Eurochambres Chief Economists
Working Paper #1

Electricity prices and employment

Across European countries

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1. Executive summary

High energy costs directly impact the competitiveness of European businesses and place additional pressure on employment. This report examines how a change in the price of electricity is associated with a change in employment in 28 European countries between 2008 and 2021. Using aggregated national-level data and focusing on 10 economic sectors and the working-age population (20–64 years), our findings show a significant negative relationship between electricity costs and employment levels.

Specifically, a 10% increase in electricity prices is associated with a reduction in employment ranging from 1% to 1.5%. This effect is more pronounced when a two-year lag is applied and is particularly evident in energy-intensive sectors, such as manufacturing, transportation, and retail. These findings suggest that sustained high energy costs may undermine job stability in key parts of the European economy.

While electricity prices are not the sole determinant of employment outcomes – European businesses also face challenges such as skills shortages – they remain a critical factor influencing competitiveness and business decision-making.

The findings have clear implications for EU policy. To safeguard Europe's industrial competitiveness and maintain an attractive investment environment, a two-pronged approach is needed: (1) reducing energy costs and (2) promoting policies that enhance labour market flexibility and support worker retraining.

These measures are essential for ensuring that Europe's industries remain resilient, adaptive, and globally competitive.

2. Acknowledgments

The report is the result of a joint effort of the Eurochambres Chief Economists Group. Eurochambres would like to extend its gratitude in particular to Johan Eklund, Chief Executive Officer and Chief Economist at the Chamber of Commerce and Industry of Southern Sweden, Goran Šaravanja, Chief Economist at the Croatian Chamber of Economy, Marco Pini, Chief Economist at Centro Studi G. Tagliacarne (Study Centre of Unioncamere) and their respective teams.

3. Introduction

The European energy crisis, triggered first by the COVID-19 pandemic and later exacerbated by Russia's invasion of Ukraine, has led to a dramatic surge in energy prices, undermining Europe's already challenging post-pandemic recovery and deepening economic uncertainty.

Despite initiatives of the European Commission and national governments to mitigate the negative impact of the energy shock, energy prices currently remain significantly above pre-pandemic levels and seem to have stabilised at higher rates. This context aggravates Europe's already fragile economic outlook with business confidence expected to remain worryingly low for the foreseeable future as highlighted in the Eurochambres Economic Survey 2025 (EES2025). With the global competitiveness of European industry at stake, investment capacity and economic soundness of individual firms – particularly small and medium-sized enterprises (SMEs) – must be supported.

As energy bills absorb a larger share of company revenues, businesses are increasingly forced to make difficult trade-offs. Many may reduce or delay investments, while others might respond by cutting labour costs – either through layoffs or by halting new hires. This dynamic undermines Europe's ability to fully utilise its human capital, weakening its position in the global economic landscape at a time when competitiveness and innovation are crucial drivers of economic growth.

To better understand the broader economic consequences of sustained high electricity prices, this paper examines the elasticity of employment with respect to electricity prices in Europe by using aggregate statistics for 28 European countries and 10 economic sectors from 2008 to 2021.

Given that price changes affect the optimal mix of inputs (capital and labour), we can assume that production and employment are dependent on the price of electricity. Theoretically, an increase in the price of electricity can result in both decreased and increased employment, depending on whether electricity and labour are complements or substitutes in the production process.

In empirical studies, it is common to find a negative effect between an increase in the price of electricity and the number of employed in the short run. This can be viewed as a direct price effect. Differences between regions and countries with respect to the composition of industries are expected to mirror regional and/or national comparative advantages. In other words, in some regions/countries, the price and supply of electricity may be a more important factor for competitiveness, compared to others. This, in turn, contributes to explaining patterns of industrial specialization. We can therefore expect a larger share of industrial dependence on electricity in regions/countries with historically affordable electricity prices.

There can also be a substitution between electricity-intensive production and labour-intensive production, which could theoretically link an increase in electricity prices with rising demand for labour. This is the so-called substitution effect. In this study, we focus on the price effect, which is confirmed as the dominant effect by previous studies, to estimate how labour demand is affected by electricity prices.

We can also expect that both the price and the substitution effects differ over time. Production adjustments often take a long time, sometimes several years, while electricity prices are often set on rapidly changing spot markets. There might also be considerable differences between different companies and industries depending on the energy (electricity) intensity of production. This means that the net effect of rising electricity prices will depend partly on how sensitive labour demand is to the price of electricity.

Our findings reveal a negative relationship between electricity prices and employment levels: increases in electricity prices are associated with decreases in employment, with the effect being more pronounced when considering a two-year lag and when examining energy-intensive sectors such as manufacturing, transport, and retail. These results are consistent with findings from existing literature performed both at the micro and macro levels.

While data employed in this study cover the period until 2023, the core analysis excludes post-2021 values to avoid distortions due to the particularly volatile energy prices in 2022 and 2023.

Based on the findings, a set of policy recommendations are presented, addressing the structural drivers of high energy prices. Eurochambres thus stresses the need to act swiftly and decisively, as addressing a pressing issue like that of high energy prices is of utmost importance to preserve Europe’s industrial base, safeguard jobs, and ensure economic growth and prosperity for businesses and citizens alike.

4. Overview of Europe’s electricity market

4.1 Functioning of the electricity market in Europe

In recent years, European countries have experienced significant surges in energy prices in general, and in electricity prices in particular, owing to the COVID-19 pandemic on the one hand, and Russia’s invasion of Ukraine on the other hand. These events have brought renewed attention to the structure of energy pricing in Europe and the underlying mechanisms that determine them.

Europe’s electricity market operates on a liberalised, merit-based pricing system whose legal bases lie in the several legislative packages – the so-called Energy Packages – that, from the 1990s onwards contributed to gradually opening up monopolistic national markets for electricity and gas to competition. In the current system, wholesale electricity prices are determined by the equilibrium of supply and demand. To maintain grid stability and avoid system breakdowns, electricity supply must match demand at all times.

The demand for electricity at the wholesale level is affected by a variety of factors, including weather conditions and infrastructure development, encompassing also geopolitical tensions, and macroeconomic variables. In the short term, household demand does not significantly impact electricity prices, whereas factors such as industrial activity, building stock development, and extreme weather play more substantial roles in shaping short-term demand.

The final wholesale market price is then set according to the principle of marginal cost pricing. When faced with a certain level of electricity demand, first it is the electricity power plants with the lowest marginal costs that are called upon to meet demand. Based on the demand level and their ability to supply, other power plants with higher marginal costs then deliver the energy quantity needed. The process continues until demand is fully met. What then sets the wholesale market price is the production cost of the last (and most expensive) power plant needed to meet the demand.

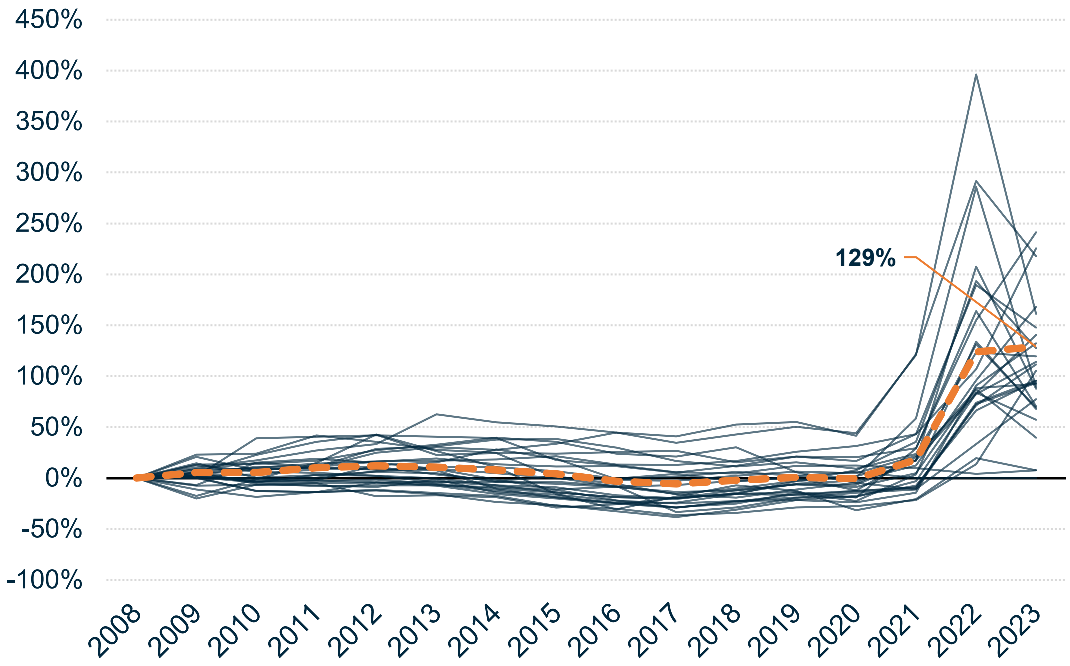
Since the marginal cost of gas power plants is higher than that of wind, solar, and nuclear power plants, gas is often the last production unit needed to meet demand and therefore sets the electricity price. This is why reduced gas supply from Russia just before the war, and higher costs of liquefied natural gas (LNG) gas from the US resulted, and still result, in higher electricity prices in Europe, especially in countries that are not self-sufficient when it comes to energy. On the contrary, renewable sources of energy have the potential to generate electricity at lower costs, even though their overreliance poses concerns over their volatility and variability.

The retail electricity prices experienced by both households and businesses, however, do not correspond directly to wholesale electricity prices. Instead, they are determined by a combination of cost components: wholesale electricity prices, grid transmission and distribution costs, and various taxes and levies. These taxes and levies can include Value Added Tax (VAT), renewable energy surcharges, capacity and environmental taxes, as well as other charges. Their weight in the overall price structure varies by country. For example, in France, energy supply accounts for 35% of the retail price, while taxes and grid costs each represent around 32–33% (Eurostat, 2025). While regulatory interventions can impact the price experienced by consumers, retail electricity prices for households and non-households (i.e., businesses) differ from each other. Since industrial consumers typically pay prices excluding VAT, they are more directly affected by wholesale market fluctuations compared to households. Overall, this pricing structure highlights how closely the EU's industrial sector is tied to developments in international energy markets and geopolitics, leaving European businesses particularly exposed to global supply shocks and price volatility.

4.2 Price trends

European countries experienced a sharp increase in electricity prices from 2021 onwards. Figure 1 shows the percentage changes in European electricity prices in the period 2008-2023 and highlights the sudden increase experienced in 2021 as opposed to the years prior. While on a decreasing trend since 2023, electricity prices seem to be converging at significantly higher levels when compared to their pre-pandemic and pre-energy crisis rates. According to Eurostat data, wholesale electricity prices in Europe in 2024 averaged €85/MWh – well above the historical average of €56/MWh seen from 2008 to 2020 (European Commission, 2025). The same trend is found in gas prices. A return to pre-crisis price levels appears unlikely in the near future, with the current context pointing more to a structural shift in the energy cost landscape.

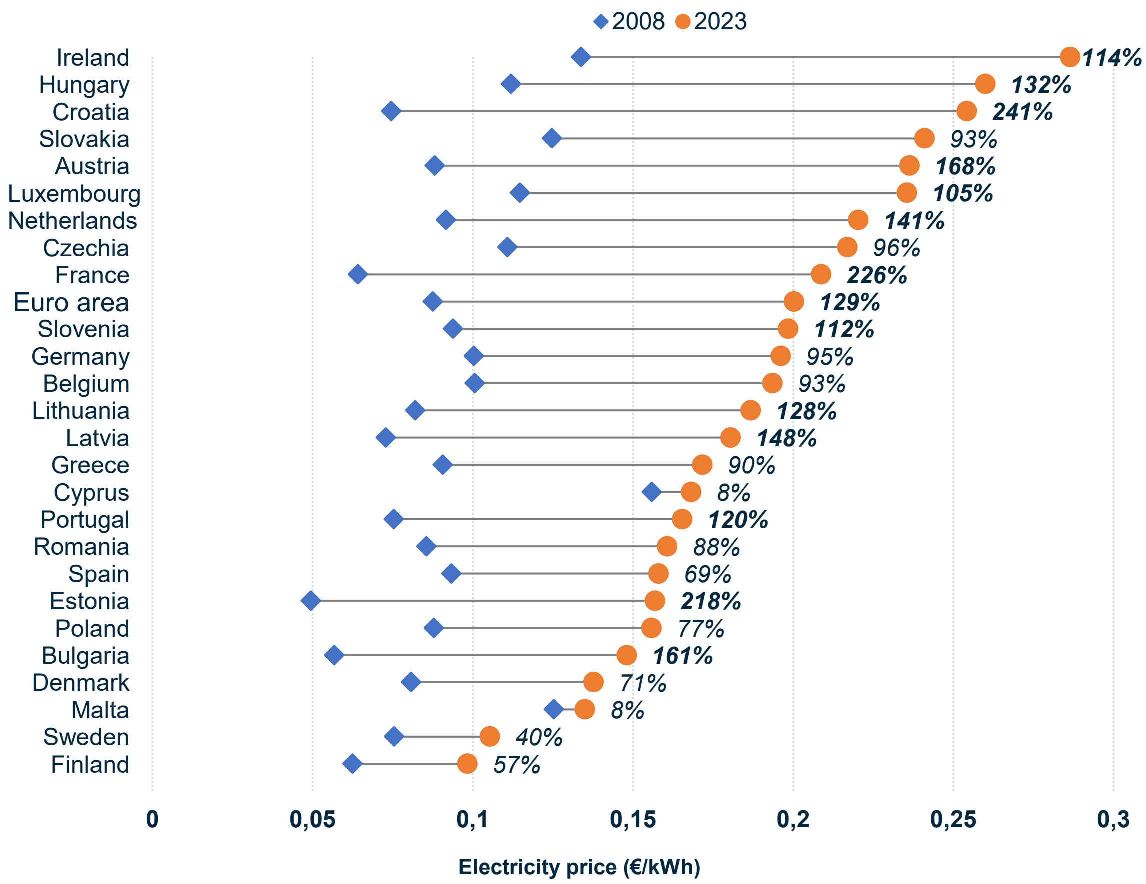
Figure 1. Development of electricity prices over time in study countries



***Source**: Eurostat **Note**: The dashed orange line represents the average electricity price across EU countries. Data is based on semi-annual averages from Eurostat and excludes taxes and levies. The graph includes the 28 countries covered by the study: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.*

European economies thus experienced significant increases in electricity prices, albeit with considerable variation across countries. Figure 2 illustrates electricity price changes across different European countries from 2008 to 2023. Two observations stand out from the graph. First, more than half of the countries considered recorded price increases exceeding 100%, with the EU average price change standing at +129%. These substantial upsurges have significant implications for the economies of the affected countries. Secondly, while all considered countries experienced a price increase, and while the vast majority encountered price increases of at least 80%, some member states experienced relatively small price changes. Notably, Malta and Cyprus saw comparatively modest increases of just 8% over the same period. This can partly be explained by exemptions from certain EU energy measures, as well as national state aid measures used, for instance, by the Maltese government, and aimed at shielding companies from higher energy costs (Sgaravatti, 2023). Data from a European Commission study (2025) further underpins these national differences, highlighting the larger electricity prices faced by countries like Italy and Hungary (€287/MWh and €227/MWh in 2022, respectively) due to their reliance on international gas markets. In contrast, Finland and Sweden, which are less exposed to imported gas, maintained lower prices (around €113–124/MWh in 2022). Tax relief and subsidies introduced in response to the crisis also varied widely: Portugal implemented subsidies of €33/MWh in 2023, while Bulgaria provided targeted support for small industrial consumers.

Figure 2. Electricity price change by country: 2008 vs 2023



Source: *Eurostat.* ***Note:*** *The percentages in the diagram represent the change in electricity prices between 2008 and 2023. Data is based on semi-annual averages from Eurostat and excludes taxes and levies (Some countries excluded because of missing electricity values).*

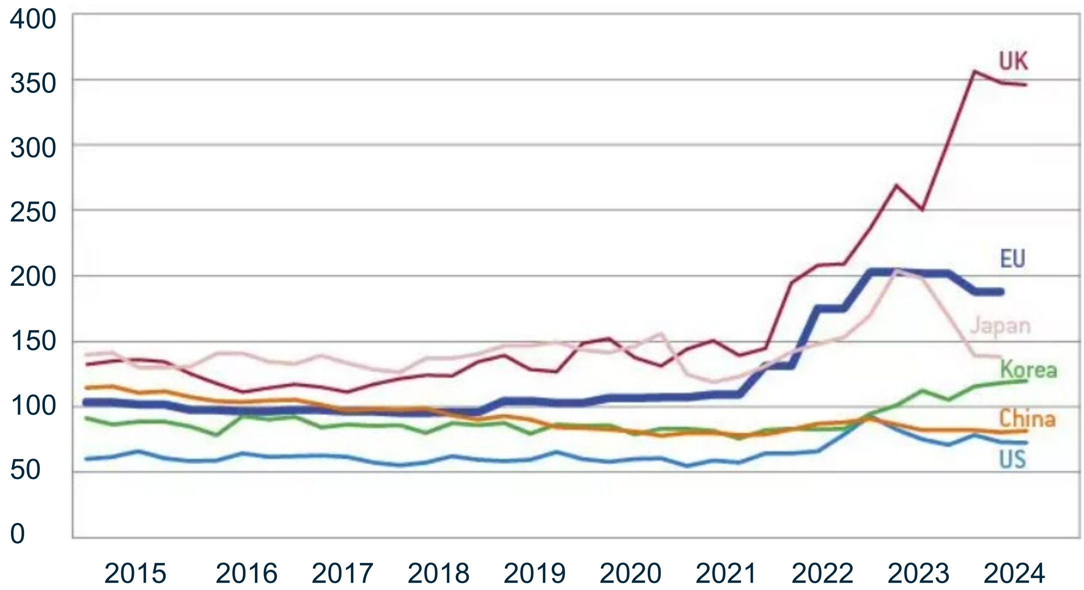
When compared to other global players, the EU's electricity prices remain considerably higher. In 2023, average wholesale prices in the EU were at €103/MWh, compared to

€59/MWh in the US. While the US also experienced price spikes in 2022, they were far less extreme than in Europe, and, by early 2024, they returned to around €36/MWh (European Commission, 2025).

While all major global economies have experienced an increase in industrial retail electricity prices since 2021, the magnitude of the increase differs significantly, with only the UK industry experiencing worse conditions than Europe in terms of the level of electricity prices (Figure 3). Other global players, notably the US and China, managed to maintain their prices at significantly lower levels than in the EU. This is explained by a variety of factors, including higher costs for power generation and different tax systems – with no energy taxes imposed on US industry (IEA, 2022). In addition, Europe has experienced higher volatility and unpredictability in the energy market since the onset of the COVID pandemic in 2019 and throughout the ensuing energy crisis, mainly due to the volatility in gas markets which then passed through to the electricity market. The sustained volatility undermines investment certainty leading to higher risk premiums and hedging costs, impacting firms' abilities to invest.

These increased costs pose a serious risk to EU competitiveness, as EU industry has to bear significantly higher fixed costs compared to its global competitors – leading to lower scope for these firms to invest in production, innovation, and human capital.

Figure 3. Industrial Retail electricity price (€/MWh)



***Source**: Bruegel based on Chief Economist Team/DG ENER/European Commission, based on Eurostat (EU), Energy Information Administration (US), Department for Energy Security and Net Zero (UK), International Energy Agency (Japan and Korea), CEIC (China). **Note**: European Central Bank conversion rates.*

4.3 Policy developments

Against the backdrop of rising electricity prices in Europe and the resulting loss of global competitiveness, the European Commission has implemented several policies to strengthen the EU energy market, while also aiming to reduce the impact of external shocks – some of which are partially linked to the EU's decarbonisation and sustainability efforts.

Underpinning energy policy at the European Union level is the ambition to establish a fully integrated internal energy market. The Energy Union Strategy published in 2015 was a key priority of the Juncker Commission (2014-2019) and was the starting point for a series of annual publications monitoring progress towards the achievement of the Energy Union. In general, while the goal of reaching a single market for energy is not new, two recent developments have brought renewed momentum to this agenda. On the one hand, the EU's climate commitments and the push for decarbonisation have placed clean, renewable energy at the centre of policy efforts. On the other hand, the energy crisis triggered by Russia's invasion of Ukraine exposed Europe's dependence on imported fossil fuels, sharply raising prices and volatility across energy markets. This dual pressure – accelerating the green transition while addressing energy security and affordability – has reopened discussions and created urgency for an updated EU energy policy.

The principles determining the current working of the EU electricity market are set in different pieces of legislation, including the Gas Regulation and Gas Directive of 2009, then reformed through the Electricity Regulation and Electricity Directive of 2019. In more recent years, the EU has introduced another range of reforms in response to the need to make the energy system more resilient, competitive, and sustainable. The Reform of the Electricity Market Design adopted in 2024, for instance, was a response to the 2021-2022 energy crisis, offering more long-term, rather than short-term, solutions to address it and to lower the impact of potentially re-occurring crises. It promotes long-term contracts such as Power Purchase Agreements (PPAs) and Contracts for Difference (CfD) as ways of shielding consumers and businesses from short-term price volatility. It also strengthens the role of the Agency for the Cooperation of Energy Regulators (ACER) in overseeing cross-border markets. These measures aim to reduce exposure to wholesale market fluctuations and provide a more stable investment environment.

Complementary instruments have also been deployed. The 2021 European Commission's Communication on Tackling rising energy prices provided member states with a toolbox to address increased energy prices by intervening in retail markets and supporting vulnerable consumers. The Temporary Crisis and Transition Framework launched in 2022 allowed for targeted state aid to energy-intensive industries, while the Trans-European Networks for Energy (TEN-E) Regulation put the focus on cross-border energy projects.

Most recently, the 2025 Action Plan for Affordable Energy, published as part of the 2025 Clean Industrial Deal, reiterated the pressing need to enhance the Energy Union in the face of current geopolitical complexities. The proposed measures seek to lower energy bills in the short-term while addressing the structural issues that keep energy prices high in Europe. The Plan also envisages an Electrification Action Plan to be published in 2026.

5. Literature review

Having looked at the general macroeconomic scenario and policy context impacting electricity prices for businesses, it is now relevant to turn to the literature to investigate the implications of higher electricity prices on employment. In a company's production mix, energy and labour are two essential inputs. On a theoretical level, depending on whether energy – in this case, electricity – and labour are complements or substitutes in a company's production process, an increase in the price of electricity can result in either increased (substitution effect) or decreased (price effect) employment levels. The net effect of rising electricity prices on employment levels thus partly depends on how sensitive labour demand is to the price of electricity.

In empirical studies, it is common to find evidence of a price effect between electricity prices and the level of employment, with an increase in the former being associated with a decrease in the latter. Bijnens et al. (2018), for example, investigate the impact of changing electricity prices on labour demand in 10 European countries and find a negative elasticity of -0.3. Their results suggest that a 10% rise in the price of electricity is associated with a 3% reduction in employment. Dechezlepretre et al. (2020) also find that a 10% increase in the price of electricity is associated with a 0.7% decrease in employment in the manufacturing industry of OECD countries. An additional study performed on the manufacturing industry of 14 European countries yields estimates of negative employment elasticities, with a 10% increase in the price of electricity being associated with a negative employment effect in the range of -0.5% to -1.3% (Bijnens et al., 2022). Countries with more specialized manufacturing sectors are also found to display larger elasticities. An analysis of the electricity market in Canada also concludes that two-thirds of the decline in manufacturing employment registered in Ontario in the years 2005-2015 was due to rising electricity prices (McKitrick and Aliakbari, 2017). In this discussion, however, it is important to highlight that there can be significant regional variations in how labour markets respond to changes in energy prices due to the specific characteristics of the considered region or country, and to the presence of energy-intensive industries, which are more vulnerable to the variability of energy and electricity prices. This is why most existing studies investigating these variables rely on region- or country-specific electricity prices (see e.g. Bijnens et al. (2022), Kahn and Mansur (2013), and Deschênes 2012). We, instead, set out to perform a broader analysis to understand the impact of high electricity prices on Europe’s labour market as a single competitive unit.

While most empirical studies support the existence of a price effect between electricity prices and employment, some analyses confirm the existence of a substitution effect between electricity and labour. Cox et al. (2014), for example, find weak substitution between labour and electricity. Bretschger et al. (2024), instead, perform an analysis on the French manufacturing sector using company-level data and find that whether there is a price effect or a substitution effect between energy and labour at the micro-level depends on a firm’s own capacity to substitute energy with labour. At the aggregate level, they argue, the overall negative impact of high energy prices on employment is driven by businesses with a limited capacity to substitute.

Another key implication of high electricity prices is the potential to lead to firm relocation, as some studies show that differences in the price of electricity between different geographical areas influence the choice of production location by firms. Kahn and Mansur (2013), for instance, study location patterns of firms with energy-intensive operations in the US and find that they tend to be located in areas with low electricity prices. Another research performed on three different geographical areas in Sweden concludes that the lack of electricity supply capacity will result in fewer jobs (Tillväxtverket, 2020). Tillväxtverket (2020) writes, among other things, that "*[...] employment is estimated to be between one and three percent lower in 2040 in all regions, as a consequence of a lack of electricity. This corresponds to between 40,000 and 124,000 jobs in the three geographies studied*.” In addition to direct effects on companies' production and use of inputs, rising electricity prices can also result in indirect multiplier effects. In the study by Tillväxtverket, the multiplier effects are calculated to be in the range of 1.4 to 1.8 (depending on the size of the region). These multiplier effects imply that a shortage in electricity capacity (higher prices) can be assumed to cause relatively large effects on the rest of the labour market. The size of this multiplier effect in Tillväxtverket

(2020) can be compared with estimates of about 1.6 calculated by Moretti (2010). Similarly, a recent study on Sweden finds negative elasticities, which, coupled with scenarios on electricity prices, can result in significant job losses over the coming decade (Eklund et al., 2024). (see Box on Sweden in section 8.2).

This has also implications for investment in a certain region or country. Barteková and Ziesemer (2019) look at direct investment in the EU27 and find that an increase in the price of electricity by 10% leads to a decrease of 0.4% in direct investment to South-West Europe and of 0.33% to North-East Europe in the short term. In the long term, the reduction is 0.6% for the South-West and 0.48% for the North-East. Based on these results, the authors suggest that a country's comparative advantage deteriorates when electricity prices increase, whereupon the incentives to locate production in the country decrease. This provides an important perspective on the impact of electricity prices for comparative advantage and on implications for the competitiveness of firms located in specific regions or countries.

6. Empirical model

In this study, we are primarily interested in the estimate of elasticity, namely how a change in the price of electricity is associated with a change in employment. Our econometric model is simple, and we use ordinary least squares (OLS) estimations. We expect employment to be a function of the price of electricity and electricity intensity. Further, we assume that electricity intensity is industry-specific and that it is therefore possible to control for electricity intensity using industry-specific effects. In addition to this, there are unobservable factors that may affect employment. This gives us:

$$EMP_{cjt} = f(EP_{ct}, EI_j, X_{cjt}), \qquad (1)$$

Where, *EMP* represents employment in country *c*, industry *j* at time *t*, *EP* electricity prices in country *c*, *EI* electricity intensity, *X* is a vector of unobservable factors that can affect employment. To control for these unobservable factors, we use fixed effects (year, country, industry). Likewise, to capture differences in employment elasticity in different industries and in countries we also use interaction variables. We expect these interaction terms to capture a significant amount of country heterogeneity and to reduce endogeneity issues. We then follow the conventional approach and estimate the effects of electricity prices on employment through elasticity. This means that we write equation 1 as a first difference and approximate it as a logarithmic and linear function[1]:

$$\Delta EMP_{kijt} = \alpha + \beta_1 \Delta EP_{it} + \beta_2 \Delta EP_{it} * EI_j + \beta_3 EI_j + \sum_x \beta_x X_x + \varepsilon_{kijt} \qquad (2)$$

We assume that electricity intensity is industry-specific and can therefore be captured with a dummy variable for industry *j*. We have chosen a log-linear form, which facilitates the interpretation of the model, and the electricity price coefficients can simply be interpreted as elasticities. *X* is a vector of control variables (country, year, municipality, industry). ϵ is a conventional error term (i.i.d. N(0, σ²)).

The price of electricity may well be endogenous. It is, for example, quite possible that the

[1] Calculated as ln(EMP_t) – ln(EMP_{t-1}), where ln is the natural logarithm. A corresponding calculation has been made for ΔEP_t.

price of electricity is correlated with other economic variables that have a simultaneous impact on employment. In addition to this, we can also expect that many electricity customers are not directly affected by changes in the price of electricity in the short run, for example, due to fixed price agreements on a long-term basis. This may very well vary between industries. To control for problems related to issues of endogeneity and omitted variables, we include several dummy variables and interaction effects (year, industry, country, industry*electricity price, country*electricity price). In addition to this, we also test for appropriate lag structure, which suggests that we can include up to two-year lags.

7. Data

Our two primary variables are employment and electricity prices. We use aggregate statistics for 28 European countries and cover 10 economic sectors. The available data covers the period 2008 to 2023. Further details and several alternative empirical specifications are reported in the Annex. While we have performed the analysis on annual data and semi-annual data, we only report semi-annual results.

Employment data is sourced from Eurostat's Labour Force Survey (LFS), specifically the section titled "LFS series – detailed annual survey results.". The LFS provides extensive information on key labour market characteristics, including total employment, employment rates, the distribution of full-time and part-time workers, self-employment, and demographic indicators such as age, sex, and education. All definitions and methodologies are aligned with international standards set by the International Labour Organization (ILO) and are harmonized across EU member states to ensure both temporal and geographical comparability. Although the LFS is conducted quarterly, annual data are compiled using either averages of quarterly variables or through direct collection of annual variables. The statistical unit is the individual, and data are aggregated at national and EU levels. EU and Euro area aggregates are calculated by summing national totals without additional weighting for absolute employment figures. Ratios and rates are then derived from these aggregates.

This study uses sector-specific employment data based on the NACE Rev. 2 classification. To maintain focus on electricity-intensive industries, certain sectors have been excluded from the analysis – particularly those considered less sensitive to electricity prices or predominantly part of the public or service sectors.[2]

Table 1. Industries included in the analysis

Agriculture, forestry and fishing
Mining and quarrying
Manufacturing
Electricity, gas, steam and air conditioning supply
Water supply; sewerage, waste management and remediation activities

[2] The category "Total – all NACE activities" was initially included to test the overall effect across all economic activities but was later excluded from the final analysis to focus specifically on electricity-intensive sectors and avoid aggregation bias. We have excluded: Real estate activities, Professional, scientific and technical activities, Administrative and support service activities, Public administration and defence; compulsory social security, Education, Human health and social work activities, Other service activities, Activities of households as employers, Undifferentiated goods- and services-producing activities of households for own use, Activities of extraterritorial organisations and bodies Financial and insurance activities.

Construction
Wholesale and retail trade; repair of motor vehicles and motorcycles
Transportation and storage
Accommodation and food service activities
Information and communication

***Source**: Eurostat*

We use employment statistics for the 20–64-year age group**.** For the semi-annual analysis, quarterly employment data was used to compute average employment levels for each half-year period. These were then matched with corresponding half-year electricity price data, enabling the estimation of elasticities and potential seasonal effects.

Electricity price data is sourced from Eurostat's database on electricity prices for non-household consumers, disaggregated by consumption bands. The data is reported in euros per kilowatt-hour (€/kWh) and excludes taxes and levies, thus reflecting the base market price of electricity. The analysis is based on semi-annual prices, with Semester 1 covering January to June, and Semester 2 covering July to December, as defined by Eurostat.

To ensure cross-country consistency and sectoral relevance, certain consumption categories were excluded. In particular, the "total – all bands" category and the highest consumption band (over 150,000 MWh per year) were omitted for two primary reasons. First, these categories lack complete time series coverage across all countries, making them unsuitable for comparative panel analysis. Second, the highest consumption group typically includes only a limited number of very large firms, many of which are directly connected to electricity producers and operate under bespoke pricing contracts. As such, their prices are not reflective of the broader industrial sector and would distort the analysis of general electricity-employment relationships.

The prices reported by Eurostat are weighted national averages, calculated using the market shares of surveyed electricity providers to ensure representativeness at the country level. For comparability, only prices denominated in euros were used. In this analysis, we used first-half (January–June) electricity prices from Eurostat as the primary price input given that prices during the first semester tend to be more stable over time, reducing the influence of short-term volatility and extreme seasonal effects. However, we note that even if prices from the second half of the year or annual averages had been used instead, the impact on results would likely remain limited. This is due to our use of a logarithmic transformation of the electricity price variable, which focuses on relative year-over-year changes, thereby smoothing out level differences across time periods.

In the separate dataset constructed for the semi-annual employment analysis, electricity prices from the first and second semesters were matched directly with employment averages from the corresponding half-year periods. That is, first-semester prices were linked with first-semester employment data, and second-semester prices with second-semester employment, enabling more precise alignment for detecting short-term and seasonal effects. To generate a more reliable and representative price indicator, we calculated an average electricity price across the included consumption bands for the first half-year data. This approach allows us to smooth out anomalies specific to any single consumption category and to better reflect the pricing environment experienced by most medium- and large-scale electricity consumers.

The study focuses on EU member states and the United Kingdom[3], while several non-EU countries were excluded to maintain institutional and regulatory comparability. Iceland, Norway, and Türkiye were excluded due to their status as non-EU members, despite partial alignment with EU statistical frameworks. In addition, a number of countries were excluded due to substantial gaps in the availability of electricity price data, particularly during the earlier part of the observation period (2008–2013). These include Liechtenstein, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia, and Kosovo. The absence of consistent historical data for these countries would compromise the longitudinal integrity of the panel. Finally, Moldova, Georgia, Albania, Ukraine, and Kosovo were excluded because of a lack of matching employment data. Since our empirical strategy relies on linking sector-level electricity prices with employment figures over time, countries without complete and aligned datasets could not be included in the analysis.

The final dataset was constructed by linking each country and economic sector to the average electricity price applicable to that country during the specified period. All sectors within a given country were assigned a uniform electricity price, as disaggregated sector-specific electricity price data was not available. While more granular pricing data by sector would have allowed for a more precise estimation of each sector's sensitivity to electricity prices, such information is unavailable.

We utilised quarterly employment data to calculate semi-annual employment averages, which were then matched with corresponding semi-annual electricity prices. The electricity price variable used in this case reflects the average across all selected consumption bands, excluding the highest-consumption and aggregate categories, as previously described.

When testing models that included years after 2021, the estimated effect of electricity prices on employment turned positive – an unexpected result likely driven by the extreme volatility in electricity prices during that period. Given this irregularity and the known market disruption after 2021, we chose to exclude post-2021 data from the core analysis. For the considered period, the variables are normally distributed.

Semi-Annual Analysis: Matching Electricity Prices with Employment Data

To increase the number of observations and account for potential seasonal dynamics, we constructed a dataset with semi-annual employment data. Quarterly employment figures from Eurostat's Labour Force Survey were used to calculate half-year averages for each country and sector. These values were then matched with the corresponding half-year electricity prices, allowing for a more granular view of the employment response to energy costs. This setup enables two key improvements. First, it captures seasonal variation, which may affect both electricity consumption and labour market dynamics (e.g., winter vs. summer demand effects). Second, it allows for the estimation of elasticities over shorter intervals, while still testing delayed responses. We estimate three separate regression models. One model measures the elasticity of employment with respect to electricity prices by comparing the same half-year period across consecutive years. The second model introduces a one-year lag, comparing a given half-year period to the same half-year one year earlier, to account for delayed adjustment processes. The third model introduces a two-year lag, comparing a given half-year period to the same half-year two years earlier, to

[3] Following 28 countries are included: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

account for delayed adjustment processes.

8. Empirical results: the impact of electricity prices on employment

This section presents the empirical findings of our research. Only results obtained using semi-annual data are included. Table 2 below reports outcomes obtained when no lag structure is included. While the results are not significant, we can observe how country and industry fixed effects are of importance.

Table 2. Employment growth and electricity price changes (semi-annual) (2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP_t	-0.003 (-0.28)	0.017 (1.29)	-0.0036 (-0.31)	0.0035 (0.30)	0.003 (0.28)	0.027** (1.99)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Observation	6 774	6 774	6 774	6 774	6 774	6 774
R^2	0.000	0.023	0.015	0.006	0.022	0.046

Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).*
Note: *Pooled OLS regressions use the first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5, and 1 percent levels, respectively. t-values are in parentheses.*

In Table 3 we introduce a one-year lag. The results indicate a relatively small negative effect on employment, but the effect becomes insignificant when year and country effects are included. This suggests significant cross-country heterogeneity.

Table 3. Employment growth and lagged electricity price changes (1-year lag, semi-annual, 2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP_{t-1}	-0.028* (-1.93)	0.018 (1.12)	-0.029* (-1.96)	-0.023 (-1.57)	-0.023 (-1.58)	0.025 (1.56)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Observation	6 242	6 242	6 242	6 242	6 242	6 242
R^2	0.000	0.015	0.015	0.006	0.020	0.035

Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).*
Note: *Pooled OLS regressions use the first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5, and 1 percent levels, respectively. t-values are in parentheses.*

In Table 4, we test for a two-year lag structure (not including lag 1). To capture industry heterogeneity and reduce endogeneity issues, we also include an interaction between industry and price changes, which should capture industry differences in energy intensity.

Table 4. Effect of electricity price changes on employment growth with industry interaction (semi-annual, 2-year lagged electricity price changes) (2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP_{t-2}	-0.161*** (-3.47)	-0.114*** (-2.45)	-0.162*** (-3.51)	-0.156*** (-3.36)	-0.156*** (-3.39)	-0.107*** (-2.31)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Industry*ΔEP	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5 710	5 710	5 710	5 710	5 710	5 710
R^2	0.006	0.018	0.022	0.014	0.029	0.041

Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).* ***Note:*** *Pooled OLS regressions use the first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5, and 1 percent levels, respectively. t-values are in parentheses.*

Finally, in Table 5, we report results for a model with one and two-year lags, as well as industry-price interaction variables.

Table 5. Effect of electricity price changes on employment growth with industry interaction (2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP_{t-1}	-0.02 (-1.39)	0.02 (1.42)	-0.02 (-1.43)	-0.02 (-1.34)	-0.02 (-1.36)	0.02 (1.64)
ΔEP_{t-2}	-0.16*** (-3.46)	-0.11*** (-2.40)	-0.16*** (-3.50)	-0.15*** (-3.37)	-0.15*** (-3.40)	-0.10*** (-2.23)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Industry*ΔEP_{t-2}	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5 710	5 710	5 710	5 710	5 710	5 710
R^2	0.007	0.019	0.022	0.014	0.029	0.042

Source: *Author's calculations based on Eurostat data, semi-annual panel (2008–2021).* ***Note:*** *Pooled OLS regressions use the first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5, and 1 percent levels, respectively. t-values are in parentheses. For concerns of multilinearity, additional interactions are not included.*

Overall, our analysis yields negative employment effects of increases in the price of electricity. We find a price elasticity of -0.1 to -0.15, suggesting that a 10% increase in electricity prices in the considered European countries can lead to a 1% to 1.5% decrease in employment. This is well in line with previous research, which suggests price elasticities in similar ranges. Even though the statistical significance of our findings could be limited, the fact that the estimations are very much in line with previous research suggests the reliability of our results. While our analysis is conducted at the macro level, similar conclusions emerge from micro-level studies (see Box 1), providing a robustness check for our findings.

Although we should be cautious about making predictions beyond our estimation intervals, the evidence suggests there is legitimate reason for concern for Europe's competitiveness regarding the impact of rising energy prices.

8.1 Box 1: Empirical firm-level evidence from Italy

The Centro Studi Tagliacarne – the Study Centre of the Italian Union of Chambers of Commerce (Unioncamere) – carried out an analysis of energy and employment based on survey data from a sample of 4,400 Italian manufacturing and service firms[1] with 5-499 employees.

The study focuses on the Italian case and aims to investigate:

i. whether an increase in electricity prices negatively affects employment;
ii. if such an effect varies according to the electricity intensity of the sector and the size of the firm (micro-small vs medium-large firms);
iii. the role of public territorial institutions in mitigating the possible negative impact of rising electricity prices on employment.

They use a probit regression to calculate the probability of expecting a reduction in employment due to rising electricity prices. The main variables under analysis are:

- *Electricity prices*, taking value 1 if the firm reported experiencing a strong increase in the electricity prices and 0 = otherwise
- *Empl_decrease_2024*, taking value 1 if the firm expects a decrease in the number of employees and 0 = otherwise

To better isolate the impact of rising electricity prices, they control for several firms' characteristics potentially affecting employment including size class (small, medium, large), sector (14 sectors according to Nace rev.2 classification), geographical location (North-West, North-East, Centre, South), firm age, turnover growth in the previous years.

The results show that all else being equal, firms experiencing a large increase in electricity prices are more likely to expect a decrease in the number of employees in the following year (the coefficient of the variable *Electricity prices* is positive and statistically significant at 5%) (Table 1, Model A). This finding is consistent across both Low and High electricity intensity industries (the coefficient of the variable *Electricity prices* is still positive and statistically significant in both cases, Model B-C). As for firm size, only medium-large firms (Model F) show a statistically significant negative impact, as opposed to the micro-small ones (Model E).

Finally, concerning the role of public territorial institutions, for firms in relation to territorial institutions (Government agencies, chambers of commerce, etc.), the probability of expecting a decrease in the number of employees when experiencing a strong increase in electricity prices becomes negative (the coefficient of the variable *Electricity prices*Territorial institutions* is negative and also statistically significant, Table 1 Column F). Therefore, there is no expected reduction in the number of employees. In other words, relationships with territorial institutions seem to neutralize the negative impact of the rise in electricity prices on employment.

Table 6. The impact of the increase in electricity prices on employment reduction: the mitigation role of territorial institutions

Dependent variable: *Empl_decrease_2024*

	Entire sample	Low electricity-intensive industries	High electricity-intensive industries	Micro-small	Medium-large	Entire sample
Electricity prices	0.010** (0.004)	0.009* (0.004)	0.028* (0.016)	0.005 (0.004)	0.019* (0.009)	0.014*** (0.004)
Territorial Institutions						-0.001 (0.005)
Electricity prices* Territorial Institutions + controls						-0.017* (0.009)
Observations	4,430	3,566	418	3,106	1,146	4,430
LR chi^2	110.22***	80.01***	38.10***	77.90	33.24***	116.16***
R^2	0.138	0.119	0.350	0.155	0.117	0.145

Source: Elaboration by Centro Studi Tagliacarne-Unioncamere ***Note:*** The table displays average marginal effects. Standard errors in parentheses. Likelihood ratio (LR) chi-square testing the joint significance of the explanatory variables. *** p < 0.01, ** p < 0.05, * p < 0.1.

8.2 Box 2: Empirical evidence on electricity and employment in Sweden

In Sweden, the electricity market is divided into four different regional submarkets, from south to north: compared to the rest of Europe, this is a unique way of organizing the electricity market. Sellers and buyers meet at electricity exchanges and the deals apply to consumption the next day or the same day. The market clearing rests on the transmission of electricity between the four submarkets when prices are settled. In a region with high demand – compared to production – a trade (transmission) should take place where the region buys from other regions with high supply. With transmission (trade) of electricity taking place between the regions we should assume a price being settled when the market is clearing.

However, for this equilibrium process to take place, infrastructure for the transition of electric power must be efficient. In fact, there are substantial bottlenecks in the transmission network that have contributed to an energy crisis in Sweden. A regulatory consequence of this is huge income transfers from consumers to Svenska kraftnät, money that should be predestined to investments that should solve the bottlenecks. Nevertheless, such investments have not taken place during the past years and the transmission problem has increased over time. There are now large price differences for electricity between the four submarket regions for electricity within the country. All in all, conditions have changed dramatically over the past decade, and in parts of Sweden, there is currently a shortage of electricity.

A recent study on how the price of electricity influences employment finds significant negative effects of raising electricity prices on employment. The study applies essentially the same method as used in this report. (Eklund et al. 2024).

The results show that there is a significant effect, which is in a range comparable with results from other studies of European countries. According to the findings in the study, it is concluded that an increase in the electricity price by 10% is associated with a 0.5% decrease in employment. The study also finds that the effects are stronger in Southern Sweden, compared to the north. In Southern Sweden, a 10% rise in the price of electricity is associated with a 1% decrease in employment. The empirical analysis employs data for the years between 2012 and 2020. The study also finds significant cross-price elasticities between the northern and southern parts of Sweden, suggesting that the electricity pricing zones distort the labour market. When controlling for cross-price elasticities between low and high-price areas the study finds significant cross-price elasticities. This suggests there are significant labour market distortions induced by the pricing/bidding zones. In this latter model, the negative impact on employment increases further. Combining electricity price scenarios with the estimations of labor demand effect the study suggests that as many as 200.000 employment opportunities may be lost over the next decade due to price increases. These results have implications for European electricity-labour markets.

From this, it is also understood that the electricity market of today generates completely different conditions of competitiveness for firms in different parts of the country, also influencing employment. The difference in the price of electricity generates negative distortionary effects between the north and south of Sweden. For more details refer to Eklund et al. (2024).

9. Conclusions and policy recommendations

The findings of this analysis have clear implications for EU policy. To safeguard Europe's industrial competitiveness and maintain an attractive investment environment, a two-pronged approach is needed: (1) reducing energy costs, and (2) promoting policies that enhance labour market flexibility and support worker retraining.

As noted in the introduction, industrial composition varies across member states; therefore, the results should be viewed as indicative of broader EU-wide trends, rather than as explanations for developments within individual countries. In this context, coordinated action between the European Commission and national governments is crucial to ensure that European industries remain resilient, adaptive, and globally competitive.

Although recent energy market crises were difficult to predict, structurally higher energy prices – relative to global competitors – and Europe’s demographic shift present long-term challenges that demand a forward-looking strategy.

Chambers of commerce and industry are best positioned to bridge the gap between institutions at both EU and national levels and the business community, helping to translate policy into tangible outcomes that benefit both businesses and the broader society.

Policy recommendations to reduce energy prices, improve efficiency, and enhance resilience

- **Ensure a well-functioning, integrated energy market.** Persistent network and market fragmentation prevent Europe from realising the full benefits of a Single Energy Market. Completing cross-border infrastructure, harmonising national regulations, and removing physical and regulatory bottlenecks in electricity and gas markets are essential steps. In this context, better coordination among Transmission System Operators (TSOs) and national regulators is needed. A well-integrated market reduces price disparities, improves efficiency, and enhances resilience.

- **Expand, modernise and digitalise the electricity system**. To successfully integrate renewables into the electricity mix, Europe must invest heavily in expanding and modernising grid infrastructure to enable electricity to be delivered efficiently from where it is generated to where it is needed. Special attention should be given to cross-border infrastructure. The deployment of energy storage is critical to shift surplus electricity to other times of the day, while also balancing demand and supply fluctuations. The digitalisation of the electricity system, combined with measures to support demand-side flexibility, can help optimise production and consumption and reduce overall system costs.

- **Accelerate the rollout of clean and low-carbon energy and streamline permitting**. Electricity from clean energy is now the cheapest form of new power generation. Expanding its deployment is therefore a key priority to reduce electricity prices. However, lengthy permitting procedures remain a major barrier. Authorities at all levels must speed up approvals for clean and low-carbon energy projects, grid expansion, and energy storage infrastructure. This should be done in line with the principle of technology neutrality and include swift implementation of recent and upcoming permitting reforms by EU member states.

- **Encourage long-term electricity contracts**. Power Purchase Agreements (PPAs) and similar supply contracts offer price predictability for industrial users while helping renewable energy developers secure project financing. These contracts are an important tool to decouple electricity prices from volatile gas markets. Despite rapid growth of PPAs across Europe, barriers remain for many energy-intensive industries. The EU should facilitate broader access to PPAs through public guarantees, clearer regulatory guidance, and reforms to forward markets, ensuring these instruments are available across sectors and member states.

- **Diversify energy sources and suppliers**. Europe’s reliance on fossil fuel imports from a limited number of external suppliers has increased exposure to price volatility. Diversifying both energy sources and suppliers reduces import dependence, enhance security of supply, and mitigate the risk of electritiy price spikes. This must be supported by efforts to boost domestic clean energy production, including hydrogen generation. All measures should respect the principle of technological neutrality.

- **Boost energy efficiency and support SMEs**. Improving energy efficiency is an effective way to reduce energy consumption and lower companies’ energy costs. Supportive measures to incentivize companies to invest in energy efficiency can significantly reduce peak demand and total system costs. As shown by several projects funded under the LIFE programme and managed by Eurochambres[4], SMEs often face greater financial and administrative barriers when adopting energy efficiency measures. This is why targeted support and practical guidance tailored to their needs, including through EU-funded initiatives, are essential.

- **Use targeted state aid during crises, coordinated at the EU level**. During crises, temporary public support to shield companies from energy price spikes is justified. However, such aid must be coordinated at the EU level to prevent harmful competition and preserve a level playing field across member states. It is indeed key to keep in mind that a fragmented approach risks distorting competition and undermining the single market. Harmonised state aid rules should thus be paired with incentives for energy efficiency and reduced energy intensity, rather than simply offsetting consumption.

Policy recommendations to enhance labour market flexibility and support worker retraining

- **Strengthen regional and sectoral skills intelligence**. Chambers must be fully integrated into EU and national systems of skills intelligence. They should lead the charge in gathering and analysing labour market data through tools like Unioncamere's Excelsior[5], providing a real-time view of emerging skill needs. By doing so, chambers can anticipate sectoral shifts, advise businesses on future workforce needs, and drive policies that align education and training with evolving market demands. Data-driven decisions are essential for preventing skills mismatches and ensuring a smooth transition for workers.

- **Scale up targeted up-and reskilling initiatives.** As energy prices disrupt industries, we need to implement large-scale reskilling and upskilling programmes now. Chambers are already designing and coordinating training efforts. We need to ensure that affected workers, especially those in energy-intensive sectors, are retrained in the labour market.

- **Facilitate mobility of workers and apprentices across borders or regions.** Labour mobility across the EU must be significantly enhanced to ensure that skilled workers can move freely and seamlessly between regions and sectors. Eurochambres advocates for the mutual recognition of qualifications and the validation of informal skills, which would make it easier for workers to transition between industries and countries. Equally, Eurochambres advocates for apprenticeship mobility. Reducing administrative and legal barriers is essential to creating a flexible and mobile workforce that can respond swiftly to economic disruptions caused by rising energy prices and industrial change.

- **Promote public-private partnerships.** In regions vulnerable to job losses due to high energy prices, public-private partnerships could develop place-based solutions. By uniting local authorities, VET providers, businesses, and chambers, regional adaptation plans can be designed to ensure social fairness while fostering industrial resilience. These strategies should prioritise upskilling, mobility between sectors, and job retention through green job creation.

[4] EcoSMEnergy, Energy Efficiency 4 HORECA, and Energy Efficiency for SME
[5] https://excelsior.unioncamere.net/

- **Leveraging renewable energy communities to foster local skills development.** Chambers are already driving innovative solutions that combine industrial decarbonisation with local skills development. For example, the Italian chamber network is promoting Renewable Energy Communities that integrate local energy production with training and hands-on learning opportunities. These initiatives create local ecosystems where businesses, training providers, and communities collaborate to support the energy transition while equipping workers with the competencies needed for the green economy.

- **Ensuring that the voice of SMEs is reflected in skills governance**. Chambers represent millions of SMEs across Europe, businesses that often lack the time, expertise, or resources to engage directly in complex policy processes or large-scale training initiatives. Through chambers, the needs of these SMEs can be effectively channelled into the design and implementation of skills policies at both EU and national levels. Chambers act as trusted intermediaries, ensuring that skills strategies are grounded in real labour market needs and that funding reaches businesses that would otherwise struggle to access it. Involving chambers systematically in skills governance and co-design processes is essential to ensure that SMEs are not left behind in the green and digital transitions and that skills programmes are tailored, relevant, and widely accessible.

10. List of references

Barteková, E. and Ziesemer, TH, (2018), “The impact of electricity prices on foreign direct investment: evidence from the European Union”, Applied Economics, vol. 51, issue 11, 1183-1198.

Bijnens, G., Konings, J. and Vanormelingen, S., (2022), "The impact of electricity prices on European manufacturing jobs", Applied Economics, vol. 54, no. 1, 38-56.

Bijenes, G., Konings, J. and Vanormelingen, S., (2018), “The impact of electricity prices on jobs and investment in the Belgian manufacturing industry”, Vives policy paper, Kluven University.

Bretschger, L. and Ara, J., (2021), “Complementarity between labor and energy: A firm-level analysis”, Economics Working Paper Series, No. 21/364, ETH Zurich, CER- ETH - Center of Economic Research, Zurich.

Cox, M., Peichl, A., Pestel, N. and Siegloch, S., (2014), “Labor demand effect of rising electricity prices: Evidence for Germany, Energy Policy, vol. 75, 266-277.

Dechezleprêtre, A., Nachtigall, D. and Stadler, B., (2020), The Effect of Energy Prices and Environmental Policy Stringency on Manufacturing Employment in OECD Countries: Sector- and Firm-level Evidence, ECO/WKP (2020)33, OECD.

Deschênes, O., (2012), “Climate Policy and Labor Markets”, In: “The Design and Implementation of US Climate Policy”, Fullerton, D. and Wolfram, C., (eds.), 37-49. Chicago University Press.

Eklund, J. E., Pettersson, L., Tryding, P. and Zaza, T., (2024), Elpriser, konkurrenskraft och syssesätttning – Hur påverkas efterfrågan på abeteskraft av elpriset? In: Deiaco, E. and Eklund, J., “Sydsvensk Konkurrenskraft”, Swedish Entrepreneurship Forum.

Eklund, JE and Thulin, P., (eds.), (2022), “Swedish Competitiveness Scorecard 2021”, Entrepreneurship Forum.

Eklund, JE and Thulin, P., (2020), "Swedish competitiveness - How to ensure long-term prosperity?" Entrepreneurship Forum

Eurochambres (2024), Eurochambres Economic Survey 2025 (EES2025) https://www.eurochambres.eu/wp-content/uploads/2024/11/EES2025-Report.pdf

European Commission: Directorate-General for Energy, E3Modelling, Enerdata, LBST, Oeko Institut, Trinomics, Jagtenberg, H., Ansarin, M., Boldizsár, G., Van Nuffel, L., Rukuma, R., van Delzen, T., Lam, L., Torres, P., Lee, L. Y., Badouard, T., Posseme, B., Bon-Mardion, J., Casteleyn, M., Meghez, B., Andry, O., Hadjuri, H., Viktoria Noka, , Schumacher, K., Hünecke, K., Fragkiadakis, D., Paroussos, L.Altmann, M., (2025) “Study on energy prices and costs – Evaluating impacts on households and industry – 2024 edition’’, Publications Office of the European Union, 2025, https://data.europa.eu/doi/10.2833/3218941

Eurostat (2025) “Electricity price statistics”. Retrieved from”: https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=Electricity_price_statistics

Gerlagh, R. and Mathys, NA, (2011), “Energy Abundance, Trade and Industry Location”, Working paper Fondazione Eni Enrico Mattei.

Gregoire, G. Kozluk, T. and Dlugosch, D., (2020), “Do Energy Prices Drive Outward FDI? Evidence from a Sample of Listed Firms”, Energy Journal, vol 41, no. 3, 63-80.

Hamermesh, DS, (1993), “Labor Demand”, Princeton, Princeton University Press.

Henriksson, E., Söderholm, P., Wårell, L., (2012), “Industrial electricity demand and energy efficiency policy: the role of price changes and private R&D in the Swedish pulp and paper industry”, Energy Policy, 47, 437–446.

Hille, E. and Möbius, P., (2019), "Do energy prices affect employment? Decomposed international evidence,” Journal of Environmental Economics and Management, vol. 96.

Holmes, A., (2015), Empowering Ontario: Constraining Costs and Staying Competitive in the Electricity Market, Ontario Chamber of Commerce.

IEA, (2022), “World Energy Outlook 2022”.

Kahn, ME and Mansur, ET, (2013), “Do local energy prices and regulation affect the geographic concentration of employment?” Journal of Public Economics, vol. 101, 105-114.

McKitrick R. and Aliakbari, E., (2017), Rising Electricity Costs and Declining Employment in Ontario's Manufacturing Sector, Fraser Institute,

Mirzaei, N., Hilletofth, P. and Pal, R., (2021), “Challenges to competitive manufacturing in high-cost environments: checklist and insights from Swedish manufacturing firms, Operation Management Research, vol. 14, 272-292.

Mordue, G., (2017). Electricity Prices and Industrial Competitiveness: A Case Study of Final Assembly Automobile Manufacturing in the United States and Canada. Energy Policy 111.

Moretti, E., (2010), “Local Multipliers”, American Economic Review, vol. 100, no. 2. 373-377.

Odenberger, M., Unger, T. and Wråke, M., (2024), "Model analyzes of the Swedish electricity price development as a result of extensive electrification", Profu.

Sgaravatti, G., S. Tagliapietra, C. Trasi and G. Zachmann (2023) “National policies to shield consumers from rising energy prices”, Bruegel Datasets, available at https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices

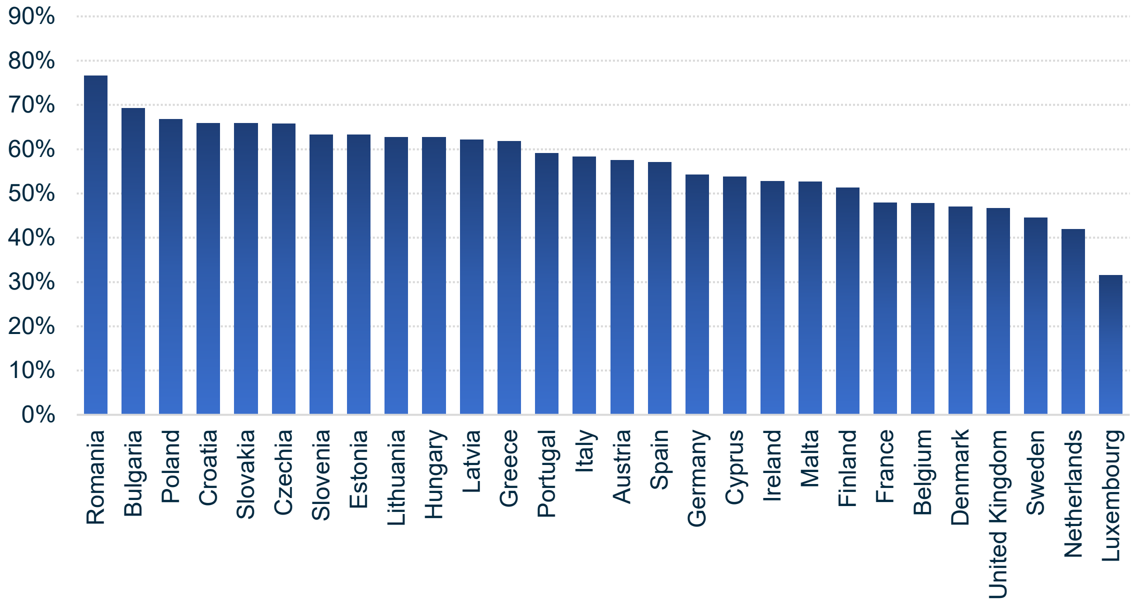
Sundén, D., (2024), “At any electricity price? Assessment of the effects on the Nordic electricity market of investments in fossil-free steel in Norrland", Scandinavian Policy Institute.

Tillväxtverket, (2020), "Four future scenarios - On regional effects of future electricity shortages", Report 0335.

The Swedish Economic Institute, (2024), the statistical database.

11. Annex

Figure 4. Share of employment in sectors covered in the study compared to total national employment



Source: *Eurostat* ***Note:*** *Percentages represent the share of employment in the selected sectors included in the study relative to total employment in each country (based on LFS data, age group 20–64).*

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Table 7. Share of included sectors in national employment

	Accommodation and food service activities	Agriculture, forestry and fishing	Construction	Electricity, gas, steam and air conditioning supply	Information and communication	Manufacturing	Mining and quarrying	Transportation and storage	Water supply; sewerage, waste management and remediation activities	Wholesale and retail trade; repair of motor vehicles and motorcycles
Austria	6%	4%	8%	1%	3%	16%	0%	5%	0%	14%
Belgium	3%	1%	7%	1%	3%	13%	0%	6%	1%	13%
Bulgaria	5%	6%	8%	1%	3%	20%	1%	6%	1%	17%
Croatia	6%	8%	7%	1%	3%	17%	0%	6%	2%	14%
Cyprus	8%	3%	9%	1%	3%	8%	0%	4%	1%	18%
Czechia	4%	3%	8%	1%	3%	27%	1%	6%	1%	12%
Denmark	3%	2%	6%	1%	4%	12%	0%	5%	1%	13%
Estonia	3%	4%	10%	1%	4%	19%	1%	8%	1%	13%
Finland	3%	4%	7%	1%	5%	14%	0%	6%	0%	11%
France	4%	3%	7%	1%	3%	12%	0%	5%	1%	13%
Germany	4%	1%	6%	1%	3%	20%	0%	5%	1%	13%
Greece	8%	11%	5%	1%	2%	10%	0%	5%	1%	18%
Hungary	4%	5%	7%	1%	3%	22%	0%	7%	1%	13%
Ireland	6%	4%	6%	1%	5%	12%	0%	4%	1%	13%
Italy	6%	4%	7%	1%	3%	19%	0%	5%	1%	14%
Latvia	3%	8%	8%	1%	3%	13%	0%	9%	1%	15%
Lithuania	3%	7%	8%	1%	3%	16%	0%	7%	1%	17%
Luxembourg	3%	1%	6%	0%	4%	5%	0%	4%	0%	8%
Malta	7%	1%	7%	0%	4%	12%	0%	5%	1%	14%
Netherlands	3%	2%	5%	0%	4%	10%	0%	5%	0%	12%
Poland	2%	10%	8%	1%	2%	20%	1%	6%	1%	14%
Portugal	6%	5%	8%	0%	3%	17%	0%	4%	1%	15%
Romania	2%	21%	8%	1%	2%	20%	1%	6%	1%	15%
Slovakia	4%	3%	10%	1%	3%	24%	0%	6%	1%	12%
Slovenia	4%	5%	6%	1%	3%	24%	0%	5%	1%	12%
Spain	8%	4%	7%	0%	3%	13%	0%	5%	1%	16%
Sweden	3%	2%	7%	1%	5%	11%	0%	5%	0%	11%
United Kingdom	4%	1%	8%	1%	4%	10%	0%	5%	1%	13%

Source: *Eurostat* ***Note:*** *The table shows the percentage of total national employment represented by the 10 sectors included in the analysis.*

Table 8. Correlation table: electricity prices and employment

	Employment	Price
$\ln(Emp_t) - \ln(Emp_{t-1})$	1	
$\ln(EP_t) - \ln(EP_{t-1})$	0.0530	1

Table 9. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Employment	4 862	1067,121	3659,728	0,4	40254,6
Electricity	4 832	0,1038988	0,0407372	0,473667	0,2991

Variable	Obs	Mean	Std. Dev.	Min	Max
$\Delta \mathrm{EMP}$	4 518	0,0013077	0,0977361	-0,8109302	1,011601
$\Delta \mathrm{EP}$	4 554	0,0525317	0,1933639	-0,4104395	1,041771
Country	4 928	14,5	8,07	1	28
Industry	4 928	6	3,16	1	11
Year	4 928	2015	4,61	2008	2023

Table 10. Correlation table: electricity prices and employment (semi-annual) (2008–2021)

	Employment	Price
ln(Empt) – ln(Empt-1)	1	
ln(EPt) – ln(EPt-1)	-0.0034	1

Table 11. Descriptive statistics (semi-annual) (2008–2021)

Variable	Obs	Mean	Std. Dev.	Min	Max
Employment	7 416	354,67	747,51	0,65	7625,45
Electricity	7 760	0,0942433	0,0249961	0,473667	0,2240667

Variable	Obs	Mean	Std. Dev.	Min	Max
ΔEMP	6 824	-0,0003785	0,1108116	-0,9119015	0,6808771
ΔEP	7 200	0,0100299	0,1139247	-0,4462944	0,7184513
Country	7 840	14,5	8,078262	1	28
Industry	7 840	5,5	2,872465	1	10
Year	7 840	2014,5	4,031386	2008	2021

Lagged Effects of Electricity Prices on Employment

To assess the possibility of delayed employment responses to electricity price fluctuations, we estimated separate models that include lagged electricity price terms. The rationale is that changes in electricity prices may not affect employment immediately but rather through slower adjustments in production planning, investment decisions, or restructuring processes particularly in electricity-intensive sectors.

We tested both one-year and two-year lagged specifications independently. This approach compares employment and electricity price changes across a two-year interval, allowing us to observe more delayed or cumulative effects.

Further, to capture even longer-term dynamics, we perform regressions using two-year differences.

This wider lag window helps reveal effects that may unfold over multiple years, providing insight into the persistence or lagged responses in employment growth to electricity price fluctuations.

Semi-annual analysis: Matching electricity prices with employment data

To increase the number of observations and account for potential seasonal dynamics, we constructed a dataset with semi-annual employment data. Quarterly employment figures from Eurostat's Labour Force Survey were used to calculate half-year averages for each country and sector. These values were then matched with the corresponding half-year electricity prices, allowing for a more granular view of the employment response to energy costs.

This setup enables two key improvements:

1. It captures seasonal variation, which may affect both electricity consumption and labor market dynamics (e.g., winter vs. summer demand effects).
2. It allows for the estimation of elasticities over shorter intervals, while still testing delayed responses.

We estimate Three separate regression models:

- One model measures the elasticity of employment with respect to electricity prices by comparing the same half-year period across consecutive years (e.g., H1 2018 vs. H1 2017).
- The second model introduces a one-year lag, comparing a given half-year period to the same half-year one year earlier, to account for delayed adjustment processes.
- The Third model introduces a two-year lag, comparing a given half-year period to the same half-year two years earlier, to account for delayed adjustment processes.

Table 12. Regression matrix: employment growth and electricity price changes (semi-annual) (2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP	-0.003 (-0.28)	0.017 (1.29)	-0.0036 (-0.31)	0.0035 (0.30)	0.003 (0.28)	0.027 (1.99)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Observation	6 774	6 774	6 774	6 774	6 774	6 774
R^2	0.000	0.023	0.015	0.006	0.022	0.046

Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).* ***Note:*** *Pooled OLS regressions use first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5 and 1 percent levels, respectively. t-values are in parentheses.*

Table 13. Regression matrix: employment growth and lagged electricity price changes (1-year lag, semi-annual, 2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP	-0.028* (-1.93)	0.018 (1.12)	-0.029** (-1.96)	-0.023 (-1.57)	-0.023 (-1.58)	0.025 (1.56)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Observation	6 242	6 242	6 242	6 242	6 242	6 242
R^2	0.000	0.015	0.015	0.006	0.020	0.035

Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).* ***Note:*** *Pooled OLS regressions use first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5 and 1 percent levels, respectively. t-values are in parentheses.*

Table 14. Regression matrix: employment growth and lagged electricity price changes (2-year lag, semi-annual, 2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP	-0.033*** (-2.19)	0.013 (0.80)	-0.033*** (-2.22)	-0.029* (-1.86)	-0.029* (-1.87)	0.020 (1.22)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Observation	5 710	5 710	5 710	5 710	5 710	5 710
R^2	0.000	0.012	0.016	0.008	0.023	0.035

Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).* ***Note:*** *Pooled OLS regressions use first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5 and 1 percent levels, respectively. t-values are in parentheses.*

Table 15. Effect of electricity price changes on employment growth with industry interaction (semi-annual) (2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP	0.012 (0.34)	0.033 (0.91)	0.010 (0.30)	0.019 (0.54)	0.018 (0.51)	0.042 (1.17)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Industry*ΔEP	Yes	Yes	Yes	Yes	Yes	Yes
Observation	6 774	6 774	6 774	6 774	6 774	6 774
R^2	0.002	0.025	0.017	0.008	0.023	0.047

Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).* ***Note:*** *Pooled OLS regressions use first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5 and 1 percent levels, respectively. t-values are in parentheses.*

Table 16. Effect of electricity price changes on employment growth with industry interaction (semi-annual, 1-year lagged electricity price changes) (2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP	-0.079 (-1.76)	-0.032 (-0.72)	-0.079 (-1.77)	-0.074 (-1.64)	-0.074 (-1.65)	-0.025 (-0.56)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Industry*ΔEP	Yes	Yes	Yes	Yes	Yes	Yes
Observation	6 242	6 242	6 242	6 242	6 242	6 242
R^2	0.004	0.020	0.018	0.010	0.024	0.039

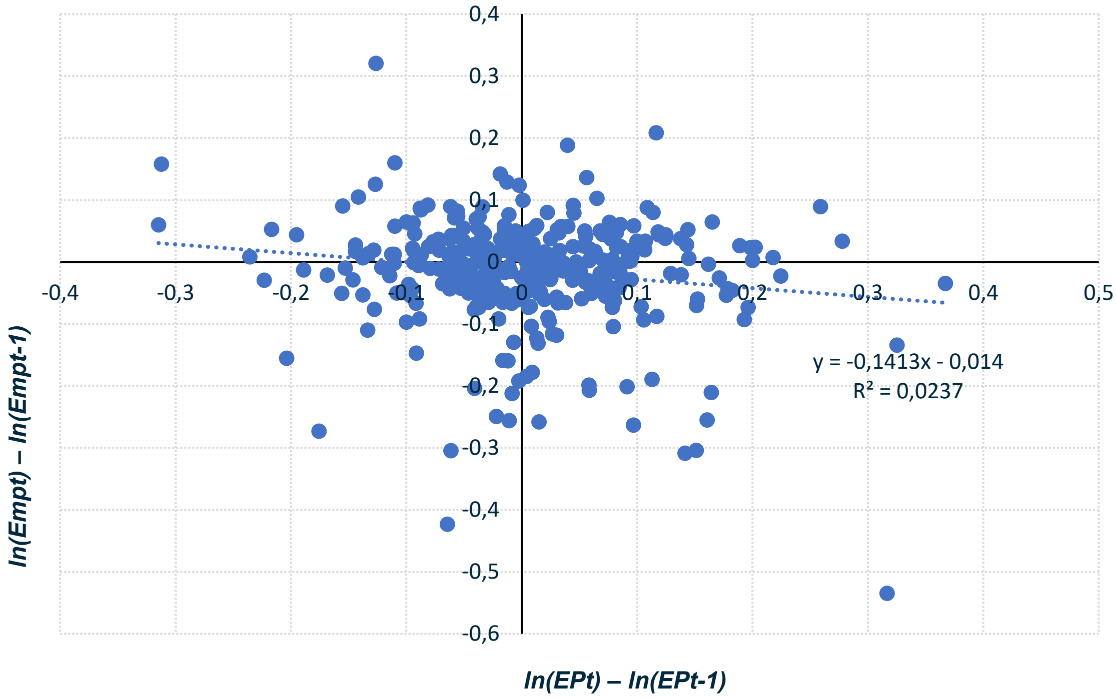
Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).* ***Note:*** *Pooled OLS regressions use first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5 and 1 percent levels, respectively. t-values are in parentheses.*

Table 17. Effect of electricity price changes on employment growth with industry interaction (semi-annual, 2-year lagged electricity price changes) (2008–2021)

	1 ΔEMP	2 ΔEMP	3 ΔEMP	4 ΔEMP	5 ΔEMP	6 ΔEMP
ΔEP	-0.161*** (-3.47)	-0.114*** (-2.45)	-0.162*** (-3.51)	-0.156*** (-3.36)	-0.156*** (-3.39)	-0.107*** (-2.31)
Year FE	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Industry*ΔEP	Yes	Yes	Yes	Yes	Yes	Yes
Observation	5 710	5 710	5 710	5 710	5 710	5 710
R^2	0.006	0.018	0.022	0.014	0.029	0.041

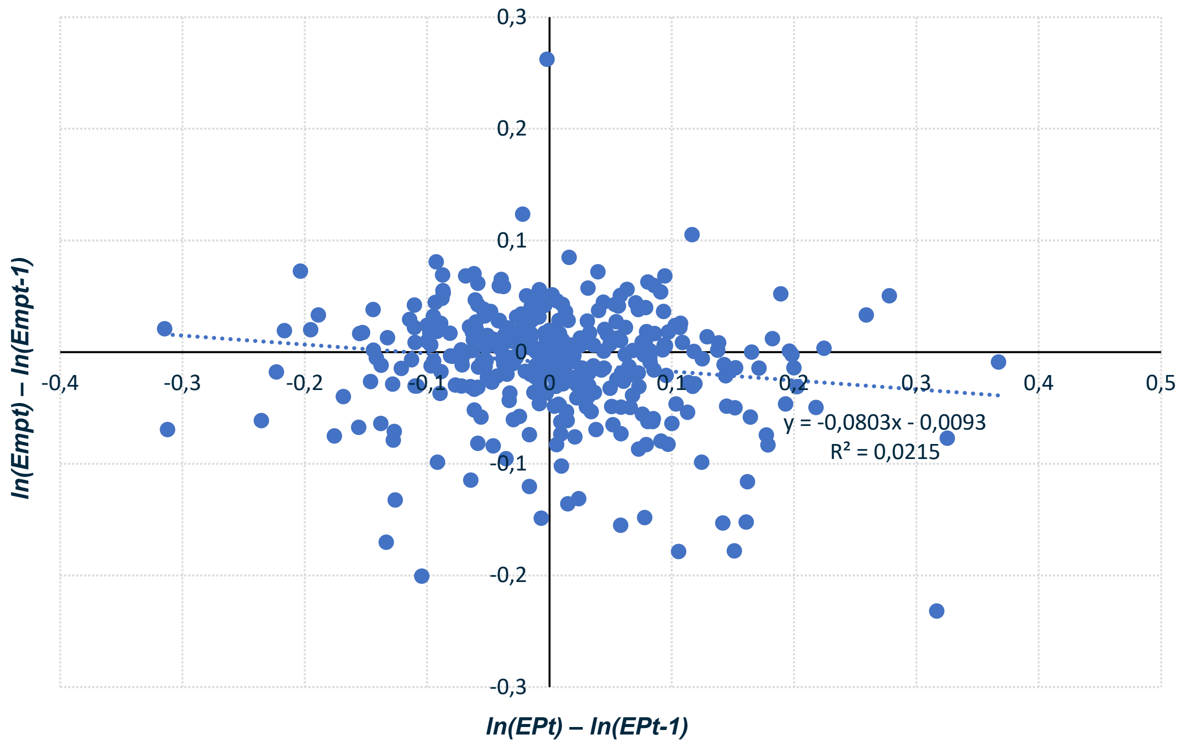
Source: *Author's calculations based on Eurostat data, bi-annual panel (2008–2021).* ***Note:*** *Pooled OLS regressions use first differences of log employment and electricity prices. Models include Year, Activity, and Country fixed effects as dummies where indicated. *,**,*** indicate significance at the 10, 5 and 1 percent levels, respectively. t-values are in parentheses.*

Figure 5. Electricity price vs. employment change in Construction (2008-2021)



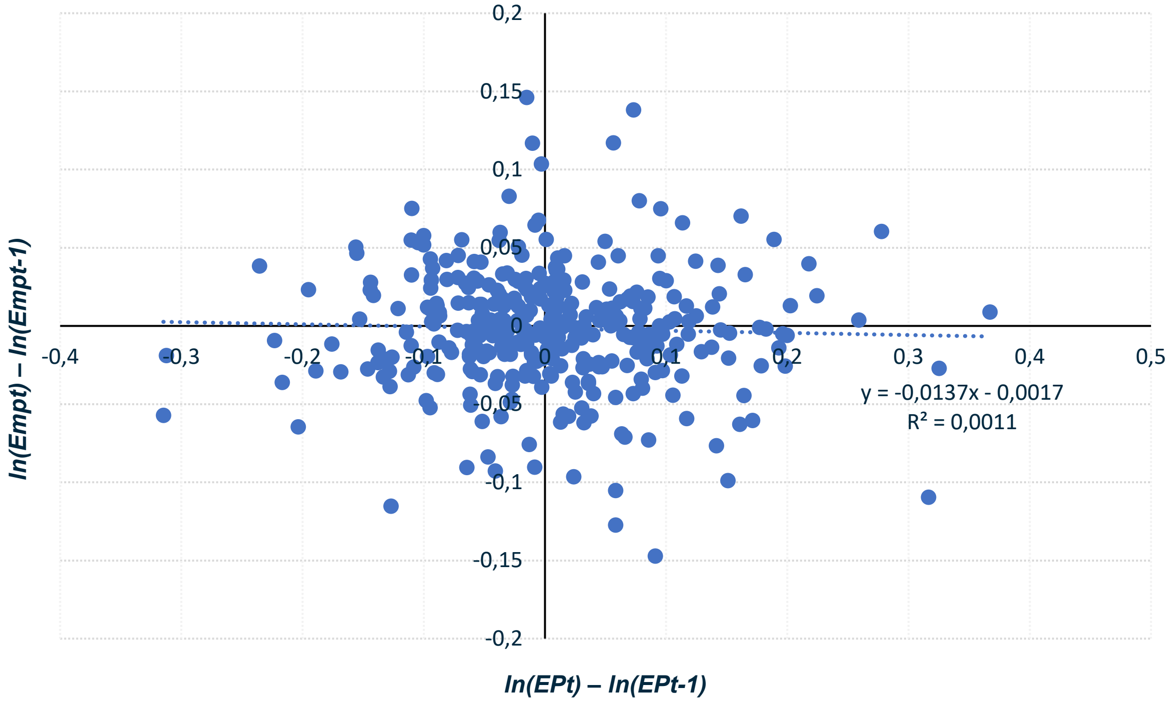
Source: *Eurostat* ***Note:*** *The scatterplot shows the relationship between year-over-year changes in the natural logarithm of employment and electricity prices in the construction sector.*

Figure 6. Electricity price vs. employment change in Manufacturing (2008-2021)



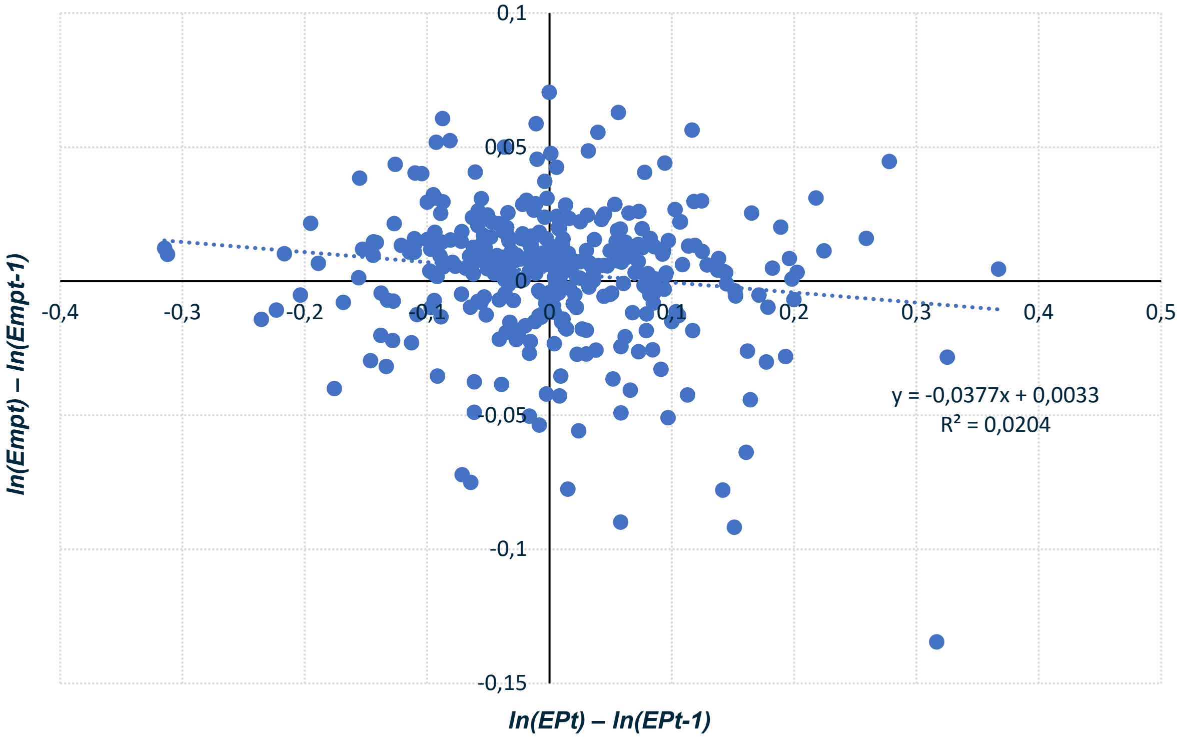
Source: *Eurostat* ***Note:*** *The scatterplot shows the relationship between year-over-year changes in the natural logarithm of employment and electricity prices in the Manufacturing sector.*

Figure 7. Electricity price vs. employment change in Wholesale and Trade (2008-2021)



Source: *Eurostat* ***Note:*** *The scatterplot shows the relationship between year-over-year changes in the natural logarithm of employment and electricity prices in the Wholesale and retail (Repair of motor vehicles and motorcycles) sector.*

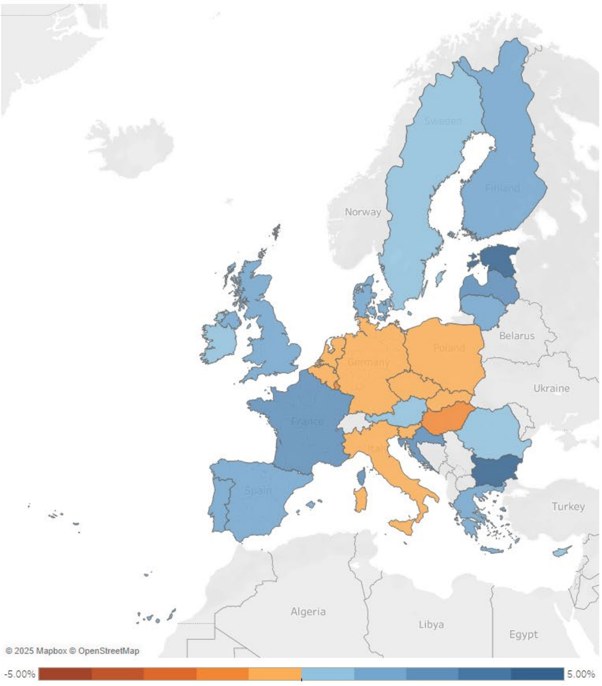
Figure 8. Electricity price vs. employment change in all activities (2008-2021)



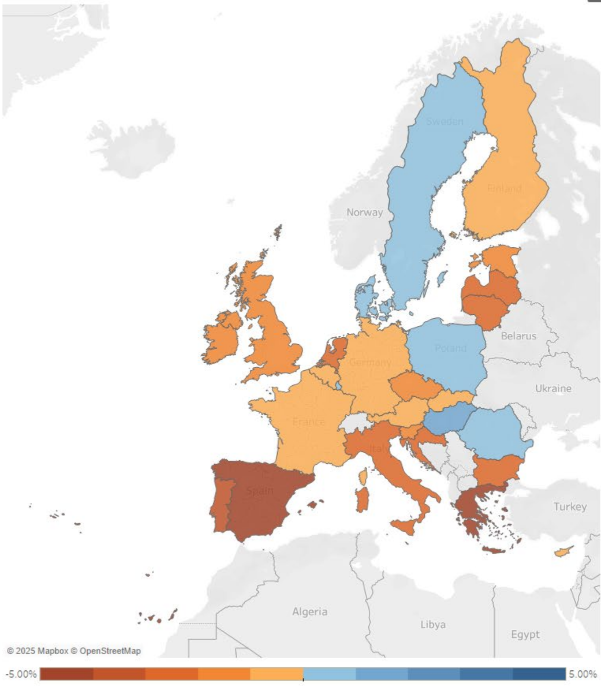
Source: *Eurostat* ***Note:*** *The scatterplot shows the relationship between year-over-year changes in the natural logarithm of employment and electricity prices in all NACE activities.*

Construction

Average Change in Semi-Annual Electricity Prices (2008–2021)
Data shown for the first half of each year



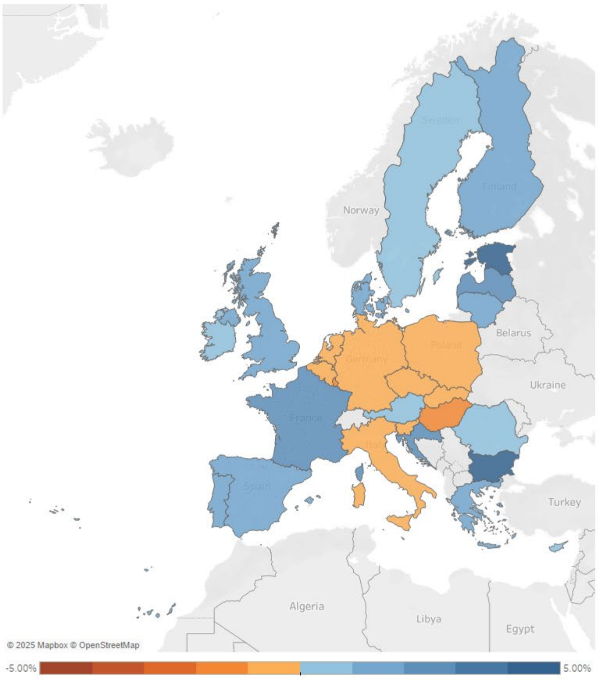
Average Annual Change in Employment (2008–2021)
Annual average



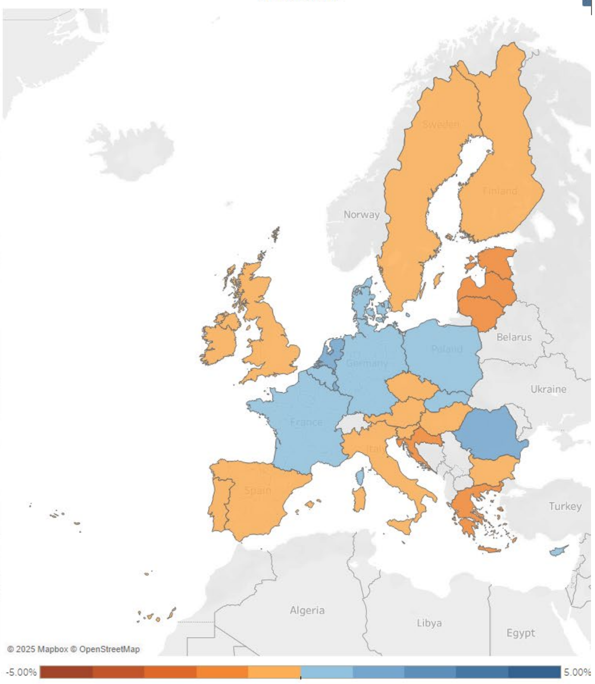
Manufacturing

Wholesale and retail trade; repair of motor vehicles and motorcycles

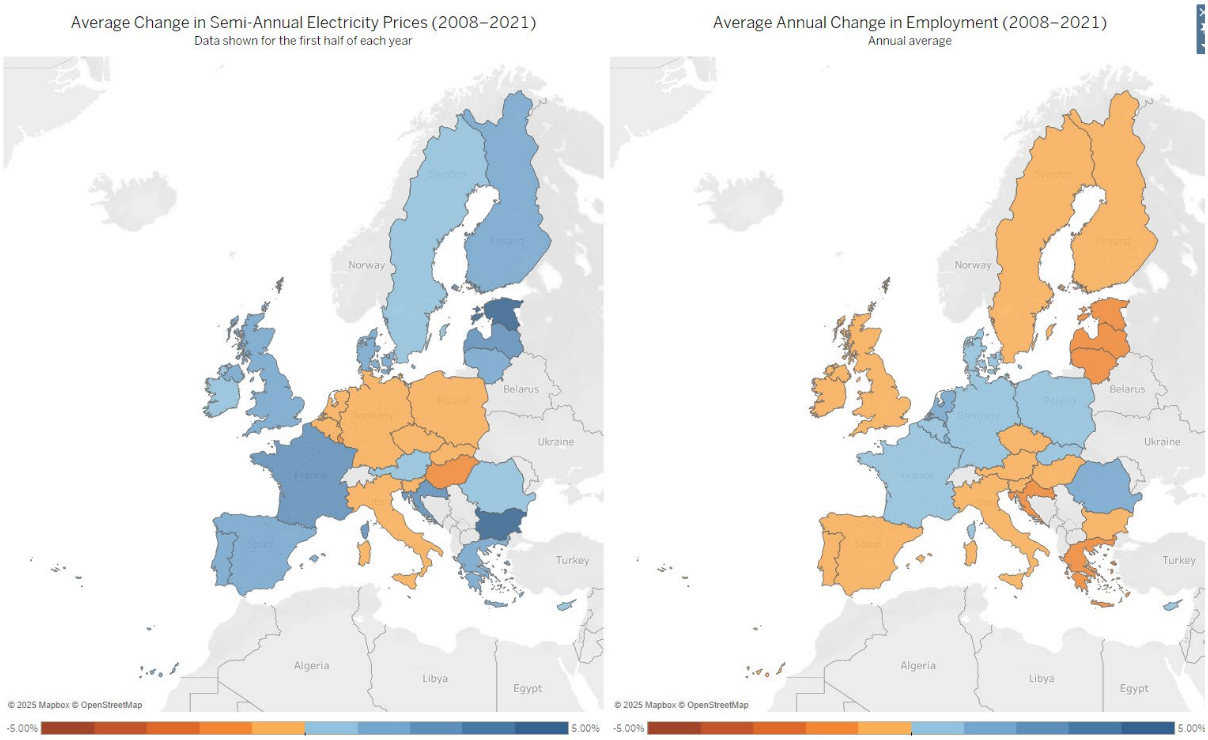
Average Change in Semi-Annual Electricity Prices (2008–2021)
Data shown for the first half of each year



Average Annual Change in Employment (2008–2021)
Annual average



Wholesale and retail trade; repair of motor vehicles and motorcycles



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