

The multi-speed energy transition in Europe: Opportunities and challenges for EU energy security

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ABSTRACT

The transition towards renewable energy is progressing at different speeds among EU member states. This trend reflects their divergent national energy security interests and leads to different energy (foreign) policy strategies within the Energy Union context. This policy perspective highlights how a multi-speed energy transition among EU Member States affects European energy relations and energy security and explores what the European Commission (EC) can do to safeguard the Energy Union. We argue that divergent energy security perceptions and priorities among EU Member States essentially create two clusters of countries: those that focus on renewable energy, considering it an industrial opportunity and a way to lower import dependence, and those that prioritize reliable supplies and perceive renewables as too volatile and expensive to replace fossil fuels. We then contemplate the energy security implications of the two emerging Europes and discuss several ways these could shape their mutual interactions. Finally, we suggest incorporating an industrial component next to the internal market and common external voice dimensions of the Energy Union, in the form of a package deal, so that the EC might overcome political tensions between the two clusters.

1. Introduction

The Energy Strategy and Energy Union call for secure, competitive, and sustainable energy in the European Union (EU) and set ambitious goals for the deployment of renewables. By 2030, for example, the EU should rely on renewable sources for 32% of its energy mix [1]. Achieving this target will require all Member States to embrace renewable energy and lessen dependence on fossil fuels (domestic and imported).

There are, however, considerable differences in the speed and motivation with which Member States pursue the energy transition. Some EU Member States strongly promote renewables (e.g. Germany,

Denmark) while some actively resist (e.g. Poland). Moreover, some have a geographical head start (e.g. Austria, Sweden), while others lack favorable conditions, finance, and expertise (e.g. Hungary, Romania). These differences reflect divergent national energy security interests and lead to different energy (foreign) policy strategies, particularly with regard to cooperation and interdependence. Some countries perceive renewable energy as an industrial opportunity that simultaneously diversifies their energy portfolio and mitigates greenhouse gas emissions. For these countries, European cooperation is a means to tackle these challenges together, which implies greater interconnection of their transmission networks. Other countries, however, perceive the efforts of their greener neighbors as a nuisance that challenges security of supply

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at affordable prices and brings grid problems and price volatility without any additional revenue or employment benefits. In recent years, these divisions have increased rather than lessened.

The divergent energy paths that are emerging threaten to undermine the Energy Strategy and Energy Union. What makes the matter additionally politically sensitive is that the divergent paths seem to run along a West-East axis. While many Western European countries coordinate for the system integration of renewables, many Eastern European countries try to block renewables' negative effects, e.g. phase-shifters installed at the German-Polish border. The EU's energy transition goals may thus exacerbate the strains between West and East.

This policy perspective highlights how a multi-speed energy transition among EU Member States likely affects European energy security and energy relations and explores what the European Commission (EC) can do to safeguard the Energy Union. We proceed as follows. In Section 2 we describe how divergent energy security perceptions and priorities among EU Member States are leading to a multi-speed energy transition and the emergence of two clusters of countries in Europe. In the next section, we discuss the implications of this development for energy relations among EU Member States, European energy security, and the Energy Union. This section also utilizes German-Polish relations as an illustrative case. We conclude in Section 4 with several policy suggestions the EC could undertake to mitigate the emergence of two clusters.

2. Divergent energy security paths in Europe

In theory, there is one Energy Union but in practice there are 28 national interests. Due to differences in geography, natural resources, history and political traditions, the energy security⁴ priorities of EU Member States vary and influence their positions on common European initiatives [2]. Leaving the particularities of each country aside, two rough clusters of EU Member States can be identified (see Fig. 1).

The blue cluster comprises countries that are deeply concerned about security of supply and the diversification of sources, particularly natural gas. These countries are located on the periphery of Europe. Security of supply is an important goal for all EU countries, however, the countries in this cluster are particularly vulnerable to supply disruptions and to actions of external suppliers.⁵ They are characterized by high levels of import dependence combined with strong market concentration, and often have a single supplier: Russia [4,5]. In addition, the energy infrastructures of these countries are less developed or aging and they lack sufficient and diverse interconnection with other countries to secure energy supply,⁶ which makes their markets less resilient and leaves little auxiliary options for overcoming supply cut-offs. They may also have limited domestic renewable sources and a large workforce in fossil fuel industries; hence, switching to renewable energies comes at a high cost.⁷ These countries also face higher capital costs relative to Western Europe and their consumers have less disposable income [10]. As living

⁴ At its narrowest, energy security is generally synonymous with security of supply at affordable prices [30–33]. Such a definition relates to dimensions such as geological availability, political accessibility, economic affordability, and infrastructure resilience. At its broadest, the term also includes dimensions such as environmental sustainability, social acceptability, and regulatory stability [32]. To keep it simple, we follow the World Energy Council which defined energy security in 2008 as an “uninterruptible supply of energy, in terms of quantities required to meet demand at affordable prices.”

⁵ The EU imported 55.1% of its consumed energy in 2017 [6]. High energy dependency rates are spread across Europe [6]; nevertheless, politically motivated disruptions, like the one between Russia and Ukraine in 2009, have highlighted the particular vulnerability of Eastern European countries.

⁶ In 2014 twelve Member States were still below 10% level of interconnection. It is expected though that only Spain and Cyprus will remain under 10% in 2020, considering current plans [34].

⁷ These countries, and more significantly Poland, have a high share of coal in their energy mix which provides cheap power and employment [35,36].

standards are generally lower, citizens tend to be more sensitive to an increase in energy prices. In short, the options for diversifying—in terms of source, origin and route—are highly constrained in the short- or even medium-term. As a result, their priority within the Energy Union is to support the development of both trans-European (gas) interconnectors and the internal market.

Countries that exemplify this cluster include Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Romania, Bulgaria and Luxemburg. Rather than pursuing a significant build-up of renewable energies, these countries focus on diversifying their gas supplies in order to avoid politically motivated disruptions (and the Baltic countries additionally seek synchronization with the Continental European Network). Four of these countries, the Czech Republic, Poland, Slovakia and Hungary, form the Visegrad Group (V4) and have started to coordinate their negotiations (and opposition) with regard to EU renewable energy directives and EU electricity market reforms. While they acknowledge climate issues, they denounce the most ambitious 2030 climate targets as unfeasible and unrealistic and demand full respect of national competences [10]. Greece, Cyprus and Malta are also grouped in this cluster as they prioritize the diversification of their energy sources and routes through more interconnections. Additionally, they share the ambition of coordinating with non-EU countries in the Mediterranean region, which could increase their relevance as energy hubs and transit countries. We have also tentatively included Ireland and the UK in this cluster. While Ireland boasts some successes with RES-E, it remains 90% import dependent and its plans for an Irish-French interconnector pre-date the UK's decision to leave the EU. The UK is a challenge to position, because the effects of leaving the EU are still unclear. The UK strongly promotes renewables and is well-connected to North-West European energy markets, but Brexit sentiments and the repercussions of divorcing the EU may increase the salience of security of supply over other energy issues.

The countries in the green cluster perceive the Energy Union as a tool to fight climate change and see renewable energy a business opportunity, while they also diversify the energy mix and improve import dependence. These Member States are located in the western half of continental Europe. They generally have a higher GDP and well-developed energy markets and infrastructures. Their consumers are less price sensitive and can tolerate higher environmental costs.⁸ They also have a longer record of accomplishment with regard to renewables and a notable portion of their labor force is occupied with the installation, maintenance and operation of renewable energy sites [9]. These countries also spearhead innovative activity in climate change mitigation technologies [7]. Renewables hence bring them economic benefits in terms of jobs and revenues,⁹ even if they come at the expense of taxes and levies. Import dependence, which is high for some of this cluster's countries as well, is counterbalanced by sufficient diversification options in terms of sources, origins and routes. In addition, these countries have more stable political relations with external suppliers, being premium markets for oil and gas suppliers and having considerable political-economic power. Most Western European countries hence see the Energy Union primarily as a means to promote their role as industrial leaders in renewable generation technologies.

Typical countries of the green cluster include Finland, Sweden, Denmark, Germany, Austria, the Netherlands, and Belgium. These countries take the lead in promoting higher renewable energy targets and climate negotiations. They are motivated by environmental concerns and economic interests, as evidenced by their high share of European and global sustainable technology patents and clean tech

⁸ Generally speaking, Western European countries have the highest households' electricity prices of Europe [8] without facing social unrest over them.

⁹ According to Ref. [9]; the highest economic returns from the renewable energy industry concentrate in Western Europe. These countries also hold a large wind energy technology' market share globally.

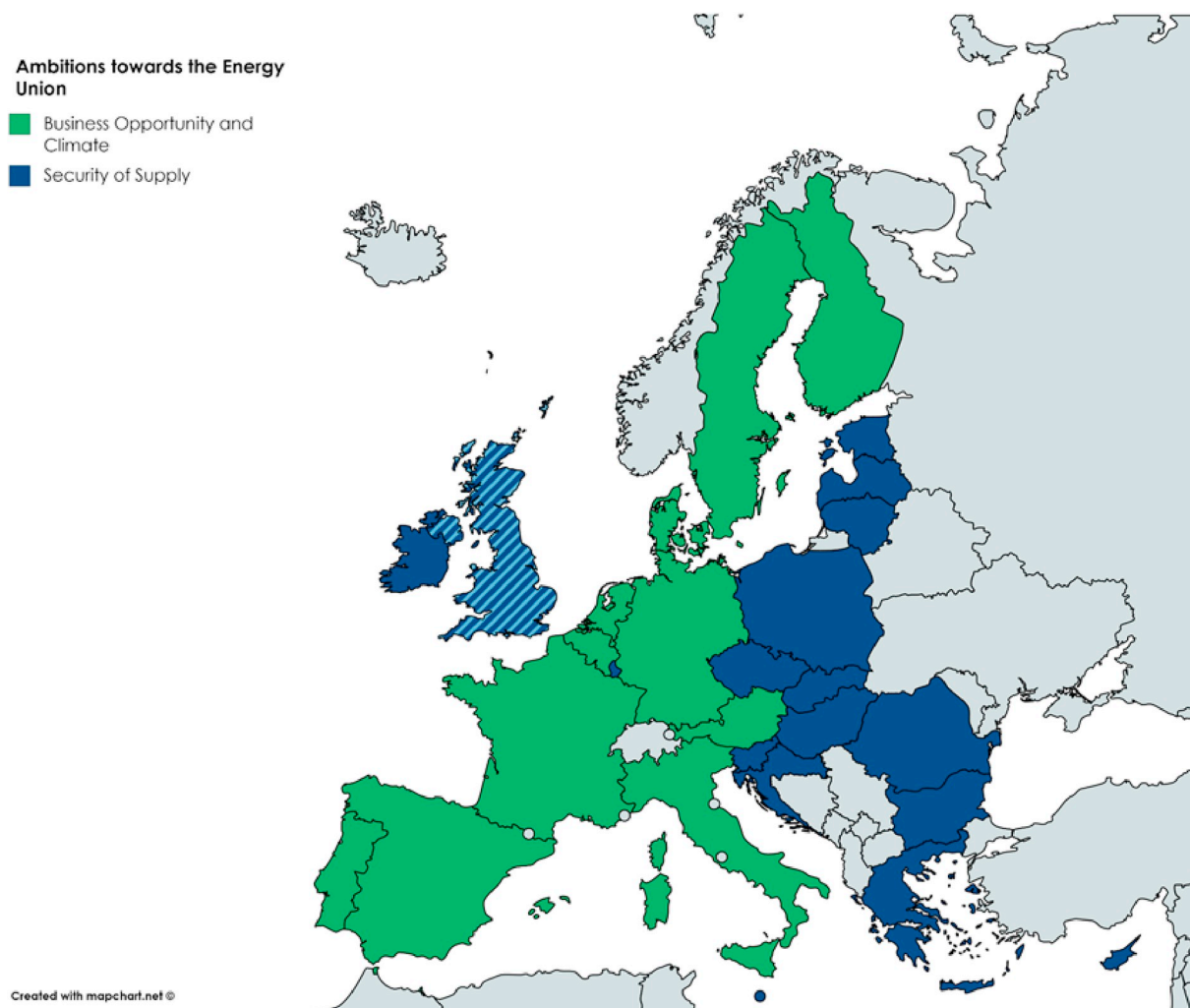


Fig. 1. Member States clustered according to their Energy Union ambitions.

Source: [3]. The two clusters of countries have been identified based on data from relevant European agencies and organizations, data collected by the EC, bibliographical analyses, and from consultations with and observed political discussions at the EC's Directorate-General for Energy (DG ENER). The two clusters have been defined following two main indicators: first, energy import dependency together with supplier concentration – with special attention to Russia – [4–6] and second, macroeconomic benefits of increased renewable energy penetration – in terms of electricity prices, low-carbon technology patents, market shares and turnover [7–9,11].

revenues [7,9,11]. In this light, it remains to be seen whether these countries will remain as enthusiastic now that increasing competition is eating away their early mover advantage. EU tariffs on Chinese solar panels might be a good indication of that.¹⁰ Needless to say, countries not included in this cluster also seek to benefit from the technological innovations ongoing in the Union. Yet they aim to build upon the expertise of their neighboring countries, rather than bear the costs of innovating themselves. Several other countries are also in this cluster, but do not fit as neatly as those mentioned above. France's nuclear focus puts it in a somewhat debatable position regarding renewables, but neither do supply security concerns dominate its energy policy. Spain, Portugal and Italy clearly have security of supply as one of their main energy priorities, due to their high import dependence, but are included in the green cluster because they have diversified supply and certainly regard renewable energy as an industrial opportunity. Despite these

¹⁰ Moreover, countries supporting market leadership may not always support ambitious renewable energy targets. During the negotiations on overall climate targets the German Minister of Economy and Energy claimed that a renewable energy target above 30% would not be technically and financially achievable for Germany and for Europe.

various differences, all members of the green cluster share two important characteristics: they are well-connected continental EU countries and are relatively older EU Member States. Newer EU entrants and Island states seems to constitute the periphery to this center, raising the question whether we should not also separate Eastern Europe and Island countries into two separate clusters.

To sum up, whereas renewable energy represents energy independence on a political front and industrial opportunities on the economic side for Western European countries, Eastern European countries realize its security of supply potential but worry about their workforce in the fossil industry and electricity prices. In short, renewable energy is perceived as win-win in the West and win-lose in the East. These different energy priorities and concerns translate into different energy strategies vis-à-vis the Energy Union. As a result, green cluster countries receive the EC's ambitious renewable energy goals with open arms while blue cluster countries prefer better gas interconnection to European markets and resist shifting from traditional power sources to renewables in a short timeframe.

3. Opportunities and challenges of a multi-speed energy transition in Europe

The most profound implication of the multi-speed energy transition is that the two clusters we identified could develop into two “Europes”. In this section, we draw insights from the energy security and renewable energy literature to sketch the implications of different degrees of a renewable energy buildup. We then review a recent case study contrasting German and Polish perceptions and approaches to renewable energy.

The wide scale adoption of renewable energies by a country or region has both domestic and international (foreign policy) effects. On the domestic front, countries competitive in renewable energy can expect certain economic benefits. We would like to note that it is a misperception that the renewable energy electricity industry offers fewer jobs. Indeed, it takes between 400 and 410 people to generate a terawatt of electricity with wind and photovoltaics, but the same amount of energy from gas or coal only requires 80 to 125 people [13]. Exporting renewable energy technology or supporting services, moreover, is already an emerging market that countries compete over, with China, the EU, the US, Japan and South Korea dominating global patents and exports [11,15]. Renewable energies also play a critical role in achieving energy justice, an umbrella term that includes the amelioration of energy poverty. For example, renewable energies can provide electricity to remote areas, which has direct economic benefits (reducing fuel costs) and can indirectly improve welfare (children can study later in the day, which enhances their later career prospects). Other economic benefits include lower health care costs, such as for coal-related illnesses and conditions [16,17].

Renewable energies also have implications for a country’s international relations [18–21]. A country and/or region that predominantly relies on renewables is, for example, less vulnerable to manipulation by foreign suppliers as it faces less asymmetric dependencies and those states are less likely to enter energy-related conflicts. Moreover, the volatility associated with renewable sources of energy is best addressed by both having a greater variety of renewables energies and increasing the connections between different sources. A large multi-state network is more stable and efficient than a small local network and ensures availability at the right time at the lowest possible price. This kind of multilateral technical cooperation can have knock-on effects. As Smith Stegen ([21], 92) argues, “the interconnectedness required of renewable energy communities may bring us closer to a ‘functionalist’ [23,24] model of collaboration, in which economic and technical collaboration can potentially lead—via spill-over effects—to political cooperation and stability.” Thus, energy cooperation could deepen European integration [25].

In sum, the green cluster could become an interconnected region with a high degree of cooperation and interdependence. This Europe would reap the (geo)political and socio-economic benefits of renewable energies and be able to minimize the negative aspects of fossil fuel dependence. The countries of the blue cluster would still be bound to fossil fuels, which provides them with short-term security of supply, but obstruct the political and socio-economic benefits of renewable energies. These countries would be more likely to have bilateral rather than multilateral connections with each other and to be less connected, in general, to the more prosperous green Europe.

What could be points of contention between the “two Europes”? We venture that there are at least four potential issue areas. First, the blue cluster states may feel themselves to be under growing and unfair pressure to become “greener”. Indeed, many Eastern European states already resent and resist such pressure. Second, as the formation of the Visegrad 4 group indicates, the states within each of the two Europes might start to align with each other according to their mutual interests, particularly to defend national energy security sovereignty. In the future, we might see a clear political separation of the eastern and western states. Third, the differences in quality of life between Western

Europe and Eastern Europe may be perpetuated and even exacerbated. Among other effects, this might cause greater east to west migration, which could heighten existing tensions and has implications for European cohesion. The exit of the UK from the EU, for example, has been attributed in large part to such migration. Last but not least, the divisions within Europe may render the EU vulnerable to divide-and-conquer tactics by third-party countries, such as Russia or China. The controversy and bitterness over the Russian and German North-Stream 2 natural gas pipeline indicates how polarizing energy security issues can be [12,27]. Tensions have also emerged over China’s activities in Europe. As part of its Belt-and-Road Initiative, China created the ‘16 + 1 Cooperation Platform’ with 16 Central and Eastern European countries, including 11 EU Member States (Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Romania and Bulgaria). The 16 + 1 platform has raised eyebrows within Brussels, as it seems to exclude the European Union on purpose.

A recent comparison of German and Polish strategies to achieving energy security—including a focus on renewable energies and interconnectors—reveals that different transition speeds, energy security interests and desire for cooperation are already having effects on the two countries’ relations [28]. Interviews with industry elites, experts and political decision-makers from both countries demonstrated that, although they share similar concerns about energy security—at a general level—their perceptions and opinions are almost diametrically opposite. For example, whereas Germany has embraced a transition to renewable energies (and a rejection of nuclear power) as a way to achieve energy supply security, Poland is highly skeptical of renewable energies and there are widespread beliefs that they are too expensive and volatile and, for these reasons, pose a threat to energy supply security.

German and Polish interviewees also have contrasting views on the foreign policy and geopolitical implications of renewable energies. In Germany, renewables are considered the best option for lessening dependence on foreign energy and attaining energy self-sufficiency, but in Poland “greater dependence on renewables is perceived as perpetuating Poland’s energy dependence on foreign countries” [28]; 3). Because of its long-term dependence on Russia for energy, Polish interviewees prioritized self-sufficiency, which they believe could be best achieved with domestic coal, nuclear power and (potentially) shale gas.

In addition, Germany and Poland have different perceptions of the benefits of renewable energies. Polish interviewees perceive greater deployment of renewable energies as entailing high social, economic and political costs. First, the Polish coal industry employs about 100,000 workers. Dislodging those people and their dependents would have profound political implications. Second, the Polish grid is outdated and insufficient. Modernizing and expanding it—so that it could accommodate renewable sources of energy—would be exorbitantly expensive.

These differences have already influenced relations between Poland and Germany and Poland and the EU. For example, some Polish interviewees expressed wariness about becoming dependent on German renewable technologies and are suspicious and resentful of Germany’s push for Poland to adopt more renewables. Poland is also a member of the Visegrad 4 group and a member of China’s 16 + 1 Platform—both of which seem to exclude and/or counter the EU.

In sum, the dynamics between Germany and Poland and the divergent perceptions of renewable energy exemplify what could happen on a broader scale between two Europes.

If two distinct Europes indeed emerge, how might their relations evolve? We sketch three preliminary scenarios based on different configurations of how the two clusters (1) perceive the best way to achieve energy security (less import dependence through renewables versus reliability through fossil fuels and gas interconnectors) and (2) their appetite for cooperation and integration. The first scenario flows from what appears to be happening now—divergent perceptions of energy security and lack of cooperation. Under this scenario, the two Europes continue to separate and two competing blocs may emerge. Specifically,

the two Europes would have different energy sources and limited interconnections between them. However, if energy security interests diverge but cooperation and grid interconnectedness become more attractive, then European energy security—in total—could become more versatile. Under this second scenario, the two Europes could balance each other out. When renewable input into the grid is low, then natural gas could come onstream. And, when renewable resources are abundant, the gas plants—which are more expensive—could be switched off. A third scenario would envision a Europe in which, after initial divergence, the two sides move towards each other in terms of their energy security strategies and desire for network interconnectedness. The triggers for such a convergence could be renewable energy technology transfers, environmental protests, or greater incentives from the EC. This re-unification would lead to a strengthened Energy Union, which is the EC's goal.

4. A way forward

Referring to East-West divergences, Jean-Claude Juncker, in his capacity as the EC's President, stated that "Europe must breathe with both lungs. Otherwise our continent will struggle for air" [22]. It is no different with the Energy Union.

The typical EU solution to the multi-speed energy transition would be a well-integrated internal energy market supported by interconnected European networks, and a common voice in external relations with energy producers. If this vision would be fulfilled, the electricity and gas interconnections would indeed allow Western Europe to balance an increasingly intermittent supply, while Eastern Europe could diversify natural gas imports by including Norwegian and Algerian gas and accessing Atlantic LNG ports. More internal trade in this fashion would also bolster a common external stance as external trade deals are likely to involve more EU members. While essentially a good strategy towards realizing the Energy Union, the dilemma remains that Member States have sovereignty over their national energy mix and will make decisions about renewables based on their economic and political needs. In addition, such a strategy does not address the difference between win-win and win-lose perceptions of member states vis-à-vis renewable energies.

The sovereignty issue has long hindered efforts at greater integration. For example, the internal energy market is still far from being integrated and resilient, despite the 2014 deadline for its completion. Differences in national energy priorities have slowed progress, a challenge the EC can only partly overcome. Action by the EC is limited by Article 194 of the Lisbon Treaty, agreed in 2017. It states that measures established by the European Parliament and Council to achieve energy market objectives and security of supply "shall not affect a Member State's right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply". In order to harmonize the European external voice, the EC has presented an amendment to the Gas Directive 2009/73/EC that would grant the EC exclusive competence in concluding agreements with third countries [29]. The EC has claimed that the amendment will enhance the solidarity between Member States and improve the functioning of the Energy Union. This move, however, can be seen as a step towards shifting the competence in energy policy from the Member States to the EU (it also contravenes the spirit of Article 194 of the Lisbon Treaty).

The second issue relates to the differing views of renewable energy. As long as renewable energy is considered a win-win issue for Western Europe (greater independence from imports and economic opportunities) and a win-lose issue for Eastern Europe (potential supply security but costly), the EC is unlikely to overcome fundamental differences. In order to protect the Energy Union from a multi-speed energy transition, the EC might have to resort to more political rather than administrative means. It might have to broker a grand deal, i.e. a political compromise, between its Member States in order to ensure that the economic benefits

of renewable energy also reach the periphery. This compromise would roughly have to entail that Eastern Europe pursues renewable energy as a policy priority for improving its security of supply as well as climate commitments, while Western Europe would compensate for this. In order to reduce the expected burden on Eastern European consumers in the short-term, Western Europe could offer cheap loans or pay for infrastructure projects (also to counter China's ambitions in this regard) so that the Eastern workforce and industry can adapt to the energy transition and lower its emissions. Western clean-tech factories could also be located in Eastern Europe by their home governments on purpose. Western businesses would benefit from low wages (and hence global competitiveness) while Eastern citizens benefit from employment. Eastern Europe would hence both import and produce Western renewable energy technology, while Western Europe may retain market shares otherwise lost to global competitors.

While the challenges regarding the internal market and external voice are well-documented, the different perceptions about the benefits of renewable energy have yet to be incorporated in EU policy. We believe this industrial component should be added to the standard package if further divergence between west and east is to be prevented. There is obviously a price to pay. Such political objectives come with an economic cost [14], but the real question is whether the EU can afford to continue down its current path, which would entail a hefty political cost.

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