

7. France: Reducing Nuclear Dominance and Promoting a Low-Carbon Energy System



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With the adoption of its first Energy Transition Law in August 2015, France has scaled up its commitment to address global environmental issues. The transition process is intended to accelerate progress towards reducing greenhouse gas (GHG) emissions and energy use and increasing local renewable energy production. Meanwhile, France aims to reduce the nuclear share in its electricity generation, which is the highest in the world. Internationally, France pushes civil nuclear cooperation and initiatives to increase the share of renewable energy. As chair of the COP21, it has become an international pioneer in green finance.

Improving resilience and sustainability of the French energy system

In terms of GHG emissions, France's starting point is more favourable than that of the majority of OECD countries, both in terms of emissions per capita and emission-intensity of GDP.² The average performance in the transport and heating sectors is largely offset by the very low emissions level in the electricity sector. Non-emitting sources represented 92.3 percent of overall electricity production in 2015,³ with the contribution of nuclear energy being by far the largest (76.3%). France decided to make nuclear the backbone of the electricity system in 1974, at a time when geopolitical tensions were raising fears of frequent oil supply cuts and price shocks. Developing domestic nuclear capacity was also seen as an opportunity to

acquire industrial know-how and create opportunities for technology exports. The quest for energy independence led to the rapid expansion of nuclear capacity. In two decades, it went from just two percent of annual electricity production to 75 percent, the highest rate in the world. Today, nuclear energy accounts for approximately 40 percent of France's total primary energy consumption.⁴

First steps in environmental regulation

While this unique predominance of nuclear is a strong asset in terms of climate policy, France has also been pursuing improvements in energy efficiency and renewable energy since the early 2000s. Feed-in tariffs were progressively introduced for wind, solar PV, biomass, geothermal energy, small-scale hydroelec-

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² Among OECD countries, France had the lowest CO₂ emissions per capita and the third-lowest emission-intensity of GDP in 2014 (EC JRC and PBL, 2015).

³ French electricity production in 2015: nuclear (76.3%), hydroelectric (10.8%), natural gas (4%), wind (3.9%), coal (1.6%), solar (1.4%), bio-energies (1.4%) and oil (0.6%) (RTE, 2016).

⁴ French primary energy consumption in 2015: oil (30%), natural gas (14%), coal (3%), primary electricity [nuclear, hydro, wind and PV] (45%), renewable thermal energy and energy recovered from waste (7%) (MEEM, 2016).

tricity and biogas. A law passed in 2005 strengthened the support mechanisms for renewables and also mandated an ambitious 80 percent reduction of GHG emissions by 2050 compared to 1990 levels. The following year, a scheme for energy savings certificates was established, requiring energy suppliers to offer tools and incentives focused on helping final customers save energy. Suppliers face non-compliance penalties if they fail to gather enough certificates, through the initiatives they launched or through the purchase of certificates from suppliers who exceeded their own CO₂ reduction targets.

In terms of actual improvements, France met its obligation under phase I of the Kyoto Protocol by achieving a 12 percent reduction in GHG emissions between 1990 and 2013 (MEEM, 2015b). It is now on track to meet its 2020 GHG targets derived from the EU Energy and Climate Package of 2008–2009.⁵ The use of renewable energy has grown substantially but still accounted for only 14 percent of final energy consumption in 2014 (Ademe, 2016), while the objective for 2020 is no less than 23 percent. If France is to meet its EU obligation, achievements since 2005 will have to increase three-fold for renewable electricity and four-fold for renewable heat over the period 2014–2020 (OECD, 2016). In terms of energy efficiency, progress achieved since 2005 has been higher than expected for primary energy consumption but slightly lower than expected for final energy consumption.⁶ Further action is required in the transport and residential sectors, which together account for more than 75 percent of France's final energy consumption (MEEM, 2015a).

2015: the new energy transition law

In the run-up to the 2012 presidential election, the Socialist Party (PS) and the Green Party (EE-LV) agreed on a list of measures to be introduced if the left-wing bloc clinched a majority. As expected, this pre-electoral agreement put a strong focus on speeding up the shift to a more efficient and renewable-based energy system. More controversial was the pledge to reduce the share of nuclear in electricity

generation from 75 percent to 50 percent by 2025. This measure was put forward within the context of growing public concern about nuclear safety. The yearly national survey, conducted six months after the Fukushima nuclear disaster of March 2011, found that the share of French people judging nuclear safety risks as high grew from 48 percent (the year before) to 55 percent, the highest since the survey was launched in 1988 (IRSN, 2012). With this change in risk perception, the idea that France had become excessively dependent on nuclear started to gain traction. However, the 2025 reduction target for nuclear is not to be interpreted as the first step of a complete phase-out plan. The official strategy is to maintain nuclear as a central – but no longer predominant – source, while freeing-up more room for renewables.

Following François Hollande's election as President in May 2012, a national consultation on the energy transition was launched in November of the same year. Involving thousands of national and local stakeholders, the purpose of this consultation was to elaborate on the President's broad commitments. Its conclusions informed the preparation of the Energy Transition Law, which was finally adopted in July 2015. This law is the result of an extensive and unprecedented debate, and its 212 articles go well beyond the nuclear issue, covering eight major topics: targets for the future energy system, energy efficiency in the building sector, clean transportation, waste management and circular economy, renewable energies, nuclear safety, simplification of administrative procedures, and new means for citizens, companies, local and national authorities to take action. In addition to reducing the share of nuclear, the law sets out various ambitious targets, in line with and sometimes exceeding EU commitments. By 2030, GHG emissions will need to reduce by 40 percent compared to 1990 levels, and the share of renewables will need to increase to 32 percent of final energy consumption and 40 percent of electricity production. Finally, fossil fuel consumption will need to decrease by 30 percent compared to 2012 levels. Looking ahead to 2050, final energy consumption is set to reduce by 50 percent compared to 2012 levels.

⁵ France is required to reduce emissions from sectors covered by the EU ETS by 21%, and to achieve a reduction of 23% from the other sectors.

⁶ Primary energy consumption amounted to 257 Mtoe in 2015, while the objective for 2020 is 236.3 Mtoe. Final energy consumption amounted to 162 Mtoe in 2015, while the objective for 2020 is 131.4 Mtoe (MEEM, 2016).

One central idea is that preparing for the post-fossil-fuel era will benefit the French economy. In addition to an explicit reference to “green growth” in its full title, the law was published alongside governmental estimates showing that GDP would be boosted by 0.8 percent in 2020 and by 1.5 percent in 2030 thanks to the energy transition (MEEM, 2016). This economic stimulus would be highly welcome in a context where the unemployment rate has been above 10 percent since 2013. Undoubtedly, the potential creation of one hundred thousand jobs in the energy efficiency and renewable sectors has been a key argument in favour of ambitious targets (such as the retrofitting of five hundred thousand homes per year as of 2017) and the introduction or extension of fiscal incentives (such as the 30% tax credit on retrofitting works, zero interest eco-loans or the EUR ten thousand bonus for switching from old diesel cars to electric cars). In the same vein, the third public investment plan that is aimed at increasing the growth potential of the French economy will dedicate 60 percent of its credits – representing EUR six billion – to projects contributing to green growth. Its final approval is expected by the end of 2016.

Another salient feature of the French Energy Transition Law is the focus on empowerment. While energy policy has been highly centralised to date, there is now a clear willingness to achieve a more balanced distribution of power. In terms of governance, the state is expected to provide greater certainty to investors by presenting every five years a national low-carbon strategy (SNBC) and an energy programming scheme (PPE). As a second step, regional planning schemes (SRCAE) will detail the local implications. The role of local authorities in implementing the energy transition is also strengthened, particularly in relation to promoting energy efficiency measures. To encourage more bottom-up action, a call for local projects was launched in November 2015. So far, four hundred communities have been labelled “energy positive territories for green growth” and received financial help of EUR five hundred thousand to EUR two million to implement innovative projects in the fields of energy conservation, renewables, clean air,

biodiversity, recycling and community engagement (MEEM, 2016). As for citizens themselves, they are given the means to take a more active role in the energy transition, such as through renewables self-consumption or crowdfunding for renewables projects.

Implementation challenges

Although there is broad agreement that the new targets are ambitious, many stakeholders and NGOs remain concerned that vested interests or a lack of political determination could undermine the implementation of the new law. To avoid speculation, the Energy Ministry accelerated the work on related ordinances and decrees. By July 2016, 85 percent of these texts had already been published. As for the first energy planning scheme (PPE), the main challenge is of course to provide clarity on how the nuclear share will be reduced by 2025. This will depend on consumption and export assumptions, the feasibility of fast-paced deployment of renewables and the decisions of the Nuclear Safety Authority (ASN) with regard to the operation of nuclear reactors beyond forty years.⁷ In addition, many are still concerned that without sufficient time and flexibility, reducing the nuclear share would lead to unbearable revenue losses for the producer and a price spike for consumers. However, pursuing the newly agreed renewables targets without setting out a clear strategy for plant closures could also exacerbate the issue of overcapacity in electricity markets. The risk is even higher if France does reduce by half its final energy consumption by 2050, as required by the new law. At this stage, the draft roadmap (PPE) published in July 2016 foresees a 10–65 TWh decrease in nuclear production by 2023, which at best would lead to reducing the nuclear share to 65 percent, according to French environmental NGOs (e.g., Greenpeace France, 2016). Further clarity will be required for the operator, EDF, to adjust its nuclear fleet upgrade programme and prepare for the future. The two questions now are: whether a consensual plan can be agreed in the near future, and

⁷ In 2015, the average operational lifespan of French nuclear reactors was 31 years. In 2025, only 30 GW of nuclear capacity (almost half the current capacity) will still be below the 40-year threshold.

whether it can withstand the next presidential election in May 2017.

COP21 presidency and the increased focus on international cooperation

France has strong experience in international energy cooperation, particularly in the sphere of civil nuclear power. In 2009, a new agency was created to assist foreign countries that are considering developing civil nuclear fleets. The objective is to promote non-proliferation, safety and security standards, but also to prepare the ground for potential intergovernmental agreements and industrial partnerships. In addition, France is actively involved in international research activities on the performance of nuclear reactors, for example through the construction of an experimental fusion power reactor (ITER) in southern France.

Since 2012, when France announced its candidacy to host COP21, the external dimension of the French energy and climate policy has been significantly bolstered. The French Government considered that it had to show the way: by improving its domestic record, France would gather sufficient political capital and be able to trigger global action. For example, France announced in September 2015 that it would no longer provide financial support for unabated coal-fired power plant projects overseas, to avoid carbon lock-in (Reuters France, 2015). In parallel, France pushed participants in the OECD arrangement on export credits to adopt similar restrictions on support for coal plants. These new OECD rules were finally published in November 2015 (OECD, 2015). Likewise, the Energy Transition Law echoes the global discussion on financial risks implied by climate change and introduces mandatory climate reporting for institutional investors. The latter are now required to make public the carbon footprint of their portfolio and to clarify the extent to which their assets contribute to the low-carbon transition. In line with this initiative, the French finance minister requested the Financial Stability Board to examine how climate change could impact the global financial system. Again, a concept that had been promoted by NGOs and scholars – here, carbon risk management – was first tested through domestic legislation, before French diplomatic efforts urged partner countries (here the G20) to take coordinated measures.

In addition to promoting reforms, France is providing direct support to facilitate access to energy and leverage global climate action. According to OECD statistics (OECD.Stat, 2016), France was the third-largest provider of energy-related ODA in 2014. In September 2015, President Hollande committed to increase the country's climate finance contribution from EUR three billion to EUR five billion a year by 2020. Convinced that “climate clubs” would help consolidate the Paris Agreement, France has also been a strong supporter of the various new initiatives launched ahead of COP21. To name only a few, France joined Mission Innovation and committed to double clean energy R&D funding by 2020. It is also co-chairing, with India, the International Solar Alliance aimed at accelerating the deployment of solar energy in countries with rich solar potential. Moreover, France is putting a strong focus on low-carbon development in African countries; EUR two billion are dedicated to the Africa Renewable Energy Initiative over 2016–2020. As COP president until November 2016, France is also preparing a report on how to foster access to clean energy in Africa. Its objective is to provide an assessment of the renewable potential in African countries and to propose measures to facilitate project financing.

Another central issue for France is the promotion of carbon pricing. The energy minister, whose portfolio includes international cooperation, is now co-chairing the Carbon Pricing Leadership Coalition, seeking to expand the use of carbon pricing by sharing information and know-how. Likewise, the French Government is in favour of strengthening existing schemes, particularly the EU Emissions Trading Scheme. France argues that investors need greater clarity on future carbon prices to take informed decisions, and therefore proposes a price corridor that would increase progressively along a predefined trajectory. Because this proposal is unlikely to get sufficient backing from the other EU member states, at least in the short term, France is considering a domestic carbon price floor or an additional tax on coal-fired power generation. Such measures – to be implemented by January 2017 – would complement the 2014 carbon tax by addressing fossil-fuel-related GHG emissions in non-ETS sectors. The next step for France will be to partner with other countries, to ensure that total

emissions are actually reduced and not simply transferred to countries/regions that lack robust carbon pricing schemes.

Turning France's energy transition challenges into valuable inputs for the G20

France's commitment to the energy transition has grown since the early 2000s and is now taken to a new level with the implementation of the Energy Transition Law. Nonetheless, the road ahead is still full of challenges – the first being adjustment of the power production mix. Should a clear and consensual strategy be defined in time, France would have the opportunity to establish a new model in which nuclear and renewables both play central roles and function as complementary sources. Managing nuclear output in order to respond to variations in demand has always been desirable, considering the size of the French fleet, and EDF has developed strong expertise in this area since the 1980s. The flexible operation of nuclear plants is now being enhanced to support the expansion of intermittent renewable sources, in addition to continued attention to demand-side response, development of storage solutions and use of cross-border power exchanges. On top of these operational challenges, expanding the share of low-marginal-cost renewables while investing for the upgrade and/or renewal of the nuclear fleet will only be possible if appropriate financial incentives are in place. Consequently, the success of the French diversification plan is also dependent on the reform of the European Union electricity market design. If such re-balancing of the French electricity mix is achieved without excessive costs and without greater reliance on fossil fuels, important lessons could be drawn for G20 members on how to reinforce synergies between nuclear and renewables.

Another area where the French experience could be valuable, from a G20 perspective, is green finance. As mentioned above, France is taking innovative steps to ensure that climate factors are integrated in financial decisions. In addition to information disclosure on climate-related risks, two certification standards for socially responsible investment were introduced in January 2016. The Energy and Ecological Transition for Climate label is granted specifically to investment

funds financing the green economy, e.g., renewable energies, energy efficiency, electricity storage, smart grids, clean transport or forest management. Likewise, President Hollande announced in April 2016 that France would be the first country to issue green bonds, creating further dynamism in this incipient financial market. These early-stage solutions illustrate France's determination to speed up the reallocation of capital towards low-carbon solutions. By bringing forward these policies, the country can contribute to the global debate on how to “*make financial flows consistent with a pathway toward a low-emissions and climate resilient development*”, as required by Article 2 of the Paris Agreement.

Finally, the G20 could draw lessons from France's efforts to put citizens at the heart of the energy transition project. The country's starting point is a highly centralised system built around key industrial players and top-down energy mix choices. Promoting a more inclusive debate should be seen as another way to rebalance the French energy model and to improve its resilience. The new governance system that France is setting up relies on energy transition strategies being discussed at the national and local levels and then translated into consistent planning tools. Controversies and delays cannot be excluded, as experienced with the first energy roadmap (PPE). However, these discussions are crucial to avoid stranded high-carbon assets and to align regulatory, societal and technological innovations. If France ensures that these new planning tools cover all issues in depth and are sufficiently robust to resist changes in government, it may offer valuable conclusions for the G20 on how to carry out an orderly energy transition. Likewise, France is now keen to ensure broad participation in the energy transition project through creative approaches. For example, in May 2016 the Ministry for Energy launched its first ‘hackathon’ to create opportunities for collaboration between digital innovators, network operators and local governments, and to build software solutions around energy savings. Only time will tell whether these various initiatives bear fruit and whether the French Energy Transition can actually become more citizen-driven, but the intention is already worthy of attention by the G20.

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