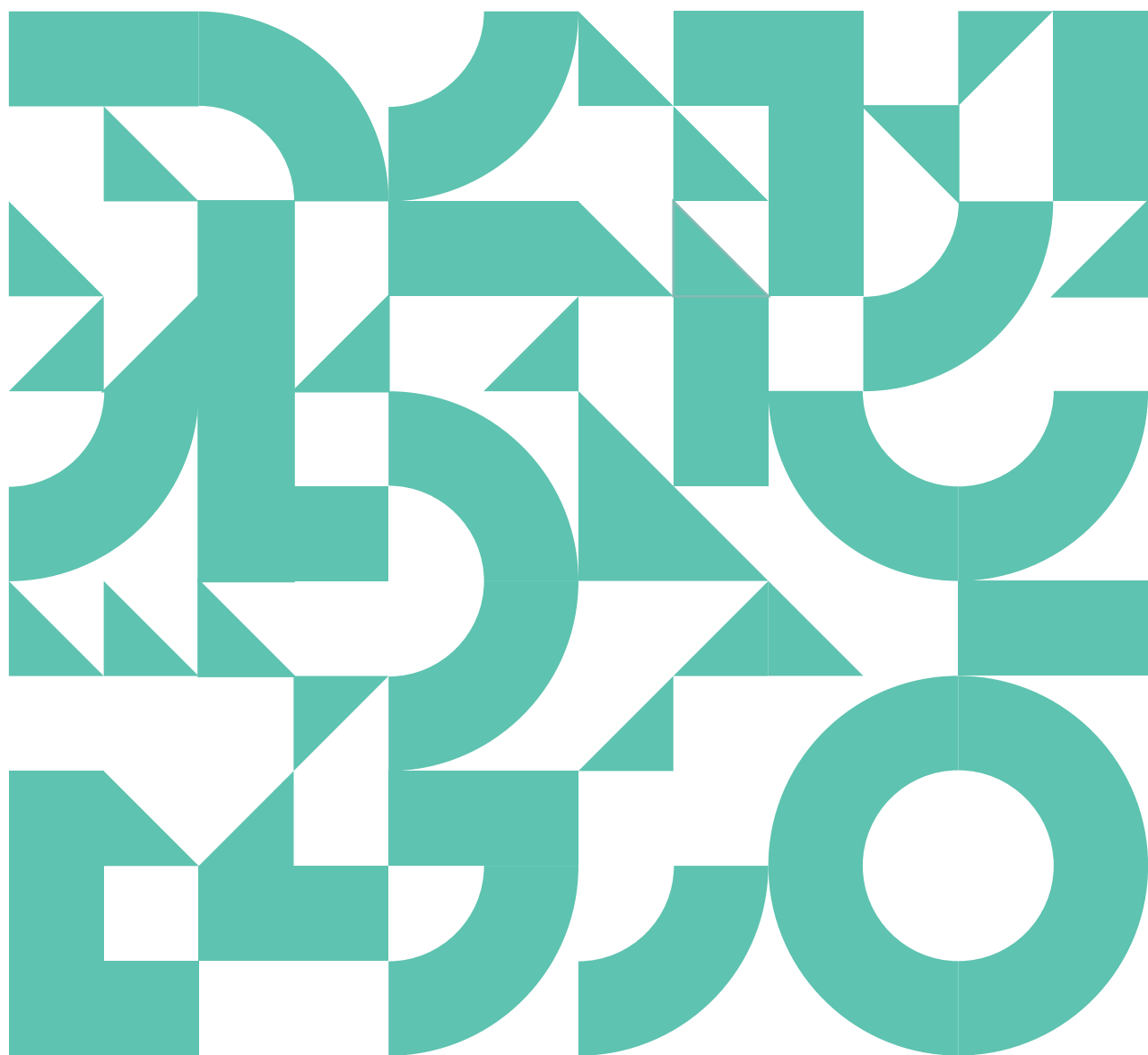


Energy Europe. From integration to power

WORKING PAPER - APRIL 2024



Energy Europe. From integration to power

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Energy Europe. From integration to power

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3

The Ursula von der Leyen ‘geopolitical’ Commission had a structural axis and a framework: the Green Deal. Her term in office began in December 2019 with the presentation of this set of initiatives and the adoption, in 2021, of the Fit-for-55 strategy, displaying a clearly asserted European ambition on climate. Despite the various crises the Union has experienced – from the pandemic in 2020 to the invasion of Ukraine on February 24, 2022 – this approach, rather than being restricted, has paradoxically been strengthened by the return of war to European soil, which has highlighted the close connection between dependence on fossil fuels (which account for over 70% of our energy needs), political sovereignty (over 60% of our energy is imported), and economic competitiveness (energy resources are totally dependent on fluctuations in raw material prices, which we cannot control). By implementing the ‘RePowerEU’ emergency plan in response to the necessary phase-out of Russian gas, Europe has further strengthened its efforts to move towards a low-carbon, more sovereign energy model.

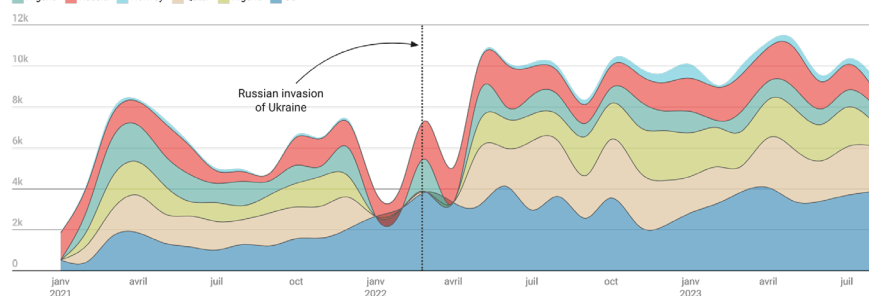
The shift to a low-carbon energy model begins

By combining urgency – guaranteeing industrial production and household heating – with the pursuit of a long-term agenda, Member States have so far successfully navigated the shift away from energy models dependent on Russian imports towards several supply sources, including US LNG. This has been achieved at the cost of significantly higher market prices for electricity and gas, which have probably contributed to accelerating the reform of electricity markets, and increased pressure for a more rapid build-up of the continent’s renewable energy sources, which, at current rates of progress, are set to increase in capacity from 500 GW to 900 GW by 2030. Finally, it is likely that the energy crisis triggered by the Russian war has given further weight to French arguments for revitalizing the nuclear industry and making it practically neutral with renewable energy sources, even if the timeframe for its roll-out and its total cost remain significant unknowns.

European liquefied natural gas imports, by origin

In millions of cubic meters.

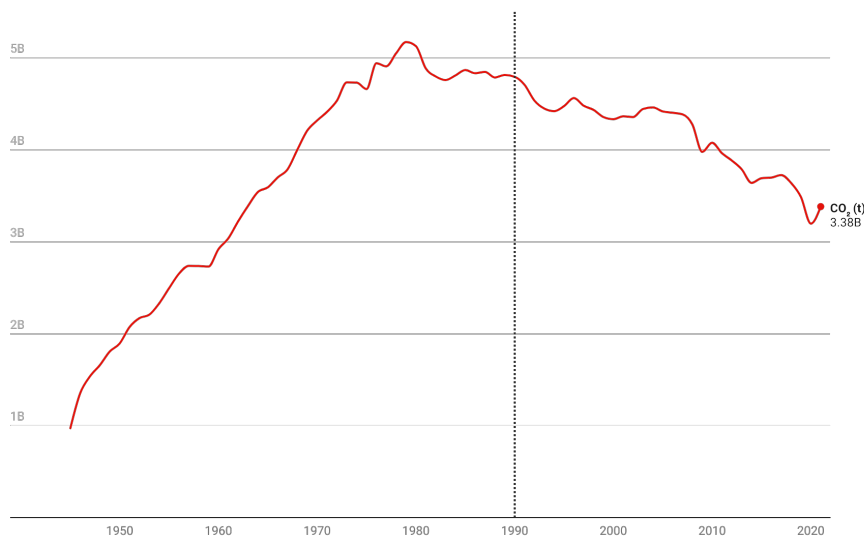
■ Nigeria ■ Russia ■ Norway ■ Qatar ■ Algeria ■ US



The chart shows only the main countries exporting to the European Union.
Graphique: Le Grand Continent - Source: European Commission

In 2023, Europe also continued to reduce its greenhouse gas emissions by 3%, bringing the total reduction since 1990 to 32.5%.¹ The share of Russian gas imports has fallen from 155 billion cubic meters (bcm) in 2021 to less than 50 bcm in 2023. Coal imports from Russia have been completely halted, while oil imports have been reduced by 90%² compared to their pre-war levels. More broadly, efforts to reduce energy consumption have decreased dependence on natural gas by almost 20%. The Union has also achieved the feat of coordinating a number of group purchases of gas between countries in order to secure the best prices, representing almost 30% of the continent's needs, or 44.7 bcm in 2023.

European Union greenhouse gas emissions (1945-2021)



In tons of CO₂ equivalent.
Chart: Le Grand Continent - Source: Jones et al. (2023)

The development of renewable energy projects has not stalled, despite rising costs and interest rates, which have made the sector less attractive. In 2022,³ more than 40 GW of new solar capacity was installed (60% more than in 2021), and offshore and onshore wind power capacity increased by 45% over the year. The share of renewable electricity in Europe's electricity mix has exceeded 39%, and May 2022 saw renewable solar and wind power generation overtake fossil-based generation. Today, the share of renewable energy in Europe's energy mix is close to 22%, and the target of 42.5% by 2030 is still achievable, even if the next stages will be much more complex to implement, as they will involve the decarbonization of the most energy and capital-intensive sectors: transport and heavy industry in particular. Implementing these objectives on a national scale appears extremely difficult for some countries.⁴ Significant funds are

1 — Press release, European Commission, EU calls for accelerated emissions reduction and clean energy transition at COP 28, November 30, 2023.

2 — European Commission, press release, State of the Energy Union 2023: the EU is responding effectively to the crisis, looking to the future, and accelerating the green transition, October 24, 2023.

3 — Ibid.

4 — The distribution formula for the European ambition, for example, calls for a 44% mix in France, whereas the PPE targets 36%, which is already an ambitious objective.

needed to upgrade transport and electricity distribution infrastructure, which is set to double in size over the coming decades. The costs and investments associated with changes in industrial processes or even engine technology in the transport sector also need to be taken into account.

At the European level, the total investment needed for infrastructure and transport to switch to a low-carbon model is estimated at an average of 335 billion euros per year⁵ over the period 2021-2035,⁶ which is equivalent to 2.3% of the Union’s annual GDP.

European Union electricity mix (2000-2023)

As a share of total electricity production.

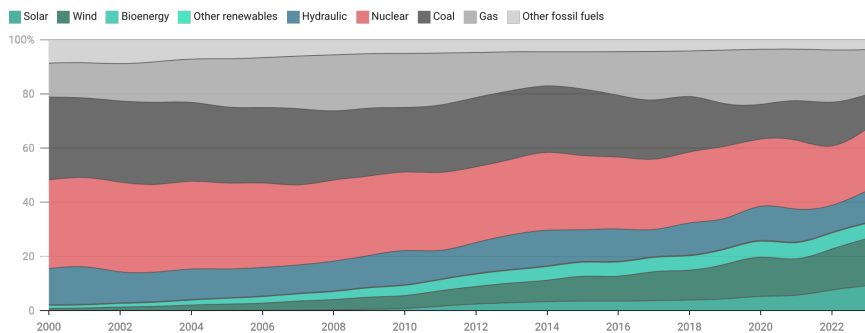


Chart: Le Grand Continent • Source: Ember

Structural regulations for new energy vectors

Within this context, the growing use of hydrogen as a complementary fuel source to the electron to decarbonize sectors that cannot do so using electricity, but require a form of gas – syngas and e-fuels – is one of the major renewed ambitions of Europe’s ‘REPowerUE’ plan. With this strategy, Europe plans to produce 10 MT of green hydrogen – and import 10 MT – to decarbonize existing uses (8.5 MT) as well as industrial and transport processes that cannot be decarbonized through electricity alone.

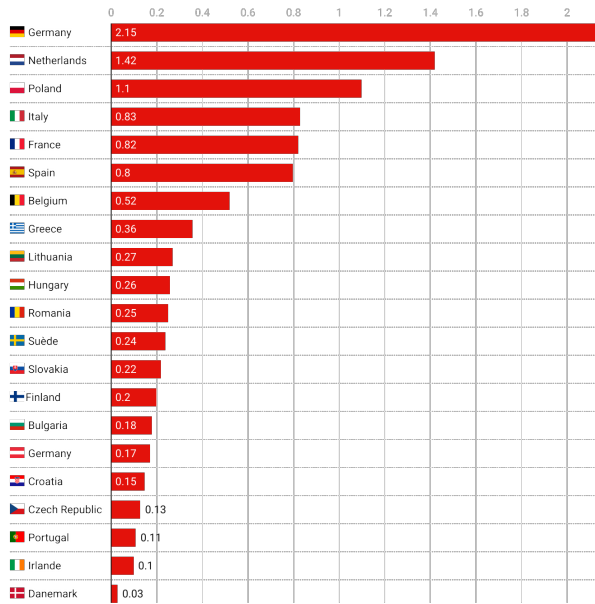
Even if the current pace of infrastructure development means that this goal will not be achieved before 2035 at the earliest, this plan has enabled numerous tools to be put in place to support the industry, particularly for equipment manufacturers – 35 projects have received support worth several billion euros – and for the first green hydrogen production projects.

5 — Klaaßen, Lena & Steffen, Bjarne. (2023). Meta-analysis on necessary investment shifts to reach net zero pathways in Europe. Nature Climate Change. 13. 1-9. 10.1038/s41558-022-01549-5.

6 — Ibid, Figure Past investments and future investment needs for the energy and transport infrastructure in Europe.

Hydrogen production capacity

In millions of tonnes per year.



November 2023.

Chart: Le Grand Continent • Source: European Hydrogen Observatory

The EU has also moved forward on a considerable regulatory package to prepare the continent for the transformation of its energy and production systems. This was achieved through protracted and highly complex negotiations, resulting in various texts on developing the use of renewable energies in the major transport, industry, and energy sectors (RED 2 and 3 directives), the gradual elimination of free allocation under the Emissions Trading Scheme (ETS), along with import protection against carbon-intensive imported production through the Border Carbon Adjustment Mechanism (CBAM). It also includes a reform of the electricity market to support the financing of major infrastructure and production projects in the renewable and nuclear sectors through non-market mechanisms, as well as the directives aimed at decarbonizing the major transport sectors (RefuelEU Aviation, FuelEU Maritime, and directives on vehicle emission standards, from passenger cars to heavy goods vehicles).

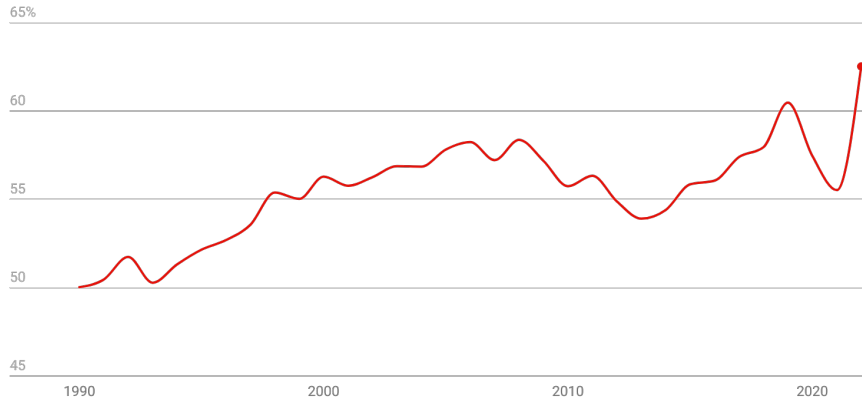
These highly complex directives, all of which were adopted after extensive three-way negotiations, demonstrate the current limits of the European model and of the Commission push in the face of national sovereignty, differing industrial policy choices between France, Nordic, and Central European countries (who are following Germany’s lead), and the growing discontent of European citizens over rising prices as well as the growing number of land-use conflicts required for the massive rollout of renewable energy – which is also contributing to the current upheaval in the agricultural sector.

Finally, the financial cost of adjustment programs to protect the population against the sharp rise in energy prices – estimated in Europe at more than 650 billion euros⁷ – and the supply crisis linked to the recovery of demand in China following the end of the Covid period, which generated strong inflationary

7 — Sgaravatti, G., S. Tagliapietra, C. Trasi et G. Zachmann (2021) ‘National policies to shield consumers from rising energy prices’, Bruegel Datasets, first published on 4 November 2021.

The European Union's energy dependency ratio

Energy imports as a proportion of total energy needs.



All energies combined (natural gas, oil, lignite, petroleum products...)
Chart: Le Grand Continent • Source: European Commission

pressures, all contributed to increasing pressure on costs.

In order to accelerate this transformation, the Commission is presenting Europeans with an existential situation, whose resolution could determine its future, and which is now also taking shape in agricultural, military, and digital terms.

Not integrated enough to be powerful, too interconnected to be effective

From an energy point of view, Europe is particularly fragile in that it does not have – and will never have – the capacity for full energy independence, and will therefore still have to supply a significant proportion of its needs into the future if it is to remain competitive without abandoning its climate ambitions. Its sovereignty will only be strengthened if it succeeds in pooling the sum of its national weaknesses into the strength of European wide supply.

In 2021, the EU produced around 44% of its energy needs and imported 56%.⁸ In terms of volume, the European Union is the world's third largest consumer, behind China and the United States, and by far the leading importer of natural gas, LNG and oil from non-European sources. In terms of new energies, according to the World Hydrogen Council's report, by 2050 Europe will be the geographic zone, along with Korea and Japan, importing the most hydrogen and derivatives such as ammonia, with at least 20 MT coming from outside the continent.⁹

As the only industrial power of a continental size being dependent on energy from elsewhere, Europe must accept its role as the main creator and prime mover in the global energy market, particularly in the low-carbon sector. It must federate the strengths and needs of European markets, enabling us not only to dictate a few rules, but also to better manage the conditions of access to them.

8 — Eurostat, Shedding light on energy, 2023 edition.

9 — McKinsey & Company, Global Hydrogen Flows - 2023 Update, Novembre 2023.

Three main challenges

1. Support the energy transition's cost

The transition's financial challenges are too great to be shouldered by national budgets without significantly straining existing budgetary resources. These resources are already facing strong social pressures in a distrustful climate that will not accept a drop or reduction in social benefits, let alone higher energy prices on the pretext of a transition whose benefits will not be immediately visible.

The transformation of our energy models will require financial resources worth several hundred billion euros over the coming decade.¹⁰ It marks the shift from a model in which the price of energy is primarily based on the price of raw fossil materials – and the cost of the carbon quota market – to a model in which that price is primarily based on the cost of capital and the cost of land; the renewable economy, like nuclear power, and the development of 'non-carbon' sources of gas and liquid fuels (e-fuels, hydrogen, ammonia, methanol, etc.) are both infrastructure-based, capital-intensive economies with long-term assets whose financing costs are essentially dependent on the cost of debt and the cost of capital. Rising interest rates have a structurally opposite effect on energy prices in times of strong demand for capital in order to deploy energy infrastructure to replace existing fossil fuel infrastructure. It is essential to develop a differentiated rates policy for climate assets, thus putting into practice the initial European development objectives for a taxonomy of low-carbon assets, in order to prioritize investments in these sustainable assets.¹¹

Finally, with regard to infrastructure, it would be difficult to imagine implementing a transformation and roll-out plan without developing a dedicated funding policy that is centrally managed and coordinated at the European level. This entails rolling out infrastructure designed to accommodate increasing amounts of electricity, installing hundreds of thousands of recharging stations and thousands of hydrogen and LNG stations, in accordance with the provisions adopted by the Union in the Alternative Fuels Infrastructure Directive (AFIR). In addition, there must be pan-European hydrogen distribution networks and import terminals for distributing the green energies of tomorrow, such as ammonia and other clean sources imported, in part, to gradually replace gas, LNG, oil and coal, as well as CO₂ networks to bring the potential of CCS (Carbon Capture and Storage) solutions to scale as quickly as possible.

For the first time in Europe's history, we have the opportunity to build energy networks designed on a continental scale that can offer our economies access to different sources of supply, from South to North, East to West. This

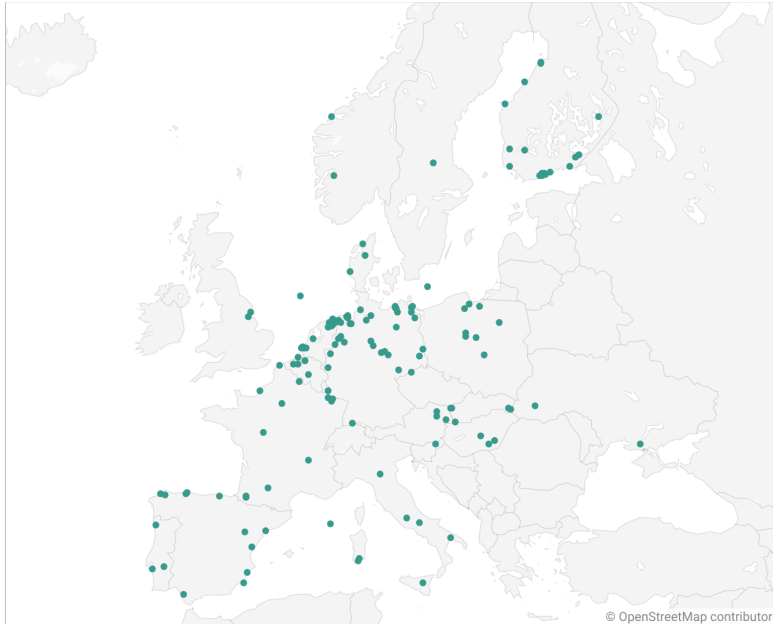
10 — For electrical infrastructure alone, this represents 560 billion euros over the course of the decade, a figure that is constantly being revised upwards (most recently in Germany, to 330 billion). France, for its part, has announced a 100 billion euro plan, such is the systemic dynamic involved, not to mention the impact of inflation and interest rates on all the infrastructure to be rolled out.

11 — As a result, it's difficult to find attractive ways of justifying the stringent constraints that must be observed, whether these take the form of access to advantageous financing terms, or regulatory signals for long-term investors.

opportunity will never come again, and is perhaps the means to endow the Union with its true depth of power.

In order to achieve this, it is necessary to have a centralized budgetary policy at the European level for all pan-European infrastructure as well as terminal strategies for serving the whole continent.

European hydrogen production infrastructures



Map: Le Grand Continent • Source: Hydrogen Infrastructure Map

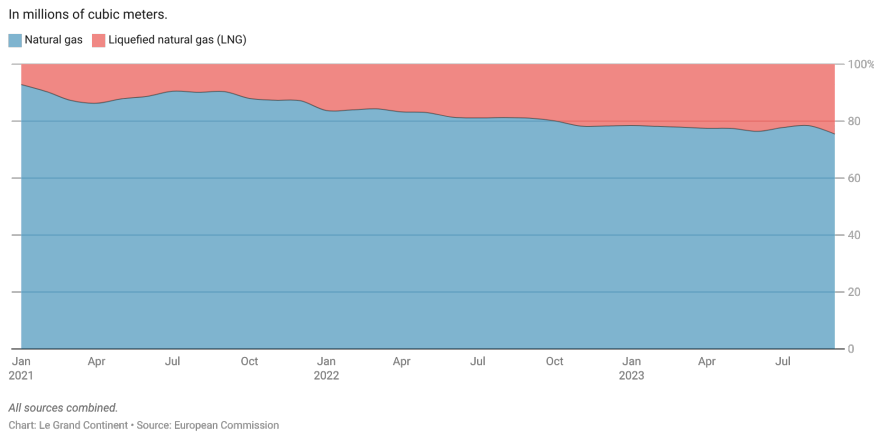
2. Reclaim significant geopolitical influence

The challenge is also geopolitical. Europe currently has to source a large part of its present energy supplies from fossil fuels, but will not have the space, resources, or agility to easily ramp up its renewable energy production capacity in the required timeframe. It will also have to find part of its clean energy needs outside its own borders. Rather than allowing each member state to develop its own energy geopolitics in a dispersed fashion and running the risk of exporting powers playing one country against another, the Union has the capacity to structure the global market for green energies, which will circulate by pipeline in the form of hydrogen or electron, or by ship in the form of ammonia or methanol produced in the most competitive areas for renewable energy sources. Rather than developing isolated supply models that compete with each other, a truly European approach will make us collectively more resilient.

France could play an active role in this and would be able to make greater use of its nuclear program, not just for its own benefit but for the structural benefit of other neighboring partner countries. It would use its transit position as an opportunity to re-industrialize the parts of its territories closest to relevant energy supply zones – Fos, in the Rhône valley, from North Africa and Spain, and the major Atlantic ports, which are well positioned to receive the new energies of tomorrow. Germany's industrial Rhineland model would be bolstered, provided that alternative hydrogen-based energy models can be rapidly implemented through access to competitive sources of green electricity from

the North, or from the South, by pipeline. The integrated model, by aggregating the needs of all member states, allows for better control of the rules for defining eligible low-carbon sources. Such a model will also enable us to pool our needs to better guarantee purchasing positions for the initial significant volumes of these new green energies, before the market is able to operate on its own – as well as significantly strengthening our geopolitical weight as the leading importer of clean energies, as compared with Japan, South Korea and Singapore, which are experiencing similar access challenges.

The share of European LNG imports more than tripled between January 2021 and September 2023



3. Deploy new tools: towards a true Europe of energy

Development of the hydrogen bank, which is still in its infancy, will provide the basis for multi-year financing of the cost delta between low-carbon energies and fossil fuels – for relatively small amounts – and could become one of the structuring tools of European energy policy. For this to happen, its resources, scope, and deployment – alongside or in addition to national instruments – need to be rapidly revised to reach levels in line with the challenges at hand. This could involve, if necessary, setting up dedicated European financing instruments under the guidance of the European Central Bank.

Building on the momentum of the joint initiatives developed to deal with the war in Ukraine in terms of natural gas supplies, it would be beneficial to develop more systematically coordinated diplomatic approaches to these new energies at the European level. These changes, which can at times be seen as a short-term surrender of sovereignty, would in fact be tools for reinforcing our strengths on the international stage, with more protective effects for European citizens. The faster we can roll out clean energy development projects, the faster the impact on investment and jobs will be evident.

Europe is the world’s leading energy importer, and will remain so in the long term, even in a post-carbon world. Europe’s inherent fragility, which is rooted in its history, will not change with the shift to a sustainable energy model, but it does offer it the opportunity to diversify its sources and vectors of supply. In this way, the Union could continue to reduce its dependence on Russian fossil fuels and complement the import base for American shale gas, which has its own environmental challenges when extracted.

Europe is at a crossroads in terms of its energy policy which also influences its industrial policy. If we allow each country to develop an ineffective sovereignty

to protect us, the Union will lose itself as well as them. The massive rollout of a low-carbon economy will certainly help reduce some of our external energy dependence and reshape our import strategy, but it is the breadth of the European area that will give it its power.

If Europe succeeds in harmonizing its approach to infrastructure, its financing and its supply strategy, which are the core of its geopolitical dependencies, then it can intelligently play its part in the world of tomorrow and build the foundations of powerful energy and industrial policies that are attractive and protective for its citizens. Energy can therefore once again become the source of a renewed European dynamism, just as the ECSC was, in its time, the starting point for European construction.