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The credibility of the European Union's efforts to decarbonise the power sector

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Policy report

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Executive summary

Further policies are needed for the EU to substantially reduce carbon emissions

The European Union was at the forefront of the international negotiations that led to the Paris Agreement. It also set, in 2013, a number of mandatory internal targets for 2020 and 2030, which commit its member states to significantly reduce their greenhouse gas emissions, increase the share of renewable energy sources and improve their overall energy efficiency. However, much remains to be done. National projections show that by 2030 greenhouse gas emissions will be only 26 per cent below 1990 levels, and therefore additional policies will be needed in order to achieve the objective of a 40 per cent cut in emissions. In this regard, decarbonising the power sector, as the largest single contributor of carbon emissions, will be central to EU and national strategies.

EU member states need a 'credible' approach for decarbonising the power sector

An important question is to what extent the EU as a whole, and its member states individually, will be able to translate their climate change commitments into action, specifically in terms of decarbonising the power sector. This report assesses the credibility of member states' efforts to do so, in order to identify areas of improvement for individual countries. This analysis aims to help strengthen the credibility of their approach to decarbonisation, which in turn can help to attract more investment into low-carbon power generation.

Credibility, in this context, means the degree of likelihood that policymakers will keep their promises to implement the pledges or policies they announce. This report argues that credible decarbonisation commitments require countries to have:

- A suitable set of policies and legislation
- A robust track record of policy consistency (by refraining from sudden policy reversal) and of meeting targets
- Sound and transparent decision-making processes (including for enforcing and monitoring policy)
- Capable policymaking bodies
- A supportive socioeconomic environment, in terms of public opinion and the private sector

The assessment of credibility is different from analyses of policy effectiveness or ambition. These are closely related, but in a complex and multifaceted way. Being credible without having ambitious yet feasible policies will not be sufficient for EU member states to meet the Energy Union's common objectives. For a complete analysis of member states' decarbonisation efforts, the European Commission should consider all three aspects of ambition, effectiveness and credibility. A large body of literature has focused on ambition and policy efficiency. This report therefore aims to contribute to the assessment of the lesser explored area of credibility.

The report focuses on the EU as a single institution, as well as a sample of eight member states: the Czech Republic, Denmark, France, Germany, Italy, Poland, Spain and the United Kingdom, chosen to ensure coverage of northern and southern countries plus old and new member states.

Key findings: wide variations in credibility across EU countries

The EU as a whole performs best in terms of having public bodies dedicated to climate change action, supported by consultative mechanisms, and in terms of having practically no history of climate policy reversal. It performs relatively less well in terms of having strong policy and legislation (largely due to the currently low carbon price embedded in the EU ETS and the lack of specific targets for the power sector), a private sector supportive of climate change action, and a climate-aware public.

At member state level, Denmark, Germany and the UK are the top performers, displaying the largest number of factors that support the credibility of their efforts to decarbonise the power sectors. At the other end of the spectrum, Poland and the Czech Republic appear to have the greatest scope for improvement. Italy, France and Spain fall in the middle.

Policy and legislation need to be strengthened in some countries to improve credibility. Poland is one example of a country where this area of credibility needs improving, notably by strengthening its long-term vision for decarbonising the power sector and its support to low-carbon investment. For example, to strengthen the credibility of its decarbonisation efforts in the power sector, Poland should introduce additional mandatory emissions reduction and renewables targets and increase its domestic carbon pricing, which, according to World Bank figures, to date stands at only €1 per tonne of carbon dioxide. By comparison, domestic carbon pricing in Denmark, France and the UK is above €20 per tonne.

Public institutions could also be improved in some countries, especially Poland and Germany, by joining up climate and energy polices in a single department, and by ensuring government action is scrutinised by independent or at least inter-parliamentary bodies.

Frequent policy reversals are a challenge to the credibility of decarbonising efforts in several EU countries, especially the Czech Republic and Spain and, to a lesser extent, Italy, France, Germany and the UK. This is particularly damaging for investment, as it undermines trust that policies being introduced will remain consistent in the long run. Planned and transparent mechanisms are required to allow for policy adjustments without unintended consequences.

Climate change awareness among the public in Poland and the Czech Republic is among the lowest in the EU, and this could undermine policymakers' appetite for bolder low-carbon policies and hence decrease the political credibility of their commitment to decarbonise the power sector.

The carbon-intensive sectors, such as mining, plastic, paper and machinery manufacturing, are important sources of jobs in countries including the Czech Republic, Germany, Italy and Poland, and this could embolden the lobby power of these groups. Notably, in Poland the private sector has challenged climate change legislation in several court cases.

Addressing credibility weaknesses would have immediate and long-term benefits

Acting on some of these determinants will have an immediate effect on the credibility of decarbonising the power sector, while others will require longer and more consistent efforts in order to have an impact. Policymakers have direct influence on policy and legislation and on public bodies, and improvements in these areas can have immediate benefits for credibility. These should be the focus of governments' attention as part of the implementation of their commitments. Policy reversal, past policy performance and decision-making processes are also under policymakers' control and are important for building trust. However, their effects on credibility may take longer to be perceived, as governments develop capacity and skills, as well as a solid track record on policy consistency and on meeting targets.

In the long run, acting on all these drivers could also help to boost those determinants outside direct government control, notably public opinion and private bodies. This will be crucial in particular in those countries where climate change policy needs greater reform. For instance, establishing or reinforcing a constructive dialogue and consultation with citizens and stakeholders can help governments to overcome opposition and build trust around climate change action. This in turn can improve the acceptability of new climate change policies and objectives, leading to a positive spiral which can enable countries to raise ambition over time.

1. Introduction

The ability of European Union member states to translate their commitments to decarbonise the power sector into concrete actions, in order to meet European and international objectives, has not been fully investigated to date. This report aims to fill this gap by assessing the *credibility* of member states' efforts in this area. For the purpose of this analysis, the credibility of policy commitments is defined as 'the likelihood that policymakers will keep their promises to implement the pledges or policies they announce' (first defined thus in Averchenkova and Bassi, 2016: 3).

While emissions from the power sectors are regulated at EU level through the EU emissions trading system (EU ETS), member states have a crucial role to play in ensuring that their institutional set-up (including complementary domestic policies, the functioning of government bodies, and stakeholders' engagement) supports the long-term credibility of their decarbonisation commitments and attracts investment.

Our analysis provides an initial comparative insight into seven key determinants of credibility of efforts to decarbonise the power sector (set out in section 2) and how these vary between countries. It does not aim, however, to produce a 'credibility ranking' of countries. Indeed, a quantified assessment of a concept like credibility would be impossible and potentially misleading to make. The aim here is to provide a simplified framework to identify key trends, areas of strength and weakness, and opportunities for improvement of countries' political credibility with respect to their commitments to decarbonise the power sector.

The approach we take builds on the work by Averchenkova and Bassi (2016). That study developed a methodology for the assessment of the political credibility of the pledges submitted by the G20 countries for the Paris Agreement, focusing on the likelihood of those governments adhering to their announced emissions reductions. The methodology has been refined to account for the specific governance framework of the EU and its member states, a narrower policy focus (the decarbonisation of the power sector), and a larger set of comparable data available for these countries compared with the G20; this is explained fully in section 2.

The global and EU policy context: climate change pledges and progress

Climate change commitments globally are becoming more ambitious. By ratifying the Paris Agreement, which entered into force in 2016, 170 countries to date (December 2017) embraced a common cause to keep 'global temperature rise this century well below 2° Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5° Celsius' (United Nations Framework Convention on Climate Change, 2015 and 2017). To achieve this goal, countries have submitted nationally determined contributions (NDCs), which reflect self-determined actions on how they will mitigate greenhouse gas emissions from their economy and adapt to potential climate risk. Those submitted so far are not yet enough to keep global warming below 2°C, but the agreement traces the way to ratchet up ambitions to achieve this target.

The European Union was at the forefront of international efforts towards striking the global climate deal that led to the Paris Agreement. It was also the first major economy to submit its intended contribution to the agreement, in 2015. Its pledged objective, set out in the 2030 climate and energy framework, is to reduce its greenhouse gas emissions by 40 per cent below 1990 levels by 2030 (European Commission, 2013). Besides the emissions reduction target, this framework also aims to achieve at least 27 per cent of final energy consumption coming from renewable sources and at least a 27 per cent energy saving (compared with business as usual) by 2030. In the longer run, the EU is committed to reducing its domestic emissions by 80 per cent compared with 1990 levels by 2050 (ibid, 2011).

The EU in on track to meet its 2020 targets for emissions reductions (a 20 per cent reduction on its 1990 levels) and renewable energy (20 per cent share of total energy), stated in its 2020 climate and energy package (European Commission, 2008). However, national projections show that by 2030, emissions will only be 26 per cent below 1990 levels (European Commission, 2016a); more needs to be done to achieve the 40 per cent target.

Electricity and heat production is the largest source of greenhouse gases in the EU, accounting for about 37 per cent of carbon emissions in 2014 (International Energy Agency, 2016). The decarbonisation of the power sector is therefore central to the EU and national climate change strategies. Furthermore, the costs of reducing carbon intensity in the power sector are generally lower than doing so in other sectors (Committee on Climate Change, 2010).

Why focus on credibility?

A better understanding of the credibility of a country's efforts has several implications.

First, it enables member states' policymakers to act upon those determinants that can improve the perceptions regarding the credibility of their commitments.

Second, it offers some additional guidance to investors interested in developing and deploying new low-carbon power generation, as well as those operating existing low-carbon capacity in the countries analysed, by providing new understanding on the likelihood of governments sticking to their political commitments to decarbonise the power sector. This is important for investors because many low-carbon technologies rely on government intervention to correct basic market failures, and this in turn creates policy risk that some investors can be reluctant to take on (Fankhauser and Bowen, forthcoming).

Third, it can support the European Commission in identifying member states' strengths and weaknesses, in order to tailor support for those countries and those determinants of credibility that are lagging behind, and to draw lessons from good practice. This is particularly important as the Commission is proposing a new regulation on the governance of the Energy Union (European Commission, 2016b) to deliver on several long-term objectives, including the 2030 energy and climate targets and the Paris Agreement commitments (Pinho and Zannier, 2017). At the core of the new system are Integrated National Energy and Climate Plans, in which member states are required to set out their national contributions to the 2030 energy and climate targets and present objectives, policies and measures to attain them. These plans are meant to provide predictability until 2030 and beyond, which will be essential given the long time horizons for investment in new and existing generation capacity and energy infrastructure (Anger and Zannier, 2017). An assessment of credibility would reflect the likelihood of the member states being able to put these plans into action.

It is important to note that the assessment of credibility is different from analyses of effectiveness and ambition (a point expanded upon in section 2 below), which have been written about extensively. With its focus on credibility, this analysis aims to complement those assessments.

2. Methodology

Defining credibility

In order to assess the credibility of EU member states' efforts to decarbonise their respective power sectors, the first step of the analysis requires defining what, precisely, is meant by 'credibility'.

In the existing literature there is no universally agreed way of defining the credibility of countries' decarbonisation commitments. Parallels, however, can be drawn with other theoretical and empirical analyses. This paper builds on the literature discussion in Averchenkova and Bassi (2016), which explored definitions applicable to the credibility of countries' intended nationally determined contributions (INDCs), which define the post-2020 climate actions they intend to take. A similar approach can be applied to the decarbonisation of the power sector.

Most definitions tend to focus on the consistency between announced commitments and actual implementation. A simple definition is that countries and governments 'have credibility if others believe that they will do what they commit to' (Brunner et al., 2012: 256). Credibility is also described as 'the extent to which beliefs about the current and future course of… policy are consistent with the program originally announced by policymakers' (Blackburn and Christensen, 1989: 2), or, more simply, that credibility is 'the expectation that an announced policy will be carried out' (Drazen and Masson, 1994: 735).

These definitions suggest that credibility is not only related to a country's behaviour (for example, policymakers introducing policies consistent with emissions reduction targets), but also to how this behaviour is perceived by others (for example, whether investors 'believe' that those policies will deliver the expected results and that they will not be repealed in the future).

A key concept associated with the perception of credibility of policy is 'the time inconsistency of optimal policies', which was first described by Kydland and Prescott (1977) in the context of monetary policy: policymakers are often driven by self-interest and seek short-run gains, which causes them to renege on previously announced policies (Blackburn and Christensen, 1989). Therefore, the credibility of a policy pledge is greater when there is less ability and fewer incentives for policymakers to deviate from previously announced policy. Thus it could be argued that the level of credibility perceived by other players is greater when there are mechanisms in place that stimulate, or constrain, policymakers' behaviour.

This report adopts the definition developed by Averchenkova and Bassi (2016: 3), which builds on this literature. **For the purpose of this analysis**, therefore, the **credibility of policy commitments is defined as:**

> *The likelihood that policymakers will keep their promises to implement the pledges or policies they announce.*

This definition focuses on the issue of consistency between announcement and compliance, and is meant to be sufficiently broad to account for both policymakers' behaviour and the perception of credibility by other players. The determinants of credibility, discussed below, have been identified in light of this broad definition.

It is also important to clarify what credibility is not: credibility is different from effectiveness (that is, the extent to which a policy achieves its stated objectives) and from ambition (for example, whether or not policies are sufficient to meet the 2°C Paris Agreement target). These, however, are closely related, in a complex and multifaceted way. For example, the lower the ambition of a commitment, the higher the probability that the policies to implement it will be effective. And as

governments are able to fulfil low-ambition promises easily, the credibility of those commitments would appear to be high. Credibility, effectiveness and ambition therefore need to be viewed together in order to understand the bigger picture of how countries are tackling climate change.

A large body of literature has focused on ambition and policy efficiency. For example, several studies have investigated the gap in ambition between the pledges made in nationally determined contributions and the Paris Agreement's target of limiting temperature rise to 2°C above pre-industrial levels (e.g. International Energy Agency, 2015; United Nations Environment Programme, 2015; Boyd et al., 2015). At the EU level, several analyses have investigated policy effectiveness and performance, for instance by assessing member states' progress towards building the Energy Union (European Commission, 2017a), meeting 2020 and 2030 emission reductions (ibid, 2016a) and deploying renewable energy (ibid, 2017b). The analysis in this report aims to complement these assessments by focusing on credibility.

Developing a framework for the assessment of credibility

The credibility of countries' climate change commitments is driven by multiple drivers, which often interact and mutually reinforce each other.

Key determinants of credibility

In order to identify and disentangle the multiple dimensions of credibility, this report builds on the analysis by Averchenkova and Bassi (2016), which scoped the relevant literature to outline the main features that appear to increase the likelihood of a country's announced commitment being implemented, focusing on those that best apply to climate change mitigation.

For example, according to Forder (2001), perceived credibility is determined by two main factors: reputation – a history of compliance in political transaction; and commitment devices – that is, incentives for successive governments to honour their predecessors' policies (in Brunner et al., 2012). This suggests that the credibility of a policy pledge is greater when policymakers have few incentives and less ability to deviate from commitments, either because damage to their reputation would affect private investment and growth, or because legal or procedural mechanisms make it difficult for government to repeal earlier decisions.

An analysis of Germany's commitment to increase its share of renewable energy, carried out by Lockwood (2015), highlights that the factors supporting such a pledge include: high levels of environmental awareness among its population, public policies setting stable, technology-specific prices, and support from a wide coalition, including government departments (such as the Environment Ministry), the Green Party and several municipalities.

By drawing on the collection of various theoretical and empirical studies, seven key determinants that support the political credibility of climate change efforts were therefore identified:

1. **Legislation and policy:** a coherent and comprehensive legislative and policy basis
2. **Public bodies:** dedicated public bodies supported by a consultative mechanism
3. **Policy reversal:** no history of policy abolition
4. **Past performance:** a track record of delivering on past climate change commitments
5. **Decision-making process:** a transparent, inclusive and effective decision-making process with sufficient political constraints to limit policy reversal
6. **Private bodies:** private bodies supportive of climate change action
7. **Public opinion:** climate-aware public opinion supportive of climate change action

Overall, these features of credibility are related either to policymakers' current and past behaviour or to external enabling factors outside government control.

The first two determinants – legislation and policy, and public bodies – are within the direct and immediate control of policymakers. Improvement on these determinants would have an immediate effect on the level of credibility of climate change commitments. Policymakers can also act directly upon the determinants for policy reversal, past performance and decision-making process, although the effects may only be perceived in the longer run, because it would take time for a government to improve its history of meeting targets and maintaining policy coherence. Decision-making processes, which include acting with transparency and building buy-in from stakeholders, arguably also require institutional changes, which may take time to consolidate.

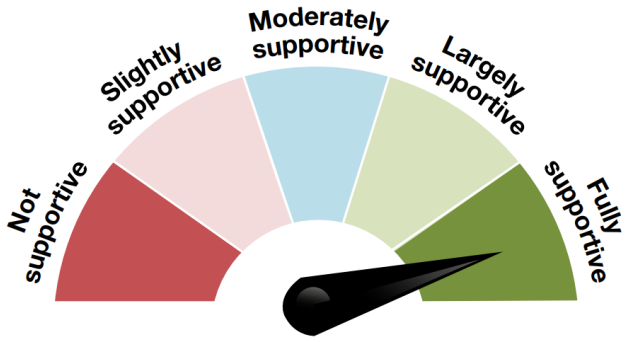
The last two determinants – private bodies and public opinion – are related to the socioeconomic context of a country, and are outside the control of policymakers. Arguably, however, improvement of the determinants that *are* under government control can, in the long run, also have a positive effect on the response of society, by improving the level of support for climate action by stakeholders.

The methodology first developed by Averchenkova and Bassi (2016) included an additional determinant, international engagement: that is, a history of active international engagement on environmental issues. While this is important for the G20's intended nationally determined contributions analysed in that report, it is less relevant for the EU member states, since they generally have a joint approach to international negotiations on climate and environmental issues. That determinant was therefore not included in this study.

In light of this set of determinants, a simplified set of qualitative and quantitative information and indicators were selected in order to measure the credibility of member states' efforts to decarbonise their power sector. The choice of determinants and their underlying indicators are described below. For a full discussion on the rationale behind the determinants, see Averchenkova and Bassi (2016).

The indicators, or a combination of them, were assessed on a scale from 'not supportive' to 'fully supportive' to the credibility of climate change commitments (see Figure 2.1). The overall score for each determinant was obtained as a simple average of the score of their underlying indicators. Given the lack of empirical studies on the relative importance of the determinants of credibility, we simply assumed that every indicator is equally important or, in other words, that they have the same weight. For the same reason, this study does not create an aggregated quantitative indicator of credibility. Rather, the primary focus of this analysis is to identify, rather than weigh up, the individual factors affecting credibility, and to draw insights from individual determinants.

Figure 2.1. Scoring system for determinants' support to the credibility of pledges



Source: Averchenkova and Bassi (2016: 10)

Scope and applicability of the findings

The resultant framework was tested to assess the credibility of efforts to decarbonise the power sector in eight selected EU member states: the Czech Republic, Denmark, France, Germany, Italy, Poland, Spain and the United Kingdom. This sample was chosen to ensure sufficient geographical diversity among northern and southern countries, as well as among old and new member states. It also accounts for different levels of carbon intensity of economies – from relatively low intensities in France (around 0.13kg of carbon dioxide per US dollar of gross domestic product) to a higher intensity in Poland (0.34kg per $GDP) (World Bank, 2017a). While the framework is applied only to a subset of member states, it is designed to be applicable to any member state and, in principle, to other countries outside the EU.

The analysis aims to help identify overall trends and the priority areas for action to increase the political credibility of climate change efforts, and to increase certainty around their implementation. The results for the selected countries are meant to illustrate how the methodology works in practice. Further, they also provide a first broad-brush assessment of how strongly decarbonisation efforts for the power sector are supported by the political, institutional and socioeconomic features already in place in the analysed countries. In light of this, it is possible to identify areas where countries can improve the factors that influence the credibility of their commitments.

The choice and nature of the determinants of credibility, and their underlying indicators

The analysis of a number of theoretical and empirical studies on policy adoption and effectiveness led to the identification of the seven determinants used for this work. For each determinant, a set of indicators was chosen to measure the level of support given to the credibility of countries' efforts to decarbonise their respective power sectors. These indicators are not meant to be a comprehensive list, and there is further room for improvement as more data become available; see Averchenkova and Bassi (2016) for a more detailed discussion on the limitations of these determinants and the potential for improvements.

The determinants of credibility and the indicators chosen to describe them are mostly qualitative in nature and are strongly influenced by the complex features of the country they are applied to. The information collected under each indicator is intentionally simple and easy to replicate. The resultant scoring system is a relatively crude approximation of the strength of each determinant of credibility in each country.

Table 2.1 summarises the set of determinants, indicators and data used for this analysis, including the year of data sources. Importantly, most of these indicators refer to a specific point in time – the year for which the latest data was available. The analysis therefore provides a snapshot of countries' credibility at the present time, rather than a dynamic picture. Conducting similar assessments in the future could help in developing a more nuanced view of how credibility changes over time.

Determinants and indicators are described in more detail in the subsections that follow.

Table 2.1. Determinants and indicators for analysing the credibility of climate commitments

	Determinants	Indicators	Data for scoring	Year
1	**Legislation and policy:** Coherent and comprehensive legislative and policy basis	High-level vision	- Climate change mitigation framework legislation	2017
			- Economy-wide greenhouse gas targets: time horizon	2017
			- Renewable targets for power sector: time horizon	2017
		Low-carbon policies relevant to the power sector	- Carbon price level	2016
			- Size of fossil fuel subsidies (€/GDP)	2006-2014
			- Size of low-carbon electricity subsidies and variance	2008-2012
			- Weighted average cost of capital (WACC) of renewable investment	2016
2	**Public bodies:** Dedicated public bodies supported by a consultative mechanism	Public bodies	- Dedicated climate change bodies joined up with energy bodies	2017
			- Consultative bodies	2017
3	**Past policy reversal:** No history of policy abolition	Abolition of climate change legislation	- Unexpected reversal of climate change related legislation for power sector inconsistent with decarbonisation objectives	2017
4	**Past performance:** Track record of delivering on past climate change commitments	Achievement of EU targets and milestones	- Past performance towards renewable generation targets for power sector	2017
			- Performance towards interconnection	2017
			- Performance towards emissions abatement in EU emissions trading system	2017
5	**Decision-making process:** Transparent, inclusive and effective decision-making process with sufficient political constraints to limit policy reversal	Mechanism for building buy-in from stakeholders	- Voice and accountability index	2015
		Stable, consistent and not easily reversible law and policymaking process	- Political constraints index	2016
			- Government effectiveness	2015
			- Political stability and absence of violence/terrorism	2015
			- Government stability	2015
		Transparent, consistent and effective administrative and enforcement mechanisms	- Bureaucracy quality	2015
			- Corruption Perceptions index	2015
			- Rule of law	2015
			- Regulatory quality	2015
6	**Private bodies:** Supportive private bodies	Private bodies	- Jobs in carbon-intensive sectors	2013
			- Jobs in low-carbon sectors	2015
			- Litigation cases	2017
7	**Public opinion:** Climate-aware public opinion	Public opinion	- Perception of climate change (importance and seriousness)	2015
			- Support to climate action (renewables and energy efficiency targets)	2015
			- Political support (green party seats in European Parliament)	2017

Determinant 1: Legislation and policy

Legislation can be a powerful instrument for preventing policymakers from backtracking from policy commitments (see, for example, Egebo and Englander, 1992). Two indicators have been used in this study to characterise this determinant:

- High-level vision on climate change mitigation (including for the power sector)
- Specific low-carbon policies for the power sector

Regarding the former, recent research has shown that overarching framework laws and policies that formalise a country's overall vision on climate change are particularly important for driving forward ambitious climate policy (Fankhauser et al., 2015). Therefore the existence of framework legislation in a country generally suggests a high degree of government buy-in for action on climate change and reinforces the credibility of a country's pledges regarding future action. This would apply to the overall economy as well as to individual sectors like power generation. Furthermore, for the purpose of this study, existence of legislation and policy that include quantifiable targets for greenhouse gases and renewable electricity are considered an indicator of commitment and forward-planning, which supports credibility of political commitments. Credibility is further supported if the targets' timeframe encompasses short- (to 2020), medium- (to 2030) and long-term objectives, as this would provide a clearer explicit timeline of the decarbonisation commitments.

As for low-carbon policies, these can vary significantly across countries, with differing degrees of stringency and coverage. For the purpose of this analysis, the level of carbon pricing has been chosen as an indicator of credibility. This is because pricing instruments have the potential to apply (or tend towards) a uniform carbon price across all economic sectors, which encourage business and consumers to reduce their spending on high-carbon products (Bowen, 2011). In the power sector, evidence shows that carbon pricing is the most cost-effective instrument for curbing emissions and leads to the fewest distortions among power generators (Doda and Fankhauser, 2017). Notably, unlike subsidies, carbon pricing does not decrease the market value of those low-carbon firms (such as hydropower) that are not subsidised. It is therefore a preferable instrument in a power sector where technologies are already relatively mature. This is increasingly the case in the EU, as low-carbon technologies including solar and wind are close to reaching market parity with fossil fuels and longstanding renewables like hydropower.

All the EU member states share a common carbon pricing, embedded in the EU emissions trading system (EU ETS). This, however, is currently relatively low, standing at around €4.50 in 2016 (World Bank et al., 2016). We therefore consider additional domestic carbon pricing as having a positive effect on credibility. This is because an additional carbon price applied to electricity would increase decarbonisation in the power sector domestically, although this would lead to additional emissions elsewhere, as the emissions cap in the EU ETS is fixed. While this is not desirable from an economic point of view (as emissions reductions should be achieved through higher EU ETS carbon pricing), it is considered to reinforce the credibility of a country's own efforts to more ambitious decarbonisation. If carbon pricing is applied to other sectors, it would ensure a more uniform and coherent carbon pricing across the economy, also signalling credibility.

There are also policies and laws that can conflict with a country's climate change objectives, for example those that support carbon-intensive activities. An important example is fossil fuel subsidies. These can discourage investments in energy efficiency, renewables and energy infrastructure (Coady et al., 2015). A relatively high level of subsidies for fossil fuels is considered to be at odds with carbon pricing policies, and to undermine the credibility of climate change objectives. To assess the size of these subsidies we rely on data from the OECD (2017), which estimates direct budgetary transfers and tax expenditures benefiting fossil fuels. As these tend to change over time, we use an average of the estimated subsidies between 2006 and 2014.

Support for low-carbon technologies is also important for credibility. Generally, subsidies in the past have helped to stimulate innovation and investment and therefore higher subsidies are associated with a higher level of credibility. However, as noted above, as technologies become more mature, subsidies become less desirable. There is, therefore, an expectation that countries would (and should) gradually decrease their level. What matters in terms of credibility is that these changes happen gradually rather than as sudden drops, as these would destabilise investment. The study therefore takes into account the level of variability of subsidies over the period 2008–2012 (for which comparable data is available), assuming that high variability in the subsidy rates over time hampers credibility. In some cases, sudden subsidy changes are the result of an unexpected repeal or reversal of legislation, which further destabilises credibility. This is captured by the 'past policy reversal' determinant, discussed below.

Furthermore, we take into account an additional measure of the risk faced by investors, the weighted average cost of capital (WACC) of low-carbon technologies (based on Ecofys, 2016). The WACC of low-carbon projects is highly dependent on national financial conditions, such as the macroeconomic rating of a country, but also on the national energy policy framework and power market regulations and their stability (Janeiro et al., 2016). It therefore provides for an economy-based reflection of the quality of a country's decarbonisation policies. This gives a snapshot of the level of riskiness perceived in a given time (the WACC data is for the year 2016) and complements the indicator on the level of variability of subsidies, which covers the period from 2006 to 2014.

Determinant 2: Public bodies

The delegation of policymaking and implementation powers to institutions with adequate capacity and expertise enables commitment to a longer-term strategy (see, for example, Majone, 1996; Helm et al., 2003).

In this study, the existence of a dedicated public body in charge of climate change (notably a ministry or other government department) is considered an important feature for ensuring the credibility of government action on electricity decarbonisation. This analysis, however, does not discuss how such public bodies interact with governments in different contexts (for instance, whether they are more or less influential in federal or centralist political systems). The basic assumption is that a body dedicated to climate change is more likely to have capacity and expertise, and be committed to the decarbonisation agenda (as opposed to this role being spread across various bodies) and therefore is generally desirable for the purpose of strengthening credibility.

Another important consideration is the level of cross-agency coordination in developing and implementing electricity decarbonisation. The greater the level of coordination, the greater the chance of gaining buy-in from key sectoral agencies, which in turn can lead to more successful policy implementation. For the EU member states, it was possible to observe whether climate change and energy issues were dealt with by the same government department – which would suggest a higher level of joined-up thinking. Examples of this are happening within the Ministry for Climate, Energy and Building in Denmark and the UK's Department for Business, Energy & Industrial Strategy.

In addition, the existence of inter-parliamentary or, ideally, independent bodies, can further contribute to the monitoring of government action and hold governments accountable for progress, reinforcing credibility. Examples of independent institutions are the UK Climate Change Committee (CCC) and the Danish Climate Council.

Determinant 3: Past policy reversal

Ensuring that private investors are incentivised to commit funding to low-carbon generation requires not only policies that provide a reasonable return on investment, but also, just as importantly, credible policies that are not subject to sudden reversals once the policy has been passed into law. This is because when firms have incomplete knowledge about the direction and extent of policy change they are exposed to higher risk, and this can lead to reduced investment (Brunner, 2012). Avoiding policy reversals is a sign of policy consistency, which is crucial for building investors' trust that governments will uphold project contracts on their original terms.

If a country has a track record of weakening or removing domestic climate change legislation or policy aiming at decarbonising the power sector, therefore, this can undermine the credibility of its commitments. It is also an indication that the risk of policy reversal, captured by the indicator of 'political constraints' (see below), is real and has already materialised in practice.

Making changes to policies is not necessarily detrimental, as policies do need to be updated to reflect changing dynamics, such as changes in technology and energy prices, along with changing economic circumstances. However, clear adjustment mechanisms should be planned for and announced in advance. But often governments make unexpected retrospective changes to the terms of existing policies, or temporarily or permanently abolish them before their end date. These kinds of policy reversal are especially detrimental when they affect the basis on which investors found their business case for investing into projects in a country.

This study has focused on policy reversals of subsidy schemes for renewable energy, which affect one or more of the following: the size and scope of policy coverage; the level of remuneration (including imposing new fees and penalties); or time periods covered by the schemes. It also considers more detrimental to credibility the outright abolition of a policy or law, compared with temporary suspensions or retroactive changes to aspects of policies (such as revisions to the size of subsidies).

Determinant 4: Past performance

Governments can develop a reputation for being credible through a history of consistent compliance with their promises (Brunner et al., 2012). Countries with greater consistency of compliance with their commitments are more likely to stick to their track record and therefore are perceived as more credible. A country's past performance on meeting domestic or international mitigation targets (or intermediate milestones), for instance, can help to determine the credibility of its climate change efforts.

The areas where past performance can be observed depend on the specific climate change effort that is being measured, as well as on data availability. This study takes into account performance towards three policy objectives:

- **The 2020 national targets for renewable electricity expressed in the National Renewable Energy Action Plans (NREAPs):** an indication on whether countries have meet their 2013–2015 interim targets and are on track to meet the 2020 target, based on data from Eurostat (2015).
- **Past performance towards the EU electricity interconnection target for 2020:** an indication of the level of interconnection in 2016, based on the Second Report on the State of the Energy Union (European Commission, 2017c), in comparison with the EU target of 10 per cent interconnection by 2020 (European Commission, 2015a). While the level of interconnection is in some cases outside the control of individual countries, it is an indication of how ready their infrastructure is to higher shares of intermittent renewable electricity, and this in turn affects the feasibility and credibility of their decarbonisation objectives.

- **Past performance with respect to emissions from the sectors covered by the EU emissions trading system (EU ETS):** an indication of whether a country's emissions in the second and third trading periods (2005–2007 and 2008–2012) exceeded their allocated allowances, based on data from the European Environment Agency (2017). Buying allowances is allowed and, indeed, an intrinsic feature of the EU ETS; however, if a country exceeds its allocation, it shifts emissions abatement to other countries; this implies limited domestic investment in low-carbon generation. This may increase the risk that carbon-intensive generation capacity becomes stranded if carbon prices increase. In our assessment this is considered a short-sighted choice which is detrimental to credibility.

Determinant 5: Decision-making process

Policy and legislation, as described above, need to be underpinned by effective processes and procedures to support credibility. Three main indicators are considered important in this study:

- Mechanisms for building buy-in from stakeholders
- Mechanisms to ensure stable, consistent and not easily reversible law and policymaking processes
- Transparent, consistent and effective administrative and enforcement mechanisms

First, mechanisms for building and maintaining buy-in from stakeholders, such as stakeholder engagement, shape the legitimacy of public policies and the governments that promote them (Park, 2015; Lockwood, 2015). For the purpose of this analysis, it is assumed that the stronger the ability of citizens to participate in the policymaking process, the stronger the credibility of a country's decarbonisation commitment. The 'voice and accountability' indicator developed by the World Bank (2016) is used as a proxy to assess the contribution of stakeholders' buy-in to credibility. It aims to capture 'perceptions' of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media (Kaufmann et al., 2010). We assume that the greater the accountability and participation of stakeholders, the higher the credibility of a political commitment.

Second, a government's structure and the characteristics of the political system can give an indication of how easy or difficult it can be for a country to withdraw or reverse a policy or piece of legislation once adopted. Kydland and Prescott (1977: 487) emphasise that credible policy relies on institutional arrangements that 'make it a difficult and time-consuming process to change the policy rules in all but emergency situations'.

For the purpose of this study, the credibility score is obtained as an average from the following range of indicators, which, to various extents, aim to portray the level of stability of a government and the mechanisms in place to avoid sudden changes in legislation when governments change:

- The Political Constraint Index (University of Pennsylvania, 2017), which provides a measure of the feasibility of policy change, looking at 'veto points' on the decision-making process.
- 'Political stability and absence of violence/terrorism' (World Bank, 2016), which measures the perceived likelihood of political instability and politically-motivated violence.
- 'Government effectiveness' (ibid), which measures the quality of public services, including governments' independence from political pressures.
- 'Government stability' (PRS Group, 2016), which is about the ability of a government to carry out its declared programme and stay in office.

Third, transparent, consistent and effective administrative and enforcement mechanisms are considered to lead to better governance (Fiorino, 2011) and hence support the credibility of climate

change commitments. In this study, credibility is assessed as the average of the following indicators:

- 'Bureaucracy quality', a measure of the strength and expertise of the bureaucracy (PRS Group, 2016)
- 'Control of corruption', an indicator of the extent to which power is exercised for private gain (World Bank, 2016)
- 'Rule of law', measuring the quality of contract enforcement (ibid)
- 'Regulatory quality', about the ability of government to implement policies that permit and promote private sector development (ibid).

Determinant 6: Private bodies

The balance of power between private bodies (e.g. private sector companies or civil society organisations) with opposing interests can influence the willingness of governments to adhere to promises and implement climate policy. Therefore private bodies also have an important role in influencing the credibility of climate change efforts.

Analysis of countries of the Organisation for Economic Co-operation and Development (OECD), for instance, provides evidence that powerful fossil-fuel-based energy lobbies tend to constrain the level of green taxation (Ward and Cao, 2012). At the other end of the spectrum, Bernauer and Gampfer (2013) find that where civil society is more involved in public decision-making, public support for domestic and international climate policy may be stronger.

For this analysis, credibility was measured against the share of jobs (out of the total workforce) associated with two business groups: carbon-intensive industries (such as mining, plastics, paper and iron and steel manufacturing) and the renewable energy sector. The assumption is that, while carbon-intensive sectors tend to oppose climate regulation, renewable energy technology manufacturers and low-carbon electricity generators tend to view government action on climate change as a business opportunity. As a result, conflict between business sectors with opposing climate interests has the potential to weaken the original anti-regulatory stance of the fossil fuel industry and open up political space to push for stricter regulatory measures (Falkner, 2008).

Furthermore, businesses and non-governmental organisations are increasingly involved in climate litigation. This is 'a double-edged sword': on the one hand, litigation can be used to enhance climate regulation and hold policymakers accountable; on the other, litigation can be used to hinder climate regulation (Gerrard and Wilensky, 2016). For example, corporations can use the courts to question what they consider to be excessively stringent standards or requirements (Setzer and Bangalore, 2017).

This study attempts to capture this enhancing or hindering role of private actors by accounting for litigation cases on climate change legislation[1] in the eight member states analysed. The assumption is that the existence of litigation cases hindering actions to reduce emissions is an indicator that the private sector in a given country is actively opposing climate change policy. This in turn is considered to be conducive to lower levels of credibility, as it increases the chances of weakening legislation via the courts.

The number of litigation cases and their significance, however, is also likely to be a reflection of the culture and political system in a given country. For instance, the UK and Spain register a high number of court cases in comparison with the other member states analysed here, while in Denmark there has been so far no litigation on this issue. It has not been possible to capture the

[1] The study takes into account litigation concerning climate change legislation in general, rather than specifically the decarbonisation of the power sector, due to the relatively limited number of cases.

relationship between litigation and political systems in the present study, but it is an element that would deserve further investigation.

Determinant 7: Public opinion

Public opinion is a key component of the socio-political context within which policymakers operate, and can compel or constrain political, economic and social action (Leiserowitz, 2009). For instance, peaks in awareness of problems, for example after climate-related disasters, can lead to more stringent carbon policy (Brunner, 2008). In contrast, carbon policy may be weakened when other issues such as unemployment move up the political agenda (Brunner et al., 2012). National differences in climate change risk perceptions therefore may help to explain the differing levels of political support for climate action between countries (Lee et al., 2015). A high degree of public awareness of climate change impacts and support for government action is therefore considered an important driver of credibility.

To compare and contrast the perceptions of climate change across the EU member states, this analysis uses data from the *Special Eurobarometer 435: Climate change* dataset (European Commission, 2015b), which provides data for 2015. The analysis focuses on survey results on the perception of the seriousness of climate change as a global problem, and at this moment in time, and the importance of government action on setting renewable energy targets and improving energy efficiency.

This study also attempts to estimate political support for environmental causes by observing the number of seats in the European Parliament (out of the total seats available to a given country) that are held by a party or candidate affiliated to the European Green Party. While this is only a crude indication of voters' preferences, it enables the difference in national election systems to be overcome, as all countries are subject to the election rules of the European Parliament. This reflects the idea by Oppenhuis et al. (1996) that European elections give citizens an opportunity to vote sincerely rather than strategically (to 'vote with the heart'), for parties that are closer to their ideal preferences rather than for larger parties that are further away but have a greater chance of forming a government. This of course is only part of the picture, and it is worth acknowledging that other factors can be at play in voters' choices for green parties, such as the timing of a European election in a national election cycle and voters' attitudes towards European integration (see, for example, Hix and Marsh [2007] for a discussion on the existing theories on the European Parliament elections).

3. The credibility of EU member states' efforts to decarbonise the power sector

As described above, the framework has been applied to assess the credibility of eight EU member states' efforts to decarbonise their respective power sectors but is designed to be applicable to any other member state and, in principle, to other countries outside the EU (as explained in section 2).

The assessment of credibility was also carried out on the European Union as a whole – see Figure 3.1. Some of the data collected for the EU is based on an average of the 28 member states' score (for example, on public opinion or on decision-making processes, as these are based on existing indicators developed at the country level only), while some reflect specific characteristics of the EU, such as institutions and policies.

Overview of results for the EU as a whole

The EU as a whole performs best on the public bodies and policy reversal dimensions, which appear to be strongly supportive to credibility. This reflects the quality of its institutions, which display joined-up thinking through a shared commissioner for the directorate in charge of climate change and the directorate for energy policy. The need for strong consensus in the legislative process in order to pass new legislation and the significant veto power of the EU member states also means that EU-level legislation affecting the decarbonisation of the power sector has never been reversed. However, it should be noted that, although policy reversal at EU level is rare, EU regulatory policy can in some cases lead to the abolition of domestic administrative arrangements, notably if they distort the functioning of the EU common market (Knill and Bauer, 2009). A key example of EU regulation affecting domestic power sector decarbonisation policy is the EU's state aid regulations. These are meant to regulate member states' government interventions which could distort competition, and in so doing can induce some unintended policy reversals at member-state level.

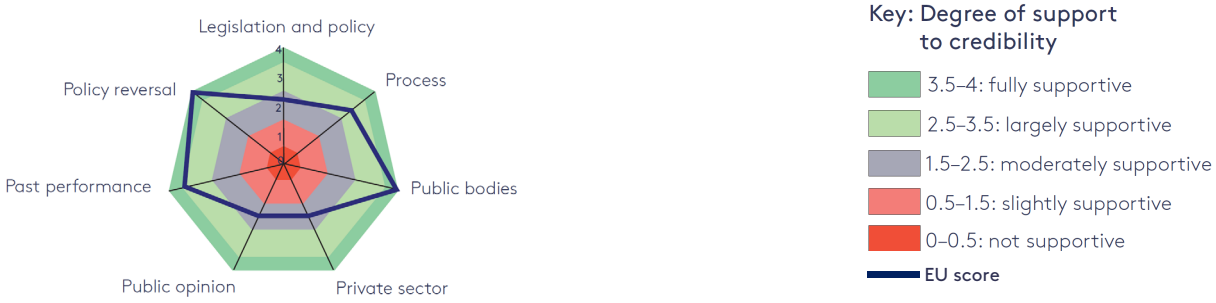
The credibility analysis below only captures these revisions at the respective state levels rather than at EU level. For example, the Czech Republic introduced a renewable energy support scheme in 2013, but was granted approval by the European Commission under the State Aid Rules only one-and-a-half years later. Contrary to EU rules, however, the Czech support scheme was already operational before receiving state aid clearance. One of the conditions for approval requested by the European Commission involved the introduction of a review mechanism to avoid over-compensation to those installations launched into operation before 2014. As a result, the length of the support period initially agreed for some renewable generators had to be shortened (Fouquet and Nysten, 2015).

Past performance is a reflection of the average score of the 28 EU member states and appears largely supportive to credibility. Collectively, they are on track to meet the 2020 renewables target for electricity and their domestic emissions and have not overshot the ETS cap.

EU legislation and policy are only moderately supportive to credibility. This is mostly due to the current relatively weak carbon pricing signal through the EU ETS, and the lack of specific renewable targets in the electricity sector. The latter is a contentious point, as the absence of targets for the power sector reflects the opportunity left to member states to choose how to best allocate emissions reductions across sectors; however, for the purpose of this study, this is considered to leave some uncertainty on the level of commitment on the size and timeline of the decarbonisation of the power sector that investors can expect at EU level.

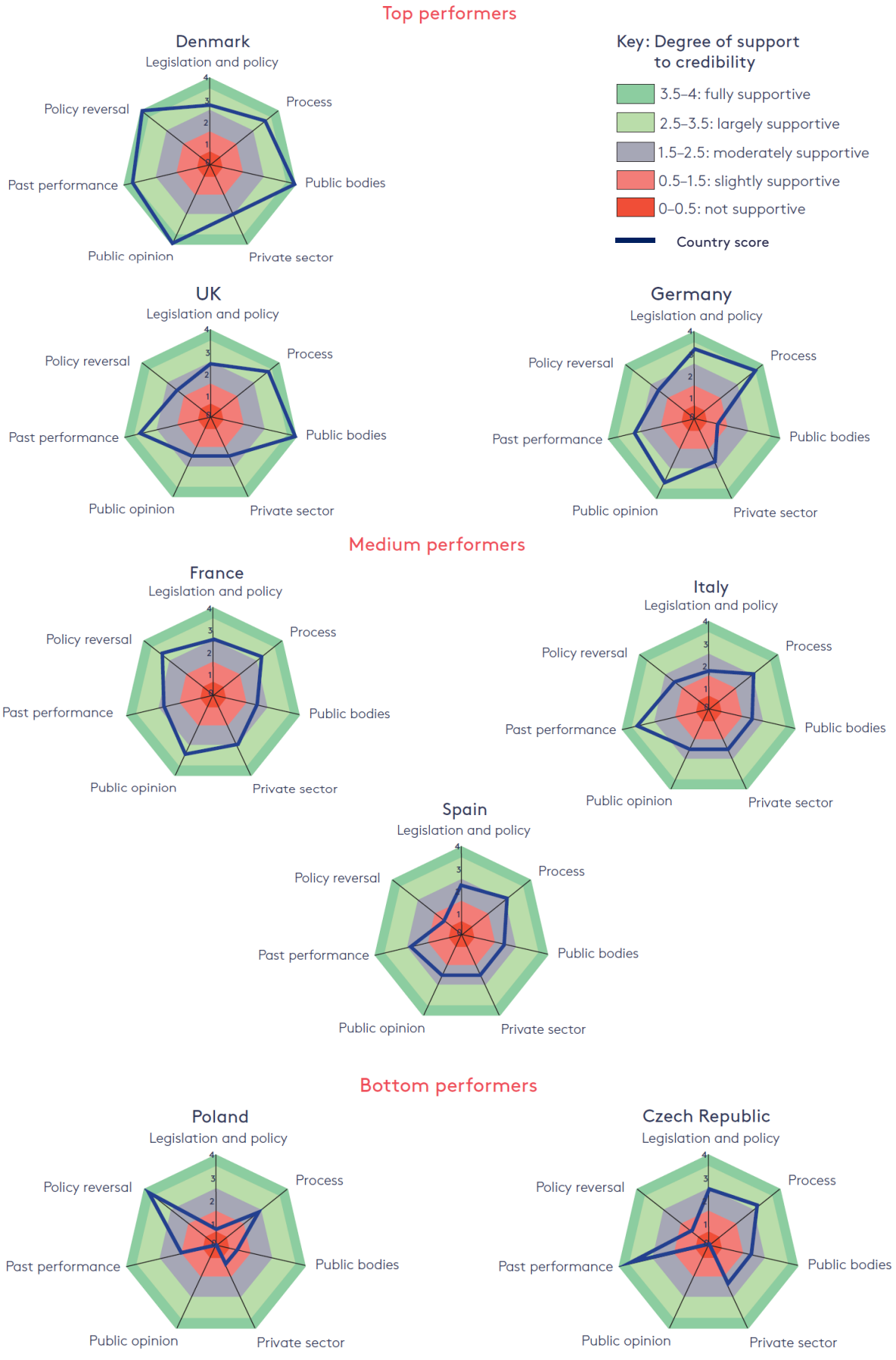
The determinants on the private sector and public opinion dimensions reflect the average scores of the 28 member states. They too are only moderately supportive to credibility. For instance, employment in carbon-intensive industries significantly surpasses that in the renewable energy sector (accounting respectively for 3.9 and 0.5 per cent of the total workforce in the EU), which suggests the former could have a stronger lobby power that could undermine climate change policy ambition. In terms of public opinion, the Eurobarometer survey (European Commission, 2015b) suggests that across all the member states climate change is perceived as an important issue, but not a top priority.

Figure 3.1. Scores for the whole European Union (source: authors)



Credibility varies across member states. Of the eight countries analysed, Denmark, Germany and the UK are the top performers, while Poland and the Czech Republic appear to be those where political credibility of decarbonisation commitments is least supported. Italy, France and Spain fall in the middle – see Figure 3.2.

Figure 3.2. Overview of country scores (source: authors)



Results: Legislation and policy

As noted above, the framework developed for this report measures credibility of policy and legislation along two aspects: high-level vision and low-carbon policies. The scores for more detailed indicators for one of the top performers (the UK) and the worst performer (Poland) are shown in Figure 3.3 below.

In terms of vision, all countries have a framework mitigation policy, except for Poland. For instance, the UK's 2008 Climate Change Act was the first law in the world to set statutory greenhouse gas reduction targets (Grantham Research Institute on Climate Change and the Environment and Sabin Centre for Climate Change Law, 2017).

Furthermore, all member states have 2020 and 2030 targets for greenhouse gas emissions, which are embedded in the EU climate and energy packages. Some countries go beyond these requirements, and have detailed targets also for the medium (to 2040) and long term (to 2050). The UK, France and Germany, for instance, have legally binding greenhouse gas targets for 2050 as well as detailed intermediate targets.

Member states also have 2020 targets for the uptake of renewable electricity in the power sector, as this was requested as part of their National Renewable Energy Action Plans. Longer term targets on renewable electricity are less common. Only Germany and Denmark have medium- and long-term targets, while the Czech Republic and France have medium-term targets.

Overall, the best performing on long-term vision is Germany, as not only does it have a framework legislation, but it also has detailed short-, medium- and long-term targets for both greenhouse gas emissions reduction and for renewable electricity, which together give a clear indication of its plans to decarbonise the power sector. This makes it stand out from other well-performing countries like the UK, which, although it has framework legislation in place and a clear timeframe for greenhouse gas emissions targets, lacks explicit indication on targets for the power sector specifically. At the other end of the spectrum, the worst performing is Poland.

In terms of low-carbon policies, as noted in section 2, all member states share a common carbon price, embedded in the EU emissions trading system, but lately this has been relatively low, at around €4.50 in 2016 (World Bank et al., 2016). Denmark, France and the UK have additional domestic carbon pricing above €20 per tonne of carbon dioxide, although only the UK's applies to the electricity sector (acting as a lower bound to the EU ETS carbon price). For the purpose of this study, the existence of domestic carbon pricing in these countries supports the credibility of their decarbonisation efforts, although their carbon pricing is still well below the highest level in the EU, which reaches nearly €120 per tonne (in Sweden). Other countries have no domestic carbon pricing or, as in Poland, a very low carbon price (about €1 per tonne of carbon dioxide (ibid).

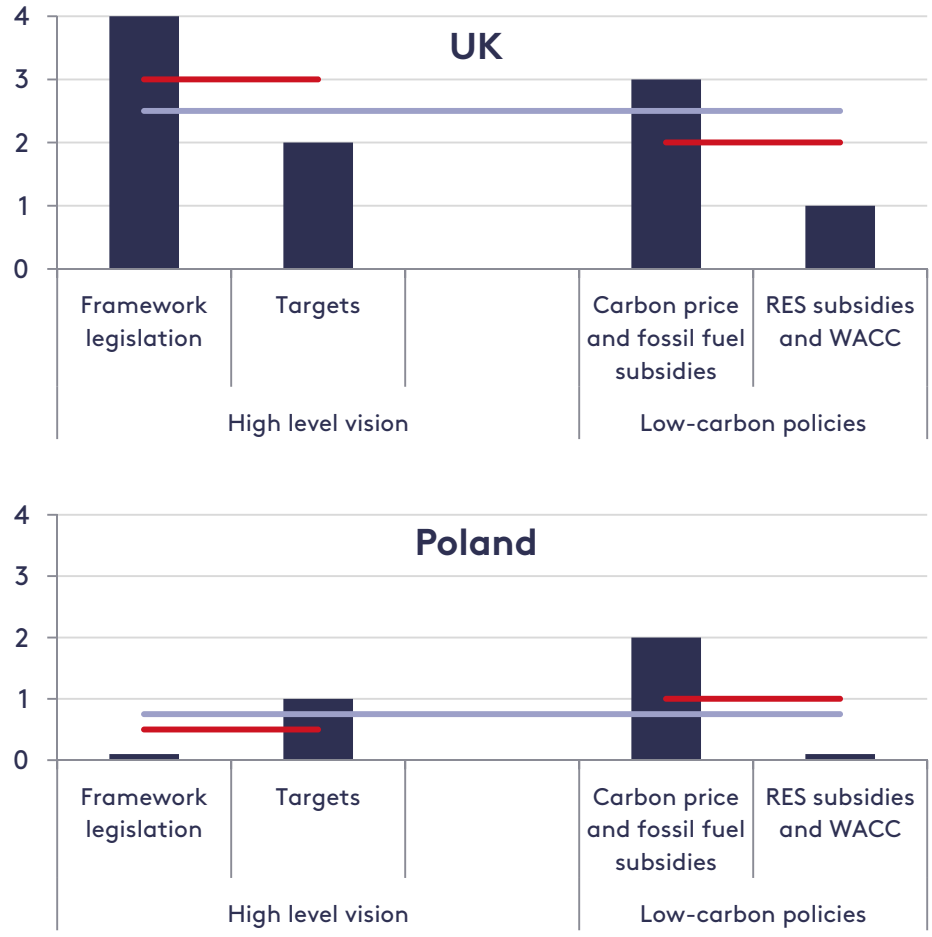
As noted earlier, fossil fuel subsidies can be detrimental to decarbonisation objectives. Therefore, the credibility of decarbonisation commitments is higher if countries feature no or relatively low fossil fuel subsidies. The average subsidy (from 2006 to 2014) in the EU is the equivalent of about 0.14 per cent of GDP (OECD, 2017). Of the countries analysed, Germany, Italy, Poland, Spain and the UK have below-average subsidies.

All member states have implemented a set of subsidies to support the uptake of low-carbon power generation. As noted in section 2, subsidies have been useful for attracting investment, but this positive effect is counterbalanced by their level of volatility, as highly variable subsidies generate uncertainty and can discourage investors. This is also reflected by countries' weighted average cost of capital (WACC) for low-carbon technologies. Poland and Italy, for instance, display a relatively low level of subsidies (as a percentage of GDP) as well as high variability of the subsidy level over the period 2008-2012. Poland also has the highest WACC among the countries analysed, at 8.7 per

cent (Noothout et al., 2016), which is reflective of its relatively higher investment risk levels. In these two countries low-carbon policies are therefore only slightly supportive of credibility.

Overall, Denmark's low-carbon policies scored the highest in terms of support to political credibility of its decarbonisation commitments, thanks to domestic carbon pricing signals and stable levels of low-carbon subsidies.

Figure 3.3. Legislation and policy indicators score: the UK and Poland



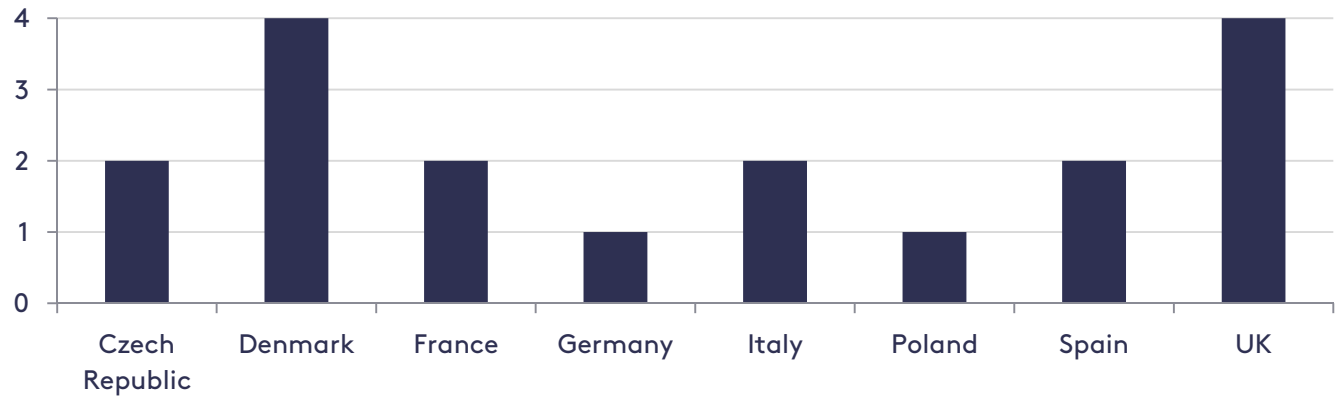
Scale: 0.00–0.49: 'not supportive' to credibility; 0.50–1.49: 'slightly supportive'; 1.50–2.49: 'moderately supportive'; 2.50–3.49: 'largely supportive'; 3.50–4.00: 'fully supportive'.
Notes: Red horizontal bars represent the average score for the sub-indicators; blue horizontal bars represent the average score for the whole determinant. RES = renewable energy sources. WACC = weighted average cost of capital.
Source: Authors

Results: Public bodies

The results for public bodies show significant differences across the member states analysed, as shown in Figure 3.4. Denmark and the UK provide particularly good examples of countries with public bodies fully supportive to credibility. They display joined-up thinking in climate and energy policy as these are dealt with by the same government department – the Ministry for Climate, Energy and Building in Denmark and the Department for Business, Energy & Industrial Strategy in the UK. In addition, their progress towards meeting their climate change objectives is monitored by independent bodies – the Climate Council in Denmark and the Committee on Climate Change in the UK.

At the other end of the spectrum, Germany and Poland's public bodies appear to be only slightly supportive to credibility, as climate- and energy-related matters are covered by different ministries. This is supported by earlier analysis by the International Energy Agency (2013 and 2017a), which stressed the need for tighter coordination within the governmental structure of these two countries. They also appear to lack an inter-ministerial or independent body providing coordination or oversight.

Figure 3.4. Public bodies: countries' scores



Scale: 0.00–0.49: 'not supportive' to credibility; 0.50–1.49: 'slightly supportive'; 1.50–2.49: 'moderately supportive'; 2.50–3.49: 'largely supportive'; 3.50–4.00: 'fully supportive'
Source: Authors

Results: Past policy reversal

The member states analysed show large variation in attitudes to past policy reversal, as shown in Figure 3.5. Countries including Denmark and Germany have had no major policy change reversal. For instance, Germany was able to avoid sudden changes to its renewable support thanks to the introduction of policy design mechanisms to discover actual technology prices, scheduled annual reviews of feed-in tariff rates, and limited capacity additions in order not to overburden budgets. In Poland new draft legislation that could affect the conditions of current and future investors on wind farms is being discussed, hence Poland is considered largely but not fully supportive to credibility on this measure.

France and Italy have introduced a few sudden changes to legislation, but have not abolished any climate policies outright. Their track record on policy reversal is therefore considered moderately supportive to credibility.

Frequent policy reversals in the Czech Republic and Spain, including permanent abolition of climate-related policies (of feed-in-tariffs in the Czech Republic and green premiums for renewable electricity in Spain, for example, both in 2013), have affected the regime of support to low-carbon generation. None of the changes ultimately affected national strategies on climate change embedded in framework legislation, but the frequent reversals affected several low-carbon technologies and are therefore only slightly supportive to credibility in these countries.

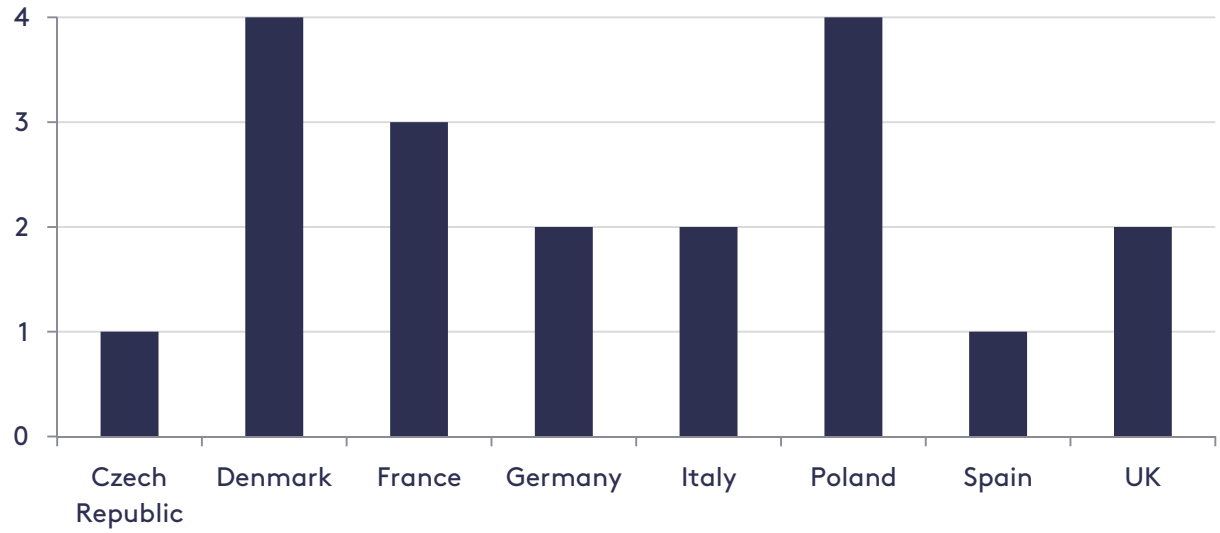
Policy reversals also affected investment on a few low-carbon technologies in Italy, Germany and the UK. This determinant is therefore only moderately supportive to credibility in these countries. For example, in 2015 the UK unexpectedly removed tax exemptions (through the Climate Change Levy) for renewable electricity generation, and made sudden changes to feed-in tariffs for solar power.[2] Germany is an example of a country with both good and bad policy revisions. For instance,

2. In 2015 the UK also cancelled a £1 billion grant scheme for carbon capture and storage, but since the scheme was not set in law it does not qualify as a legislative policy reversal in our methodology.

it was able to incorporate policy design mechanisms to discover actual technology prices, announced in advance that it would review feed-in tariff rates annually, and limited capacity additions in order not to overburden budgets. At the same time, following the nuclear accident at Fukushima, Japan, and widespread public opposition to nuclear power generation, Germany reversed its decision to extend the operating lifetime of the nuclear power fleet by an average of 12 years (German Parliament, 2010). A new amendment to the Atomic Energy Act (German Parliament, 2011) was introduced in 2011 to reinstate a previous deadline of phasing out nuclear in 2022. This led to the shutting down of the oldest nuclear reactors, resulting in about 8GW-worth of power coming off line. Power generation from coal made up for this sudden drop in capacity, causing an increase in Germany's carbon emissions from electricity.

It should be noted that the 'policy reversal' determinant needs to be considered in conjunction with the determinant for 'policy and legislation', to understand if the lack of reversal is in itself a sign of sound climate policy coherence, or if it is due to the fact that policies are too few and weak to stir any opposition or change. Denmark and Poland are cases in point. Denmark scores high on policy and legislation credibility, and displays no reversal. Poland, on the other hand, has also made no significant policy reversal, but its score on policy and legislation is low, suggesting that the lack of policy reversal is likely related to relatively low policy ambition.

Figure 3.5. Past policy reversal: countries' scores



Scale: 0.00–0.49: 'not supportive' to credibility; 0.50–1.49: 'slightly supportive'; 1.50–2.49: 'moderately supportive'; 2.50–3.49: 'largely supportive'; 3.50–4.00: 'fully supportive'
Source: Authors

Results: Past performance

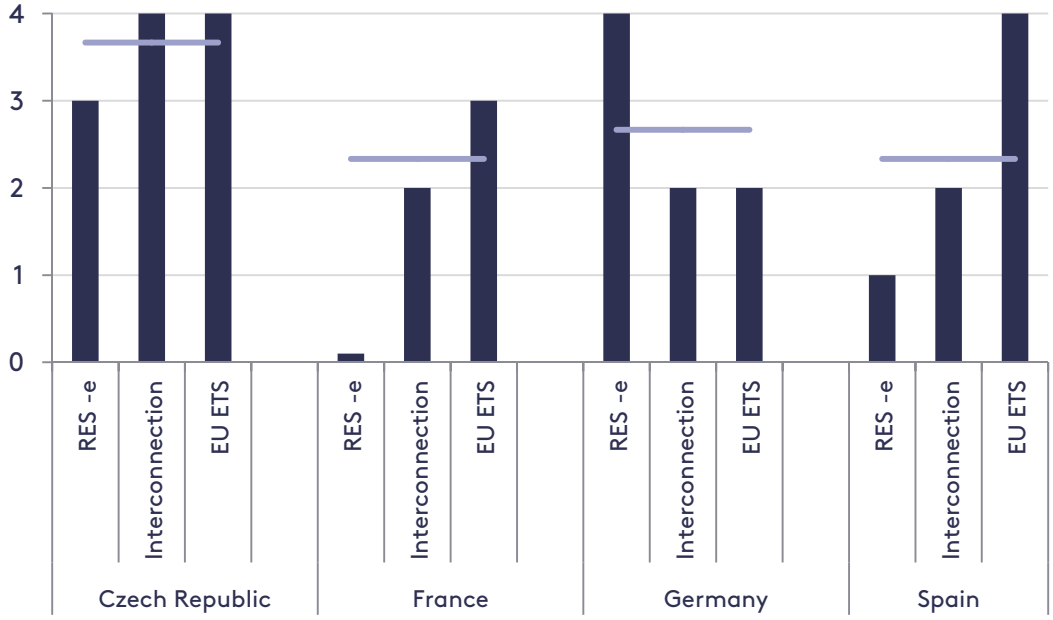
Countries' performance towards existing targets is at least moderately supportive to credibility in all of the member states analysed. Almost all have met their 2013–2015 interim targets for renewables' share in the power sector, and appear on track to meet or exceed the 2020 targets, as set out in their National Renewable Energy Action Plans. The only exceptions are France and Spain, which are expected to miss the 2020 targets. France has also missed its interim targets.

Denmark and the Czech Republic have met the EU target of 10 per cent interconnection by 2020 (the aim for each member state to be able to transport at least 10 per cent of the electricity it produces from its own power plants across its borders to neighbouring countries) (European Commission, 2017c). Other countries, such as France at 8 per cent, are relatively close to the target. Poland is the furthest from meeting it, with interconnection currently at 4 per cent. Poland is also the only country among those analysed whose emissions in the EU ETS are above its allowance for

the third trading period (2013–2020). All the other member states are nearly or well within their allowance.

Overall, Denmark and the Czech Republic have the highest scores in terms of past performance, which is fully supportive to credibility. They are followed by Germany, Italy and the UK (largely supportive), then France, Poland and Spain (moderately supportive). Figure 3.6 shows the score for a sample of relatively high (Czech Republic), medium (Germany) and low (France and Spain) performers on this determinant.

Figure 3.6. Past performance scores: Czech Republic, France, Germany and Spain



Scale: 0.00–0.49: 'not supportive' to credibility; 0.50–1.49: 'slightly supportive'; 1.50–2.49: 'moderately supportive'; 2.50–3.49: 'largely supportive'; 3.50–4.00: 'fully supportive'
Note: Blue horizontal bars represent the average score for the determinant. RES-e = electricity from renewable energy sources. EU ETS = European Union emissions trading system
Source: Authors

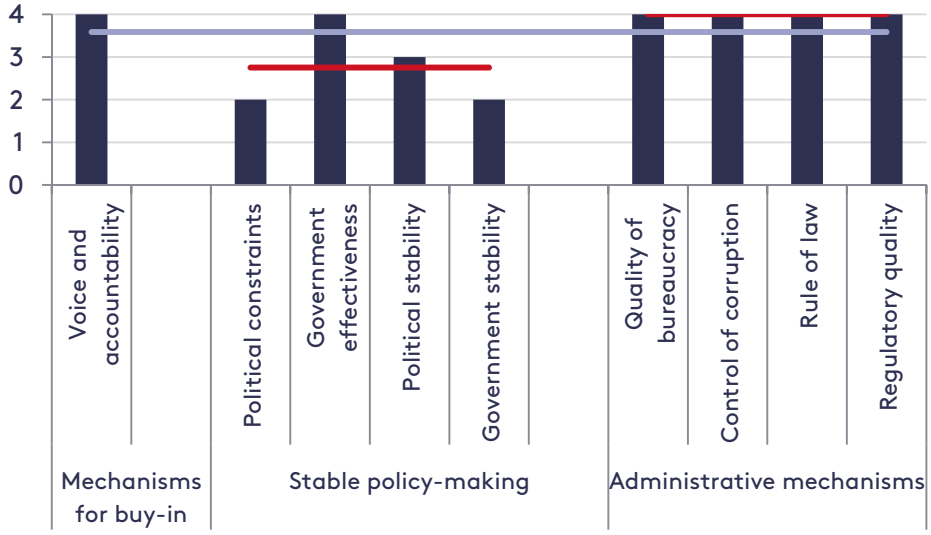
Results: Decision-making process

All the countries analysed appear to have a decision-making process largely supportive of credibility, thanks to well established and functioning institutions, although with slight differences. An example of country scoring, based on data for Denmark, is shown Figure 3.7. In particular, the mechanisms for building buy-in from stakeholders appeared to be fully supportive to credibility in Denmark, and largely supportive to credibility in all the other countries analysed.

The indicators for stable policymaking processes appear largely supportive to credibility in the Czech Republic, Denmark, Germany, Poland and the UK, and moderately supportive to credibility in France, Italy and Spain.

The score for administrative and enforcement mechanisms was generally higher than for the other measures, being fully supportive to credibility in Denmark, Germany and the UK, and largely supportive to credibility in all the other countries.

Figure 3.7. Example of decision-making process score: Denmark



Scale: 0.00–0.49: 'not supportive' to credibility; 0.50–1.49: 'slightly supportive'; 1.50–2.49: 'moderately supportive'; 2.50–3.49: 'largely supportive'; 3.50–4.00: 'fully supportive'
Note: Red horizontal bars represent the average score for the sub-indicators; blue horizontal bars represent the average score for the whole determinant
Source: Authors

Results: Private bodies

The composition of the private sector is largely supportive of credibility in Denmark and France, with a relatively low number of jobs in carbon-intensive sectors (especially in France), a relatively high number of low-carbon jobs (especially in Denmark) and a history of almost no litigation cases hampering climate policy.

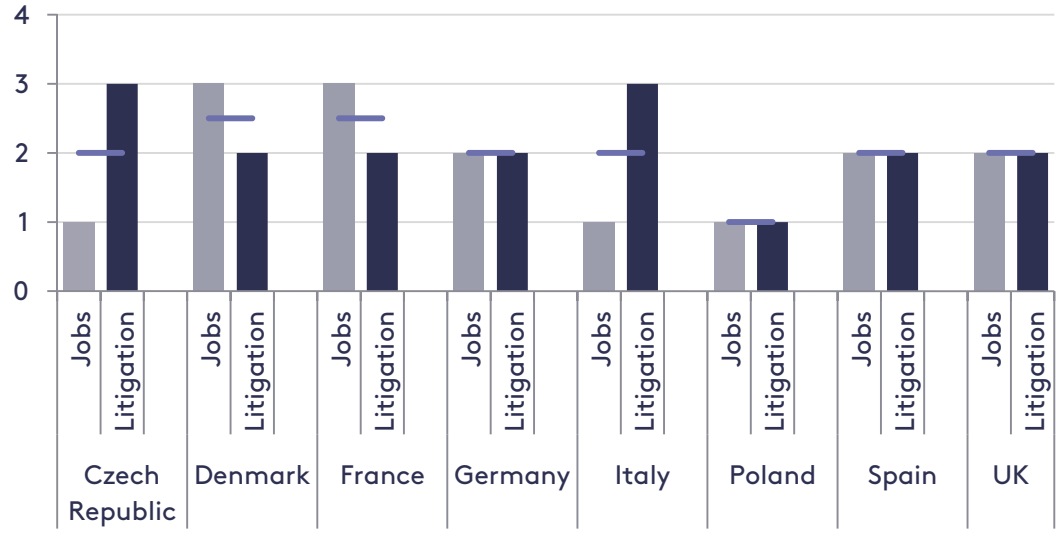
Carbon-intensive sectors are an important source of jobs in particular in the Czech Republic (7 per cent of total jobs), Germany (6.4 per cent), Italy (5.2 per cent) and Poland (4.6 per cent), and this could embolden the lobby power of these groups in those countries. The renewables sector employs fewer people than the carbon-intensive sector across the EU. Among the countries analysed, the largest percentage of jobs in renewables are found in Denmark (1.4 per cent of all jobs), followed by Germany (0.8 per cent).

Countries also display very different attitudes towards private sector litigation. Denmark and France recorded the fewest cases of litigation between 1995 and 2017 (none and three respectively), while Spain and the UK displayed the highest number (32 and 36 respectively), almost equally split between cases that hindered and cases that strengthened climate change policy.

Overall, the score for the private sector is largely supportive to credibility in Denmark and France, and moderately supportive to credibility in all the other countries analysed but Poland, where it is only slightly supportive to credibility. Notably, in Poland the private sector has challenged climate legislation in several court cases.

An overview of the score for the individual indicators of jobs and litigation is shown, for all the countries analysed, in Figure 3.8.

Figure 3.8. Private sector: countries' scores



Scale: 0.00–0.49: 'not supportive' to credibility; 0.50–1.49: 'slightly supportive'; 1.50–2.49: 'moderately supportive'; 2.50–3.49: 'largely supportive'; 3.50–4.00: 'fully supportive'
Note: Blue horizontal bars represent the average score for the indicators
Source: Authors

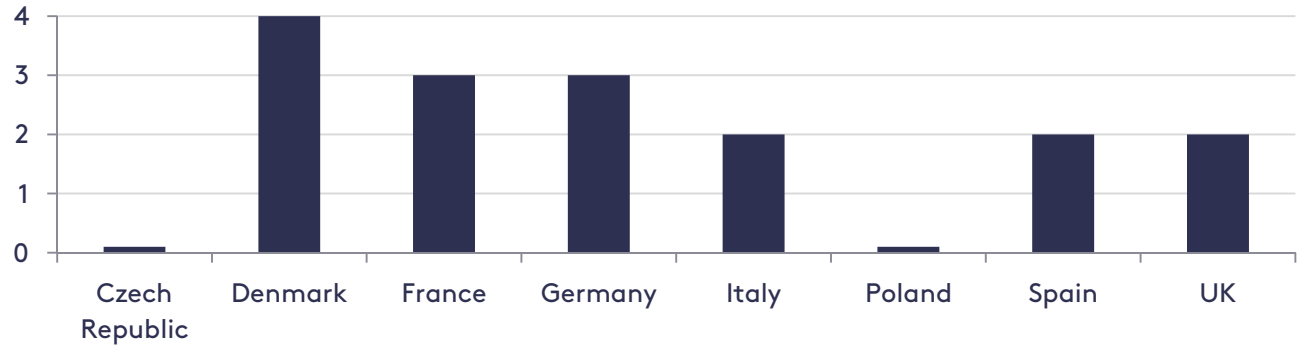
Results: Public opinion

Lastly, there are significant differences in the score for public opinion across the countries analysed, as shown in Figure 3.9.

According to the 2015 Special Eurobarometer survey on climate change (European Commission, 2015b), the majority of Danish citizens consider climate change to be 'the single most serious global problem', and believe policy action (in the form of setting targets) to be very important. Furthermore, of the 13 seats held by Denmark in the European Parliament, one is within the European Green Party, which gives Denmark more than the EU average share of 'green' seats (amounting to 7 per cent of its national seats). Poland and the Czech Republic, by contrast, recorded among the lowest average scores in the Eurobarometer survey's climate-related questions. Furthermore, none of their European Parliament seats are within the European Green Party.

Overall, public opinion appears to be fully supportive to credibility in Denmark, largely supportive in Germany and France, moderately supportive in Italy, Spain and the UK, and not at all supportive to credibility in the Czech Republic or Poland.

Figure 3.9. Public opinion: countries' scores



Scale: 0.00–0.49: 'not supportive' to credibility; 0.50–1.49: 'slightly supportive'; 1.50–2.49: 'moderately supportive'; 2.50–3.49: 'largely supportive'; 3.50–4.00: 'fully supportive'. *Source: Authors*

4. Conclusions

Credibility of political commitments is vital for building trust among investors and the international community, and for helping to increase the ambition of political commitments over time. It is particularly crucial for climate change pledges, including those to decarbonise the power sector, as credibility and mutual trust are essential for the achievement of the common ambition of preventing global temperature from rising by more than 2°C above pre-industrial levels. Furthermore, countries with policies that are perceived as more credible and stable are more likely to attract the private investment and climate finance that will be essential for their successful implementation than those with policies that do not fulfil these criteria (Averchenkova and Bassi, 2016).

Assessing credibility is challenging because it is driven by multiple factors that often interact with and mutually reinforce each other. This analysis has drawn on the collection of various theoretical and empirical studies to identify determinants that are measurable and comparable across countries. However, the credibility of decarbonisation efforts can also be determined by other dynamic factors, such as strong leadership in the face of political inertia, the lack of political consensus on climate change and energy policy across party lines, and the timing of upcoming elections (ibid). These elements are time-bound and can change very rapidly, making them difficult to measure, and it was not possible to capture them in this analysis. They should, however, be taken into account when assessing countries' credibility in more detail.

Policy conclusions for the eight EU member states analysed

All of the member states display some individual weaknesses that will need to be addressed in order to improve their credibility and attract more investment into low-carbon power generation. Denmark, Germany and the UK are the top performers, while Poland and the Czech Republic appear to be those where credibility is least supported. Italy, France and Spain fall in the middle.

Some countries, particularly Poland and, to a lesser extent, Italy and Spain, would benefit from stronger policy and legislation to improve their credibility. This would include improving their long-term vision for power sector decarbonisation by, for instance, introducing additional mandatory targets, and revising the support to low-carbon investment in a more transparent and predictable manner. Poland is also the only country among those analysed that does not have framework legislation on climate change, and would therefore benefit from its introduction. In all the member states, credibility would also be strengthened by a higher price of carbon through the EU ETS (see, for example, Doda and Fankhauser, 2017, on the advantages of carbon pricing over other policies to decarbonise the power sector). Domestic carbon pricing should also be introduced and/or raised in sectors outside the EU ETS, to ensure that emissions are priced consistently across the economy.

Public institutions could also be improved in some countries, particularly Poland and Germany and, to a lesser extent, the Czech Republic, France, Italy and Spain, by joining up climate and energy polices in a single department or establishing a tight coordination mechanism between the two, and ensuring government action is scrutinised by independent or at least inter-parliamentary bodies.

Past policy reversal is another important determinant of policy credibility. Frequent policy reversals are a challenge to the credibility of decarbonising efforts in particular in the Czech Republic and Spain; and, also to a lesser extent, in Germany, Italy and the UK. Sudden and unforeseen changes are particularly damaging for investment, even in those countries that display relatively good policies and legislation (the UK, for instance), as they undermine the trust that those policies will remain consistent in the long run. Planned and transparent mechanisms are therefore required to

allow for policy adjustments without unintended consequences. Germany, for instance, in some of its policies was able to incorporate policy design mechanisms to discover actual technology prices, announced in advance that it would review feed-in tariff rates annually, and limited capacity additions in order not to overburden budgets.

Improving credibility in future policymaking: an opportunity to be seized

Since the ratification of the Paris Agreement, all its signatories, including the EU member states, should be considering next steps to meet the 2030 commitments and prepare for stronger action to curb emissions by 2050. Credible planning and policy certainty are crucial for encouraging investment in low-carbon power generation and preventing carbon-intensive infrastructure from becoming stranded. To make timely investment possible, countries have a window of opportunity between now and 2030 in which to improve the credibility of their commitments. Notably, the forthcoming Integrated National Energy and Climate Plans (NECPs) up to 2030 offer an opportunity for member states to have a much more integrated approach to their energy and climate policies.

This assessment of credibility highlights a number of general lessons that are valid not only for the eight countries here analysed, but also for countries within and outside the EU that share similar characteristics.

Clear policy and firm legislation are key areas in which policymakers can make immediate gains in terms of credibility

Notably, credibility is enhanced by having a coherent high-level vision and integrated long-term planning tools, which can give investors a clear direction of travel. Policymakers can also enhance credibility by introducing or strengthening bespoke low-carbon policy. This would include raising the price of carbon in the EU ETS, removing fossil fuel subsidies and making low-carbon subsidies more predictable, for instance by designing and communicating how subsidies would adjust to changing circumstances. These should be the focus of governments' attention as part of the implementation of their commitments.

Policymakers can further strengthen credibility by improving joined-up thinking and scrutiny of decision-making bodies

Notably, dealing with climate change and energy within the same government department could stimulate a higher level of joined-up thinking on decarbonising the power sector. In addition, setting inter-parliamentary or, ideally, independent bodies that monitor government action on decarbonisation would further reinforce credibility.

Commitment devices may be required to ensure policy consistency over time

This is because frequent and/or sudden policy reversal is particularly damaging to credibility, especially when it affects the basis on which investors found their business case. Changes to legislation are not necessarily damaging in themselves, and can in some cases even be desirable, for example to account for changes in economic circumstances or a fall in technology costs. However, clear adjustment mechanisms should be planned for and announced in advance.

Dialogue and consultations, together with tailored policy design, should be pursued to generate policy buy-in from the private sector and the general public

This is important as credibility hinges on the support and buy-in of stakeholders, crucial particularly in those countries where climate change policy needs greater reform. Establishing or reinforcing a constructive dialogue and consultation with citizens and stakeholders could help governments to overcome opposition and build trust in climate change action. Policy can also be designed in a way

that can win over opposition or distrust from the general public (see, for example, the discussion on carbon taxation in Carattini et al., 2017).

For a complete analysis of member states' climate change efforts, the European Commission should consider these insights on credibility together with analyses of policy ambition and feasibility. It is hoped that this report's exploration of credibility will help complement the European Commission's assessment of the adequacy of member states' actions, in particular in the context of their Integrated National Energy and Climate Plans.

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Appendix 1. Scoring system

The tables below summarise the scoring system used for the credibility assessment.

Table A.1.1. LEGISLATION AND POLICY: Coherent and comprehensive legislative and policy basis

High-level vision: climate change framework legislation and targets

	Yes	No
Framework legislation	Fully supportive	Not supportive

Source: Grantham Research Institute on Climate Change and the Environment and Sabin Centre for Climate Change Law (2017)

		Renewable energy sources for electricity target (RES-e)			
		Short term (up to 2020)	Medium term (up to 2030)	Long term (up to 2050) low ambition (<80% RES) or informal	Long term (up to 2050) high ambition (>80% RES)
GHG target	Short term (up to 2020)	Not supportive	Slightly supportive	Slightly supportive	Moderately supportive
	Medium term (up to 2030)	Slightly supportive	Moderately supportive	Moderately supportive	Largely supportive
	Long term (up to 2050) low ambition (<80% decrease) or informal	Slightly supportive	Moderately supportive	Moderately supportive	Fully supportive
	Long term (up to 2050) high ambition (>80% decrease)	Moderately supportive	Largely supportive	Fully supportive	Fully supportive

Source: Grantham Research Institute on Climate Change and the Environment and Sabin Centre for Climate Change Law (2017); ICF and Ecologic (2015); International Energy Agency (2017b); IRENA (2013)

Policies supporting low carbon generation: carbon pricing and energy subsidies

			Barrier: Fossil fuel subsidies	
			Above EU average (>0.14% GDP)	Below or equal to EU average (<= 0.14% GDP)
Carbon pricing	EU ETS only		Not supportive	Slightly supportive
	Carbon tax	Low (<€10/t CO_2)	Slightly supportive	Moderately supportive
		Medium (€10-€20/tCO_2)	Moderately supportive	Largely supportive
		High (>€20/tCO_2)	Largely supportive	Fully supportive

Source: OECD (2017); World Bank et al. (2016)

			Weighted average cost of capital (WACC)	
			>= EU average (8.4%)	< EU average (8.4%)
Low carbon subsidies / GDP (2008-2012)	Variance > EU average (70)*	Share < = EU average (0.28%)	Not supportive	Slightly supportive
		Share > EU average (0.28%)	Slightly supportive	Moderately supportive
	Variance <= EU average (70)*	Share < = EU average (0.28%)	Moderately supportive	Largely supportive
		Share > EU average (0.28%)	Largely supportive	Fully supportive

*approximately equal to EU average +- 10%; Czech Republic and Spain variance for 2008-2012 is below the EU average, however they have been considered as above average because of sudden changes in subsidy levels that followed policy reversals introduced after 2012, which could not be captured by the data series used here.
Source: Alberici et al. (2014); Ecofys, 2016

Table A.1.2. PUBLIC BODIES: Dedicated climate change public bodies

Climate change bodies

		Consultative body		
		None	Non-independent	Independent
Dedicated climate change body	None	Not supportive	Slightly supportive	Moderately supportive
	Not joined up with energy	Slightly supportive	Moderately supportive	Largely supportive
	Joined up with energy	Moderately supportive	Largely supportive	Fully supportive

Source: Grantham Research Institute on Climate Change and the Environment and Sabin Centre for Climate Change Law (2017); International Energy Agency (2017a)

Table A.1.3. POLICY REVERSAL: No history of policy abolition/reversal

		Type of policy reversal		
		Framework change?		
		Yes	No	
			At least one (permanent) abolition	Only retrospective or temporary abolition
Number of low-carbon technologies/sectors affected	2 or more	Not supportive	Slightly supportive	Moderately supportive
	1	Not supportive	Moderately supportive	Largely supportive
	0	Not supportive	Fully supportive	Fully supportive

Source: Bloomberg (2016); EUROFORES (2013); Fouquet and Nytsen (2015); Grantham Research Institute on Climate Change and the Environment and Sabin Centre for Climate Change Law (2017); International Energy Agency (2017a); RES Legal Europe (2017); Renewable Energy Focus (2011); United Nations Development Programme (2014); Vorwenk (2002)

Table A.1.4. PAST PERFORMANCE: Track record of delivering on commitments
Performance towards renewable energy targets for power sector

		Performance 2013-2015 interim targets		
		Missed	Met (+-5%)	Exceeded (>5%)
Performance towards 2020 target	Likely to miss	Not supportive	Slightly supportive	Moderately supportive
	Likely to meet (+-5%)	Slightly supportive	Moderately supportive	Largely supportive
	Likely to exceed (>5%)	Moderately supportive	Largely supportive	Fully supportive

Source: Eurostat (2015)

Performance towards interconnection

	<2.5%	2.5 to 4.9%	5% to 7.4%	7.5% to 10%	>10%
Performance towards 2020 target (10%)	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: European Commission (2017c)

Performance in EU emissions trading system

	Above allowance	Equal to allowance (+-2%)	Below allowance
Level of emissions before trading	Not supportive	Moderately supportive	Fully supportive

Source: European Environment Agency (2017)

Table A.1.5. PROCESS: Transparent, inclusive and effective decision-making process with sufficient political constraints to limit policy reversal

Mechanism for building buy-in from stakeholders

	-2.50 to -1.51	-1.50 to -0.51	-0.50 to +0.50	+0.51 to +1.50	+1.51 to +2.50
Voice and accountability	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: World Bank (2016)

Stable, consistent and not easily reversible law and policymaking process

This is an average of the following indicators:

	0.00 to 0.20	0.21 to 0.40	0.41 to 0.60	0.61 to 0.80	0.81 to 1.00
Political constraints	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: University of Pennsylvania (2017)

	-2.50 to -1.51	-1.50 to -0.51	-0.50 to +0.50	+0.51 to +1.50	+1.51 to +2.50
Government effectiveness	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: World Bank (2016)

	-2.50 to -1.51	-1.50 to -0.51	-0.50 to +0.50	+0.51 to +1.50	+1.51 to +2.50
Political stability and absence of violence/ terrorism	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: World Bank (2016)

	0 (high risk) to 2.3	2.4 to 4.7	4.8 to 7.1	7.2 to 9.5	9.6 to 12 (low risk)
Government stability	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: PRS Group (2016)

Transparent, consistent and effective administrative and enforcement mechanisms

	0 to 0.79	0.80 to 1.59	1.60 to 2.39	2.40 to 3.19	3.20 to 4.00
Quality of the bureaucracy	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: PRS Group (2016)

	-2.50 to -1.51	-1.50 to -0.51	-0.50 to +0.50	+0.51 to +1.50	+1.51 to +2.50
Control of corruption	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: World Bank (2016)

	-2.50 to -1.51	-1.50 to -0.51	-0.50 to +0.50	+0.51 to +1.50	+1.51 to +2.50
Rule of law	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: World Bank (2016)

	-2.50 to -1.51	-1.50 to -0.51	-0.50 to +0.50	+0.51 to +1.50	+1.51 to +2.50
Regulatory quality	Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Source: World Bank (2016)

Table A.1.6. PRIVATE SECTOR: Supportive private bodies

Private sector weight on the economy

		Low-carbon sectors		
	Jobs/Labour force	Below 0.20% (30% EU percentile)	0.21% to 0.69%	Above 0.70% (70% EU percentile)
Carbon-intensive sectors	Above 4.50 (70% EU percentile)	Not supportive	Slightly supportive	Moderately supportive
	0.31% to 4.49%	Slightly supportive	Moderately supportive	Largely supportive
	Below 3.00% (30% EU percentile)	Moderately supportive	Largely supportive	Fully supportive

Source: Eurostat (2017); IRENA (2016); UK Data Services (2017); World Bank (2017b)

Litigation

	No. of cases	Strengthening climate policy		
		Fewer than 3	3 to 10	More than 10
Hindering climate policy	More than 10	Not supportive	Slightly supportive	Moderately supportive
	3 to 10	Slightly supportive	Moderately supportive	Largely supportive
	Fewer than 3	Moderately supportive	Largely supportive	Fully supportive

Source: Court of Justice of the European Union (2017); Energy Charter (2017); Grantham Research Institute on Climate Change and the Environment and Sabin Centre for Climate Change Law (2017); Tirado (2015)

Table A.1.7. PUBLIC OPINION: citizens' support for climate action (opinion)

		Public opinion on climate change and policy action		
		Below 2.9 (EU average)	2.9 to 3.3	Above 3.3 (90th percentile)
% Green party seats in EU Parliament	No seats	Not supportive	Slightly supportive	Moderately supportive
	At least one seat, equal to or below EU average (6.9%)	Slightly supportive	Moderately supportive	Largely supportive
	Above EU average (6.9%)	Moderately supportive	Largely supportive	Fully supportive

Source: European Commission, 2015b

Appendix 2. Country scoring: summary table

Table A2.1. Detailed country scoring

Key:

0-1	1-2	2-3	3-4	4-5
Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Determinants and sub-indicators	EU	Czech Republic	Denmark	France	Germany
1. Legislation and policy					
Low-carbon support policies					
High-level vision					
2. Public bodies					
Joined-up and accountable climate and energy bodies					
3. Policy reversal					
Abolition of climate change legislation for power sector					
4. Past performance					
Performance towards RE targets for power sector					
Performance towards interconnection					
Performance in EU ETS					
5. Decision-making process					
Mechanisms for buy-in					
Stable, consistent and not-easily reversible process					
Transparent, consistent and effective mechanisms					
6. Private sector					
Supportive private sector					
7. Public opinion					
Supportive public opinion					

Table A2.1. Detailed country scoring (continued)

Key

0-1	1-2	2-3	3-4	4-5
Not supportive	Slightly supportive	Moderately supportive	Largely supportive	Fully supportive

Determinants and sub-indicators	Italy	Poland	Spain	UK
1. Legislation and policy				
High-level vision				
Low-carbon support policies				
2. Public bodies				
Joined-up and accountable climate and energy bodies				
3. Policy reversal				
Abolition of climate change legislation for power sector				
4. Past performance				
Performance towards RE targets for power sector				
Performance towards interconnection				
Performance in EU ETS				
5. Decision-making process				
Mechanisms for buy-in				
Stable, consistent and not-easily reversible process				
Transparent, consistent and effective mechanisms				
6. Private sector				
Supportive private sector				
7. Public opinion				
Supportive public opinion				

Appendix 3. Updating the methodology for the European Union: comparison with the framework used for the G20's INDC

The credibility framework adopted in this study builds on the methodology developed by Averchenkova and Bassi (2016). That framework was created to assess the political credibility of pledges made by the G20 countries in their intended nationally determined contributions (INDCs) for reductions in greenhouse gas emissions, which were submitted ahead of the 21st Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change (UNFCCC), and led to the Paris Agreement.

The two policy contexts – the G20 INDC and the European Union's efforts to decarbonise electricity – differ widely in scope, governance structure and data availability. Adapting the credibility framework to EU countries, therefore, required some adjustments.

First, the INDC assessment has a broad scope, encompassing climate mitigation and adaptation measures. The analysis by Averchenkova and Bassi focused on mitigation only, but the methodology was meant to be applicable to adaptation too. The analysis of the EU power sector required indicators with narrower focus, wherever possible. For example, it looked at renewables targets and subsidies targeting the power sector specifically.

Second, the governance structure that underlines how sovereign states commit to undertake climate action under the Paris Agreement is different from that for the EU climate and energy framework. The Paris Agreement takes a bottom-up approach with countries submitting their own self-determined plans to meet the overall global target. The EU 2030 targets reflect both a top-down and bottom-up approach between EU institutions and member states to meet common targets. Therefore, the difference in the governance structures of the Paris Agreement and decarbonisation policies for the EU electricity sector reflects differences in how power is exercised between the respective supranational authorities handling these agreements – that is, the UNFCCC and EU institutions – and the participating sovereign states. Notably, EU member states generally have a common approach to international climate change policy, which made the determinant on 'international engagement' redundant.

Third, more comparable data is available for the EU members than for the G20 countries, thanks to the existence of centralised databases and a relatively large number of comparative analyses. The indicators of credibility could therefore be built on slightly larger and more detailed datasets. For example, the analysis on low-carbon policies was able to account for the different levels of carbon pricing adopted by the countries analysed, as well as the level and variance of support for low-carbon subsidies. The adjustments made to the methodology in this paper were made to take into account these differences. A comparison between the two frameworks and the data used for the assessment of the G20 and the European Union member states is shown in Table A3.1 below.

Table A3.1. Methodological framework and data used for credibility assessment of the G20 countries and European Union member states

	Determinants	Indicators	Data used for assessment of G20 intended nationally determined contributions (INDCs)	Data used for assessment of EU efforts to decarbonise power sector
1	**Legislation and policy:** Coherent and comprehensive legislative and policy basis	High-level vision	- Mitigation framework legislation - Economy-wide greenhouse gas targets: time horizon and legislative strength	- Mitigation framework legislation - Economy-wide greenhouse gas targets: time horizon - Renewables targets for the power sector: time horizon
		Low-carbon policies	- Existence of carbon pricing - Existence of sectoral policies - Size of fossil fuel subsidies	- Existence and level of carbon pricing -Size of fossil fuel subsidies - Size of low-carbon electricity subsidies and variance - Weighted average cost of capital (WACC) of renewable investment
2	**Public bodies:** Dedicated public bodies supported by consultative mechanisms	Public bodies	- Dedicated climate change bodies - Consultative bodies	- Dedicated climate change bodies joined up with energy bodies - Consultative bodies
3	**Policy reversal:** No history of policy abolition	Abolition of climate change legislation	- Abolition of key climate change legislation	- Unexpected revision or abolition of climate change legislation for power sector inconsistent with decarbonisation objectives
4	**Past performance:** Track record of delivering on past climate change commitments	Achievement of UNFCCC mitigation requirements	- Ratification of Kyoto Protocol - Performance: meeting of targets (for Annex B countries) or submission of National Communications (NC) and Biennial Update Reports (BURs)	- Past performance towards renewable generation targets for power sector - Performance towards interconnection - Performance towards emissions abatement in EU emissions trading system

	Determinants	Indicators	Data used for assessment of G20 intended nationally determined contributions (INDCs)	Data used for assessment of EU efforts to decarbonise power sector
5	**Processes:** Transparent, inclusive and effective decision-making processes with sufficient political constraints to limit policy reversal	Mechanism for building buy-in from stakeholders	- INDC consultation - Voice and accountability index	- Voice and accountability index
		Stable, consistent and not easily reversible law and policy-making process	- Political constraints index	- Political constraints index - Government effectiveness - Political stability and absence of violence/terrorism - Government stability
		Transparent, consistent and effective administrative and enforcement mechanisms	- Number of national communications or inventories - Bureaucracy quality - Corruption Perceptions index - Law and Order index - International Property Rights index	- Bureaucracy quality - Corruption Perceptions index - Rule of law - Regulatory quality
6	**Private bodies:** Supportive private bodies	Private bodies	- Carbon lobby (value added) - Environment lobby (number of International Union for Conservation of Nature bodies)	- Jobs in carbon-intensive sectors - Jobs in low-carbon sectors - Litigation cases
7	**Public opinion:** Climate-aware public opinion	Public opinion	- Awareness of climate change - Climate change rated serious - Acceptance of climate change being caused by human activity	- Perception of climate change (importance and seriousness) - Support to climate action (renewables and energy efficiency targets) - Political support (green party seats in EU Parliament)
8	**International engagement:** History of active international engagement on environmental issues	Commitment to UNFCCC initiatives	- Number of UNFCCC agreements or accords signed/ committed to - Number withdrawn	Not relevant for EU member states (joint approach to UNFCCC)
		Participation in Multilateral Environmental Agreements (MEAs)	- Number of MEAs ratified - Number of MEAs withdrawn	Not relevant for EU member states (joint approach to MEAs)