

# FROM ROADMAPS TO REALITY

A FRAMEWORK FOR POWER SECTOR  
DECARBONISATION IN EUROPE



A CONTRIBUTING STUDY TO ROADMAP 2050: A PRACTICAL GUIDE TO A PROSPEROUS, LOW CARBON EUROPE



# P R E F A C E

*From Roadmaps to Reality* is the latest report in the European Climate Foundation's larger Roadmap 2050 Project. That project so far produced two studies of a technical nature, *Roadmap 2050: a practical guide to a prosperous, low-carbon Europe (2010)* and *Power Perspectives 2030: on the road to a decarbonised power sector (2011)*<sup>1</sup>.

The first report, *Roadmap 2050*, provides a practical, independent and objective analysis of pathways to achieve a low-carbon economy in Europe, in line with the energy security, environmental and economic goals of the European Union. The second report, *Power Perspectives 2030*, describes the challenges and potential solutions facing the transition to a fully decarbonised power sector from a technical point of view.

*From Roadmaps To Reality* is of a different nature. Unlike the previous studies, this report is not a quantitative technical analysis but a qualitative analysis of the current legal, policy and governance framework in the EU. Hence, it follows the shift in the debate in Europe from long-term scenario modelling to a conversation on real-world implementation challenges and policy frameworks.

For reasons of consistency and continuity, *From Roadmaps To Reality* refers primarily to the framing assumptions and analytical findings of the prior two ECF studies. Still, most of these studies' conclusions are echoed in the other roadmap exercises, despite their differences in scope, assumptions and analytical models used<sup>2</sup>:

1. Full decarbonisation of the power sector is a prerequisite for reaching the EU's 80-95% emission reduction economy-wide<sup>3</sup>.
2. The system cost of electricity can be maintained at comparable levels over the next decades, with or without decarbonisation, but a substantial increase in upfront investments (Capex) is needed to benefit from reduced operational cost (Opex) later.
3. Decarbonisation can enhance growth and security over the long term. While the rise in consumption of electricity is similar to Business-As-Usual (BAU), due to extensive electrification of heat and transport, the overall cost of energy per unit of Gross Domestic Product (GDP) in the decarbonised pathways declines substantially (20–30%) over the period relative to BAU, due primarily to greater energy efficiency in general and, in particular, efficiency gains associated with electrification.
4. Given the expectation of increased demand for electricity in the heat and transport sectors, it is critical to reap the full potential for cost-effective energy efficiency.
5. Continued build-out of a large portfolio of renewable technologies beyond 2020 is critical in every decarbonisation scenario. Focus on innovation and driving learning rates are important parts of the post-2020 decarbonisation agenda.
6. Cross-border cooperation, integrating markets and sharing of resources can significantly reduce the overall costs of the power sector transition.

<sup>1</sup> See Annex 1 for a more detailed overview of the key assumptions, modeling and conclusions of ECF's *Roadmap 2050* and *Power Perspectives 2030* work.  
<sup>2</sup> See Annex 2 for a more detailed overview of third party roadmap reports. The reports considered are the European Commission Low-carbon economy Roadmap 2050 and Energy Roadmap 2050; Eurelectric Power Choices and Power Choices Reloaded; and Greenpeace [R]evolution.  
<sup>3</sup> The prior analyses did not actually achieve 100% decarbonization; a *de minimis* level of emissions (<2% of 1990 levels) remained in 2050.

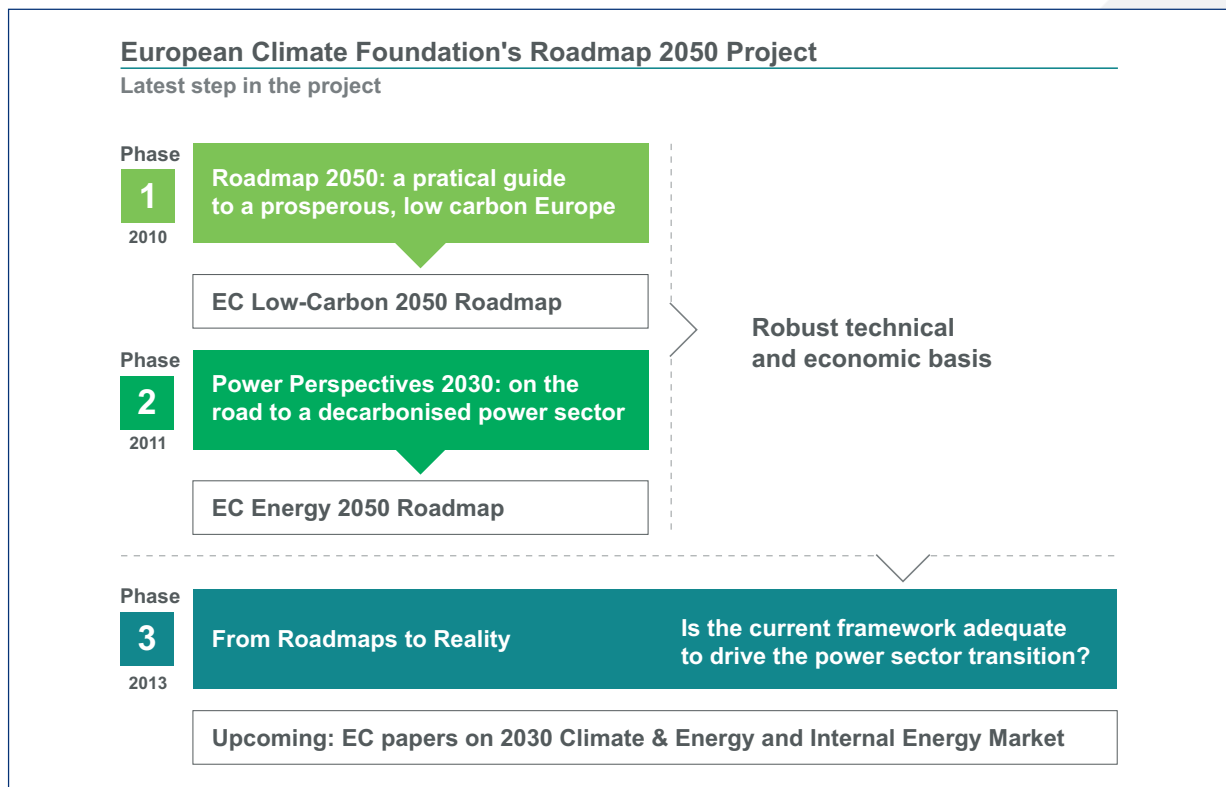
7. As the share of variable renewable supply grows, flexible conventional generation, demand response (including distributed end-use energy storage devices) and transmission infrastructure are the most cost-effective levers to balance the power system. Beyond 2020, transmission capacity across the EU has to double compared to today.
8. It is essential to make use of the time available. Implementation of new policies and regulations, orderly construction of new infrastructure, and a smooth build up of technology supply chains requires the full period about forty years. Delaying the transition will double the investment requirements in the 2020-2030 timeframe and increase overall cost.

ECF's Roadmap reports, as with the European Commission's and other roadmap studies, were designed to explore pathways towards achieving the

EU's 2050 decarbonisation objectives<sup>4</sup>. In turning these roadmaps into reality, the challenge lies with governments to establish a policy, legal and governance framework that allows decarbonisation trajectories to become self-sustainable in the market while continuing to ensure affordable and secure supplies of electricity.

The decarbonisation objective may well be the most vulnerable of the three pillars of energy policy since it lacks the immediacy of impact on society that security of supply or competitiveness issues can have, and it is more recently established and arguably less securely enshrined in the rule of law than other energy policy objectives.

This report, therefore, looks at whether the current EU framework and direction of travel is adequate to drive a secure and affordable transition to a decarbonized power sector. Where it is not, the report examines solutions to tackle the identified challenges.



<sup>4</sup> European Council conclusions October 2009 set the objective to reduce domestic GHG emissions of 80-95% by 2050

The objective of this report is to define a framework that enables governments in the EU to establish and stick to interim decarbonisation targets consistent with achieving the 2050 target.

The report is not starting from a blank sheet of paper. Climate and energy law and policy has been the subject of intense activity at both EU and national levels in recent decades. In particular, the introduction of liberalised and competitive markets along with the requirement to reduce carbon emissions has created a complex tapestry of measures. The report starts from this reality and looks at how policy, legal and governance arrangements can be improved to meet upcoming challenges.

In the first chapter, the report describes the key features of the current EU framework and analyses its adequacy in relation to delivering the decarbonisation objective. In the second chapter, the report looks at the solutions at hand to tackle the identified challenges. In the third chapter the report examines how these solutions can be brought together in a more robust EU framework on climate and energy.

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Given the widely shared conclusion that early decarbonisation of the power sector is achievable and plays a central role in the decarbonisation of the wider economy, this report has the electricity sector at its core. Therefore, it can only bring a power-sector specific perspective on economy-wide instruments such as the EU ETS and the 2030 Climate & Energy package.

In addition, the report cannot explore in detail all aspects relevant to the power sector transition. The report, for example, provides a limited perspective on the interplay with gas, heat and transport sectors, or the role of distribution-level systems.

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# ACKNOWLEDGEMENTS

*From Roadmaps To Reality* was developed by a consortium of authors from ECF, E3G, RAP and ClientEarth<sup>5</sup>, in close consultation with a large group of stakeholders and academic experts. This group of stakeholders, called the Core Working Group (CWG), consists of a wide range of utility companies, transmission system operators, technology manufacturers, energy companies and NGOs. In addition, a panel of experts has advised the process with latest academic thinking on the relevant topics.

The willingness of the organisations in the CWG and academic panel to consult and be consulted has been of critical importance and ensures the report reflects a broader perspective on the topics at stake. The proposals in this report, therefore, present a series of ideas that have been broadly tested and challenged in expert seminars. At the same time, it is important to underline that the report presents the conclusions drawn by the authors from ECF, E3G, RAP and ClientEarth and that the responsibility for the content rests solely with these organisations. The CWG representatives and the academic panel have shared their views and contributed material but have not necessarily committed to support the conclusions drawn or take responsibility for the content.

The ECF wishes to thank the members of the CWG and academic experts for participating to the seminars and for having provided feedback throughout the development of this report. The Core Working Group: Acciona; ABB; Agora Energiewende; Birdlife Europe; COGEN Europe; Dong Energy; Elia; Eneco; Friends of the Earth; Friends of the Supergrid; General Electric (GE); Iberdrola; Red Electrica de Espana (REE); Schneider Electric; SAP; Scottish &

Southern Energy (SSE); Siemens; Statkraft; Terna; WWF. The academic panel: Prof. Dr. Christian Von Hirschhausen, Technische Universität Berlin; Jacques de Jong, Clingendael International Energy Programme; Prof. Dr. Michael Grubb, Cambridge University; Christina Hood, International Energy Agency (IEA); Sami Andoura, Notre Europe – Jacques Delors Institute; Dr. Goran Strbac, Imperial College London; Dr. Georg Zachmann, Bruegel

Representatives of the European Commission, notably from Directorate General for Energy and Directorate-General for Climate Action, have been updated on a regular basis and have provided guidance regarding objectives, approach and emerging thinking throughout the process.

The process leading to this report started in July 2012. After three seminars in the period up to December 2012 to scope out the work, the consortium of authors started an iterative drafting process during spring and summer 2013 supported by three more seminars. This extensive process has enabled the consortium of authors to reach a strong set of qualitative conclusions about the policy landscape and the choices that need to be made at EU and Member State levels.

The report is funded entirely by ECF, which itself is funded solely from private philanthropic organizations<sup>6</sup>. ECF does not have financial ties to EU political bodies or to businesses.

<sup>5</sup> Client Earth is a new addition to the consortium of authors that developed the previous report in the ECF Roadmap 2050 project. As a legal consultancy, ClientEarth has provided valuable input on the legal and governance dimensions contemplated in this report. More information about ClientEarth and the work they do can be accessed at <http://www.clientearth.org/>

<sup>6</sup> ECF's funding sources is set out on its website, [www.europeanclimate.org](http://www.europeanclimate.org)

## EXECUTIVE SUMMARY

The many 2050 energy roadmaps, published over recent years, all share one conclusion: the transition towards a decarbonised economy in Europe requires a fundamental transformation of the power sector.

The challenge to policy makers is therefore to establish a framework that drives this transformation, and enables governments to remain on track to achieving the 2050 decarbonisation objective in a secure and affordable manner. That leads to the central question in this report: is the European energy framework as currently designed and implemented adequate to drive the power sector transition in the next decades? And to the extent it is not, what needs to be improved?

The central architecture of the EU energy framework is comprised of on the one hand, a commitment towards market liberalisation backed up by several Energy Packages, and on the other hand, an EU-wide Emissions Trading Scheme (EU ETS) intended to internalise the costs of carbon emissions. In other words, the core EU framework projects a market vision that relies on price signals in an integrated, competitive energy market.

The report finds that, given the huge cost saving and risk management potential from an integrated European market approach, this market vision should be maintained. Indeed, various scenario analysis have demonstrated considerable cost savings from cross-border resource sharing across Europe<sup>7</sup>. The recently released report from Booz & Co prepared for the European Commission suggests a net system benefit of between €12.5bn and €40bn per year by 2030 from integrating energy markets. ECF's Power Perspectives 2030 analysis calculated potential savings from optimal resource sharing of up to €426bn in the 2020-2030 timeframe.

However, the report also finds that the market vision and related cost savings will not materialise without concrete

action to make the integrated market function properly. First and foremost, weak Member State compliance in the context of the internal energy market is undermining the regulatory conditions necessary to stimulate investment and political trust in the internal energy market project. But in addition to that, policy makers should take action to further drive adequate infrastructure, activate the demand side, regionalise system operation, and steer investment from high to low carbon assets. In the meantime, and until the core EU framework is seen to be delivering as intended, interventions will remain an essential feature of the policy landscape, in particular with regard to support for renewable technologies, energy efficiency and resource adequacy.

The challenge for EU policy is, therefore, to seek to capture the benefits of increased market integration whilst allowing the prudent and, where possible, coordinated use of administered interventions to achieve well-defined goals. However, due to limitations in current EU governance structures it is far more difficult to introduce significant administered interventions across the entire EU than it is in an individual Member State. Therefore, such interventions risk creating a patchwork of national policy measures that undermine market integration and negate the related cost savings and risk mitigation potential.

This report proposes a suite of measures to address these challenges outlined in the key recommendations below. Although none of the measures proposed require a fundamental revision of the EU's constitutional competence on energy as laid out in the Treaty, they do reflect a need for more effective governance and institutional arrangements.

Where governance structures on the EU level are inadequate and it is not realistic to expect an immediate step-change in competences from national to European

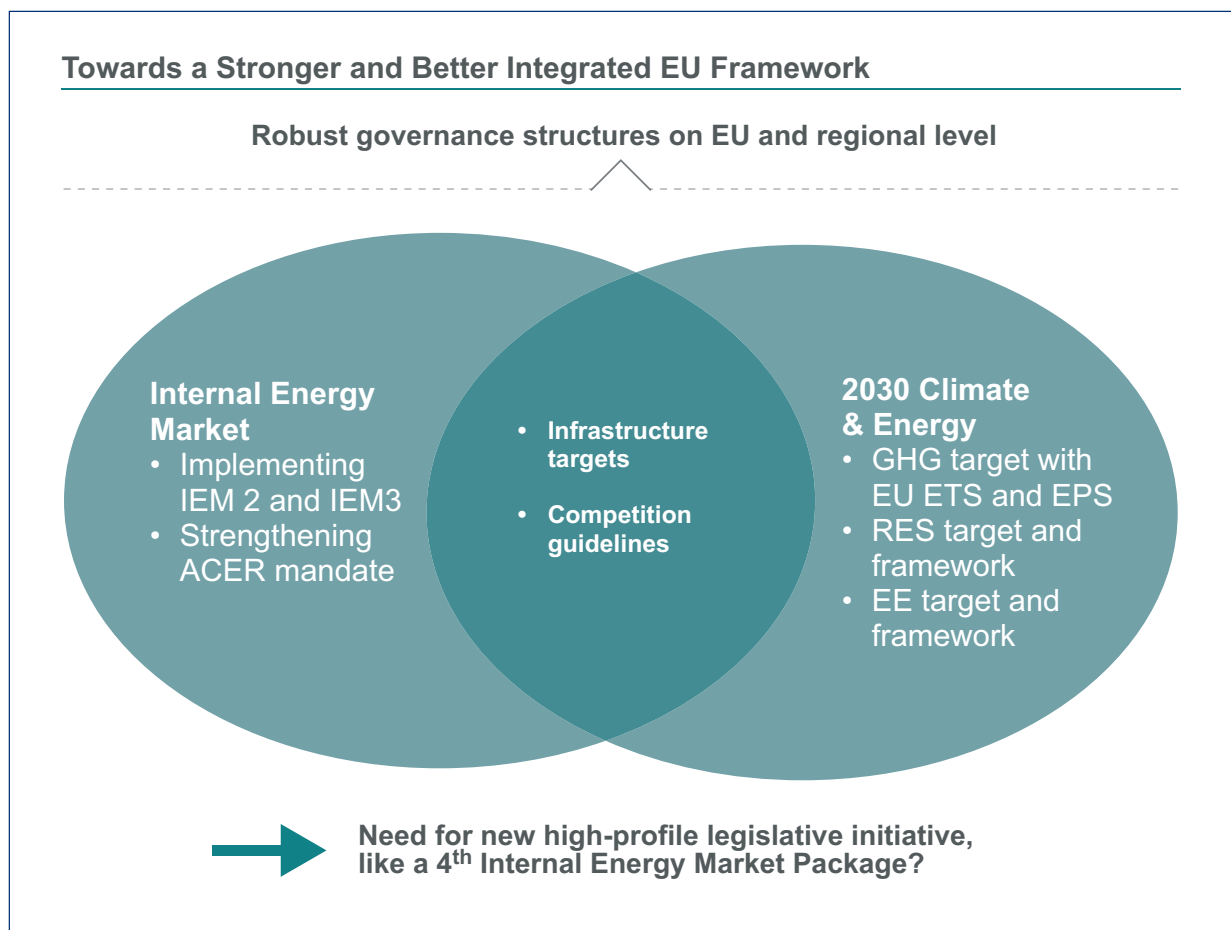
<sup>7</sup> The recently released report from Booz & Co prepared for the European Comm suggests a net system benefit of between €12.5bn and €40bn per year by 2030 from integrating energy markets. ECF's Power Perspectives 2030 analysis calculated potential savings from optimal resource sharing of up to €426bn in the 2020-2030 timeframe.



level, initiatives at a regional level provide a feasible 'stepping stone' towards wider European market integration. It is particularly relevant to look at the Regional Groups, already established in the Energy Infrastructure Regulations, and ACER, the EU umbrella group of national regulators, to shape and formalise regional cooperation initiatives.

To ensure consistency between market regimes, governance frameworks, climate targets and infrastructure policies, a new high-profile legislative initiative (for example, a 4<sup>th</sup> Internal Energy Market Package) should be considered to bring together power market reforms and decarbonisation policies in a new, robust EU energy framework.

The emerging debate on a 2030 Climate & Energy framework offers an attractive context for this discussion to take place. EU governments should take a fresh look at EU energy policy and work towards a stronger EU energy framework that aligns market liberalisation and decarbonisation objectives, links targets to delivery mechanisms and establishes robust and truly independent governance structures. The timeframe between now and 2015 provides a unique window of opportunity to establish a more integrated and strengthened common EU strategy on climate and energy issues.





# OVERVIEW OF KEY RECOMMENDATIONS

Given that the principal focus of this report is on the power sector, the report only brings a partial perspective on economy-wide policy initiatives like the EU ETS, the 2030 Climate & Energy package and the related debate on high-level targets. Still, several of the key recommendations in the report are relevant to this and other legislative initiatives.

## *Ensuring Effective Implementation & Enforcement of Core EU Energy Framework*

1. It is essential that Member States deliver improved compliance with the obligation to ensure timely and complete compliance with the EU IEM regime; the EU Commission must demonstrate a greater commitment to timely enforcement of the rule of EU energy law, including a willingness to seek the imposition of fines.

## *Building adequate infrastructure:*

2. The European Commission should propose updated European infrastructure targets in the 2030 Climate & Energy package;
3. The Agency for Cooperation of Energy Regulators (ACER) and National Regulators Authorities (NRAs) should establish new cost-recovery mechanisms for Transmission System operators (TSOs) for cross-border projects and set financial incentives for TSOs to deliver agreed network plans;

## *Activating demand side*

4. The European Commission should strengthen the mandate for National Regulatory Authorities to deliver demand response; National Regulating Authorities (NRAs) should open all markets to

innovative aggregators of demand-side resources, including distributed end-use energy storage services.

## *Regionalising system operation*

5. NRAs should sharpen the quality and transparency of intra-day energy and balancing services market prices;
6. ACER should ensure that system-balancing solutions are optimised regionally rather than on a country-by-country basis, based on the physical constraints of the power grid instead of national borders.

## *Steering investments from high to low carbon resources*

7. The European Commission should propose an ambitious and clear GHG emissions cap for 2030, delivered by the EU ETS, as part of the 2030 Climate & Energy package. For the power sector, a plant-based Emissions Performance Standard (EPS) could be an attractive supportive measure to reinforce political commitment to the decarbonisation objective and ensure timely disinvestment from high carbon assets.

## *Coordinating support for renewable technologies*

8. The European Commission should ensure a stable framework for Renewable Energy Sources (RES) as part of the 2030 Climate & Energy Package and require RES support schemes to operate on a cross-border basis with improved cooperation mechanisms and incentives to respond to market price signals.

### *Capturing energy efficiency opportunities*

9. The European Commission should ensure a stable framework for Energy Efficiency as part of the 2030 Climate & Energy Package and propose policy measures that are specifically designed to tackle well-documented market failures.

### *Reviewing resource adequacy mechanisms*

10. The European Commission should ensure, by means of regular review, that resource adequacy evaluation is done on at least a regional basis on the basis of transparent standards and takes full account of demand side resources. Only well-designed regional capacity markets can play a positive transitional role in guaranteeing resource adequacy.



## CHAPTER 1

# THE CHALLENGES

### 1.1. THE CURRENT DIRECTION OF TRAVEL

EU energy law has evolved substantially in the past twenty years to the point that it now consists of a complex regulatory network enshrined in numerous legal instruments. Although this still novel regime rests on an uneasy and untested constitutional bargain between Member States and the EU to share competence around the energy sector, the European Commission nevertheless has a clear constitutional mandate for continued development of EU energy policy and for delivering EU level oversight of national compliance with the energy law *acquis*. The core features of the EU framework as it stands now are:

- An **internal energy market** framework, and related Directives (including the establishment of ACER and ENTSOs), that aims to ensure open and competitive markets in energy and create a fully integrated internal market for gas and electricity, including coupling of both day-ahead energy markets and balancing markets.
- A pan-European GHG emission cap and trade scheme (**EU ETS**) that covers emissions from a number of sectors including the power sector.
- EU-level **competition law, including State Aid** under the Treaty and Commission guidelines to prevent Member States governments from

introducing national measures that unjustifiably distort competition.

- **Directives** to promote renewable energy and energy efficiency. For renewable energy, this includes binding national targets up to 2020 as well as rules requiring priority access to the grid and priority dispatch for renewable electricity. For energy efficiency this includes EU and national measures to deliver the 2020 target as well as measures designed to pave the way towards further improvement beyond 2020.
- A range of **environmental and safety regulations** that govern energy infrastructure and power generation development and regulate the performance of power stations.

The current vision for electricity markets is characterised by the integration of 'energy only'<sup>9</sup> wholesale markets underpinned by a carbon price to drive decarbonisation<sup>10</sup>. This requires market participants to make their own operational decisions<sup>11</sup> based on exposure to market prices (self-balancing) and investment decisions based on expected future wholesale earnings from the sale of energy and ancillary services. Until 2020, this is complemented with a suite of policies intended to ensure that the market delivers specific policy objectives.

<sup>8</sup> Chapters 20 and 21 of the Treaty on the Functioning of the EU (TFEU) govern the extent to which the EU institutions have the competence to act in the context of energy and environmental policy. According to Art 194 TFEU, the European Commission has a mandate for continued development of EU energy policy, having regard to the need to preserve and improve the environment, with the expressed aims of:

- Ensuring the functioning of the energy market;
- Ensuring security of energy supply in the EU;
- Promoting energy efficiency and energy saving;
- Promoting development of new and renewable forms of energy;
- Promoting the interconnection of energy networks.

<sup>9</sup> The term 'energy only' often obscures the fact that market participants trade not only in energy but also in ancillary services (e.g., operating reserves) required to maintain moment-to-moment supply/demand balance.

<sup>10</sup> Please see box 1 on page 12 for a more detailed explanation of the current long-term vision of electricity markets.

<sup>11</sup> Ahead of gate closure after which the System Operator assumes balancing responsibility.

Although the EU energy *acquis* comprises an extensive suite of measures, achieving its intended objectives depends substantially on Member State willingness to deliver compliance at national level. The EU energy *acquis* consists primarily of Directives. Though widely used within EU law as an instrument of harmonisation, Directives require Member States to transpose their terms into national legislation to be effective. Member States have considerable discretion in deciding how best to embed Directive requirements within their distinctive legal and regulatory systems; however, the European Court has made clear that this does not extend to a freedom to delay implementation beyond the deadline set down in Directives or to deliver only partial compliance. In effect, Member States have a clearly defined legal duty to ensure full and timely implementation of Directives in law and in practice by the deadline set down in the measure.<sup>12</sup>

In reality, evidence exists of significant problems in Member State implementation of some of the key Directives in the core EU framework. This is particularly pronounced in the case of compliance with the internal energy market regime despite that being the most mature element of the EU energy policy regime with an imminent (2014) deadline for completed implementation.

Some policy makers and industries in a number of Member States are sceptical about whether the current vision for electricity markets will support on-going investment in the portfolio of resources (new and existing) needed to meet the currently prevailing standards for security of supply. Despite the theoretical justification that the current vision provides the most efficient way to deliver the policy objectives, some Member State governments have shown by

their actions that, at present, they consider trust in the core EU framework to be too much of a gamble<sup>13</sup>. Member States have implemented or proposed various interventions in the market, in some cases driven by a desire for some form of electric sector self-sufficiency (or even energy neutrality) within national boundaries<sup>14</sup>, or by other policy objectives such as national industrial strategies, social policy or public engagement and energy ownership.

Although the 3<sup>rd</sup> Energy Package significantly reinforces the institutional arrangements for market governance through the creation of ACER and strengthened independence and competences for National Regulatory Authorities, leadership in driving compliance with the rule of EU energy law must come first and foremost from the European Commission. It is constitutionally tasked as the 'Guardian' of EU law and is the only entity with powers to apply to the European Court for the imposition of financial sanctions on non-compliant Member State.<sup>15</sup> While the Commission has proved willing to make proactive use of its powers under EU Competition Law to regulate for competition within the energy sector,<sup>16</sup> it has proved much more reluctant to similarly make proactive use of its wider enforcement powers to ensure full and timely implementation of EU internal energy market rules. This problem is compounded by the lengthy delays associated with obtaining rulings from the European Court where litigation is taken<sup>17</sup>.

<sup>12</sup> Or within 20 days of the Directive being published in the Official Journal.

<sup>13</sup> There is evidence of significant non-compliance by Member States with key aspects of the EU energy *acquis* and a lack of evidence of matching Commission enforcement action.

<sup>14</sup> Hitherto, network development plans have often been based on this expectation and very little transmission infrastructure has been constructed with the primary objective of facilitating bulk transfers of electricity between Member States. This creates a self-fulfilling prophecy in which existing assets are often underutilised and where there is little incentive to build a power plant in one state in the expectation that it will make significant earnings through serving the demand elsewhere. 'Self-sufficiency' means having enough installed domestic capacity to meet national needs. 'Energy neutrality' means achieving zero net imports over some chosen period.

<sup>15</sup> Under Article 17 of the Treaty on European Union the Commission is required to 'promote the general interests of the Union and shall take appropriate initiatives to that end'. More specifically it is empowered under Articles 258-260 of the Treaty on the Functioning of the EU to take formal enforcement proceedings against Member States in breach of EU law, which may result in the imposition of substantial financial sanctions.

<sup>16</sup> Angus Johnston and Guy Block, *EU Energy Law* (Oxford University Press, 2013).

<sup>17</sup> Further analysis on the legal framework and implementation and enforcement issues in annex - CE

## BOX 1: THE CURRENT LONG-TERM VISION FOR THE ELECTRICITY TRADING

The current long-term vision for the electricity trading is one in which administered interventions are restricted to the minimum. The physical nature of electricity is such that there will always be a residual requirement for governments to establish statutory limits for operational parameters (frequency, voltage) and a System Operator (SO) to ensure these are not violated. This will involve dispatching supply and demand in real time and procuring a portfolio of services (e.g. operating reserves) to maintain integrity in the face of normal variations from forecast and of unforeseen failures.

The current view is that it is appropriate for the SO to assume control of the system one hour ahead of real time (gate closure) with market participants free to trade ahead of this time. (Gate closure times vary – in some markets gate closure occurs closer to real time). In addition to managing normal variation and unforeseen failures, the SO will also be required to determine the capacity of the network to transport power and inform the market where physical trading is possible. The SO may also administer allocation of and trade in financial transmission rights.

A second major central intervention that is envisaged to comprise part of the enduring market arrangements involves centrally imposed limits on emissions: either on a plant-by-plant basis (e.g. SO<sub>x</sub> and NO<sub>x</sub>) or on installations with trading across a broad range of sectors.

Within these constraints, prices will be established through trading energy on a variety of forward, day ahead and intra-day markets as market participants strive to achieve balance between physical positions (production or consumption) and contractual positions (sales or purchases). The

costs of imbalance, as calculated and charged by the SO, will be an important driver of energy trading and, in line with economic theory, it is envisaged that this will be the marginal value to consumers of the balancing resources procured by the SO after gate closure to ensure system balance.

Where a large proportion of electricity is produced from variable renewable sources with avoidable generation costs close to zero, and where the demand side of the market is largely inactive, the prices in the markets will tend to be more volatile. Under these circumstances, and in the absence of a sophisticated market in options trading, there is a heightened risk of administered interventions acting on behalf of consumers. Improving formation of scarcity pricing can mitigate this, but without active demand participation prices in the markets will tend to be excessively volatile.

The development of an active demand side of the market, where a broad range of consumers (including various forms of energy storage) are able to increase or reduce consumption according to short term price signals, is therefore critical to ensuring the viability of this market vision. Under these circumstances market participants will be active in day-ahead, intra-day and ancillary services markets such that clearing prices for energy and services will equal the marginal value to consumers across various end uses. This should tend to mitigate price collapses and extreme price spikes, more fully value flexible resources and lead to fuller utilisation of variable renewable resources. The extent to which the cost of carbon still feeds into power prices at this time will depend on the role of storage, biofuels and, possibly, high efficiency fossil generation with CCS.

## 1.2 COST AND RISK ANALYSIS



A well-designed package of policy measures will increase the chances to continue to meet the top-level policy objectives going forward (security of supply, competitiveness and decarbonisation). This requires that the policy package is robust to uncertainties and is designed to effectively risk manage credible threats to the delivery of these policy objectives.

Numerous studies have been undertaken to model a fully functioning internal energy market with efficient sharing of resources across borders, and have

timeframe. Around a third of that (€135bn) derives from savings in capital investments (capex), whilst the remainder (€291bn) derives from savings in operating costs (opex). That means that the bulk of the savings come from physical interconnection and optimising system operation, with a smaller share attributable to optimal siting of renewable generation assets.

Other analytical reports have come to similar conclusions despite differences in scope, analytical tools and assumptions.

### Analyses – Cost Savings of Resource Sharing Across Europe

<div style="background-color: #008080; color: white; padding: 5px; text-align: center; font-weight: bold;">European Climate Foundation</div> <p><b>ECF</b>, <i>Power Perspectives 2030: on the road to a decarbonised power sector</i>, November 2011</p>  <p>Savings from cross-border coordination up to <b>€416bn</b> in the 2020-2030 timeframe.</p>	<div style="background-color: #008080; color: white; padding: 5px; text-align: center; font-weight: bold;">Booz &amp; Co for European Commission</div> <p><b>Booz &amp; Co</b>, Imperial College London, <i>Benefits of an integrated European Energy Market</i>, September 2013</p>  <p>Integrating the energy markets in combination with optimal RES build-out and sharing can deliver savings of up to <b>€70bn per year by 2030</b>.</p>	<div style="background-color: #008080; color: white; padding: 5px; text-align: center; font-weight: bold;">Others</div> <p><b>European Commission</b>, Impact Assessment accompanying the legislative package on the internal market for electricity and gas, 2011: macro-economic benefits of an internal market for electricity and gas up to <b>0,57% GDP</b> after 5 years from implementation</p> <p><b>Mott McDonald</b>, Impact Assessment on European Electricity Balancing Market, July 2013: savings of integrating balancing markets up to <b>€3bn per year</b></p> <p><b>Siemens</b>, <i>Competitive energy landscape</i>, May 2013: savings for cross-border coordination up to <b>€45bn</b> between 2020 and 2030</p>
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demonstrated considerable cost savings related to this approach.

Noteworthy is the recently released report from Booz & Co.<sup>18</sup>, prepared for the European Commission. It suggests a net system benefit of between €12.5bn and €40bn per year by 2030 from integrating energy markets. Also ECF's *Power Perspectives 2030* analysis calculated potential savings from optimal resource sharing of up to €426bn in the 2020-2030

It is difficult for technical analyses to capture the full range of risks and future uncertainty, and to assess the robustness of different policy measures. Therefore, this report makes a qualitative attempt to firstly, identify the key risks to the delivery of the policy objectives, and secondly, assess the effectiveness of a fully integrated internal energy market and/or the introduction of administered interventions in the market in managing these risks. The risks are ranked in order of importance based on an online expert

<sup>18</sup> Booz & Co, and others; *Benefits of an Integrated European Energy Market*; September 2013 [http://ec.europa.eu/energy/infrastructure/studies/doc/20130902\\_energy\\_integration\\_benefits.pdf](http://ec.europa.eu/energy/infrastructure/studies/doc/20130902_energy_integration_benefits.pdf)



survey that gathered the views of a wider expert group across the EU.<sup>19</sup>

### 1) Perception of policy uncertainty and regulatory instability:

The perception that the policy and regulatory framework will change may prevent investors from committing finance when it is not possible to persuade the necessary investment approval bodies that the potential return warrants the level of risk involved. This is particularly relevant where it is a common experience that investors lose money as a result of frequent or unforeseen changes in government policy.

- **EU IEM: Positive** – A pan-EU framework is less susceptible to policy swings.
- **Administered interventions: Negative** – administered interventions create more policy ‘levers’ that can add to the perceived instability.

### 2) Lock-in of high carbon assets

can arise where the long term decarbonisation trajectory is not sufficiently clear or compelling, leading investors to commit to high carbon assets that future Governments may be reluctant to render uneconomic.

- **EU IEM: Positive** – difficult for Member States to insulate high carbon resources from the market.
- **Administered interventions: Positive** – Emissions Performance Standard regulation is effective in reinforcing the political commitment to the long term decarbonisation trajectory.

### 3) Failure to drive cost convergence between low carbon and high carbon energy systems

will mean that there are always short term run cost savings to be achieved through adopting high carbon technologies. This will result in on-going competitiveness tensions between carbon-

constrained economies such as the EU and those that choose not to constrain emissions.

- **EU IEM: Positive** – improves overall system efficiency and allows pooling of Research, Development and Deployment costs to drive down costs of renewable technologies.
- **Administered interventions: Positive** – Beneficial in promoting deployment of emerging renewable technologies.

### 4) Inadequate network infrastructure

may constrain the ability of low carbon generation to trade in the system. This can result from regulators restricting allowed investment until future need is certain, from poorly designed planning and permitting processes, or from project sponsors doing a poor job of navigating the planning and permitting processes. It can also arise due to poor market design leading to the absence of price signals that would reveal the value of new infrastructure investment.

- **EU IEM: Positive** – A more interconnected market will allow greater system flexibility and resource optimisation.
- **Administered interventions: Positive** – Administratively determined technology targets can be helpful in ensuring long term network plans are developed and approved in anticipation of need.

### 5) Inadequate system flexibility

will drive up the costs and risks of integrating low carbon generation, particularly variable RES, into the system. Investors in flexible resources (flexible generation, storage, demand response, transmission capacity) must be able to assess with a reasonable level of confidence the long-term value of the mix of energy and balancing services they will provide; the inability to do so may constrain deployment.

<sup>19</sup> The risks are ranked in order of importance, based on an online expert survey that was conducted in parallel to the core report development with the Core Working Group. The Delphi study was conducted over the months August and September 2013 and gathered expert views from a total of 73 respondents from 10 different EU countries. The full results are posted on the homepage: <http://www.roadmap2050.eu/project/roadmap-to-reality>



- *EU IEM: Positive* – more interconnection will allow sharing of balancing resources and this will reduce the overall requirement for flexibility.
- *Administered interventions: Positive* – growing need for balancing resources likely to require increased role of System Operator in procuring and dispatching resources.

**6) Planning and permitting delays** can significantly restrict the deployment of low carbon assets. Poorly designed or non-transparent planning and permitting processes, or the failure of project sponsors to competently manage the planning and permitting processes, can consume considerable resources without delivering any end product.

- *EU IEM: Positive* resources can be developed where benefits are greatest, and the choice of locations to minimise negative environmental and social impacts is greater (provided local planning procedures protect environmental values).
- *Administered interventions: Uncertain* – may constrain location, thereby increasing environmental and social impacts and leading to challenging planning and permitting processes. On a local level, spatial planning requirements remain critical protect environmental values.

**7) Technology specific risks** arise where the pathway has become overly dependent on the performance of a low carbon technology that has significant delivery, performance or cost risks. These issues are exacerbated where there are limited opportunities for trading between energy markets. Particular examples include relying too heavily on the ability to roll out CCS technology on time, at scale and at a reasonable cost; to source large volumes of sustainable biomass; or to overcome concerns about nuclear cost and safety.

- *EU IEM: Positive* – increases effective market size and, thereby, increases effective diversity

- *Administered interventions: Positive* – technology support can be used to promote technology diversity where insufficient diversity is available through trading.

**8) Failure to exploit a substantial share of cost-effective energy efficiency** opportunities will make delivery of all policy objectives more challenging. Cost-effective energy efficiency is, therefore, crucial in reducing the extent of the policy challenge.

- *EU IEM: Negative* – Market integration by itself is not effective in addressing the deeply rooted market failures that inhibit energy efficiency.
- *Administered interventions: Positive* – policy and programmes will remain critical for the foreseeable future.

**9) Supply chain constraints** may restrict the deployment of low carbon assets if supply chain investment decisions need to be taken well in advance of any specific orders being secured. For example, it can take many years to develop the necessary port and barge capacity to deploy offshore wind or to train an appropriately skilled workforce.

- *EU IEM: Negative* – market integration does not provide long term clarity on technology choice or location.
- *Administered interventions: Positive* – long term technology targets provide greater certainty over timescales relevant to supply chain investment .

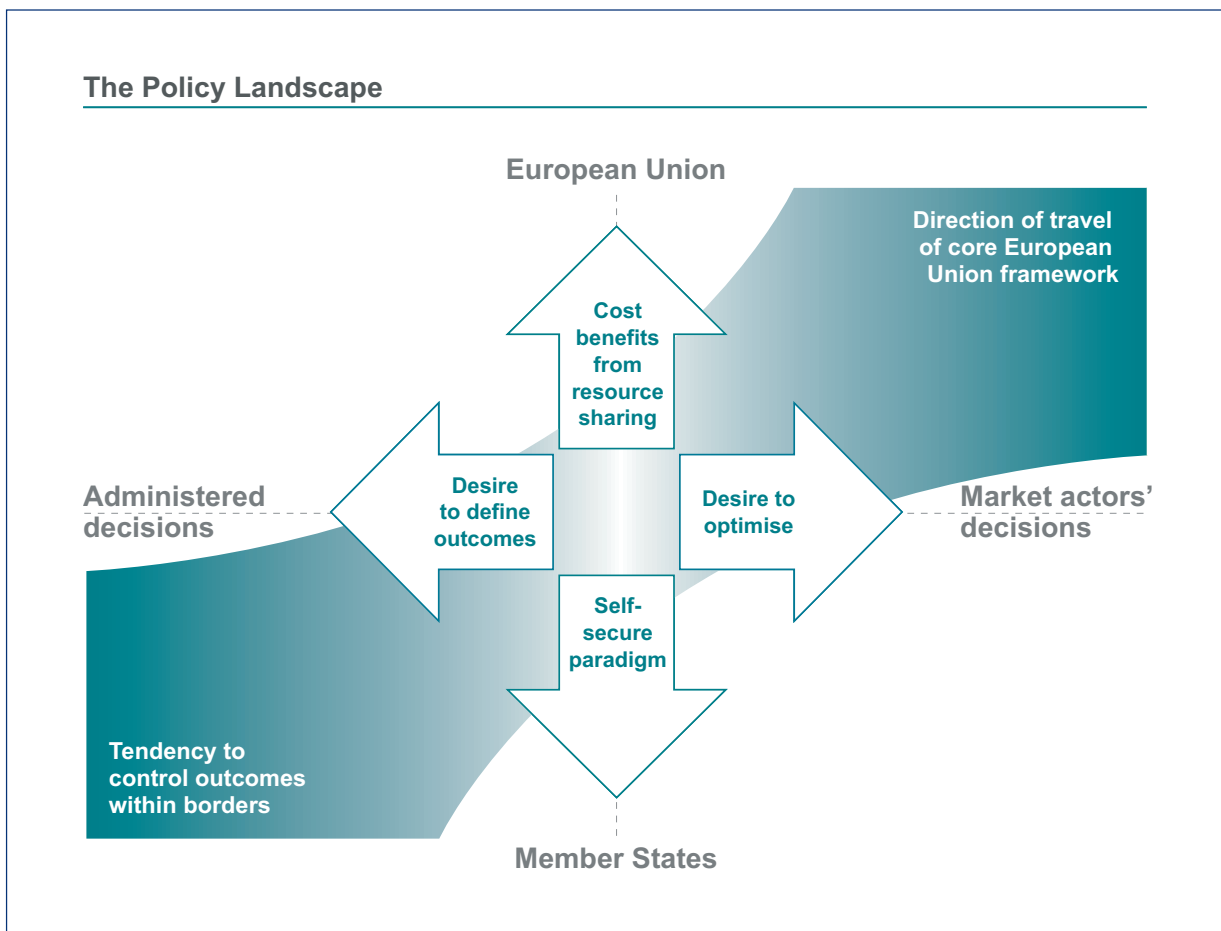
The qualitative risk analysis above shows that both the creation of a truly integrated pan-EU market and the prudent use of administered interventions, are important in addressing the risks to the successful delivery of policy objectives<sup>20</sup>.

This illustrates a major policy challenge. It is far more difficult to introduce administered interventions across the entire EU than it is in an individual Member State. Therefore, such interventions risk creating a patchwork of national policy measures, which could obstruct the process of market integration and leave the related cost savings untapped.

### 1.3 THE POLICY CHALLENGE

The policy challenge described above can be graphically illustrated in the chart below. It sets out the energy policy landscape and draws out two key dimensions: (1) vertically, the extent to which

measures are governed at EU or national levels and, (2) horizontally, the extent to which outcomes arise as a result of the decisions of an administrative authority or through independent actions by market participants<sup>21</sup>



<sup>20</sup> This does not mean that all potential administered interventions would be helpful. Many instruments could be introduced that are actively unhelpful. The important conclusion is that a combination of market integration and administered intervention is required to manage policy delivery risks.

<sup>21</sup> In this chart, the term 'market actors decisions' is used to describe the situation where market participants make their own investment and operational decisions on the basis of prices reflecting the balance between supply and demand. This is the basis of the EU target model. The term 'administered decisions' refers to a situation where a central authority determines the outcome.

At a granular level the optimal balance for various policy measures will be scattered across all four quadrants but at an aggregate level the vision of the core EU framework leans toward more European integration and a more market-based industry environment. Yet the increasing prevalence of administered interventions on a national level is pulling the policy environment toward the bottom left-hand quadrant – diametrically opposed to the direction of travel envisaged by the core EU framework. Considering the above cost and risk analysis, the trend away from integrated markets is particularly concerning given the importance of delivering decarbonisation in an affordable and secure manner.

The core EU framework is based on the principle that administered interventions in energy market outcomes should be restricted to the minimum level consistent with delivery of recognised public policy objectives<sup>22</sup>. A situation where many key outcomes are determined by administered interventions, at either EU, regional or national levels would represent a significant departure from this vision and would require fundamental reform of associated governance structures. To re-define the core framework would require strong evidence that the current long-term vision cannot be made to work and this evidence does not exist at the moment. In fact, there is a sound argument to be made that this market vision represents the most efficient way to deliver policy objectives.<sup>23</sup> However, it must be made to work as intended.

The report finds that new measures are required to make the market vision in the core EU framework a viable long-term proposition. In the meantime, until the framework is seen to be functioning as intended, administered interventions are likely to remain a key feature of the market.

The challenge for EU policy is, therefore, to seek to capture the benefits of increased market integration whilst allowing the coordinated use of administered interventions. Both of these approaches will be critical in the near to medium term to ensuring a robust framework that can deliver the decarbonisation objective in a secure and affordable manner.

This calls for a strategy with three key strands, all of which require policy action.

#### **1. Ensuring effective governance of the core**

**EU framework:** Despite its pivotal importance to achieving the EU's energy objectives, governance of the internal energy market regime is currently substantially undermined by a lack of full and timely Member States implementation of the IEM regime, slow EU level enforcement, and a lack of verifiably independent National Regulatory Authorities (NRAs) across the EU

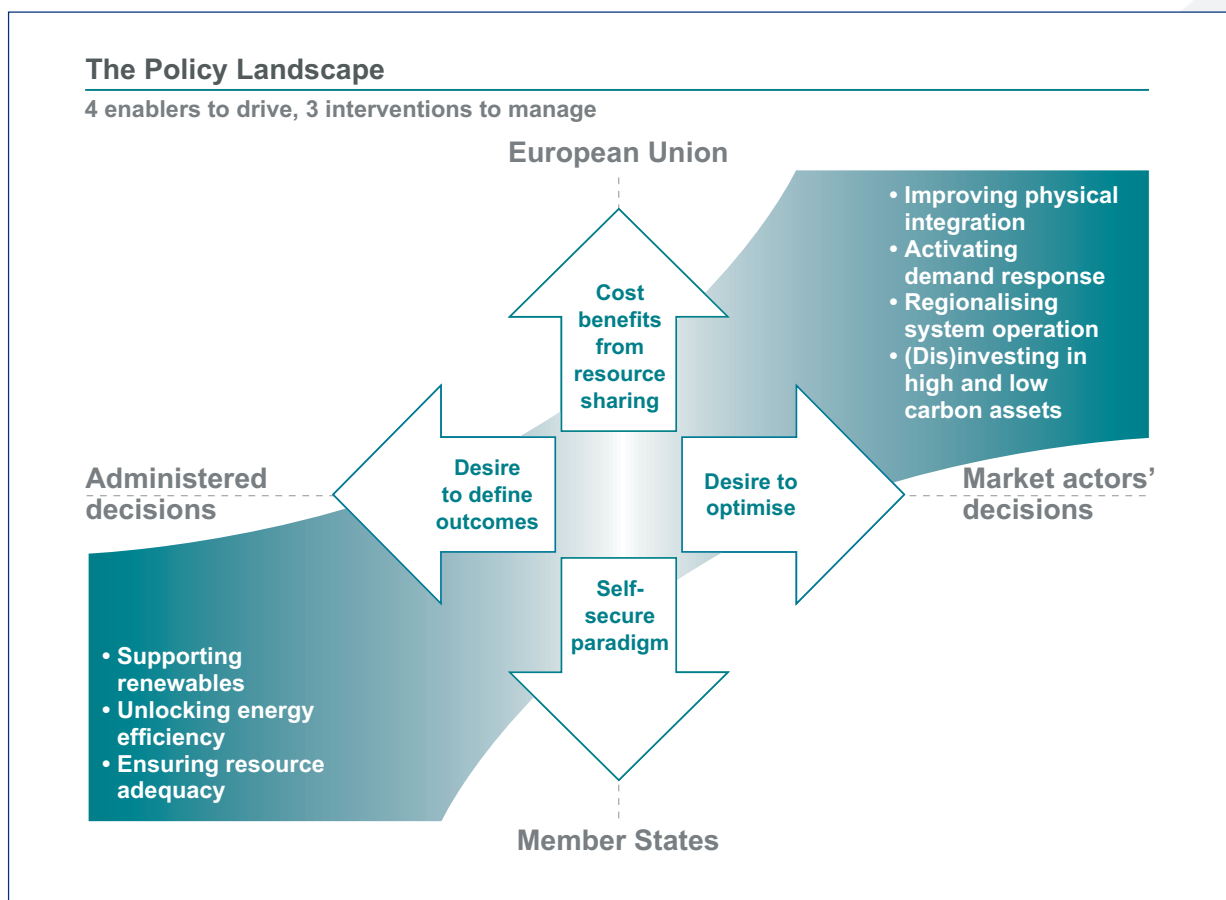
#### **2. Driving market enablers:** it is critical to promote and drive the conditions that will allow the core EU framework to robustly deliver the required decarbonisation objective. The key market drivers are:

- Physical infrastructure
- Demand side activation
- System operation
- (Dis)investment in high and low carbon technologies

<sup>22</sup> See Box 1 on page 03, the current long-term vision for electricity trading.

<sup>23</sup> Recent analysis suggests that many of the concerns expressed about the 'energy only' market could be addressed by improving the market's expression of scarcity value in the energy and ancillary services markets, combined with steady improvement in demand participation in markets. See, e.g., "Electricity Balancing Significant Code Review – Draft Policy Decision", U.K. Office of Gas & Electricity Regulation, 30 July 2013.

- 3. Managing administered interventions:** it is equally critical to ensure that current and future administered interventions in the market are fit for the limited purpose intended and do not conflict with the realisation of this long-term vision. They can be managed by individual Member States but must be embedded in a clearly articulated European framework; cross-border coordination is strongly preferred. Their *raison d'être* will decrease over time as the market enablers improve the market functioning. The key interventions are:
- Support for low carbon technologies
  - Support for energy efficiency
  - Resource adequacy mechanisms



## CHAPTER 2

# THE SOLUTIONS

Chapter 1 concluded with a proposed three strand strategy for forging a policy, legal and governance framework capable of enabling governments to establish and stick to interim decarbonisation targets. The present chapter elaborates in more detail on the measures that will be required to drive the strategy. Given the scope for new measures, this chapter focuses on the two latter strategy strands divided in two parts: PART A - Measures needed to drive market enablers; and PART B - Measures needed to manage the administered interventions.

Still, it is critical for EU and Member States to deliver on the first key strategy strand, to ensure effective governance of the core EU framework. Effective governance means not only that the appropriate institutional and legal mechanisms exist at national, regional and EU levels to deliver the outcomes required, but also that oversight of action is robust and accountability for failure is meaningful. This is critical since compliance creates the regulatory stability necessary to unlock investment in new and existing energy resources and the political conditions necessary to build trust in the market integration process.

Effective governance also requires that decision-making is sufficiently transparent and participative to protect the credibility and legitimacy of the decarbonisation process amongst the myriad political, industry, regulatory and individual stakeholders engaged in and affected by the transition. Ultimately, it is the cornerstone for building the political solidarity, industry confidence and public support necessary to decarbonise the European power system.

Despite its pivotal importance to achieving the EU's energy objectives, governance of the core EU framework is currently substantially undermined by three key factors:

1. Lack of full and timely Member States implementation of the Internal Energy Market regime;
2. Slow EU level enforcement; and
3. Lack of verifiably independent National Regulatory Authorities (NRAs) across the EU.

### PART A: MEASURES TO DRIVE THE MARKET ENABLERS

#### A.1. PHYSICAL INTEGRATION

Delivering sufficient network infrastructure is a prerequisite to accessing the cost savings enabled from efficient sharing of resources and managing balancing and connection risks, as well as enabling technology diversification. As identified in ECF's *Power Perspectives 2030* report, a near-doubling of existing electricity transmission capacity could be required by 2030<sup>24</sup>, alongside extensive investment in flexible and smarter distribution grids to enable demand response and decentralised generation<sup>25</sup>. The gas transmission and distribution network will also need to be responsive to changing demand patterns, but existing ENTSO-G<sup>26</sup> investment plans for 2020 are expected to be sufficient to ensure supply, even towards 2030<sup>27</sup>.

<sup>24</sup> ECF, *Power Perspectives 2030*, November 2011 - <http://roadmap2050.eu/project/power-perspective-2030>

<sup>25</sup> There are multiple challenges related to distribution system management, which require local solutions, outside the scope of this report. For more info please consult Eurelectric, *Active Distribution System Management*, February 2013. [http://www.eurelectric.org/media/74356/asm\\_full\\_report\\_discussion\\_paper\\_final-2013-030-0117-01-e.pdf](http://www.eurelectric.org/media/74356/asm_full_report_discussion_paper_final-2013-030-0117-01-e.pdf)

<sup>26</sup> The European Network of Transmission System Operators for Gas

<sup>27</sup> ECF, *Power Perspectives 2030*, November 2011 - <http://roadmap2050.eu/project/power-perspective-2030>

Despite recent progress (including the Energy Infrastructure Regulation and establishment of ENTSO-E), under current conditions a lack of physical integration is likely to remain a key constraint on the development of the internal energy market and cost-effective decarbonisation.

Overcoming this constraint will involve a major change in the way that both transmission and distribution networks are planned and costs are recovered. In practice, this will mean moving away from a 'grid follows generation' approach and towards a network model where anticipatory network investment enables future efficient generation investment and utilisation. For transmission assets, it will also require sharing some of the costs of strategic assets on a regional or European basis – as it would be difficult to divide the full public value of enabling an integrated energy market among individual countries or users.

The measures set out below should be viewed as transitional, driving the shift to a more integrated European power market and a decarbonised power sector. In theory, over the long run, investment signals for new transmission should be generated within the operation of the market itself.

Under current conditions, however, this market signal is not sufficiently strong to lead to adequate network investment: rapid, policy-induced changes in generation and consumption structures mean that current flows may not be indicative of future needs. In the interim, therefore, a more proactive approach is required.

### Proposed measures:

1. Member states should agree **updated quantified targets for the development of a 'core European network'** as part of the 2030 Climate & Energy package, with minimum transfer capacities set for key corridors. The targets should be agreed by Regional Groups and be validated by ACER and the European Commission. In order to ensure alignment between 2030 energy

policy objectives and infrastructure policy, the targets should be set at a level that reflects objectives for the cost effective use of renewable resources, enabling all countries to participate fully in European electricity markets, and maximising system efficiency at a European level<sup>28</sup>. They would provide a key input to TSOs for the development of network plans, and would provide a strong steer to regulators to facilitate approval of strategic anticipatory investment. The targets would supplement the existing system of priority corridors by enabling Regional Groups to agree common, quantified objectives for each corridor. They would replace the outmoded existing European Council target for countries to develop interconnections equivalent to at least 10% of national generation capacity, which has proved ineffectual due to the lack of implementation responsibilities and the inappropriate nature of a single target for the whole of Europe.

2. ACER and national regulators should jointly develop adequate **financial incentives** to ensure TSOs deliver agreed network plans on a timely basis and to compensate for the increased risks entailed through financing and developing a project that crosses more than one jurisdiction. This could include higher rates of regulated return for projects that contribute to the core European network, and should be made conditional on completion of the projects within agreed time limits and contribution to the wider European network. It could also include socialising higher proportions of the cost of key cross-border infrastructure in future through wider utilisation of financial mechanisms through the Connecting Europe Facility and other European sources such as structural funds. However, if the minimum target capacities for the core European network are still not met through suitable project proposals from incumbent TSOs, Regional Groups should have the power to solicit project proposals from third parties and enable such projects to access regulated returns. For smart grid infrastructure at the distribution network level, financial incentives will be needed to support innovation and investments

<sup>28</sup> The targets should also respect nature protection regulation and objectives



to support demand-side flexibility and integration of decentralised generation.

- 3. New cost-recovery mechanisms** will be needed to support this approach - including socialisation of some of the costs of strategic assets. ACER's cost allocation rules should take into account the contribution that individual projects make towards completing the core European network, with a proportion of the costs shared across all European countries in recognition of their shared value.<sup>29</sup>
4. Network investment will also be needed beyond the 'core network', and this will require forward visibility on network needs. **Regional Groups could play a pivotal role**, and they should be tasked with publishing regional renewable energy delivery plans to provide a shared view on how any new 2030 targets will be met (replacing the NREAPs in the current package). Such plans would provide an aggregation of national measures and plans and help to identify opportunities for renewables trading and prioritising the best value resources. Elaborating the delivery plans at a regional level will also provide a signal for flexible resource needs, including further infrastructure development as well as demand side opportunities (see B2 hereafter).

## A.2. BUILDING THE DEMAND SIDE

The efficiency and effectiveness of the current EU market vision ultimately requires the emergence of an active demand side to the market, whereby a significant proportion of individual loads would be able to respond to market price signals over a relatively short timeframe. This will empower customers to manage their own energy requirements, add valuable flexibility to a system with growing shares of variable supply, increase the utilisation of capital-intensive renewable investments, increase the frequency and reliability of scarcity pricing and mitigate the occurrence of economically unwarranted price

excursions, consequently diminishing the temptation on the part of governments to intervene in the market.

Enabling responsive customer loads to compete in energy, services and (where they exist) capacity markets as an alternative to changes in production allows scarcity and surplus to be expressed in a more incremental and reliable manner, mitigates supply-side market power and gives a truer measure of what constitutes an "adequate" supply of resources. In other words, the issues most often cited by Member State governments as justification for establishing capacity or resource adequacy mechanisms in the market will largely disappear.

Building the demand side will involve the widespread rollout of appropriate technology, development of dynamic retail pricing options, and the emergence of new demand aggregation business models, all of which will take time. However as variable renewables become a larger share of supply, enabling demand to participate in day-ahead and intra-day markets in response to less controllable changes in supply will be among the lowest cost options to stabilise prices and ensure security of supply.

Demand response as used here refers primarily to loads that are controllable (remotely or via on-site automation of responses, by agreement with the customer) and thus can be relied upon as system resources. It must be quantifiable, reliable and accountable. It exploits modes of response that do not appreciably interfere with customers' enjoyment of energy services and are thus available as needed to balance the less controllable variations in supply that will be a regular feature of a decarbonised power system. This form of demand response will rely on the availability of real-time price signals.<sup>30</sup>

Demand response can be facilitated and augmented by the adoption of "end-use" energy storage (e.g., as hot water, ice or in electric vehicle batteries) that allows the delivery of energy services to be decoupled in time from the related production of electricity with no appreciable service disruption. This functionality is sometimes treated

<sup>29</sup> This approach has also been adopted in the US, through FERC Order 1000.

<sup>30</sup> System operators may compensate customers or by intermediaries for the value of the services they provide rather than being exposed directly to real-time pricing and left to respond as best they can. This would avoid concerns about practicality, equity and reliability commonly associated with real-time retail pricing.



as storage rather than as demand response; either way, it represents a widely available, technically proven, low-cost alternative to grid-scale or electricity storage options.

Activation of demand side resources faces a number of challenges in the European market, including explicit and implicit barriers to participation in markets and financial disincentives for system operators to encourage its development. With proper market implementation demand response should be able to thrive without policy support, however pro-active policy is required to remove barriers to active demand side participation, including the following measures:

### Proposed measures:

#### 1. Allow new, innovative aggregators to participate:

While emergency demand response has historically been sourced on request from large industrials, load aggregation by technically savvy and creditworthy entities will be critical to tapping the vast potential for more frequent and less intrusive load control in smaller customer classes.<sup>31</sup> Independent demand aggregators must be responsible for balancing consequences but they must also have an equitable opportunity to meet that obligation either through transparent arrangements with existing parties or through an appropriate process for assuming balancing responsibility directly. A wide range of entities can serve this aggregation market, from traditional suppliers to electric vehicle manufacturers if the commercial opportunity is attractive. In many jurisdictions, however, there are explicit or implicit barriers to participation by non-traditional players in energy and grid services markets.<sup>32</sup> Such barriers must be identified and removed. Conditions for participation in markets should be adapted to reflect the characteristics of qualified demand response resources. One of the key sources of value will come from the participation of aggregators operating at scale across multiple markets. The full value of

demand response can only be realised if, *inter alia*:

- Measurement and verification procedures are harmonised across borders to eliminate prohibitive administrative burdens;
- Regulators and system operators enable partnerships between experienced energy service companies and non-traditional actors (such as car manufacturers) seeking to participate in the market;
- Barriers to participation by third-party aggregators are removed; system operators are incentivised to engage with promising non-traditional players; and
- Minimum size criteria designed with generation in mind should be lowered for demand resources; aggregators should be given reasonable discretion to replace individual loads; and metering and telemetry requirements should be adapted appropriately.

#### 2. Exploit 'end-use' energy storage opportunities:

Energy storage opportunities are not limited to grid-scale options that return electricity to the grid. End-use options store energy in the form in which it will be used (e.g., as hot water or in a vehicle battery) close to the point of consumption, augmenting the ability of demand to respond to conditions on the grid. Options include thermal energy storage associated with district heating Combined Heat and Power (CHP) plants. As the share of variable renewables increases, and as the current over-supply of firm capacity across the EU dissipates, economic opportunities to store energy may emerge. The decision to invest in energy storage should be based on the market value of the services that energy storage devices can provide. Where market measures are introduced to drive investment in energy storage, for instance through forward

<sup>31</sup> See, for example, *A National Assessment of Demand Response*, Staff Report, Federal Energy Regulatory Commission, June 2009, page 29

<sup>32</sup> An example is in Germany, where in the potentially lucrative secondary reserves market aggregators are prohibited from standing as obligor for the obligations of individual sites.

procurement of storage services, distributed storage options must be given an opportunity to participate either directly or via demand aggregators.

### **3. Enhance the role of National Regulatory Authorities (NRAs) in driving demand response:**

Given their pivotal role in regulating energy market functioning, the EU energy regime should more clearly prescribe the role of national energy regulators in building the demand side, giving them a more formal and secure locus to monitor and drive compliance by Transmission and Distribution System Operators (TSOs and DSOs) and to sanction failure or discriminatory action. It must be clear and enforceable that direct or indirect discrimination in market access for comparable demand-side resources is prohibited. At present the traction of EU law on national energy regulators in this context is diffuse, difficult to enforce and will lead to fragmented engagement by regulators across the EU.

These measures should be addressed through market rules, regulations and grid codes. EU law provides a framework for promoting demand response that confers, albeit not clearly, responsibility on a range of actors to build the demand side – primarily, national governments, national energy regulators, TSOs, DSOs and ACER/ENTSOE with oversight and support from the European Commission. Hence, in the first instance, building the demand side requires these actors to fulfil their existing obligations and act on powers they have been given on demand side management under the existing provisions under the Electricity Directive and the new Energy Efficiency Directive. For instance, the relevant Network Codes currently under development must address directly the perverse incentives and competitive barriers embedded in national regulation and governance of transmission and distribution system operators, and the Codes must also address legitimate consumer concerns about fairness and data privacy. Forthcoming Commission guidance on demand response in the context of electricity markets will also be helpful to clarify expectations for action.

However, given the centrality of demand side response to moderating the cost of meeting the decarbonisation objective, new EU legislation should also be brought forward to clarify and strengthen the duties on actors to promote full and comparable market access for demand response in line with the recommendations. The chances of success, in this as in other areas covered by this report, could be greatly enhanced by the promotion of cooperative regional institutional arrangements.

## **A.3. SYSTEM OPERATION**

It is also necessary to address system operation and the role of TSOs. System Operators are critical enablers of the integrated market, but significant changes in the operating framework will be required to ensure that they fulfil this objective consistent with the long-term vision for the internal energy market.

TSOs must be incentivised to seek options to share resources, increase market transparency and promote efficient and reliable scarcity pricing of energy and balancing services, all in the interest of minimising the overall cost of delivering reliability. This inevitably requires TSOs to cooperate in the balancing of the system over larger balancing areas in real time, with capacity management based on physical constraints on the system rather than the shape of national borders. Therefore consolidation of the geographical scope of balancing areas should be pursued to the greatest extent possible.

Through the transition period some system operators may perceive a need for forward interventions in the energy and services markets in order to ensure that their security of supply obligations are met, and such measures may undermine progress toward fully coupled balancing markets. The mechanisms by which balancing services are procured must not be allowed to distort energy and services market price formation or substitute for balancing actions that could reasonably be taken by market participants.

This requires not only full implementation of current regulations – including in particular balancing market coupling – but the adoption of additional measures set out below.

### Proposed measures:

**1. Sharpen energy and services market price signals (scarcity pricing):** Realisation of the increasing market value of flexible resources relies on energy and services market prices that too often fail to reflect true shortage conditions accurately on the system. Market prices often do not reflect the opportunity cost (i.e., the true value) of the marginal measures deployed by system operators to ensure service reliability. Resources providing needed reserves to the system operator are paid at their direct cost, or not at all, rather than being paid a price that reflects the changing real-time reliability value of reserves especially during shortage periods. As a result energy prices languish at too low levels for much of the time only to spike to extreme high levels once demand approaches the limits of supply. This in turn leads to the imposition of price caps that only exacerbate the situation. This will become especially pronounced as the share of variable renewables grows. The following measures are required:

- Co-optimisation of energy and reserves post-gate-closure so that the price of energy fully reflects changes in the real-time value of providing reserves.
- Incorporation of the value of all system operator balancing actions, including load interruption and other voluntary demand response programs, into cash-out prices.
- A “pay for performance” requirement where system operators are required to set differential pricing for providers of ancillary services based on the quality of the service provided.

**2. Move to a system of pricing zones based on physical system constraints** rather than political boundaries. ACER must develop and implement a methodology to incentivise System Operators such that they are rewarded when, and only when, their actions minimise costs across balancing areas defined by physical network architecture rather than by national borders. These incentive schemes must also encourage SOs to minimise the costs of securing balancing resources to prevent them from acquiring reserves to cater for events that are predictable ahead of gate closure and can be managed by market participants. In addition, the incentive schemes must encourage the full exploitation of the cost-effective resource potential (including demand side resources) across the balancing zone.

**3. Incentivise member states to develop regionally integrated balancing authorities,** along with appropriate coordination of regulatory activity. At the same time, ACER must develop and implement a methodology to enable System Operation costs to be recovered on a balancing area basis as appropriate

**4. Ensure appropriate ACER oversight of forward balancing service procurement mechanisms** on a periodic basis, with the objective of minimising forward procurement as demand participation improves and market-balancing behaviour becomes more reliable and responsive to system needs.

**5. ACER must review the mechanisms used to calculate imbalance settlement prices and balancing services prices** and recommend a common framework to be applied to balancing mechanisms across the EU. A key feature of this common framework is that they accurately reflect market scarcity including that arising from the procurement of balancing services. It is also important that market participants will be able to forecast imbalance prices over timescales that are longer than it takes to initiate a physical response since this is a necessary enabler to allow self-

balancing and the development of liquid intra-day markets. One example of a measure designed to promote these objectives, which has been successfully deployed in some markets and is being actively considered in others, is the adoption of demand curves for critical services (such as operating reserves) established several hours in advance of each operating interval and used in determining settlement prices.

In most cases, measures proposed above are within ACER's current competences and are part of already on-going processes related to network codes. However, ACER's roles and powers are extremely difficult to clarify because they are scattered across a highly complex legislative landscape. In principle, ACER's competences are designed to address a 'regulatory gap' identified by the Commission at EU level with specific responsibilities in the promotion and facilitation of interoperability. It was created by law (Regulation 713/2009/EC) and enjoys complete legal independence from national or EU levels actors. This Regulation should be opened for review to expand ACER's competences to cover the tasks on infrastructure, demand response and system operation described in sections below (B1, B2 and B3).

#### A.4 (DIS)INVESTMENT IN HIGH AND LOW CARBON TECHNOLOGIES

Investors must expect to realise clear cost advantages by investing in and operating low carbon resources over higher carbon resources if decarbonisation is to become self-sustaining in the market.

With the adoption of the EU ETS, it has been considered the role of the carbon price to value carbon emissions correctly and ultimately to deliver the chosen overall emissions cap. The EU ETS also, importantly, links the power sector decarbonisation to

emissions reductions in other sectors of the economy. However, experience has demonstrated that the EU ETS has not created conditions sufficient to maintain and increase momentum in investment in low carbon assets, and it is currently also falling short in supporting a coal to gas switch in the daily market operation.

In light of this perceived deficiency, various reforms have been suggested to the EU ETS that will stabilise or reinforce the carbon price signal<sup>33</sup>. However, many factors determine the carbon price and its effectiveness (e.g. demand, fuel costs) and it is, therefore, very challenging to impose *ex ante* constraints on the carbon price that are efficient.

In addition, and with regard to the role of the carbon price in the daily market operation, the significant potential for emission reductions through coal to gas switching in the power sector offers a relatively low-cost option for some time to come and would prevent prices from escalating, even if a tight cap were adopted. From a power sector perspective it is therefore not necessary to impose a significant change in price formation under the EU ETS. Instead, and recognising the extent of the potential for cost effective decarbonisation of the power sector, it is appropriate to establish an ambitious carbon reduction cap and adjust the annual linear reduction factor accordingly.

Nevertheless, questions remain over the ability of the EU ETS to drive long-term investment and disinvestment decisions in the power sector<sup>34</sup>. There is little confidence today among market actors that politicians will stick to the emissions cap, regardless of the impact on prices. Investment continues to flow, albeit at a reduced rate, into resources that would appear to be uneconomic based on the current ETS trajectory and there is the risk that low carbon generation resources will be retired in favour of higher carbon resources despite the tightening ETS cap. This suggests that for the time being supportive

<sup>33</sup> Given that the ETS operates across sectors, it is inappropriate to recommend major reforms purely on the basis of a power sector analysis. Nevertheless, in the absence of imminent and major technological innovation, the power sector presents the decarbonisation options and will, therefore, tend to dominate the ETS.

<sup>34</sup> International Energy Agency, Summing Up The Parts, December 2011; Presentation, Carbon pricing and complementary mechanisms, October 23rd expert seminar, <http://roadmap2050.eu/project/roadmap-to-reality>



measures are needed, relevant for the power sector, to help build confidence in the long-term integrity of the cap<sup>35</sup>.

One option would be to introduce a plant-based emissions performance standard (EPS). This could be a very effective supporting measure to reinforce confidence in the political robustness of the emissions cap, as it provides a clear long-term signal to aid efficient investment planning. This will ensure that momentum is maintained in the transition towards a decarbonised power system whilst reinforcing the conditions that will enable the ETS to become the primary driver of commercial behaviour. In other words, the EPS will determine who is allowed to participate in the market and the ETS will determine how they compete. However, it is important that the standard is designed to provide sufficient flexibility to allow least cost short run decisions to be made in light of the overall emissions cap. This requires that the design of the EPS builds on the extensive experience gained in the design of standards to control other power plant emissions (SO<sub>x</sub>, NO<sub>x</sub> and particulates) and provides power plant owners with alternative routes to achieve compliance and time-limited derogations for plant that is too expensive to refurbish. However, the overall emissions rate must degress over time to a level that is consistent with a largely decarbonised power market thereby eliminating the possibility that high carbon assets can operate at high load factors into the long term future. A carefully designed EPS in support of a structurally reformed EU ETS to deliver an appropriately tightened emissions cap therefore presents an attractive policy option and creates the conditions that will lead to an orderly transition from high to low carbon resources<sup>36</sup>.

### Proposed measures:

1. **An ambitious cap for the EU ETS beyond 2020**, with annual linear reduction factor adjusted accordingly;
2. **EU-wide plant based emissions performance standard (EPS)**, with built-in flexibility to allow least cost short run decisions and an overall emissions rate that degresses over time.

<sup>35</sup> There is no consensus as yet amongst relevant stakeholder as to what these supportive measures could be, if at all any, and different ideas have been floating around like carbon floor prices and carbon taxes.

<sup>36</sup> It is stated in the Acknowledgment section that the report represents the conclusions drawn by the consortium of authors from E3G, RAP and ClientEarth and that the responsibility for the content rests solely with these organisations. Core Working Group representatives and the academic panel have shared their views and contributed material, and that process has strongly informed the final report, but they have not necessarily committed to support the conclusions drawn or take responsibility for the content.

## PART B: MEASURES TO MANAGE THE INTERVENTIONS

### B.1. SUPPORT FOR LOW CARBON TECHNOLOGIES

Given the fundamental transformation the power sector faces in light of the decarbonisation objective, it is likely that administered technology support mechanisms will continue to be needed for the foreseeable future. The current RES Directive imposes mandatory 2020 targets for renewable energy and allows Member States the flexibility to choose how the target is met across sectors at the national level with the option to meet the target through trading with other Member States (via cooperation mechanisms).

It is unlikely that the power market context (market rules, responsive demand, physical infrastructure and EU ETS reform) will have evolved by 2020 to the point where a level playing field exists for renewables technologies, particularly variable renewables. Therefore, renewable support mechanisms will be needed beyond 2020 and, in the absence of a pan-EU framework, would be established independently by Member States.

Analysis has demonstrated<sup>37</sup> that there are significant potential savings through optimising the geographical location of renewable resources across Europe along with the associated network infrastructure. A pan-EU policy framework for renewable deployment beyond 2020 is, therefore, needed to enable Member States to take advantage of these potential cost efficiencies through supporting efficient deployment of technology and clear long-term growth trajectories that enable efficient supply chain and infrastructure development.

There is no consensus as yet amongst relevant stakeholder on the details of such a post-2020 EU RES framework. Some argue that it is most effective

to establish an overall volume<sup>38</sup> target for renewable generation at EU-level.<sup>39</sup> Irrespective of this, it is important that the design of this renewables policy framework encourages deployment across regions and the development of infrastructure where significant resource sharing is not possible. This suggests that the post-2020 EU-framework for renewables deployment should be focused at the regional level and should be consistent with measures to develop strategic cross-border infrastructure projects.

The EU framework for renewables deployment also has a key role in ensuring that support mechanisms are consistent with the long-term vision for an integrated EU market. In particular, it is important that technology support mechanisms incentivise operators of renewable assets to develop the capabilities to trade effectively in the power markets. This will ensure investment in renewable generation is sustainable into the longer term without revenue support mechanisms. Market risks can be particularly significant for variable renewable generators. Feed-in-tariff support mechanisms generally provide a fixed rate of income for each unit of electricity produced. This has proved to be beneficial in creating the earnings certainty that has been largely responsible for dramatic improvements in the cost and performance of these technologies. However, the long-term vision for the integrated energy market cannot function as envisaged if a large proportion of the generation is insulated from market price signals.

Many renewable generators do not possess the trading skills or resources to manage market risks and it is difficult to procure this capability at competitive prices. Also, the magnitude of the costs involved will be highly dependent on the extent to which the system is transformed to reflect a new resource mix, in much the same way that the system was transformed by massive investments in the 1970s and 1980s in new high-voltage transmission, energy storage and other measures to accommodate

<sup>37</sup> See slide on page 14 - *Cost benefits from resource sharing*. According to the Booz & Co report, coordinated build-out of RES in optimal location across EU could save up to €30bn / year up to 2030. ECF Power Perspectives 2030 brought out a number of €135bn of Capex savings over the decade 2020-2030.

<sup>38</sup> It may be appropriate to allow the volume targets to be adjusted in light of progress with relative technology costs.

<sup>39</sup> Further discussion on the role of binding targets, and the design of such targets, is needed as each design option has its merits and trade-offs, including measurability and political acceptability. Targets should for example not support bio-energy where this increases carbon emissions. Such questions are beyond the scope of this study and will be resolved by discussions currently on-going amongst renewable energy experts and policy makers.

the integration of large power plants. Continued support for deployment will be required throughout the transformation period to avoid a costly hiatus in RES deployment and maturation. It is, therefore, prudent to progressively increase exposure to market forces to avoid exposing renewable generators to significant and unmanageable risks that would need to be offset by correspondingly higher tariffs. This will give time for market conditions to evolve and for renewable generators to acquire the necessary skills and for renewable investors to adapt their business models to evolving market conditions. Some Member States are adopting feed-in-tariffs mechanisms that involve exposure to market prices (e.g. CfD FiT in UK, Market Premium FiT in Germany) and these may provide valuable learning for the future. The post-2020 EU frameworks for renewable energy should, therefore, introduce some level of market exposure for renewable electricity.

Irrespective of the decarbonisation objective, Member States will continue to have clear incentives to promote the development of new technologies, such as resource diversification and industrial strategy objectives. Hence, there remains an enduring need for technology support mechanisms for pre-commercial low-carbon technologies (like early-stage RES technologies and CCS) with the long term potential to make a significant contribution to the energy mix. It is more appropriate that support for these technologies is implemented through a Strategic Energy Technology plan with cost reduction targets, rather than deployment targets.

### Proposed measures:

**1. EU RES framework beyond 2020.** More consideration is required as to how targets should be allocated amongst Member States. This report suggests that a regional approach may be more appropriate.

**2. RES support mechanisms** should include a degree of market exposure and appropriate depression rates; and should involve a cross-border and/or regional dimension to encourage efficient use of resources across a larger area.

**3. Strategic Energy Technology Plan beyond 2020** to (1) identifies the list of eligible technologies with appropriate review points, (2) establishes cost reduction targets for these technologies, and (3) ring-fences an appropriate amount of the EU budget to ensure delivery of these targets. More consideration is required as to how such targets should be delivered.

## B.2. SUPPORT FOR ENERGY EFFICIENCY

The ECF *Roadmap 2050* analysis shows that electricity usage in other sectors (like heat and transport) will increase as they decarbonise. Hence it is critical to reap the potential for cost-effective energy efficiency to keep the projected growth in electricity demand manageable. In order to do so, tailored policies and regulatory interventions are needed.<sup>40</sup>

The current EU framework, with the ETS as currently structured, is unlikely to deliver these savings. Numerous well-documented market failures and market barriers inhibit otherwise cost-effective investments in energy efficiency.<sup>41</sup> In many cases these market failures are fundamental and are unlikely to be resolved by perfecting wholesale energy markets or carbon pricing mechanisms.<sup>42</sup>

It is therefore likely that central interventions will continue to play a key role for the foreseeable future, primarily at the Member State level or below but with essential impetus provided by the EU.

40 IEA, Energy Efficiency Market Report 2013 <http://www.iea.org/newsroomandevents/pressreleases/2013/october/name,43788,en.html>

41 See, e.g., Prindle et al., "Energy Efficiency's Role in a Carbon Cap-and-Trade System: Modelling Results from the Regional Greenhouse Gas Initiative" (2006).

42 A recent report from the Fraunhofer Institute for Systems and Innovation's provides a detailed bottom-up assessment of cost-effective potentials in the different economic sectors and refers to commercially and economically available measures [http://energycoalition.eu/sites/default/files/Fraunhofer%20ISI\\_ReferenceTargetSystemReport.pdf](http://energycoalition.eu/sites/default/files/Fraunhofer%20ISI_ReferenceTargetSystemReport.pdf) report: Analysis of a European Reference Target System for 2030.



For these reasons, sustained progress toward a decarbonised electricity sector is inextricably linked to the adoption of an enforceable post-2020 framework of complementary policies directly supporting cost-effective energy efficiency measures. Binding targets may be needed as part of an enforceable framework to set a clear metric against which the effectiveness of various regional and member state specific policy measures must be assessed and to recognise the fact that poor efficiency in any individual Member State will drive up energy costs in neighbouring inter-linked markets<sup>43</sup>. That means a package of specific policies, measures and/or incentives will be needed that are designed to tackle sector-specific issues and barriers.

#### Proposed measures:

##### 1. EU Energy Efficiency framework beyond 2020.

More consideration is required as to how targets should be allocated amongst Member States.

2. Obligate regulators and system operators at all levels to **factor delivery of Member State energy efficiency policies into demand forecasts** used, e.g., to administer capacity mechanisms.

3. **A range of targeted standards, regulations and finance initiatives** to overcome the barriers to cost-effective investment in the efficiency use of electricity, such as:

- Expanding the scope and tightening standards for electrical apparatus in the Eco-design Directive;
- Dedicated funding sources and innovative financing schemes;
- Measures related to energy usage in Industrial processes and buildings.

### B.3. RESOURCE ADEQUACY MECHANISMS

In theory, energy and services markets are capable of efficiently ensuring economic resource adequacy if properly designed and implemented and kept free of political meddling. Unfortunately the current reality is that there remains a considerable gap between the theoretical ideal and real-world conditions, in part because system operation continues to be governed largely at the national level. As interconnection increases, scarcity pricing becomes more reliable and predictable, market governance becomes more regional in scope and the demand side of the market develops, the requirement for capacity mechanisms should diminish. However, until that becomes a reality, well-designed and regional capacity markets can play a transitional role.

Some Member States may wish to retain or introduce mechanisms aimed at achieving a certain margin of firm resources over and above expected peak demand in order to ensure security of supply (often referred to as “resource adequacy”). Many such mechanisms may not be compatible with the current EU framework and could undermine market integration. Therefore, such mechanisms must be subject to regular review against a clear set of EU standards, must not unjustifiably inhibit development of the conditions that will enable energy-only markets to function efficiently in the future, and must not restrict the free trade of electricity across the EU.<sup>44</sup> In order to achieve the desired security of supply at the lowest cost such mechanisms must include all firm capacity-equivalent resources, both supply-side and demand-side, both new and existing, including the effective firm capacity value of renewable resources based on transparent and non-discriminatory statistical analysis, and they must allow all capacity resources with access to the market an equal opportunity to participate regardless of where they are located.

<sup>43</sup> Further discussion on the role of binding targets, and the design of such targets, is needed as each design option has its merits and trade-offs, including measurability and political acceptability. Such questions are beyond the scope of this study and will be resolved by discussions currently on-going amongst energy efficiency experts and policy makers.

<sup>44</sup> As recommended above, the EU should introduce a EU emissions performance standard for existing and new power stations. If introduced, such a standard would automatically apply to any capacity covered by capacity mechanisms. In the absence of a legislative standard, EU supervision of proposed national mechanisms should ensure application of an equivalent standard to ensure alignment between and integration of EU policy goals (internal energy market and environmental protection (i.e., decarbonisation)).

In justifying the need for such intervention it should be mandatory that the security of supply assessment be done on at least a regional rather than national basis. Also, it is increasingly apparent that capabilities beyond firm capacity, such as flexible responsiveness to market conditions, will be equally important in delivering resource adequacy at a reasonable cost, especially when there are significant volumes of variable supply on the system. Therefore it is important that resource adequacy mechanisms, if adopted, encourage not simply a given quantity of firm resources but also the right mix of resource capabilities by ensuring that capacity resources are differentially compensated based on the differential value they provide.

- Value capacity differentially based on the demand for critical resource capabilities to ensure that security of supply can be maintained at least cost at all moments in time and not simply at the system peak (gross) demand.

### Proposed measure:

- 1. Member States to assess any mechanisms** against need, competition and IEM guidelines.
- 2. The European Commission to review** existing mechanisms on a regular basis.

Mechanisms must:

- Positively accommodate demand side resources (both efficiency and demand response), which means that auctions, procurement mechanisms, qualification standards, measurement and verification procedures must be designed with a view to capturing cost-effective demand side resources.
- Fully account for the contribution to security provided by interconnectors.
- Fully account for the contribution to security provided by renewable resources based on transparent, non-discriminatory statistical analyses.
- Assess security of supply on a regional rather than national basis.

## CHAPTER 3

# TOWARDS A STRONGER EUROPEAN FRAMEWORK

### 3.1. STRENGTHENING EU GOVERNANCE

The core objective of this report is to define a framework that enables governments in the EU to remain on track to achieving the 2050 decarbonisation objective. To that effect, the measures proposed in this report aim to improve the legal, policy and governance framework towards delivering this objective in a secure and affordable manner.

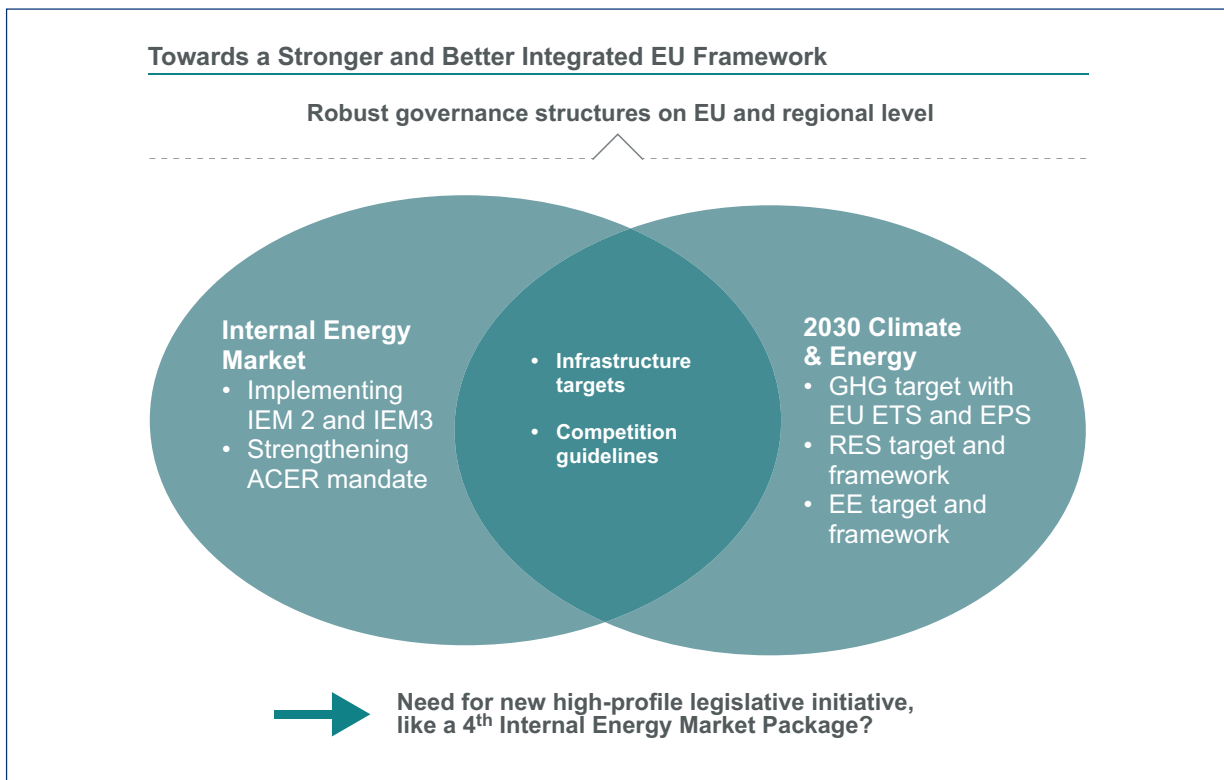
While some of these proposals imply new legislative and non-legislative initiatives, the European Commission is considered to have the authority and competence under the existing framework, based on the new energy chapter in The Lisbon Treaty (Article 194 TFEU), to act to a significant degree on the proposals put forward. Similarly the Commission's existing powers are considered sufficient to enable it to make substantial progress towards delivering the necessary improvements in EU level oversight and enforcement of Member State compliance with the rule of energy law; as well as clarifying and recalibrating of ACER's role and competences. Hence, the report finds that, as such, treaty reform is not a pre-condition to either implementing effectively the recommendations made in this report, or the decarbonisation of the power sector.

Notwithstanding the above, the plethora of measures proposed in this report indicates that the current framework is not functioning as intended and that governance and institutional arrangements should be strengthened.

To this end, the European Commission could consider bringing forward proposals for a cohesive 4<sup>th</sup> Internal Energy Market Package. Whilst the measures proposed in this report could also be introduced via a set of amendments to the 3<sup>rd</sup> Package, a 4<sup>th</sup> package would have the merit of avoiding a piecemeal or fragmented approach to reform.

This would send a clear signal to investors of the political commitment to advance a framework that is capable of driving energy market integration and ensure alignment of the EU's market liberalisation and decarbonisation agendas, establishing clear linkage between targets and delivery mechanisms and strengthened arrangements for market governance – including the evolution of regional governance mechanisms (see 3.2 below).

The timing of the emerging debate on a new 2030 Climate & Energy package provides an appropriate and attractive context for facilitating discussion of the nature and scale proposed here. More specifically, the existence of compelling evidence underlining energy market integration as a critical vehicle for unlocking the least cost route to energy decarbonisation underlines the argument for making coherent reform of the energy market framework a pivotal dimension of the 2030 climate and energy architecture.



### 3.2. FORMALISING REGIONAL GOVERNANCE

The report repeatedly refers to the role of the regional level as a ‘stepping stone’ to wider European market integration, especially where governance structures are weak or competences are limited. This is based on a recurrent hypothesis that regional-level approaches offer opportunities to capture much of the value of cross-border resource sharing while still managing to reflect differing national contexts and priorities.

In some cases, such approaches may sidestep conflicts on subsidiarity. However they will never avoid such questions entirely, particularly if regional-level initiatives are endowed with powers previously exercised by member states individually. Equally, from the EU perspective, if regional initiatives seek to exercise adjudication or law-making powers and thereby supplant or circumvent competences allocated to the EU, there is a high likelihood the Commission would challenge them.

There are currently a large number of regional initiatives and activities in the field of energy, ranging from longstanding regional market integration platforms such as Nordel and Mibel to more ad-hoc initiatives such as the North Seas Countries Offshore Grid Initiative, the Baltic Energy Market Integration Plan, and market coupling groups such as the Pentilateral Forum and the 5 Market Coupling initiative. But despite the number of regional initiatives, there is not yet a consistent regional layer of governance within Europe. Most of the initiatives are largely bottom-up collaboration processes without a formal status in European law.

Optimising the value of regional co-operation will therefore inevitably require a move away from the informal arrangements that currently characterise this process. Although the question remains as to whether a shift towards formalising those arrangements is best achieved through a ‘bottom up’ or ‘top down’ approach, the risks of compounding an already highly fragmented European energy market will be significantly reduced if this process is embedded within the European energy framework.

There is a strong bias away from formalised regional governance as a tool for achieving the EU's objectives in areas of shared competence. Although the Commission has signalled its support for regional initiatives, its proposals in this regard do not indicate an immediate willingness to create formalised arrangements in this regard<sup>45</sup>. However, the model of regional governance created by the Energy Infrastructure Regulation potentially provides a valuable model for rolling out the process of regional governance to other contexts<sup>46</sup>. Given that the Commission has already indicated its support for regional initiatives as a tool for accelerating implementation of the IEM2 and IEM3 and Network Codes, it is certainly arguable that serious consideration should be given to developing proposals for formalised regional structures to support these implementation processes.

It is therefore especially relevant to look at the Regional Groups, established in the Energy Infrastructure Regulations, which may provide a model for future regional cooperation. Also ACER plays a critical role in formalising the regional governance levels. In several places the report proposes to expand the competences of both these institutions:

### Regional Groups:

- Extending competences to facilitate cross-border collaboration and identifying regional priorities, including through validating capacity targets for the 'core European network' and developing regional renewable deployment and flexibility resource assessments. To achieve this, more permanent

and better-resourced institutional arrangements for cross-border collaboration would be needed given the expansion of activities envisaged, for example through European budget funding to support dedicated secretariats for each Regional Group.

- Extending competences to allow collaboration on renewables trading. There remains limited political appetite amongst member states for moving to a single renewable renewables support mechanism, and the flexibility mechanisms in the current Renewables Directive are under-used. Developing cooperation mechanisms on renewables trading at a regional level could avoid problems associated with implementing a Europe-wide scheme while still enabling a considerable degree of cost savings. However this would require the relevant initiative to have a clear mandate for decision-making as well as sufficient resources to navigate the complexities that combining national regulatory processes inevitably present.

### ACER:

- ACER should incentivise System Operators to ensure that system-balancing solutions are optimized regionally rather than on a country-by-country basis, based on the physical constraints of the power network. This is essential to facilitate cross border resource sharing and minimise the overall cost of delivering reliability. To achieve this, ACER should develop a methodology to enable System Operation costs to be recovered on a balancing area basis as appropriate, and member states should establish arrangements to enable

<sup>45</sup> Though Articles 170-172 TFEU have provided the legal basis for creating the EU's first legal framework for regional governance within the sphere of energy, significant legal uncertainty and complexity surrounds Member States' and the EU's powers to expand the reach of regional governance beyond the confines of decision making concerning European energy infrastructure. The residual Enhanced Co-operation procedure created by Article 20 TFEU appears to create a potential legal basis for embedding 'bottom up' proposals for further regional governance arrangements within the EU framework where a coalition of (at least nine) willing Member States exists. However, while Article 20 also creates a framework for the adoption of binding acts for participating Member States, thus further mitigating some of the weaknesses associated with purely informal regional arrangements, the Council's powers to sanction enhanced co-operation under Article 20 are explicitly described as being those of 'last resort'. Article 20(2) provides these powers can only be used as a legal basis for enhanced cooperation where it has been established that the objectives of such cooperation cannot be attained 'within a reasonable period by the Union as a whole'.

<sup>46</sup> First and foremost, it creates a framework for delegating the power to adopt binding measures agreed within these groups. Although decision making powers rest exclusively with the Commission and Member States, and the Commission's delegated powers to permit the inclusion of agreements reached in the regional groups in the Annex to the Regulation and thus acquire binding status is time limited (for 5 years) and subject to unilateral revocation by the Council or Parliament, these arrangements nevertheless create a valuable model for exploring how regional governance arrangements could be created in the legally complex context of powers shared between the EU and Member States. Equally, the conferral of new powers to the Commission to designate (in agreement with Member States concerned) 'a European coordinator' for a period of up to 3 years to provide more dedicated monitoring, supervision and support where projects of common interest agreed by the regional groupings encounter 'significant implementation difficulties'

a move towards regionally integrated balancing authorities, along with appropriate coordination of regulatory activity.

Importantly, a corollary of expanded responsibilities to regional governance approaches is an increased need for greater transparency and accountability.

The two approaches considered in this chapter (strengthening EU-level governance structures and formalising regional governance structures) appear to be both feasible and important steps toward a more effective integration and decarbonisation framework for the power sector. As such they are deserving of further analysis and consideration as a matter of urgency.

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## FROM ROADMAPS TO REALITY

FROM ROADMAPS TO REALITY IS THE LATEST STEP IN ECF'S ROADMAP 2050 PROJECT AND BUILDS ON THE ANALYTICAL EVIDENCE IN ROADMAP 2050: A PRACTICAL GUIDE TO A PROSPEROUS, LOW-CARBON EUROPE (2010) AND POWER PERSPECTIVES 2030: ON THE ROAD TO A DECARBONISED POWER SECTOR (2011). THE OBJECTIVE OF THIS REPORT IS TO DESCRIBE HOW THE CURRENT EU ENERGY FRAMEWORK CAN BE IMPROVED TO SUPPORT THE POWER SECTOR TOWARDS FULL DECARBONISATION IN A SECURE AND AFFORDABLE MANNER.

THE ANALYSIS WAS CONDUCTED BY A CONSORTIUM OF AUTHORS INCLUDING E3G; THE REGULATORY ASSISTANCE PROJECT (RAP), AND CLIENTEARTH. THE REGULATORY ASSISTANCE PROJECT (RAP), AND CLIENTEARTH. THE EUROPEAN CLIMATE FOUNDATION ACTED AS A NEUTRAL CONVENER AND PROJECT MANAGER OF THE REPORT.

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A WIDE RANGE OF COMPANIES, TRANSMISSION SYSTEM OPERATORS, TECHNOLOGY MANUFACTURERS, AND NGOs HAVE BEEN CONSULTED DURING THE PREPARATION OF THE REPORT, WHICH STARTED IN JULY OF LAST YEAR. THEIR WILLINGNESS TO CONSULT AND TO BE CONSULTED IN THE COURSE OF THIS WORK SHOULD NOT BE UNDERSTOOD AS AGREEMENT WITH ALL OF ITS ASSUMPTIONS OR CONCLUSIONS. THE ECF WISHES TO THANK THE MEMBERS OF THE CORE WORKING GROUP AND ACADEMIC EXPERT PANEL FOR PARTICIPATING TO THE REGULAR SEMINARS AND FOR HAVING PROVIDED FEEDBACK THROUGHOUT THE DEVELOPMENT OF FROM ROADMAPS TO REALITY. THE CORE WORKING GROUP: ACCIONA; ABB; AGORA ENERGIEWENDE; BIRDLIFE EUROPE; COGEN EUROPE; DONG ENERGY; ELIA; ENECO; FRIENDS OF THE EARTH; FRIENDS OF THE SUPERGRID; GENERAL ELECTRIC (GE); IBERDROLA; RED ELECTRICA DE ESPANA (REE); SCHNEIDER ELECTRIC; SAP; SCOTTISH & SOUTHERN ENERGY (SSE); SIEMENS; STATKRAFT; TERNA; WWF. THE ACADEMIC PANEL: PROF. DR. CHRISTIAN VON HIRSCHHAUSEN, TECHNISCHE UNIVERSITÄT BERLIN; JACQUES DE JONG, CLINGENDAEL INTERNATIONAL ENERGY PROGRAMME; PROF. DR. MICHAEL GRUBB, CAMBRIDGE UNIVERSITY; CHRISTINA HOOD, INTERNATIONAL ENERGY AGENCY (IEA); SAMI ANDOURA, NOTRE EUROPE – JACQUES DELORS INSTITUTE; DR. GORAN STRBAC, IMPERIAL COLLEGE LONDON; DR. GEORG ZACHMANN, BRUEGEL.

FOR MORE INFORMATION ON FROM ROADMAPS TO REALITY:  
[HTTP://WWW.ROADMAP2050.EU/PROJECT/ROADMAP-TO-REALITY](http://www.roadmap2050.eu/project/roadmap-to-reality)

## CONTRIBUTING STUDIES TO ROADMAP 2050

THE CONTRIBUTING STUDIES TO ROADMAP 2050 IS A SET OF PUBLICATIONS STRATEGICALLY ADDRESSING SOME OF THE MAIN CHALLENGES AND SHORT-TERM PRIORITIES AS IDENTIFIED BY THE ROADMAP 2050 ANALYSIS IN THE MOVE TOWARDS A LOW-CARBON ECONOMY IN EUROPE.

## ROADMAP 2050

THE MISSION OF ROADMAP 2050 IS TO PROVIDE A PRACTICAL, INDEPENDENT AND OBJECTIVE ANALYSIS OF PATHWAYS TO ACHIEVE A LOW-CARBON ECONOMY IN EUROPE, IN LINE WITH THE ENERGY SECURITY, ENVIRONMENTAL AND ECONOMIC GOALS OF THE EUROPEAN UNION.

FOR MORE INFORMATION ON ROADMAP 2050:  
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