Bostan, Mircea

Article

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International Journal of Energy Economics and Policy

Provided in Cooperation with:
International Journal of Energy Economics and Policy (IJEEP)

Reference: Bostan, Mircea (2021). EU electricity policymakers' (in) sensitivity to external factors : a multi-decade quantitative analysis. In: International Journal of Energy Economics and Policy 11 (6), S. 303 - 314.
https://www.econjournals.com/index.php/ijeep/article/download/11630/6132.
doi:10.32479/ijeep.11630.

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2021, 11(6), 303-314.

EU Electricity Policymakers' (in) Sensitivity to External Factors: A Multi-decade Quantitative Analysis

Mircea (Mike) Bostan*

University of Maastricht, Netherlands. Email: mircea_bostan@yahoo.co.uk

Received: 22 June 2021 **Accepted:** 10 September 2021 **DOI:** https://doi.org/10.32479/ijeep.11630

ABSTRACT

The article explores possible reasons for the consistent dominance in the EU energy space of one energy policy priority, environment, when a more balanced policy would be expected, according to the classical energy trilemma. Stemming from a policy dynamics theoretical background, the sensitivity of EU policymakers to external factors is quantitatively tested by comparing legislative output against key relevant indicators, such as the public opinion and air pollutants emissions. The study encapsulates the last three decades, across all the three energy pillars of the energy trilemma, plus a fourth, internal energy market. The investigation converts into ordinal values data from selected indicators so as to create comparable scales. Results show that, unlike other energy pillars, which display strong connections between external factors and legislative output, environment legislation is rather indifferent to external factors pressure. Possible explanations are incorrect policy calibration or internal factors, originating in the rational choice realm. This research is one of the first to introduce comparative assessments in the Environmental Policy Integration discussion and employs in novel ways research methods for energy policy analysis emerged in the field of energy security policies.

Keywords: Electricity Policy, Policy Dynamics, Quantitative Analysis, Classical Energy Trilemma
JEL classifications: F530, Q480

1. INTRODUCTION

"Rage, rage against the dying of the light" the Welsh poet Dylan Thomas is urging. For an energy policymaker, keeping lights on is only one side of the energy equilibrium. Environment and affordability need to be considered as well, if the reference framework is the classical energy trilemma. The trilemma defines three main priorities of energy policy: environment, affordability and security of supply, and postulates that those policies are in a rather competitive state. However, there is little research into what drives the prioritisation of EU electricity policies.

A systematic quantitative mapping of the EU electricity policies from 1986 to 2018 (Bostan, 2019), showed a large number of laws, policy instruments and newly-proposed policy importance in favour of the environmental pillar, compared with the other energy pillars. For any of those three perspectives, environment hovers around 40% of total laws, policy instruments or policy importance. But, more policy attention to an energy priority would affect the others (Auverlo et al., 2014; Gunningham, 2013; World Energy Council & OLIVER WYMAN, 2015), all being a balancing act.

Why then there is a consistent dominance in the EU energy space of one energy policy priority, when we would expect to have a balanced policy? Why some energy priorities receive far little energy attention from EU policymakers? A temporary situation determined by some particular circumstances, such as an oil crisis or an economic downturn, is not a valid explanation, as the mapping encapsulates 30 years of data, enough to eliminate any passing driving factors. Therefore, there could be some long term, structural explanation to this policy bias.

This article aims to find a response to the question of why environmental priorities were favoured compared with other energy priorities and postulates that sensitivity or insensitivity of policymakers to certain key external factors is a cause. There is a significant strand of literature dedicated to the question of why environmental priorities are favoured, namely the Environmental Policy Integration (EPI) debate. To recall, EPI literature looks at when and why environmental policies are successfully mainstreamed and converted into a priority in sectoral policy areas. More recently, the EPI scholarly conversation evolved to discuss the Climate Policy Integration (CPI) as well (Kettner and Kletzan-Slamanig, 2020).

This article aims to examine the existing explanations, test them quantitatively where possible, compare them with other pillars for benchmarking and attempt to bring own explanations to this puzzle. Furthermore, the research includes all electricity binding legislation, creating this way an overarching empirical testing study of the EU environmental policy success in the electricity area. Our explanation to the conundrum is that EU policymakers have a different policy response to changes in key environmental factors than any other policy response for other electricity policy priorities. We propose testing this hypothesis by comparing changes in electricity legislation (in terms of importance of policy instruments) against selected factors (or benchmarks), over a 30-year period.

The methodology relies on the fact that a variation of a factor relevant for the electricity sector triggers a policy response, and the policy response can be measured and compared. The policy response is divided into the three pillars of energy trilemma, plus internal energy market. A much different policy response, in terms of importance of policy instruments, should to external factors influencing environment should be expected compared with the policy response to affordability, security of supply or internal market development factors.

A conceivable reason for this sensitivity mismatch is that the EU public was rarely confronted with a major crisis (such as blackouts or high percentage of electricity cost in a household budget) in any other field than climate (even if the climate one is, although clearly established, in the medium to long term). This investigation into EU policymakers' sensitivity finding would help predicting future policy response, by monitoring the relevant factors. Hence, the first objective of the article is finding the relevant factors to test. Such endeavour has an inevitable grain of subjectivity, even with a thorough literature perusal in support. Nevertheless, triangulating between statistically-recognized indicators, data availability and employed factors in current research, the selection process ensures an objective draft.

A second major objective of the study is to find explanations for why environmental factors draw such particular attention from policymakers compared with other electricity priorities. The findings would contribute to understanding the theoretical bodywork under which environmental policy is designed. As such, this objective contributes directly to the EPI scholarly debate by investigating existing explanations and finding responses to the question of why EU environmental priority is so successful in gaining EU policymakers' attention. However, the research is not limited to the environmental debate, as external factors driving all electricity pillars are under analysis. The overall purpose of the article is to narrow down what drives the EU electricity policy by successively distilling and quantitatively testing various explanations.

The paper is divided into eight parts: an introduction and a background, followed by an exposition of the analytical framework employed, including the methodology. The empirical results are separated into the four developed policy perspectives: security of supply, environment, affordability and internal electricity market, each with its own conclusions. Finally, the conclusions respond to the questions addressed by the study, if EU policymakers are more sensitive to the variation of the main external factors that influence environment, compared with the variation of main external factors influencing the other pillars of the classical energy trilemma.

2. THE POLICY DYNAMICS DEBATE IN ENERGY POLICY: FROM HISTORICAL INSTITUTIONALISM TO ENVIRONMENTAL POLICY INTEGRATION

An important scholarly contribution to determining the main influences to legislative evolution is the policy dynamics debate (Howlett and Cashore, 2009), which looks specifically at the drivers of policy change. The different conceptualizations of policy change can be summarized into four perspectives: *structure vs. agency*; *external vs. internal* causal factors; *revolution vs. evolution*; and *output* (linear, teleological) *vs. process* (cyclical, dialectical) (Capano and Howlett, 2009). In this article the focus is on the *revolution vs. evolution* dichotomy, arguing that a change in policies is caused by external factors creating disruptions to the existing paradigm (Smith, 2000; Thelen, 2004). Such taxonomy clarification is important as policy change and, inherently, policy determinants mean different things for different scholars.

This academic view focusing on external factors has its roots in the *punctuated equilibrium* concept (Baumgartner and Jones, 2010), similar to *historical institutionalism* (Jevnaker, 2015), which argues that policy alters only gradually, due to an inherent calcification of institutions. Policy modifications appear only when the government party changes or when there is major pressure from public opinion (Hallsworth, 2011). This institutional ossification is used for energy regime analyses (Colgan et al., 2012) and noted in the EU space as well (Herranz-Surrallés, 2015). The notion comes in contrast with *rational-choice institutionalism*, which looks at policy output from the perspective of institutional negotiations and sees their interests as causal factors (Farrell, 2018; Jevnaker, 2015).

The selection of relevant factors for this research builds on those theoretical grounds, but it is also inspired by the classical energy trilemma definitions and the policy measurements employed by energy security studies in recent years. To sum up, relevant factors are drafted from four sources: (a) from the existing EPI literature, to a great extent, (b) from historical institutionalism theory,

(c) from World Energy Council definitions, and (d) from the energy security analytical framework, each source being discussed below.

First, an in-depth view of EPI factors is developed, as the research question is why environmental priorities were preferred compared with other energy priorities. Environment policy integration, broadly speaking, refers to the incorporation of environmental aspects and targets into sector policies (Jordan and Lenschow, 2010), such as energy. It is differentiated from environmental policy, as its purpose is to integrate environmental objectives into other policies (Eckerberg and Nilsson, 2013). A summarized version of the main factors found in EPI literature is generally classifying them along three divisions: normative factors, organisational factors and procedural factors (Lenschow and Zito, 1998; Mickwitz and Birnbaum, 2009; Persson, 2004), to which some authors include a governance strand, a "green Europeanisation" in the energy sector (Solorio, 2011, p. 397).

Another classification of factors includes: "High-level political commitment"; "Societal backing" or "Change of routine procedures: impact assessment of policy proposals, consultation and participation, rules of decision-making" (Persson, 2004, p. 36).

However, not all of those external factors are quantifiable and an assortment of them is needed, as argued in the analytical framework section. "High-level political commitment" and "societal backing" are good candidates, as they are also suggested by the historical institutionalism approach. Additionally, several normative, empirical EPI factors are proposed (Runhaar et al., 2014), most prominent being EU CO_2 emissions (Adelle and Russel, 2013).

As the aim of this article is to learn if EU policymakers have a different policy response to variations in external environmental factors compared with other external electricity policy factors, comparable factors are required for the three other policy priorities: affordability, security of supply and internal market. The comparison of the ordinal scale of environment external factors with the scales of the other pillars is necessary because the other pillars provide the benchmark against which the sensitivities are measured.

Few studies are empirically testing policy outputs and are largely restricted to sectoral investigations (Knill et al., 2012; Schaffrin et al., 2015). While quantitatively analysing the major EU environment policies implementation to see leaders and laggards (Knill et al., 2012), a comprehensive list of policies is created, including measurable indicators. In another article, Knill et al. focus on clean air policy and test empirically regulatory density and intensity with measured emissions. In a further step, the authors look for determinants of air emissions, but find no correlations (Knill et al., 2012). An investigation into national climate policy instruments in selected countries verifies successfully the activity of a number of policy instruments (Schaffrin et al., 2015), a useful set of factors to this analysis, but confined to the climate field.

In an EPI literature review (Runhaar et al., 2014), authors decry that there is no research testing which proposed EPI strategies work (Russel and Benson, 2014; Steurer and Hametner, 2013; Turnpenny et al., 2009) and note that comparative assessments are missing altogether. To our knowledge, this article is the first to quantitatively study the success of EPI, suggesting policymakers' different sensitivity to electricity policy priorities as a reason.

Second, historical institutionalism in the framework of the European Union was employed mainly on the integration process, on the study of EU institutions and on EU policies (Christiansen and Verdun, 2020). In the EU energy policies sector, recent research focused mainly on the sustainable transition, such as revealing causal links between institutions and renewable energy (Allen et al., 2020), material efficiency in energy and climate policies (Hernandez et al., 2018) and climate issues (Lindberg, 2019). Some investigations endeavoured to understand factors that led to the inclusion and expansion of energy security (Bocse, 2020). Several scholars argue that critical junctures are undervalued in energy research and crises may indeed strongly affect the policy process (McCauley et al., 2018; Quahe, 2018).

Third, World Energy Council definitions for the classical energy trilemma priorities are: energy security defined as meeting reliably a country's current and future energy demand; affordability meaning providing universal access to energy; and environment representing the transition to an energy system mitigating and avoiding environmental and climate change impacts (World Energy Council, 2020). Some of these definitions translate into quantitative indicators, for example, energy reliability of a country has quantitative indicators such as energy dependency and length of interrupted energy supply.

Finally, important advancements in policy measurement and comparison emerged in the field of energy security policies, where a large number of scholars are developing quantitative analysis frameworks and measurable factors in policy output studies. The concept of energy security, as presented by specialist literature (Asia Pacific Energy Research Centre (APERC), 2007; Chester, 2010; Kruyt et al., 2009; Von Hippel et al., 2011) includes *availability of energy products*, *affordability* and *sustainability*. Incidentally, those are the very pillars, including the internal electricity market, of the EU electricity policy that this research is focusing on. The analytical framework provided by the energy security policies is used as inspiration for the methodology of this research, more detailed in the subchapter below. Furthermore, the literature under energy security studies provides inspiration for external factors as well, as quantitative indicators are searched for each energy pillar to allow energy security analyses.

3. AN ANALYTICAL FRAMEWORK TO SELECT MAIN DRIVERS OF EU ENERGY POLICY: CLASSICAL ENERGY TRILEMMA

The article aims to rate sensitivities between *a change in policies* and *variations of external factors*, by creating a scoring scale for data and convert it into ordinal values. The change in policies is measured by the targets and objectives' importance over 30 years of analysis, divided according to the classical energy trilemma policy priorities. There are a number of ways to divide electricity policies. For example, the Directorate-General Energy of the European Commission divides energy policies in several fields, ranging from "energy efficiency" to "oil, gas and coal" (European Commission, 2020b). The European Green Deal focuses on GHG emissions, decoupling the economic growth from resource use and on social equity (European Commission, 2020a). Some authors propose a cooperative arrangement, where different energy priorities are classified in separate arenas (Kanellakis et al., 2013). However, one of the more popular classifications is the one proposed by the World Energy Council (World Energy Council, 2020), as it acknowledges that attaining simultaneously the three policy priorities of environment, affordability and security of supply, is often a delicate balancing act, even a zero-sum game at times. Such inherent competition of these so-called "pillars" supports the cataloguing process of EU binding legislation. To those three, a fourth was added, internal market, due to the key priority of creating a single market which permeates the EU policymakers' decisions.

Historical institutionalism postulates that policy changes occur only when there is *government change* or *public opinion pressure*. The first option, governmental changes, is mainly translated within our EU analytical framework scope, as European Commission president changes and, in a larger sense, changes of European Parliament's political balance and European Council's leaders party leaning. For this reason, these three governmental changes are examined, but the results are found inconclusive. The "government" would mean the European Commission president. Between 1986 and 2018, there are seven mandates of Commission president (Jacques Delors II – 1989; Jacques Delors III – 1993; Jacques Santer – 1995; Romano Prodi – 1999; José Manuel Barroso I – 2004; José Manuel Barroso II – 2009 and Jean-Claude Juncker - 2015). In fact, only five people had been heading the European Commission during three decades. The number of variables is not sufficient to draw any significant conclusions.

It can also be argued that "high-level political commitment" could come from the European Parliament or the European Council. For the European Parliament, there is the same insufficient number of variables to draw relevant conclusions; weighted down by the long-standing alliance between centre-left Socialists (Party of European Socialists) and centre-right EPP (European People's Party). For the European Council, the increasing number of EU members and frequent national elections at top and parliamentary level makes the analysis too fragmentated.

Therefore, our investigation concentrates on the second strand of the historical institutionalism approach: pressure from public opinion. This approach is underlined by one of the EPI empirical factors, "societal backing". Furthermore, there is sufficient data under the Eurobarometer surveys, from all EU (European Communities pre-1993) members starting from 1974 (European Commission, 2020c).

Public opinion is one of the external factors that cuts across energy pillars, allowing comparisons between those pillars and offering deep insights into what the public sees as important. It is one of the main external factors, singled out by both historical institutionalism and EPI literature. There is no single EU survey that runs over the entire 30 years of study; however, the comparison between the three pillars of affordability, security of supply and environment appears frequently in the Eurobarometer, either as a straight comparison or choice amongst other options.

In the 1980s, several surveys ask specifically what the public thinks is the preferred policy between the three. Afterwards, in the 1990s, the question is changed, asking what pillars the public considers as the most serious problem. 2000s was quite barren in energy policy surveys, with few questions useful for our research. The last decade asked the public what problem citizens seem most important and the closed answer surveys included energy topics which could be assimilated under the pillars selected by this study. A detailed presentation of the surveys and questions selected is in the indicators technical note, and coding calculations in the tables technical note.

An additional challenge was to compare and code answers which have different question structures: some required unique answers, some multiple answers, while some others allowed two main answers. This obstacle was surpassed by calculating the figures for each pillar (percentage of responses from respondents) as a ratio within the sum of all the other pillars. This solution eliminated the "don't knows" or other available answers in the questionnaire. This resolution was employed as there is no research interest in this article in the public opinion on security of supply, but in how the public opinion is ranking this pillar of security of supply compared with other pillars. The coding kept an ordinal scale of 10 through the process, to create comparative variables with the similarly coded scale of legislation importance.

Public opinion pressure is sometimes a symptom of other external factors, for example a high electricity price will be perceived as energy poverty. Additionally, public opinion cannot be always known in the detail needed to identify policy choices, as there is no available data. Hence the importance of aggregating external factors, in order to dilute unrepresentative variations of single factors and allow an illustrative comparison with the evolution of policy changes. Literature identifies distinct external factors that can cause policy change, separate from public opinion, such as raw materials price (Schröder et al., 2013), foreign relations (Taggart and Szczerbiak, 2013) or technology (Alizadeh et al., 2016; Shilei and Yong, 2009; Zhu et al., 2015). Consequently, while public opinion is a factor that goes across energy pillars, distinct external drivers (independent variables) for each pillar are under analysis as well, to allow measuring and comparing policymakers' sensitivities to external factors across the four energy pillars. The Table 1 displays the analytical matrix of external factors used for the four pillars, each of the factors being elaborated in the empirical sections.

"Simple" factors are the direct numerical data that can be extracted from statistical sources, such as the Eurobarometer surveys or the electricity price. "Aggregated" factors are composites of the "simple" factors. One of the insights of the successful quantitative analytical frameworks from the security of supply field is the

Table 1: External factors employed for analysis for each pillar

Pillar	External factors		
Environment	Public opinion for environment	Air pollutants	GHGs emissions
Internal energy market (IEM)	Public opinion for IEM	Intra-EU energy trade	Market coupling
Affordability	Public opinion for affordability	Electricity prices	Household energy expenses
Security of supply	Public opinion for security of supply	Customer minutes lost	Solid fuels/natural gas dependency

Source: Author's elaboration

development and employment of aggregated factors (Malik et al., 2020; Yamanishi et al., 2017; Yao and Chang, 2014). The usefulness of adding this extra layer of complexity is that it allows comparison of our constant (policy importance) with multiple variables (the "simple" factors) in one aggregated factor. The methodological solution is an average value of the simple factors, after those factors are converted into ordinal values. To note, all the "simple," and, consequently, the "aggregate" factor, use data consolidated at EU level.

Legislation takes time to take effect and steer the agents towards the regulators' desired result (Pérez-Arriaga, 2014). This is valid the other way around as well, when a factor, such as public opinion, pressures for action. As such, one of the minor objectives of this study is to measure how much time takes from pressure to approved policy (EU binding legislation published in the Official Journal). Earlier, successful testing on approved climate policies effects on RES generation and production (Bostan, 2019) suggests examining one and 2-year timelines; further timelines, 3-year for example, showing much weaker effects. Hence, the scope of the research is on 1 and 2-year factor-delay testing.

In an upcoming article, we developed a policy analysis that catalogued all EU binding legislation in the electricity sector, from 1986 to 2018, including each individual target and objective. The "electricity" sector refers to electricity-related pieces of legislation only and "binding" means EU documents with legal effects: Regulations, Directives and Decisions. Each target and objective received an "importance" number, from one to four, according to a predefined rulebook. A database of about 700 obligations and targets was thus created, including over 8,000 tags.

To conclude, this study intends to find why the electricity environmental legislation is so dominant compared with other electricity policy priorities, by testing the EU policymakers' sensitivity to variations of external factors, such as the public opinion, and expecting to find a very different sensitivity. To achieve this purpose, the investigation needs to convert into ordinal values the data from external factors so as to create comparable scales. The codification of results into ordinal values uses a decimal, 10-points scale, from 1 to 10, each point of the scale being an equal interval for the selected factors. The average value of the selected factors would give the value of the aggregated factor, used for comparison. Using this methodology, this exploration hopes to reveal some important factors in policy-making, useful for future prediction of policy output. Finally, the research aims also to determine how significant for legislative sensitivity is the 1 and 2-year delay in policy results compared with the time of the driving factor.

4. POLICYMAKERS' SENSITIVITY TO ENVIRONMENT – LEGISLATION INDIFFERENT TO EXTERNAL FACTORS PRESSURE

Environment as policy priority is one of our main points of interest, as environment-related legislation has a commanding presence in the policymakers' attention, looking at the number of pieces of legislation, objectives and targets, and the importance of those objectives and targets compared with other policy priorities. Under the umbrella of "environment", both environment and climate issues are covered, to ensure consistency over the 30-year of empirical observations. The external factors selected are: the omnipresent across all pillars, public opinion; air pollutants; and greenhouse gases per capita.

4.1. Public Opinion

The inquiries found in the Eurobarometer on the EU public regarding environment include terms such as "pollution," "cleaner energy" or "protection of the environment". The legislation compared against includes targets and objectives encompassing renewable energy sources, air pollutants or measures to protect the environment, making it a relevant comparison. Only surveys where environment was compared against other energy priorities were taken into account, ignoring priorities within environment (air pollutants or renewable energy) or sectoral (nuclear environmental safety or energy independence).

4.2. Air Pollutants

The most frequent indicators in all European Environment Agency (EEA) database and having most legislative coverage is air pollutants. Furthermore, there are long-time series going until the 1970s for the main pollutants. However, compressed data was found only since 1990, at European Community level. In the electricity field, there are pieces of legislation aimed specifically at reducing the amount of emitting pollutant gases (e.g., Directive 2010/75/EU on industrial emissions (the Industrial Emissions Directive); Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants). For these reasons, available data and importance of indicators, this external factor was included in the empirical research. For the purpose of this study, the latest data on emissions of the main air pollutants in Europe was employed, as provided by EEA (European Environment Agency, 2019). The pollutants measured are ammonia (NH_3), non-methane volatile organic compounds (NMVOC), nitrogen oxides (NO_X), particle matter that have diameter less than 2.5 micrometres ($PM_{2.5}$) and sulphur oxides (SO_X). These air pollutants were aggregated into one - air pollutants external factor.

4.3. Greenhouse Gases Emissions Per Capita

Climate policies have become a key overarching policy, now only in the electricity sector, but for the European Union as a whole, generating an active policy debate reflected in the climate policy integration discussion. Climate preoccupations have imposed on the attention of policymakers and, consequently, an external factor related to this development was selected. The key measurement is the greenhouse gases emissions (GHGs emissions). The expansion of the European community over years and the availability of data suggests using the GHGs emissions tonnes per capita as the most precise, long-term external factor to add into the analysis.

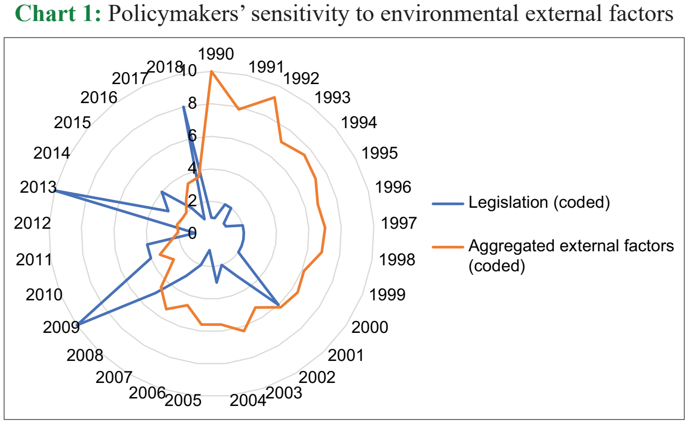
The Chart 1 displays in a radar plan the external aggregated factors and the legislation importance. This method is frequently used for security of supply analyses (Asia Pacific Energy Research Centre (APERC), 2007; Bogoviz et al., 2019; Malik et al., 2020; Yamanishi et al., 2017; Yao and Chang, 2014), but used in this article for cross-sector investigation. The key indicators to examine are the scale, frequency and evolution of the external factors and legislation importance. Such display allows insights into the meaning of data, that are presented in the conclusions part of this chapter. The chart presents data since 1990, the year when at least two external factors come into play.

4.4. Analysis

The aggregated external factors' pressure is gradually declining, from highs close to maximum 10 in the 1990s to almost 2 at the end 2010s. A small dip appears in 1993 and again in 2003, followed by a larger drop in 2010. Unlike affordability or security of supply pillars, there is no seesaw evolution of external factors, but a rather constant decline.

The published environmental legislation, however, has a contrasting evolution, with periods of dwindling presence followed by towering highs, in 2001, 2009, 2013 and 2018. These years correspond with ground-breaking environmental legislation, including: Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants; Directive 2009/28/EC on the promotion of the use of energy from renewable sources (RED I); Decision No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions (the Effort Sharing Decision); Regulation (EU) No 1293/2013 on the establishment of a Programme for the Environment and Climate Action (LIFE); Regulation (EU) No 525/2013

Chart 1: Policymakers' sensitivity to environmental external factors



Source: Author's elaboration

on a mechanism for monitoring and reporting greenhouse gas emissions (Monitoring Mechanism Regulation); Regulation (EU) 2018/1999 (Governance of the Energy Union and Climate Action). To note, it is not one single piece of legislation that creates a spike, but rather several pioneering pieces in a given year.

There is an obvious decline in external factors' pressure after legislation is published, visible in 2002, in 2009 and 2014. The drop in pressure of external factors follows closely legislative spikes. However, it seems anomalous to have a constant decay in external factors' pressure, but a dramatic increase in published legislation in the environmental domain. No individual external factor under investigation sees a marked increase in pressure towards policymakers. The external factors selected for environment, public opinion, GHGs and air pollutants, are commonly used in the EPI literature and feat prominently in the environment legislation, being specifically monitored and capped; they are clearly relevant.

5. POLICYMAKERS' SENSITIVITY TO INTERNAL ENERGY MARKET – WEAK CONNECTION BETWEEN EXTERNAL PRESSURE FACTORS AND LEGISLATION ADOPTION

The internal energy market pillar is a new pillar suggested for analysis, alongside the three traditional energy pillars proposed by the World Energy Council. The introduction of this pillar was underpinned by the fact that some European policy targets and objectives do not fit any of the three energy policy priorities, such targets and objectives are only to enhance the European Union and the internal energy market. As such, the indicators selected have a more salient European dimension. The external factors selected are: public opinion; intra-EU electricity trade; and market coupling.

5.1. Public Opinion

Unlike public opinion sections of other pillars, the public is not asked their opinion by ranking internal energy market alongside affordability, security of supply and environment in their preference. However, the public is expressly asked if energy policy (environment in earlier years) should be at national or European level, which provides a good indicator for an external factor pressure. The question is followed by the Eurobarometer since 1989 until recent times, with gaps in only a few years.

5.2. Intra-EU Electricity Trade

One external factor that measures the pressure for creating policy is the internal electricity trade. As no infrastructure or networks codes existed at the beginning of our timeline of research, little trade could happen. However, a desire to trade existed, for arbitrage and hedging opportunities. The more infrastructure and rules aimed to increase the flow of trade appeared, the more electricity trading increased; hence relieving pressure from regulators to create trading opportunities. Eurostat is monitoring internal EU electricity trade value and the figures are gross and seasonally adjusted, making this indicator an excellent candidate as a main external factor for EU internal energy market development.

5.3. Market Coupling

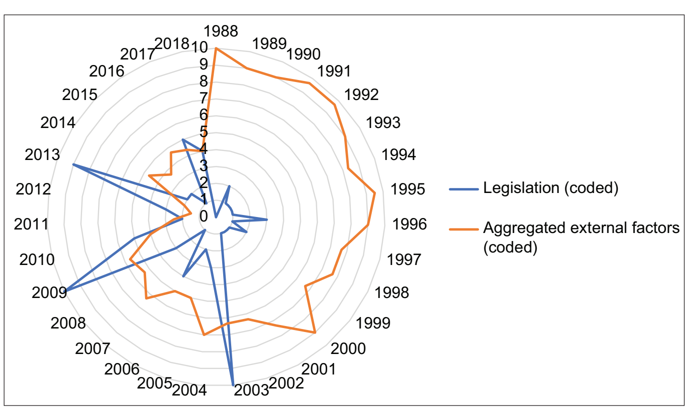
Market coupling means coupling EU member states in a common market for electricity. Market coupling does not necessarily refer to physical interconnections, although they are a *sine qua non* condition, but to the possibility to trade easily across borders. The project that started such endeavour was the Price Coupling of Regions (PCR), designed by European power exchanges, and aiming to create a single price coupling solution for day-ahead electricity prices in participating regions (EPEX SPOT, 2021; Europex, 2016, 2019). The empirical research tracked historically when one EU member state got connected to at least one another member and a price coupling was available.

As in previous sections, the aggregated factors in ordinal values and legislation importance are displayed in the Chart 2. The chart presents data since 1988, the year when at least two external factors come into play.

5.4. Analysis

The legislation importance appears either with low numbers or in large spikes, in 1996, 2003, 2006, 2009 and 2013. Those years coincide indeed with major energy packages adopted by the European institutions. The 1980s are barren in terms of legislation promoting internal energy market; however, every decade since, a major spike occurs, driven by pioneering legislation. Directive 96/92/EC concerning common rules for the internal market in electricity is the first piece of legislation that brings major, specific EU-market dedicated rules. 2003 is a foremost year of European market development, as the Directive 2003/54/EC concerning common rules for the internal market in electricity and Directive 2003/55/EC concerning common rules for the internal market in natural gas are adopted, alongside Regulation (EC) No 1228/2003 on conditions for access to the network for cross-border exchanges in electricity. Decision No 1364/2006/EC laying down guidelines for trans-European energy networks is a major piece of

Chart 2: Policymakers' sensitivity to internal electricity market external factors



Source: Author's elaboration

legislation enhancing the internal market. In 2009, a new energy package including Directives concerning common rules for the internal market in electricity and gas, but also Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity and Regulation (EC) No 715/2009 on conditions for access to the natural gas transmission networks expand significantly the incipient European electricity market.

The aggregated external factors put huge pressure for regulation to appear, but gradually become subsided by consecutive legislative packages and pressure decreases. After the legislative spike in 1996 and particularly after 2003, the external factors push declines to half the previous levels. The additional expansion of the internal market in 2009 further reduces the pressure, which reaches bottom following the 2013 legislation spike. However, since the middle of 2010s, the external factors start to pressure again, mainly driven by public opinion, which considers that the energy policy must be more in European hands.

Visualizing the evolution of legislation importance and external factors over 30 years of research, it appears to have a weak connection between external pressure and legislation adoption. After every major energy package, and implicit legislation importance spike, the pressure for new targets and instruments generally drops, but not always. The major legislative spike in 2013 is followed by an increase in public pressure, rather than a decrease. Overall, it appears that the European policymakers respond to external factors for the pillar of internal energy market and they calibrate, albeit rather poorly, their sensitivity to the most relevant external factors.

6. POLICYMAKERS' SENSITIVITY TO AFFORDABILITY – CALIBRATED LEGISLATIVE RESPONSE TO EXTERNAL FACTORS' PRESSURE

Affordability is the third pillar of the classical energy trilemma, alongside security of supply and environmental protection. It looks at the costs to purchase energy, in our case electricity. According to a legislative investigation (Bostan, 2019), it appears to be the most neglected political priority. In this section, the main indicators measuring affordability are tested in order to find why the lack of political attention. The selected external factors are: the public opinion; the electricity price; and energy expenses, all detailed below.

6.1. Public Opinion

Looking at the Eurobarometer surveys and investigations of public opinion regarding energy policies, affordability was never at the top. While definitely a contender, sometimes placed close to environment and, in some years, above security of supply as political priority, it is often at the bottom of priorities according to EEC/EU citizens. As such, this external factor supports the findings that affordability should not be at the top of EU policymakers' priorities. However, a larger external factors sample could prove further insights; hence including into the analysis the electricity price for households and a household energy expenses.

6.2. Electricity Price

One clear indicator for affordability is electricity price for households. Eurostat has an indicator tracking electricity price since 1976, but figures (even incomplete) for the entire European community exists only since 1991. Another constraint is the bandwidth of electricity for measurement of an average household. In 30 years, the consumption of an average household increased, hence the need to modify upwards the bandwidth. Luckily, Eurostat modifies the methodology from 2007 and allows a higher bandwidth. Hence, the average household bandwidth, DC, is measured for a consumption between 2 500 kWh and 5 000 kWh per year until 2007 and then of around 3 500 kWh per year, all taxes and levies included. A third constraint is that the figures presented are not seasonally adjusted: 12 eurocents in 1990 value totally differently than 12 eurocents in 2018. Therefore, all figures were seasonally adjusted, according to European Central Bank inflation data, to bring them at the same value as in 2018 and have comparable data.

6.3. Energy Expenses (Measured as % of Household Budget For Energy Expenses)

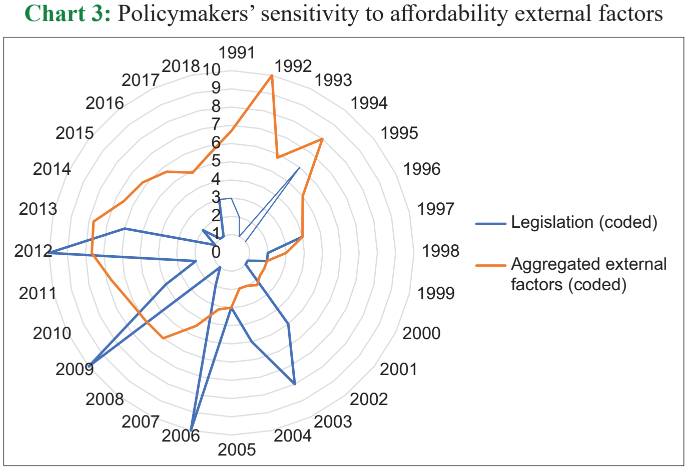
A close proxy, but relevant and accurate indicator is the final consumption expenditure of households by consumption purpose (Classification of Individual Consumption by Purpose - COICOP). For this research, the percentage of a household total revenues used for the purpose of acquiring electricity, gas and other fuels (energy expenses) was selected. This indicator has EEC/EU-wide figures, starting from 1995. As the indicator is conveniently a percentage, there was no need for further adjustments.

The data coding and aggregation are presented in the Chart 3, which displays in a radar plan the affordability external aggregated factors and the legislation importance. The chart presents data since 1991, the year when at least two external factors come into play, as in the previous section.

6.4. Analysis

To conclude, the pressure from external factors is rather high in the beginning of 1990s, gradually declining until 2007, when the effects of the economic crisis push up the external pressure. The pressure continues until 2013, then again steadily declines.

Chart 3: Policymakers' sensitivity to affordability external factors



Source: Author's elaboration

Legislation's importance has an oscillating evolution, with highs in 1994, 2003, 2006, 2009 and 2012 and values close to zero in other years. Particularly in the 2010s, only 1 year presents legislation output, the rest of the years just not being in the policymakers' attention.

In 1994, the reason for such highs in terms of affordability is a series of Council decisions financing nuclear research, aiming mainly for cheap electricity from nuclear development. The twin Directives 54/EC and 55/EC from 2003 concerning common rules for the internal market in electricity and gas have several important objectives aiming for more affordable energy. In 2006, there are several programmes providing financing for nuclear research, but also the Directive 2006/32/EC on energy end-use efficiency and energy services, seeking to increase energy efficiency. Again, the recast twin Directives 72/EC and 73/EC concerning common rules for the internal market in electricity and gas have many and important objectives regarding affordability. Finally, 2012 is marked by the Directive 2012/27/EU on energy efficiency, a continuation of the 2006 Directive.

While legislation has a cyclical evolution, the pressure from external factors is rather tidal, with gradual increases or decreases. Legislation follows the external factors: increasing external factor pressure is usually followed by several legislative initiatives. This connection is best seen in 1994, in 1997 and in 2012. The legislative highs of 2003 and 2006 do not reduce significantly the external factors' pressure; however, such force is low during early 2000s. The economic crisis starting in 2007-2008 and its aftermath are clearly seen in external factors' pressure, from 2007 to 2013; and no further political response is sought by the external factors afterwards, with external factors' pressure progressively dropping.

To sum up, rather few anomalies can be identified with this pillar. The legislative response seems, in general, to be calibrated and timed to respond to external factors' pressure. The exception is the legislative output from 2003 and 2006, which appears to not be enough to quell the increasing burden. Looking at the aggregated factors, the reason is an increase of average household's energy costs: swelling from 3.2% in 2002 to 4.2% in 2008, a ±30% increase. 2007 sees also a large increase in electricity prices, in contrast with continuous price decreases in the 10 years before, since 1997.

7. POLICYMAKERS' SENSITIVITY TO SECURITY OF SUPPLY - RATHER CLOSE LEGISLATIVE RESPONSE UNDER DURESS FROM EXTERNAL FACTORS

The concept of security of energy supply has evolved and it encompasses two meanings: uninterrupted supply of energy, in our case electricity, and a nation's capacity to meet energy demand reliably, resisting to external shocks. Both meanings are reflected in the definition for security of supply of the World Energy Council (World Energy Council, 2020). The chosen factors are: public opinion of security of supply; the amount of time electricity was not delivered, per customer (loss minutes per customer - CML); and, finally, energy dependency.

7.1. Public Opinion

Security of supply was rarely seen as a problem by the EEC/EU public in the last 30 years. Even more, the trend is a decreasing one, with less respondents mentioning security of supply as important. There are some years where interest for energy security erupts, but almost never topping the attention of the public. Nevertheless, security of supply remains a key part in the balance of energy priorities.

7.2. Uninterrupted Security of Supply

Uninterrupted security of supply can be expressed quantitatively as the number of minutes when electricity is not supplied to customers. While Eurostat holds no data on such indicator, CEER (Council of European Energy Regulators) publishes reports with quality of electricity supply from 1996 to 2016, latest. The figures are per country and include the great majority of EU members at different stages in the 20 years reported so far. Full details of reports are in the indicators technical note – the exact indicator employed was customer minutes lost per year (CML), unplanned interruptions, including all (exceptional) events.

7.3. Energy Dependency

Energy dependency is an indicator monitored by Eurostat and easy to employ, with records going since 1990. Energy dependency is imports divided by the gross available energy, with the formula = (imports – exports)/gross available energy (Eurostat, 2021). However, the scope of this research is electricity, not energy, so the search had to be further refined. Only EU energy dependency of natural gas and solid fuels was employed and coded, presented as an average of the two, as those have a large contribution to electricity generation and are mainly imported for this purpose. Testing EU electricity dependency, by calculating the net EU imports, provided no useful results, as the net imports are too small compared with the EU electricity consumption, at their highest under 2% and averaging around 0.5%.

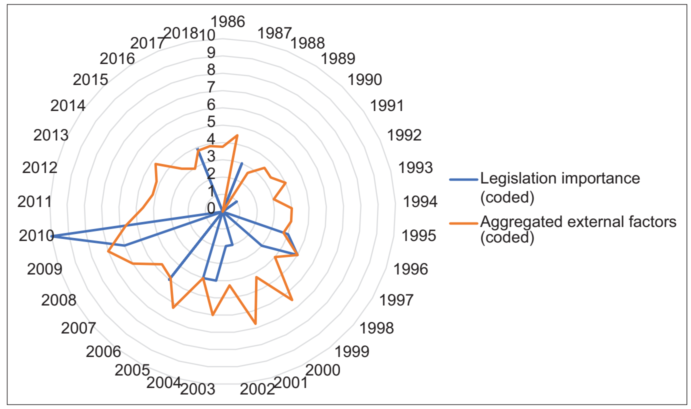
The conclusions can be visualized in the Chart 4, which displays in a radar chart the external aggregated factors and the legislation importance, both coded in an ordinal decimal scale to allow comparisons.

7.4. Analysis

In terms of scale, external factors put constant pressure on policymakers, increasingly at the end of the 1990s and beginning of the 2000s. After a slow start in late 1980s and early 1990s, pressure picks up towards late 1990s and stays high, with a relative decline in the middle 2000s. Late 2000s see the most pressure towards policymakers for more security of supply legislation. This pressure drops to lowest on record in the 2010s. Legislation importance for security of supply appears infrequently, in waves, with appearances in early 1990s, middle 1990s, early 2000s, 1 year in middle 2000s, a major surge in early 2010s and one more appearance towards end 2010s.

Legislation importance seems to match external factors pressure in most instances, except early 2010s, when legislation skyrockets (e.g., Directive 2009/72/EC concerning common rules for the internal market in electricity; Regulation (EU) No 994/2010

Chart 4: Policymakers' sensitivity to security of supply



Source: Author's elaboration

concerning measures to safeguard security of gas supply). It is not an unusual result, as we can see factors building pressure in earlier years and pressure dropping after the legislative surge. What looks abnormal is the importance of security of supply legislation in early 2000s: pressure is building in the previous years, but legislative output does not match the pressure. This is reflected in external factors pressure continuing after the legislative output, not solved until the major surge in the early 2010s. Overall, a connection between external factors' pressure and legislative importance output seems to exist for the security of supply pillar. External factors' pressure appears to drop after legislative importance output and increase without it.

Possible explanations for the increase in the external factors' pressure for more EU energy security in mid and late 2000s are linked to the Russia-Ukraine gas transit disputes. Such disputes over the gas prices resulted in the Russian gas being cut off to Ukraine, affecting not only the transit country, but also several EU member states in the winter of 2005-2006 and in early 2009 (Kirby, 2014; Natorski and Surrallés, 2008). The picture is not complete however, as concerns over security of supply appear in other years as well, clearly not related to the Ukraine-Russia gas disputes. Those years of surging energy supply concerns seem to coincide with years with relatively longer electricity supply interruptions (such as in 1999 and 2001). In conclusion, both electricity supply and energy dependence seem to create security of supply concerns.

8. DISCUSSION AND CONCLUSION

The article investigated why environmental priorities were favoured compared with other energy priorities from the classical energy trilemma. The hypothesis proposed was that EU policymakers have a different perspective to environmental external factors driving the energy policy compared with any other factors. The premise was tested by selecting and comparing external factors to evolution of legislation, for each pillar of the energy trilemma, plus the additional internal electricity market pillar.

The results of the empirical research showed a relatively close legislation response to external factors for security of supply and affordability; to give an example, external factors pressure decreases after legislation adoption. For environment and, moderately, internal electricity market, the legislative response is rather weak; for instance, a decrease in external factors pressure does not mean a decrease in legislative response. In other words, external factors have a high influence over security of supply and affordability policies and a much weaker one for environment and internal market legislation.

Responding to the article's research question, the findings display that EU policymakers are far *less* sensitive in policy response to changes in environmental factors, contrary to affordability or security of supply pillars' situation. There is a strong legislative output, despite declining pressure from external factors: GHG/capita decreased and air quality became significantly better, but that did not mean the environmental policies reduced speed of adoption. Furthermore, there are significant spikes of environmental legislation adopted despite major progress in environmental protection, a clear example of moving policy targets. On the contrary, more ambitious climate action targets were proposed and new areas of environmental protection were found.

What is driving such ambition, which ignores major indicators? One explanation, looking at external factors and keeping the policy dynamics theoretical framework perspective, would be that the targets themselves are not well calibrated, hence constantly moved. The purpose of decarbonization is not just less GHGs emitted in the air, but almost no net GHGs emissions. The increasing urgency perceived by the public (which can be seen in the figures from the tables technical notes) to arrive at those targets is pushing the EU policymakers to constantly bring forward the decarbonization targets. Hence, this paradox of successful environmental policies, if measured by targeted indicators, but increasingly pressurizing external factors.

In the same vein of policy dynamics, one person can argue that policymakers are oversensitive to public opinion in regard to climate issues. Indeed, public opinion is at record highs in terms of pressure, particularly on climate legislation, in the latest years of the empirical database, 2017 and 2018, while the other factors are at their lowest. However, the number of variables is not enough to determine if this is true. Extending the research and gathering data for more years could offer further insights, but it cannot give a definite answer at the moment.

Another explanation has the premise that maybe internal factors are of fault, and the discussion moves to the rational-choice institutionalism realm. For instance, the European Commission could use its extended environmental legitimacy to create legislation and give itself competences. Or maybe member states use the prerogatives of the Commission to better protect environment in order to avoid internal struggles with groups of interest.

What are the consequences in real life of this outcome? A weak sensitivity of EU policymakers to major environmental indicators variations, such as GHG/capita or air quality, means, for instance, that a fast-decarbonizing European Union will likely not taper the environmental protection. It is a testament of how strong is the EU ardour, driven possibly by the EU public, by EU institutions rational choice or maybe both, for environmental protection and climate action, adopting ambitious legislation despite respectable environmental protection progress.

These findings also show where the balance of power within the Commission resides, where units tasked with environmental protection and climate action hold more independence, being less dependent on indicators than units tasked with social protection, such as energy poverty, or security of supply. Paradoxically, the indicators for environment are more developed than for affordability (Deller, 2018; Poggi and Florio, 2010; Thomson et al., 2016) and security of supply (Ang et al., 2015; Chester, 2010).

How are the findings contributing to the Environmental Policy Integration (EPI) debate and historical institutionalism in energy policies? One of the gaps mentioned in the EPI discussion was the missing comparative assessments (Runhaar et al., 2014). A possible reason for this problem could be the increase of the Climate Policy Integration (CPI) discussions in detriment of deeper EPI research. This article endeavours to provide such comparative assessment, and the results for EPI are rather satisfactory, environment policies dominating the energy field. Furthermore, this study's findings contribute to Knill et al. (Knill et al., 2012) conclusions (that no determination were found for air emissions) in that environmental legislation is weakly influenced by external factors. Little use was found for comparing environmental indicators with related policies, as the relationship is weak, but could be useful for sectoral analyses (Knill et al., 2012; Schaffrin et al., 2015).

The juxtaposing of the chronological evolution of legislation and external factors may expose critical junctures from a quantitative perspective, a novel perspective for historical institutionalism in energy policies. For example, the security of supply external factors increased pressure could be due, arguably, to the Russia-Ukraine gas transit disputes (Natorski and Surrallés, 2008). The economic crisis starting in 2007-2008 and its aftermath are clearly seen in affordability external factors. For the internal market, every energy package comes with a significant boost that increases market coupling and intra-EU electricity trade. No critical junctures can be identified for environmental external factors.

One of the minor objectives of this article was testing if 1 and 2-year delays of results following legislation adoption would bring any new insights. Tested thoroughly for each of the four pillars: security of supply, environment, affordability and internal electricity market, no particular patterns could be identified. It appears that adopted legislation has generally an immediate impact over the external factors' pressure, a rather counterintuitive conclusion.

The scope of this article does not cover the degree of correlation between different external factors and the adopted legislation. Such an experiment could give further insights and offer quantitative proof over the determinants of the EU electricity policies. Maybe strong correlations could be found and undisputable drivers of EU policies could be revealed.

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