Policy Priorities for 2019-2024

Electricity sector holds the key for the EU's low-carbon economy

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Summary

The notion of decarbonisation has changed over the years as a new consensus on long-term climate objectives emerges.[1] From being synonymous with emissions reduction in just some energy sectors, it has spread to all sections of the economy and society. Policymakers describe it as ushering in a new phase in industrialisation. aimed at underpinning the role of the EU in future technologies, fostering sustainable growth and jobs, and improving everyday life for EU citizens.

Electrification continues to be identified as a least-cost decarbonisation option. In order to be successful, this will require competitive and affordable – for both industry and citizens – low-carbon electricity at very large volumes. The EU can build upon the successes of its 2020 strategy, but the cycle from 2020 to 2030 will bring new and bigger challenges. The volumes of renewable energy needed to meet the targets are of a different magnitude. The low-carbon transition will continue to spread further beyond the electricity sector into the mobility, energy-intensive industry and gas sectors. By 2030, around 65-70% of electricity output – renewables and nuclear combined – will have zero marginal costs. This will transform the economics of the power sector.

[1] A new consensus is forming based on the temperature targets of the Paris Agreement, the IPCC Special Report on the 1.5C target, and its implication that virtually all greenhouse gas emissions need to be eliminated eventually in so far as possible, and any residual emissions compensated with negative emissions; i.e. a net-zero GHG, or climate-neutral economy.

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The recently approved electricity market design provides a robust and fit-for-purpose reform of the way new electricity markets work in the context of an ever-growing share of renewable generation. The market design did not modify the way wholesale electricity prices are constituted in Europe. But, in a context of protracted overcapacity in generation, the further growth of renewable generation coupled with a stable contribution of nuclear in the day-ahead markets will further weaken the market price signal and with it, the ability to remunerate existing assets, let alone drive the investments required to meet EU climate ambitions. During its term, the new Commission will be increasingly faced with calls to provide effective signals to unlock investments, for example in the form of a newly conceived long-term price signal.

A precondition for any signal to work will be a level playing field between the growing number of market participants, implying *inter alia*, carbon pricing, reforming grid tariffs, aligning competition policy with decarbonisation objectives and ensuring that wholesale prices are the main component of retail prices. In addition, fostering innovation offers the opportunity to make Europe a leader in some low-carbon key technologies and thus to generate a 'transition dividend' in terms of growth and jobs. Finally, the spread of – direct and indirect – electrification is likely to bring to the fore the question of who pays and for what and how. With electricity being a central vector to achieve EU energy and climate goals, it is counterintuitive to tax and levy electricity irrespective of its carbon content.

Introduction

A major achievement of the outgoing Juncker Commission was the gradual integration of climate, energy and economic competitiveness objectives into a coherent set of policies (Egenhofer and Elkerbout, 2019), which culminated with the November 2018 Long-term Strategy (European Commission, 2018) and its kick-starting of a debate on how to achieve EU long-term climate objectives, including how to achieve net-zero GHG emissions by 2050.[2] A new and more ambitious target than the existing one of 80-95% greenhouse gas reductions by 2050 compared to 1990 has become necessary in light of the 2015 Paris Agreement, reinforced by the IPCC (2018) Special Report on 1.5°C warming, and dramatically falling technology costs.[3]

The Long-term Strategy identifies the energy and low-carbon economy transition as one of the vehicles to modernise the European economy; the competitiveness of European industry is underpinned by low-carbon energy and technology. Its corollary is that there will be no economy-wide decarbonisation if the EU power sector is not in a position to provide cost-effective and affordable low-carbon electricity.[4] The successive European Commission studies of energy prices and costs[5] show that they are, and will remain, an important component of industrial and economic competitiveness as well as of household purchasing power. With increasing electrification, electricity prices and costs will gradually take on the importance that global energy commodities (i.e. oil, gas, coal) have today.

Electrification is a no-regret option

Economic studies suggest that electrification is a no-regret option. Least-cost decarbonisation of the economy is best achieved initially by decarbonising the electricity sector (European Commission, 2018, p. 8), especially when compared to the higher costs associated with, for example, liquid fuels-based scenarios (e.g. IPCC, 2014, p. 418). Decarbonised electricity can be used to reduce emissions directly – through use of electricity in heating, transport or industry, sometimes referred to as sector coupling.[6] Through technologies such as Power-to-X or green

[2] With a net-zero greenhouse gas emissions target, any remaining emissions should be balanced by negative emissions such as carbon removal, e.g. by growing carbon sinks such as forests which absorb carbon dioxide from the atmosphere.

[3] For an overview, see chapter 5 in CEPS (2018); batteries have dropped in price by 85% between 2010 and 2018, to on average 176 USD per kWh, e.g. BNEF (2019). Over the same period, cost reductions for renewables have likewise been significant for onshore wind (-49%), offshore wind (-56%), and solar PV (-84%); https://about.bnef.com/blog/battery-powers-latest-plunge-costs-threatens-coal-gas/

[4] This should not be confused with a more populist claim of 'no cost'.

[5] European Commission (2019) for the latest edition. For all editions, see: https://ec.europa.eu/energy/en/data-analysis/energy-prices-and-costs

[6] Sector coupling refers to the idea of interconnecting or integrating energy consuming sectors – buildings (e.g. heating and cooling), transport, and industry – with the power producing sector.

hydrogen more generally, electricity can be shifted to energy carriers for later consumption in other energy-consuming sectors.[7]

Since 1990, CO_2 emissions in the electricity sector have decreased by over 28%[8] and there is a visible shared ambition among policymakers[9] and the European electricity industry to accelerate decarbonisation. The current EU electrification rate is about 23%. The eight different scenarios developed in the European Commission's Long-Term Strategy foresee the share of electrification in 2050 ranging from 41% to 53% (European Commission, 2018).

It is easy to appreciate the size of the challenge faced by the EU electricity sector and the volumes that will be demanded in the future. However, an effective level of electrification will depend on numerous variables, each of them requiring specific policy attention: prices, long-term price signals, convenience, infrastructure and technology,[10] sharing of the cost associated with the transition, permitting procedures, and continued societal and political support.

The next cycle will be different

2030 is going to be very different from 2020. This is partly because the low-carbon transition will necessarily spread further beyond electricity generation and consumption, and partly because the volumes required for meeting the 2030 obligations are of a much greater magnitude.

Investment

It is estimated that in 2030, some 75% of electricity output – renewables and nuclear combined – is going to have zero or very low marginal costs. At the same time, low-carbon electricity generation is very capital-intensive, meaning that the investors will have to put up more than 90% of the total investment upfront, to be amortised over a long period. Electricity wholesale market prices to date and in the foreseeable future will not be enough, alone, to encourage sufficient investment. As time goes on, this dilemma will become more and more apparent.

Flexibility

In the second half of the 2020s, the flexibility needs of the EU electricity system are destined to escalate, as a result of the sheer volume of renewables as well as of decentralised generation sources. Fortunately, the digitalisation of electricity systems will provide new flexibility solutions. Similarly, gas can make a major contribution to addressing the flexibility challenge; initially through natural gas and, increasingly in the run-up to 2050, via low-carbon gas. The

[7] See also: http://fsr.eui.eu/sector-coupling-and-sector-integration/

[8] Own calculations using the EEA (2018) and Eurostat (2018).

[9] See e.g. the comments by Commissioner Arias Cañete at the release of the EC's 2050 long-term climate strategy: http://europa.eu/rapid/press-release_IP-18-6543_en.htm

[10] A major determinant of electrification will be investment and technological choices by energy-intensive industries in Europe.

latter in return has implications for the power sector, e.g. demand for renewable energy but also the development of grids.

Reinforcing the grid

Investment in the grid and grid innovation are another no-regret policy. Incentives to perform necessary investments in hardware and services will have to come primarily from the regulators who face the challenge of ensuring that grid operators are rewarded, within their regulated revenues, for investing in a smarter grid, not just in larger ones.

Beyond reinforcing the grids and technological upgrades for electricity infrastructures, legislators, and the EU in particular, will have to set new rules for flexibility products, taking into account that, for the foreseeable future, the most important scarcity in the market will be transmission and distribution capacity.

Towards a post-2020 agenda

The recently approved electricity market design provides a robust and fit-for-purpose reform of the way new electricity markets work in the context of an ever-growing share of renewable generation. However, the market design reform has not, and was never meant to review the way wholesale electricity is priced in Europe. It is reasonable to expect that the further penetration of variable renewable generation in the electricity mix, coupled with a stable contribution of nuclear, by shifting the cost structure of the offer towards fixed costs, will increase the volatility of wholesale electricity prices and hence the risks for investors. There is a risk that in the period up to 2030, the wholesale (day-ahead) market price will be further weakened and thereby the ability to remunerate existing assets, let alone drive the investments required to meet EU climate ambitions. Three issues stand out: price signals, cost allocation and innovation.

a) Long-term price signal plus

Current price signals are not in line with investment needs and the rate of investment required. Various factors have contributed to this situation. Among them are the economic cycle, deindustrialisation and energy efficiency in industry, international gas prices and overcapacity in generation. The overcapacity problem stems from the fact that the renewable capacities brought into the system as a result of EU and national policies should have been offset by equivalent closures of existing inflexible capacities. This was necessary, and partly still is, because electricity demand has been stagnating if not contracting for the whole 2012-2020 period. Unfortunately, the size and speed of these closures has been largely insufficient to address the oversupply. Neither could the EU ETS, although the most recent reforms should be able to tackle the consequences of oversupply to a certain degree through mechanisms limiting the supply of allowances.

The structural shift towards renewables will continue to exert downward pressure on wholesale electricity prices across the EU. This means that the recent and foreseeable price

paths of electricity wholesale prices will most likely be unable to generate a sufficiently robust and stable investment signal to encourage new investments or even to remunerate existing assets. It is already now foreseeable that the gap between the full costs and market value of generation and wholesale prices will need to be bridged. This is true for both renewable and conventional generation.

While long-term power purchasing agreements (PPAs) will play an important role in this context,[11] and can still be expanded, it is hard to see how they could, alone, solve the impending imbalance. Pricing of long-term power purchasing agreements are generally based on the wholesale market price, which reflects the general electricity wholesale price performance. However, bilateral contracts risk not reflecting the costs of security of supply in the power price. The new Commission should not underestimate the risk that the generation sector, irrespective of the technology entailed, could stumble into becoming an ever more regulated business where member states and in some case local governments design 'tailor-made' national or regional solutions instead of a 'market' perspective.

As stated by the 2018 European Commission (2019) report on energy prices and costs, a decoupling effect between investments and price signals can be observed. This should suggest the opportunity of rethinking electricity pricing to establish a new methodology with a holistic approach, by taking into account energy, capacity, flexibility and system needs. Revenues from these markets should be able to cover both capital and operating costs, as the central focus. The market may need a long-term price signal to plan adequate returns on future assets and stabilise financial planning but also to reduce the cost of capital by reducing the risk premium. We have called this the long-term price signal *plus*.

b) Distributional issues, costs and allocation of costs

There is a general consensus about the fact that reaching 2030 targets will imply extending emissions reductions efforts further beyond the electricity sector by shifting attention to transport, heating and cooling and, possibly, other everyday aspects of life for EU citizens. In order to make sure that specific climate and energy policies will enjoy the support of voters, an effective approach is needed at both EU and member state levels for dealing with distributional aspects, i.e. who bears the cost.[12]

A first element of cost-efficient electricity decarbonisation is reliance on markets in the power sector. This will require reinstating a 'meaningful' price dynamic in the day-ahead market. Another element is carbon pricing, as in the EU Emissions Trading System, which is still the most efficient implementation of the polluter pays principle. Cost-effectiveness can be increased if carbon content is also taxed in sectors outside those already covered by the EU ETS, particularly for heating and transport, as far as politically feasible. Acceptable and correct market signals will be essential for triggering a change in customer and investor behaviour. A difficult issue to

[11] COWI & CEPS (forthcoming).

[12] See for example Zachmann (2018) on the distributional impacts of climate change policy.

tackle will be the indicated carbon cost and its associated compensation as laid down in Art. 10a(6) of the EU ETS Directive.

Also, the whole debate on transition cannot exclusively focus on its associated costs. Decentralised and digitalised electricity systems generate revenues that can also benefit consumers. The recently approved reform of the market design enables all consumers to generate, store and/or sell their own electricity to the market based on retail market conditions. Demand response means allowing consumers to, for example, adapt their energy usage to different energy prices throughout the day to receive a payment from an energy service company. These are concrete benefits, in terms of new sources of disposable income or reduced energy bills, that have the potential of contributing to establish a more balanced and fairer energy transition.

To achieve this will require major efforts, for example by reforming energy and electricity taxation including charges. If electricity is a major driver in achieving EU energy, climate and environmental goals, it makes little sense to tax electricity irrespective of its carbon content. According to the European Commission (2019) study on energy prices and costs, taxes and levies still represent more than 40% of final electricity prices. Another key element is the removal of non-electricity components such as levies and charges from the retail price. The proceeds raised from carbon pricing, for example through higher ETS prices, an ETS expansion or carbon taxes in the non-ETS sector could then be used to compensate for the loss of revenues from electricity taxes and levies. This would likely increase political acceptability.

We should also expect that, in addition, policy at EU or member state level will need to effectively address energy poverty, where it exists, preferably through transfers or social policy. If such efforts fail, either investment will stall, or political support erode, or both. 'Rationalising' the allocation of costs will also require an adaptation of grid fees and grid regulation as described in the previous chapter.

c) Innovation

Decarbonisation technologies are an area where EU industry generally has competitive advantages. It is therefore also a field where Europe could reaffirm its role as a global legislative, regulatory, technology and industrial power. In parallel, 'low-carbon industry' offers the prospect for new value-added solutions and more generally, opportunities for applications of technological innovation and the creation of new business models.

However, solutions are only now being developed, and it is probably too early to know what the future electricity system will look like. Innovation, e.g. in technology, new services and new business models, will need to be able to occur freely in order to foster the development of new value chains across the board, e.g. electricity supply and demand, mobility, information technology and data, etc.

Therefore, an essential element for the EU will be the development of a framework to provide a level playing field, for example for supply, demand and grids, to ensure cost-effective solutions. In addition, to the level playing field, there will be a need for research and innovation

in new, and some not yet foreseen, technologies that will accelerate the transformation of the electricity sector.

Looking ahead and the role of electricity

Under the last Commission, the decarbonisation paradigm both widened and deepened with practical implications for the industry, legislators and regulators alongside a greater salience of the issue among voters. As repeatedly stated, 2030 will be a different story from the already challenging 2020 strategy. The volumes needing to be mobilised will lead to some concrete consequences, in the first place for policymakers. The new Commission will need to develop a more comprehensive framework. Some – still controversial – proposals have been flagged recently. President Macron proposed the constitution of a European Climate Bank in the broader context of issuing green bonds for infrastructures.[13] More recently, European Commission President-elect Ursula von der Leyen gave traction to the French proposal by endorsing the creation of a bank to concentrate on climate change and aimed at scaling up green investment across the continent. Von der Leyen signalled that modifying the mandate of the European Investment Bank is among the options under consideration.

Although the concepts differ in many aspects, these and other similar recently elaborated proposals converge on the idea that the energy transition has the potential to breathe new life and perceived purpose into the European project. They also agree upon the opportunity of using the decarbonisation strategy as an addition to already existing tools to fix more structural imbalances in the present macroeconomic and financial structures of the EU, namely by helping the emergence of a EU safe asset class in the form of green bonds or equivalent investment vehicles to support the EU 2030 targets. In the present context of a sharp contraction in renewables investment (IEA, 2018), such a perspective gains even more importance.

Moreover, in financial and environmental policies, the relevant regulatory framework would benefit from better coordination across government agencies and departments to ensure that financing reaches the intended goals. This is essentially the purpose of the sustainable finance approach at EU level, a goal that will reinforce the already growing role of active private investors in reshaping the direction and logic of private investors in asset allocation.

Recognition of change is visible for example in the attention increasingly given to the cost of capital, essential not only for the competitiveness of low-carbon technologies including electricity, but also the future macro-economic effects of electrification (FTI Consulting & Compass Lexecon, 2018). This extends in addition to the role of monetary policy and large institutional financial investors in keeping decarbonisation cost at its lower economic boundary. In 2018, Benoît Cœuré,[14] Member of the Executive Board of the ECB, argued that a lasting shift in the energy mix can be expected to introduce a persistent change in relative prices; inflation, costs of capital and energy investments mutually influence each other. Increasingly, macro-economists are starting to discover the possible implications of the low-carbon transition. And electricity will be among its most significant aspects.

[13] https://www.elysee.fr/emmanuel-macron/2019/03/04/for-european-renewal.en

[14] https://www.ecb.europa.eu/press/key/date/2018/html/ecb.sp181108.en.html

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