Divergent Energy Paths within the European Union

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Divergent Energy Paths within the European Union

ECPR Conference

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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 greater energy efficiency and deployment of renewables in the coming decades. By 2030, for example, the EU should rely on renewable sources for 32% of its energy mix. Achieving this and other targets will require all Member States to embrace renewable energy and lessen dependence on fossil fuels (domestic and imported). However, it appears that divergent energy paths are emerging within the EU.

There are considerable differences in the speed and motivation with which Member States pursue an energy transition. Some EU Member States strongly promote renewables (i.e. Sweden, Denmark) while some actively resist (e.g. Poland). Moreover, some have a geographical head start (e.g. Austria, the Netherlands), while others lack favorable conditions, finance, and know-how (e.g. Hungary, Romania). These differences both reflect and lead to divergent national energy security interests and energy (foreign) policy strategies. For example, pro-renewable countries perceive the energy transition 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. Other countries, however, perceive the efforts of their greener neighbors as a nuisance that challenges security of supply 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. The EU's energy transition goals may thus exacerbate the strains between West-East, particularly with regard to energy relations. If the European Commission is to ensure the success of the Energy Strategy and Energy Union, it will need to find a way to prevent, mitigate, or mediate potential challenges whilst harnessing the opportunities of renewable energy.

The work herein presented investigates how the different paths towards the EU energy transition and related divergent energy security perceptions among Western and Eastern EU Member States affect European energy relations and what the European Commission can do to prevent, mitigate, or mediate potential strife. Our focus is on contemporary developments and how they may shape the coming decades.

The structure is as follows. Section 2 briefly describes the current strategies adopted by the EU to achieve a sustainable and robust European economy and some of the tools to address the issues that arise with the creation of the Single Energy Market. In Section 3 the divergences among Member States on delivering the potential of renewable energy and on their ambitions towards the 2030 target is presented. Section 4 addresses the differences in ambitions and identifies

two clusters of countries, in order to discuss the possible consequences of such divergences in Section 5. The main conclusions and remarks are summarised in Section 6.

2 A path towards the Energy Union

The Energy Union and climate constitutes one of the top ten priorities of the European Union for the next decade and is the last strategy adopted by the EU in order to hold the increase in global temperature below 2 degrees Celsius. In 2014, and as a prior step to the creation of the Energy Union, the European Commission released its Energy Security Strategy and the European Council agreed on the 2030 Climate and Energy Framework. The former was developed with the aim to address short and long-term security of supply challenges faced by the EU and the latter was created to set a series of targets towards a low-carbon energy market in 2030.

The European Commission presented the Energy Union package in 2015, a strategic tool for building a resilient Energy Union and a low-carbon economy. The Energy Union is based on five key pillars that build up the EU energy strategy for the coming decade: security, solidarity and trust; a fully integrated EU energy market; energy efficiency contributing to moderation of demand; decarbonising the economy, and research, innovation and competitiveness. The strategy confirmed the 2020 package that had set headline targets of a 20% reduction of greenhouse gases (GHG) emissions, 20% of renewable energy consumption and 20% in energy efficiency for the year 2020. Building upon these dimensions and targets, the EU aims to decouple economic growth from emissions in order to achieve a sustainable and robust European economy.

One common EU project and 28 different approaches

The energy framework and the energy targets are set at European level, however, the European Single Market is still far for being integrated. There are still national and regional divergences both in terms of the infrastructure and the national market designs. Some countries will require a significant amount of investment in order to be integrated with an EU market as for instance the Baltic States, which still remain as energy islands as they are not synchronized to continental Europe. Others fear losing sovereignty over their national energy mix and a swift of competence in energy policy from the Member States to Brussels.

A transparent and integrated single market with regional cooperation and interconnections for cross-border flows will be the cornerstone of the Energy Union. In order to reach such a major achievement, the EU will have to take action to ensure that national energy regulations do not generate distortions by implementing and reinforcing EU legislation when necessary.

To integrate the regional markets and to address the different issues that arise with the creation of a Single Market, the European Commission has different tools to help Member States in transforming the system. For instance, in 2013 the Projects of Common Interest (PCI) was adopted. The PCI is a flexible list

updated every two years and designed by private promoters and transmission system operators (TSOs), for which more than half are electricity interconnection projects. (European Commission, 2015). Other strategic funding tools are the Connecting Europe Facility (CEF), which has facilitated several achievements like the Biscay Gulf France-Spain interconnection, and the European Fund for Strategic Investments (EFSI), for which more than 40% are sustainable projects to achieve the climate targets. The European Commission gives priority to those countries with more urgent needs in order to help them reaching their targets and lessen the fragmentation of the EU.

3 Renewable energy deployment: significant variations across the EU

Renewable energy has a key role in the energy transition to develop a secure, sustainable and competitive European energy market. The vast majority of the European Member States have some indigenous natural resources that can be exploited for energy generation and thus increasing their national renewable energy share will reduce their energy dependence and increase the security of supply. The development and implementation of new energy technologies is crucial not only to achieve energy independence but also technology independence. The growth of the energy industry, from the development of new materials to manufacturing, can place Europe at the forefront of innovation and attract more investment and capital.

Delivering the potential of renewable energy

The first binding target of a mandatory share of renewable energy in the energy consumption was set in 2009 as a measure of the 2020 package. The renewable energy obligation in final energy consumption was introduced under the Renewable Energy Directive (RED), which set legally binding targets for each of the Member States. The national targets were assigned on the basis of the level of renewables already achieved and the GDP per capita in 2008. The contribution of the Member States' targets towards the EU-level target of 20% of renewable energy consumption varied among countries and is presented in Figure 1.

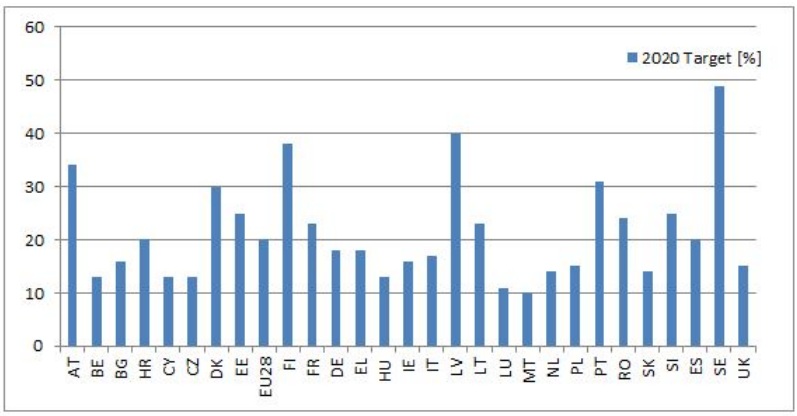

Figure 1: 2020 Target of Share of Renewable Energy in Final Consumption (Source: Eurostat)

Member States have sovereignty to develop their own national plans in order to meet their individual targets and the European Commission can only implement corrective measures if the countries are falling short and not implementing the designated tools to reach their targets. This has resulted in 28 different approaches under a common EU goal.

The latest data available on the performance of the countries towards the deployment of renewables is shown in Figure 2.

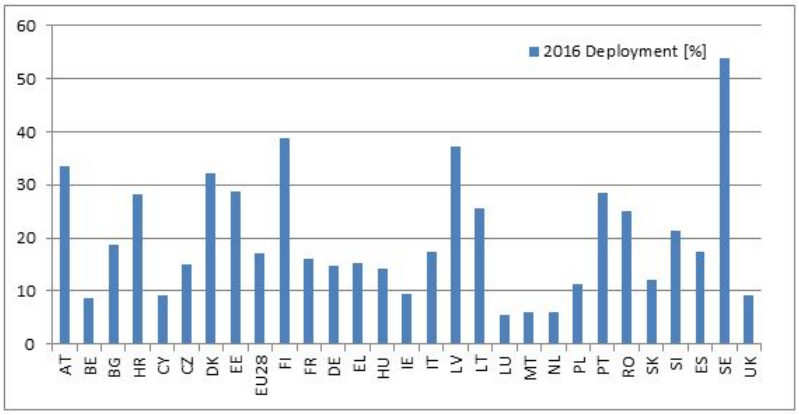

Figure 2: 2016 Share of Renewable Energy in Final Consumption (Source: Eurostat)

The countries with the highest targets have performed well and are on track to meet their legally binding shares by the end of the decade. The growth of renewable energy in these countries has been driven mainly by two factors: abundant natural resources and strong political support. The countries with the highest targets are: Sweden, Latvia, Finland, Austria, Portugal and Denmark. For instance, almost half of Austria's land is covered by forest (International Energy Agency, 2014a) and the country counts with important water reserves. These rich renewable sources combined with long-term support policies, have resulted in an important share of hydro and biomass in the energy mix of the country.

In Denmark, the strong expansion of offshore wind has been mainly the result of successful tenders and grid connection guarantee that have driven the costs down and attracted investors. According to the latest data available, Sweden, Finland and Denmark already achieved their 2020 targets in 2016, and Latvia, Austria and Portugal are likely to meet them before the end of the decade (Eurostat, 2016).

On the other side of the spectrum, the countries the lowest renewable energy targets are: Malta, Luxembourg, Belgium, Cyprus, Hungary and Czech Republic. Overall, these countries had a very low record of renewable energy which was also limited by their topography and nature protection. For instance, Malta, Luxembourg, and Cyprus are relatively small countries where the spatial planning of solar or wind farms face challenges. Belgium faces similar hurdles as it has a high population density. In the case of Hungary and Czech Republic renewable energy has experienced a large growth since 2009 mainly due to biofuels, despite claims of natural resources limitations. Both countries have already reached their 2020 targets but in order to achieve a steady and sustainable growth of renewables, they should diversify their portfolio and promote other renewable sources.

Because of planning and regulatory issues, some countries are likely to miss their 2020 targets despite having climate issues among their political priorities. The countries furthest behind their renewables target are the Netherlands and France. The first one, in spite of its great potential in onshore and offshore wind, is facing several problems such as low investor certainty due to several changes in the support policies and inability to catch up with its neighbouring countries' deployment of renewables (International Energy Agency, 2014b). In France, the delivery gap has been mainly originated as a result of high administrative complexity and excessive bureaucracy. Deployment of renewables will also have to increase sharply in Ireland and the United Kingdom (UK) to meet the legally binding targets and avoid substantial fines. In the context of Brexit negotiations, the level of investment has significantly faded in these regions and climate issues are not at the top of the political agenda any more. It is also important to note that these countries received high climate and energy targets due to their high average income and they might be lagging behind due to, and among other reasons already mentioned, high energy consumption related to economic growth.

Ambitions towards the 2030 renewable energy target

In order to consolidate the results achieved under RED, the European Union negotiating parties have proposed the establishment of a new ambitious binding target of 32% for 2030, under the recast of the Directive (RED II). Such target was initially established at 27% but it has been increased alleging technology developments and cost reductions. Unlike the previous Directive, RED II establishes a binding EU-level target to be achieved through voluntary national targets that will be evaluated, and corrected if necessary, by the Commission. This turn in the EU regulation aims to give greater flexibility to Member States to drive the energy transition in the most cost-effective manner attending their specific situations.

Independently of the performance on the delivery of their national targets, there are divergences among the Member States in the support for such

ambitious EU target and strategy for 2030. Some countries, despite falling short their renewables' 2020 targets, are setting more ambitious climate action plans and supporting higher European sustainable goals. Other countries are under-performing in their delivery on climate targets, perceive the Energy Union as a threat to their national plans and see the proposed targets as unrealistic or unfeasible. Overall, these countries have a more conservative attitude and fear the financial and economic costs of shifting from traditional power sources to renewables in a short time frame.

The group of Member States taking the lead and claiming a higher renewable energy target in the recent climate negotiations included countries such as Sweden and Portugal, but also Luxembourg, Lithuania and the Netherlands. These countries see ambitious targets as a great opportunity to turn the EU a world leader in the energy transition and as a necessary means to reach the overarching objectives under the Paris Agreement. The positions in favour or against ambitious renewable energy policies can also be highly politicized as it was reflected by the turn in support by Italy and Spain. The changes in the Spanish and Italian governments at the last stage of the RED II and the Energy Efficiency Directive negotiations shifted the countries' positions from roughly supporting a target of 30% to claiming a target of 35%.

A different case is Germany, which has been traditionally at the forefront of sustainable development but is losing its notorious role as advocate of renewable energy. Germany's Energiewende, an ambitious project to switch the country's energy supply from fossil fuels to renewables, placed the country as an international role model in the expansion of clean technologies. However Germany's vision for the future is more discouraging, during the negotiations on the overall climate targets the Minister of Economy and Energy claimed that a renewable energy target above 30% would not be achievable for Germany and for Europe. The main argument was the technical and finance infeasibility to achieve such level of deployment of renewables and of electric vehicles.

On the same note, the political discourse of many Central and Eastern European countries including Poland, Hungary, Czech Republic and Slovakia, denounced the most ambitious 2030 climate targets as unfeasible and unrealistic. These Member States demanded full respect of national competences and flexibility to take into account the different characteristics of the individual countries. They did not disregard climate issues but request that energy policies in the EU remain a domain of national competence. Among them, Poland has been a leader voice in claiming less ambitious targets. The energy sector of the country has been facing structural problems such as an obsolete infrastructure, a market design far from being liberalised and an energy mix still heavily reliant on coal. The Central Europe Energy Partners (CEEP) also reminded of their higher capital costs with respect to Western Europe and the higher burden on consumers in these countries (CEEP, 2018).

4 Divergent priorities in pursuing the Energy Union

In theory there is one Energy Union but in practice there are 28 national interests. It goes without saying that energy plays a crucial role in ensuring a country's prosperity since a well-functioning energy market is indispensable to ensure a high quality of life and economic growth. Due to differences in geographical situation, natural resources and historical and political roots, the most urgent needs and priorities of the Member States vary across Europe and influence their positions on a common European legislation.

Leaving the particularities of each country aside, two different trends can be identified when considering the main priorities of the countries towards the energy transition. On the one hand are the countries that overall pursue a higher security of supply and diversification of energy sources. Energy security is an important goal for all the EU countries, however, some remain more vulnerable to external geopolitical actions than others. Generally speaking, these countries are located at the periphery of Europe and due to their historical and economic situations, they strongly support interconnection with a trans-European energy system. On the other hand are the countries that perceive the Energy Union partly as a necessary tool to fight climate change, partly as a business opportunity. These Member States have a higher GDP per capita and seek to develop and implement new energy technologies to further boost their economic growth. Because they have a higher income, these countries are less price sensitive and therefore can afford to have a more environmentally responsible behaviour.

Figure 3 shows the two groups identified by the present study, based on bibliographical analyses and consultation of key European organisations and agencies, as well as on data collected by the European Commission:

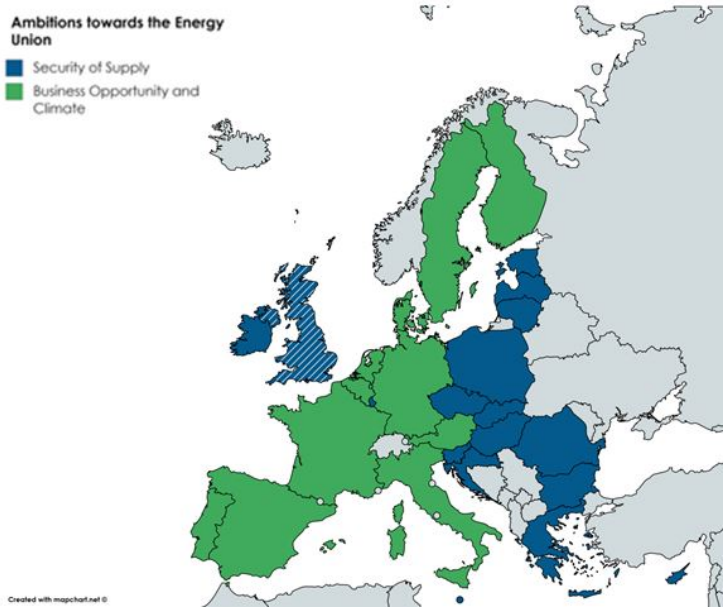

Figure 3: Member States clustered according to their ambitions

4.1 Member States seeking higher security of supply

Energy security standards differ among Member States and there is no clear definition at the EU level of what it means. In 2008 the World Energy Council defined it as "uninterruptible supply of energy, in terms of quantities required to meet demand at affordable prices" (World Energy Council, 2008), however in the recent years the definition has broadened. It includes, but it is not limited to, ensuring an adequate level of generation capacity, the balance between demand and supply and the ability to quickly react in times of crisis or supply disruption. There is also a long-term dimension of security of supply, meaning diversification of energy sources, low share of imported fossil fuels, robust and flexible infrastructure and high integration of the energy markets within the EU.

This group of countries include: Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Romania, Bulgaria, Greece, Cyprus, Malta, Luxembourg, the UK and Ireland. Other countries such as Spain or Italy, also have security of supply as one of their main energy priorities due to high energy dependence, but are not included in this cluster because they also regard energy goals as an industrial opportunity.

An EU with high net import dependency

The EU currently imports more than half of its consumed energy leaving several countries vulnerable to external actors and supply disruptions. Concretely, the overall EU dependency rate was 53.6% in 2016. The share imports in 2014 added up to 90% for crude oil, 69% for natural gas and more than 40% for solid fuels and nuclear fuel (European Commission, 2014). Such dependency on foreign energy supplies turns energy into a geo-strategical tool that prevents the EU from developing a secure energy market that guarantees constant supply to all the Member States. Energy demand has increased in recent years and is expected to increase by 27% by 2030 (European Commission, 2014) which makes energy dependence an even more urgent matter.

The dependency rate is calculated as share of net imports in gross energy consumption. The EU average hides different extremes, as the national rates vary from 6.8% in Estonia to 100.9% in Malta as it can be seen in Figure 4.

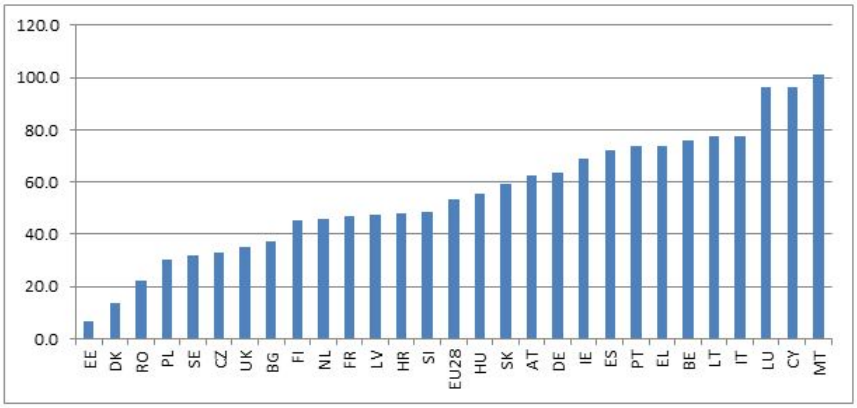

Figure 4: 2016 import dependency as % of final consumption (Source: Eurostat)

Due to their relatively small size, Cyprus, Malta (with a rate over 100% due to the stock of energy products) and Luxembourg are the three countries with the highest dependency on energy produced outside the EU. Imports in Luxembourg come from a broad range of sources, suppliers and routes, but the two islands remain highly dependent on oil and as of 2016, Cyprus was still not supplied with natural gas.

Aggregate supplier concentration

The energy security depends as much on the diversification of the energy mix as on the diversification of the supply sources and routes. The market concentration is measured by the Herfindahl-Hirschman Index (HHI). The index indicates the competitiveness of the market and the diversification of the suppliers. The lower the index, the higher the competition since the market is dominated by more players. Except for Slovenia, all the Member States have seen their competitiveness increased between the years 2005 and 2015 (European Commission, 2017d).

With regards to power generation, the countries with the highest market concentration index in 2015 were Latvia, Cyprus and Malta. With respect to the wholesale gas supply, there was a noticeable difference between Eastern and Western Member States. Most of the countries of East Europe have a high reliance on Russian gas and its main supplier Gazprom. Consequently, these countries are vulnerable to geopolitical actions by their neighbouring country and regard security of supply as their most urgent need. For instance Hungary has a single external supplier that provides around 80% of the consumption of the country (European Commission, 2017d).

According to the Agency for the Cooperation of Energy Regulators (ACER) the threshold index for a well-functioning system is 2,000 (10,000 corresponds to a monopoly). The HHI for gas supply presented in Figure 5 clearly visualizes such West-East division.

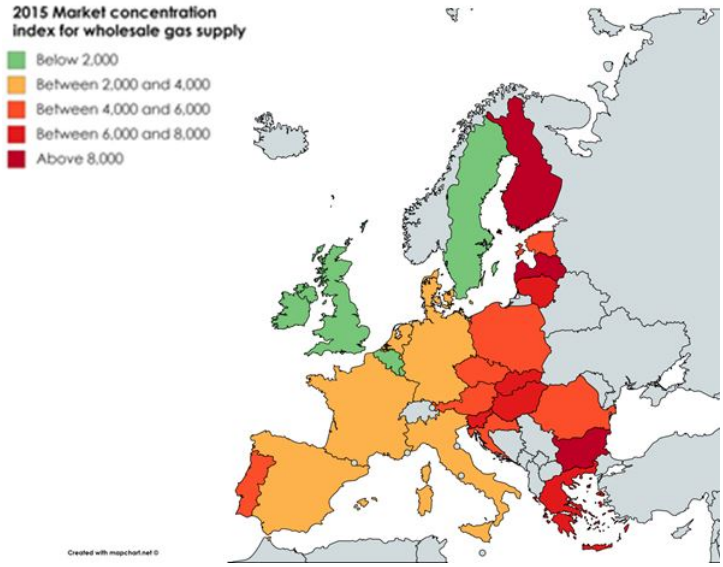

Figure 5: Market concentration (HHI) for wholesale gas supply (Source: ACER)

Currently Russia is the main external supplier of crude oil, natural gas and solid fuels to Europe. The great majority of Member States are dependent on imports, however the most vulnerable countries are Bulgaria, Estonia, Finland, Slovakia, Latvia and Lithuania, whose only gas supplier in 2014 was Russia, and especially worrying are the situations of Slovakia, Latvia and Lithuania, which depend on gas for more than a quarter of their energy needs (European Commission, 2014). The demand for imported natural gas is experiencing a growing trend (from 2015 to 2016 gas imports increased by 12%) (European Commission, 2017d) due to lower domestic production and higher industrial activity. This situation has placed security of supply as the focus of most Eastern European energy strategies.

Europe has already experienced the consequences of politically-rooted blackouts. In 2009 some of the Eastern Member States were affected by a dispute between Russia and transit country Ukraine, which hit them with temporary gas supply disruptions. Since the conflict, a lot has been done in terms of energy security at European level, however, the EU action is limited by Article 194 of the Lisbon Treaty, agreed in 2017. The Article states that the measures established by the European Parliament and the Council to achieve the 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 European Commission has presented an amendment to the Gas Directive 2009/73/EC that would grant the Commission exclusive competence in concluding agreements with third countries (European Commission, 2017b). The Commission has claimed that the amendment will enhance the solidarity between Member States and improve the functioning of the Energy Union. However, such movement, if observed from a broader perspective, can be seen as a step forward to swift the competence in energy policy from the Member States to the EU.

It is on the interest of the Energy Union security of supply to diversify the supplies, sources and routes. To this aim there are plans for the development of a Mediterranean gas hub. The Southern Gas Corridor (SGC), a new gas route from the Caspian Region, Central Asia, the Middle East and Eastern Mediterranean partners to the EU, will open in the next two years and has been the result of an active political dialogue with the partners involved. As expressed by the European Commission Vice-President Maroš Šefčovič projects such as the SGC are "strategically important for the EU's energy security, including in the most vulnerable parts, such as South-East Europe and Southern Italy" (New Europe, 2018). By reducing the sovereignty of Member States over their energy supply structure the EU can favour other projects that reduce the reliance on Russian supplies, as for instance the SGC.

The plans for large infrastructure projects in the Mediterranean gas, electricity and petroleum sectors will strengthen the positions of Greece, Cyprus and Malta as energy hubs. The three countries have joined the Clean Energy for Islands Initiative that seeks to improve the EU islands' self-reliance. Although these countries have low supplier concentration indexes, they are not free from suffering supply disruption from political discussions. Very recently, in June 2018 and after

the Maltese government refused to give shelter to the immigrants in the rescue ship Aquarius, the Italian Deputy Prime Minister Luigi di Maio claimed that Malta was accepting electricity from Italy but refusing to take in the immigrants. He threatened that if Italy wanted to, it could cut off Malta's electricity supply from the interconnector.

Natural gas in the EU is mainly consumed in households and in the industry sector. The residential sector uses the gas in heating and cooling and the industrial sector in combined heat and power systems, in process heating and as a raw material. With the EU strategy and measures, these countries can see the consumption of natural gas reduced as the Commission is providing measures to increase the share of renewable energy in heating and cooling.

Diversification of players and sources is one of the main goals of the Energy Union. It will further improve Member States' energy security situation and improve emergency response mechanisms in case of disruptions or political disputes.

Updating the energy infrastructure

Energy infrastructure is critical to ensure Europe's security of supply, sustainability and competitiveness. The right infrastructure and the level of interconnection are crucial for developing a secure energy system.

According to the EU, interconnectors bring together not only markets but also Member States and citizens. Because of that reason, more than half of the PCI are electricity interconnection projects. Figure 6 shows all the completed and ongoing PCI on high-voltage lines (blue) and smart grids (green) and gives a sense of the relevance of integrating all the electricity markets. In 2016 eleven Member States were still below 10% level of interconnection but it is expected that after the implementation of current PCIs only Spain and Cyprus will remain under 10% in 2020 (European Commission, 2015).

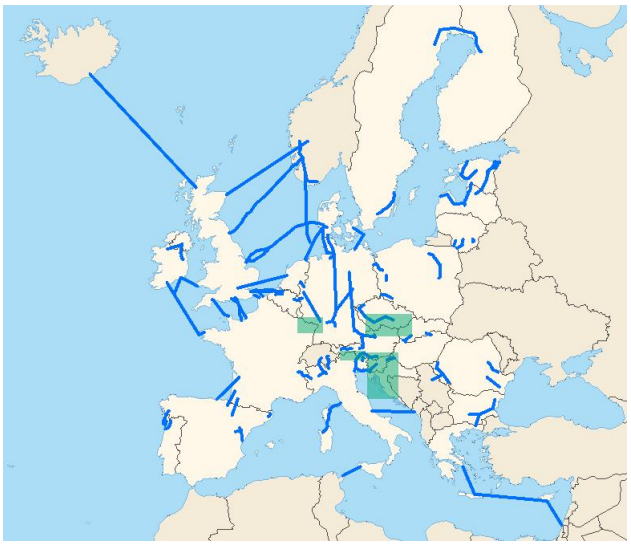

Figure 6: Map of PCI for electricity interconnectors (Source: © PLATTS for the underlying grids for electricity, gas and oil, 2018; © European Union, 2018)

Particularly interesting is the situation of the UK and Ireland. England has been traditionally a leader in sustainable goals and climate change was high on the policy agenda. However, following "Brexit" the Energy Union is not a priority anymore and it is unclear whether the country will remain a member of the Internal Energy Market. Taking into account that currently Ireland imports 85% (World Energy Council, 2017) of its energy needs and its only access to the Internal Energy Market is via the UK, any change in energy trades with continental Europe will have important repercussions on the country. As a consequence, cross-border flows have become one of the main concerns of the two countries.

As regards the Baltic countries, their synchronization with the Continental European Network (CEN) has always been at the focus of their energy security strategy and the development of the Energy Union is a guarantee for it. Their electricity systems initially belonged to the Russian and Belorussian systems, thus they operated in a synchronous mode with them. It is the third project of this type; Czech Republic, Hungary, Poland and Slovakia were synchronized in 1995 and Romania and Bulgaria in 2004. The electric isolation of the Baltic States is predicted to end in 2025 (European Commission, 2018c).

Further electricity and gas interconnections are needed to exploit Europe's large generation capacity. Physical links will enhance security of supply and provide Europe with more domestic energy sources. For instance, Romania has a very low dependence rate due to its rich national reserves but it is lagging behind in energy security due to Russian gas imports. Investments in interconnections with neighbouring countries would enhance transmission with Western Europe and increase the stability of the region.

Sub-clusters

In summary, for an important number of countries the Energy Union is the solution to the issue of security and of supply. Such ambition for an increase in the diversification of energy sources has different roots, according to which several sub-clusters can be identified:

- Central and Eastern European countries: Bulgaria, Slovakia, Czech Republic, Poland, Hungary, Slovenia, Romania, Croatia, Estonia, Latvia and Lithuania. These countries are pursuing an energy transition to reduce their dependence of Russia to avoid politically-rooted disruptions. Additionally, the Baltic countries have the goal of achieving their synchronization with the CEN. Overall, the focus of their efforts is the diversification of the gas supply rather than the pursue of innovative renewable energy technologies. The gas security of supply is a priority of the Energy Union, however, the next decade presents a new pattern of transition with the pursue of clean technologies at the centre of attention.
- Mediterranean countries: Greece, Malta and Cyprus. The relative small size of of Malta and Cyprus (also of Luxembourg) and their relatively small endogenous renewable energy capacity, result in a higher ambition to diversify their energy sources and routes through more interconnections.

Additionally, the projected plans with third countries in the Mediterranean region could increase their relevance as energy hubs and transit countries.

- British isles under the "Brexit" uncertainty: the UK and Ireland. The permanence of the UK in the Internal Energy Market is under question and is raising concerns in both countries about the future energy trade and supply with continental Europe.

4.2 Member States seeking a stronger position in the energy market

The current imports of fossil fuels is an important leakage of GDP to third countries that could be invested in domestic industries. The transition to an alternative energy system based on renewable energy translates into the creation of jobs and can place Europe and the forefront of innovation. Europe has already lost its momentum in the solar photovoltaic industry to China, only a few producers remain in Germany, so it is crucial to maintain Europe's leadership in other technologies and to provide a solid political framework to attract investors. Many countries in the EU aim to benefit from their knowledge and experience to place themselves and Europe as leaders in renewable energy.

This group of countries include: Finland, Sweden, Denmark, Germany, France, Austria, the Netherlands, Italy, Spain and Portugal. Needless to say, other countries not included in this cluster also seek to benefit from the technological innovations ongoing in the Union and aim to build-up on the expertise of their neighbouring countries, but from a more conservative approach.

Leaders in innovation

According to a joint study between the European Patent Office (EPO) and the International Renewable Energy Agency (IRENA), innovative activity in climate change mitigation technologies is concentrated in developed and emerging regions. New patents support the deployment of these technologies which are growing globally with renewable energy technologies growing the most (EPO and IRENA, 2016).

Germany, Denmark and Luxembourg are the countries with the largest number of low-carbon technologies patents related to Energy Union research and innovation (R&I) priorities, with more than 39 per million of habitants. They are followed by Finland and Austria with more than 20, and by the Netherlands, Belgium, Sweden and France with more than 10 (European Commission, 2017d). The Netherlands, despite falling short of the renewable energy target for 2020, has potential to become an energy hub and develop carbon capture and storage (CCS) technology as well as grid infrastructure for the wind projects in Northern Europe. The Dutch country is also an important logistical hub in sustainable transport, Tesla headquarters are located in the country, and is at the forefront of the transition in this sector in the EU.

There is a strong link between the number of patents of low-carbon technologies issued in a country and its performance on innovation systems. In May 2018

the European Union published the annual European Innovation Scoreboard that provides a ranking of the EU States' in innovation. At the top of the list are Sweden, Denmark, Finland, the Netherlands, the UK and Luxembourg, which are defined as "innovation leaders". The "strong innovators", also above the EU average, are Germany (which has dropped positions from previous scoreboards), Belgium, Ireland, Austria and France (European Commission, 2018a). It can be observed that on average these countries also have the highest share of patents in sustainable technologies.

These countries perform better in innovation because of different reasons. In economies and sectors that grow faster, favourable conditions are created to sell services and goods. In countries with a higher GDP, as it is in the case of Western European countries, the demand for more innovative goods and services is higher than in countries with lower income (European Commission, 2018a) and a higher share of GDP is spent in research and development (R&D) activities (EPO and IRENA, 2016). Other argument is the geographic agglomeration of innovative activities. A short geographical distance to a technologically specialised region results in greater innovation activities due to the spillover of innovation patterns to the neighbouring countries and to the concentration of production. Such concentration is also found at the sectoral level (Moreno et al., 2015).

Macroeconomic benefits (and costs) of the renewable energy sector

High deployment of renewables and the creation of an industrial base around it results in economic development and a more competitive industry in Europe and worldwide. Several Member States are exporting technologies to external markets. For instance, in wind energy technology, the export share of Denmark, Germany and Spain together add up to 90% of the total market (EurObserv'ER, 2018). Furthermore, Italy is a leader in smart metering and storage in the EU and can become a leader in smart grids integration. The turnover of renewable energy by Member State is shown in Figure 7.

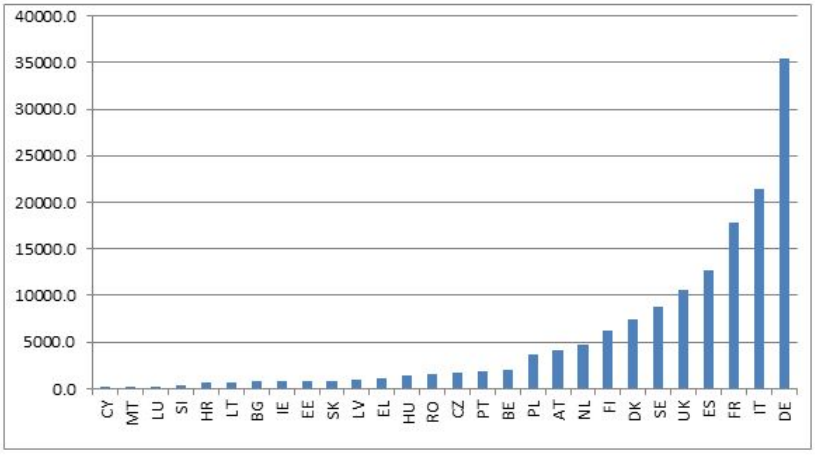

Figure 7: 2016 turnover (in millions of euros) of renewable energies by Member State (Source: EurObserv'ER)

Some studies argue that the lower returns to the peripheral regions of the EU is related to their weakly institutional settings, which result in lower incentives for investments and undermine the efforts of public investment (Rodríguez-Pose and Di-Cataldo, 2014). Additionally, retroactive changes in subsidy regimes turn investors wary of the region. Spain's step back on the feed-in tariffs is a good example of the impact of bad energy policy: the country experienced a dramatic decline in new investments after 2008 and has only started to slightly recover in 2017.

The deployment of renewables also have significant social benefits. Since the entry into force of the European strategies to promote renewable energy, there has been an important positive impact in the employment of Member States in West Europe. Countries with a wide deployment of these technologies and with a longer record of renewables, hold a significant share of their labor force in the installation, maintenance and operation of the plants. In 2016 the top ten countries with the largest workforce in the renewable energy sector were: Germany, Italy, France, Spain, the UK, Poland, Sweden, Romania, Denmark and Finland (EurObserv'ER, 2018). As expressed earlier, this might be the result of the greater demand for high-tech services and goods in countries with higher income levels.

Despite the benefits, the extensive deployment of renewable energy does not come without a cost. Generally speaking, Western European countries have the highest households' electricity prices of Europe (Eurostat, 2016) due to the high share of taxes and levies in the retail prices. As the living standards of Eastern European countries are below the EU average, their governments are very sensitive to impacts on the affordability of energy and on the employment. These countries have a high share of coal in their energy mix which provides cheap power and employment and are reticent of the likely growth in electricity prices with the energy transition. Additionally, despite having lower prices overall, the energy expenditure in final consumption expenditure for the poorest 20% of the population is larger than in the Western countries (European Commission, 2017d). This has resulted in reservations towards renewable energy and in a lower adaptation and environmentally responsible behaviour in Eastern and Central Europe, which is more associated with energy saving than with renewable energy (PwC, 2016).

5 Potential Conflicts

The production and consumption of energy, and especially of natural gas and oil, have been historically involved in both cooperation events and conflicts among countries. It remains to see how the energy transition will change interstate relations among Member States and if it will exacerbate their differences or, on the contrary, reduce the fragmentation of the EU.

The focus of the European energy strategy is shifting from gas diversification to the mass deployment of renewables. The new EU regulations have ambitious climate policies at their core and pursue revolutionary measures, such as participation of consumers in the energy transition and the promotion of

renewables in heating and cooling among others. There are diverging views across the Union as some countries embrace such measures while others have some reservations and a rather conservative approach. The fast changes in the energy system and infrastructure can bring some tensions between and within Member States. Generally speaking, Eastern countries consider diversification of gas supply as their main concern instead of the development and implementation of innovative technologies. As these countries are more sensitive to energy prices, employment and security of supply, the energy transition is likely to be more disruptive and to happen in a different way than in Western Europe (PwC, 2016).

The European Commission has placed the three aims - security of supply, competitiveness and sustainability - at the core of the energy strategy to address the energy needs across Europe and to hamper potential conflicts. However, potential tensions might prevent the energy landscape from unfolding as expected.

Security of Supply

As regards security of supply, alternatives to Russian gas are still not competitive and Europe is not likely to be able to reduce its dependence in the short term. Domestic gas production is declining and will continue to decline since the Netherlands has capped its production due to risk of earthquakes and the exploratory activities in the UK have decreased (European Political Strategy Centre, 2017). New projects involving Russian pipelines will set up conflicts within the EU as several factors make Russian gas still an attractive option for Western Europe. These countries have a more stable political relation with Russia, their gas markets are more resilient to supply shocks than that of Eastern Member States and their infrastructure and market models are better developed. Additionally, Member States in Western Europe are at the forefront of the energy transition which is also beneficial for the security of supply (Boersma, 2014).

A good illustration of the issue is the Nord Stream II project, which has split Europe and put into question the Energy Union dimension of security, solidarity and trust. According to the International Energy Agency (IEA), gas prices in the EU are about three times higher than in the U.S.A. which is damaging heavy industries in Europe. The plans for the new pipeline are to double the current capacity of gas supplied from Russia to Germany and to circumvent the most costly route through Ukraine. The saving of costs will provide cheaper gas to Europe but will increase its dependence on the neighbouring country. The countries where the companies supporting the project are based, Germany, France, Austria and the Netherlands, justify the project with economic terms as Russian gas is more beneficial for the industry than other market players (European Political Strategy Centre, 2017). On the other hand, Member States from Central and Eastern Europe led by Poland, argue that the new pipeline poses a political threat and negatively affects former transit countries. Polish Prime Minister Mateusz Morawiecki warned that the project is a Russian "poisoned pill" to undermine energy security in EU and that it will have long-lasting consequences (Radio Poland, 2018).

Tensions regarding Russian gas supply have mounted as new agreements with Russia could reduce U.S. exports of liquefied natural gas (LNG) to Europe. The

Trump administration has threatened the EU with sanctions if Germany does not reject the Nord Stream II project. However, U.S. LNG price is still not competitive in the EU market and its sustainability is called into question by many Member States as it is obtained through fracking (European Union, 2014). As regards LNG infrastructure, there is an over capacity of import facilities in Western EU but these are difficult to reach by Eastern Europe due to lack of interconnections (European Commission, 2018d). Regarding the Southern Gas Corridor, some experts argue that it does not fit into the long-term security strategy as the project could facilitate the import of Russian gas instead of diversifying the European supplier mix. Current issues over Russian supplies uncover the challenges that the EU will face if countries do not address their regional needs under the vision of a common European energy project, and the unfold of events will capture whether Member States and stakeholders are ready to truly embrace energy interdependence within the EU.

Competitiveness

With respect to competitiveness, the unaffordability of renewable energy technologies had limited their uptake until now. Many Eastern and Southern Member States still face a high cost of capital gap that prevents them from unlocking all their macroeconomic potential. The new measures by the EU acknowledge this hurdle and aim to enable all European Member States to deploy low-cost renewable energy (Agora Energiewende, 2018).

The increased penetration of renewables can help Eastern and Southern countries meeting their targets, but can also bring negative effects to their systems. A large share of renewable energy will most likely increase price volatility in the short term due to a more frequent mismatch between supply and demand. Unless the right balancing mechanisms are in place, severe extreme prices are likely to increase from 2026 (Energy Brainpool, 2017) and can place the most sensitive countries against an energy mix based on renewables. For instance, due to high electricity prices in 2013, Czech Republic's commitment to the energy transition was hampered and the competitiveness of the region was hindered (PwC, 2016). Additionally, many Eastern countries with heavy coal industries are wary of renewables because of labour considerations. In Poland, where a high share of renewable energy could negatively affect mining jobs, the government has defined its position on renewable energy by establishing a minimum 1.5 km limit between wind farms and housing.

The affordability of EU electricity can also be harmed by the investment needed to accommodate renewables and to replace the ageing infrastructure. The Connecting Europe Facility has a public budget of 5.35 billion euros for electricity and gas infrastructure projects. The quantity seems relatively small compared to the estimated 230 billion euros needed for EU energy networks by 2020 and considering that it is around five times smaller than the budget allocated to transport (Connecting Europe Facility, 2018). The European Commission predicted an increase in the average electricity price of 30% with respect to 2011 levels in order to support grid extension, efficiency measures and new generation capacity (European Commission, 2014b). Eastern and Southern

Europe will require more investments in storage capacity, reverse flow facilities and interconnectors, and their governments will have to make the largest financial contributions to the projects (Boersma, 2014). This may interfere with the political agenda of their governments, as it may hurt their national economies and raise their domestic prices.

The competitiveness of the European renewable energy industry is also threatened by China's intensified interest on low-carbon technologies. According to the IEA, four of the top ten wind turbine manufacturers and six of the top ten solar panel makers belong to the Asian country. So far, Chinese manufacturers have focused on mass production rather than on technology innovation and quality, which has brought the costs down. The heightened domestic competition in China is making the country starve for higher margins in foreign markets while preventing European manufacturers to enter the Chinese market. Additionally, previous events on intellectual property issues concern European developers about issuing licenses in the country. The large growth potential of less-mature markets in Eastern and Southern Europe and the higher potential profits in these regions are very attractive to Chinese companies looking to deploy their wind turbines and solar modules (Taylor Wessing, 2012). The new EU regulation, which is intended to reduce investors' uncertainty, can paradoxically favour China's expansion into Europe and reduce the market share of Western European manufacturers.

Sustainability

Concerning sustainability, there has been a drop in GHG emissions due to a large extend to the economic recession. The nuclear phase-out, the coal dependence and the economic recovery will pose serious challenges to the future goal of reducing emissions by 80% by 2050 (Deloitte, 2015). The closure of nuclear base load capacity, which currently provides more than half of emissions-free electricity (World Nuclear Association, 2018), will be mostly replaced by renewable bio power and by gas. The higher reliance on gas will increase emissions, exacerbate the political issues mentioned above and drive up prices. With respect to the phase-out of coal, nine Eastern and Southern European countries (Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, Slovenia and Spain) have not scheduled the closure of their coal power plants and some have announced their intention to build new ones. These countries, which operate around 75% of the coal plants in Europe, have not signed the *Powering Past Coal Alliance*, a commitment by some OECD and EU Member States to close existing traditional coal power plants to align with climate commitments (Europe Beyond Coal, 2018). The recent discredit of renewables caused by retroactive changes in the support schemes combined with the absence of a long-term emissions reduction strategy in some European countries might derail the ambitious climate plans of the EU.

Conclusion: tensions along a West-East axis

Different national interests between Western Europe – concerned about climate and about increasing its competitiveness in the low-carbon industry – and Eastern Europe – concerned about Russian dependence and about security of supply – present important challenges for the development of the Energy Union. Such

challenges can be geographically summed up in the following way:

- Tensions in Eastern Europe as a result of Western ambition on large deployment of renewables: higher electricity prices, loss of employment and revenues from the coal industry, and new security of supply challenges related to the integration of large share of renewables into the grid.
- Tensions in Western Europe as a result of Eastern dependence on fossil fuels and concern over Russia: lower imports of cheap Russian gas, loss of low-carbon technologies market share to cheaper Chinese manufacturers and unfulfillment of European climate targets.

6 Policy Recommendations

"Europe must breathe with both lungs. Otherwise our continent will struggle for air", President of the European Commission Jean-Claude Juncker referring to the East-West divergences

Member States have sovereignty over their national energy mix and will make decisions based on their economic and political needs. Judgments following purely political objectives may come with an economic cost, as well as pursuing economic objectives may pay a political price (European Union, 2014). The needs may diverge along the EU and Member States might have conflicting interests, as it is the case with Nord Stream II. The solution to guarantee Europe's security, competitiveness and sustainability is a well integrated internal energy market. However, despite 2014 being the deadline for its completion, the internal energy market is still far from being integrated and resilient. Further action is needed as new regulatory pressure will scale up renewable energy deployment and will bring rapid changes.

In order to protect the Energy Union from a multispeed energy transition due to the divergent energy perceptions across Europe, future energy policies should propose a trade-off that both sides will be willing to agree upon. Some recommendations for a deal package that would address the potential conflicts are the following:

- Agreement between both sides on the distribution of costs and benefits of achieving an interconnected European network and a working internal energy market.
- Compromise to limit Western Europe gas imports from Russia while, in compensation, Eastern Europe would agree to import Western renewable energy technology and reduce imports from third countries. Lower Russian imports would be balanced by the exploitation of LNG infrastructure overcapacity and the necessary interconnections would be built to export LNG to Eastern Member States.
- Eastern Europe would place renewable energy as a policy priority for improving its security of supply as well as for achieving its climate

commitments. In order to reduce the expected burden on Eastern European consumers in the short-term, Western Europe would offer loans and subsidies so that the Eastern workforce and industry can adapt to the energy transition and lower its emissions.

Such an agreement would aim to balance the three dimensions that are currently at the center of the EU agenda. However, if analyzed from national perspectives and geographic boundaries, Member States would find out that no agreement would come without a cost. In a context where energy markets are being opened and interconnectors are being built, Member States should look for the optimal solution at European level and work on a compromise agreement because they "are sufficiently independent of each other so that neither can impose a solution on the other and yet suciently interdependent so that both would lose if no solution were found" (Schmitter, 2002).

7 Conclusions

The EU is promoting a new set of ambitious climate targets for the next decade. The European package *Clean Energy for all Europeans* includes a raise in the share of renewable energy in final energy consumption of 32% and is part of a wider strategy aiming to achieve sustainability, competitiveness and security of supply for Europe. Previous EU measures have reached several milestones but have failed to fully deliver the expected results: emissions have been reduced though mainly due to the economic slowdown caused by the crisis, consumers have seen their bills rise and European energy dependence on foreign supplies have increased and will continue doing so.

As a consequence the new climate agenda has been received with varying levels of ambition. Some Member States have received the ambitious goals with open arms and aim to place Europe as a global leader in the action to combat climate change. These countries include Member States that will need to make a significant effort to reach their targets and that are lagging behind mainly due to regulatory issues. On the other side, some Member States have strong reservations about the raise of the target and claim that reaching a high share in renewable energy will be very costly to achieve and technically difficult. These Member States include many countries from Central and Eastern Europe, where renewable energy is still not as competitive as in Western Europe and where the energy markets are less developed, but also major EU economies that have suffered the consequences of expensive public support such as Germany.

The energy interests vary across the Union and have determined the energy mix of Member States and limited their coordination, preventing the creation of a fully integrated European energy market. Overall, two main clusters of countries can be identified according to their energy priorities: those countries seeking higher security of supply and those countries seeking a stronger position in the energy market. Most of the countries in Eastern Europe still depend on Russia and fear politically-rooted gas disruptions from the neighbouring country. Because their markets are less resilient and their infrastructure is less developed, they have

security of supply as the main priority in their energy agenda. In order to build a resilient energy system, their infrastructure will require significant investments. Nevertheless, the management of the economic burden remains a challenge as the consumers of these Member States have lower living standards and therefore are more sensitive to an increase in energy prices. Other non-Eastern countries also seek higher security of supply, due for instance to low indigenous energy sources or few interconnections with Europe. On the contrary, most of Western European countries see the Energy Union has a tool to place them as market leaders in the mass deployment of renewable technologies, which may further boost their economies and help them reach their climate goals. These countries have more stable political relations with external suppliers and have more robust markets. The higher GDP of Western Member states makes them more resilient to a rise in prices, which is also counterbalanced by the turnover of renewable energy and the large workforce they have in the industry.

Under the new energy package Member States will have wide flexibility in achieving their climate goals, which can perpetuate the European energy policy as a mixture of national policies designed to safeguard national interests. The EU is likely to experience political issues within its borders due to, for instance, new agreements between Russia and Western Europe as Russian gas is still the most competitive option and the most attractive supplier to these countries. Additionally, the significant investments in interconnectors and renewable energy projects are likely to be disruptive in European countries with the lowest GDP and living standards. It is hard to determine whether the Energy Union will be a great success, or if on the contrary it will turn out problematic and countries will judge it as a loss of power over their energy mix and detrimental to their economies. The European Commission will have to take action when conflicting national interests arise and persist in building a a liquid, competitive and integrated energy market across European borders.

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