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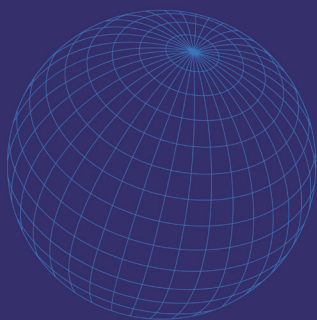
Supercharging Electrification

Europe Energy Security & Competitiveness

Life Is On

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Foreword



Europe keeps facing a clear energy trilemma, which combines the need to decarbonize its energy system with growing concerns on energy security and affordability. While progress on the former is strong, with 37% reduction in emissions since 1990, the EU continues to rely for nearly 60% of its energy supply on foreign imports, an annual spend of 380 billion euros, and the cost of energy within the EU is 2-5 times that of the U.S. and China, a clear drag on its economic and industrial development.

These dependencies and high costs put a toll on the EU's economic and political leadership in a world increasingly more competitive. To break off this situation, the solution for the EU is clear: it is electrification. It is recognized and consensual, and all scenarios, analyses and plans converge toward this approach, with the goal to reach 32% of electricity in its final energy mix by 2030, and 50% by 2040.

Yet, the share of electricity in the EU final energy is today stuck at 21%, a figure which has remained stable for over a decade. In fact, electrification is far from progressing at the right pace: electricity demand in EU 27 Member States only grew by 1% in 2024 [1]. Several problems and barriers prevent electrification from materializing at a more rapid pace. They essentially revolve around two key concerns: competitiveness of electrification, and accessibility of solutions, two issues which hamper its attractiveness.

In this report, we provide 4 key recommendations to supercharge EU's electrification future. Greater

competitiveness is possible through the combination of electrification with distributed generation and flexibility. To make it happen will require (1) to reduce the spread between electricity and natural gas prices and (2) to accelerate financing support.

Accessibility will come with the development of a robust, local, industry delivery system. To make it emerge at pace and scale requires to (3) create the market for electrification and (4) foster this development to be localized in the EU.

We hope this modest contribution to be a useful source of inputs for incoming discussions at the EU level.

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1 Electrification: the solution to exit Europe's energy trilemma

Europe faces a persistent energy trilemma

Over the past mandate, the European Union (EU) has driven a very ambitious decarbonization policy, via various legislation packages such as the *Green Deal*, including the *Fit for 55 package*, and *RepowerEU*. Europe aims to become the first carbon-neutral continent in the world. At the same time, the EU has been faced with significant crises, including the COVID-19 crisis and the war in Ukraine, which tested its stability and cohesion. They also revealed a growing and concerning competitiveness gap with other regions of the world, which has been highlighted by former Italian Prime Minister Mario Draghi. In the last 5 years, the economic growth in the EU has on average been 1% lower than that of the U.S. The medium-term projection (2028) is around 0.8% below that of the U.S. [2]. The productivity of the zone has also deteriorated in recent years. Key to these issues is energy. The EU faces an energy trilemma, combining challenges around decarbonization, energy security, affordability.

On decarbonization, the EU has made significant progress, with a reported reduction of greenhouse gas emissions of 37% since 1990 (2023 data), and a forecasted decline by 49-55% by 2030 [3, 4].

On security, the EU remains today still highly reliant on fossil fuels, with around 75% of its supply coming from oil (40%), natural gas (20%) and coal (15%) [5]. Most oil and natural gas are sourced outside of the EU. The share of import dependencies (in terms of total energy supply) was 61% in 2019, down to 58% in 2023 (post energy crisis) [6]. Eurelectric [7] considers geopolitical tensions, including physical and cyberthreats, trade as supply chain and raw materials issues and climate change as critical concerns affecting EU's security of supply.

On affordability, energy prices have receded from their 2022 peak, at the height of the Ukraine crisis, but they remain structurally much higher than those of the U.S. or China (Table 1).

A key outcome of this trilemma is the cost that energy imports represent to the EU economy. It amounted to 380 billion euros in 2023, a figure lower than the historic record of 580 billion in 2022, yet much higher than the 200-250 billion bracket of the last ten years.

The solution to Europe's energy threefold challenge is electrification

The needs for oil and natural gas in the EU are well identified (Figure 1). Several options exist to substitute them, including geothermal energy (for buildings), biofuels (mobility, industry) or biogas (buildings, industry), but they are all limited in terms of absolute potential [18, 19]. The dominant option is to substitute fossil fuels with electricity (including indirectly through green hydrogen) as a key vector of low-carbon energies. This has been widely documented in multiple reports and is now largely consensual [5, 8, 20]. As an example, Eurelectric [1] estimates that one third of fossil fuel imports could be saved by electrifying the residential and transport sectors alone.

A key reason for this consensus is also the plentiful availability of renewable resources to supply this electricity. Many countries in Europe are endowed with enough resources to supply over 10 times their annual energy needs, and for those more "stretched", their potential is generally above 2 times their needs [21, 22], all this prior to accounting for the additional potential of nuclear power.

Retail Energy Prices averages	EU [8,9]	US [10-12]	China [13-17]
Electricity (Euros per kWh)	EU: 2x US, 3x China		
Residential	0.27	0.15	0.08
Industry	0.19	0.08	0.06
Natural gas (Euros per kWh)	EU: 2-5x US, 2-3x China		
Residential	0.1	0.05	0.03
Industry	0.076	0.013	0.02 (Coal Gas) 0.04 (Natural Gas)
Oil (Euros per liter)	EU: 2.5x US, 2x China		
Gasoline	1.7	0.7	0.9

Table 1 – Retail energy prices: EU, US & China averages

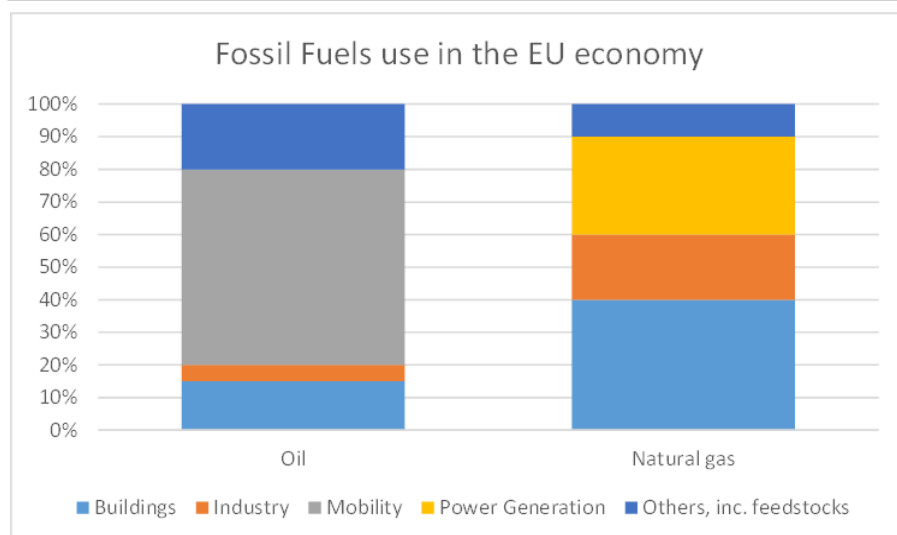


Figure 1 – Fossil Fuels use in the EU economy [23]

Electrification is technically feasible

Electrification is also largely feasible. The technological potential for electrification of buildings, industry and mobility has been widely documented and is considered to represent above 75% of energy demand (either directly or indirectly) [23-26]. In buildings, electric solutions exist and are already deployed at scale across a number of countries. In mobility, electric vehicles offer a clear pathway toward electrification. In industry, over 90% of processes will have at least one direct electrification solution technically available for scale by 2035 [26].

In a previous exercise, we estimated that the EU could reasonably reach 50% direct electrification by leveraging currently competitive and accessible technologies (Figure 2), i.e., in a relatively short time frame.

The EU Commission confirms this potential and envisions the share of electricity in final energy demand to rise from slightly above 20% today to 32% by 2030, 50% by 2040, up to 62% by 2050 (Figure 3) [5, 23]. The 2040 target thus corresponds to what our previous analysis estimated to be readily accessible with existing technologies [23].

This increase in share would translate into a rise in electricity demand of 300TWh by 2030 and nearly 1,000TWh by 2040. Such forecast assumes combined efficiency efforts which reduce the need for electricity. It however neglects the demand for data centers, which could account for 40-130 TWh by 2030 (Figure 4) [27].

As an outcome of this electrification (combined with the development of renewable energies on the power system), the consumption of oil and gas (primarily sources of imports) could drop 30% by 2030 and 2/3rd by 2040 [5]. The level of dependency on fossil fuel imports would decrease as a result to 50% by 2030 and around 30% by 2040. All else being equal, this would represent an annual saving for the EU of around 100 billion euros by 2030 and 250 billion by 2040.

Supercharging electrification

In a geopolitical context shaped by increased uncertainty, the urgency of addressing the energy trilemma has never been greater. The solution to this trilemma is clear and widely recognized: rapidly electrifying the economy, while fueling this growth in electricity demand with “homegrown” renewable and nuclear generation [7, 20]. Technology is available and therefore not a roadblock to this transition. Ambition and planning are also not roadblocks to this transition, as illustrated by the multitude of scenarios and planning exercises conducted by the European Commission and national energy agencies.

Yet, the transition to a more electric energy system is not happening (Part 2). This paper suggests key avenues for policymakers and the private sector to advance this critical journey (Part 3).

While the share of electricity in final energy demand in the EU has remained stable at around 21% over the last 15 years, China’s share of electricity grew 10 points in the same period to reach 26-28% today, and is forecasted to reach 32-35% by 2030 [13, 28-32]. There is growing evidence that China is electrifying all its sectors of economic activity, including industry [29]. Alongside this change, the competitiveness of its industry arises and puts EU industries under significant pressure on international markets [33]. It is thus time for the EU to accelerate the modernization of its energy system.

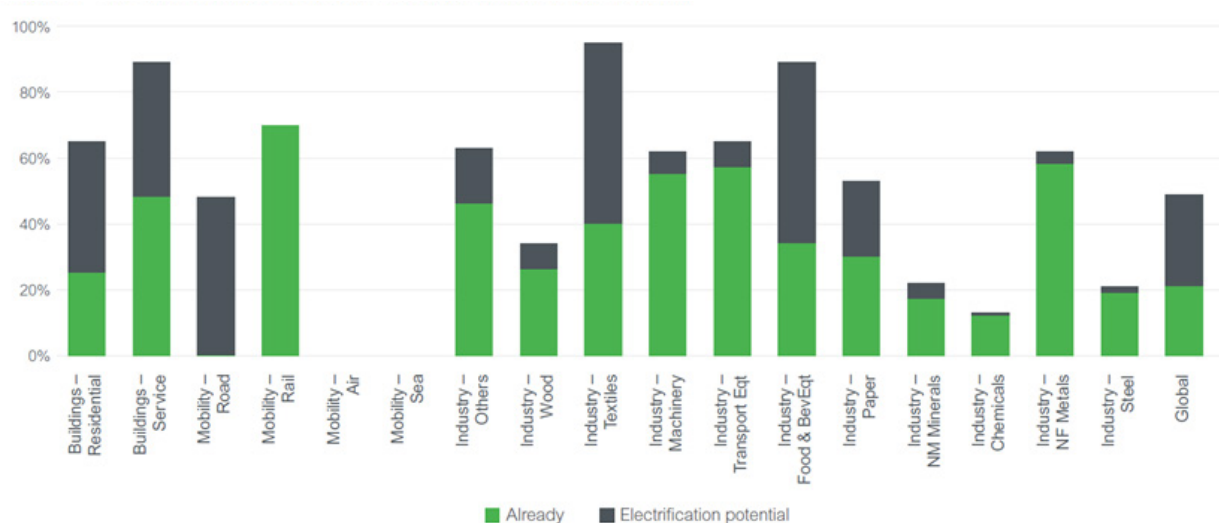


Figure 2 – Potential of electrification with mature technologies [23]

In green, the current level of electrification per sector. In grey, the electrification potential with readily available technologies for which no deep retrofit is required.

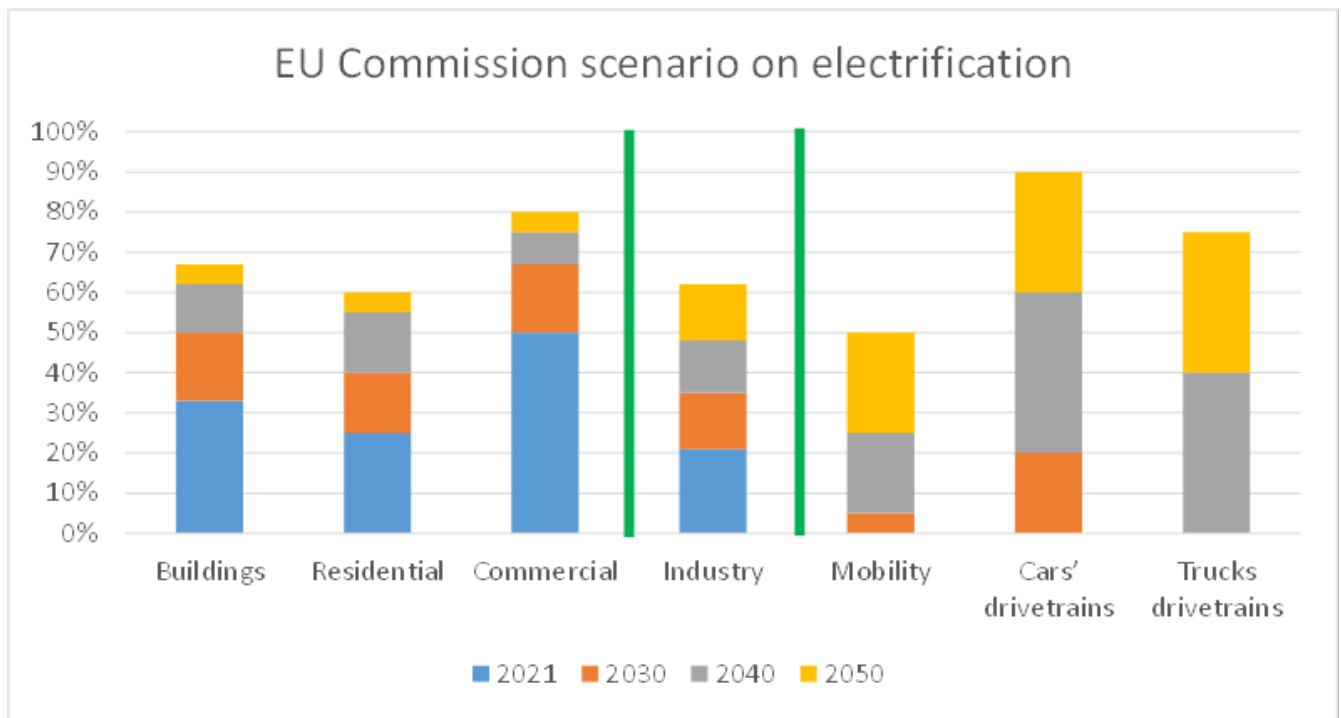


Figure 3 – EU Commission scenario on electrification [5]

These figures include indirect electrification, notably with hydrogen and with the provision of e-fuels. Hydrogen represents 5-10% of passenger cars' drivetrains in 2040-2050, 10-25% of trucks' drivetrains, while hydrogen and e-fuels represent the bulk of needs in shipping and aviation

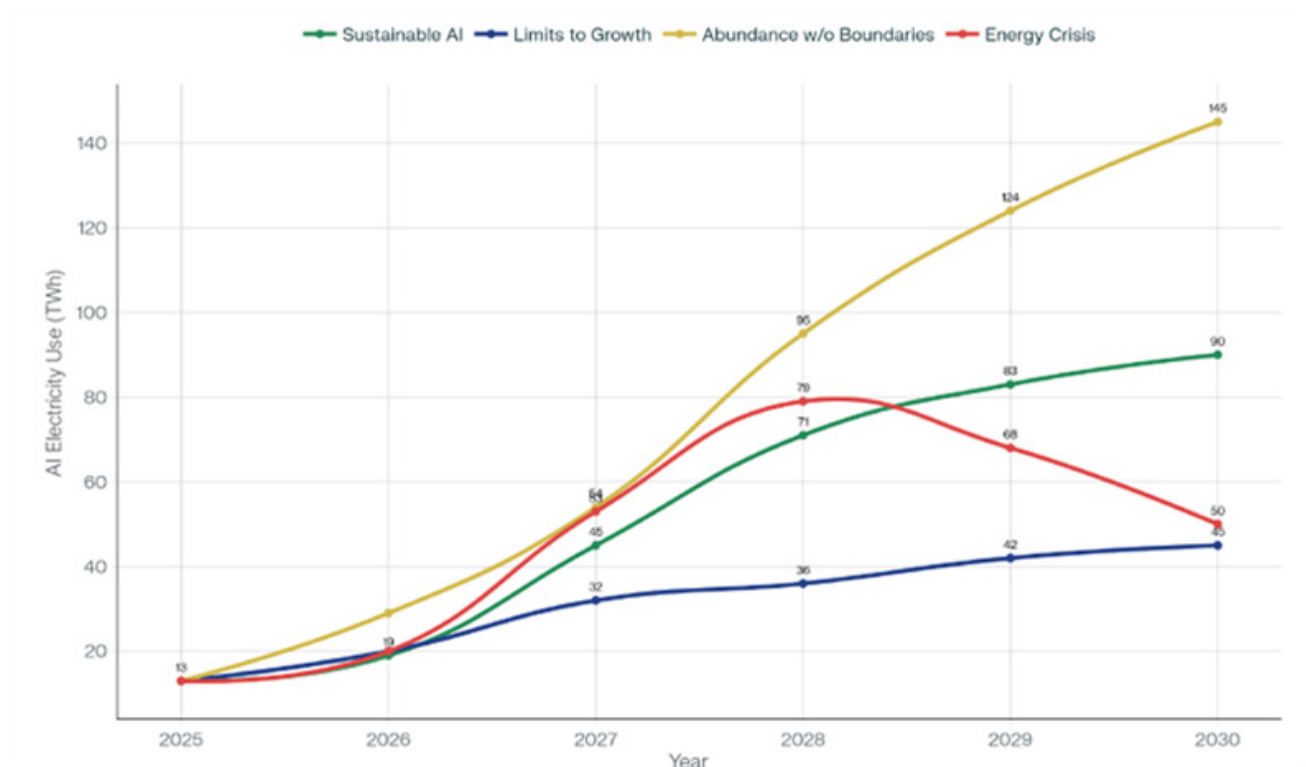


Figure 4 – 2030 impact of AI on Electricity demand in Europe across 4 scenarios [27]

2 Electrification is not progressing across the EU



Table 2 shows a set of KPIs which highlight the state of progress (or rather lack of) toward electrification across key sectors and countries [5, 34-39].

For mobility, Nordic countries (Denmark, the Netherlands, Sweden) are typically more advanced in their transition. Countries in the South of Europe see their buildings structurally more electrified, but Belgium and the Netherlands stand out with high share of prosumer developments. In industry, the share of electrification varies significantly across countries and depends on the structure of industrial activities.

Even if not part of the EU, Norway stands out as a highly electrified country across most end uses. It lags however on prosumer development. Current levels of adoption are generally low across all countries from the EU, however. Looking at the 2030 ambition, the EU is lagging significantly across all sectors of activity.

Table 2 – Progress in electrification

KPIs	Mobility	Buildings			Industry	
	EV %	Heat pumps %	Electricity %	Prosumers %	Electricity %	Prosumers %
Austria	5%	11%	29%	NA	29%	NA
Belgium	5%	NA	20%	22%	31%	NA
Bulgaria	NA	NA	52%	NA	32%	NA
Croatia	NA	NA	25%	1%	27%	0%
Cyprus	NA	NA	43%	14%	21%	0%
Czechia	1%	6%	21%	4%	33%	NA
Denmark	12%	7%	20%	NA	33%	NA
Estonia	1%	NA	20%	4%	45%	NA
Finland	4%	45%	35%	3%	31%	2%
France	4%	8%	36%	2%	37%	0%
Germany	4%	2%	21%	7%	33%	6%
Greece	1%	NA	34%	1%	40%	NA
Hungary	2%	NA	20%	6%	38%	NA
Ireland	7%	7%	27%	5%	28%	3%
Italy	1%	NA	20%	3%	39%	2%
Latvia	NA	NA	13%	NA	16%	NA
Lithuania	1%	NA	18%	5%	32%	3%
Luxembourg	12%	NA	17%	7%	51%	1%
Malta	4%	NA	75%	10%	67%	3%
Netherlands	7%	7%	24%	30%	24%	NA
Poland	1%	2%	12%	9%	26%	1%
Portugal	4%	NA	42%	4%	33%	1%
Romania	1%	NA	15%	2%	29%	8%
Slovakia	NA	NA	21%	NA	27%	NA
Slovenia	2%	NA	34%	6%	38%	4%
Spain	2%	19%	45%	2%	31%	6%
Sweden	8%	36%	48%	6%	34%	3%
EU - 27	4%	16% *	26%	NA	21% **	NA
Norway	26%	42%	71%	1%	64%	2%
Ambition 2030 EU-27	20%	45% *	40%	NA	35%	NA

* both residential and commercial buildings, data 2023, corresponding to around 20 million units in the stock, including 60% in residential [40]. Building stock is about 100 million households and 10 million commercial buildings. Target for 2030 is around 60 million units [39, 41], i.e., 3 times more. There is however no clear penetration rate ambition, including per segment. Assuming similar number of units per type of building and constant stock, this leads to a 2030 ambition of 45%.

** Figure 3 shows a share of electricity in industry of 21% as of 2021. This figure includes non-energy feedstocks. The figures reported per country exclude energy feedstocks and correspond to an average share of 33%. The overall ambition of the EU is to reach 35% by 2030, i.e., +14 points in the mix, including energy feedstocks.

3

Supercharging electrification



Priority 1 – Make electrification competitive

A first key issue with electrification is concerned with the price of electricity and its subsequent impact on competitiveness.

First levers are already identified to make electrification more competitive

The EU Commission has recently focused on laying out a plan to address this issue, the *Action Plan for Affordable Energy* [8]. The plan introduces a series of policy recommendations, including reducing permitting times for energy supply and infrastructure, supporting long-term contracts and PPAs, and boosting grids and interconnectors with counter guarantees from the European Investment Bank (EIB). All these measures aim at increasing the provision of competitive supply across the EU Member States.

Other propositions focus on addressing retail prices by looking into network charges and taxation, among other measures. On taxation specifically, taxes on electricity represent a similar percentage than taxes on natural gas across both households and industry, but they are 2-3 times higher in absolute value (i.e., in euros per kWh) [9]. Taxes on electricity also increased faster than on natural gas in recent years [42].

Flexibility mechanisms are also encouraged to cope with growing intermittent renewable energies and avoid both price spikes as well as curtailed generation. The goal of the EU is to facilitate market access for storage and demand response mechanisms.

Going the next mile: flexibility further increases electrification competitiveness

In this report, we argue there is a large potential for cutting energy bills and creating large volumes of flexibility by combining technologies on the demand-side, what is seldom considered.

Industry

Analyses from Eurelectric [20] and others [26, 43-45], in Europe and elsewhere, have shown that, under certain conditions, electrification could be competitive for certain industry sectors. Yet, other analyses have shown the opposite, i.e., a negative impact from electrification on competitiveness [24].

Most of these studies however neglect the economic impact of combining electrification with local generation, storage and digital controls, effectively making electrification flexible, i.e., able to leverage renewable-based intermittent supply and associated variable retail prices.

A set of Schneider Electric studies has explored the economics of such flexible electrification on the demand-side for a variety of industrial sectors, looking at the resulting levelized cost of production. In sectors such as ammonia and steel, these studies have demonstrated that costs of production could be competitive (Figure 5 & 6) [46, 47].

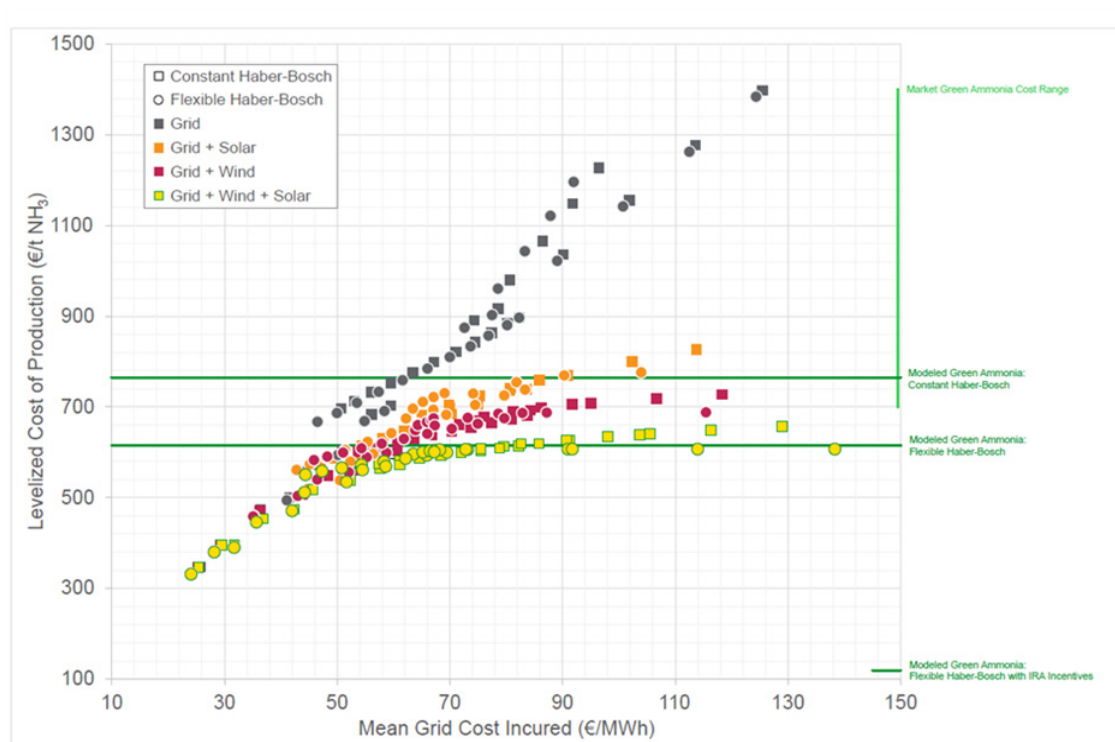


Figure 5 – Levelized cost of Green Ammonia production as a factor of the cost of electricity [46]

Buildings

The same logic can apply in buildings, whether they be residential, commercial or industrial buildings. When electrification is combined with rooftop PV, stationary storage and digital controls, Schneider Electric studies suggest savings on energy bills ranging between 15-80%, a major economic breakthrough [48]. Residential buildings and horizontal commercial assets (e.g., retail centers) generally range above 60%, while more vertically constrained assets (e.g., large office buildings or hospitals) will trail on the lower end.

Paybacks are also generally attractive, with Internal Rate of Return - IRRs - above hurdle rates (Table 3).

Implications of flexible electrification

This development not only reduces energy bills and increases competitiveness with attractive paybacks, it also contributes to a faster transformation of the energy system.

First, it supports the accelerated deployment of power capacities across the region [48]. The potential of rooftop PV is notably estimated to be above 1,000GW in the EU [49], nearly 10 times the current installed capacity of around 140GW [50].

Second, it also helps to mitigate peak demand issues, hence reduce grid expansion costs. It will notably contribute to create headroom for further demand to be integrated, and for the existing network to reach higher utilization levels (all benefits not integrated into the above economic estimations) [51, 52].

Finally, as it also supports the further provision of flexibility services, it benefits the system by reducing curtailment and contributes to avoid price spikes [53].

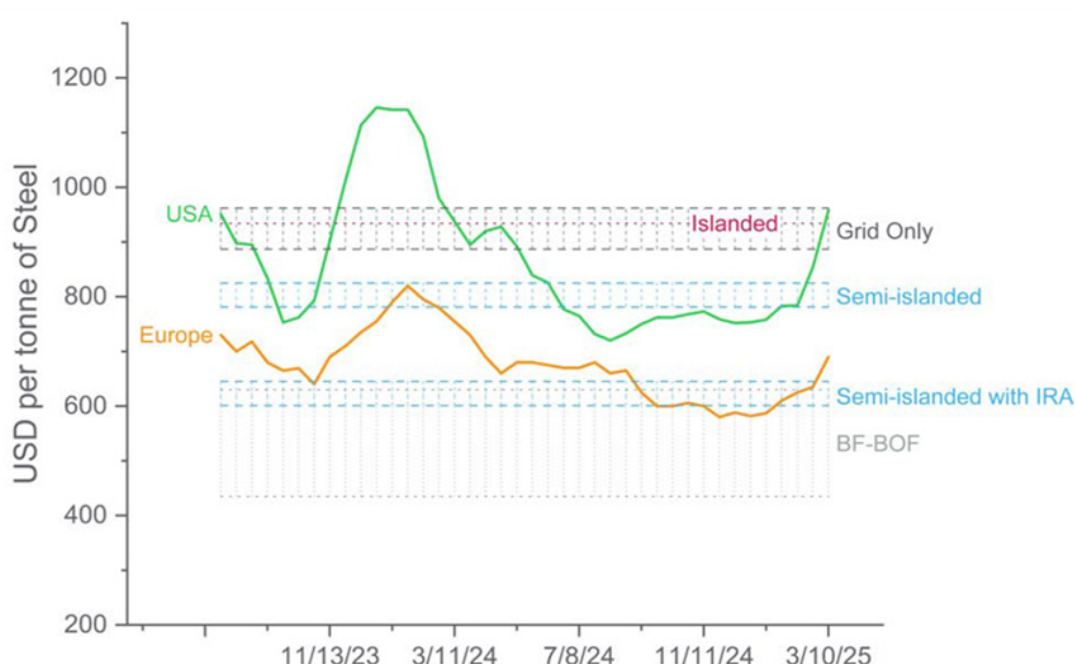


Figure 6 – Levelized cost of Green Steel production leveraging flexibility [47]

Table 3 – Paybacks in years of the implementation of rooftop PV, stationary storage, digital controls and heat pumps across different building types

Payback in years		Retrofit				New			
		Denmark	France	Italy	Spain	Denmark	France	Italy	Spain
Private investor	Large office	15	20	17	17	19	14	11	13
	Small hotel	10	11	10	7	9	10	8	7
	Strip mall	8	11	8	6	3	7	6	3
Public investor	Hospital	6	9	7	7	7	9	7	7
	Secondary School	12	17	13	14	14	11	8	11
Households	Mid-size apartment building	8	9	9	9	4	5	6	5
	Single Family home	7	9	8	9	5	5	6	5

Accelerating on electrification competitiveness

A more efficient and flexible demand side, capable to leverage variable retail prices, is thus key to cut electricity bills and enable competitive electrification. At the same time, such development increases the efficient dispatch of the growing renewable capacity installed throughout the EU. This “built-in” flexibility optimizes the utilization of the system as a whole and reduces the need to invest in utility-scale level provisions.

We recommend the following, in addition to the proposals of the *Affordable Energy Action Plan* [8]:

Recommendation 1 – Reduce the spread between retail electricity and natural gas prices

In the short term, putting an end to **fossil fuel subsidies** would improve this spread. Subsidies that increased during the energy crisis, have not been all phased out. This is particularly relevant in Germany, Poland and France [54].

Another key measure, already discussed by the EU Commission [8], is to address the **taxation discrepancy** between electricity and natural gas. The revision of the energy taxation, over 20 years old (2023), is still ongoing and must be finalized. Taxation changes at national level should be encouraged.

Key to reducing this spread will also be making **electricity tariffs more flexible**, in order to ensure the emergence of flexibility incentives that will play a pivotal role in reducing total energy costs for buildings and industry. The bottleneck of smart meter deployment must notably be addressed: EU27 penetration rate is at 58%, behind the 80% target [1].

The standardized **compensation mechanism** for industrial demand flexibility suggested by M. Draghi should also be encouraged as a key tool to foster the development of large flexibility capacities [55].

Recommendation 2 – Accelerate the financing of the transition (both public and private)

While benefits of the transition will be felt on the long run, upfront costs constitute a key barrier to change in the short term [26, 56, 57]. The EU can contribute to reduce these, hence optimize profitability evaluations significantly, through **investment incentives** and **production tax incentives**. As an example, the US \$500bn *Inflation Reduction Act* main instruments include tax credits and tax deductions. In India, corporate tax rates for foreign firms are being reduced and rules for foreign investment made easier. By contrast, the EU financial support is much less effective: it is both fragmented and subject to complex procedures. While the Commission's recommendation on national tax incentives [26] offers targeted solutions for industry to make final investment decisions, it remains a non-binding guidance and implementation up to Member States [58].

A second issue with upfront costs is the cost of capital. The creation of an “**Industrial Decarbonization bank**” and first pilot auction is positive: such initiative should be pursued and focused on electrification. Securing favorable capital costs for the private sector could contribute to optimize the profitability of these investments in the short term. Attention to the electrification of heat in industrial processes is particularly important - by 2035 most industrial processes will have at least one direct electrification solution technically available at scale, which could cover 90% of these processes [26].

Third, a specific focus could be placed on **SMEs** in their transition. Bruegel calculated that 59% of funding earmarked to shield households during the energy crisis was untargeted price subsidies [59]. Targeting support without distorting prices is a means to shield households and SMEs at a much lower cost. Support to SMEs could notably be significantly improved, as the bulk of current support mechanisms today targets large companies [55].

Finally, **ETS revenues and the Innovation fund** could be primarily allocated to electrification projects at national level, in addition to unlocking targeted funding under the upcoming *Multiannual Financial Framework*.

Priority 2 – Make electrification accessible

Barriers to electrification are not only economic

Electrification does not only require to be economically attractive. It is also faced with key impediments to adoption and rollout. Industry as a whole can play a crucial role in diffusing new solutions effectively [60], but is facing four critical uncertainties, which hamper adoption.

First, **market demand** for sustainability remains uncertain [61-63] and can evolve over time [64]. It is affected by changes in context [65], public opinion shifts [66] or narratives [67-69]. These concern not only demand from consumers, but also demand across industry sectors [57], and thus influences industry decisions to engage in their transition.

The process of change is also deeply constrained by the perpetuation of social practices and habits [70, 71], cultural traits [56, 72, 73], and the fear of adaptation and the complexity that it entails [56, 74, 75], what can lead to resistance to change [56, 76, 77]. Industry is thus faced with this critical uncertainty, even if it can in part contribute to mitigate it by shaping future markets [78-80].

A second uncertainty relates to **competition** dynamics. Industrial sectors are characterized by relative inertia: “mimetic” pressures are the norm [81-83]. This pattern contributes to slow down change initially, but it accelerates it when scaling begins. Incumbents are notably key in this process of scaling [60, 81, 83], given their size and reach, even if there is evidence that they seldom initiate change originally, thus requiring external interventions [78, 84]. The future potential for differentiation or concerns on losing this differentiation play a major role in driving corporations to adopt new strategies such as electrification [81, 85, 86].

The third barrier concerns **feasibility** of change. It first has to do with technological [26, 63] and infrastructure risks [26, 62, 63, 87]. Technological risk is all the more an issue in the absence of standards and norms [88, 89], and generally requires institutional evolutions [90-94]. It is also deeply connected with the potential lack of awareness on existing solutions [63, 95-99]. Feasibility also depends on the readiness of infrastructure, supply chains [26, 62, 63, 74, 100, 101], and skills [95, 97-99, 102, 103].

Finally, industry is particularly sensitive to **policy** uncertainty [104, 105] and misalignments with government on objectives and ambitions [106, 107] (Figure 7).

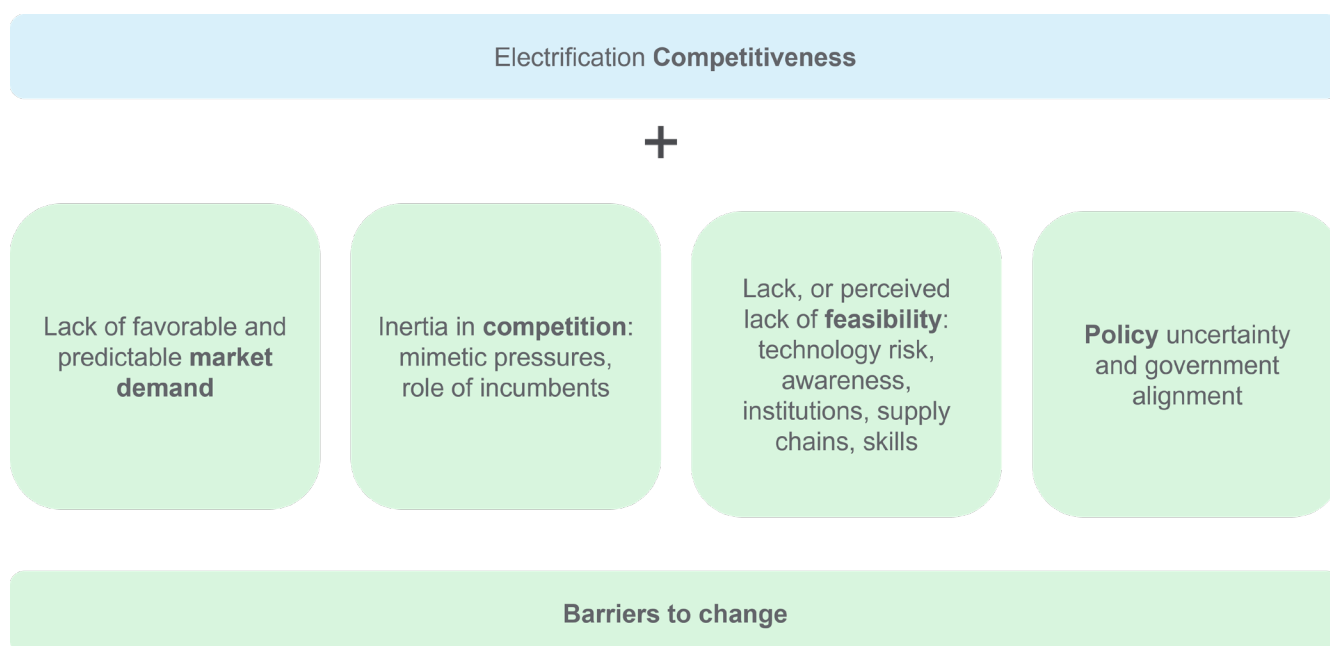


Figure 7 – Making electrification accessible

Address the last mile: Ramp up a clean delivery industry

For electrification to become accessible requires a local, job-intensive delivery system to emerge at scale. Such development will reshape markets and solve for most barriers identified. It will first contribute to create market demand by increasing the attractiveness of electrification. To take an example, the cost of a rooftop installation in Australia today ranges around AU\$0.9 per Watt [108]. In Europe, this is 4-6 times more [109-112], when accounting for exchange rates. The reason for such difference lies in the availability (or lack of) of a robust delivery system. It will also contribute to solve for competitive inertia. With market demand growing, incumbents and competitors scale their response accordingly. It will finally help to address feasibility issues, by reducing technology risk through learning curves and innovation, by building efficient supply chains and skills, and by institutionalizing change.

Recommendation 3 – Create the market

Tackle the low hanging fruits to kick off rapid change

A first option to enable this ramp up is to mandate change where change is easy. These include first **new constructions**: there is nothing that prevents new constructions (e.g., buildings, light industry facilities) from being designed electric and flexible. In the building sector, for instance, the additional cost impact on construction is negligible compared to the cost of land [48, 113], and irrelevant when considering the benefits to dwellers.

The **commercial building sector** (including industrial buildings) is also easier to electrify. Decision processes are more straightforward, capital is more readily available and paybacks are very attractive in most cases [53, 114].

A dedicated focus must be placed on the development of **prosumer**, for residential, commercial and industrial buildings. A recent estimate suggests the potential creation of up to 1 million jobs in the EU, mostly in installation services which are impossible to delocalize [115].

Boilers also represent a quick win in both buildings and manufacturing. Fossil fuel based **steam production and water heating** systems represent around 10% of final energy demand in the European Union, across all sectors of economic activity [23]. In all these applications, electric alternatives already exist and are deployed at scale. For instance, in commercial buildings, more than one in three boilers is electric. In the food and beverage industry, electric drying systems represent one in six systems deployed already. There is no roadblock to bring these shares closer to universal adoption. The phasing out and banning of fossil fuel boilers in buildings, as adopted in the *Energy Performance of Building Directive* (EPBD) should notably be rapidly implemented.

Beyond steam production, **heat pumps** are already mature and competitive technologies for many applications across both space and industrial process heating. Space heating addresses residential and commercial buildings, but also industrial buildings: process heating indeed only accounts for 60% of final energy demand in industry [26].

For process heating, low-temperature processes (i.e., below 150 degrees) account for 30% of total (and nearly 40% below 200 degrees) [26]. Once again, the rapid

deployment of building and industrial heat pumps could speed up electrification.

Finally, **electric vehicles** represent a significant opportunity for reducing oil demand in the short-term. Most recent projections suggest that EVs will reach purchasing price parity in the foreseeable future, while they clearly offer significant savings on operational costs already [38, 116]. Greening corporate fleet with relevant incentives would notably support the adoption of EVs. Company cars represent 40% of new vehicle sales in Europe [117], on par with privately-owned cars.

Create long-term predictable demand

Once these low hanging fruits are tackled, industry also requires predictability. Select markets indeed need deeper transformations and will need to engage in very large capital investments. These include for instance the steel and chemical industries. Together, they account for 30% of oil and natural gas demand in industry (excluding feedstock) [23].

Around 40% of **steel production** goes to the **construction industry**. Ensuring the rapid ramp up of green steel has necessarily to rely on long-term predictable markets, and will thus depend on the demand for such materials from the construction industry. Regulating on mandatory shares of green materials within construction standards is a key enabler of a private-sector funded development of the green steel industry. As we showed above, the cost of such materials does not need to be higher than current. It may however be the case if flexibility options are not leveraged. In any case, the impact on total cost of ownership remains extremely limited [118].

The **chemical industry** is today the main sector where hydrogen is consumed. The European Union produces around 8 million tons of hydrogen annually [119], essentially thru reforming. This is a primary target for the removal of fossil fuels in the European economy, where support should be targeted. While this may lead to an increase in the cost of production at first, this does not necessarily need to be the case either, as discussed above [46]. Over 55% of hydrogen is used for **treatment of diesel** production, while another 25% goes to **ammonia production**, out of which 70% is used for **fertilizers** production [119]. Regulation on both refinery use of hydrogen and fertilizers' hydrogen content would support the ramp up of a sustainable green hydrogen industry.

The implementation of **Contracts for Difference** (CfDs), offtake prices and other mechanisms will also contribute to ensure rapid ramp up of decarbonized products in hard to abate sectors and can complement other regulations discussed above.

The European Commission's first **sectoral tripartite contracts** for offshore wind, grids and storage could be a first step forward, giving producers confidence to deploy projects that boost industrial electrification and clean energy. Expanding tripartite contracts for electrification tailored to industry needs would further reduce market risks and drive investment. Tripartite contracts could also be linked to additional regulatory measures, such as faster permitting.

Recommendation 4 – Foster local development

The ramp up of a vibrant delivery value chain must also be a source of local economic development and jobs. Lots of recommendations have already been suggested in the report prepared by former Italian prime minister Mario Draghi [55]. We support these findings and recommend a key focus on three key subjects, which we believe can contribute to accelerate the development of electrification.

Leverage public procurement

Public procurement should be a first priority. Each year, the EU spends 14% of GDP on the public purchase of services, works and supplies [120]. If all these public investments integrated a strong sustainability component (e.g., on public buildings), a vibrant local market for new value chains would emerge.

We also recommend a mandatory **minimum European content** in public procurement. The revision of the public procurement directives is the opportunity to strategically leverage public demand and incentivize investment and job creation in Europe.

Reduce information asymmetries

Emphasis must also be placed on supporting this local development through targeted institutional and informational measures. **Standardization** will for instance be a critical enabler of the ramp up of a vibrant local value chain. Indeed, standards play a major role in creating the right conditions for the upskilling of existing value chains and manufacturers. Efforts in standardizing installation rules should thus be accelerated by existing bodies, and deployed to the EU countries more rapidly. The use of European standards and certification, when required, should be a prerequisite.

A complementary measure would be to develop a **market clearinghouse**. The lack of awareness of existing solutions and potential incentives to transition is a key barrier to change, particularly for SMEs. This could be addressed by the development of a one-stop-shop access which would provide the necessary information to customers and suppliers on technology, opportunities and support mechanisms.

Develop a targeted industrial strategy

Finally, we suggest targeting **support for technologies where Europe can lead**. In 2023, China accounted for 80% of the investments in manufacturing of key clean technologies (versus 20 % for the EU and US combined) [121]. In the technology race, Europe is lagging in seven of eight most critical technologies (semiconductors, AI, manufacturing, quantum computing , biotech, energy tech, space tech, and advanced connectivity) [122]. This requires measures with high impact, to focus support, incentives and investment on critical and cutting-edge technologies where the EU can still be ahead globally, as in batteries, technologies for electrification, electrolyzers, or digital solutions for energy management.



Conclusion



The electrification of the EU is a crucial priority to recover economic margins of maneuver, reduce its physical (and geopolitical) reliance on imports, cut energy bills for Europeans, and foster a vast industry modernization program to regain productivity and competitiveness at global level. In fact, electrification is primarily about modernization, a positive change which will bring prosperity while decarbonizing the economy.

While a consensus generally exists on the importance of electrification for the EU, it however does not progress at the scale required, or at least in line with the ambitions set forth by the EU Commission. The target is to reach 32% share of final energy by 2030, versus 21% today, a figure which has stayed stable for the last 15 years.

Supercharging electrification will require to focus on making it competitive and accessible. Both are possible in a short time frame, i.e., before 2030. We suggest key recommendations to advance this ambitious agenda, which are summarized in Table 4.

Another important region of the world, China, has embraced this plan for a decade. Results are, as discussed, staggering. The EU has the potential, skills, financial depth, and resources to execute this plan and beyond, and secure a long-term economic and political leading influence at global level. It needs to embrace modernization.

Table 4 – Summary of recommendations

Priority	Recommendation	Detailed measure
Make electrification competitive	Reduce the spread between retail electricity and natural gas prices	End fossil fuel subsidies
		Address taxation discrepancies between electricity and natural gas
		Make electricity tariffs more flexible to incentivize electrification and prosumer models
		Foster the implementation of the standardized compensation mechanism for industrial demand flexibility
	Accelerate the financing of the transition (both public and private)	Facilitate investment through investment and production tax incentives
		Focus the Industrial Decarbonization bank on electrification to secure access to affordable capital
		Focus target incentives on SMEs
		Allocate ETS revenues and the Innovation Fund primarily to electrification
Make electrification accessible	Create the market <i>Tackle the low hanging fruits</i>	Put clear mandates on new constructions: what is built new is built right
		Focus on the commercial building sector (including industrial buildings): economics are more attractive
		Develop a specific prosumer initiative to accelerate uptake
		Develop a specific boiler replacement program across buildings and industries
		Develop a specific heat pump deployment program across buildings and industries
		Drive further EV adoption, with notably a focus on fleets
	Create the market <i>Create long-term predictable demand</i>	Steel: set minimum shares of green materials in the construction industry
		Chemicals: set minimum shares of green hydrogen on fertilizers and on diesel treatment
		Develop a plan to accelerate contracts for differences (CfD) across industry actors
		Expand sectoral tripartite contracts for electrification
	Foster local development <i>Leverage public procurement</i>	Mandate electrification in sustainable procurements
		Mandate minimum European content in public procurement
	Foster local development <i>Reduce information asymmetries</i>	Accelerate on standardization and norms, particularly on installation rules
		Develop a market clearinghouse to correct information asymmetries and accelerate uptake
	Foster local development <i>Develop a targeted industrial strategy</i>	Target support for technologies where Europe can lead, such as batteries, electrolyzers, digital solutions for energy, etc.

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