

From Roadmaps to Reality – Progress Update

December 2012



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1. INTRODUCTION

Over the last few years, ECF¹ has been running a process on the transition to a low-carbon economy Europe, in cooperation with a large group of stakeholders in the energy debate. So far this has resulted in two pieces of technical and economic analysis: *Roadmap 2050: a practical guide to a prosperous, low carbon Europe* (April 2010) and *Power Perspective 2030: on the road to a decarbonised power sector* (November 2011).

The mission of ECF's *Roadmap 2050 project* 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. The *Roadmap 2050 project* is an initiative of the European Climate Foundation, and has been developed by a consortium of experts funded by the ECF. The present project, called *From Roadmaps to Reality*, is accomplished in cooperation with E3G, RAP and Client Earth.

From Roadmaps to Reality aims to support and progress the thinking around the challenges of the transition of the European power systems. It does so by exploring key questions, identifying key obstacles and mapping out sets of solutions that best supports the decarbonisation of the power sector over different timescales. We expect the Commission to come out with a communication in 2013 on a post-2020 climate & energy approach possibly leading to concrete legislative proposals in the years after.

In the first phase of the project, ECF convened three seminars to scan the scene and establish a common understanding of the key questions around the power sector transition.

In this Progress Update we provide an overview of the outcomes from the first phase of the project and indicate a direction for the next phase of the R2R project. The main purpose of the document is to establish a common understanding with the Core Working Group on where we are after the first three seminars.

In the last chapter we have outlined our current thinking regarding the next steps for this process. On January 16th we will convene a meeting to conclude and agree on the programme for 2013 and set the dates for upcoming activities.

First, we would like your feedback on the outcomes of the first three seminars in order to establish a common understanding but any sort of comments are of course welcome. After each section there is a box containing a question.

We invite you to send back comments on the document before the end of the second week of December.

The Progress Update is a "live" document intended to function as a communication tool among the participants in the Core Working Group. A new version adapted to your views and comments and containing a more detailed proposal on the next phase will be sent out for consideration before the "taking stock" meeting on January 16.

¹ The ECF was established in early 2008 as a major philanthropic initiative to promote climate and energy policies that greatly reduce Europe's greenhouse gas emissions and to help Europe play an even stronger international leadership role to mitigate climate change. The ECF aims to significantly drive the transformation of Europe to a low carbon economy, which means reducing greenhouse gas (GHG) emissions in Europe by 30% in 2020 and at least 80% in 2050.

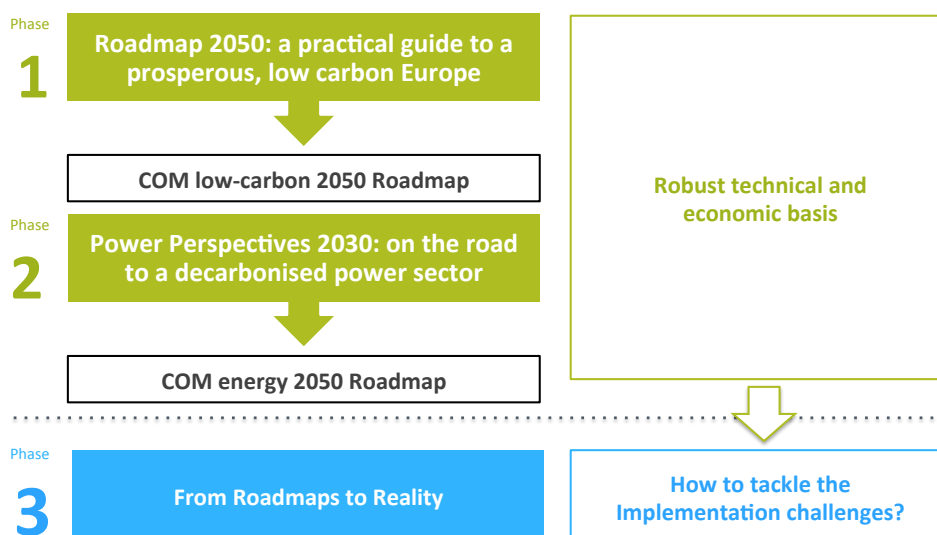
2. ECF'S ROADMAP 2050 PROJECT

The relative success of ECF's roadmap projects so far is best illustrated with the publication of the European Commission's *Energy Roadmap 2050* communication (December 2011), which has confirmed many of the key findings from the ECF studies. These are:

1. *Electricity plays an increasing role in the energy system*
2. *Energy savings throughout the system are crucial*
3. *Renewables move centre stage – but all fuels can contribute in the long-run*
4. *The importance of grid capacity increases, both on transmission and distribution level.*
5. *Rethinking energy markets in Europe*
 - *Need for more flexible resources.*
 - *RES impact on wholesale market prices*
 - *Ensure that market arrangements offer cost-effective solutions, allowing all resources to be used (including demand side)*
 - *Ensure that policy developments do not create new barriers to - market integration*
6. *Decarbonisation is possible – and can be less costly to society than current policies in the long run.*
 - *Large investments for capital-intensive electricity resources are needed, but operational expenditure and the external fossil fuel bill decreases substantially.*

Today, the debate in Europe is shifting from technical analyses to real-world implementation challenges. More specifically, how to get to a suitable set of policies in line with the analytical findings of the COM's *Energy 2050 Roadmap*. This responds indirectly to the call for input from Commissioner for Energy, Guenther Oettinger, for a climate and energy package after 2020.

ECF'S PROCESS – FROM ROADMAPS TO REALITY



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As indicated, the different Roadmaps show an increasing role for electricity in other energy-using sectors as well (buildings, industry, transport, etc.). This puts the power

sector at the heart of the energy transition and turns it into the driver of decarbonisation for other sectors too. However, this will not happen overnight and different markets and policies will still apply to different sectors, the same way as the current climate and energy package deals with different energy sectors. Still, ECF considers it is relevant to take the power sector as the focus of its process as a starting point for the wider discussion on the energy transition.





































Question 2 to the Core Working Group: Do you have comments on the interpretation of the findings in the Commission's Energy Roadmap as presented in this section?

3. FROM ROADMAPS TO REALITY:

3.1 The value of the process

The willingness of the core working group (CWG) participants to consult and be consulted has been of critical importance. As the debate moves from roadmaps to reality, this CWG can play an equally significant role in sorting out the implementation challenges for the power sector.

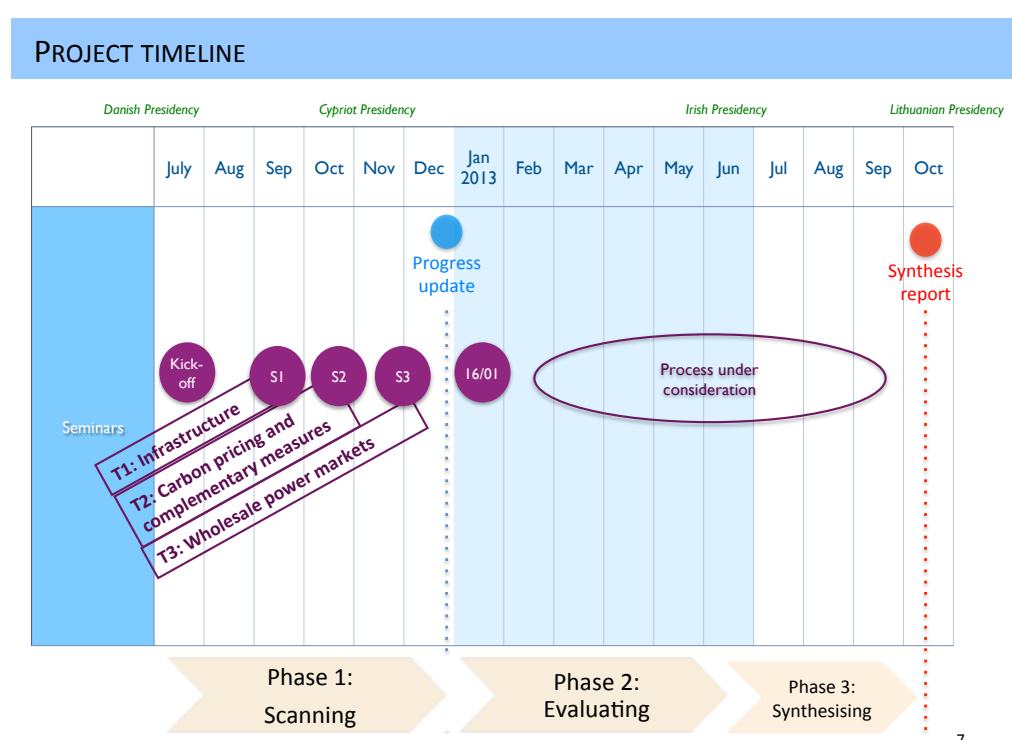
Externally, towards the public debate, a set of ideas that has been 'battle-tested' in a large stakeholder group will have a particular appeal to policy makers. Internally as well, ECF aims to add value for the organisations involved with expert contributions and mutual learning from different organisations' points of view.

PROJECT STRUCTURE AND INVITED PARTICIPANTS			
Coordinator	Participants		
Lead authors	Utilities	         	Expert panel
	Energy	 	
	Tech Manufacturers	   	
	TSOs	   	
	DSOs	 	
	NGO	  	
	Other organisations	  	
	IT companies		
	Finance	 	
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Question 3.1 to the Core Working Group: Do you have comments on additional measures to be taken to add value to the ongoing study? Are there stakeholders or expertise that should be added to the process?

3.2 Where we are and where we are heading

The autumn seminars was prepared and run by lead authors from RAP, E3G and Client Earth. The seminars involved the core working group and a group of academic experts. The seminars aimed to scan the power sector scene and identify the key issues and questions around the implementation of the transition. The results of the scanning phase will serve as the basis for the next phase in the *From Roadmaps to Reality* project.



We foresee to draft a **synthesis report** in the autumn of 2013 that provides an overview of the main points and conclusions at the end of the project. Concretely, that means that by then we want to (1) identify the key questions/obstacles to the power sector transition (what really matters), (2) evaluate different solutions by comparing frameworks and (3) indicate the implications and consequences of different options/choices. With this we aim to support policy makers, both EU and MS level, in sorting out the challenges for the power sector for the coming years and to inform them of the choices and trade-offs that need to be handled.

The ECF is solely responsible for the final document of the project. Having participated in the CWG seminars does not imply, and will not be presented as, full endorsement of the content of the final report. All participants retain the right to withdraw their name from the document when asked for permission before publication.

Question 3.2 to the Core Working Group: Do you have comments on the project timeline, the realism in relation to expected outcome or the timing of the end product?

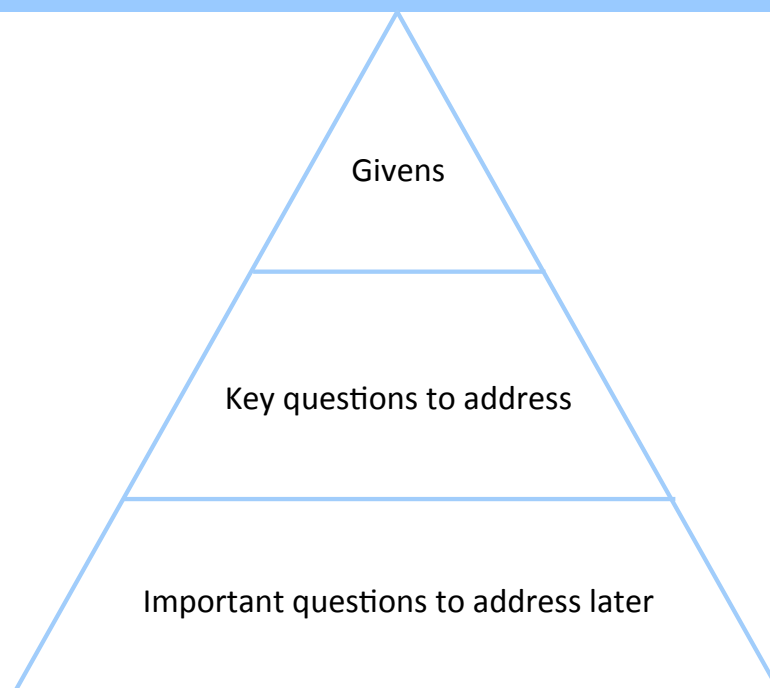
4. THE SCANNING PHASE

At the seminars, the core working group and the expert panel discussed the briefing notes drafted by the lead authors, and presented several constructive contributions and viewpoints. The outcomes outlined in this chapter and in its appendix are non-exhaustive and are open for your review and feedback.

The main outcomes of each of seminars are summarized in a strategy triangle. The 'triangle' tool differentiates between three categories: *givens*, *key questions to address now* and *important questions to address later*:

- Under *givens* is outlined what the participants in the seminar could accept as a starting point for the conversation and which developments they considered as relevant to build the conversation upon. This does not represent the group's view of what is set in stone or what will happen without any specific effort or commitment. The *givens* should therefore be understood as 'reality assumptions'.
- The next two categories aim to summarise the key questions that came up at the seminars. The participants considered these questions relevant and important to tackle, representing a major obstacle or issue to a successful transition in line with the analytical basis in the roadmaps. Within this category, we attempted to reflect the group's views on what are *key questions to address now* and what are *important questions to address later*.

OVERVIEW OF SEMINAR OUTCOMES - 'TRIANGLE'



4.1 Seminar on infrastructure

The first seminar addressed challenges facing energy network infrastructure in the context of the transition to a decarbonised power system. The scenarios outlined in the 2050 Roadmaps imply major changes to the type, volume and utilisation of future energy infrastructures (including electricity transmission and distribution grids, gas pipelines and carbon dioxide pipeline networks). Successful delivery of these networks will be a key enabler (or constraint) on future power system options. Although the required investment in energy infrastructure will be significantly lower than generation, the scale, speed and extent of infrastructure development foreseen is a major difficulty. This is compounded by the challenges of reconciling the long-lived nature of infrastructure assets with the uncertainties facing future development of a rapidly changing European power system. In addition, successful infrastructure development will depend on aligning approaches between different levels of governance and between infrastructure types. In response to these issues, there are two underlying tasks for policymakers. The first is to develop a framework that enables sufficient forward visibility for decisions on long-lived network investments to be taken, without unduly restricting or distorting power market operations. The second is to ensure the deliverability of infrastructure objectives; through ensuring investment incentives reflect long-term value rather than a short-term focus on cost control.

Givens

- A power mix in transition will feed significant infrastructure needs, but significant uncertainty remains on what generation is built and where.
- Implementation of the 3rd Package and Energy Infrastructure Package will take place but difference between Members States' approaches continue to exist
- Most infrastructure projects will continue to be slow to develop

Key questions to address

- How can infrastructure be developed at the required scale and speed?
- How can uncertainty be managed and the infrastructure investment risks be dealt with?
- How can consistency between infrastructure types, and jurisdictions be improved?
- How can demand side investments be used to reduce the needs and delivery risks?
- What governance arrangements could best deal with these challenges?

Important questions to address later

- What specific lines, pipelines or corridors are needed?
- Which new infrastructure technologies need to be supported?
- What should the level of any new targets be?
- What is the most appropriate remuneration regime and level?

Question 4.1 to the Core Working Group: Do you agree with the givens, key questions to address now and important questions to address later as described in the section? Are important issues missing? Are the priorities made correct?

4.2 Seminar on carbon pricing and complementary measures

Workshop 2 explored the role that carbon pricing and complementary measures will play in the post-2020 policy framework. There is little academic consensus over the optimal mix of measures with different parties preferring a simple approach that is easy to understand or one that is more complicated and has the potential to deliver more cost-effective abatement. However, it is generally accepted that broad ranging mechanisms operating at an EU level and linking into international mechanisms should be more efficient. These theoretical considerations are complicated by various national perspectives across Europe. Countries have different views on the extent to which a diverse technology mix needs to be promoted using different subsidy mechanisms and also on the nature of the desired mix. Moreover, some countries have national decarbonisation goals and it does not appear possible to achieve these different objectives with single pan-European instruments. Tensions between carbon pricing and complementary policies and between EU and member state level governance have the potential to undermine the effectiveness of policy mechanisms through inconsistency and incompatibility. The challenge is to ensure that these tensions are resolved in a way that is mutually reinforcing and that creates a robust basis for investment.

Givens

- There will be an EU ETS based on a 2030 reduction target
- Investment in a diverse range of low carbon technologies (primarily RES) will not happen without some form of dedicated subsidy mechanism
- Member States have different views on investments in a low carbon technologies, and where they believe technology support is required, there are differing views on which and how much technologies
- Broad ranging (EU-wide) mechanisms are more efficient than a number of narrow ranging (member state based) mechanisms from an overall EU perspective.

Key questions to address

- What is the role of the power sector in decarbonisation and is there any need to make this clearer?
- Why are complementary measures necessary to ensure broader policy objectives and what options do Member States have?
- How should complementary policies be designed and implemented to ensure they reinforce the role of ETS rather than undermine it?
- What combination of mechanisms and governance is most likely to attract sufficient investment?
- What are the advantages/disadvantages for Member States in signing up to pan-EU complementary measures?
- Are there any new high level design features that the ETS must have (e.g. to stabilise price) to ensure consistency with complementary measures and support efficient investment?

Important questions to address later

- What will the EU carbon reduction target be?
- Should the scope of ETS be extended to other sectors and what does this mean for the design of ETS?
- How do climate and energy policies support the growth/competitiveness agenda?
- What design features need to be introduced to support competitiveness?
- What technology targets should complementary measures deliver (at Member State or EU level)?

Question 4.2 to the Core Working Group: Do you agree with the givens, key questions to address now and important questions to address later as described in the section? Are important issues missing? Are the priorities made correct?

4.3 Seminar on wholesale power markets

Seminar 3 considered the key challenges posed to a competitive-market-based electricity sector by the EU's climate commitments, and vice versa. The various roadmaps all acknowledge, to varying degrees, the central role markets and private sector capital are expected to play in Europe's power sector. At the same time, however, each of them also poses specific challenges to the wholesale power markets. This is in the nature of roadmaps – while markets are open-ended affairs roadmaps are employed with a stated destination in mind. In the case of the roadmaps considered here, the destination they share in common challenges markets to (i) promote a pattern of resource investment that leads to a nearly zero carbon (or, in one case, carbon-neutral) power sector by 2050; and (ii) enable the power system to continue to deliver reliable and affordable electricity throughout the period to 2050 as it adapts to this new supply paradigm.

The central tension that animated the discussion is between (i) the goal of improving the functioning of the market so that the commonly agreed objectives of energy policy – sustainability, security of supply and affordability – are properly and fully valued in interactions between buyers and sellers, and (ii) the need or desire to intervene administratively in the market out of a concern that it cannot or will not adequately promote one or more of these objectives.

Givens

- COM and MSs committed to IEM but MS approaches differ
- Supply imbalances due to out-of-market support schemes
- Security of supply and decarbonisation objectives require considerable investment
- Full competition, market liquidity and transparency essential for investment

Key questions to address

- Which existing resources will or should retire?
- When are market interventions to encourage investment warranted?
- Extent of intervention variation across regions without undermining IEM?
- Intervention design that complements IEM and reflects future supply mix?
- How is “security of supply” evaluated in interventions at different governance levels?
- How can participation of “smart” demand-side resources be fully realized?
- How to develop and deploy a diverse portfolio of resources and technologies post-2020?

Important questions to address later

- National TSOs Vs independent supra-national system operators, re. achieving favorable market conditions?
- Fair remedies to address the “average price” challenge faced by (competitive) renewables?
- Best way to allocate balancing services costs for different production patterns?
- Compatibility of IEM with supply portfolio 60%+ capital-intensive, very low marginal cost resource?

Question 4.3 to the Core Working Group: Do you agree with the givens, key questions to address now and important questions to address later as described in the section? Are important issues missing? Are the priorities made correct?

The content and outcomes of the seminars have been documented extensively in briefing notes, slides, minutes and reflection notes. The full documentation will be available on the project website: www.roadmap2050.eu before the next seminar on January 16th. Appendix A to this report gives an elaborated overview of the main outcomes of the seminars.

5. INITIAL CONCLUSIONS FROM THE SCANNING PHASE

In order to form a stepping stone for the next phase in the project tentative conclusions have been drawn on general issues, key dimensions and a merged strategy triangle to sort out what should be taken as given, the most pressing issues and issues that can be handled later.

5.1 General conclusions so far

- The core issues and challenges addressed in the seminars are crosscutting. Each of the core challenges identified – scale, speed, deliverability; uncertainty and predictability; consistency – applies to all three seminar themes
- There is no single solutions (the problem is too complex) when the context is taken into full account
- An all-European solution has clear cost benefits but would be challenging to deliver in practice. Still, a benchmark solution can be defined by making assumptions (note: that depends on how we shape the ‘benchmark solution’, we could also take ‘today’s situation’ as leading parameter to draft a starting point solution package.)
- The space of possible solutions can be described by refining and elaborating on main challenges
- By forming a benchmark solution (strong visible European hand + RMs realised) a point of reference can be constructed
- Identifying and quantifying the gaps between a benchmark solution and alternative options will give relevant information to judge the “costs”/consequences of different choices to be made
- “Costs”/consequences will have to be assessed in different time perspectives

Question 5.1 to the Core Working Group: Do you agree with the conclusions drawn in this chapter? Are important issues missing? Are the themes covered the most relevant ones?

5.2 Key dimensions

Throughout the seminars, and despite the different themes, we identified that similar structural questions came back in every discussion. These can be summarized in three dimensions:

1. Governance
 - How can society's preferences be turned into instruments that can have an enduring impact on market outcomes? Are the means to make consistent choices in place?
 - Are different instruments aligned and reinforcing? What instruments need to deliver what outcome?
 - What is needed to avoid "governance failure"? Are mechanisms facilitating "course corrections" in place? How is market confidence achieved? How are risks for flip-flopping handled?
2. Geography
 - What needs to happen on different governance/competence levels?
 - How can actions with various geographical outreaches be aligned and mutually supportive?
 - Are there restrictions (legal, physical, practical...) to what can be dealt with on different levels? Where do European solutions add real value from a power system perspective? What sort of "appetite/demand" for common solution can be expected from a member states perspective?
3. Markets
 - How is demand organised and by whom? Consumer empowerment. The role of/room for DSR.
 - How is planning/direction and market forces/incentives aligned (selective or radical surgery)?
 - Are the markets investable? For whom?

Question 5.2 to the Core Working Group: This section identifies three key dimensions. Do they, taken together, constitute a relevant set of dimensions for describing alternative frameworks in the next phase of the project?

5.3 An initial merged triangle for the scanning phase

Givens

- The established policy path (IEM, ETS, 20-20-20 package, Infrastructure) will be sustained but major improvements/reinforcements will be required
- Huge investments are needed
- Progress will not happen by itself, society's requests will have to transformed into policy impact
- EU policy action will have to build on MS demand

Key issues to address

- Governance arrangements to ensure decarbonisation delivery have to be sorted out. Coherence between different policy instruments influencing the power sector is needed to avoid “cannibalising”; instruments applied should be mutually reinforcing. The same goes for EU versus MS actions.
- Regional cross-border coordination will be needed
- The role of power in relation to energy and the economy at large – power can act as “forerunner”, but how should the role of power be handled in relation to the energy sector and the economy at large?
- Market incentives are needed/have to be established (combinations of incomes/costs and “risk relief”). Consumer empowerment and demand side response will have to grow in importance.

Important issues to be addressed later

- On governance – “Details” can/should be sorted out at a later stage
- The role of TSOs in a regional cross-border coordination context
- The role of power in relation to energy and the economy at large
- Market incentives – design issues

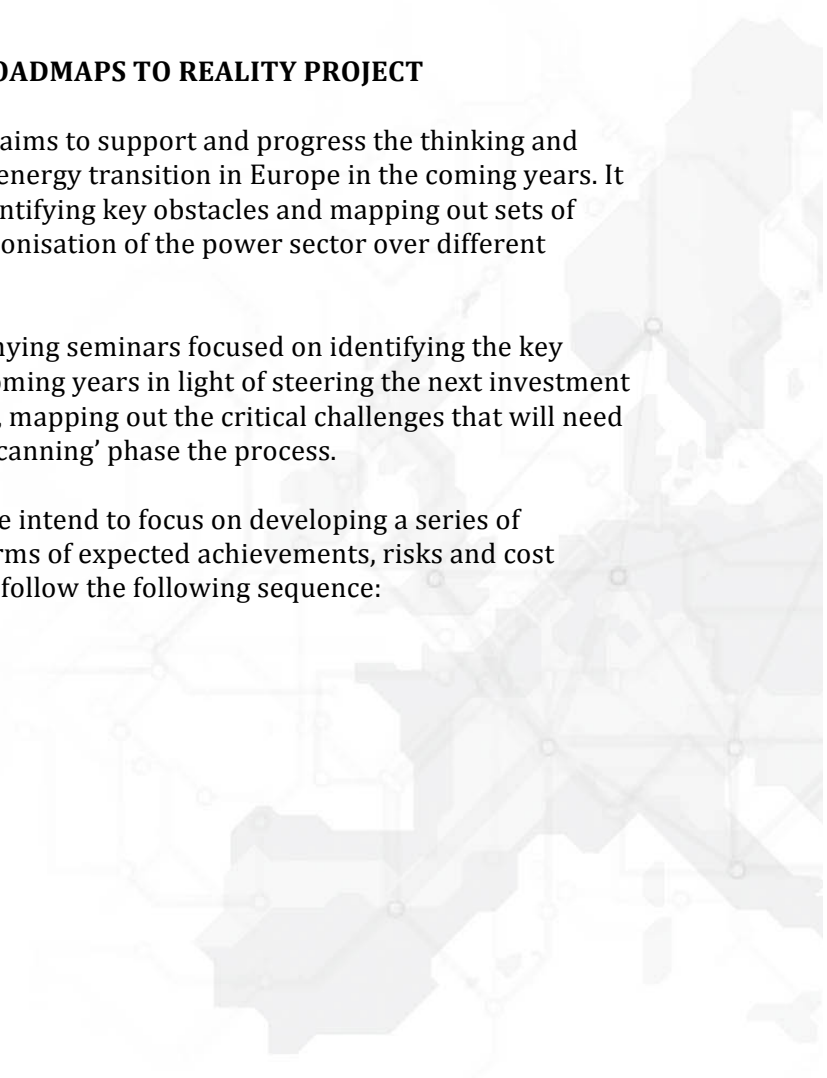
Question 5.3 to the Core Working Group: Do you agree with the consolidated givens, key questions to address now and important questions to address later as described in the section? Are important issues missing? Are the priorities made correct?

6. THE NEXT PHASE IN THE FROM ROADMAPS TO REALITY PROJECT

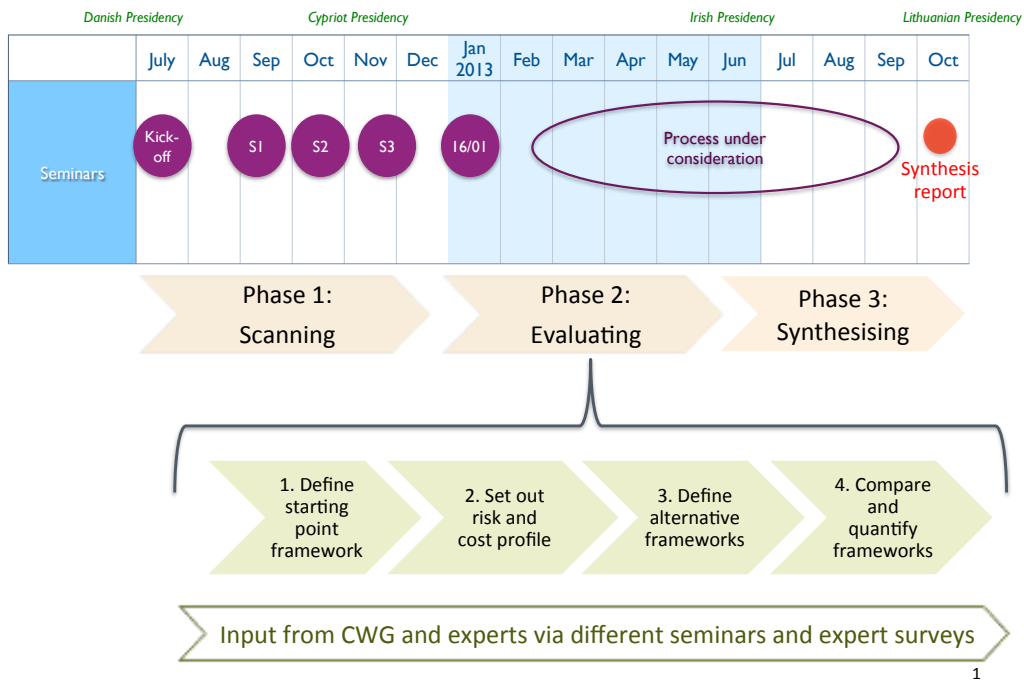
The *From Roadmaps to Reality* process aims to support and progress the thinking and understanding of the challenges in the energy transition in Europe in the coming years. It does so by exploring key questions, identifying key obstacles and mapping out sets of solutions that best supports the decarbonisation of the power sector over different timescales.

The initial briefing notes and accompanying seminars focused on identifying the key obstacles for the power sector in the coming years in light of steering the next investment cycle in line with the roadmap analysis, mapping out the critical challenges that will need to be addressed. This was part of the ‘scanning’ phase the process.

In the next phase, called ‘evaluating’, we intend to focus on developing a series of frameworks and comparing them in terms of expected achievements, risks and cost profiles. In practice, the process would follow the following sequence:



PROJECT TIMELINE



The final delivery is a synthesis report in which we aim to deliver an overview to policy makers about the key issues for the power sector transition and the implications of the choices at hand.

Question 6 to the Core Working Group: We will get back to you before the “taking stock” meeting on January 16 of the year with a more in-depth description of the process going forward and a proposed work programme. Please feel free to feed in your views and to the direction as indicated in this section. Are the steps proposed relevant? Does the sequencing make sense?

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