Energy competitiveness

Electricity costs and the energy transition: what are the consequences for the industrial competitiveness of countries?

E-CUBE STRATEGY CONSULTANTS

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Fore Word

Energy competitiveness is a key factor in the overall competitiveness of a country for industrial players. Higher energy prices can affect demand and undermine the ability to compete in global markets. It can lead companies to move their production locations abroad. Additionally, a country's ability to supply sustainably produced energy at a stable price can increase its attractiveness for capital investment.

The ability to master value, stability and quality of energy sourcing is essential to maintain a competitive industrial activity.

Several factors contribute to low electricity supply costs for industrial purposes. These factors include:

1. **Energy sources development and costs**: countries with abundant and low-cost energy sources, such as hydropower, nuclear, renewable energy, or gas turbines with low gas prices can offer lower electricity supply costs to industrials.
2. **Government subsidies and regulations**: government subsidies and favourable regulations can lower the overall cost of electricity for industrial consumers.
3. **Transmission and distribution costs**: efficient infrastructure management, lower transmission costs, and specific cost allocations can contribute to reduced electricity costs for industrials.
4. **Flexibility development**: developing flexibility in the electricity grid is crucial for efficiently integrating renewable energy sources, managing variability in demand, and ensuring a reliable, stable, and competitive power supply.

The energy transition reshapes global energy market dynamics. Increased investment in renewable energy infrastructure and technologies, as well as changes in the energy mix impact the cost of electricity supply for industrial users. Shifts in government policies and regulations to support clean energy and decarbonization can also affect the overall cost of electricity supply for industrial purposes.

How does the energy transition change the competitiveness of countries regarding electricity supply?
What are the consequences for industrial activities?

Electricity supply costs have historically been determined by the generation costs of nuclear, gas, coal, and hydroelectric power plants

i. Many countries benefited from relatively competitive industrial electricity prices due to low-cost energy sources, such as Canada, some US states, Nordics countries, France and Germany to a lesser extent.

Energy transition leads to a restructuring of energy competitiveness of several countries

ii. Far from the previous paradigm, a new renewable energy mix modifies the energy competitiveness of each country.

iii. Regardless of the market design the full cost of the electricity system shall therefore be primarily dependant on the cost of renewable generation of the grid and of the flexibility.

Spain, Sweden, Finland, Denmark & Texas have lower renewable electricity costs compared to France and Germany which gives them a competitive advantage in the long run

iv. Several countries benefit from **low-cost renewable energy (Spain, Italy, Texas, etc) and should become more competitive in the future,**

v. Other countries will even **combine the advantages of a historically competitive electricity production system with recent low-cost renewable generation resources (e.g. Sweden, Finland)**, remaining among the most competitive countries.

vi. **Finally, countries from western Europe such as Germany and France with higher renewable or nuclear generation costs should see their competitiveness hampered** while their renewable production increases. The economic competitiveness of the new nuclear plants will be crucial for those countries.

Industrials are seeking to limit the volatility of electricity costs and will therefore assess the energy competitiveness through price stability and foresight

vii. Industrial players are **seeking to limit the volatility** and increase the foresight of electricity supply costs to gain better visibility on the budgets allocated to electricity in the long run.

viii. Electricity market players seek to protect themselves against volatility risks and therefore **charge industrials risk premiums** related to volatility.

ix. **If renewable energy provides long term stability of electricity cost**, it requires tools (storage, market profiling offers, etc) to mitigate **the volatility of the short-term intermittency.**

The capacity margins and the electricity quality are also key criteria for industrials

x. With the acceleration of the electrification of energy usages (mobility, industries, heating, etc.) the forecasted electricity demand is strongly growing.

xi. Many European countries must therefore speed up renewable energy development to ensure sufficient generation capacity and the delivery of electricity without any shortage.

xii. This risk on the quality of electricity in Europe is expressed differently in the United States where **the lack of resiliency of the electric grid** leads to several interruptions in the delivery of electricity.

Flexibility and local grid improvement are crucial to ensure a reliable, stable, and therefore competitive power supply

xiii. **Flexibility is key** to enable the energy transition in terms of price stability, capacity margins, and electricity quality. It must be planned to develop it at the lowest cost possible.

xiv. **Countries that have hydropower will benefit from an inexpensive and very useful source of flexibility.** These include the Nordic countries, Quebec, and Washington State. However, the growth potential of such flexibility can be questioned compared to the demand growth and is also expected to be impacted by climate change.

xv. **Network development is necessary**. This is particularly anticipated **in Europe. Interconnections** are in this sense very useful to enable countries with high generation costs to benefit from lower generation costs.

Regulatory measures and financial aids as levies that can be used to reduce the cost of the energy transition borne by industrials

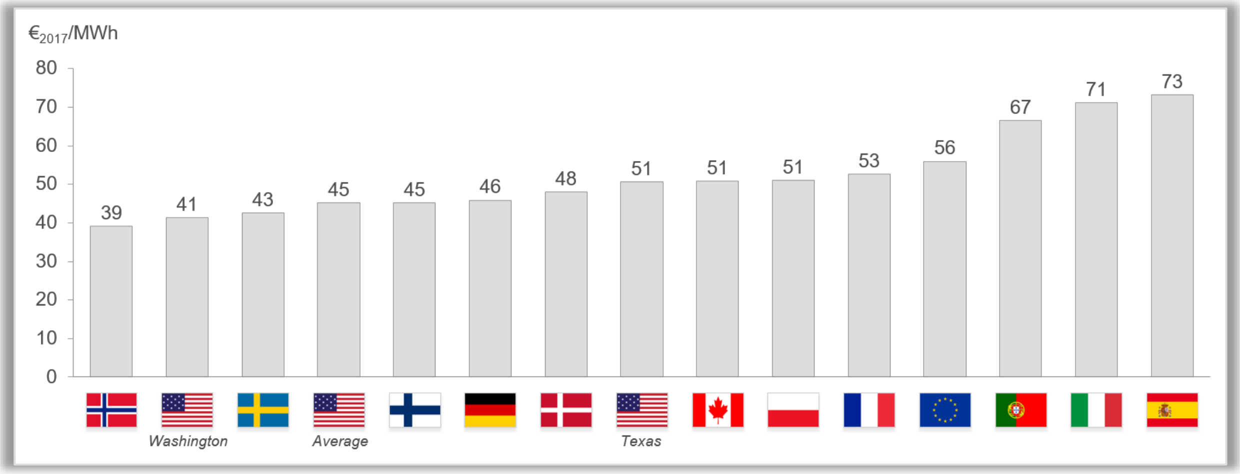
xvi. The different ways in which governments add levies to the price of electricity create huge discrepancies in the prices paid by consumers. **Governments can increase or reduce tax to shift the cost of the transition onto entities that are not subject to internation competition** (households, small-sized plants)

xvii. Countries can also improve their energy competitiveness by **facilitating the development of renewable** energy through a combination of **strategic planning**, **acceleration** of projects, and **streamlining authorization processes.**

A Electricity supply costs have historically been determined by the generation costs of nuclear, gas, coal and hydroelectricity power plants

Many countries benefitted in the past from relatively competitive industrial electricity prices due to the **low cost of energy sources**, such as Canada, US, Nordics countries, and France to a lesser extent.

Figure 1 - Average industrial electricity supply costs in a selection of competitive countries in 2017. (average national price in €/MWh without taxes, considering both electricity supply and transport/distribution costs, for industrials with annual consumption between 20GWh/year to 70GWh/year)
Source: EUROSTAT (for European countries), IEA (for non-European countries)



Most countries that rely largely on **hydropower such as Norway, Sweden, Finland, specific states in the United States (Louisiana, Idaho, Washington State) and Canada (Quebec)** with **abundant hydropower resources** offered low electricity prices to industries. Lowest hydropower generation cost in states in the US was estimated at 12-15€/MWh in 2020.[1]

Countries with an access to a low gas sourcing such as **the US** also benefitted from low electricity prices thanks to numerous **Combined Cycle Gas Turbines** (lowest combined cycle gas generation costs in the US were estimated at 30€/MWh in 2020).[2]

France has a substantial share of **nuclear power** in its energy mix and provides a stable and cost-effective source of electricity. According to a report from the Cour des Comptes published in 2021 the generation cost of historical nuclear power was between 42€ and 60€/MWh.

Prior to the Ukrainian crisis, **Germany** offered a competitive energy supply thanks in particular to its cheap coal (lignite) and cheap gas supply from Russia.

[1] Data published by National Renewable Energy Laboratory (NREL).
[2] Data published by National Renewable Energy Laboratory (NREL).

B Energy transition leads to a restructuring of energy competitiveness of these countries for industrials

Many countries have already set objectives for a decarbonized electricity mix that mostly rely on renewable and/or nuclear power. The share of renewables in the global power generation mix is forecast to rise from 29% in 2022 to 35% in 2025.

- Europe targets a 42.5% share of renewable energy consumption by 2030 and 74% of renewable electricity supply by 2030. Renewables are meant to account for more than 80% of electricity supply in most European countries.
  - In countries where nuclear development is planned, renewables will remain under 50% of electricity generation (as an example, France targets 40% of renewable energy for the electricity supply by 2030).
- In the US, wind, solar, and other renewables are expected to rise to 60% of electricity generation in 2030 vs 22% in 2021) under the Net Zero Pathway.

The massive transition to renewables transforms electricity markets. Eventually, most of the electricity cost should be based on:

- **Renewable generation costs** to replace the previous electricity mix and to match the growth in electricity demand
- **Investments in the grid** to integrate large shares of renewable energy in the mix, which are translated in the network tariffs (payments for maintaining and expanding the grid).
- **Flexibility and capacity costs** as the retiring coal and old nuclear capacities are replaced by new peak and flexible assets (batteries, back-up assets, etc.) to ensure security of supply. For instance, capacity markets can (where they exist) reflect these costs.

Far from the previous paradigm based on hydropower, coal, gas, and nuclear, a new renewable energy mix will therefore lead to a restructuring of energy competitiveness. Regardless of the market design, the full cost of the electricity system shall therefore be lower in countries with low renewable generation costs.

Focus Germany #1

Historically, Germany offered competitive energy supply in Europe thanks in particular to its low-cost coal and gas supply from Russia. German wholesale prices where historically the lowest in Western Europe.

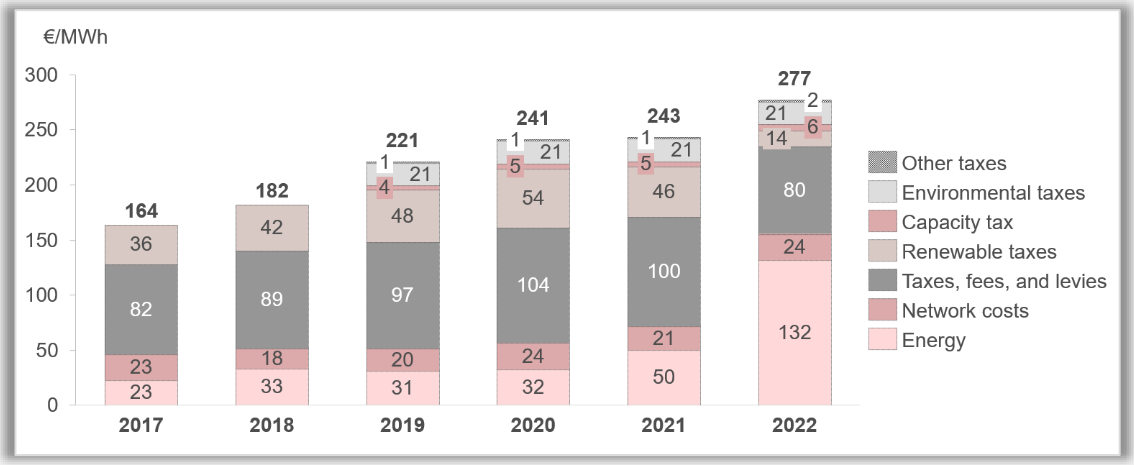
For the last 10 years, Germany has been moving strongly towards 100% renewable energy **at all costs**. Since the decision in 2011 to phase out nuclear power, Germany has no other option than to replace its fossil fuels source with renewable production which still represent around 40-45% of the electricity generated in Germany (coal and natural gas) in 2021.

The level of ambition of the Federal government for the Energiewende[3] has dramatically increased with the new coalition elected in 2021. The country now aims to provide 80% of electricity through renewables by 2030. This means a multiplication by 2.5 of solar power, by 2 of onshore, and almost 4 the offshore wind compared to the end of 2023.

The aggressive decarbonization strategy of Germany is impacting the national energy competitiveness for industrials

On one hand, renewable electricity flooded the power market pushing down wholesale power prices and benefitting to large and energy-intensive industrial companies that mainly source their electricity at wholesale prices; on the other hand, the capital-intensive deployment of renewables pushed up power prices for households and less energy-intensive companies who financed the transition through specific fees like the EEG.[4]

Figure 2 - Annual electricity cost industrials with an annual consumption between 20GWh/year and 70GWh/year from 2017 to 2022 [€/MWh]
Source: Eurostat



Recently, Transmission System Operators announced the doubling of grid fees in 2024 (around 10-20%[5] raise on corporate electricity bills), mostly because of the necessary investments for offshore wind connection in the north of the country.

[3] The "Energy turnaround".
[4] EEG levy: dedicated to the expansion of renewable power plants.
KWKG levy promotes the generation of electricity and heat in efficient combined heat and power plants (KWKG plants) as well as the expansion of heating and cooling networks, and heat and cold storage facilities.
StromNEV levy compensates the lost revenue due to individual grid fee
Offshore grid levy covers costs incurred from compensation for disruptions of the grid connection of offshore wind farms as well as the costs for constructing and operating offshore connection lines.
Levy for interruptible loads: covers costs of interruptible loads which are used to maintain grid and system stability.
[5] According to calculations by the German Chamber of Industry and Commerce, depending on whether a company has access to the German government's electricity price peak compensation mechanism.

Focus France #1

France has a low-carbon electricity mix owing to its nuclear fleet. Yet most reactors are reaching the end of their lifetime in the next 15 years which requires modernizing those that can continue long-term operations under safe conditions and investing in new capacities (with increased cost).

- Nuclear total generation costs of current installation (including Flamanville 3) have been estimated at 57-61€$_{22}$/MWh.[6] But with the development of new, more expensive nuclear plants (as the Hinkley Point contract demonstrated), this cost could increase. It is the reason why the French government is proposing to set a threshold for levying EDF's revenues at 78€$_{22}$/MWh.[7]

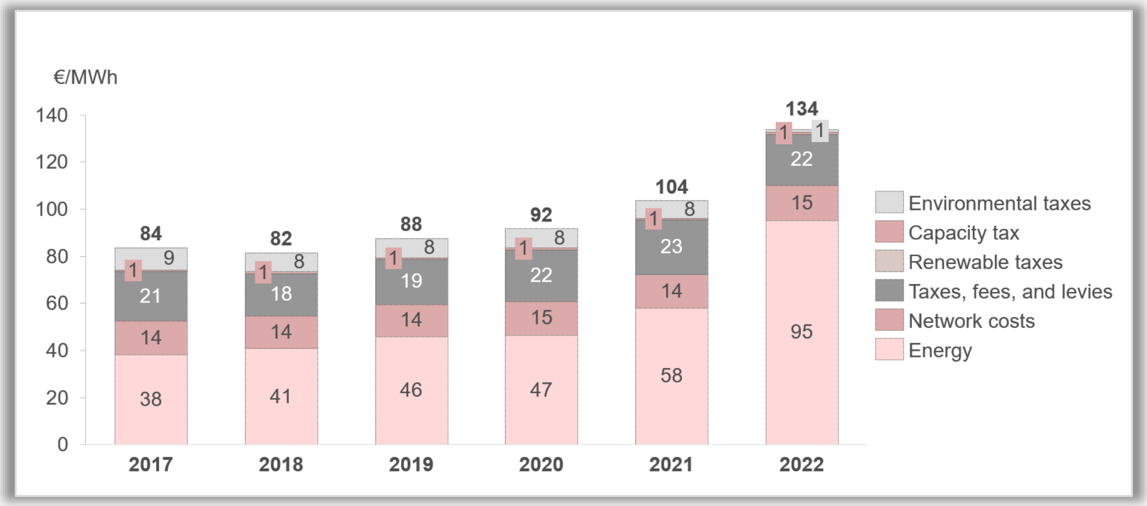
The lack of continuous investment to anticipate the upcoming surcharges will have an upward impact on the cost of electricity production in the medium term.

Electricity costs will also increase due to high renewable cost in France.

- Renewable generation costs in France oscillate around 80€$_{2023}$/MWh for solar installations and 80-90€$_{2023}$/MWh for wind installations.
    - Before the energy crisis, these costs were respectively around 65-70€$_{2020-2022}$/MWh for solar installations and around 65-75€$_{2020-2022}$/MWh for wind installations.[8]
    - The energy crisis led to an increase in interest rates, materials costs and OPEX.
- Generation costs are expected to decrease to around 60-65€$_{2030}$/MWh for solar and around 80-85€$_{2030}$/MWh for wind by 2030 because of the decrease in interest rates and CAPEX (which are especially high regarding solar technology).

[6] Data transmitted by the CRE to the French government in a report published in July 2023. It would be better to cite the report itself.
[7] Data published by the ministry of energy in the public consultation regarding the mechanisms post-ARENH. It excludes income from the valuation of certificates of capacity allocated to the nuclear fleet via the capacity mechanism.
[8] Figure 5.

Figure 3 - Annual electricity cost industrials with an annual consumption between 20GWh/year and 70GWh/year from 2017 to 2022 [€/MWh]
Source: Eurostat

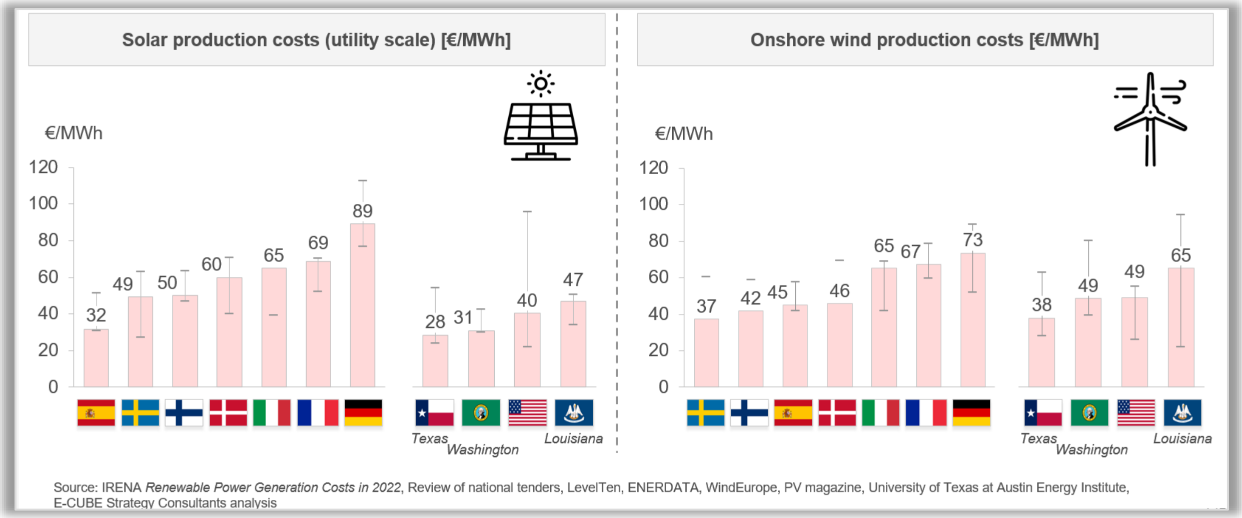


C Spain, Sweden, Finland, Denmark, and Texas have lower renewable electricity costs than France and Germany giving them a competitive advantage in the long run

Several countries **benefit from low-cost renewable energy** (Spain, Italy, Texas) and can even **combine the advantages of a historically competitive electricity production system with recent low-cost renewable generation** resources.

Yet, other countries (such as Germany and France) with higher renewable generation costs should see their competitiveness hampered while their renewable production or their new nuclear share increases.

Figure 4 - Solar and onshore wind generation costs [average data from 2020-2022, €$_{2020}$-€$_{2022}$/MWh]
Source: Renewable Power Generation Costs in 2022, Review of national tenders auctions, WindEurope, LevelTen Energy, ENERDATA, University of Texas at Austin Energy Institute, NREL, Energy Markets & Policy Berkeley Lab



High differences in the total cost of renewable production can be explained by several factors:

- **Favourable climatic conditions enabling higher load factors** observed in:
  - Nordic countries with strong wind enabling them to reach a 28-30% load factor for wind power in Sweden and Finland compared to an average of 24% in 2021[9][10] in the EU.
  - Countries with high solar irradiation such as Spain benefit from a high load factor for solar power (16-20%). In comparison, the worldwide average is around 11-13%. The best locations in California, Australia, South Africa can reach 25% locally. **Such load factors can reduce generation costs by 30% to 40%.**

[9] WindEurope, published in the report: *2022 Statistics and the outlook for 2023-2027*. It would be better to cite the report itself.
[10] Including old turbines. Incorporate that into the text and delete the footnote.

- **Scale effect**, with a gain in development costs and CAPEX, but also in the maturity of the sector. For instance, the size of solar parks in Spain is often significant (130-230MW) and allows economies of scale in production.
- **Low borrowing rates, associated with a better market design –** secured revenue and volumes, etc.,
- **Low operating and maintenance costs**, which represent between 10% and 30% of the total cost of production. For onshore wind projects, operating and maintenance costs amount to around 24€$_{22}$/kW/year in Spain, when in France, Germany, and the US they reach around 40-45€$_{22}$/kW/year.[11]
- **Significant attractiveness of guarantees of origin (GoO/REC)** which provide additional sources of revenue for renewable projects: In Spain, GoOs are considered by investors as a stable source of revenue and 29% of the electricity consumption is covered by guarantees of origin (compared to 12,17% in 2020 in France); in the US, 9.6 million consumers voluntarily procured around 244TWh[12] of RECs – equal to 38% of US non-hydro renewable energy generation.
- **Favourable governmental support, policies, and subsidies:** tax incentives and feed-in tariff programs help stimulate investment and reduce costs.
- **Grid connection costs** which are also dependent on grid connection rules and ability to tolerate congestions' risks.
- **Short project development time** can reduce the cost of a project. On average, the project development time is relatively long in Europe. Delays in obtaining construction permits exceed the European limit of 2 years in most projects.[13]
  - The duration is on average 5 years in France and 3 years in Germany. In Italy, currently half of all renewable projects are abandoned and the other half are subject a six-year delay before obtaining permits.[14]
  - To limit the surcharges due to unplanned delays, Spain introduced a positive administration silence for self-consumption installations and solar parks.[15]

Spain, **Sweden**, **Finland**, **Denmark, Texas** tends to combine favourable factors (load factor, low O&M costs, short project development time) contributing to lowering the total cost of their renewable production when **France** and **Germany** face strong obstacles on several of the above-mentioned criteria. For those western countries, the economic competitiveness of the new nuclear plants will be crucial.

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[11] The Land-Based Wind Market Report reports that operating expenses for recently installed projects (i.e., 2019-2021) are anticipated to average between $33/kW/year and $59/kW/year (Wiser and Bolinger, 2022).
[12] National Renewable Energy Laboratory (NREL) 2021 data.
[13] REDII specifies that the administrative procedures for permit granting shall not exceed two years for renewable electricity production plants and the related grid infrastructure, including all relevant authorization, certification and licensing procedures by competent authorities.
[14] WindEurope
[15] Whenever administrations do not give a reply within 30 days the associated administrative step is considered as approved.

D Industrials are seeking to limit the volatility of electricity supply costs and will therefore assess the energy competitiveness through price stability and visibility

The energy competitiveness is not only assessed on the level but also on the stability and foresight of power prices. **Industrial players are seeking to limit the volatility of electricity supply costs** to gain better visibility on the budgets allocated to electricity and to be able to make long term investments decision more easily.

On one hand, as renewable costs are mostly fixed, they represent an opportunity to stabilize the cost in the long term. Yet, the variability of renewable production raises real stability problems for the power markets, increasing price volatility in the spot markets. Correlation between price and supply also induces risk in the value of electricity production and limits the overall value of renewable electricity production when assessing a PPA.

Moreover, electricity market players seek to protect themselves against volatility risk and therefore charge **risk premiums** generally related to volatility. This is the case for electricity suppliers that supply industrial players.

To manage this volatility the access to mitigation tools is key

Such as:

- Physical tools: flexibility assets (demand response, storage)
- Virtual/financial tools: profiling contracts, profiled or baseload PPAs.

Countries that support the development of such tools or countries with a high hydropower share should be able to provide better stability to industrials.

The regulatory risk is also key to industrials since their investment decisions are based on foreseen evolution of taxes, fees, and cost allocation rules for industrial players.

E The capacity margins and the electricity quality are also key criteria for industrials

With the acceleration of the electrification of energy usages (mobility, industries, heating, etc.), the forecasted electricity demand is strongly growing.

In Europe, the electricity demand is expected to more than double by 2050,[16] especially in countries where gas was a very significant energy carrier such as Germany.

Many countries must strongly accelerate renewable energy development to ensure sufficient generation capacity and the delivery of electricity without any shortage. This is especially true for France, Germany, and the UK, that all need to strongly reinvest in their generation mix.

The 2022 energy crisis in Europe showed that electricity margins were limited in a strained situation, leading to previously unseen electricity prices, risks premium, and strongly reducing industrial production in these countries. To prevent this crisis, many industrials are looking into the risks of:

- Missing nuclear plant development targets in France
- Missing renewable development targets in Germany and in France
- Missing interconnexion and nuclear development in the UK

This risk on access to the electricity in Europe is expressed differently in the United States where the lack of resiliency of the electric system led to several shut-down, such as in Texas in February 2021. While European countries such as France, Germany, and the UK have a System Average Interruption Duration Index (SAIFI) below 0.5, the US SAIFI is at 1.4, and was at 3.3 in Texas in 2021**: the average customer was without electricity 3 times more in the US than in Western Europe.**

The electricity quality is also key for industrials as it is key to avoid any production disruptions or material damage.

[16] The European Commission estimates it will need to more than double its electricity generation by 2050 while boosting renewables to reach its ambitious goal of climate neutrality.

F Flexibility and local grid improvement are crucial to ensure a reliable, stable, and therefore competitive power supply

To obtain price **stability**, **foresight**, **sufficient capacity margin,** and **high electricity quality**, it is crucial to efficiently integrate renewable energy sources, managing variability in demand and supply, thanks to flexibility, which can be:

- **Storage**
- **Grid interconnection**
- **Demand response** technologies (including smart grid technologies)
- **Demand-side** management

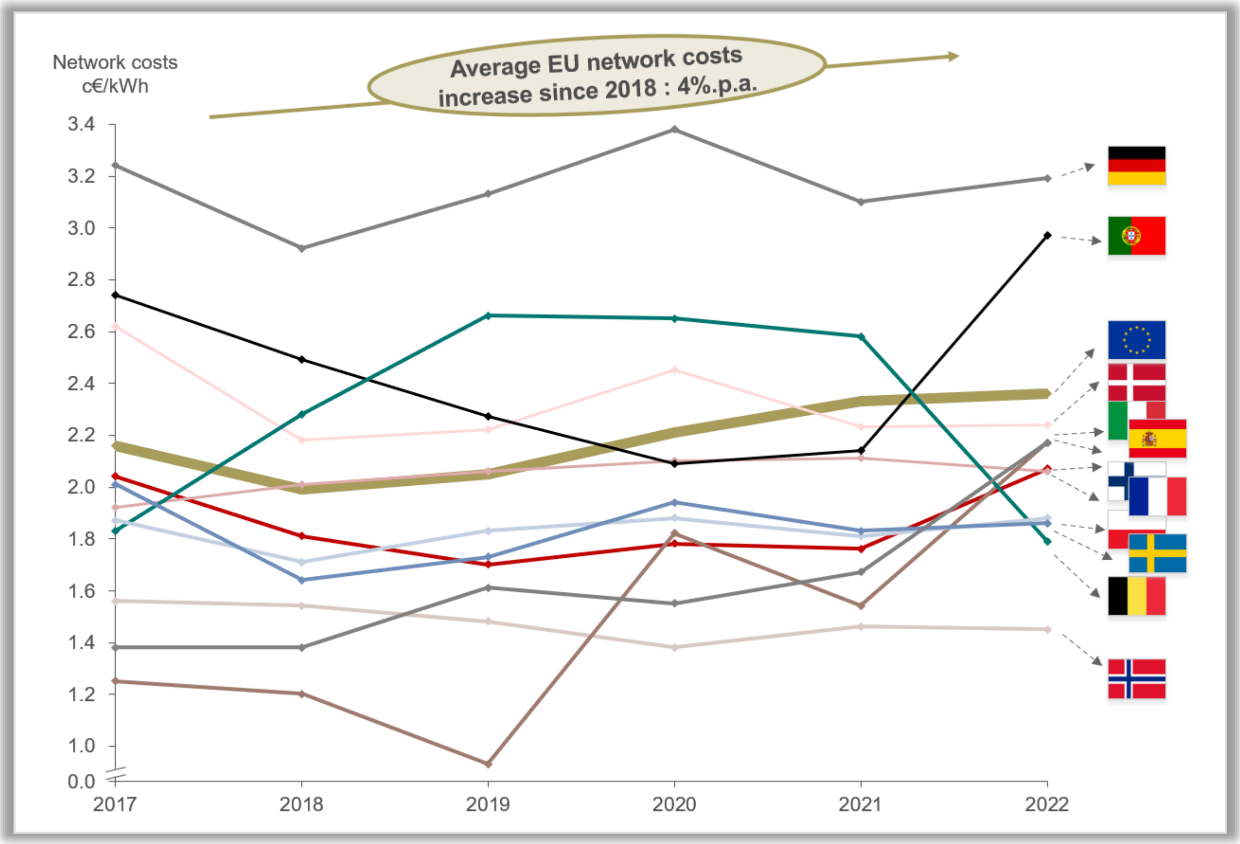
If flexibility is key to enabling the transition, it must be planned to develop it at the lowest cost possible. **It is therefore key to develop flexibility markets and regulatory frameworks** (market design providing incentives for flexibility, including capacity market and ancillary services market, encouraging market participants to invest in and provide flexibility solutions) that reward grid flexibility investments.

It will be easier for countries that have hydropower to reach higher flexibility because they already benefit from an inexpensive and extremely useful source of flexibility. These include the **Nordic countries**, **Quebec,** and **Washington State**. However, the growth potential of such flexibility can be questioned, compared to demand growth, and is also expected to be impacted by climate change.

In addition, flexibility can be reached through **demand response**, which constitutes an alternative to generation for the power system. French DSOs & TSOs have launched calls for tenders enabling storage (and flexibility providers) to offer local flexibility services, notably under the capacity market. France is working on reducing the barriers to the rollout of storage including the introduction of a legal framework, the simplification of the network connection rules, and the clarification of tax rules, with the goal that battery storage plays a significant role in stabilizing the grid by 2030. A new tender has been launched to support decarbonized flexibility technologies (AOFD) such as battery storage, to rely on them to meet modulation needs during peak periods (8am-1pm and 6pm-8pm) throughout the winter period (October to April).

Network development is also necessary. It includes the development of long-distance transmission of electricity with low losses, the facilitation of interconnection between national grids and a support in integrating renewable sources**.** The European Commission has estimated that €584 bn of investment is needed by 2030 to expand both the transmission and distribution grids in Europe. Average EU network costs have already been increasing since 2018 with high discrepancies between countries which could widen in the coming years.

Figure 5 - Network costs evolution in European countries, for industrial players with an annual consumption between 2GWh and 20GWh/year
Source: EUROSTAT



Interconnections between states/countries have been highly anticipated in Europe and are extremely useful to enable countries with high generation costs (France, Germany) to benefit from lower generation costs (e.g. Spain and the Nordic countries).

- In Europe, private market players have understood that they could benefit from neighbouring low generation cost through virtual Power Purchase Agreements (PPAs), yet they are held back by possible market disconnections which may generate high market risks if markets become uncorrelated because of insufficient interconnection.

The **modernization** of the grid is a common challenge to every country. An aging grid can slow the pace of development of renewable plants and create a bottleneck on green electricity generation.

- For example, in Poland solar installations have been delayed due to the incapacity of the grid to integrate them.
- Grid development is also a bottleneck in Spain, especially for storage development.

Focus France #2

The French Transmission System Operator (RTE) recently published its investment program for 2024 amounting to €2.2bn[17] (vs €2bn in 2023). It includes €715m to renew the existing network (+€150m compared to 2023), €490m to reinforce and create infrastructure, €260m to connect offshore wind farms, and €260m for new interconnections. Preliminary plans for 2025, 2026, and 2027 amount to €2.9bn, €3.4bn, and almost €4bn respectively according to RTE.

[17] Data communicated by RTE in February 2024 after the approval of the CRE (Commission de Régulation de l'Energie). Better to cite the article from where the data is from.

G Regulatory measures and financial aid are other levers that can be used to reduce the cost of the energy transition borne by industrials

The different ways in which governments add levers to the price of electricity create huge discrepancies in the prices paid by consumers.

The energy crisis drew attention to this specific levy. As electricity prices soared, governments responded with billions of euros in subsidies/tax exemptions to protect households and companies (EEG in Germany, TICFE in France). Although the acute phase of the energy crisis has passed, growing concerns about industrial competitiveness create political pressure for governments to continue with such subsidies or tax exemptions.

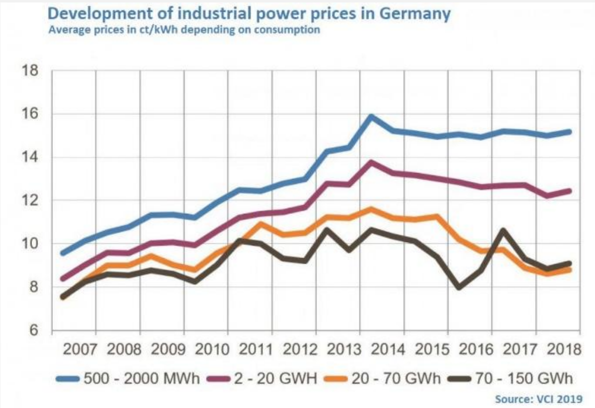
To lower the cost of electricity paid by an industrial consumer, governments can act on the tax base to shift the cost of transition onto entities that are not subject to international competition. For example, they can use to their advantage:

- The split between household and company taxes, and between small-sized, medium size and large plants.
- The split between energy-intensive and non-energy intensive companies.
- Trade-offs in attracting new clean-technology manufacturing factories.

Focus Germany #2

In Germany, large companies have enjoyed maximum exemptions from taxes and levies, paying low rates for electricity and benefiting from low wholesale power price.

Figure 6 - Historical industrial power price in Germany according to electricity consumption [c€/kWh, 2007-2018]



Germany succeeded in offering competitive electricity costs to energy-intensive industrials through specific tax exemption or levies.

- For instance, exemptions to the EEG levy were made for medium-sized and large plants in the manufacturing sector. The EEG levy is also known as "green power surcharge" and it is paid since 2000 to subsidize the expansion of renewable power plants.[18]
    - Plants were eligible for **EEG exemptions** if they used more than 1 GWh of electricity and if the ratio of electricity cost to gross value added GVA at the firm level exceeded 14%. Exempted plants paid a drastically reduced EEG of 0.5 €/MWh (compared to around 65 €/MWh in 2020) for all electricity consumption exceeding 10% of their baseline use in the year determining eligibility. Very electricity-intensive plants with an electricity consumption above 100GWh and a ratio of electricity cost to GVA of more than 20% were fully exempted.
- In addition, a levy for **industry rebate on grid fees** is included in the power price paid by German households, representing around 1.1% of the bill. Indeed, as large power consumers are partially or totally exempt from grid charges the costs are distributed among consumers via this levy amounting to 4.3 €/MWh.

Recently, the Germany's three-party government coalition has agreed a "power price package" providing at least €28bn of support from 2024 to 2027 to provide relief to manufacturing industries faced with high power prices.

The package includes:

- The **lowering of the electricity tax** in 2024 and 2025 from 15.4 €/MWh to the European Union minimum of 0.5 €/MWh for the manufacturing sector.[19] The lowered tax could be extended for a further three years.[20]
- A five-year extension of a **subsidy scheme to compensate energy-intensive companies for part of the CO2 costs** for electricity under the EU Emissions Trading System (EU ETS) for the energy-intensive companies most vulnerable to international competition.
- A five-year extension of the "super cap" which limits total CO2 emissions trading costs for about 90 especially energy-intensive companies to a certain percentage of the company's gross value added.
- A state subsidy to prevent the rise of grid fees in 2024.

[18] In 2022, the German government put an end to the EEG levy to limit the rise in electricity prices resulting from the sum of an ambitious energy transition and the high gas prices. The federal government will compensate the transmission system operators for the lost revenues with the special Energy and Climate Fund (EKF).

[19] The plan will be extended to 2026-2028 if the federal budget allows it.

[20] Government announcement.

Countries can improve their energy competitiveness by facilitating the development of renewable energy through a combination of strategic planning, acceleration of projects, and streamlining authorization processes. Here are several levies that countries can consider:

- **Long-term renewable energy planning**: with national renewable energy targets, including clear and ambitious targets for the share of renewable energy in the national energy mix, providing a roadmap for development and a certainty in its ability to maintain an over-supply of electricity despite the fast growth of demand.
- **Policy and Regulatory Framework**: with Feed-in Tariffs and Power Purchase Agreements (PPAs) providing long-term contracts with guaranteed prices for renewable energy producers, reducing the generation cost for everyone and accelerating the transition.
- **Streamlined authorization and permitting processes**: developing standardized procedures and requirements for project approval to simplify the authorization process and reduce uncertainties for developers.
- **Investment incentives and support** through tax incentives (tax credits, exemptions, or other financial incentives to attract investment in renewable energy projects).

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Energy competitiveness - Electricity costs and the energy transition: what are the consequences for competitiveness of the countries toward industries?

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