



Original research article

## Trinity on thin ice: Integrating three perspectives on the European Union's likelihood of achieving energy and climate targets



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### ABSTRACT

The energy policy of the EU is established around the objectives of sustainability, competitiveness, and security of supply. These objectives are embodied in targets known as the “20-20-20”. The targets concern decreasing Greenhouse Gas Emissions (GHG) generation, increasing the share of renewables in total energy consumption, and raising energy efficiency. This paper analyses the target achievements through Data Envelopment Analysis (DEA) and a classification of schemes that uses the typology derived from three sources: World Energy Council's (WEC) energy trilemma, Fragile States Index (FSI), taking a comparative perspective across countries. It uses mathematical programming, and the resulting efficiency levels reveal the effectiveness of the input parameters in terms of the policy toolbox, motivators, barriers and other economic, cultural and social factors, and the execution practices for achieving the 20-20-20 targets. These efficiency values aid policy makers addressing the process parameters towards target achievements. The results show that WEC scores and FSI performances are not direct indicators of performances in terms of target achievements. For instance, Belgium, Germany and the United Kingdom were not found to be as efficient as their standings would suggest, whereas Bulgaria, Croatia, Cyprus, Estonia, Hungary, Lithuania, Malta and Romania have the highest efficiency values.

### 1. Introduction

As in many countries, energy security is a priority in the governmental agenda for European Union (EU) member states, and hence at the EU level. As a result of the enlargement, there is a greater diversity of voices, representing varying energy needs. In the interests of all member states, the EU has long made efforts to establish a common energy policy. However, several factors caused its failure, including the sovereignty issue, differing energy needs of individual countries, diverse relations with energy exporter countries, and different priorities. These factors undermined efforts to resolve the issue dating back to the establishment of the European Coal and Steel Community (ECSC), which was established with the very purpose of guaranteeing the just distribution of energy and industrial resources among members [1].

In addition to the main challenge of establishing a common energy policy, since the beginning of the 21st century, the EU has also faced varying energy challenges. As highlighted in official papers and treaties, these challenges include climate change, global competition for energy supplies and energy import dependency. Together with the political and institutional reorganization, a widespread European

approach was also required to manage these ongoing challenges.

The EU's first response was to set energy and climate targets, reducing its Greenhouse Gas Emissions (GHG) generation in order to address the aforementioned challenges. Accordingly, the European Commission acknowledged a renewed energy policy for the EU in March 2007, identifying three objectives: the sustainability, competitiveness, and security of supply, and also establishing binding targets, known as the “20-20-20” [2]. The targets were; (1) to decrease GHG generation by 20% compared to 1990, (2) increase the share of renewables in total energy consumption to 20% compared to the 2005 figures and (3) to raise energy efficiency by 20% by 2020 compared to 2005 figures. The achievement of these early milestones was scheduled for 2020, simultaneously with member countries' own targets.

Consequently, this study seeks to establish the relationship between the 20-20-20 targets, and prominent drivers utilized by member states to achieve them. By doing so, it aims to assess the efficiencies of the member states and the EU-28 in achieving 20-20-20 targets.

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## 2. The development of European energy policy, and energy and climate targets

Following ECSC, European Economic Community (EEC) and European Atomic Energy Community (EURATOM) were established under the Treaty of Rome to expand initial cooperation on coal and steel to the economic and nuclear energy domains. Before the 1973 oil crises following the Yom-Kippur war, energy remained as a national issue; however, following the oil crises, the urgent need for a community energy policy was supported by the European Council (EC) resolution – Towards a new energy policy strategy for the Community, published in 1974. This was the first time that the EU had adopted guidelines regarding the security of energy demand and supply [3]. After this time, the EU made many fruitless attempts to establish a functioning common energy policy, through legislation or specific dedicated chapters, such as the Single European Act in 1987, and the treaties of Maastricht in 1992, Amsterdam in 1999, and Nice in 2003 [4]. Despite the lack of success of these efforts, important energy regulations emerged at the beginning of the 21st century, such as Renewables Directives [5,6] and environmental regulation – Article 175 of Treaty of Nice [7].

Hence, the 21st century was the turning point for efforts towards a common energy policy. Jose Manuel Barroso's appointment (2004–2014) as the President of the EC in particular elicited a greater emphasis on energy issues, in particular with the first specific energy chapter into the Treaty of Lisbon [8].

During Barroso's era, the Commission published two green papers – A European Strategy for Sustainable, Competitive and Secure Energy in 2006, and Energy for a Changing World in 2007. The aim was to develop a common energy policy, focusing on delivering a sustainable, secure, and competitive energy, prioritizing the harmony among the member states, and reflecting the original for the EU, leading to the introduction of the 20-20-20 targets. In short, this policy emphasized the prerequisite for member states to act together to ensure a sustainable, secure, and competitive energy supply, and to overcome the challenges of changing energy markets and geopolitics.

The EU's common energy policy framework, included as a specific chapter in the Lisbon Treaty in 2010, set out four main aims of the EU's energy policy: (1) ensuring the functioning of the energy market, (2) ensuring the security of supply in the Union, (3) promoting energy efficiency and renewable energy, and (4) promoting the interconnection of energy networks [9].

Furthermore, in 2011, the EC further set a stimulating target for 2050, aiming for an 80–95% decrease in GHG generation [10]. Renewable energy sources have been prioritized as a key tool to achieve this vital target. Accordingly, a new and more ambitious framework for climate change and energy market was designated by the EC as 2030 targets, an enhancement of the 2020 targets. These were; (1) to decrease GHG generation by 40% compared to 1990, (2) to increase the share of renewables in total energy consumption to 27% and (3) to raise energy efficiency by 27% by 2030 compared to 2005 figures, in addition to individual member's own targets [11].

Moreover, with Juncker's commission, the EU took the further step of adopting an innovative and more concrete strategy – European Energy Union (EEU), to achieve these goals through common action. The EEU strategy follows the policy framework of the Lisbon Treaty, but with a better defined and more advanced approach. The clarified priorities include the transition to a low-carbon, secure and competitive economy, as well as the energy, and also climate issues, among the 10 priorities of the Juncker Commission. The EEU strategy has dimensions of: (1) supply security, (2) a fully-integrated internal energy market, (3) energy efficiency, (4) Climate action – emission reduction, and (5) research and innovation [12].

### 2.1. The impact of public perception and choice

Public perception and attitudes became an important driver of such ambitious goals; almost three-quarters of Europeans ranked climate change as the third most important global problem, behind only poverty and international terrorism [13]. However, a similar survey in 2013 ranked the economic situation as more serious than climate change [14]. It is also important to mention here that while economic crises have negative impacts on the EU economy, these crises have had positive impacts on the energy and climate targets, by decreasing industrial production, energy demand and transportation volumes, resulting in a reduction of GHG emission and energy consumption, especially in 2009, 2010, 2011 and 2012 [15].

It is also important to mention that EU decision-making concerning energy-related issues is more widely supported by the public compared to national decision making in 2008 [16]. A more recent study, however, demonstrates that unlike the energy related issues, European citizens believe that national governments should primarily be responsible for climate change related issues [11]. The latest study demonstrates that European citizens now believe that it is national governments which should be responsible for having targets for energy efficiency and renewable energy use, to reach the 2020, 2030, and also 2050 targets [13].

### 2.2. The impact of energy and climate targets

Thus, member states are also aiming to integrate the aforementioned targets in line with their capacities, capabilities and policies within the conditions and limits set by the EC [17]. Although member states face similar challenges, this integration process intensifies a number of current challenges and presents new ones due to differences in energy mixes, suppliers and state interests, and thus national energy strategies. In other words, countries are concerned about potential conflicts between their own national strategies, and the common energy policy of the EU. However, a number of common measures have been tested, and it is proposed that these should be a part of all national strategies. Such measures include increasing renewable energy use, the implementation of Clean Coal Systems, fuel switching, greater application of electricity in end use sectors, and efficiency improvements [18].

It is already observed that there are significant changes in the energy policy-making of the member states, owing to the existence of targets, together with new political and institutional frameworks, including EEU [18–20]. For instance, Fragkos et al. [19] demonstrate that ambitious targets could have vital and structural impact in the overall European energy system and energy related investments. Moreover, there are existing studies providing different perspectives on the achievability of aforementioned EU energy and climate targets [21–23]. Proskurina et al. [21] shows that a number of EU member states with high energy consumption rates such as France, Germany and United Kingdom, could experience vital problems.

Existing studies concerning target achievements generally limit their focus to one of the following: a single stage of the targets, a specific energy type, GHG, or a specific geography or sector. These generally employ either a modelling approach or conduct impact analysis [24–32]. Arasto et al. [27] focuses on biomass, while Streimikiene and Balezentis [30] decomposes GHG emissions, concerning energy use, economic growth and population growth.

Moreover, a recent study conducted by Khanam et al. [33] reveals interesting insights for the target achievement. This study surveyed 187 experts from 25 countries and results demonstrated that current EU GHG policies are inadequate, therefore, it is unlikely to achieve the anticipated levels.

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