

European Commission

Directorate-General for Energy

Mid-term evaluation of
the European Energy
Programme for
Recovery

Final Report

Disclaimer

The views and comments expressed in this text are the responsibility of Deloitte and do not necessarily reflect the opinion of the European Commission.

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Deloitte
Berkenlaan 8c
B-1831 Diegem
+32 2 600 60 00

www.deloitte.be

EXECUTIVE SUMMARY

1. Introduction

In late 2008 and early 2009, the European economy faced a sharp downturn in the wake of a global financial crisis at a time when there was an increasing policy focus on the need for greenhouse gas reduction and at the same time, there were concerns about security of supply, particularly for gas.

Part of the EU response within a European Economic Recovery Plan (Recovery Plan) (EERP) was the European Energy Programme for Recovery (EEPR). The goal was to finance measures that rapidly addressed both the economic crisis and energy policy objectives. The emphasis was on mature projects capable of making efficient and effective use of significant amounts of financial assistance by the end of 2010 and of catalysing significant amounts of investment from other sources, including from the European Investment Bank; and where action at European level would add value. The Regulation establishing the programme also required adequate geographic balance to be taken into account¹.

Three sectors which met the criteria of the EEPR were gas and electricity infrastructure (EGI), offshore wind energy (OWE) and carbon capture and storage (CCS). Each sector constituted a sub-programme of the EEPR. Within two sub-programmes, there were sub-categories designed to ensure that certain technologies or types of project received funding, e.g. North Sea grid integration of wind energy or reverse flow projects for gas. Many of the projects to receive funding were already identified in the Regulation as were the maximum amounts they could receive. That amount was up to half the cost of the action to be financed by the EEPR (with the exception of actions under the CCS sector where the co-funding rate could be up to 80%) – an action being part of a wider project. Project promoters nevertheless had to submit proposals for actions which met the selection and award criteria defined in the Regulation. The selection of projects reflected the needs identified in the Second Strategic Energy Review.

The total financial envelope available was almost EUR 4 billion, which all but EUR 146 million² was committed by end-2010, the date set in the Regulation. The commitments by sub-programme were:

- Electricity and gas infrastructure projects: EUR 2,267m (please chose a single format (€ or EUR, m or million) and use it consistently throughout the entire report) committed of EUR2,365m available;
- Offshore wind energy projects: EUR 565m fully committed;
- Carbon Capture and Storage projects: EUR 1,000m committed of EUR 1,050m available.

Fifty-nine energy projects received funding: 44 gas and electricity infrastructure projects, nine offshore wind and six carbon capture and storage projects. Some projects have already been completed and are now operational, or are close to it. Those are mainly gas infrastructure projects.

¹ Regulation (EC) No 663/2009 of the European Parliament and of the Council of 13 July 2009 establishing a programme to aid economic recovery by granting Community financial assistance to projects in the field of energy.

² The uncommitted funds were reallocated to a newly created facility, the European Energy Efficiency Fund, supporting energy efficiency projects.

Most others had by May 2011, the cut-off date of the mid-term evaluation, incurred costs or placed orders representing significant amounts of investment. Payments under the EEPR by that date were EUR 367m for electricity and gas infrastructure projects, EUR179m for offshore wind energy projects and EUR300m for carbon, capture and storage projects.³ The rate of payments versus commitments was 16.2% in the case of electricity and gas infrastructure, 31.6% in the case of offshore wind energy and 28.6% for carbon capture and storage – an average of 21.8%. These expenditures had a significant leverage effect through orders placed.

In recognition of the well known risks that large infrastructure projects will encounter delays, the Commission imposed special reporting conditions on some projects to minimise the financial risks to the Union of failure to spend the committed amounts. Some of these conditions had not been lifted as of May 2011.

2. Electricity & Gas Infrastructure

The EEPR, through its selection of electricity and gas infrastructure projects, was relevant to economic recovery because it was intended to provide an indirect stimulus to sectors hit by the economic downturn, such as construction, cable and pipeline manufacture. It was also relevant to energy policy objectives because it was in line both with infrastructure policy priorities set out in the Strategic Energy Policy Review and the need for a response to the gas supply crisis of early 2009. At the time of that crisis in January 2009, the EU paid a price for outdated and poorly interconnected energy infrastructure, and a lack of reverse flow options, and of adequate interconnection and storage infrastructures. This meant the EU had no easy solutions to the gas disruptions, particularly in Eastern Europe. The electricity projects were in addition relevant to contributing to reducing greenhouses gases because they were designed, inter alia, to contribute to enabling intermittent supplies of renewable to be better managed.

The level of funding was also appropriate to the needs of the projects. In some cases, the sums of money made a critical contribution in absolute terms; in others, it had a ‘quality label’ effect, i.e. other financial backers were readier to contribute because the project had the backing of the EU. These grants also met a need to reduce the risk profile of these projects, including projects vital to security of gas supply, but not fully commercially viable.

The EEPR has been effective and efficient in that it enabled nine projects (one-fifth of the projects) to achieve completion by mid-2011, and there are sound reasons based on a web-based survey of beneficiaries and interviews with stakeholders to believe that most of these would have been unlikely to have progressed this far by that date without the EEPR. These projects are two electricity interconnectors, three gas pipelines and four reverse flow/gas storage projects. Most other projects are moving ahead. Nevertheless, the evidence gathered indicates that the EEPR contributed to overcoming financial – and to some extent administrative – obstacles that were preventing a number of projects progressing, and in some cases led to them being accelerated. The EEPR funds disbursed by the cut-off date of this evaluation of May 2011 have had benefits for the wider economy because relatively small amounts often secured very large orders with suppliers.

³ These amounts include advance payments.

Six projects, mainly large gas projects, had still to take their Investment Decision as of the cut-off date of this mid-term evaluation. The reasons include the inherently complex nature of large energy infrastructure projects, not just when it comes putting the financial package together, but also in relation to permitting and regulatory authorisations, and conclusion of gas supply contracts. However, this is not stopping investment going ahead.

The EEPR has also had a short-term impact on job creation within the EU, particularly in non-technical/non-managerial jobs. The data must be treated with caution and it is particularly difficult to measure the indirect employment effects, but more than 5,000 jobs had been created by May 2011. Almost all those jobs were within the EU.

While the full benefits of a number of the projects associated with EEPR actions have yet to be reaped, a number of the interconnectors are already in use, either partially or fully. This is contributing to security and diversification of supply, better functioning of the single market, more efficient use of resources – including intermittent renewables and greenhouse gas reduction. In addition, there has been a significant addition of reverse flow and gas storage capability for use in a crisis. Consequently, the EEPR electricity and gas infrastructure projects are already proving their value and utility.

3. Offshore Wind Energy

Offshore wind was identified by the European Commission in 2008 as a strategic energy technology in the European Strategic Energy Technology Plan (the SET Plan). By providing funding for offshore wind energy under the EEPR, the intention was that the wind farms selected should be those moving the technology forward, i.e. they should be at the frontier between demonstration projects and commercial development – taking wind farms into ‘uncharted waters’, i.e. deep and distant offshore locations, and/or upscaling innovative technologies. This was particularly relevant to countries without many nearshore options, notably Germany. The grid projects were designed to add a (new) cross-border dimension to offshore wind transmission connections to improve the functioning of the internal market, with an emphasis on the importance of integration of networks.

The EEPR was clearly relevant to these needs. It helped leverage additional finance at a time when the finance sector was cutting back on lending to the offshore wind industry because of the financial crisis and economic downturn, just as the industry was reaching a level of maturity at which it could move from demonstration to large-scale deployment of large turbines in deep waters. The EEPR contributed to projects going ahead, which might otherwise have stalled, and sped up the pace at which some new technologies could be introduced.

One EEPR offshore wind farm began feeding power to the grid in December 2010; another began installing foundations in August 2011 and by the time this report was finalised had installed the foundations for half the turbines. A third had been able to deploy a more innovative technology. The orders placed by two offshore wind farm projects had by May 2011 contributed significantly to the development of industrial clusters in innovative technologies in northern Germany.

Large and innovative projects in an industry with difficult operating conditions are inherently risky, but the EEPR contributed not only to mitigating financial obstacles, but to some extent made it possible for promoters to overcome some administrative obstacles as well. It was beyond the scope of the EEPR to be able fully to mitigate permitting risk, and where there were still delays as of May 2011, this tended to be a major contributing factor. These delays were mainly affecting grid projects, which in any event were expected not to be completed until the middle of this decade.

The EEPR projects in Germany, the site of most of the wind farm projects on the EEPR list and a particular focus of the evaluation, have made a clear contribution to economic activity and the energy policy objectives of a low-carbon economy. They had created or protected an estimated 4,000 jobs by May 2011 and contributed significantly to kick-starting large-scale deployment of offshore wind in Germany, together with associated industries and innovation clusters. This should boost the competitiveness of the EU industry as a whole, including on non-EU markets, and have the potential for replication elsewhere in the EU.

4. Carbon Capture and Storage

The choice of CCS as an EEPR sub-programme reflected the priorities of the EU's Climate and Energy package of 2007, and the adoption in 2009 of a legal framework and significant incentives for the deployment of carbon capture and storage via the adoption of the Directive on the geological storage of carbon dioxide and the revision of the Directive on the EU Emission Trading System (ETS). At the time the EEPR was adopted, CCS was about to move from pilot to demonstration scale, requiring a quantum leap in financing and representing significant risk for the industrial companies involved. The EEPR sought to finance, and therefore contribute to validating, a range of possible future CCS technologies, and at the same time explore and develop different storage options.

The overriding objective of the EEPR was economic recovery, with energy policy objectives nevertheless very much in the forefront. In the case of the CCS programme, the relevance to the energy policy objectives, particularly the decarbonisation of the energy sector and the development of a low-carbon economy, was in practice predominant in the short term in order to spur the development of this sector at a crucial time in its development. CCS had, moreover, been identified as a strategic energy technology in the SET Plan.

The levels of funding mobilised for CCS via the EEPR were significant and relevant to the financing needed to embark on investment and sign contracts with suppliers – including for significant amounts. Although they were never intended to cover the full project costs, it was expected that they would leverage additional funding and thus trigger a final investment decision if all non-financial obstacles were to have been overcome. This has not yet been the case. Furthermore, regulatory uncertainty has continued to hold up deployment of CCS on a demonstration scale, and in particular CO₂ storage. However, while this was still true as of May 2011, we note that one project appeared to be close to a Final Investment Decision as this report was being finalised. At least one other appeared certain to go ahead if its application for funding under the NER 300 programme is approved. Investment in another had been stopped, however.

Nevertheless, the EEPR has contributed to accelerating the launch and early development phase of CCS demonstration projects of technologies which appear to have very good potential for the industrial validation of technologies, particularly capture technologies already developed on a pilot scale. Via the CCS project network, the European Commission – through the EEPR – has created the first European platform for sharing knowledge and best practice by CCS demonstration projects promoters.

The rate at which the projects have advanced has been variable, as might have been expected for a cutting-edge technology. Some project promoters have, moreover, been or felt unable to proceed until the storage directive has been incorporated in national legislation. This reluctance has been exacerbated by uncertainty about the future carbon price within the emissions trading scheme.

Consequently, the number of jobs created as of May 2011 was estimated at 400. The socio-economic benefits of CCS technology will clearly take longer to reap.

It is consequently also too early to say what role the CCS sub-programme will ultimately play in the switch to a low-carbon economy or developing an EU-based CCS industry which also has the potential to compete on world markets.

5. Conclusions

- Overall, the objectives and the resources of the EEPR Regulation were of relevance to economic recovery and of significant relevance to energy policy, and fulfilment of EU energy policy objectives.
- While the objective of the EEPR was economic recovery, it was also designed to meet energy policy objectives, and this implied funding large energy infrastructure projects which by their nature do not always proceed on schedule – resulting in a tension with the desire for quick-start investment. The financial resources made available by the EEPR are, therefore, being used, but not always as rapidly as might have been envisaged because of the type of project selected, but also because the economic crisis has been more protracted than had been hoped.
- Nine electricity and gas infrastructure projects had already been completed by mid-2011 – two electricity interconnector projects, three gas interconnectors and four reverse flow/storage projects; most other projects have begun construction and/or begun tendering/placing orders for major items of capital expenditures. A handful of electricity and gas infrastructure projects, mainly large gas infrastructure projects, have not yet taken their Investment Decision, but this is not a bar to preparatory investment.
- One EEPR offshore wind farm began feeding power to the grid in December 2010; another began installing foundations in August 2011. The orders placed by two offshore wind farm projects had by May 2011 contributed significantly to the development of industrial clusters in innovative technologies.
- CCS demonstration projects were already investing in validating their technologies at the time of the evaluation, but had not yet taken final investment decisions. However, at least one project appeared likely to do so some time in 2012.
- Where projects are taking longer to get off the ground than had been hoped, this is consistent with the pattern of financing and permitting difficulty frequently found in programmes involving large infrastructure, particular where projects cross borders or a technology is moving from demonstration to industrial-scale deployment.
- Utilisation of the EEPR funds measured solely on the basis of payments to promoters understates the impact of the programme, since this has leveraged substantial additional expenditure in terms of orders placed.
- The EEPR had a catalytic effect on other funders in a significant number of cases and on regulatory authorities in a few cases, and therefore has already contributed to achieving the programme objectives to a perceptible extent.

- It is both too early and intrinsically difficult from the information available from many of the beneficiaries to draw conclusions at this stage on socio-economic benefits. However, there appear to be short-term employment benefits in electricity and gas infrastructure, offshore wind and to a lesser extent CCS. Long-term employment and competitiveness benefits from offshore wind, and with less certainty at this stage, CCS appear likely.
- As more and more EEPR projects come on stream, the EEPR is contributing to achieving the energy policy objectives of security of supply, decarbonisation, competitiveness, completion of the energy single market, and functioning of energy markets.
- It is already possible to identify areas in which the EEPR is contributing to security of supply, competitiveness, greenhouse gas reduction and completion of the single market.

Contents

1	Introduction.....	7
2	Context of the European Energy programme for recovery	9
2.1	The policy context.....	9
2.1.1	The European Energy Programme for Recovery (EEPR).....	10
2.1.2	The EU energy policy context	11
2.2	EEPR objectives, scope and implementation.....	18
2.2.1	EEPR Objectives and scope.....	18
2.2.2	Selection and award criteria	20
2.3	EEPR implementation.....	22
3	Evaluation of the Electricity and gas infrastructure sub-programme	24
3.1	Introduction.....	24
3.2	Relevance.....	25
3.2.1	Introduction and summary	25
3.2.2	Relevance of the contribution to economic recovery.....	25
3.2.3	Contribution to energy policy objectives	27
3.3	Effectiveness and Efficiency.....	29
3.3.1	Introduction and summary	29
3.3.2	Status as of May 2011	30
3.3.3	Contribution of EEPR to securing financing	33
3.3.4	Contribution to restoring investor confidence and leveraging additional funds	34
3.3.5	Contribution to overcoming non-financial obstacles	35
3.4	Impact	39
3.4.1	Introduction and summary	39
3.4.2	The broader socio-economic benefits	40
3.4.3	The employment impacts	41
3.4.4	The geographic spread of benefits	42

3.4.5	The implied multiplier effect	43
3.4.6	Job creation as a function of budget consumption	44
3.5	Utility	45
3.5.1	Introduction and summary	45
3.5.2	Contribution to security of supply	45
3.5.3	Contribution to lower GHG emissions and long-term decarbonisation	48
3.5.4	Contribution to the completion of the energy single market and the functioning of the energy markets	49
3.5.1	Contribution to Europe’s competitiveness	50
3.6	Conclusions	52
4	Evaluation of the offshore wind energy sub-programme	53
4.1	Introduction	53
4.2	Relevance	54
4.2.1	Introduction	54
4.2.2	Relevance of the EEPR to economic recovery	54
4.2.3	Relevance of the EEPR to energy policy objectives	57
4.3	Effectiveness/efficiency	60
4.3.1	Introduction	60
4.3.2	Extent to which the financial resources are being used	60
4.3.3	Extent to which the programme objectives are being met	62
4.3.4	The contribution of the EEPR	63
4.4	Impact	72
4.4.1	Introduction	72
4.4.2	Web-based survey: socio-economic impacts	73
4.5	Utility	75
4.5.1	Introduction	75
4.5.2	Contribution to increasing security of supply	75
4.5.3	Contribution to immediate reduction in GHG emissions and long-term decarbonisation	76

4.5.4	Contribution to Europe’s competitiveness through investments in the right skills and technologies.....	76
4.5.5	Contribution to completion of the single market and functioning of energy markets ..	79
4.6	Conclusions.....	80
5	Evaluation of the Carbon Capture and Storage sub-programme.....	81
5.1	Introduction.....	81
5.2	Relevance.....	83
5.2.1	Introduction.....	83
5.2.2	Relevance of the sub-programme’s objectives to contribute to economic recovery.....	84
5.2.3	Relevance of the sub-programme’s objectives to contribute to the EU energy policy objectives.....	85
5.2.4	The relevance of the resources made available for the sub-programme, relative to the objectives of the EEPR.....	86
5.3	Effectiveness/efficiency.....	88
5.3.1	Introduction.....	88
5.3.2	Extent to which the financial resources made available are being used	89
5.3.3	Extent to which the programme objectives are being met	93
5.4	Impact	99
5.4.1	Introduction.....	99
5.4.2	The broader socio-economic benefits	99
5.4.3	The employment impacts	100
5.5	Utility.....	103
5.5.1	Introduction.....	103
5.5.2	Extent to which EEPR contributes to immediate reduction in GHG emissions and to long-term decarbonisation.....	103
5.5.3	Extent to which the EEPR contributes to Europe’s competitiveness, including through investments in the right skills and technologies in order to take advantage of the economic opportunities.....	107
5.6	Conclusions.....	108
6	Annexes.....	110
6.1	Annex 1: Our methodological Approach.....	111

6.1.1	Intervention logic	111
6.1.2	Analytical framework	113
6.1.3	Work plan.....	113
6.2	Annex 2: Documentation overview	117
6.3	Annex 3: List of Case study projects and Sample projects	122

List of figures

Figure 1: Ratio of expenditure to action costs at end of first reporting period (late 2010/early 2011, projects within each range - %)	32
Figure 2: Progress to date with securing financing	33
Figure 3: Beneficiaries' perception of EEPR contribution to reduce the risks and increase funders' confidence	34
Figure 4: Perceived EEPR contribution to speeding up administrative processes	37
Figure 5: Perceived EEPR contribution to overcoming administrative obstacles	37
Figure 6: Perceived EEPR contribution to overcoming environmental obstacles to project realisation	38
Figure 7: Perception of projects' contribution to a better functioning of energy markets	50
Figure 8: Relevance to a financial stimulus and competitiveness (by number of respondents)	57
Figure 9: Relevance of level of EEPR funding to 20/20/20 objectives (by number of respondents)	58
Figure 10: Relevance of EEPR to a single smart grid, and larger turbines (by number of respondents)	59
Figure 11: Status of overall completion of EEPR action reported by beneficiaries (by number)	61
Figure 12: Budget consumption end-2010 as % of cost of action, sample projects	62
Figure 13: Contribution of EEPR to overcoming financial obstacles	64
Figure 14: Contribution to increasing funder confidence, reducing perception of risk and leveraging additional funding (by number of respondents)	64
Figure 15: Risks identified at the proposal stage	68
Figure 16: Contribution of EEPR to economic objectives	77
Figure 17: Perceived relevance of EEPR funding level to economic recovery and energy policy objectives (by number of respondents)	86
Figure 18: Intervention logic of the programme	112

List of tables

Table 1: Selection and award criteria by sub-programme	20
Table 2: EEPR payments v. commitments.....	23
Table 3: Electricity and Gas Infrastructure – Implied employment multiplier	43
Table 4: OWE – Average employment per maximum MW assumed with project	74
Table 5: Timeline foreseen by beneficiaries toward project realisation	90
Table 6: Expenditures and commitments incurred by sample projects by the end of 2010.....	93
Table 7: CCS demonstration projects – Employment per €1 million as per costs incurred.....	102
Table 8: Expected contribution of EEPR-funded actions to the demonstration of CCS technologies according to beneficiaries	105
Table 9: Phase 1 – Preparation, desk research, structuring and inception	113
Table 10: Phase 2 – Data gathering	114
Table 11: Phase 3 – Analysis, judgement and reporting.....	116
Table 12: Sample of electricity and gas projects (including case studies).....	122
Table 13: Sample of CCS projects (including the case study).....	125
Table 14: Sample of OWE projects (including the case study)	126

1 INTRODUCTION

The European Commission mandated Deloitte to perform the mid-term evaluation of the European Energy Programme for Recovery⁴, a request for services in the context of the DG TREN Framework Contract on Impact Assessments and Evaluations (TREN/A2/143-2007).

Article 27 of the Regulation establishing the European Energy Programme for Recovery stipulates that "the Commission will carry out an evaluation of the EEPR by 31 December 2011 in order to assess its contribution to the effective use made of the appropriations".

Therefore, the general objective of this evaluation is to analyse the relevance, the efficiency and the effectiveness of the programme. The specific objectives are to:

- a) evaluate the state of play in the implementation of the EEPR projects;
- b) evaluate, as far as it is possible at this early stage of implementation of the EEPR, the impacts of the programme in terms of economic recovery, both at microeconomic and macroeconomic level;
- c) evaluate the contribution that the programme is giving to the achievement of the EU energy policy objectives.

The scope of the evaluation is the three EEPR sub-programmes (electricity and gas infrastructure projects (EGI), offshore wind energy (OWE) and carbon capture and storage (CCS)).

In order to achieve the objectives of the evaluation, this report answers four evaluation questions:

To what extent are the objectives and the resources of EEPR Regulation pertinent to economic recovery and energy policy? How relevant is the EEPR Regulation for the EU energy policy objectives?

The evaluation question deals on the one hand with the relevance of the objectives and the resources of EEPR to the economic and recovery policy and on the other hand with EU energy policy objectives. In other words, it covers the *coherence* of the programme's objectives and resources within the broader EU policies on economic recovery and energy. Moreover, the question also addresses the *level* of relevance of the programme ("to what extent") and the *way* it is relevant ("how").

To what extent are the financial resources made available by the EEPR Regulation being used and to what extent are they contributing to achieving the programme objectives?

This evaluation question deals with the effectiveness of the programme and to some extent its efficiency. EEPR made available €3.98 billion as a stimulus for energy projects so the first question is "Is this money used?" and then "Was it useful to reach the (sub)programme(s) objectives?" So, we analysed the extent to which the EEPR contributed to the projects being able to enter into expenditure by end-2010, since the criterion of substantial expenditure by that date was the translation through the award criteria of the purpose of the EEPR, i.e. to

⁴ Regulation (EC) No 663/2009 of the European Parliament and of the Council of 13 July 2009 establishing a programme to aid economic recovery by granting Community financial assistance to projects in the field of energy.

meet a need for urgent action to support investment in energy infrastructure that might otherwise face severe delays because of a lack of finance and provide a financial stimulus to economic recovery. We also looked at the position on the basis of the data available as of May 2011 (end of this evaluation). In the cases where the resources were not as fully utilised as had been expected, we explored the reasons why this was the case and the extent to which this was beyond the control of the Commission.

What are the short and medium term impacts of the programme? What is the impact in terms of direct and indirect job creation, increase in consumption and investments? What is the macroeconomic multiplier effect of the EEPR investment spending?

Our understanding of this question was that it seeks to measure in quantifiable terms the extent to which the EEPR did in fact achieve its broader objectives in terms of economic recovery, including financial stimulus, job creation and economic growth, i.e. the *impact*. In order to answer this question and considering the early stage of the programme, the evaluation focussed on qualitative indicators, while using available quantitative data to complement the analysis.

To what extent is the EEPR contributing to achieving the EU energy policy objectives of security of supply, decarbonisation, competitiveness, completion of the energy single market, functioning of the energy markets?

The first evaluation question deals with the relevance of EEPR within the broader scope of the EU energy policy. This fourth question deals with its contributions to the EU energy policy objectives, in other words, the *utility* of the programme to tackle the problems and needs identified by the EU policy.

We present and develop our answers for each sub-programme (EGI, OWE and CCS) in chapters 3 to 5. Each chapter includes a general conclusion on the sub-programme.

2 CONTEXT OF THE EUROPEAN ENERGY PROGRAMME FOR RECOVERY

2.1 THE POLICY CONTEXT

The EEPR had its origins in three events:

- the financial crisis of 2008, which left the European economy facing a sharp downturn. GDP fell each quarter from the second quarter of 2008 to the second quarter of 2009 inclusive. The downturn was particularly sharp (-2.5%) in the first quarter of 2009, when there was serious disruption to gas supplies from Russia;
- the need to reduce greenhouse gas emissions, both by cutting emissions from existing sources and developing renewable energy sources, in the context both of the EU's policy objectives and the run-up to the Copenhagen summit on renewal of the Kyoto Protocol;
- concerns about security of gas supply, in particular in the aftermath of supply disruptions in parts of eastern Europe in January 2009.

It was part of the European Economic Recovery Plan (the Recovery Plan), which was a wider response to the economic and financial crisis designed to restore confidence and taking fiscal stimulus measures with immediate impact. The economic crisis had led to greater risk adversity on the part of financial institutions and investors. According to calculations by the European Investment Bank using figures from Eurostat, private sector investment fell almost 20 percentage points between 2007 and 2009, while government spending rose by five percentage points over the same period.

The Recovery Plan was proposed in November 2008⁵ and endorsed by the Council of Ministers the following month⁶. The plan comprised a series of measures for injecting purchasing power into the economy which were estimated to be equivalent to some 1.5% of the GDP of the EU – a figure amounting to around €200bn. Trans-European energy interconnection projects were one of six sectors pinpointed in the Plan for fiscal stimulus.⁷

At the same time, it was recognised that the long-term strength and sustainability of the European economy depended on reshaping it to face the need to reduce greenhouse gas emissions and the demands of energy security. The increasing concerns about securing reliable gas supplies through immediate measures to optimise existing infrastructure and diversify sources of supply reinforced this conclusion.

⁵ A European Economic Recovery Plan; COM(2008)0800; http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=EN&type_doc=COMfinal&an_d oc=2008&nu_doc=0800

⁶ Conclusions of the European Council, December 2008, December 11/12 2008, register.consilium.europa.eu/pdf/en/08/st17/st17271-re01.en08.pdf

⁷ The others were broadband infrastructure, Trans-European Transport infrastructure (TEN-T) projects, Construction (energy-efficient buildings), Cars, particularly 'green' cars, and factories of the future. As part of this evaluation, we sought information from interviewees and through desk research as to the relevance, effectiveness and efficiency of the EEPR relative to any of these activities. Few interviewees were aware of the EEPR, and none had a conclusive view of the relative merits. We identified two studies on very specific subjects (Romania and the impact in rural areas), but it appears to be too soon for broader studies to have been made.

2.1.1 The European Energy Programme for Recovery (EEPR)

In relation to the spending in the energy sector, the European Council asked the Commission to present a list of specific projects, taking into account an adequate geographical balance, to reinforce investment in the development of infrastructure projects in particular. The goal was to finance measures that rapidly addressed both the economic crisis and the Community's urgent energy needs.

In order to have a tangible and substantial impact, those measures were to be focused on a few specific sectors in which action would make a clear contribution to the objectives of the security of energy supply and the reduction of greenhouse gas emissions. The emphasis was on *mature projects* capable of making *efficient and effective use of significant amounts of financial assistance* and of *catalysing significant amounts of investment* from other sources, including from the European Investment Bank; and where action at European level would add value.

As the same European Council that endorsed the Recovery Plan also endorsed the EU's internal climate change strategy. This reinforced the Commission's mandate to bring the two together in what became the European Energy Programme for Recovery, the EEPR. Indeed, the European Council made the link by saying that the Union's efforts to combat climate change should be coupled with resolute action to enhance its energy security, including interconnections and the connection of the most isolated European Countries.

The sectors – gas and electricity infrastructure, offshore wind energy, and carbon capture and storage, and the projects identified – were selected by the Commission as fulfilling the criteria of maturity, ability to make effective and efficient use of finance, and catalysing significant amounts of investment from other sources. The Commission's proposals were refined in discussion with the Council of Ministers and the European Parliament, in order in particular to take 'adequate geographical balance' into account and address energy efficiency, e.g. through offshore wind energy.

The Programme also reflected the desire for an immediate response to a security of supply crisis in January 2009, when gas supplies to some Central European countries from Russia were severely disrupted by the latter's dispute with Ukraine – the second security of supply crisis in three years.⁸

⁸ A dispute between Russia and Belarus over power supplies in June 2011 illustrates that Russia is still prepared to use supply cuts as a negotiating tool. Belarus and Ukraine are the two transit countries which are critical for the EU and make it vulnerable to Russia's disputes with these countries.

2.1.2.1 GENERAL OVERVIEW

The EEPR had its roots not only in the Recovery Plan, but was a logical consequence of energy policy formulation in the previous decade or more. Key milestones along the way to the EEPR included:

- The development of the TEN-E programme;
- A Green paper on “A European strategy for sustainable, competitive and secure energy” (2006)⁹;
- The 2005 Communication “Winning the battle against climate change”¹⁰, and the 2007 Communication “Limiting Global Climate Change to 2 degrees Celsius - The way ahead for 2020 and beyond”¹¹;
- The 2006 “Renewable Energy Road Map. Renewable energies in the 21st century: building a more sustainable future;”¹²
- The March 2007 climate and energy objectives – the 20/20/20 policy – agreed by the European Council:
 - to improve energy efficiency to save 20% of the EU's energy consumption compared to forecasts for 2020;
 - to raise the share of renewable energy to 20% of EU overall energy consumption by 2020;
 - to raise the share of biofuels to at least 10% of total petrol and diesel consumption for transport in the EU by 2020.

This was translated into binding legislation in 2009, in the form of three directives on reduction of greenhouse gas emissions (which promotes carbon capture and storage (CCS) by providing that carbon captured and stored according to the Directive will be considered as not emitted). They cover: promotion of renewables, emission allowance trading and geological storage of carbon dioxide.

- The November 2008 Second *Strategic Energy Review*, entitled “An EU Energy Security and Solidarity Action Plan”¹³, in which the priority infrastructure actions foreshadowed those of the EEPR.

While the EEPR was established at the point at which the chronology above stops as a one-off response to the economic crisis in an area that had been identified as a priority, policy on energy, including infrastructure, and on climate change, including energy-related aspects, such as mitigation measures (carbon capture and storage) and renewable energy, and energy technologies as a contribution to creation of sustainable, green, ‘hi-tech’ jobs has continued in parallel, and to some extent interact with the EEPR.

⁹http://europa.eu/documents/comm/green_papers/pdf/com2006_105_en.pdf

¹⁰ COM(2005) 35 final; Winning the Battle Against Global Climate Change; http://eur-lex.europa.eu/LexUriServ/site/en/com/2005/com2005_0035en01.pdf

¹¹ COM(2007) 2 final; Winning the Battle Against Global Climate Change Limiting Global Climate Change to 2 degrees Celsius; http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0002en01.pdf
The way ahead for 2020 and beyond

¹² COM(2006) 848 final; Renewable Energy Road Map: Renewable energies in the 21st century: building a more sustainable future; http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0848en01.pdf

¹³ COM(2008) 781 final; Second Strategic Energy Review: an EU energy security and solidarity action plan; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52008DC0781:EN:HTML:NOT>

These include:

- The 3rd internal energy market package promulgated in August 2009,¹⁴ with a transposition deadline of March 2011¹⁵. There were also accompanying regulations, including the regulation on security of supply for gas¹⁶;
- The Commission communication in August 2009 on the *Strategic Energy Technology Plan (SET-Plan)*¹⁷. The SET-Plan includes initiatives on wind and CCS and electricity grids;
- The *2009 Technology Roadmap* following on from the SET-Plan;
- The *EUROPE 2020* strategy for smart, sustainable and inclusive growth¹⁸, which incorporates the 20/20/20 targets;
- *Energy 2020: A strategy for competitive, sustainable and secure energy*¹⁹, which was put forward in November 2010;
- The Communication on energy infrastructure priorities for 2020 and beyond²⁰ – *A Blueprint for an integrated European energy network* of November 2010. This sets out plans for a new Energy Infrastructure Instrument and also which reinforces the direction in which the EEPR pointed in terms of interconnections, offshore grid development and CCS.

2.1.2.2 THE CONTEXT BY SUB-PROGRAMME

1. Electricity and gas infrastructure

The adoption of successive internal energy market packages has brought about major changes in the way electricity and gas infrastructure is regulated and the demands made on it:

- much of the market is fully deregulated, subject to some safeguards against pricing excesses;
- tariffs for regulated segments, e.g. generally where there is a natural monopoly, such as in transmission, are set by the regulator and are intended to be free of political interference;

¹⁴ Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators; Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003; Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003; Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005; Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC; Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC; <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2009:211:SOM:EN:HTML>

¹⁵ Not all Member States have completed transposition of the Directives.

¹⁶ Regulation (EU) No 994/2010 of the European Parliament and of the Council of 20 October 2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:295:SOM:en:HTML>;

¹⁷ COM(2009) 519 final; Investing in the Development of Low Carbon Technologies, (SET-Plan)

¹⁸ COM(2010)2020; Europe 2020; A strategy for smart, sustainable and inclusive growth; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>

¹⁹ COM(2010) 639 final; Energy 2020: A strategy for competitive, sustainable and secure energy; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52010DC0639:EN:HTML:NOT>

²⁰ COM(2010) 677; Energy infrastructure priorities for 2020 and beyond - A Blueprint for an integrated European energy network;; [http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SPLIT_COM:2010:0677\(01\):FIN:EN:PDF](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SPLIT_COM:2010:0677(01):FIN:EN:PDF)

- system operators have to ensure access to the grid and security of supply, without the integrated planning of their own or their users' activities which often existed in the past;
- interconnections have assumed added importance as cross-border trade has increased and trade across those interconnections has been liberalised;
- ambitious renewables targets are changing the mix and nature of demand.

The identification of interconnection projects eligible under EEPR reflects the concepts of contributing to the priorities and needs identified in the Second Strategic Energy Review (recital 13 of the Regulation), while ensuring an adequate geographical balance (Recital 4).

A. Electricity infrastructure

In practice, in 2009 when the EEPR regulation was adopted, major investments were (as they are still) needed to make the single electricity market a reality and to adapt grids to decentralised and large-scale wind and solar electricity generation. Due to the lack of transmission capacity but also to the insufficient use of existing capacity, overall volumes of cross-border trade remained relatively low, and electricity markets were still essentially national, though this has been evolving fast in some regions, e.g. northwest Europe.

The 2011 *Blueprint for an integrated European energy network*, as already foreshadowed in the 2nd Strategic Energy Review in 2008, identified priorities, which it can clearly be seen inspired EEPR priorities:

- **Offshore grid in the Northern Seas and connection to Northern as well as Central Europe**, including not only interconnections, but also hydro storage facilities in the Alpine region and in Nordic countries;
- **Interconnections in South Western Europe** to accommodate wind, hydro and solar, in particular between the Iberian Peninsula and France, more connections with Central Europe, use of Northern African renewable energy sources via existing infrastructure with Europe;
- **Connections in Central Eastern and South Eastern Europe** – strengthening the regional network in North-South and East-West power flow directions, in order to assist market and renewables integration, including with storage, and integration of energy islands;
- **Completion of the BEMIP** (Baltic Energy Market Interconnection Plan) – improved integration into the European market by reinforcing internal networks and strengthening interconnections with Finland, Sweden and Poland and through reinforcement of the Polish internal grid and interconnections east and westward.²¹

All the short-listed projects corresponded to priority projects identified by predecessors of ENTSO-E (ENTSO-E was only created in June 2009), which are now also included in ENTSO-E's Ten-Year Development Programme, reflecting the priorities of TSO's. All the EEPR projects are in one of the 'Blueprint' electricity corridors and are in line with the TNYDP.

²¹ This plan signed in June 2009 also includes gas interconnection projects, including some financed by the EEPR.

The TYNDP 2010-2020 identified and listed grid investment projects “of pan-European significance” across ENTSO-E’s six regional groups to cater to the following needs:

- Massive integration of new sources of generation and especially generation from renewable sources, especially in the Northern part of Europe (mainly wind in the Nord Sea and the Baltic Sea countries) and the Southern part of Europe (mainly wind, hydro and solar in the Iberian Peninsula);
- Increase of transmission capacity to ensure market integration, including the strengthening of the Central Eastern and South Eastern Europe network in North-South and East-West power flow directions, the connection of areas that are isolated or insufficiently connected such as the Iberian peninsula, Italy, the three Baltic States, and islands that need to be connected to the mainland;
- Security of supply including the need to respond to demand growth in certain areas (in particular in Spain, France, Hungary, Slovakia, Poland, Czech Republic), to reduction in supply due to decommissioning of generation plants in others (Lithuania) and the need to enhance the quality of the network by refurbishing aging/obsolete sections (in particular in Central Europe and Baltic countries).

Among these needs, abolishing barriers to market integration and connection of new generation, especially renewable energy sources (RES), are identified by ENTSO-E’s TYNDP as the two most important issues for TSOs for the coming years.

B. Gas infrastructure

The gas market is not only having to adapt to the changed demands on and need for infrastructure as a result of the single energy market, but because patterns of supply are changing. The EU is becoming increasingly dependent on imported gas as the EU’s own indigenous resources deplete, notably those of Denmark, the UK, which is already a net importer, and of the Netherlands, which will become a net importer in 2025²². At the same time, the availabilities from Norway will stabilise. Some countries in northern and eastern Europe, in particular, remain highly dependent on a single source, and concern was expressed to us by some stakeholders, and is borne out by desk research, about the growing market power of that single source within the EU through the infrastructure projects it backs, some of which are in competition with EEPR projects, and the vertically integrated alliances it is building with major European energy companies.

For gas, the *Blueprint* identified the following priority corridors.

- **Southern Corridor** to further diversify sources at the EU level and to bring gas from the Caspian Basin, Central Asia and the Middle East to the EU.
- Linking the Baltic, Black, Adriatic and Aegean Seas through in particular:
 - the implementation of **BEMIP** (Baltic Energy Market Integration Plan – see above), and
 - the **North-South Corridor** in Central Eastern and South-East Europe.
- North-South Corridor in Western Europe to **remove internal bottlenecks** and increase short-term deliverability, thus making full use of possible alternative external supplies, including

²² Energierrapport 2011 of June 10, 2011.

from Africa, and optimising the existing infrastructure, notably existing LNG plants and storage facilities.

The ENTSO-G Ten-Year Development Plan for the period 2011-2020²³ lists all the infrastructure projects of which it has been informed by TSO's. It analyses the implications in terms of vulnerabilities to congestion and supply based on a breakdown between those which have their Final Investment Decision (FID) and those which do not. The result of the analysis is that – with the FID projects – there will be a “reasonable level of flexibility under all modelled scenarios” for “most parts” of the European transmission system. However, as demand increases and national production decreases, flexibility will become more problematic in Scandinavia, Luxembourg, Serbia and Greece if only those projects the FID projects go ahead. Non-FID projects can reverse that, except in the case of Luxembourg. European countries will be able to cover their overall demand in the event of disruptions in the supply of LNG or of gas from Norway and North Africa based on the FID projects, but some regions (parts of Baltic, Central and Eastern Europe) would not be able to meet all their demand with only FID projects if there were transit disruptions of gas from Russia. Non-FID projects could enable Central and Eastern Europe to face a transit disruption through Ukraine, but additional projects will nevertheless be necessary to enable Lithuania and potentially Poland to meet their whole demand if there were a disruption in transit through Belarus. Consequently, the projects selected for the EEPR sit well with the need to provide this flexibility and meeting ongoing problems of vulnerability.

There were 40 FID transmission projects as of March 2011, of which 12 are EEPR projects²⁴. There were 27 FID storage projects, of which two are EEPR projects. There were 11 FID LNG terminal projects of which one is an EEPR project. There were 53 Non-FID transmission projects, of which seven were EEPR projects, including several of the largest, e.g. Nabucco, Poseidon, Galsi and the Slovak-Hungary interconnector; of the 22 Non-FID storage projects and 20 Non-FID LNG Terminal projects none were EEPR projects. The total estimated cost of these projects as of March 2011 was €90 billion, including €21.5 billion for the FID projects.

Security of gas supply

When supplies were disrupted in January 2009, Bulgaria, Greece, Hungary and the Slovak Republic all suffered cuts of more than 75% in their supply, and Austria, Poland and Slovenia were at levels of 50-75%,²⁵ highlighting the risks of being overly dependent on a single source, particularly where the share of gas in primary energy consumption is high.

The 2009 gas crisis also showed up a shortage of storage to act as a buffer. Of the storage available (based on 2007 figures), 56% was in three countries: France, Germany and Italy. Greece had none, and Bulgaria had less than half a percent of the total. The Czech Republic, Hungary, Latvia, Romania and the Slovak Republic had less than 5% of the total capacity each.

²³ http://www.entsog.eu/publications/index_g_investment.html, as of February 17, 2011.

²⁴ The figures on the number of EEPR projects should be taken as indicative. The definition of an EEPR project in the TYNDP is not exactly the same as that of the Regulation. For example, where two TSO's are involved in an EEPR project, each TSO's own project may be listed separately. Moreover, the TYNDP does not identify reverse flow projects separately.

²⁵ The Quest for Gas Market Competition: Fighting Europe's Dependence on Russian Gas more Effectively, European Centre for International Political Economy, ECIPE Occasional Paper – No. 1/2010.

This specific concern in relation to vulnerability to Russia (or any single source) translated into the inclusion of bi-directional, reverse flow projects in the EEPR package. It foreshadowed the specific security of supply arrangements in the security of supply regulation for gas put forward by the Commission in July 2009 (adopted in October 2010 as Regulation 994/2010) and of which the Second Strategy Energy Review of November 2008 was also precursor. The security of supply Regulation, which is part of the ‘third package’²⁶ provides the legal basis for investments which do not – and may never meet - strictly economic and financial criteria, but for which there is a strategic need. It means in effect that all Member States must have two sources of supply.

A study by Gas Transmission Europe in July 2009 identified the need for 45 reverse flow projects. The report was produced in order to identify small investments that could improve security of supply in the short term. There is a close, but not a perfect correlation, between the projects identified in the study²⁷ and the projects financed by the EEPR. Of the 14 reverse flow projects part-funded by the EEPR, 12 are on the GTE list. The exceptions are the project in Portugal and the project linking Lithuania and Latvia.

The perspective on what is required has therefore evolved significantly in less than a decade from a focus on being able to import from a wider range of regions, and both via pipeline and as LNG, to encompass a desire for greater flexibility in times of crisis. There has been a clear shift of emphasis over the last decade to attaching greater importance attached to enabling eastern European countries (including Baltic countries) to draw supplies from sources other than Russia, to obtain Russian gas via non-traditional routes, and to have more buffers in the event of a supply crisis.

2. Offshore wind

Directive 2009/28/EC on the *promotion of the use of energy from renewable sources*²⁸ committed Member States to be obtaining 20% of primary energy consumption from renewables by 2020, setting country-by-country targets, and stressing the importance of interconnections. Both the UK and Germany needed to make among the greatest leaps – 13.7 percentage points and 12.8 percentage points to achieve national targets of 15% and 18% respectively. At that point, Germany was lagging behind the rest of the EU in terms of offshore wind. It was a technology on the threshold of maturity, but facing challenges in scaling up.

The Strategic Energy Technology Plan’s *European Wind Initiative (EWI)* envisaged as of June 2009:

- reducing the cost of wind energy by 20% by 2020 and making it the most competitive energy source by some time in the following decade;
- ensuring European technology leadership on and offshore, and developing large-scale turbines, including exploring concepts up to 20 MW;
- enabling large-scale grid integration of on- and offshore wind with a view to achieving for wind a 20% share of consumption by early in the next decade.

²⁶ Regulation (EU) No 994/2010 op.cit; <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2010:295:SOM:EN:HTML>

²⁷ GTE+ ReverseFlowStudyTF, Technical Solutions, 21 July2009

²⁸ Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF>.

To this end, the EWI proposed:

- i. the development of more accurate mapping of wind resources and capacity potential in Europe, including hostile and complex environments, through coordinated measurement campaigns and the development of spatial planning tools;
- ii. 5-10 new testing facilities for new turbine systems;
- iii. up to 10 demonstration projects of next generation turbines including a 10-20 MW prototype;
- iv. at least 4 prototypes of new offshore structures tested in different environments;
- v. demonstration of new manufacturing processes; and
- vi. testing the viability of new logistics strategies and erection techniques in remote and often hostile weather environments;
- vii. demonstration on an industrial scale of grid integration techniques to manage wind farms as “virtual power plants”.

Each of the EEPR projects falls into at least one of these categories, and sometimes several.

3. Carbon capture and storage

The revised Directive 2009/29 on the *EU Emission Trading System*²⁹ promotes carbon capture and storage (CCS) by providing that carbon captured and stored according to the Directive will be considered as not emitted, which in practice exempts power plant operators from paying carbon allowances for these emissions³⁰. Policy-makers also agreed on providing CCS with unprecedented financial support in the form of 300 million carbon allowances (the so-called NER300 scheme) that were set aside by the Directive to support 12 CCS commercial demonstration projects and demonstration projects of innovative renewable energy technologies³¹.

Directive 2009/32 on the *geological storage of carbon dioxide*³² sets out the framework for carbon storage in order to manage environmental risks and remove legal barriers to its development. Among other requirements, the Directive led to the inclusion of carbon capture and storage projects in the Annex I of the Environmental Impact Assessment directive (EIA directive), which created a requirement on all CCS projects to carry out an EIA. The Directive includes an obligation on new combustion plants with a capacity of 300 MW or more to include enough space for the installation of carbon capture equipment. Plant operators will also have to assess the availability of suitable storage sites and transport facilities, and the technical feasibility of retrofitting for carbon capture at existing sites. The deadline for Member States to transpose the Directive in national legislation was 25th June 2011.

By including CCS in the climate and energy package, EU policy-makers clearly demonstrated their support to the development of this technology as part of the policy mix needed to achieve the European GHG reduction objectives. During the negotiations that led up to the adoption of the climate and energy package, the issue of financing was central to the discussions concerning CCS. In this

²⁹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0029:EN:NOT>

³⁰ Under this Directive, any emission resulting from leakage would have to be surrendered.

³¹ Based on carbon prices at the time of negotiations, it was foreseen that the scheme would translate into some €6-7bn. This estimation has now been brought down to €4.5bn.

³² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0114:0135:EN:PDF>.

context, it was only “logical”, as interviewed stakeholders put it, to include CCS in the proposed regulation establishing the EEPR, which was put forward just one month after a political deal between was clinched between the European Parliament and the Council on the Climate and Energy package.

2.2 EEPR OBJECTIVES, SCOPE AND IMPLEMENTATION

2.2.1 EEPR Objectives and scope

It was against this background, therefore, that the European Parliament and the Council adopted Regulation (EC) No 663/2009 of 13 July 2009, establishing a financing instrument entitled the European Energy Programme for Recovery (EEPR) The overall objective was to stimulate recovery while bringing the EU closer to meeting its energy and climate policy objectives, namely the security and diversification of energy supply, the operation of the internal energy market and the reduction of greenhouse gas emissions.

As noted in the Commission’s April 2010 report on the implementation of the plan³³: “to deliver secure, competitive and sustainable energy supplies over the coming years and decades, the EU faces the urgent task of expanding, renewing and making interoperable its energy infrastructure and decarbonising its energy production through the deployment of strategic low carbon technologies. These developments are crucial if the EU is to reach by 2020 the targets to which all Member States are committed, namely reducing greenhouse gas emissions and primary energy consumption by 20% and increasing the share of renewable energy to 20% of final energy consumption.”

The EEPR addressed these challenges via three sub-programmes:

- Gas and electricity infrastructure projects to optimise the capacity and functioning of the internal energy market, notably by constructing the ‘missing links’;
- Forerunners in the offshore wind sector - technologies to be demonstrated and deployed on a large-scale — innovative foundation structures (gravity, jackets, tripods, tripiles), multi-MW offshore turbines and modular-based grid integration technology;
- Carbon Capture and Storage (CCS).

The sectors were selected because it was felt (Recital 6 of the Regulation) that “there exist large, mature projects capable of making efficient and effective use of significant amounts of financial assistance and of catalysing significant amounts of investment from other sources, including from the European Investment Bank; and action at European level would add value. The sectors of gas and electricity infrastructure, offshore wind energy and carbon capture and storage fulfil those criteria.”

³³ Report from the Commission to the Council and the European Parliament on the implementation of the European Energy Programme for Recovery; COM (2010) 0191; finalhttp://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=EN&type_doc=COMfinal&an_doc=2010&nu_doc=0191

The objectives of the EEP for electricity and gas infrastructure are to be found in Article 5 of the EEP Regulation:

- (a) security and diversification of sources of energy, routes and supplies;
- (b) the optimisation of the capacity of the energy network and the integration of the internal energy market, in particular concerning cross-border sections;
- (c) the development of the network to strengthen economic and social cohesion by reducing the isolation of the least favoured regions or islands of the Community;
- (d) the connection and integration of renewable energy resources; and
- (e) the safety, reliability and interoperability of interconnected energy networks, including the ability to use multidirectional gas flows where necessary.

In Article 6, the Regulation also sets out priorities for electricity and gas infrastructure as criteria which serve as a translation of the objectives and of which the selection and award criteria in the Regulation are a further translation.

“The EEP shall serve urgently to adapt and develop energy networks of particular importance to the Community in support of the operation of the internal energy market and, in particular, to increase interconnection capacity, security and diversification of supply and to overcome environmental, technical and financial obstacles. Special Community support is necessary to develop energy networks more intensively and to accelerate their construction, notably where the diversity of routes and sources of supply is low.”

There are no equivalent provisions for the other two sub-programmes.

The identification of the projects was driven by the EU energy policy orientations set out in the Second Strategic Energy Review and in the Strategic Energy Technology Plan, taking into account progress made in the implementation of the TEN-E programme and an adequate geographical balance, and consultations with stakeholders in the areas covered by the programme. This identified shortlists of projects which governments were likely to agree to co-finance and/or were planning to finance, and which were likely to have reached a sufficient degree of maturity.

The total financial envelope available was almost €4 billion:

- Gas and electricity infrastructure projects: EUR 2,365m.
- Offshore wind energy projects: EUR 565m;
- Carbon Capture and Storage projects: EUR 1,050m

- Seventeen gas infrastructure projects, nine electricity infrastructure projects and two small island projects were shortlisted by name in the Regulation. Twelve countries were listed as having projects eligible for the reverse flow envelope of €80m (within the total envelope).
- Eight offshore wind projects were shortlisted – one offshore grid integration project and six wind farms, of which four were in Germany³⁴ and two which had particular innovative

³⁴ National choices translated into Commission proposals via discussions in the Council and the European Parliament were a matter of maturity and national priorities. Compatibility between this grant system and national systems for subsidising offshore wind may also have played a role according to stakeholders, i.e. the system is compatible with feed-in tariff systems where the feed-in tariff is granted on a case-by-case basis as projects mature, but not where a feed-in tariff or some other form of subsidy is linked to calls for tender.

characteristics (in Belgium and the UK) were listed by name. Six countries were listed from which applications would be accepted for North Sea grid projects with a total capacity for projects selected of 1GW. These countries were (in the order of listing) United Kingdom, Netherlands, Germany, Ireland, Denmark, Belgium, France, Luxembourg.

- Thirteen CCS projects were short-listed.

The EEPR funds were to be committed by end-2010. In practice, €3,882m was committed (see Table 1). It was a condition of the agreement of the European Parliament to this envelope and allocation that any money uncommitted by end-2010 be used instead of energy efficiency projects. This balance proved to be €146m, which has been re-allocated to energy efficiency and renewable projects.³⁵

2.2.2 Selection and award criteria

Selection and award criteria were similar, but with the difference that permitting and maturity were assessed during the selection stage for the CCS projects (which are demonstration projects) and during the award stage for the other sub-programmes.

Table 1: Selection and award criteria by sub-programme

	Electricity and gas infrastructure (EGI)	Offshore Wind Energy (OWE)	Carbon Capture and Storage (CCS)
Selection	soundness and technical adequacy of the approach	soundness and technical adequacy of the approach	soundness and technical adequacy of the approach
	soundness of the financial package for the full investment phase of the action	soundness of the financial package for the full investment phase of the action	soundness of the financial package for the full investment stage
			maturity (reaching the investment stage and incurring substantial investment-related expenditure by end-2010)
			identification of all necessary permits and a strategy for obtaining them

³⁵ Regulation (EU) No 1233/2010

	Electricity and gas infrastructure (EGI)	Offshore Wind Energy (OWE)	Carbon Capture and Storage (CCS)
Award	maturity, defined as reaching the investment stage, and incurring substantial capital expenditure by the end of 2010	maturity (reaching the investment stage and incurring substantial capital expenditure by end-2010)	
	extent up to which lack of access to finance was holding back the implementation of the action	extent to which lack of access to finance was holding back the action	extent to which lack of access to finance was holding back the action
	extent to which EEPR assistance would stimulate public and private finance	extent to which the project improves or increases the scale of installations and infrastructures	
	socio-economic impacts	extent to which the project includes the construction of full-size and industrial-scale installations and infrastructures	requested funding per tonne of CO2
	environmental impacts	innovative features	complexity and level of innovation,
	contribution to the continuity and interoperability of the energy network, as well as to the optimisation of its capacity	contribution to the offshore wind grid system	
	contribution to the improvement of service quality, safety and security	commitment to dissemination	
	contribution to the creation of a well integrated energy market	adequacy of the management plan	soundness and adequacy of the management plan
Threshold	60/100	None	60/100

Source: EEPR Regulation

2.3 EEPR IMPLEMENTATION

Fifty-nine energy projects were selected for funding overall – 44 for Commission Decisions in gas and electricity infrastructure (including reverse flow and storage), and nine for Grant Agreements in offshore wind and six in carbon capture and storage – for a total of EUR3.8 billion. Each project is in formal terms an ‘action’, which may or not be part of a larger project, and may consist of up to five sub-actions. Where the action is part of a larger project, the action was designed around activities which could meet the EEPR objectives, and therefore were likely to incur substantial amounts of capital expenditure by end-2010. One project listed in the Regulation, the Slovakia-Poland interconnection, was not subsequently the subject of a proposal by the potential beneficiaries and is only now reaching maturity. Not all projects received the full amounts to which they were entitled.

There are Commission Decisions or Grant Agreements in relation to all the projects which have gone ahead. However, there have or will be changes to the beneficiary or co-beneficiary in a number of instances, as a result transfers of ownership, withdrawal of a beneficiary and substitution of another, or transfer of a grant to a different project using the same technology in analogous conditions involving one of the original co-beneficiaries in order to overcome obstacles to the use of innovative technology in relation to the project originally proposed. There are at least three such cases.

As the projects supported by the EEPR can present a high degree of technical, organisational and financial complexity and therefore involve some level of risk, measures were taken to address these risks: individual decisions for gas and electricity projects state that, before advance and/or interim and/or payments can be made, that the beneficiaries must have...

- obtained the necessary environmental authorisations in relation to specified EU environment legislation; and
- submit an investment decision, namely a formal commitment by the project promoters to go ahead with the project, by the end of 2010 (subsequently extended to later dates in a number of cases).

Of the 44 projects, 22 were originally subject to some form of restriction (either/or, or both). As of May 2011, 17 projects still had such limitations in relation to environmental compliance and six were still waiting for their FID. Four projects were on both lists. In the six cases where there was still no FID, special reporting conditions on project implementation were imposed to allow the Commission to monitor them more closely.

Limitations on advance or interim payments, or other conditions, do not mean that the projects are not placing orders or disbursing funds at all, but they are indicators of potential for delay.

Some projects have already been completed and are now operational, or are close to it. They included as of May 2011:

- Romania–Hungary gas interconnector;
- Austria–Slovakia gas reverse flow project;
- Hungary–Croatia gas interconnection;
- East-West gas link in Belgium;
- Austrian reverse flow projects (two);
- Czech Republic reverse flow projects;
- Slovak reverse flow/storage increase;

- Austria–Hungary electricity interconnection;
- Spain-Portugal electricity interconnections (Lagoaça and Tavira).

As of May 2011, €845.5 million had been paid to beneficiaries;

- €366.9 million to gas and electricity infrastructure projects;
- €178.8 million to offshore wind energy projects;
- €299.8 million to carbon capture and storage projects.

By comparison, this was an increase over the expenditure at end-2010 of €5.9m in the case of gas and electricity infrastructure projects, €32.8m in the case of offshore wind, and €106.8m in the case of carbon capture and storage projects. The figures at this date are of interest inasmuch as this was the date by which it was intended beneficiaries should have incurred substantial capital expenditure. However, it is *not* the same as expenditure by the projects. Some received advance payments. Many have incurred expenditures since 2009 for which they had not yet applied for payments. They also placed orders which contributed to economic recovery, but on which they had not necessarily expended large sums at that point.

Table 2: EEPR payments v. commitments

	Committed (€m)	Paid as of May 2011 (€m)	End-May 2011: payments v. commitments (%)
Electricity and gas infrastructure (EGI)	2267	367	16.2
Offshore wind energy (OWE)	565	179	31.6
Carbon capture and storage (CCS)	1050	300	28.6
Total/average	3882	846	

Source: Deloitte from European Commission data

3.1 INTRODUCTION

The European Economic Recovery Plan, of which the EEPR was part, had two key pillars: a major injection of purchasing power into the economy, to boost demand and stimulate confidence, and short-term action to reinforce Europe's competitiveness in the long term through 'smart' investment – in skills, energy efficiency, clean technologies to boost sectors like construction and automobiles in the low-carbon markets of the future, and infrastructure and interconnection to promote efficiency and innovations. In relation to infrastructure, it stressed the need to accelerate a series of investments, including high profile trans-European projects to help to increase the EU's energy security and integrate more Member States into the European electricity grid. Speeding up infrastructure investment was expected not only to cushion the blow to the construction sector, but enhance Europe's longer-term sustainable-growth potential.

The Second Strategic Energy Review, the energy policy document which had immediately preceded the EEPR, stressed the importance of identifying infrastructure of major importance to the EU's energy security and then ensuring its construction in the context of the EU's overall energy policy objectives of sustainability, competitiveness and security of supply.

That Review spelled out six priority infrastructure actions:

- Connecting the remaining isolated energy markets, notably the Baltic Region;
- A southern gas corridor for the supply of gas from Caspian and Middle Eastern sources;
- LNG and gas storage capacity;
- A Mediterranean energy ring;
- North-South gas and electricity interconnections within Central and South-East Europe;
- a North Sea offshore grid and interconnection of national electricity grids in Northwest Europe and plug-in offshore wind projects.

Not long after, as pointed out in the *Blueprint for an integrated European energy network* and reflected in the objectives and priorities of the EEPR, the EU paid a price in January 2009 for outdated and poorly interconnected energy infrastructure, when the lack of reverse flow options, and of adequate interconnection and storage infrastructures, meant the EU had no easy solutions to the gas disruptions, particularly in Eastern Europe.

The selection of projects eligible to propose actions for EEPR funding shows a clear correlation with those of the Strategic Energy Review and the influence of the January 2009 gas supply crisis.

3.2 RELEVANCE

To what extent are the objectives and the resources of the EEPR Regulation pertinent to economic recovery and energy policy? How relevant is the EEPR Regulation for the EU energy policy objectives?

3.2.1 Introduction and summary

We look in detail in the next two sections at the contribution to economic recovery and to energy policy objectives. Broadly speaking, however, interviewees and beneficiaries regarded the EEPR as relevant to the needs of the time. They considered that the actions financed by the EEPR kick-started or accelerated a significant number of projects which are important to security of supply, a better functioning single market, and the reduction of greenhouse gas emissions, through better integration of renewable energy sources into the transmission networks. The level of finance was relevant because it made a real difference, both in terms of the amount and the ‘quality label’ it conferred.

In summary, there is a consensus among stakeholders interviewed and beneficiaries³⁶ that in the area of electricity and gas infrastructure, the EEPR served the objective of economic recovery and that the projects will support smart investments, which will contribute to the EU’s long-term competitiveness. As the EEPR is felt to have made a perceptible difference to jobs and orders in some ailing sectors, the amounts made available are felt to have been relevant. There is also a belief that the energy and gas infrastructure funded via the EEPR is proving relevant to EU energy objectives by improving market integration and security of supply, and contributing to the move to a low-carbon economy. The extent of the relevance is in both cases difficult to measure both because the programme is still under way and because many other factors are at work.

Views of relevance expressed in the web-based survey, and indeed in the fieldwork, reflected the different perspectives of those building interconnectors, and those involved in reverse flow and storage projects. Logically enough, the first are felt to be more important to market integration and the internal market, and the latter to security of supply. Stakeholders recognise the contribution to a low-carbon economy, but see the relevance to the other energy policy objectives as greater.

3.2.2 Relevance of the contribution to economic recovery

Aiding economic recovery was the rationale of the EEPR. The first recital of the Regulation says that “extraordinary and immediate efforts are needed to counter this serious and unprecedented economic situation. In order to restore confidence among market players, measures impacting on the economy need to be finalised without delay.” In this section, we look first at the relevance of the EEPR to achieving this, and to objectives and then at the relevance of the levels of funding.

³⁶ The terms ‘stakeholders interviewed’ or ‘stakeholders’ include EU and national stakeholders, and also beneficiaries. Beneficiaries are subsumed into this group for confidentiality reasons. The term ‘beneficiaries’ refers to respondents to the web-based survey. The results of the survey are generally in line with what was found during the in-depth interviews. However, they are sometimes more positive.

Beneficiaries responding to the survey were confident that the EEPR was sufficiently resourced to contribute to economic recovery. Very nearly all agreed or tended to agree that the level was relevant to providing an immediate financial stimulus in order rapidly to address the downturn.

Stakeholders agreed with the premise of the Regulation that, by focusing on mature projects which could give a boost to infrastructure construction projects and capital expenditure on items such as steel tubes, compressors or power transmission cables and equipment, the EEPR as a concept was relevant to contributing to economic recovery. They also felt that the levels of expenditure would make a perceptible difference to job creation or protection to certain companies and in certain countries/regions, either because those countries are major beneficiaries, e.g. France and the Baltic region, or the location of major supplier industries, e.g. Germany and Italy. These would then provide spillover benefits in other EU countries.

All but one survey respondents agreed or tended to agree that the level of funding is relevant to supporting “smart” funding that will reinforce Europe’s competitiveness in the long-term (good potential for job creation and economic growth in the sectors supported). Interviewees also agreed that the investments, particularly those in integrated networks, would be relevant to competitiveness (and therefore future growth and jobs) via a better functioning energy market (and therefore lower costs).

Most had not given thought to whether some other form of financial assistance would have been more relevant. Where they had, they in some cases felt that other types of funding programme could have had a more immediate impact, e.g. in energy efficiency in buildings.

Finding 1

Perceptions are that EEPR was relevant to contributing to economic recovery, both as a concept and in terms of the level of funding.

The relevance at programme level is an aggregate of the relevance at project/action level, which we look at here. The projects came from a list predefined in the Regulation adopted by the Council of Ministers and the European Parliament. The exceptions were the reverse flow projects, where the list of countries was predefined. The political process took geographical balance into account. Interviewees recognised this political reality both in their perceptions of the contribution to economic recovery and to energy policy objectives.

A total of more than 70% in the case of gas infrastructure and more than 80% in the case of electricity infrastructure felt that the level of funding in relation to the eligible costs of the actions directly financed by the EEPR and to the total costs of the overall project, and therefore the contribution to the overall project was either critical or significant. A higher proportion of the gas infrastructure project respondents (just over one-quarter) felt that the level of the EEPR contribution was *critical* to their project, compared to 18% for electricity infrastructure projects. The explanation lies in the importance of the EEPR funding to reverse flow projects contributing to security of supply. These had a particular need for funding because they would have been unlikely to find other sources of funding even without an economic crisis because they cannot recover all their costs through commercial operations.

This is largely consistent with what we found in interviews, i.e. that this level of funding had met a need to get a number of projects off the ground, or to get them launched in 2009/2010 rather than be delayed, or indeed to advance them by several years.

The need for the EEPR funding at project level was, moreover, not just for the level of funding but for the quality label attached to being a member of what one interviewee described as a ‘club’ of those who have received EU funding.

“...in addition to the monetary contribution, the political support which comes attached, is of utmost importance”...survey respondent.

“The levels of funding are moderate compared to the required investment volumes, but the political support thereby provided by the Commission is vital” – survey respondent.

In some cases, some interviewees felt that certain projects would probably have found the funding in any event. This was particularly to be perceived to be the case where project promoters are directly or ultimately owned by large energy multinationals, as was the case for the majority of gas projects. While TSO’s are no longer as low risk as they were before the economic crisis, some interviewees nevertheless felt that there are still some who would nevertheless have found funding for their projects, particularly where they are not subject to regulated tariffs or have exemptions from third-party access. It might be expected that in such cases EEPR funding freed up financial resources that might otherwise have been used for other projects which would boost the economy, but it is not possible to substantiate this.

The EEPR had not always been sufficient as of May 2011 to achieve the hoped-for results in every case, as will be discussed in the next section. However, where actions financed under this programme have continued to experience delays, this appears on the basis of stakeholders’ perceptions to be for reasons unrelated to the relevance of the EEPR or the level of funds mobilised.

Finding 2

The perceptions are that many projects certainly needed the finance, though there may be a few which would have found other means of funding their projects even during the economic and financial crisis. The level of finance – and the reputational benefits attached – were also felt to be relevant because these sums made a significant and sometimes critical difference to the ability of many projects’ ability to proceed.

3.2.3 Contribution to energy policy objectives

The second recital of the EEPR Regulation stresses its importance to energy policy and of energy policy to the economy: “at the same time it is clear that the long-term strength and sustainability of the European economy depend on reshaping it to face the demands of energy security and the need to reduce greenhouse gas emissions. Increasing concerns about securing reliable gas supplies reinforce this conclusion.” The tenth Recital covers as well the internal market: “Among energy infrastructure projects, it is necessary to select those that are important to the operation of the internal energy market, to the security of energy supply and which also contribute to the recovery of the economy.”

In the web-based survey, an overwhelming majority felt that the level of the EEPR was relevant to increasing security of supply and maximising the internal market: 97% agreed or tended to agree in both cases. There was particularly strong agreement about the relevance to security of supply – 80% agreed totally, compared to 59% in relation to maximisation of the internal market. These results are in line with the findings in the fieldwork and other interviews.

Survey respondents and – in some but by no means all cases – interviewees were less likely to see a relationship with reduction of greenhouse gases. In both groups, the relationship with better management of intermittent sources of energy of electricity through better integration with renewables was well understood by some, but less readily perceived by others. The relationship was clearest to those in the electricity sector. Of those with gas infrastructure projects, the relationship tended to be less clear to those with reverse flow/storage projects. This is discussed further in relation to utility, but is not intended to suggest that the relationship does not exist.

Finding 3

The EEPR, and the levels of funding of the EEPR, are regarded as relevant to EU energy policy objectives, particularly security of supply and maximisation of the internal market.

3.3 EFFECTIVENESS AND EFFICIENCY

To what extent are the financial resources made available by the EEPR Regulation being used and to what extent are they contributing to achieving the programme objectives?

3.3.1 Introduction and summary

In this section we consider only the issue of the effectiveness and efficiency of the financial resources made available and the extent to which the financial resources are contributing to achieve the programme objectives. We look in detail at the contribution of the EEPR to the various strands of energy policy in the final section dealing with utility.

In this section, we begin by looking at the point which had been reached as of May 2011, both in terms of project completion and financial expenditure on EEPR actions, and at the complexities faced in implementing these projects. We then look at the contribution of the EEPR to enabling EEPR projects to reach that point by easing the path to additional finance, restoring confidence and removing non-financial obstacles.

It is important to recognise at the outset, however, that the EEPR Regulation represents a difficult balancing act, as stakeholders stressed to us. It is predicated on the belief that “there exist large, mature projects capable of making efficient and effective use of significant amounts of financial assistance...” and that investing in those projects would meet the need for a financial stimulus to spur economic recovery. The projects were selected *inter alia* because they were felt to be at risk of not being able to invest money because of scarcity of funds, even in cases where the investment decision had been taken at the time the EEPR Regulation was published. It was hoped that the EEPR would act as a catalyst to raising the finance. However, there could not be total certainty that the EEPR funds would be enough on their own to achieve this. These are large and complex projects. They carry inherent risks of delay. These relate to their financial packages, but also to permitting and regulatory approvals. It is, therefore, not surprising that a limited number of projects – particularly large projects – have progressed more slowly than might have been hoped. Indeed, the Regulation recognises that these are projects which take significant time to plan and execute. Moreover, the economic and financial crisis has been more protracted than had been envisaged in 2009, with implications for the availability of finance. This is important context for the analysis of expenditure to date below and in the following sections.

Two electricity interconnectors, four gas reverse flow projects, and three gas pipelines, which are either interconnectors or vital links in future interconnector projects, had been completed by mid-2011 despite the difficult environment. Moreover, the EEPR helped some project promoters obtain their investment decision. Survey respondents spoke of the “positive influence” on and the “clear contribution” of the EEPR to this.

Overall, the electricity and gas infrastructure projects in our sample had spent 13% of the amount budgeted for their EEPR-financed actions by late-2010/early 2011³⁷. However, some of this is a down payment on orders placed, so there is an induced effect in the wider economy.

³⁷ Based on the most recent comparable data available as of May 2011.

3.3.2.1 STATUS OF COMPLETION

Nine projects represented by the actions funded by the EEPR had been completed as of mid-2011. They were:

- **Romania–Hungary gas interconnector:** building of 47 km long gas transmission pipeline and related installations between Romania and Hungary. It connects the already existing 36 km pipeline between Horea and Pecica.
- **Hungary–Croatia gas interconnection:** purchase of raw material and compressor stations for the construction of a pipeline interconnection between the Hungarian and Croatian gas networks;
- **East-West gas link in Belgium:** procurement of pipes and the construction works from Raeren (Eynatten) to Opwijk of a total length of 170 km;
- **Austrian reverse flow projects (two):** upgrading of the Baumgarten gas hub to allow transport of gas from Germany to countries adjacent to Austria; and upgrading of the Überackern Export Facility to allow for reverse flow from Germany;
- **Czech Republic reverse flow project:** increase of the transmission capacity through the Czech Republic from the Czech-German border towards Czech-Slovak border;
- **Slovak reverse flow/storage:** increase in delivery and construction of two parallel interconnection pipelines to interconnect the two gathering stations of the existing Underground Gas Storage (UGS) Lab Complex and connect these two gathering stations with the Central Station Gajary-Baden;
- **Spain-Portugal electricity interconnections (two):** construction of the new interconnection between Portugal and Spain in the Algarve region, and extension of the 400kV line from Valdigem towards Vermoim situated close to the Atlantic coast, the reinforcements of the overhead lines in the Douro area and the extension of the 400kV line to the Douro Internacional region.

The Commission Decisions granting the financial aid to these projects were finalised between July and November 2010. The contribution of the EEPR ranged from €1.15m to €35m. These actions represent in total some €127m of EEPR funds and €277m of investment³⁸.

Many other projects commenced civil works in 2010. The European Commission's implementation report for 2010 published in April 2011 puts the figure of those which had begun construction at 4 electricity and 17 gas projects, including some which were near completion. The analysis of the sample confirms this picture.

According to the web-based survey, as of May 2011, eighteen gas infrastructure projects (60%) had completed defining their technical/technological options, as had six (55%) of the electricity projects. Eight gas projects and two electricity beneficiaries (out of 30 and 11) had this 'under way'. For the others, it was under way with some delays, except for one gas infrastructure project. As is logical, the rate of advancement was significantly higher for smaller projects than for large.

The information we have received in relation to the projects which were selected for in-depth analysis suggests that where there are delays, they are minor and that project promoters expect to make up lost

³⁸ Total EEPR funds allocation is €2.27 billion; total investment in EEPR projects is €5.73 billion.

time. There were, however, as of the closing date of this evaluation six projects for which there was not yet a Investment Decision : Nabucco, Poseidon, Galsi and the interconnections between Bulgaria and Greece, Slovakia and Hungary, and France and Belgium (for the segment in France only). Thus, of the six gas projects to which the EEPR allocated more than €100m, two the Skanled/Baltic pipe and the Rhône valley segment of the interconnection from Africa through Spain and up through France – had been able to take their investment Decision.

There are a variety of reasons, including not having been able to contract gas, lack of proven shipper interest, permitting and delays in associated projects, e.g. being contingent on an investment decision on an LNG gas terminal in the case of the Belgian-French gas pipeline, a decision which took longer than expected.

Stakeholders believe, however, that project promoters had reasonable expectations at the time they made their applications for EEPR funding that they would not be facing the sorts of delay they are now encountering. As pointed out in the introduction, at that time, it had been thought that the economic and financial crisis would be over by now.

Moreover, in most cases, promoters start investing well before the investment Decision is taken. The results from the web-based survey clearly indicate this. The web-based survey also demonstrated that the bulk of the projects were already mature, i.e. had reached the investment stage, at the time they were selected for inclusion in the EEPR.

Finding 4

Nine EEPR actions (20%) had been completed by mid-2011. Almost all others were on track, albeit with ‘some’ delays in a number of cases. The extent of those delays varies considerably, but some large projects have been particularly badly affected by the ongoing economic and financial crisis. Overall, the bulk of the projects are well into the investment stage.

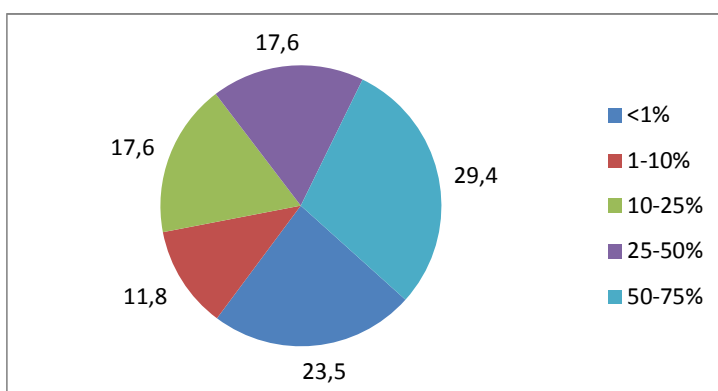
3.3.2.2 STATUS OF PROJECT EXPENDITURE

At the end-date of the first reporting period (six months after the grant decision) and based on Interim Technical Implementation Reports available to the Commission at May 2011, there was a very wide range in the extent to which the *sample* project beneficiaries had incurred expenditure covered by the Commission Decision (‘eligible costs’) by a date which can be assimilated with end-2010³⁹.

The expenditure ranged from 75% of the action’s costs down to less than one per cent. There were five projects in the 50-75% range; three in the 25-50% range, three in the 11-25% range and four where it was <1%. The five projects which had spent most were all projects involving expenditure of less than €100m. Overall, the expenditure incurred represented 12.95% of eligible costs for the sample projects, whose total eligible costs are €2,185m. However, this data should be treated with caution. The Interim Technical Implementation Reports are not triggers for payments, so there is no incentive for project promoters to be absolutely precise. These reports merely provide an estimate of the costs incurred at a certain date.

³⁹ The variation in reporting dates makes it impossible to arrive at a precise figure for end-2010. Two projects had reporting dates of September 2010, but we do not consider that this invalidates our calculations, particularly as some figures include some expenditure incurred in 2011. The latest reporting date is 30/04/2011.

Figure 1: Ratio of expenditure to action costs at end of first reporting period (late 2010/early 2011, projects within each range - %)⁴⁰



Source: Based on European Commission data

Given that the overriding purpose of the EEPR Regulation was to provide a financial stimulus to economic recovery and that one of the award criteria in the Regulation was to incur substantial capital expenditure by end-2010, the expenditure by the project promoters against their budgets as reported to the Commission might nevertheless be considered a low figure, and is lower than the promoters had expected at the outset of their actions. However, as pointed out above, there are reasonable contextual explanations for this. Moreover, the expenditure data was just one award criterion of eight listed in the Regulation, and the ability to contract for expenditure was also taken into account.

According to the Commission's second implementation report,⁴¹ 29 of the 32 gas infrastructure projects and all the electricity projects had proceeded to tender for and order long-lead items during 2010. This is also borne out by our desk research and interviews, though the value of those orders relative to the size of the project and the number which had completed the complex process of moving from tendering to ordering the major items was highly variable. Moreover, while there were delays compared to initial expectations, there are also cases where ordering was accelerated in order to meet milestones in EEPR Decisions. It is difficult to gain a clear picture overall as beneficiaries are not currently required to report in detail or comparably on their tendering and ordering. Nevertheless, we have identified several actions (other than those already completed) where the value of the orders placed by May 2011, and indeed by end-2010, already exceeded the total amount of the eligible costs of the action, i.e. the action gives a partial picture of the overall catalytic effect on projects of the EEPR.

Finding 5

Expenditure by sample projects by late 2010/early 2011 was nearly 13% of eligible costs, with relatively small projects able to absorb funds more rapidly on the whole than larger projects. The value of orders placed was higher, but it is not possible to quantify this.

⁴⁰ Includes only those projects in a representative sample selected in agreement with the Commission for in-depth analysis.

⁴¹ Report from the Commission to the Council and the European Parliament on the Implementation of the European Energy Programme for Recovery, COM (2011) 271 final.

3.3.3 Contribution of EEPR to securing financing

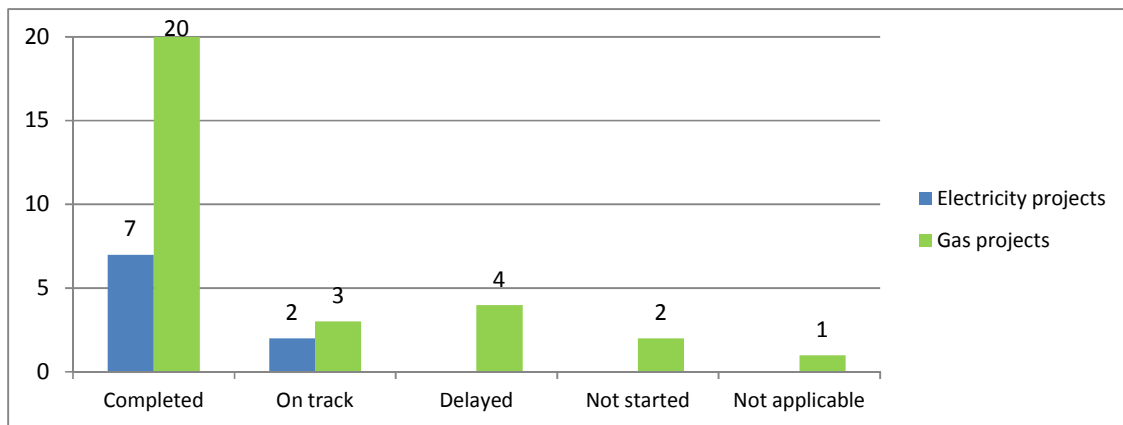
Many of the EEPR projects are intrinsically perceived as high risk by investors because, for example, of long payback times and their cross-border dimension. The EEPR Regulation is built on an assumption that it was difficult to raise finance at the time it was agreed. Consequently, the extent to which the EEPR was needed and enabled beneficiaries to secure their financing is also pertinent to the answer to this evaluation question.

In the web-based survey, most respondents accepted the hypothesis that it would have been difficult for them to have gone ahead without the leverage of the EEPR: 80% of electricity respondents agreed (in mild terms for a majority of them) that their projects would not have happened without the EEPR or would have faced substantial delays because of financial obstacles; the figure drops to 60% for gas infrastructure projects. However, there was broad consensus around the fact that the EEPR contributed to accelerating the overcoming of financial obstacles – with well over 90% agreeing, at least to some extent, with this proposition.

While planning on these projects was well advanced, since they would otherwise not have been able to meet the tight time frames for submitting proposals, there is clear evidence that the existence of EEPR funding either ensured they actually proceeded or even accelerated the pace at which they proceeded. This was also borne out during interviews. In these, we also found in interviews the differences between electricity and gas infrastructure projects that the survey showed, i.e. that the EEPR was more important to electricity projects, but this needs to be counterbalanced by the fact that there are differences between the larger and smaller projects.

The web-based survey indicates that by May 2011, the bulk of the projects – and all the electricity projects – had completed their financing, or in a few cases were on track to do so. Those which had not yet started or reported delays were all gas infrastructure projects. This was one in five of the respondent beneficiaries from the gas infrastructure projects.

Figure 2: Progress to date with securing financing



Source: web-based survey

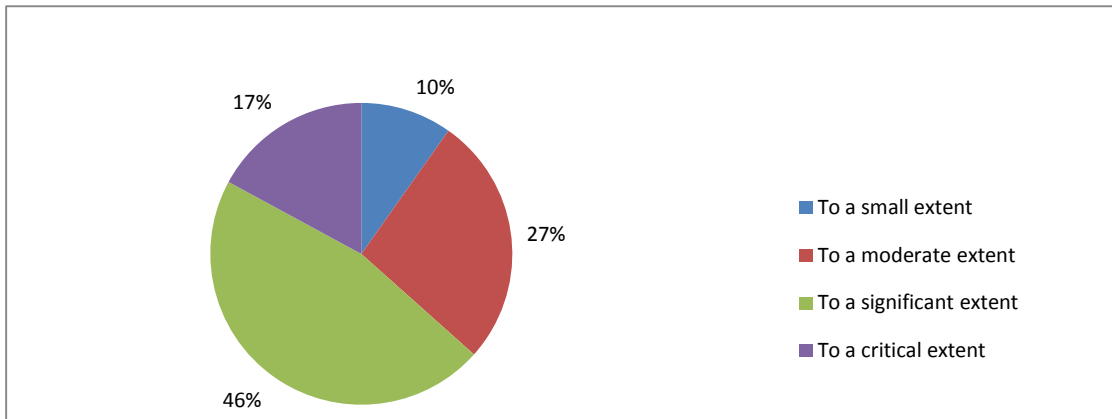
Finding 6

There is considerable evidence that the EEPR contributed to overcoming financial obstacles. Many respondents to the web-based survey, particularly those with electricity infrastructure projects and those with large gas infrastructure projects, felt their actions would either not have happened or have faced substantial delays without the EEPR. By May 2011, most projects had secured their financing or were on track to do so.

3.3.4 Contribution to restoring investor confidence and leveraging additional funds

Restoring investor confidence was one of the most important purposes of the EEPR and is mentioned in the very first Recital of the Regulation. Ninety per cent of web-based survey respondents thought that it achieved this to a critical to moderate extent, as the Figure below shows. This was also the consensus of interviewees.

Figure 3: Beneficiaries' perception of EEPR contribution to reduce the risks and increase funders' confidence



Source: web-based survey

Finding 7

The EEPR contributed significantly to reducing risk and increasing investor confidence.

Another expectation of the EEPR Regulation was that it would catalyse significant amounts of investment from other sources. Beneficiaries largely agreed that this was the case. In the web-based survey, almost three-quarters of respondents thought that the EEPR had either a significant (64%) or a critical (9%) effect on leveraging funding from additional sources.

“EEPR funding and Commission involvement is a clear signal to other financiers about the political importance of the project. Commission investment is an important risk mitigant and conducive to getting a wide array of lenders and institutions aboard” –survey respondent.

There was not a simple equation in relation to the EEPR in which a credit crunch was synonymous with the inability of the beneficiaries to borrow money and therefore to finance specific projects, because the ways in which such projects are financed are complex. Four web-based survey

respondents gave commercial banks as their main source of funding, three in gas and one in electricity. Balance sheet funding has been used in many cases as the results of the survey show. This is particularly true of the gas infrastructure projects. Two thirds of the gas infrastructure projects gave 'own resources' as the main source of their funding⁴² as opposed to one for electricity. A further four cited equity. Three cited development banks, as opposed to seven for electricity. Three gas sector respondents gave debt from commercial banks as the main source; three electricity sector respondents cited bonds. Bonds were much less important to the gas sector.

The predominance of own resources makes it difficult to know whether or not these companies would have allocated treasury funding from equity, bond revenues or commercial borrowing to these particular projects without the EEPR, or to know what other projects benefited indirectly because there were funds which could be allocated elsewhere, but interviews, desk research and the web-based survey have shown that the availability of the EEPR funding leveraged investment and expenditure decisions, not just with financial institutions, but also with corporate treasurers, including those of TSO's.

The EEPR Regulation anticipates that there would be a leverage effect with the European Investment Bank (EIB). There were several EEPR-related projects with approved or signed loans as of May 2011. However, given that the Bank tends to finance only the larger projects which have long lead times in putting their financing together and which are among those delayed by the economic and financial crisis in particular, it is too soon to be able to establish the leverage as against the expectations of the promoters when they applied for EEPR funding, or against lending to energy infrastructure projects in the past.

Finding 8

It is too early to establish the leverage effect of the EEPR on EIB lending.

3.3.5 Contribution to overcoming non-financial obstacles

EEPR project promoters face a range of non-financial obstacles, which can often be as difficult or even more difficult than financial obstacles. A report on Implementation of the TEN-E 2007-2009⁴³ identified a number of common obstacles:

- Crossing of natural protected areas (e.g. Natura 2000 sites)/Environmental constraints (e.g. due to Natura 2000);
- Opposition from the local population/Crossing of densely populated areas and natural barriers;
- Commercial and regulatory complexities;
- Difficulties in authorisation procedure (permits, planning issues);
- Time-consuming authorisation and permit procedures.

⁴² One of these cited five 'main sources', but this is the only anomalous reply.

⁴³ Annex to the Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions on the Implementation of the Trans-European Energy Networks in the period 2007-2009, COM(2010)203 final, SEC (2010)505 final.

A recent study for the European Commission on permitting procedures points out that “authorisation procedures often present a major challenge to the realisation of critical energy infrastructure projects, both national and transboundary. The duration of authorisation procedures is in many cases unpredictable.... Transboundary projects face additional challenges. The design, timeline and requirements of permitting procedures in different EU Member States vary strongly. This often results in the conclusion of the permitting procedure much earlier on one side of the border than on the other. Sometimes even the construction of a project is finished on one side of the border while the permitting procedure on the other side is on-going.”⁴⁴

Our own analysis of the project sample and our fieldwork confirms how complex and uncertain this process is, with the duration of many elements difficult to plan. An example of complexity is where projects must secure easements from every landowner under or over whose land an interconnector will pass. The range of permits is illustrated by some of the causes of (minor, and retrievable) delays experienced by some EEP projects, e.g. in obtaining work permits for key personnel from outside the EU or permission to cut down trees.

According to the web-based survey, the number of projects which were fully permitted at the proposal stage and fully compliant with environmental legislation was very low, one in each case for electricity and gas infrastructure. Most, but not all, projects had, however, embarked on both processes as of July 2009. Our analysis of the sample confirms this information from the web-based survey, i.e. that many projects were still at an early stage of permitting in July 2009.

However, there has been time for many promoters to remedy this. The web-based survey illustrates that a significant number of projects were no longer being held up by permitting as of May 2011, both in terms of compliance with environmental legislation, and obtaining environment and construction permits. Of 41 beneficiaries responding to the web-based survey, fourteen were fully environmentally compliant as of May 2011 and five had their construction and environment permits as well. Four were not environmentally compliant and thirteen did not have their permitting process under way.

Finding 9

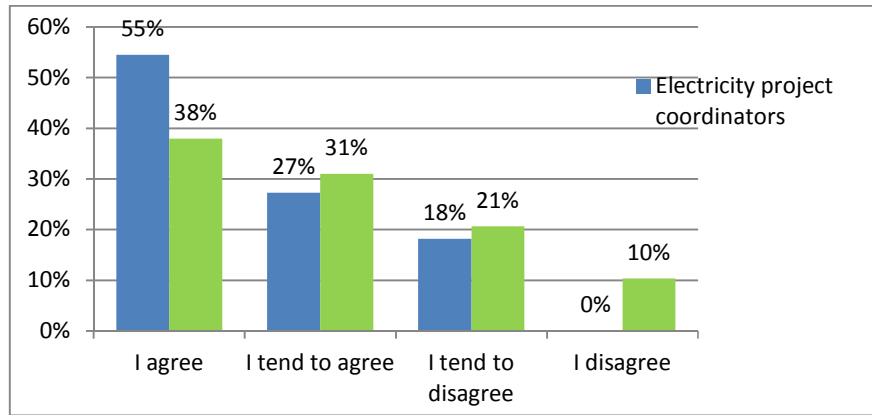
Many projects which were not far advanced in their permitting in mid-2009 had made substantial strides towards completing this process by May 2011, suggesting that most expectations were realistic at the time of the project proposals.

Regulatory authorities were reluctant in interviews to indicate that they had given preference to EEP projects, and there was a range of opinion among interviewees as to whether this had been the case. But the interviews did indicate that there are instances where the EEP ‘quality mark’ did make the administrative processes smoother, and this is borne out by beneficiaries’ responses in the web-based survey.

⁴⁴ Permitting procedures for energy infrastructure projects in the EU: evaluation and legal recommendations, Roland Berger Strategy Consultants, http://ec.europa.eu/energy/infrastructure/studies/doc/2011_ten_e_permitting_report.pdf

In the survey, 82% of electricity project beneficiaries agreed or tended to agree that the EEPR had speeded up processes which would otherwise have taken longer. This was less the case for gas infrastructure projects, but the two together – gas and electricity projects – nevertheless represented 69% of respondents.

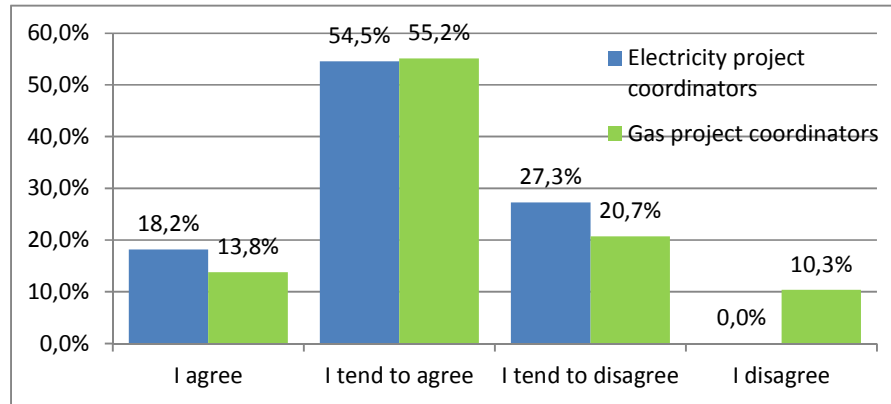
Figure 4: Perceived EEPR contribution to speeding up administrative processes⁴⁵



Source: web-based survey

There is also a difference between the electricity and gas projects in terms of perceptions of the contribution to actually overcoming administrative obstacles, but the gap is much narrower: 73% and 69%.

Figure 5: Perceived EEPR contribution to overcoming administrative obstacles

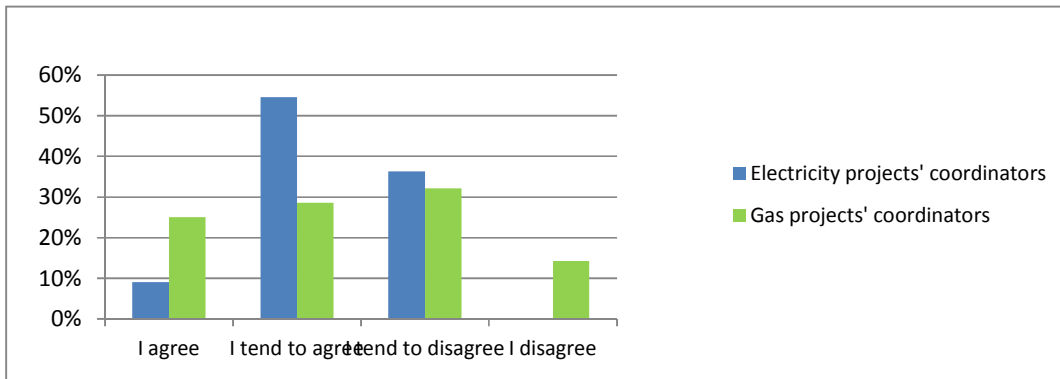


Source: web-based survey

The EEPR was also seen in the web-based survey as having contributed to overcoming environmental and technical obstacles, but not to the same extent as in the case of administrative obstacles, and again with a difference of degree between the electricity and gas projects.

⁴⁵ These are percentages of the total number of respondents who have expressed an opinion.

Figure 6: Perceived EEPR contribution to overcoming environmental obstacles to project realisation⁴⁶



Source: web-based survey

The EEPR has contributed to overcoming administrative and environmental obstacles, and particularly the former; this has particularly been the case for electricity projects, but is also true of gas projects.

⁴⁶ Ibid.

3.4 IMPACT

What are the short and medium term impacts of the programme? What is the impact in terms of direct and indirect job creation, increase in consumption and investments? What is the macroeconomic multiplier effect of the EEPR investment spending?

3.4.1 Introduction and summary

The EEPR sample and case study projects involving electricity and gas infrastructure are at different, and generally early, stages of implementation, and it is therefore difficult to assess the socio-economic impacts with any precision. The information is based principally on information provided to the Commission at the proposal stage, as well as other qualitative information (such as follow up information from Commission visits to specific projects and our own fieldwork).

Looking across the different projects, it is apparent that a wide range of socio-economic benefits was anticipated to follow from EEPR funding. These include: short-term macroeconomic benefits in terms of employment and increased consumption and investment; regional benefits to local economies; benefits in terms of commodity competition, including an expectation of lower prices through the integration of energy markets; the mitigation of future economic harm, by improving the security of energy supply; and reductions in constraints (and corresponding regional/market price differences) through the greater interconnection of networks. The extent to which these were substantiated through prior detailed analysis varied widely, and any studies there were have generally not been updated, at least for the projects looked at in greater detail.

In terms of jobs created which can potentially be attributed to the EEPR funding across the various sub-programmes, it is estimated, on the basis of the surveys, that over 11,700 jobs have been created in total (including direct, indirect and economy-wide jobs). Of these electricity and gas infrastructure projects accounted for around 46%, of which 70% were in the gas sector. Looking at the programme as a whole, this is consistent with the less labour-intensive nature of these projects relative to OWE, in particular. The figures also reflect the status of the projects.

Across the two infrastructure sectors there has been a substantial impact in terms of indirect FTEs jobs created, in particular through the use of suppliers, but also across the economy as whole. In one electricity project it is estimated the major employment effect has been through indirect jobs created in the economy as a whole.

One quarter of the jobs created represent direct employment in funded projects (25.4%), while half (50.9%) have been created at suppliers and the remainder within the broader economy. This implies an indirect employment multiplier of 2.0, and an economy-wide induced employment multiplier of 2.9. That is, for every 10 direct jobs that has been created or retained as a result of the EEPR programme, an additional 30 indirect jobs are estimated to have been created in the economy as a whole. Almost all of these are in the EU, since only one web-based survey respondent said that their main source of supply was outside the EU.

In terms of the types of employment created, the pattern appears to reflect the stage of development for the different projects, and the underlying nature of the projects. 23% of jobs created in gas infrastructure are management/technical in nature (with 65% of jobs in that sub-programme being manual/construction jobs). The proportion of management jobs in the electricity infrastructure projects is lower (12%), but the data is incomplete.

Finally, a further observation on the possible broader effects of the EEPR programme can be gleaned from examining the number of jobs that have been created as a proportion of budget consumption to date for the sample projects. This analysis suggests that, on average, one FTE job appears to have been created, on average, for every €100,000 consumed. These numbers should, however, be treated with care as there is significant variation across the programmes, and between individual projects, in terms of the jobs that have been created, ranging from 0.5 of a job per € 1 million consumed for one project to 39 jobs per €1 million consumed for another project.

3.4.2 The broader socio-economic benefits

Many of the expected beneficial socio-economic impacts in the electricity and gas infrastructure projects are associated with the price and market benefits of increased interconnection of neighbouring markets – and through them to other countries. Other expected benefits associated with some of the projects include: higher levels of trading on European power markets; an increased ability to allow for the development of offshore wind capacity; and benefits associated with a diversification of sources of supply (with benefits for consumer prices) and security of supply, and positive impacts on local labour markets, including improving the skill base of the local workforce and creating new jobs and stimulating local economies.

More widely, some projects emphasised the positive spill-over effects of the investments through the economies of the EU, and noted that the equipment orders would generate new suppliers in the machinery and engineering sector, while other projects focussed on benefits in terms of the operation of the networks, particularly in terms of improving the flows on the international networks, and through the diversification of the number of entry and exit points into the transit and distribution systems.

This is consistent with our findings from fieldwork and desk research on developments since the EEPR project selection was made.

Finding 10

Generally speaking, the main expected economic benefit of the gas and electricity infrastructure projects is associated with the interconnection of different electricity markets and networks, and therefore diversification of supply and improved functioning of the single market.

Not all the projects examined included a detailed cost-benefit study, or other financial analysis, to support their estimates of the expected socio-economic benefits as part of their proposal despite being asked ‘where possible’ to provide information on at least two of three economic ratios: net present value, internal rate of return and benefit-cost ratios. It appears, moreover, that this information was not used as a means of differentiating between proposals. As no definition was given or sought, what figures there are do not appear to be comparable.

For those electricity projects that did present estimates of the potential market benefits, there was a wide range of expected financial benefits from tens of millions of euro annually to billions of euro over the lifetime of the project. In some cases, the estimates presented were not supported by a full cost-benefit study, or were based on simplistic scenarios. In other cases, the estimates were based on detailed modelling and analysis, which examined a number of different scenarios under very specific (but standard) assumptions, about the operation and development of the relevant electricity markets.

The various scenarios examined incorporate different assumptions about levels of integration of markets and regions, and different expectations regarding the achievement of renewable and other policy objectives (including in relation to nuclear power).

In gas, there is substantial variation across the projects examined in terms of the assessment of socio-economic impacts and, on the whole, the analysis is generally less detailed than in the other EEPR sub-programmes. While some projects referred to a cost-benefit study, or other financial analysis, to support their estimates of the expected socio-economic benefits, other projects presented only a more general discussion of the expected benefits. For those studies which did present financial analysis it is notable that some projects are negative in net present value (NPV) terms, and have very small expected internal rates of return. This implies that the project is not commercially viable and will not meet the profitability standards of the beneficiary over its lifetime. However, some projects attempted to quantify the financial benefits in terms of the prevention of a security of supply emergency arising in the future, and it is clear that this was one of the objectives in funding these projects.

Finding 11

Detailed cost-benefit or financial analysis is available for a few projects, and is often not comprehensive. Some gas projects are not commercially/financially viable (i.e. they are NPV-negative), but are justified on security of supply grounds⁴⁷.

3.4.3 The employment impacts

In terms of employment, there was also a wide range of expected impacts across the different electricity and gas infrastructure projects. While some electricity infrastructure projects estimated that thousands of full time direct jobs would be created during the construction phase, other proposals estimated that the direct and indirect jobs created would be in the couple of hundreds.

As might be expected, it was not anticipated that much permanent employment would be created, as in most cases the local grid operators will manage the interconnection project once it is constructed and operational. Similarly in gas, some projects estimate that hundreds or thousands of jobs will be created during the construction phase, while other proposals suggest more modest estimates of fewer than 100 jobs (with one project suggesting no jobs will be created). There is, naturally enough, a correlation with the size of the projects. As in electricity, it was expected to be a more limited permanent employment impact associated with the operational phase. For many of the projects, the types of job created will largely be indirect and relate to the use of suppliers.

The situation as it is seen now was addressed in the web-based survey, though it is important to bear in mind that the data may not be directly comparable across different types of projects, or for projects at different stages of a production/development cycle.

⁴⁷ For a discussion of the need to meet the N-1 criterion in the subsequent EU Regulation on security of supply irrespective of financial viability, see the next question.

An analysis of the web-based survey suggests that, to date, around 1,700 jobs (both direct and indirect) have been created across the different projects in electricity infrastructure, and that around 3,600 jobs (both direct and indirect) have been created across the different gas projects to date.

Finding 12

There is a wide range of expected employment impacts across the different projects, reflecting the diversity of projects funded, and there is also a paucity of data, but it appears that more than 5,000 jobs had been created as of May 2011.

The majority of direct full-time equivalent (FTE) jobs created as a result of the EEPR funding in electricity (75%) have been temporary in nature (although this does not include one large project which did not differentiate between temporary and permanent employment). There is less of a difference between permanent and temporary jobs in gas, and around 58% of the direct FTE jobs created or retained as a result of the EEPR projects have been temporary in nature.

The majority of employment created in electricity projects to date has been construction or manual labour jobs, which is perhaps unsurprising given the stage of development of many of the projects and the general nature of the investment. Similarly in gas, around two-thirds of jobs created have been construction or manual labour jobs, with a further 23% being managerial and technical in nature. There are, however, exceptions with some projects reporting a higher relative proportion of managerial/technical employment and administrative employment (which may reflect the early stage of development for these particular projects). However, it is very early in the life of most projects to draw firm conclusions on this type of impact.

Finding 13

For the majority of the projects, and particularly in electricity, any employment generated is expected to be largely temporary in nature, i.e. there is a short-term stimulus. The employment effect appears to have been greater in unskilled than in managerial/technical jobs.

3.4.4 The geographic spread of benefits

Finally, the location of suppliers and contractors has been in the same member state as the project for slightly more than half of the electricity project respondents, and just over two-thirds of the respondents in gas. Some 36% of electricity respondents and 31% of gas respondents said that the main location of suppliers and contractors was in another member state. One respondent (in electricity) noted the main location of suppliers and contractors as being outside the EU. In other words, the financial stimulus has been to the EU economy.

Finding 14

The induced effects have largely been within the EU, and well over half have been within the beneficiary's own Member State.

3.4.5 The implied multiplier effect

In measuring the impacts associated with employment across the different projects it is useful to examine these effects in terms of the implied employment multiplier effect, both in terms of indirect jobs created, and in terms of induced effects across the whole economy.

Unfortunately for a large number of projects the data is not available in the web-based survey to permit such a comparison. This may reflect a number of factors such as the stage at which a number of the projects are at in terms of development, or the difficulties in estimating the indirect or implied employment effects of a project. Taking account of these limitations in the data, the table below presents estimates of the implied indirect employment multiplier, and the induced economy-wide multiplier.

For the projects for which we have the necessary data, the table suggests that, in electricity the implied indirect multiplier is 3.9, and the induced multiplier is 4.4. In gas the implied indirect multiplier effect is 2.6, and the induced multiplier is 3.7. In other words, this analysis suggests that for every 10 direct FTE jobs associated with the EEPR projects in electricity, around 29 jobs have been created indirectly in terms of suppliers, and around 34 jobs have been created in the economy as a whole (including the indirect supplier jobs). Similarly, for every 10 direct FTE jobs associated with the EEPR project in gas, around 16 jobs have been created indirectly in terms of suppliers, and around 27 jobs have been created in the economy as a whole (including the indirect supplier jobs).

Table 3: Electricity and Gas Infrastructure – Implied employment multiplier

	Direct	Indirect - Suppliers	Indirect - Economy wide	Total	Implied indirect multiplier	Implied induced multiplier
Electricity	374	1106	200	1680	3.9	4.4
Gas	993	1633	1070	3696	2.6	3.7

Source: web-based survey

Finding 15

There are relatively high estimated implied multiplier effects associated with the EEPR infrastructure projects: 2.9 indirect jobs and 3.4 jobs in the economy as a whole (including indirect jobs) for every direct job created in electricity; 1.6 indirect jobs and 2.7 jobs in the economy as a whole (including indirect jobs) for gas.

3.4.6 Job creation as a function of budget consumption

The table below builds upon this analysis to compare the average direct and indirect jobs created as a function of the *actual* budget consumption, that is the employment that has been created as a proportion of budget consumed to date for a sample of *selected* EEPR projects⁴⁸. This analysis is seen as insightful in so far as one of the objectives of the EEPR programme was to provide an immediate, and substantial stimulus to the economies, or put slightly differently, it was intended to provide substantial sums of money that could be absorbed and spent relatively quickly.

The estimates presented are, however, indicative and should be treated with *considerable caution* on the basis that they only reflect the analysis of the nine infrastructure projects for which we have necessary data, and each project is obviously at a different stage of the development cycle (and therefore have different levels of costs and employment associated with them). Moreover, these estimates may also not present an accurate picture of the impact on employment, in so far as they do not take account of the ‘leverage effect’ whereby firms place orders, or hire staff, on the expectation that funding will be forthcoming to cover those future outgoings/commitments.

Bearing these points in mind, the analysis suggests that, across the three projects examined in electricity infrastructure, an average of 5.1 FTE jobs (both directly and indirectly) have been created per €1 million of budget consumed. In gas, for the five projects examined, the analysis suggests that an average of 4.9 FTE jobs (both direct and indirect) have been created per €1 million of budget consumed, which is roughly the same as the jobs recorded in electricity infrastructure (however, it also reflects the very large relative employment per €1 million consumed for one particular gas project). Caution should be exercised in using these figures, however. The data is too weak for a finding, for example, that investing in electricity infrastructure creates more jobs than investing in gas infrastructure.

Finding 16

In terms of jobs created as a proportion of the EEPR budget consumed to date, the analysis of a sample of projects suggests that approximately 5 jobs have been created per €1 million of the project budget consumed in electricity and gas infrastructure projects.

⁴⁸ In the web-based survey, beneficiaries were asked for information on jobs created/safeguarded ‘so far’.

3.5 UTILITY

To what extent is the EEPR contributing to achieving the EU energy policy objectives of security of supply, decarbonisation, competitiveness, completion of the energy single market, functioning of the energy markets?

3.5.1 Introduction and summary

The extent to which projects are completed, or almost so, is important to be able to form a judgement on actual and future utility by comparison with the expectations when the proposals were submitted. We consider the extent to which the EEPR is already contributing to security of supply, to a low-carbon economy, competitiveness through investments in the rights skills and technologies, to completion of the single energy market and the functioning of energy markets.

The extended time frames for a number of EEPR projects, and uncertainty still about what the time frames will be of some large gas infrastructure projects means that the utility is less than had been hoped for at this stage. This concern is less for the electricity projects in the sample as all have secured the investment decision and all have signed major contracts with suppliers. At this stage there are no elements indicating that some of the electricity infrastructure projects could not go ahead.

However, utility does not necessarily come from the size of the action or related project. There are already positive contributions from some finished gas infrastructure projects, particularly in reverse flow and short cross-border gas interconnections in central and Eastern Europe. These come both from the capacity and from the political security which this capacity provides.

It is too early to have data on changes in trade flows, but there are assessments from desk research, interviews and the web-based survey. No one questioned the current or future utility of most of the projects. In some cases, full realisation of utility will depend on optimisation of the high degree of interdependency between certain projects: all the links in the chain need to go ahead to feel the full benefits.

There is an understanding that these projects will contribute to the low carbon economy through their contribution to reducing greenhouse gases through more efficient use not only of renewables, but also of renewables in combination with other sources of electricity. The contribution, at least potentially, to completing the single energy market, the functioning of the energy market is regarded as very high. The contribution in terms of competitiveness through innovation and skills development is regarded as moderate-to-significant.

3.5.2 Contribution to security of supply

The most obvious way of measuring the contribution of the EEPR to security and diversification of supply would be through quantitative data. Figures on changes in supply patterns or usage of new infrastructure were not available as of May 2011. However, the potential can be assessed through increases in interconnection capacity, and in gas storage capacity and reverse flow capabilities. We provide here some information on the concrete contribution which some projects will make, and then look at the views collected in interviews and the web-based survey.

Security of electricity supply

At the moment there is very limited transmission capacity between the Baltic markets and European markets. The transmission capacity between Estonia, on the one hand, and Russia and Belarus, on the other, is more than seven times that with Finland. Estlink 2 will bring that relationship down to less than three to one by almost tripling capacity with Finland. It will furthermore ease very significantly the congestion which exists at present with a single link and notably improve trading liquidity throughout the Nordic/Baltic region. The full potential will be realised once the connection between Estonia and Latvia has been upgraded to alleviate the bottlenecks created by changes in generation and flow patterns resulting from the closure of the Ignalina nuclear plant in Lithuania.

The Austria-Hungary interconnection will contribute to the Central Eastern and South Eastern Europe corridor, where strengthening of the regional network in North-South and East-West power flow directions is needed. The Malta-Italy interconnection will end the absolute energy isolation of Malta by creating the first interconnection between Malta and Italy, consisting of a 200MW cable.

The France-Spain interconnector will tie in the Iberian peninsula to the rest of Europe. No new line had been built since 1982 while energy demand had more than doubled since the early 1980s⁴⁹. Given the complementarities of the generation mix between France (predominantly nuclear) and the Iberian Peninsula (large amounts of wind power which can strain its grid at peak production times), it is expected that the connection would have a major impact on cross-border trading providing reinforcements to Spain's grid are in place.

Security of gas supply

Security of supply is a particular concern for gas. Indigenous gas supply is falling rapidly and the EU does not have the option of greater indigenous production, at least over a reasonable planning horizon and assuming that any development of 'unconventional' gas⁵⁰ will not make a significant contribution over the next ten years. According to data from the European Network of Transmission System Operators for Gas, indigenous production will drop by around one third between 2011 and 2020⁵¹. It will continue to drop after that as UK, Danish and Dutch reserves continue to deplete. At the same time, and notwithstanding the development of renewables, ENTSOG projects that demand will continue to rise. ENTSOG's modelling also illustrates how the EU lacks flexibility in the Baltic area in general, and that the situation would be particularly serious for Poland and Latvia if there were a supply disruption through Belarus. There is potentially still a problem with flexibility in southeastern Europe if there were a supply disruption through Ukraine even with the EEPR-supported projects.

Therefore, the EU needs long-distance gas pipelines and interconnectors for supply as such and for diversification, e.g. from countries in the Caspian basin, as well as from North Africa. EEPR projects, such as Poseidon, Nabucco and the Galsi pipeline, as well as stretches of pipeline in France, among others, address this. The EEPR will also allow new types of supply, e.g. by bringing LNG into Poland.

⁴⁹ http://ec.europa.eu/ten/energy/coordinators/doc/2008_01_10_interim_report_mm_fr.pdf

⁵⁰ Sometimes also known as 'challenging' gas, which can mean both shale gas ('unconventional') and gas from small fields that are not currently viable.

⁵¹ ENTSOG – Ten-Year Development Plan, as of 17 February 2011

In relation to projects already completed, the Hungary-Romania and Hungary-Croatia links, the perceptions of the promoters is that they will play a key role in security of supply. The Hungarian gas TSO, FGSZ Földgázszállító Zrt, has described the Hungary-Romania pipeline⁵² as “the first tangible step to establish a regional infrastructure-based platform in the CEE [Central Eastern European] region, it significantly increases the security of supply.” The Hungarian government also regards the Hungary-Croatia pipeline as important for security of supply.⁵³ These projects are regarded as key steps towards a North-South supply line in a region which has traditionally been supplied from east to west.

Security of supply cannot always be measured in terms of capacity or supply patterns. In an ideal world, there will never be a crisis which needs the reverse flow capability in Austria and in Slovakia to be used for the reasons for which it was built. Coupled with the existence of contracts for small amounts of gas to flow west to east, the availability of capacity provides the necessary potential to bridge any future crisis.

The benefits of the reverse flow capability that has been added in Slovakia have been underlined by its promoter, SPP: “In reverse flow mode, we are thus now able to get more gas to Slovakia than its highest daily consumption requirement during the winter. This puts gas security in the country on a totally different level.”⁵⁴ As a result of diversification of sources of supply⁵⁵, reverse flow measures and filling storage facilities at the start of the winter 2010, SPP could “face a gas crisis without any impact on our customers.”

In the meantime, there are beneficial ancillary benefits: more options for the promoters to provide reliable services, e.g. in the event of shutdowns in other parts of the network for maintenance, and alternative uses, such as creation of pressure beneath depleting fields to extend their life.

Interviewees were positive about the contribution that EEPR projects are making to removing bottlenecks, providing additional operational flexibility, and of the contribution they will eventually make to greater competition and more diversified sources of supply for physical or virtual trading at key hubs and exchanges, such as Baumgarten, Leipzig and Zeebrugge. The extent of that contribution will depend whether all the EEPR projects and complementary projects go ahead as planned providing other missing links are put in place.

Many neighbouring European countries are competing to be the first to develop diversified transit routes or hubs for gas. Our desk research and interviews showed a lack of agreement as to whether the delicate balance between spare and excess capacity will be achieved. There is also doubt as to whether a small minority of EEPR projects will realise their full benefits or eventually happen, or that they will all make the contribution to security of supply that their backers hope for. It is too early at this stage to know who is right, and it may well be several years before it is possible to evaluate this.

⁵² <http://fgsz.hu/en/news/arad-szeged-gas-pipeline-was-opened-inauguration-ceremony>

⁵³ http://www.cepa.org/ced/view.aspx?record_id=312&printview=1

⁵⁴ These contracts do not necessarily generate actual west-east flows other than at times of crisis.

⁵⁵ After the gas crisis in 2009, SPP signed contracts for up to 1 billion cubic metres of gas a year in the event of a crisis. This would cover more than 20% of annual consumption from sources other than Russia.

Perceptions of beneficiaries

The information in the sections above is based both on desk research and interviews. The web-based survey of all beneficiaries confirms the importance of the projects which make up the EEPR Programme to security of supply. Eighty per cent of beneficiaries felt that their project was contributing in this way to security of supply through diversification of sources. Seventy-six per cent felt their project was making a contribution to continuity and interoperability – an issue related both to security of supply and better functioning of the internal market.

Of the 22 beneficiary respondents who felt that their project was contributing to removing gas transmission bottlenecks, 18% felt the contribution was critical, 55% felt it was significant and 27% felt it was moderate. There were eleven responses from electricity infrastructure beneficiaries. Of these, 36% felt the contribution was critical, 36% felt it was significant and 27% felt it was moderate.

Finding 17

The projects which make up the EEPR programme are either already contributing significantly to security of supply or have the potential to do so. The contribution will decrease vulnerability to supply disruptions, diversify sources of supply in key regions, remove transmission bottlenecks, and provide greater scope for cross-border trade flows and better management of electricity generation.

3.5.3 Contribution to lower GHG emissions and long-term decarbonisation

A reduction in GHG emissions and to long-term carbonisation is a beneficial side-effect of optimising energy generation. The EEPR projects contribute directly to this.

The electricity transmission projects, particularly some of the cross-border projects, will accommodate an increase in wind power and provide greater flexibility via a more extensive network of intermittent supplies of various forms of renewable energy. Some of the projects will facilitate the connection of offshore wind farms. Latvia will have access to Scandinavian hydro power. Estlink 2 will allow an increase by up to 500MW of additional wind power capacity in Estonia (compared to the maximum capacity of 600MW today) within today's regulatory framework. If the framework on balancing were relaxed, the additional potential capacity that the system could accommodate would be 1200MW without Estlink 2, and up to 2200MW with Estlink 2, i.e. a differential of 1000MW. It is estimated that the new line will allow for an increase of up to 1.8 GW of wind power capacity in Spain (compared to a capacity of 17 GW in 2010).

The gas infrastructure projects should support CCGT capacity more efficiently and therefore also contribute to optimising power management, although there is a risk perceived by some interviewees that additional gas infrastructure will encourage more CCGT investment at the expense of lower carbon renewables. It is too soon to be able to evaluate whether this is the case or whether the availability of gas has displaced demand management.

Decarbonisation can also be a side effect if it will lead to substitution of coal for gas, e.g. in the case of the Polish LNG terminal, or where the pipeline will serve new gas-fired power generation capacity replacing ageing coal-fired or fuel oil-filled plant – potentially the case in Belgium and France.

There is qualitative evidence from interviews and comments in the web-based survey of the contribution to reducing greenhouse gas emissions from better management of networks and flows, particularly intermittent flows.

“...gas is important to balance the uneven availability of electricity generated from renewable sources, gas is "cleaner" than other fossil fuels...” web-based survey respondent

In the quantitative results from the web-based survey, the relationship is less well perceived: 34% thought that the contribution to reducing greenhouse gases will be significant, 27% thought it would be moderate, 20% answered ‘low’ and 20% had no opinion. Electricity infrastructure beneficiaries were more likely to believe the contribution was significant – 45% as opposed to 30% in the case of the gas infrastructure beneficiaries.

Finding 18

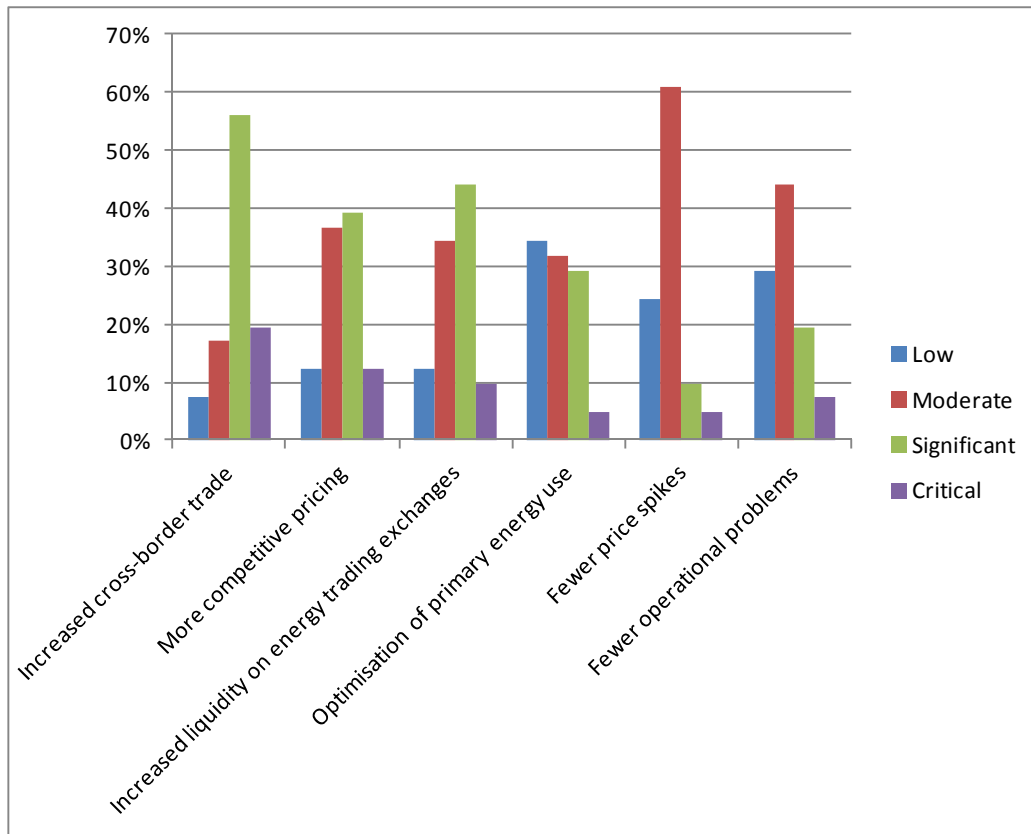
EEPR projects are contributing to greenhouse gas reduction by enabling more efficient management of electricity generation and displacement of more highly polluting fossil fuels.

3.5.4 Contribution to the completion of the energy single market and the functioning of the energy markets

Survey respondents were in overwhelming agreement (88%) that the EEPR projects will contribute to a better functioning of the single energy market. The primary means by which the EEPR actions might contribute to completion of the single energy market and energy market functioning are removing barriers to interoperability, optimisation of primary energy use, reducing operational problems (e.g. from the intermittence of renewables generation) and increasing the liquidity of energy trading.

Both gas and electricity survey respondents ranked the increases in cross-border trade as the most critical and significant contribution. This was followed by greater liquidity on trading exchanges and more competitive pricing (with little to separate them), then some way behind, fewer operational problems (which was seen as more important by the electricity respondents) and then with little to separate them – optimisation of primary energy use and fewer operational problems, which are also the two categories with the highest ‘low’ score. There is very little expectation that there will be a significant contribution to reducing price spikes.

Figure 7: Perception of projects' contribution to a better functioning of energy markets



Source: web-based survey

At the same time, interviewees also stressed and desk research has confirmed that this is a complex equation of which the physical infrastructure is only part. The regulatory and policy frameworks need to keep up, e.g. the effects of the ‘Third Package’ are not yet fully felt; reconciling investments in gas infrastructure which has a 50-year life with the objective of a low-carbon society by 2050; allocation of costs where the investment cost is on one side of a frontier and the beneficiaries are in another – the investment in reverse flow in Austria, which will largely benefit Slovakia, and of the Hungarian side of the Hungary-Slovak pipeline (80% of the length) – are just some examples of this.

Finding 19

EEPR projects are already contributing to improved functioning of EU energy markets, and are expected to do so to an even greater in future, but this will not be achieved by infrastructure alone. There are flanking policy and regulatory measures which will be required.

3.5.1 Contribution to Europe’s competitiveness

The selection of EEPR gas and electricity infrastructure projects was not primarily motivated by a desire to promote innovation or invest in new skills, but this was nevertheless explored in interviews and the web-based survey since it is important to the EEPR Programme as a whole.

The perceptions of stakeholders in interviews was that any usefulness in terms of innovation and skills development was limited, and that with a very few exceptions, the EEPR projects were using proven technologies, albeit often state-of-the-art.

The web-based survey confirmed this. 2% (one project, a large gas projects) thought that the contribution to innovation and skills development would be critical. However, 29% thought the contribution to innovation and 39% thought the contribution to skills development would be significant. The corresponding figures for ‘moderate’ are 29% and 37%; for ‘low’, they are 41% and 22%. The electricity infrastructure beneficiaries tended to take a more positive view of this contribution of the EEPR than the gas infrastructure beneficiaries – apart from the outlier who sees the contribution as critical.

Finding 20

Some EEPR projects are contributing to competitiveness, i.e. innovation and skills development, as a secondary outcome, but the contribution is regarded as moderate-to-significant, rather than critical.

3.6 CONCLUSIONS

- The EEPR, through its selection of projects, was relevant both to economic recovery because it provided an indirect stimulus to sectors hit by the economic downturn and to energy policy objectives because it was in line with policy objectives set out in the Strategic Energy Policy Review.
- The level of funding was appropriate, though in some cases as much for a ‘quality label’ effect as for the amount.
- The EEPR enabled nine projects to achieve completion by mid-2011, and there are sound reasons to believe that most of these would have been unlikely to have progressed this far by that date without the EEPR.
- The EEPR contributed to overcome financial obstacles that were preventing a number of projects going ahead, and in some cases led to them being accelerated, but it did not play a critical or significant role across the board.
- The EEPR lowered the risk profile for a number of projects, particularly those relating to security of gas supply, which might otherwise never have found funding.
- The EEPR could not of itself have been a panacea in every case as large energy infrastructure projects are inherently prone to delays which are not necessarily related to raising finance, as has happened in particular for large gas infrastructure projects.
- The EEPR played some role in enabling beneficiaries to overcome administrative obstacles, but less of a role in the case of environmental obstacles.
- The level of EEPR financial aid consumption of the representative selection of projects on which it was agreed there would be more in-depth analysis of less than 13% by end-2010/early 2011 is low in the context of the Regulation’s overriding purpose of economic recovery. However, it understates the ripple effect from costs incurred by the project promoters in placing orders and also has to be seen in the context of the inherent complexity of energy infrastructure projects and the ongoing economic and financial crisis.
- The EEPR has had a short-term impact on job creation within the EU, particularly of non-technical/non-managerial jobs. It is too early to measure long-term impacts.
- Even though the main benefits are still to come, the EEPR is already proving its value through the projects it is financing in better functioning of the single energy market and security of supply.

4.1 INTRODUCTION

Offshore wind was identified by the 2009 *Strategic Energy Technology Plan (SET-Plan)*⁵⁶, the concrete implementation of the previous year's Strategic Energy Review⁵⁷ as a critical component in attaining CO₂ reductions of 80% by 2050. Objectives along that path envisaged by the Plan's *European Wind Initiative (EWI)* included ensuring European technology leadership on and offshore, and developing large-scale turbines, and enabling large-scale grid integration of on- and offshore wind. This meant demonstrating large scale, more efficient and more reliable wind turbines under real operating conditions for both offshore and onshore applications, rolling out dedicated maritime technologies to allow for exploitation of offshore potential in deep waters and optimising manufacturing processes and logistics cycles.⁵⁸

To this end, the EWI proposed:

- the development of more accurate mapping of wind resources and capacity potential;
- 5-10 new testing facilities for new turbine systems;
- up to 10 demonstration projects of next generation turbines including a 10-20 MW prototype;
- at least 4 prototypes of new offshore structures tested in different environments;
- demonstration of new manufacturing processes; and
- testing the viability of new logistics strategies and erection techniques in remote and often hostile weather environments;
- demonstration on an industrial scale of grid integration techniques to manage wind farms as “virtual power plants”.

The timing of the EEPF was particularly propitious in that context, since there was at that time no EU funding instrument, which could bridge the research and innovation funded by the FP7 programme and commercial operation.

By providing funding for offshore wind energy under the EEPF, the intention was that the wind farms should be at the frontier between demonstration projects and commercial development – taking wind farms into ‘uncharted waters’, i.e. deep and distant offshore locations, and/or upscaling innovative technologies. This was particularly relevant to Germany, which does not have the nearshore options of some other EU countries because of the risk to environmentally sensitive areas. The grid projects were designed to add a (new) cross-border dimension to offshore wind transmission connections to improve the functioning of the internal market, with an emphasis on the importance of integration of networks.

⁵⁶ COM(2009) 519 final; Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Investing in the Development of Low Carbon Technologies, (SET-Plan)

⁵⁷ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52008DC0781:EN:HTML:NOT>

⁵⁸ Brussels, 7.10.2009, SEC(2009) 1295, Commission Staff Working Document *Accompanying document to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Investing in the Development of Low Carbon Technologies, (SET-Plan) - A Technology Roadmap* - {COM(2009) 519 final

4.2 RELEVANCE

To what extent are the objectives and the resources of the EEPR Regulation pertinent to economic recovery and energy policy? How relevant is the EEPR Regulation for the EU energy policy objectives?

4.2.1 Introduction

Most of the stakeholders and beneficiaries interviewed were of the view that the inclusion of OWE in the EEPR did make sense in the economic policy and financial context of the time. They felt that investing in OWE would contribute to economic growth, but not necessarily as rapidly as was envisaged when the EEPR was designed because of delays to grid integration projects in particular. They saw a particular need at the time of the EEPR Regulation for finance for German offshore projects, and for some projects in particular. They also felt that the EEPR was contributing to energy policy objectives, both the 20/20/20 policy of reducing greenhouse gas emissions by 20%, increasing to 20% the consumption of renewable energy, and reducing primary energy use by 20% by 2020, and to a lesser extent to the related Strategic Energy Technology (SET) Plan.

In the web-based survey, respondents were marginally more likely to feel that the programme has been relevant to energy policy than to the economic objectives of financial stimulus and long-term competitiveness through job creation and growth⁵⁹. This is consistent with the fact that a number of the projects would never have been able to achieve a quick spend, but were included in the Regulation for their potential to demonstrate technologies which would help achieve energy policy objectives. It is also consistent with the fact that some projects have experienced delays, both among those which were at an early stage at the outset, and some which it had been expected would be further advanced by now.

“The project is designed to improve the chances of new multi megawatt offshore wind turbines reaching the 'commercially proven' stage, increasing choice for developers, which will lead to more competition and lower costs of generation. It is likely that there will be a wider economic stimulus through turbine manufacturers being more likely to set up new facilities associated with the project.” –survey respondent

4.2.2 Relevance of the EEPR to economic recovery

Stakeholders in Germany, where the fieldwork was carried out and the site of four of the nine OWE projects of which all are wind farms or technology related to wind farms, repeatedly told us that they feel the risk profile of the offshore industry now is that of the onshore industry twenty years' ago, making banks cautious about exposure to offshore projects. There are demonstration projects which appear to be proving some of the new technologies, but they have been operating for far fewer years than the duration need to provide a financial return. Banks became even more cautious in 2008/2009, cutting by around half the amount they would put into a consortium in one case we look at. The asset-

⁵⁹ Throughout this chapter, it should be borne in mind that the results of a web-based survey which only covers nine respondents can only be regarded as indicative.

based securities market dried up, and one project which had intended to finance itself this way found itself forced at an advanced stage to re-think its funding plans.

The perception was that large companies using balance sheet financing, and not needing to use the project as collateral, generally found themselves able to proceed with their projects if it was a corporate priority. If they were not going ahead with projects in Germany, it was in practice because the investment and tariff climate, and the technological challenges were easier elsewhere, notably the UK, where they could operate in shallower waters than is the case in the German or Belgian North Sea areas were more favourable elsewhere, necessarily the UK. This may be the reason for the delay in one non-sample project.

Finding 21

There was a particular need for finance for projects operating in deeper waters at the time of the EEPR.

The difficulties are borne out by a 2010 study *Offshore Wind in Europe*⁶⁰, which found that there were particular problems in “access to financing in Germany, more potential investors are dependent on project financing than in the UK. In addition, the level of financing required to fund typical OWPs [offshore wind projects] in Germany, where investment costs are commonly between EUR 1.0 and 1.5 billion, is very difficult to obtain. This is partly due to changes in the project financing market because of the financial crisis, and the fact that commercial banks are not yet ready to finance offshore wind projects without extensive assurances from government, public funding institutions and export credit agencies for the specific offshore risks.”⁶¹

The conclusions of an associated survey of the effects of the economic crisis were that 92% felt that there had been a high, significant or noticeable effect of the economic crisis on loans for the offshore wind industry (with 37% rating it high) and 95% thought the same of the effect on the risk premium, with 34% rating it as high. More than a quarter of respondents felt that the market will not normalise until 2013, or later – if at all.

The German market was more vulnerable to the economic and financial crisis because there are fewer international utilities in the business –72% as opposed to 37%. This means there are more of the groups likely to need project finance, e.g. independent developers: 28% as opposed to 12%, and municipal utilities: 11% as opposed to 1%.

Interviewees also agreed that the main problems with lack of finance were being encountered by projects *not* backed by a large energy multinational (which was the case of all the sample wind farm projects, but not of all the wind farm projects financed).⁶² The case study project was “the first such offshore wind farm in German waters to achieve financial close using non-recourse project finance”⁶³. One financial institution told us it felt that this had played a very significant role in proving that

⁶⁰ <http://www.kpmg.com/global/en/issuesandinsights/articlespublications/pages/offshore-wind-in-europe.aspx>

⁶¹ See also: *State of the Offshore Wind Industry in Northern Europe – Lessons learned in the first Decade* (Ecofys): “the recent financial crisis, however, has affected banks’ willingness to lend, which means that independent developers are highly constrained and now rely heavily on development banks for financing” – including the EIB.

⁶² Nordsee Ost is an RWE Innogy project.

⁶³ <http://www.sgurrenergy.com/News/Germanoffshorewind.php>

project finance was nevertheless still possible for offshore wind projects, and had been influential as an example to a second non-EEPR project which achieved its financial close in 2011.

Whether the EEPR per se was needed against this background is less certain. One stakeholder suggested that there may ultimately have been too many financial cushions for German projects with not enough coordination between the different players when the availability of funding from multilateral, national and regional development banks, from the EEPR and via the feed-in tariff is taken into account. This was a minority view, but it was held by one of the rare stakeholders without a vested interest in presenting the EEPR in the best possible light, i.e. without a direct interest in the EU providing funding for such projects in future.

Finding 22

The offshore industry in Germany was particularly vulnerable to the economic and financial crisis, particularly when project finance was required, and in the view of most stakeholders, the EEPR was a needed response in the investment climate of the time.

As they were generally familiar with the background to the EEPR, stakeholders interviewed found it difficult to separate the level of EEPR funding in the absolute – and therefore whether the level was relevant – from their recognition that this was the level that could realistically have been expected in the circumstances of re-allocating an EU budget surplus, on which many demands were being made. They tended to the view that the signalling effect was as important as the level of funding. The degree of agreement in the web-based survey is shown in the Figure below.

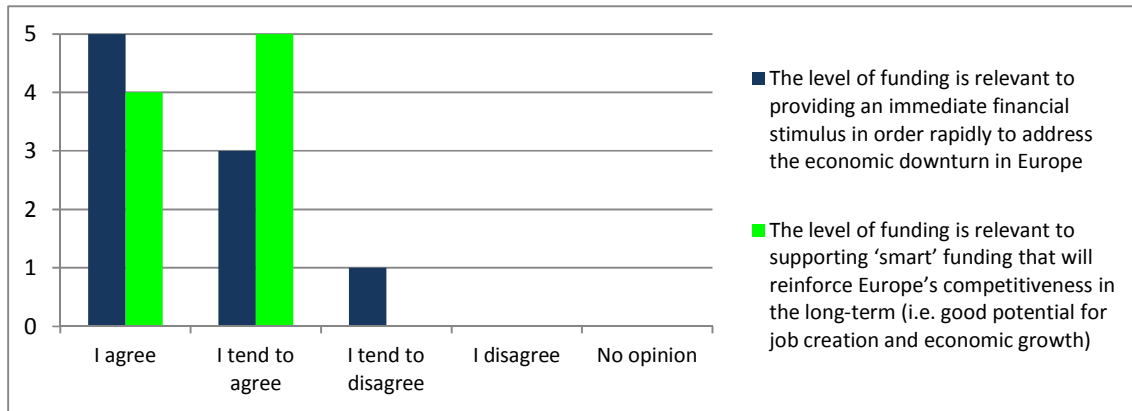
In terms of the contribution to the second economic objective of long-term competitiveness⁶⁴, in particular in preparing the shift toward⁶⁵ and providing jobs in growth sectors for the low-carbon economy, interviewees agreed that the technology for large offshore wind farms in deep waters had at the time of the financial crisis and economic downturn just reached a level of maturity at which it could move from demonstration to large-scale deployment – and was mature in a way that other technologies were not, e.g. concentrated or photovoltaic solar. Interviewees and web-based survey respondents (see Figure) also agreed that the catalyst to support the risk-taking involved in deep waters and in innovative technologies⁶⁶, would produce long-term benefits for EU competitiveness.

⁶⁴ Second “Pillar” of the [European Economic Recovery Plan](#) (p2).

⁶⁵ One of the four “strategic aims” of the [European Economic Recovery Plan](#) (p5).

⁶⁶ Though not required by the EEPR Regulation, innovation was used as a differentiator in evaluating the proposals. It is consistent with the objective of promoting ‘smart’ investments.

Figure 8: Relevance to a financial stimulus and competitiveness (by number of respondents)



Source: web-based survey

Finding 23

In terms of the economic policy objectives, the signalling effect of the EEPR funding was as important as the actual amount in terms of financial stimulus, and the EEPR was perceived to contribute to long-term competitiveness.

4.2.3 Relevance of the EEPR to energy policy objectives

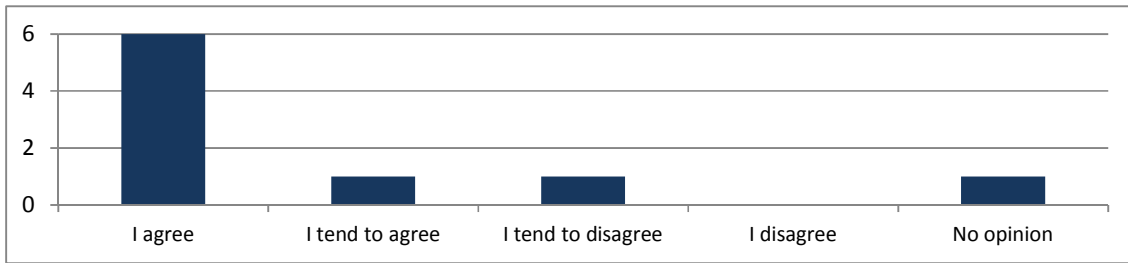
Perceptions of stakeholders as to the contribution of the EEPR to the EU’s overriding strategic energy objectives were that the selection of OWE for a sub-programme was relevant to these objectives in that any increase in domestic generating capacity increases security of supply and that the grid integration projects would deepen the internal energy market through greater efficiency of cross-border flows, including more efficient trading – though the extent of the contribution of the EEPR Programme was felt to be useful and catalytic, but not a determining factor. In the web-based survey, all beneficiaries either agreed or tended to agree on the relevance to security of supply and maximisation of the internal energy market, with six agreeing and three tending to agree.

Finding 24

The EEPR was seen as relevant to the overarching policy objectives of security of supply and better functioning of the single market.

Six respondents to the web-based survey agreed that the level of funding of EEPR is relevant to contributing to the 20/20/20 objectives. One tended to agree, but one – a wind farm promoter – tended to disagree. This is consistent with the views of interviewees. They saw the relevance of the EEPR as a programme – within its funding limits – because individual wind farm projects would contribute, but more because of the catalytic effect at a crucial point in developing offshore wind farms in deep waters (and in due course offshore grids), and by improving the ability to deal with the variability of wind power output and/or develop more efficient technologies or trading, particularly once obstacles to trading cross-border directly from offshore locations have been removed.

Figure 9: Relevance of level of EEPR funding to 20/20/20 objectives (by number of respondents)



Source: web-based survey

Finding 25

EEPR projects individually will contribute directly or indirectly to a reduction in greenhouse gas emissions, and therefore the programme in the aggregate will make a contribution to achieving this objective. However, the level of funding is not large relative to what is required.

By providing finance to some of the first large turbines in deep waters, to offshore grid connections and to a wind farm designed specifically to test new technologies, the EEPR sought to respond directly to the funding and technology needs identified by the industry and in the SET-Plan, i.e. to reduce the cost of wind energy, ensure European technology leadership and enable large-scale grid integration with a view to achieving for wind a 20% share of consumption by early in the next decade.

Stakeholders did see the EEPR as relevant to reducing the cost of wind energy. This was not so much because of the absolute amounts as the timing (and the associated leverage effect on other funders): the start-up of certain of the projects financed allowed suppliers to enter into manufacture of large turbines on a fully fledged production line rather than in ad hoc quantities – turbines of a type which will also be transferable to other markets (subject to adjustments for different wind conditions) and can contribute to European technology leadership, with wider spillover benefits which will be discussed in the section on the utility of the programme. They stressed, however, that this was a contribution that should be seen in the wider context: the right regulatory frameworks, whether it be the feed-in tariff or resolving the regulatory barriers to integrating grids across borders, are also important drivers of lower costs.

While stakeholders considered that the EEPR was relevant to large-scale grid integration, they also emphasised that the relevance should be seen in relation to the scale of the need. The number of projects funded is small in comparison to the need, (and small compared to the number of applications received). In terms of offshore grid development alone, the European Wind Energy Association’s proposed offshore grid master plan⁶⁷ builds on 11 offshore grids currently operating and 21 being considered in the Baltic and North Sea (including the projects funded by the EEPR)⁶⁸. EWEA also

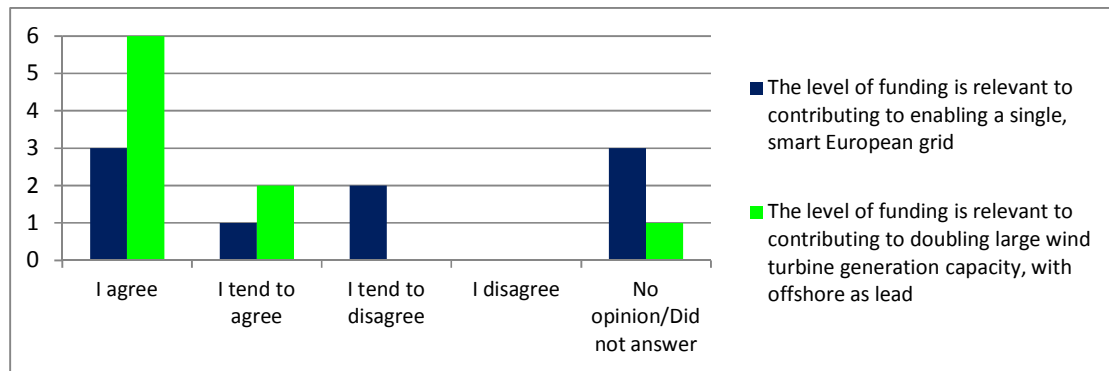
⁶⁷ <http://www.ewea.org/index.php?id=203>

⁶⁸ Within that Master Plan, the Kriegers Flak project was regarded as a flagship project because of the potential to link three countries, and in so doing not only optimise generation from variable wind flows and trading. This was based on the assumption that it would be a three-country project. Since then Sweden has dropped out, leaving only Germany and Denmark.

identified eight other offshore grids needed by 2020⁶⁹. The total cost by 2030 (including additional projects in the decade from 2020) was put as of 2009 at €20-30bn.

Stakeholders and web-based survey respondents alike had reservations in some cases about how much the EEPR could contribute to the SET-Plan objectives, as illustrated by the figure below. The consensus is greater around the contribution to the development of large turbines than in relation to development of a single smart grid, even if it is only making a contribution to a few projects. In the first case, all respondents agreed to some extent, but only four were in full agreement. Those who only tended to agree were mainly from wind farms (four of the five wind farm promoters). In terms of promoting a smart grid (and integration of renewable energy sources), two of the five wind farm promoters tended to disagree – of the three who had an opinion. (The third agreed with the hypothesis). Of the other promoters, one had no opinion, two agreed and one tended to agree. The lack of consensus in this area is illustrated in the Figure below.

Figure 10: Relevance of EEPR to a single smart grid, and larger turbines (by number of respondents)



Source: web-based survey

Finding 26

The EEPR was relevant to scaling up offshore wind development and grid integration, but more so at this point in relation to wind farms.

In terms of the EEPR funding relative overall to the finance needed to implement the SET-Plan, only EU stakeholders had an overview, and their views were not unanimous. On the one hand, they fell into the category ‘every little helps’ – and whenever it arrives – in a context where it is difficult to find funds to implement the SET-Plan. On the other hand, there was a view that the EEPR funding was being seen as part of the €6 bn needed whereas other sectors were starting with a clean, i.e. zero, slate when being considered for SET-Plan funding. Since the EEPR project selection criteria were not synonymous with (albeit not in contradiction with) the SET-Plan objectives, the implementation of the SET-Plan might, therefore, have been different had it not been for the EEPR.

⁶⁹ *Oceans of Opportunity, Harnessing Europe’s largest domestic energy resource*, 2009; http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/Offshore_Report_2009.pdf

Finding 27

The EEPR was relevant to the objectives of the SET-Plan, and acted as a stepping stone en route to implementation of the SET-Plan, but there are limits to the extent of its contribution.

4.3 EFFECTIVENESS/EFFICIENCY

To what extent are the financial resources made available by the EEPR Regulation being used and to what extent are they contributing to achieving the programme objectives?

4.3.1 Introduction

Utilisation of the financial resources made available by the EEPR (based on the sample) is high relative to what was planned, i.e. an anticipated figure of just under 30%. Whether this is ‘substantial’ as required by the Regulation is undefined, but the OWE sub-programme was trying to strike a balance between rapid expenditure and achieving the objectives of demonstrating that new technologies could make a viable contribution to achieving the programme energy objectives. Whether it did this, it is rather too early to tell.

The EEPR does appear to have played a perceptible role in facilitating the utilisation of financial resources and meeting the programme objectives through its catalytic contribution to securing finance and smoothing the non-financial path for some projects.

The fact that projects were pre-selected taking “adequate geographic balance” into account as per the EEPR Regulation must also be factored in when making a judgement as the Commission did not have a totally free hand in selecting projects which would best utilise resources and meet the programme objectives. Nevertheless, the rate of utilisation is high relative to the electricity and gas infrastructure programmes.

There is evidence that the sample is over-representative of projects that are on track because it contains two of the three wind farms which are furthest advanced, while a fourth project related to wind farm technology was awaiting a change of co-beneficiary as of May 2011. This illustrates the difficulty of a fully geographically and technologically representative sample over a relatively small number of projects. The next section discusses why sample and non-sample projects are not fully on track.

4.3.2 Extent to which the financial resources are being used

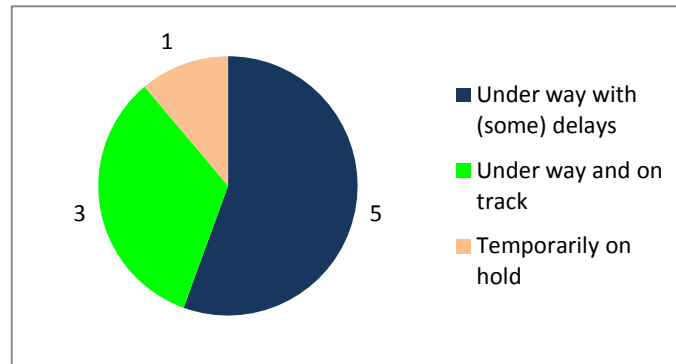
For the financial resources made available by the EEPR Regulation to be utilised as fully as anticipated and to be contributing as intended to achieving the programme objectives, the projects need to be on track.

In fact, according to feedback provided by beneficiaries in the web-based survey in May 2011, only three of nine OWE projects, including two of the sample projects, were at that time on track without any delays. Five projects were under way with some delays (of which three sample projects) and one was temporarily on hold.

Grid integration projects were far more likely to be subject to delays than wind farms and associated innovative structures, but the project temporarily on hold nevertheless involved an offshore wind farm technology which experienced delays in obtaining certification.

The projects under way with delays had mainly progressed with design and contracting, while one was progressing with consents.⁷⁰

Figure 11: Status of overall completion of EEPR action reported by beneficiaries (by number)



Source: European Commission data

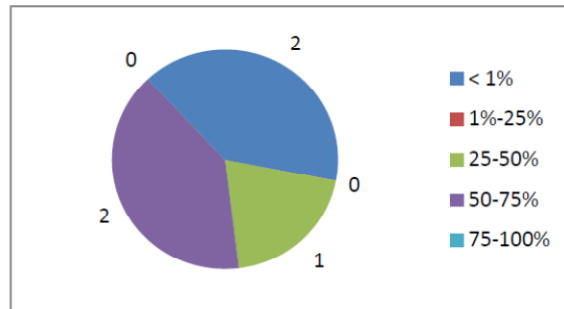
These delays have, therefore, affected the ability to absorb EEPR funds, but not to the same extent as for the other sub-programmes.

For the sample projects, the average rate of expenditure relative to the total cost of the action at end-2010 was 24.6%. It ranged from less than one per cent to more than eighty per cent, as opposed to levels anticipated in the grant agreements ranging from 1.2%-97.6%, and an average of 27.3%. Thus the rate of absorption of the sample is close to what was expected.

The wide range in the rate at which it was planned to spend money by end-2010 indicates the extent to which the importance attached to innovative projects – the ‘demonstration’ component – outweighed the criterion of incurring substantial capital expenditure from the very outset.

⁷⁰ Report from the Commission to the Council and the European Parliament on the implementation of the European Energy Programme for Recovery, COM(2011) 0217, April 2011.

Figure 12: Budget consumption end-2010 as % of cost of action, sample projects



Source: European Commission data

Nevertheless, expenditure is higher than these figures indicate. Interim reports, which are primarily reports on progress against milestones, where they are unrelated to requests for payment, do not necessarily cover all eligible costs incurred in the reporting period. In addition, some expenditure often represented – frequently significant – down payments to suppliers, thus inducing further expenditure in 2010.

Moreover, the two projects in the sample with low levels of expenditure were never expected to spend substantial amounts in 2010 (below 3% of all eligible costs in 2010, as opposed to less than 1% in practice in both cases). These projects are not scheduled for completion until 2016, reflecting the way in which the OWE sub-programme had to combine two – not necessarily compatible – objectives: financing projects that were mature enough to absorb substantial capital expenditure by end-2010 and at the same time take offshore wind to the next level.

Finding 28

The OWE sub-programme is, broadly speaking, meeting expenditure targets based on the sample and figures to end-2010. Projects with low levels of expenditure were those for which this was projected at the outset, but which qualified for EEPR funding on the grounds of their innovative content.

4.3.3 Extent to which the programme objectives are being met

The delays to some projects – both built-in because of the long time frames agreed initially and since – have obviously affected the ability to achieve the overall objectives of a short-term financial stimulus, i.e. a substantial level of capital expenditure by end-2010, and of reducing greenhouse gas emissions and contributing to security of supply, and key intermediate objectives of contributing to demonstration and deployment of a competitive large-scale offshore wind energy industry.

As the term ‘substantial’ was never defined, the extent to which the projects were on track with planned expenditure can be considered to be the extent to which the objective is being met. In the case of the sample projects, the shortfall is small, but it is not certain that this is the case to the same extent for the non-sample projects as explained in the next section.

There is strong evidence that the demonstration objective is being met for some sample projects involving wind farm technology, albeit with some minor delays. It is too soon to say whether the

delays to the grid integration project are serious. Figures of additional generating capacity are available for some projects, but the contribution they – and the grid integration projects – are supposed to make is not so much as project level as at demonstration level to enable the EU to meet its 2020 targets. It is too soon to say how whether those will be met or what the EEPR projects and programme’s contribution will have been.

Finding 29

Demonstration objectives are already being met by several projects involving wind farm technology. Sample grid integration projects are less advanced. This was always expected, but they have fallen behind schedule and still have significant hurdles to overcome.

4.3.4 The contribution of the EEPR

As noted above, the sample contains a higher-than average number of projects responding to the web-based survey that they are on track, on track with some delays and – logically – of projects having secured their financing. In one case, our analysis shows that those delays are not major. In the other two cases, the projects are at such an early stage that the risk that they will not go ahead cannot be ruled out. Of the non-sample projects, one was temporarily on hold at May 2011 according to the web-based survey. Desk research on information in the public domain suggests two others are still planned, but subject to delays. It is therefore pertinent to consider what lessons can be learned from the EEPR process as to where the EEPR succeeded and, in particular, whether these delays were foreseeable. We bear in mind that these were intrinsically high-risk projects trying to reconcile the objective of spending money rapidly with the desire to promote demonstration projects to prove a technology which is not totally mature. It is too early to assess whether the technologies themselves have succeeded.

Finding 30

Given that not all projects are proceeding on schedule, it is pertinent to look at the reasons the contribution which the EEPR has been making to projects going ahead and what risks it could not or failed to mitigate. It is too early to assess the technological success.

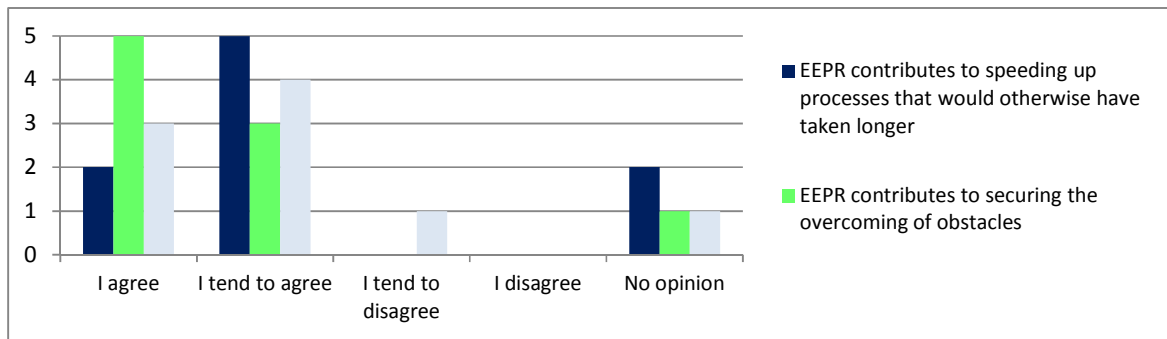
4.3.4.1 MITIGATION OF FINANCIAL RISK

In order to utilise the financial resources of the EEPR, these projects needed to contribute financing of their own. Consequently, we look at the extent to which the EEPR was instrumental in enabling projects to get as far as they have, since this catalytic effect was an expected result of the programme.

Most beneficiaries do regard the EEPR funding as having played a critical role in them being able to go ahead, according to the web-based survey. Only one respondent said that their project would not have happened without the EEPR funding, but the EEPR acted as an accelerant for others⁷¹.

⁷¹ Like all the answers relating to the levels and benefits of the EEPR funding, they should be treated with caution. There may be a positive bias in response to the survey given that the beneficiaries have no interest in the contrary finding.

Figure 13: Contribution of EEPR to overcoming financial obstacles



Source: web-based survey

Finding 31

There is broad consensus among beneficiaries that the EEPR contributed to overcoming financial obstacles and speeding up the process of overcoming financial obstacles.

The EEPR gave investors – and regulators required to approve TSO investment plans that include them – confidence in individual projects according to the stakeholders interviewed. That confidence came not just from the level of funding, but from the quality label attached to enjoying EU funding and from the decrease in risk which comes from a grant which can be equated with equity.

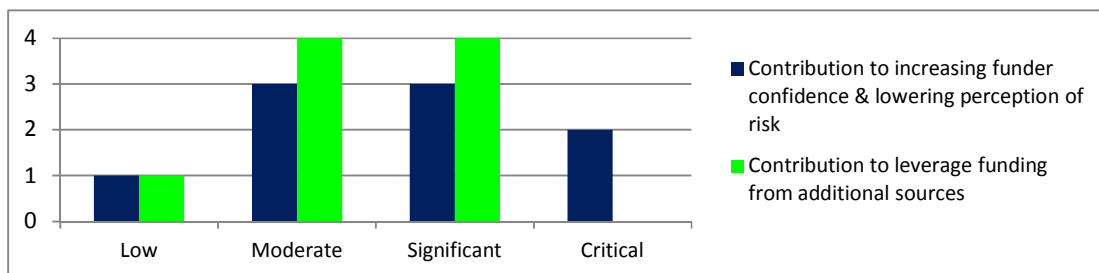
“EEPR funding gives offshore wind projects an EU quality proof which helped during the difficult period in the aftermath of the financial crisis. EEPR facilitates the access to finance for offshore wind projects from commercial lenders and multilaterals” –survey respondent

As the Figure below shows, this is borne out by responses to the web-based survey as to whether the EEPR had:

- increased investor confidence and lowered co-funders’ perceptions of risk, and
- leveraged funding from additional sources.

In the first case, no one thought the contribution critical. In the second, one beneficiary felt the contribution of the EEPR had been critical in leveraging resources from additional sources. Overall, the majority felt that the EEPR had played at the very least a moderate role in both respects.

Figure 14: Contribution to increasing funder confidence, reducing perception of risk and leveraging additional funding (by number of respondents)



Source: web-based survey

Finding 32

The EEPR contributed to increasing funder confidence and lowering perception of risk in most cases. It also contributed to the ability to leverage funding from additional sources.

What would in fact have happened to these projects without the EEPR, i.e. whether they would have merely experienced delays, or not gone ahead at all, is, of course, hard to assess. The financial situation has not eased, according to stakeholders, as these are still regarded as high-risk investments. However, the feed-in tariff system in Germany has been modified since and additional KfW funding is becoming available⁷². This appears to be affecting (positively) other projects in the pipeline.

Moreover, the OWE beneficiaries are not heavily dependent on debt financing from commercial banks. This is thought to have cushioned them from the worst of the financial crisis. In response to the web-based survey, only three cited commercial banks as their main source of funding. For two it was equity (two) and for four their own resources (which could, of course, include borrowing which ultimately relies on financial markets, but is not project specific). There was in fact a view expressed to us that the EEPR would have been more effective and efficient by concentrating on projects needing project finance and could have achieved the same ends with subordinated loans.

Our interviews with stakeholders suggest that the existence of development bank funding (from the European Investment Bank or KfW) may play an equally, if not more, important role in leveraging the funding of offshore wind farms. On the one hand, they are important quality labels in their own right; on the other, they are able to enter into direct dialogue with other banks to put together a full financial package. They are also better known quantities. In one case, the conditions imposed by the EEPR grant agreements – at least on paper – were a deterrent to commercial banks because it was felt they added too much uncertainty, with the result that the EEPR funding could not be equated with equity in the funding package.

Stakeholders believe, however, that a key advantage of an EEPR grant and the criteria for awarding it is that it has enabled backers to take greater risks with new technology, and therefore speed up the introduction of innovation. One of the findings at a European Commission workshop on offshore grids in March 2011 is also representative of views expressed to us across all projects, i.e. that the EEPR made it possible to:

“consider solutions that otherwise would not be taken into account from purely market based and “low risk” investment return considerations. The EU support favours the deployment of investments not considered in the initial frame of the projects, or at least their significant anticipation, fostering solutions for the realisation and integration of offshore grids. Thereby, the selected projects entail an investment reasoning based on a wider set of possible social and socio-economic benefits to be achieved.”

⁷² In the case of the case study project, the EEPR made very specific contribution, though the project received development bank funding as well, because this project – unlike most completing German offshore wind projects – was not at that time eligible for funding from the German development bank, KfW, because it was owned by municipal utilities.

Finding 33

The EEPR played a moderate-to-significant, but not critical role, compared to that of others, e.g. development banks, in enabling projects to reach financial close, but did play a key role in enabling beneficiaries to speed up the adoption of innovative technologies.

However, although the EEPR was significant for individual projects, at programme level, those interviewed did not feel that it had spread a glow over offshore wind energy investments as a whole, even if funding of Borkum West II was felt by one interviewee to have had an important catalytic effect as an example to the financial sector that project finance for an offshore wind farm project was still possible. This stakeholder believed that projects which had followed had found it easier to raise finance as a result. Interviewees were on the whole, however, cautious about drawing conclusions at the level of the energy sector as a whole, either in one country or across the EU.

Finding 34

There is not enough data for a finding of a cross-sectoral leverage effect from the EEPR, though a perception of a wider benefit can be found.

The European Investment Bank (EIB) was one of the sources of additional finance for these projects, which the EEPR could have been expected to leverage. The EIB is an instrument of EU policy, of which the EERP, and with it, the EEPR, is one. There is not an automatic cause and effect, however. The EIB lends to projects on their merits. Moreover, not all project backers necessarily look to the EIB as an additional source. They may have a project which looks eligible, but it may not fit their current objectives in terms of exposure to the EIB; the EIB, for its part, may be in a position of not wanting too large an exposure to a single company which has already borrowed from it to a significant extent. A project funded by the EC may be too small for the EIB to take on. Although the EIB has financed a significant number of wind farms and offshore transmission projects which have not received EEPR funding as well as some wind farms which have, some stakeholders believe this that being EEPR-eligible helped projects through the EIB processes. This must be set against the fact that a development bank may be a ‘must-have’ in offshore wind project finance⁷³.

Finding 35

There is not enough data to find conclusively that there was a leverage effect on EIB funding, although there is some evidence of this.

4.3.4.2 MITIGATION OF NON-FINANCIAL RISKS

It was also hoped that the EEPR could help make a contribution to overcoming administrative, legal, environmental and technical obstacles⁷⁴, but this is difficult to substantiate – administrations and regulatory authorities are naturally cautious about conceding that they might have given a company privileged treatment. On the whole, however, there is very little (though there is some) evidence from interviews that normal administrative procedures (for environmental compliance or other necessary

⁷³ In a presentation in 2010 on current and offshore trends in offshore wind financing, Dirk Mous, the head of infrastructure and renewables for the Dutch bank, NIBC, calculated that KfW or EIB involvement is “inevitable” for projects with more than 40 turbines, based on a per-bank contribution of €40m (which interviewees said was currently regarded as high).

⁷⁴ Recital (13) and Article 5 of the EEPR Regulation.

permits) have been speeded up because of the availability of EEPR funding. Indeed, we collected evidence that regulatory authorities and beneficiaries were unaware of these provisions in the EEPR Regulation.

The contribution of the EEPR to overcoming these obstacles was also tested in the web-based survey, where it is worth noting that offshore wind beneficiaries were more positive about the relationship than the gas infrastructure beneficiaries, for example. A number said that the EEPR had made a critical contribution in a number of areas, including helping with dialogue with the regulator and with suppliers. Data collected in interviews also tends to suggest that the EEPR status provided momentum in finalising technological solutions, including in discussions with suppliers.

“EEPR status has raised the profile of the project amongst relevant stakeholders who share its ambitions. This has facilitated dialogue” – web-based survey respondent.

One third of beneficiaries felt that the EEPR had made a critical contribution to overcoming **administrative obstacles**, and one-third tended to agree with this.

Four of the nine beneficiaries (two who agreed and two who tended to agree) felt that the EEPR had made a critical contribution to overcoming **legal obstacles** (where such existed).

Five of the nine beneficiaries (two who agreed and three who tended to agree) felt that the EEPR had made a critical contribution to overcoming **technical obstacles**.

None of the beneficiaries felt that the EEPR had made a critical contribution to overcoming **environmental obstacles**, though one tended to agree that it had helped speed up the processes and another tended to agree that it had helped secure the overcoming of obstacles.

This balance between the different types of obstacle that the EEPR contributed to overcoming is consistent with the perceptions of stakeholders interviewed.

Finding 36

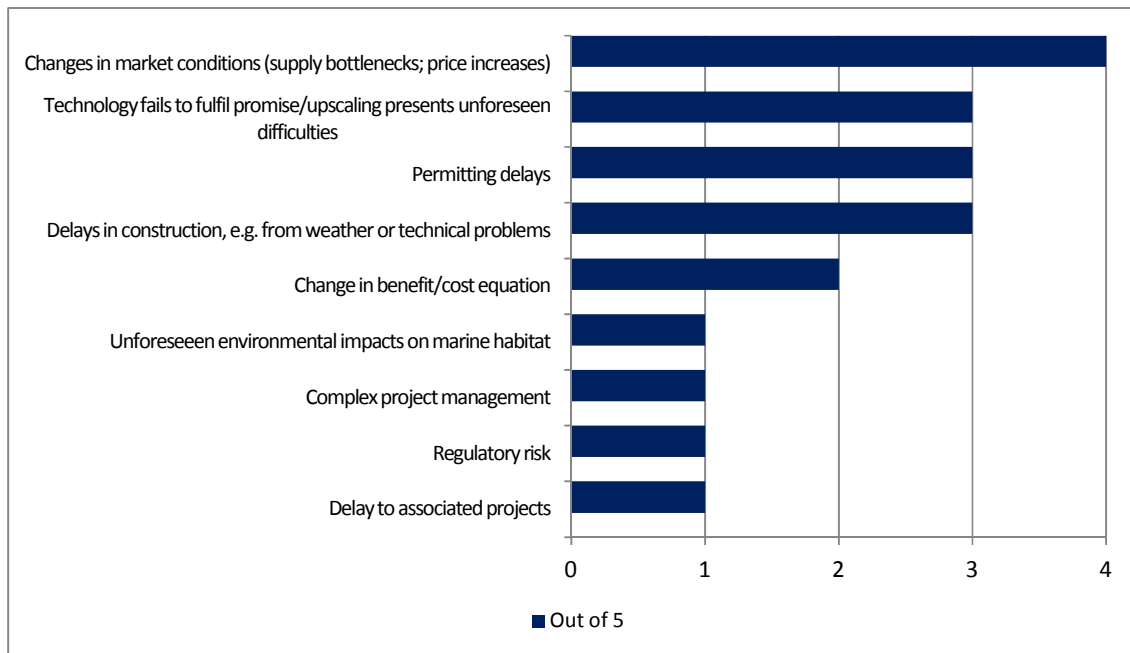
The EEPR has played a critical role in a number of cases in helping overcome administrative, legal and technical obstacles, but none in overcoming environmental obstacles.

4.3.4.3 MITIGATION OF INTRINSIC RISKS

Some of the risks are almost intrinsic. The offshore wind energy industry operates in particularly difficult conditions because it is a seasonal activity. Very little can usefully be done offshore over the winter. In addition, any large energy infrastructure project is vulnerable to delays. In addition, the financing conditions remained difficult even beyond 2009.

Promoters were required in their proposals to analyse the sort of risks they would encounter, with changes in market conditions, problems with the technology, permitting delays and construction problems (from weather and technical problems) all clearly identified. These uncertainties were presented by beneficiaries as risks for the timely implementation of the projects but also, potentially, for the ability of their project to go ahead. The terminology used is not standardised, so there is some clustering in the Figure below on the basis of our own analysis.

Figure 15: Risks identified at the proposal stage



Source: European Commission data

Because there was no predetermined template, the table may also over- or understate a risk depending on the approach of the promoter. The fact that only one promoter mentioned complex project management does not necessarily mean, therefore, that this project was intrinsically more complex.

There are projects which have spent little money and which are behind schedule, but this is relative: the two projects in the sample with low rates of expenditure proportionate to what were already low levels anticipated in relative terms have action durations of seven years and five months, and seven years. However, their current status makes it uncertain whether they will in fact get off the ground, although both are still officially going ahead. One is still awaiting its permits; the other is dependent on a decision from an unrelated promoter on a related investment.

Clustering the risks ‘change in market conditions’ and changes in the ‘benefit/cost’ equation shows that there were risks which were clearly beyond the control of the Commission, but were a risk to spending money rapidly. The technology risk was accepted upfront, since the one of the objectives was to demonstrate new technologies at a larger scale. Permitting and regulatory risk – taken together – also rank highly, and we consider below whether these could have been taken into account better, since some projects have still to clear some key administrative and environmental hurdles, and that in one case the technology will be implemented by a different beneficiary because of certification issues with the regulator for the original beneficiary. This means that it is useful to look at whether the award and selection processes were robust enough to predict difficulties.

Finding 37

Steps were taken to identify risks at the outset. It was beyond the ability of the EEP to mitigate risk from changing costs or market conditions, and technology risk was accepted, but permitting and regulatory risk also ranked highly and might have been easier to foresee.

4.3.4.4 MITIGATION OF PROJECT MATURITY RISKS

For the OWE projects to utilise financial resources by end-2010, it was important for them to be mature enough to start up their investments relatively quickly. If it turned out that they then did not do so, there may be lessons to be learned about how better to assess maturity in future, even if the delays may not be as great in this sub-programme as in the others.

The first step is to assess whether the *timing of the selection and allocation processes* interfered in any way with the ability of the projects to proceed. The date for signature of grant agreements envisaged in the call for proposals was end-2009/beginning 2010, and the date given at an info day for applicants in June 2009 was November/December 2009. However, only four (of nine) agreements were signed by end-January 2010.⁷⁵ The last was signed in December 2010, i.e. up to one year later than envisaged, and just in time to commit all the funds allocated to the OWE (€565m) by December 2010.⁷⁶

Overall, beneficiaries found the process rapid (six in all). Wind farm promoters, whose grant agreements were signed between December 2009 and April 2010, were more likely (80%) to think this than the others (50%) – whose agreements were signed between July and December 2010. However, the correlation is not perfect.⁷⁷ Interviewees did not see any link between the time taken to finalise grant agreements and the time frames of the projects.

Finding 38

It took up to a year longer than envisaged in the call for proposals to conclude grant agreements. Nevertheless, applicants felt the time taken was reasonable and there is no evidence that the additional time affected the time frames of the projects.

In terms of the *effectiveness of the process*, some concerns were expressed to us about whether enough financial information was sought for the selection stage, when compared with that which would be required for a bank loan. Applicants were required to provide annual accounts for the last two years for which the accounts had been closed (where available) and an external audit report on those accounts. A management plan was also required. Identification of financial risks was optional.

The requirements of the German development bank KfW for offshore wind energy projects are one basis for comparison.⁷⁸ KfW not only requires audited accounts for the previous year from the project

⁷⁵ This description does not take into account that in mid-2011 there was a change of beneficiary and a new grant agreement for one non-sample action because of permitting problems. The action is one of the three which received pre-financing.

⁷⁶ Action start dates (and therefore trigger dates for eligible costs) were between July 2009 and October 2010. Three pre-financing payments, totalling €110m were made between February and December 2010. Two payments were made to different actions in 2010 (in April and May), totalling €36m. Thus, a total of five projects receive payments in 2010.

⁷⁷ Parts of the allocation processes were based on existing mechanisms used by DG TREN/ENER for FP7 (e.g. the comitology procedure, the grant agreement model). However, there were a number of significant differences. All the projects except those in the North Sea grid category (22 proposals of which two were selected) were pre-selected at political/legislative level; these are commercial not applied research or demonstration projects – albeit they could be considered to have demonstration elements; they are not collaborative; the evaluation was internal.

⁷⁸ http://www.kfw.de/kfw/de/1/II/Download_Center/Foerderprogramme/versteckter_Ordner_fuer_PDF/600001_940_M_273_Offshore_Windenergie.pdf.

sponsor, but also from key suppliers and contractors, cash flow projections, indicative term sheets for the financing – including security, margins and fees, draft due diligence reports on the technology, insurance, legal issues and taxation, draft financing agreements, and the view of a bank lender on the risk. Some applicants did provide cash flow projections, which have been incorporated in the grant agreements. However, given the strength with which concern was expressed to us about the absence of financial detail required, in particular in relation to wind energy development, which tends at the outset to be in the hands of small-scale developers with no track record, we believe it is important to reflect this even if there are some differences between lending and providing grants.

The call for proposal said maturity would be judged on a business plan having been adopted and co-funding secured, but the information supplied did not in the eyes of those who raised this with us extend to sighting business plans⁷⁹ or information on co-funding, such as letters from banks.

The expertise of the European Investment Bank, which has broader experience of financing offshore wind energy on this scale, was not exploited.

That being said, none of the projects in the sample (including the case study) have encountered difficulties because they are financially unsound.

Finding 39

There was notionally a risk that not enough attention was paid to projects' financial viability, but this was not a problem in practice.

The *financial maturity* of applicant projects, i.e. their ability to spend funds by the end of 2010, which was the genesis of the EEPR, was in practice not an overriding consideration when considering proposals. The way in which the proposal marking system worked meant that significantly greater weight was given to technology and innovation than to the need for finance or the ability to spend money in the short term. Indeed, permitting was bundled into the same criterion as the judgement on the latter – defined as reaching the investment stage and incurring substantial capital expenditure by the end of 2010.

If there had been a threshold, such as the 60/100 used for the electricity and gas infrastructure projects, it would theoretically have been possible for a project that met the technology and innovation criteria to have received funding even though it was financially totally immature⁸⁰. The advantage of this weighting according to stakeholders was that it made it possible to use technical and innovation characteristics as differentiators in the face of a score of grid integration proposals⁸¹. The result was that the long-term objectives were felt to outweigh the short-term objectives.

Finding 40

The long-term objective of innovation outweighed financial maturity in the award process.

⁷⁹ As understood by a banker, as opposed to the management plan in the application which accounted for five points in the evaluation.

⁸⁰ The consultation processes which followed are such that we are assured that despite the absence of a threshold, a poor proposal could not have got through. We nevertheless recommend the use of a threshold as an objective criterion which avoids the risk of political considerations coming into play for borderline projects.

⁸¹ This weighting makes unsurprising, therefore, the web-based survey finding in relation to relevance that the EEPR was more relevant to energy policy objectives than to economic recovery and financial stimulus.

The perception of the beneficiaries is that their projects were mature, i.e. at the investment stage – the case of two projects, or that they were under way to that stage as of 2009. However, only one was fully compliant with environmental legislation, had all its permits and a final investment decision as well. Some projects which had reached the investment stage did not have a final investment decision and vice-versa. Some had reached the investment stage without being compliant with environmental legislation of having their permits. There is not ‘one-size-fits-all’ for the sequence of these, making it objectively difficult to set criterion for investment maturity.

In fact, in the case of German offshore wind farms, investment is almost a sine qua non of obtaining permits. The basic environment permit is the start of a process, and many years can elapse between obtaining a permit as a form of ‘staking a claim’ and the project coming to fruition, though regulatory measures have been introduced to make this less possible in future. However, using the permit as a trigger in a selection or award process can be misleading both for this reason and because once the promoter has the permit, they have to obtain clearances (generally three) before they get the final green light. This implies meeting certain conditions which will require investment. It is not clear that this was sufficiently understood at the selection stage. It is pertinent because financial backers may have other preconditions in this respect from those of the EU which need to be understood and taken into account.

Only three EEPR projects had obtained all their permits by May 2011, and only three (not the same three) had secured their financing. Only two had completed defining the technical/technological options; for one this was under way, and for the others under way with some delays. This suggests that there is still scope for new or additional delays for a number of projects, and there is information in the public domain about the permitting delays to some projects, thus affecting their ability to contribute to the programme objectives.

OWE projects were – unlike other projects – required to provide detailed information on permits and strategies for obtaining them, and it is clear that these were possible sources of delay. The process made it difficult to mitigate many of these by pre-defining a list of projects to be financed.

Finding 41

Permitting complexity has delayed several projects, but the Commission took steps to understand this, but was working to a significant extent with pre-defined projects, so could not fully mitigate this.

4.4 IMPACT

What are the short and medium term impacts of the programme? What is the impact in terms of direct and indirect job creation, increase in consumption and investments? What is the macroeconomic multiplier effect of the EEPR investment spending?

4.4.1 Introduction

As the EEPR funding is supporting a range of different types of OWE projects (including demonstration plants, transmission upgrades and wind-farm developments), and correspondingly, there are likely to be different socio-economic impacts observed across the projects. Unlike for the gas and electricity infrastructure projects, the expected socio-economic impacts of the OWE projects was not a criterion in determining the EEPR grant. Some proposals did, however, provide information, which includes a consideration of various socio-economic criteria, including job creation and other broader benefits. Accordingly, the discussion of the sample projects and case studies in this section relies heavily on information and data contained at the proposal stage. Updates were sought through the web-based survey and interviews, but no significant data was available.

A number of sample projects examined highlighted the strategic impacts of the projects and considerable emphasis was placed on the ability to generate various ‘lessons’ which would be of relevance to other offshore wind projects and the suppliers to these projects, and therefore to act as an enabler for economic activities associated with offshore wind. For example, one project focussed on the expected high-level European wide benefits associated with the project in terms of innovation.

Some projects identified the benefits associated with potential cross-border trading as a result of the interconnection of different electricity markets on the off-shore grid, while others emphasised the impacts in terms of the creation of employment both at a local level but also in terms of the involvement of suppliers from different member states in the different stages of project development (which would therefore also benefit from the EEPR funding).

Generally speaking, the financial assessment of potential benefits of the project were cast in general terms on the basis of the expected amount of EU offshore wind development in the future. One study did include a feasibility study which suggested various socio-economic benefits associated with the development, which related principally to the benefits associated with price differences between the markets and associated trading, which in turn is driven by the differences in the generation profile and cost merit order in those markets.

In terms of employment impacts, the assessment was again largely cast at a general level, with some studies referring to the potential employment created by the European offshore wind programme as a whole. In one case it has been suggested that the EEPR funding has led to substantial job creation for companies in manufacturing offshore wind turbines and tripod foundations, and this has been confirmed in our interviews and desk research. However, in other cases, no specific assessment of the direct and indirect employment associated with the project was presented.

Finding 42

OWE sub-programme projects were not required to justify their proposals on socio-economic grounds. A number did so on a voluntary basis, including on the basis of formal feasibility analysis, stressing the benefits, at European level, or to the OWE industry as a whole. Information was also supplied in a few cases on job creation effects.

4.4.2 Web-based survey: socio-economic impacts

In this section we review the survey responses to date as they relate to socio-economic impacts for the nine OWE projects for which we have data. It is particularly important when reviewing the results below to take account of the fact that different types of projects were supported under the EEPR programme (including deployment facilities and full-scale wind farms and transmission links), and that the different projects are at different stages of the production/development cycle.

Eight of the nine respondents provided employment estimates in relation to the EEPR project funding in OWE infrastructure. Looking across the data for the various OWE projects the key messages are as follows:

- Just over 4,000 direct FTE jobs are estimated to have been created or retained as a result of the EEPR projects in OWE. With the exception of one particular project (which did not differentiate between temporary and permanent employment), the data for the other projects suggest that the vast majority of these jobs appear to have been permanent.
- The multiplier impact appears to have been less in terms of indirect FTEs created than in the gas and electricity infrastructure funded projects. Specifically, it is estimated that some 720 indirect jobs have been created across the projects, while a further 360 jobs have been created in the economy as a whole (although one project did not distinguish between direct and indirect employment, and so these figures may be understated). Our desk research and interviews suggest this significantly understates the induced effect discussed in the section on utility.
- Roughly similar proportions of jobs have been created in managerial/technical activities (43%) and construction/manual labour jobs (41%), with a minority of jobs (16%) being administrative/clerical in nature. There are, however, exceptions, with one project reporting a relatively higher proportion of managerial/technical employment (consistent with the type of project that it is), while two projects reported a high relative level of construction/manual employment (60% - 65%).
- In terms of the main location of suppliers and contractors, for five out of the nine projects the main suppliers have been based in the same member state as the project. For the remaining four projects the main location of suppliers was in another member state.

Finding 43

An analysis of the web-based survey suggests that around 5,100 jobs have been created (both direct and indirect) across the different OWE projects to date. Most of these jobs have been direct jobs, and most of these have been permanent. Around half of the jobs have been in construction/manual activities with the other half being in management and technical tasks.

As in the previous discussions of electricity and gas infrastructure, we have estimated the effects of this employment in terms of the implied employment multiplier effect. However, given the nature of

the responses to the web-based survey it is only possible to undertake a comparison for a small number of projects. Accordingly the estimates in the table below are based on estimates of the implied indirect employment multiplier for four projects, and the induced economy-wide multiplier for two projects.

For the OWE projects for which we have the necessary data, the table below suggests an implied indirect multiplier effect of 1.2 and a slightly higher induced multiplier of 1.3. However, it must be noted that one project did not distinguish between direct and indirect employment, and consequently the levels of indirect employment may be greater than estimated. In addition, these figures reflect a very high implied indirect and induced economy-wide multiplier estimates associated with one project (which recorded an implied indirect employment multiplier of 13.5, and a very high induced employment multiplier of 38.5).

Table 4: OWE – Implied employment multiplier

	Direct	Indirect - Suppliers	Indirect - Economy wide	Total	Implied indirect multiplier	Implied induced multiplier
OWE	4066	720	360	5146	1.2	1.3

Source: web-based survey

Finally, it is possible examine and compare the impact of EEPR funding in terms of employment created per maximum MW of capacity installed with each OWE project. The table below presents a comparison across the different projects for the four projects for which the data is available. The analysis suggests that, *if the employment levels stay as they are*, and each project installs the maximum capacity, then on average the EEPR projects in OWE infrastructure reported would have resulted in an average of 2.56 FTE jobs (both directly and indirectly) per 1 MW of OWE infrastructure installed. This is substantially higher than the estimate of 0.17 FTE job per 1 MW for electricity infrastructure, and reflects the significantly higher levels of employment associated with OWE projects examined coupled with the lower levels of capacity expected to be associated with the OWE projects (hence giving a higher ratio of employment to output). However, caution should be exercised when reviewing these estimates, as for some of these projects it would be expected that the employment will increase as the project is developed (and therefore the ratio will be higher).

Table 4: OWE – Average employment per maximum MW assumed with project

	Direct FTE (per MW)	Indirect FTE - Suppliers (per MW)	Indirect - FTE Economy wide (per MW)	Total (per MW)
OWE	2.18	0.38	0.00	2.56

Source: web-based survey

Finding 44

The estimated implied multiplier effect associated with this direct employment is relatively low with an estimated 0.2 indirect jobs for every direct job, and 0.3 jobs in the economy as a whole (including indirect jobs) for every direct job created. As one project did not distinguish between direct/indirect employment, these estimates may be underestimated).

4.5 UTILITY

To what extent is the EEPR contributing to achieving the EU energy policy objectives of security of supply, decarbonisation, competitiveness, completion of the energy single market, functioning of the energy markets?

4.5.1 Introduction

The findings in response to this question start from two assumptions based on the expectations from desk research and as the results of interviews:

1. The two German EEPR offshore wind farm projects which have already achieved financial close – Bard I, Borkum West II, together with some other large projects, notably Global Tech 1 – have produced a step change in the scale of the offshore wind industry in deep waters in Germany.⁸² They have enabled turbine and other equipment suppliers to ramp up production from single items or small runs to large-scale manufacture, and they will be operational within the next couple of years, thus proving the technology in the short term and providing a technological basis for further scaling up;
2. The grid integration projects will go ahead, albeit with some delays, and will be able to serve as best practice examples for solving cross-border legal, regulatory and trading issues. The findings in this and subsequent sections start from two assumptions based on the expectations.

Based on these assumptions, there is a perception – and indeed there is concrete evidence – that individual projects are beginning to contribute to all these objectives, though more to security of supply, decarbonisation and competitiveness than to completion of the single market and functioning of the energy markets, since these are more dependent on the grid integration projects going ahead.

This section discusses this in relation to each individual objective.

4.5.2 Contribution to increasing security of supply

The contribution to security of supply from the projects funded by the EEPR is still in the future. The only projects currently supplying power to the grid are Bard 1 and Thornton Bank, and neither is fully operational. None of the other projects is currently operational in any form. There are therefore as yet no significant changes in supply patterns. Individually, moreover, these projects only make a small contribution to security of supply. The difference they will make to security of supply (and therefore the derived contribution of the EEPR) according to interviewees and desk research is in their demonstration value at a commercial scale of the feasibility of a technology. The same will be true in due course of the grid integration projects, while the Aberdeen Offshore Deployment Centre will act as a testbed for further innovation as the industry develops.

⁸² The Thornton Bank project in Belgium has similar characteristics, but the EEPR contribution has not played the same role since it is for a very small amount for a specific technology.

Finding 45

By being among the pioneers, the EEPF-funded projects will bring to the industry and funders confidence that large-scale offshore wind and accompanying offshore grid integration are viable, and that there is a basis in planning for security of supply on the basis of major expansion.

4.5.3 Contribution to immediate reduction in GHG emissions and long-term decarbonisation

Wind energy avoided 126 mt of CO₂ in 2010, according to the European Wind Energy Association, on the basis that 1TWh of wind energy saved 0.696 Mt of CO₂ in 2010 and that wind energy production was 182 TWh, of 5.5% of total EU electricity demand⁸³. Wind energy has a carbon footprint as a result of production, service and maintenance, but this is well below the saving from generation. It is axiomatic, therefore, that each additional MW of capacity will bring an immediate reduction in greenhouse gas emissions and contribute to long-term decarbonisation.

The grid integration projects are designed, and this is not disputed in the literature or by stakeholders, to lower costs by bringing power to shore more efficiently, by making trading more efficient – including by making better use of variability in wind patterns across a wider area, and thus making it possible to run wind turbines for longer.

Thus, the EEPF-funded projects, though making only a small contribution now to lowering greenhouse gas emissions and long-term decarbonisation in the absolute will do so on a larger scale in future and will bring spillover benefits from their catalytic effect on speeding up development of the industry. This is the view from desk research and stakeholders.

Finding 46

The EEPF-funded projects will individually make a contribution to greenhouse gas reduction and long-term decarbonisation and will have a catalytic effect on the development of the industry, which will scale up the reductions and decarbonisation.

4.5.4 Contribution to Europe's competitiveness through investments in the right skills and technologies

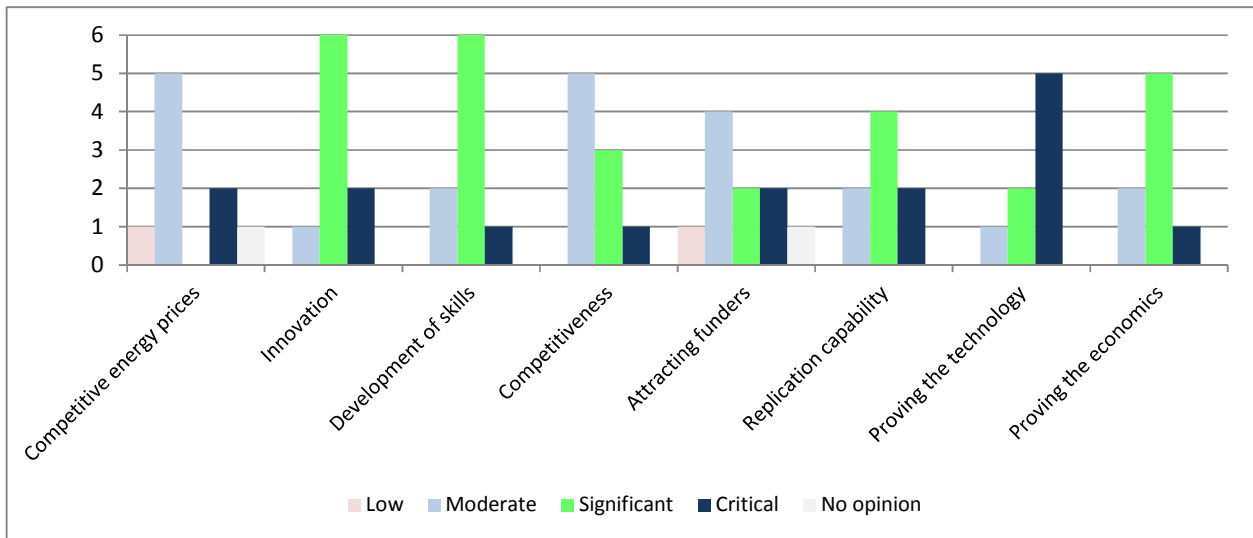
Respondents to the web-based survey considered that the main contribution of the EEPF was to proving the technology. This tended to be the perspective also of interviewees, most of whom by the nature of their function are not used to thinking about the broader policy objectives which might be served by the EEPF. However, they also confirmed that the EEPF projects are creating jobs, including skilled jobs both within the projects themselves, and in industrial and science clusters which will build up around some of them, particularly the German wind farms and the Aberdeen Offshore Deployment Centre – the projects with which they were the most familiar. Many of these jobs will be

⁸³ *Pure Power: Wind energy targets for 2020 and 2030*, A report by the European Wind Energy Association, 2011; www.eewa.org

in managerial or technical jobs requiring qualifications, such as engineers. In the web-based survey, the proportion of such jobs was put at 25-50%, depending on the project.

In addition to the critical contribution, the EEPR projects are expected to make to proving the technology, web-based survey respondents believe the EEPR projects will – based on the totals for ‘significant’ and ‘critical’ combined primarily benefit innovation, skills development, proving the economics and replication capability. They are less convinced – as the Figure shows – about the contribution to competitiveness, competitive energy prices or attracting funders to these technologies. There are no significant differences in the spreading of opinion between the different types of projects.

Figure 16: Contribution of EEPR to economic objectives



Source: web-based survey

Finding 47

The biggest contributions to economic objectives will come from proving the technology (by far the greatest contribution), proving the economics, innovation and development of skills.

The specific case of Germany

“Offshore wind energy is on the way to industrialisation: a German offshore industry is born,” according to an industry report put out in June 2010, by Germany’s WAB (Windenergie-Agentur), an assessment based on the fact that not only were three offshore wind farms feeding power into the grid (including Alpha Ventus, a demonstration wind farm, which served as a test bed for the technology used by Borkum West II’s supplier Areva Wind as well as for Repower), but that an additional 15 will be operational by 2017. This includes Borkum West II, the second on the list following Baltic 1.

The WAB estimates that the industry could be providing between 12,000 and 28,000 jobs by 2020. Most of these jobs are in manufacture and installation, but more than ten per cent are in service and

maintenance. A single service vessel can have a crew of 50 people, and the provision of service vessels has significant potential for the shipbuilding industry according to another recent report⁸⁴.

Even without orders for service vessels, this report that the offshore wind industry has the potential considerably to outstrip the classic activities of the German shipbuilding industry by 2020 thanks to orders for jackets and platforms. The report calculates that this could account for between 4,500 and 6,000 jobs by 2020.

Development of the offshore wind industry is leading to the development of industrial clusters and centres of excellence (extending to the creation of specialist university faculties) in northern Germany according to desk research and interviewees. These are centred on the ports of Bremerhaven and Cuxhaven (with Eemshaven in the northern Netherlands also feeling some benefits as a base port for service and installation vessels).

In addition, according to interviewees, the lessons they are learning from pioneering in offshore German waters will stand them in good stead not only elsewhere in the EU, but as far away as China.

A Prognos study⁸⁵ published in January 2011 on the potential for Bremerhaven concluded that becoming an offshore wind energy terminal could bring considerable economic and tax benefits, with a positive benefit/cost ratio in both a base case and best case scenario – though the scenarios are vulnerable to delays in Bremerhaven making the necessary investments in port infrastructure and the speed with which competitors on both sides of the North Sea develop as wind energy terminals. Its scenarios are based on handling 100-160 turbines a year.

The study concluded that wind energy has already contributed significantly to a 10% increase in employment since 2005. It also calculated that public sector investment of between EUR79 and EUR90 million would create added value by 2040 of EUR9.9-17 billion (depending on the scenario), 7,100-14,100 jobs (including jobs not lost and new jobs created), and bring in 2,100 to 4,900 new residents. Additional tax revenues would be EUR 174.4 m-EUR384.1m. The tax benefits would outweigh the costs by 2018-2023.

The worst case scenario (not investing or finding an investor) would mean EUR21.8 m lost in planning costs, negative value creation of EUR1.1 billion, the loss of 800 jobs and 180 residents.

The report also pointed out that there are unquantifiable qualitative benefits in attracting research and development institutions, universities, service providers and network players to the area, and synergistic effects from clustering.

Finding 48

Economic studies confirm the views of interviewees that the first large offshore wind farms to get under way in Germany, including EEPR projects, are having a catalytic effect on creation of a large-scale industry.

⁸⁴ *Offshore-Wind – Potenziale für die deutsche Schiffbauindustrie*, KPMG 2011

⁸⁵ Endbericht Potenzialanalyse OTB 14-01-2011_final

Potential to replicate the German case

While the benefits in terms of long-term competitiveness relate here mainly to Germany because of the importance of German offshore wind farms in the EEP programme, there is no reason to believe that the broad conclusions would be different in other locations with the proviso that a number of characteristics have to be replicated, e.g. a domestic shipbuilding, cable, gearbox, foundations and turbine manufacturing industry, and the port facilities and spare land available for the land-intensive aspects of the manufacture and installation (of turbines and for storage of the foundations, for example).

On the other hand, other locations may have a head start in developing centres of excellence, such as the oil and gas industry experience of the area around Aberdeen. The Aberdeen Offshore Deployment Centre will, moreover, by definition contribute to competitiveness and skills once fully operational, since its vision is “to deploy new equipment, systems, processes and initiate R&D to improve the competitiveness of Offshore Wind Energy production, whilst generating environmentally sound marketable electricity and to increase the supply chain capabilities in Scotland, the wider UK and Europe.”⁸⁶

By analogy, it seems reasonable to assume that grid integration projects will bring similar benefits, but we have been unable to find data on this.

Finding 49

There is every reason to believe that the types of benefits seen in Germany can be replicated in other areas of the EU with similar characteristics.

4.5.5 Contribution to completion of the single market and functioning of energy markets

It is the cross-border grid integration projects which have the greatest potential to contribute to completion of the single market, i.e. the Cobra Cable and Kriegers Flak⁸⁷, by bringing down the cost of transmission through more efficient redispatch of electricity produced offshore. This helps optimise the variability of wind flows and trading, leading to lower energy prices. Interviewees and desk research have confirmed this.

This contribution to completion of the single market is particularly the case of Kriegers Flak, which is based on the concept of combining a grid connection with an interconnection cable and a step-by-step concept to connect wind farms and new countries, while the Cobra Cable is a bilateral interconnection, though it should permit transit to the Nordpool trading area via Germany. Nevertheless, as a purely bilateral interconnection, there are some doubts about the wholesale price

⁸⁶ *Publishable summary, Project Periodic Report to March 31, 2011.*

⁸⁷ The HVDC Hub is a domestic project, though it has the potential to be connected to Norway.

benefits, particularly in the Netherlands. It may not reach its full potential until there is a pan-European grid.⁸⁸

Until these projects are operational, the benefits of the projects (and the EEPR programme) are notional. But the feasibility study for Kriegers Flak⁸⁹ illustrates what some of these should be, including ancillary trading services and capacity to feed in wind generation to other countries in the event of outages or capacity reductions in one connection. This is in addition to benefits in other areas, such as increased security of supply and practical expertise for developing future offshore grids.

The value of these projects – as for the wind farm projects – lies not so much, according to interviewees, desk research and the results of the web-based survey, in their individual contribution, but in their contribution to proving the technologies and the economics in order to reap wider benefits across the EU in the medium term.

Finding 50

Grid integration projects contribute to completion of the single market by optimising wind use and trading. These benefits from the EEPR projects are still theoretical.

4.6 CONCLUSIONS

- The EEPR had an important signalling effect in relation to some projects and their funders. While that role may not have been critical in terms of leverage additional funding, it was real, and in particular enabled new technologies to be introduced more quickly.
- Large and innovative projects in an industry with difficult operating conditions are inherently risky, but the EEPR contributed to some extent to mitigating financial and some administrative risks, but not environmental risks.
- It was beyond the scope of the EEPR fully to mitigate permitting risk, and steps were taken to identify these, but where there are delays, this is a major contributing factor.
- The sample projects were close to their budget consumption targets at end-2010, so were in line with the objectives set for them under the EEPR programme – which were not always ambitious for the most innovative projects.
- The EEPR projects in Germany, in particular, are making a short-term contribution to economic recovery and the energy policy objectives of a low-carbon economy.
- The EEPR projects in Germany have been important in creating jobs and kick-starting large-scale deployment of offshore wind, and associated industries and innovation clusters, which should boost the competitiveness of the EU industry as a whole and should have the potential for replication elsewhere in the EU.

⁸⁸ *The Effects of the Cobra Cable: A study of the influences on efficiency, competition and the feasibility of wind energy*; http://www.tilburguniversity.edu/research/institutes-and-research-groups/tilec/energy/pdf/20100618_Celis.pdf; and *Study on flexibility in the Dutch and NW European power market in 2020, A report prepared for EnergieNed* by Frontier Economics; April 2010; http://www.energiened.nl/_upload/bestellingen/publicaties/344_Frontier%20study%20report.pdf

⁸⁹ http://www.50hertz-offshore.net/de/file/2010-02-24_Final_Feasibility_Study_Public.pdf

5.1 INTRODUCTION

The adoption of the EEPR proposal closely followed the reaching of a political agreement on the Climate and Energy package, which established a legal framework and significant incentives for the deployment of carbon capture and storage via the adoption of the Directive on the geological storage of carbon dioxide and the revision of the Directive on the EU Emission Trading System (ETS). Concerning the central issue of financing and following the June 2008 Council's call for setting up a mechanism to incentivise investment in up to 12 demonstration projects, policy-makers had agreed on providing CCS and innovative renewables with unprecedented financial support in the form of 300 million carbon allowances⁹⁰ that were set aside by the revised ETS Directive to support up to twelve CCS commercial demonstration projects and demonstration projects of innovative renewable energy technologies⁹¹. As the implementation provisions of the ETS Directive were adopted in mid 2010, no certainty existed before on the size and timeframe of the funding. In response to the economic crisis and in order to accelerate investments in key energy sectors, the CCS sub-programme aimed to precede and complement the upcoming NER 300 funding, by providing early financing to "proposals that [were] already very mature", in order to "allow these first movers to go ahead with their projects already in 2009/2010", in order to be operational by 2015⁹². If projects funded by the EEPR were to be selected to receive NER300 financing, the latter would be reduced by the amount of financing received from the EEPR⁹³.

The EEPR regulation therefore provided that "financial assistance should be directed towards those projects that are in a position to progress substantially with project development in 2009 and 2010"⁹⁴. A total of €1bn was allocated to six CCS projects in the UK (Don Valley, formerly known as Hatfield), the Netherlands (Rotterdam), Germany (Jänschwalde), Poland (Belchatow), Italy (Porto Tolle) and Spain (Compostilla). Each project was entitled to receive up to €180m of EU funding, except for Porto Tolle which was granted €100m. The combination of projects covers a range of different capture technologies (pre-combustion in Don Valley, oxyfuel and post-combustion in Jänschwalde, post-combustion in Rotterdam, Belchatow and Porto-Tolle, oxyfuel in Compostilla) and different types of storage sites, including storage in offshore saline aquifers (Porto Tolle and Don Valley), in hydrocarbon fields (Rotterdam, Jänschwalde and Don Valley), and in onshore saline aquifers (Compostilla, Belchatow and Jänschwalde).

The objective of the sub-programme was to kick start investments in these projects which were expected, by the end of 2010, to reach investment stage, including the exploration and the development of storage options, assist validating the technology and bring down the costs of these first-of-a-kind demonstration projects. To boost the likelihood that the projects selected would reach this investment stage in a timely fashion, one of the selection criteria included in the Regulation was

90 The so-called New Entrant Reserve scheme (NER300).

91 Based on carbon prices at the time of negotiations, it was foreseen that the scheme would translate into some €9bn. This estimate had been brought down to approximately €4.5bn as of the carbon prices of early June 2011.

92 EEPR call for proposals http://ec.europa.eu/energy/grants/docs/eepr/eepr_call_for_proposals.pdf

93 As provided by the Commission decision on NER 300 adopted in November 2010.

94 Recital (15) of the EEPR Regulation.

the fact that the projects had to incur substantial investment-related expenditure by the end of 2010, as for the other sub-programmes. .

The scope covered by the EEPR varies from one project to another, as illustrated by the project sample:

- In Rotterdam, the EEPR-funded action covers the design, construction and commissioning of the capture unit (including its integration to the base plant), the transport pipeline and the storage unit.
- In Jänschwalde, the EEPR-funded action covers the design, construction and commissioning of an Oxyfuel boiler equal to 260 MWel and of a post-combustion capture facility, which was initially to be equal to 125 MWel, but which was then reduced to 50MWel in the course of the project, and its integration to the power plant (to a boiler currently being rebuilt); the assessment of two storage sites, and the securing of permits for storage in these two sites, as well as the feasibility study for a pipeline transport system to whichever of the site will be retained for CO₂ storage.
- In Compostilla, the EEPR action covers the construction of three technology development plants at pilot scale for CO₂ capture, transport and storage respectively The actions includes: investment in a 30 MW capture plant, FEED studies for the full scale demonstration plant, development of a transport concept for the demonstration plant and storage site exploration for the demonstration plant.

5.2 RELEVANCE

To what extent are the objectives and the resources of the EEPR Regulation pertinent to economic recovery and energy policy? How relevant is the EEPR Regulation for the EU energy policy objectives?

5.2.1 Introduction

By including CCS in the climate and energy package, EU policy-makers clearly demonstrated their support to the development of this technology as part of the policy mix needed to achieve the European GHG reduction objectives. As had been identified already in the 2008 CCS communication⁹⁵ and was subsequently illustrated by the negotiations that led to the revision of the Directive on the Emissions Trading Scheme, financing was recognised as a major barrier to the early deployment of carbon capture and storage technologies. Via their participation in national and European funding programmes (FP7) as well as based on their own financial resources, equipment suppliers and electricity producers had already poured in significant amounts of R&D funding (up to several hundred millions per company) for the development of different technology “blocks” for single components of the CCS chain. At that stage, significant additional funding was needed for the demonstration of the integrated chain of CCS at an industrial scale. Via the European Technology Platform for Zero Emission Fossil Fuel Power Plant (ZEP), i.e. the coalition of stakeholders (including European utilities, petroleum companies, equipment suppliers, several environmental NGOs) supporting CCS, the industry had declared its willingness to “cover a major portion of the costs and risks of implementing an EU demonstration programme”, while asking for public funding to cover the “incremental costs of CCS”, i.e. these additional costs on power plant operation that were not to be compensated by the avoidance of emission allowances costs⁹⁶. The ZEP estimated these costs to €7-12bn for 10-12 CCS demonstration projects. For CCS as for other low-carbon technologies, it was reckoned, as put forward by the European Commission in the European Strategic Energy Technology Plan (SET-Plan), that a significant portion of this funding would need to be delivered by the public sector both at national and European level. The rationale behind EU CCS policy, as laid down by the Council Conclusions of Spring 2007 and Summer 2008, was to incentivise Member State and private sector investment to ensure the construction and operation of up to 12 demonstration projects by 2015.

Most interviewees agreed with the case for public and private investment as they regarded CCS as a key technology for the decarbonisation of the energy sector and as a building block of the low-carbon economy. Via the levels of funding made available by the EEPR and NER300 schemes taken in combination, and the timing of the EEPR sub-programme, the EU was seen as positioning itself as a potential front-runner on the demonstration of CCS. Given the number of projects retained and the fact that additional public funding was not yet secured, the level of funding allocated by the EEPR alone to individual CCS projects was pointed out by some stakeholders as being small relative to the

⁹⁵ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Supporting Early Demonstration of Sustainable Power Generation from Fossil Fuels*, COM(2008) 13 final

⁹⁶ ZEP’s Proposal for an EU demonstration programme for CO₂ capture and storage (November 2008): www.zeroemissionsplatform.eu/downloads/15.html

total costs of end-to-end demonstration projects, even if, in absolute terms, the support was very high compared to existing EU funding schemes for this type of project.

Stakeholders' feedback indicated that the relevance of the CCS sub-programme to generate an immediate financial and employment stimulus was not evident to them.

5.2.2 Relevance of the sub-programme's objectives to contribute to economic recovery

Interviewed stakeholders and beneficiaries saw the CCS sub-programme as more relevant to long-term competitiveness and to energy policy objectives than to the economic recovery. The latter aspect was not obvious to interviewed stakeholders and beneficiaries. When asked about the relevance of the levels of EEPR funding to provide an immediate financial stimulus and to rapidly address the downturn faced by the European economy, most beneficiaries agreed, but for a majority of them in mild terms⁹⁷. Rather than a response to the economic crisis, the demonstration nature of the CCS sub-programme was perceived as a long-term orientated and strategic investment whose potential economic impact would mainly be felt when the exercise will have contributed to make CCS commercially viable. As reflected in the Implementation Plan of the CCS European Industrial Initiative for 2010-2012⁹⁸, the timeline envisaged at the time of selection of the CCS projects under the EEPR was that demonstration projects funded by the EEPR would be operational by 2015 and that the development of second-generation technologies would make it cost-effective after 2020.

Stakeholders regarded the EEPR as relevant to contribute to Europe's long-term competitiveness as they saw CCS as a sine qua non condition for coal to remain an integral part of the electricity mix in a sector regulated by the emission-trading scheme. While higher CO₂ prices would be needed to justify the use of CCS on gas-fired plants in comparison with coal-fired plants, the European Commission's Roadmap for moving to a competitive low carbon economy in 2050 and accompanying impact assessment foresee that Europe's long term objective to decarbonise the energy sector is also likely to require the use of CCS in gas-fired power plants and energy intensive industries⁹⁹. Equipping itself with regulation and funding to support the deployment of CCS would potentially allow Europe to become a front runner in the development of CCS and to export its technology to other parts of the world.

Concerning the relevance of the EEPR level of funding to reinforce Europe's competitiveness in the long-run, half of the survey respondents agreed that this level was relevant, and half tended to agree.

Finding 51:

Stakeholders felt that the CCS sub-programme is relevant to contribute to Europe's long-term competitiveness, as they considered CCS as a key building block of the low-carbon economy. However, the relevance of the CCS sub-programme to the objective of providing an immediate economic stimulus and to foster the economic recovery was less evident to them.

97 Two beneficiaries agreed; three tended to agree; one tended to disagree.

98 Zero Emission Platform, CCS EII Implementation Plan 2010-2012, adopted in October 2009

99 The estimates developed in a recent study published by ZEP on the cost of CCS after 2020 ("The Costs of CO₂ capture, transport and storage: post-demonstration CCS in the EU") showed that the price of Emission Unit Allowances required to justify the installation of CCS on gas-fired power plant would be higher than for coal (€37/tonne of CO₂ for hard coal; approximately €34/tonne of CO₂ for lignite; and approximately €90/tonne of CO₂ for gas).

5.2.3 *Relevance of the sub-programme's objectives to contribute to the EU energy policy objectives*

We looked at the relevance of the CCS sub-programme to contribute to the Strategic Energy Technology Plan and to the objective of reducing Greenhouse gas emissions by 20%.

Two priorities were identified by the SET-Plan (European Industrial Initiative on carbon capture and storage) in order to enable the deployment of CCS technologies by 2020-2025: first of all proving the technical and economic feasibility of CCS using existing technology; and secondly developing more efficient and cost competitive CCS technologies (2nd-generation technologies).

At the time of the EEPR proposal, equipment suppliers and electricity producers had already invested significant R&D efforts in the development of different technology “blocks” for single components of the CCS chain¹⁰⁰. The next step identified by the “Technology Matrix” was to test and optimise the integration of the capture plant into the power plant on the one hand, and the integration of capture, transport and storage components on the other hand.

By supporting full-scale, industrial-sized demonstration projects for the first time, the EEPR directly responded to the funding needs identified by the industry. As for the minimum size of demonstration plants, the EEPR requirement that capture covers at least 250MW of electric output also originated from recommendations made by the industry via the Zero Emission Platform (ZEP), even though not all members of ZEP agreed on the figure¹⁰¹.

Finding 52:

The CCS sub-programme directly responds to the needs identified by the SET-Plan and by the industry, which are the validation of existing technologies (from a technical and an economic point of view), via the testing of the integrated CCS chain on an industrial scale.

Concerning the contribution of the EEPR to the objective of reducing Europe’s GHG emissions, a majority of beneficiaries felt that the level of funding made available by the EEPR were relevant: of six beneficiaries, three agreed about the relevance of the EEPR funding level, and two tended to agree. Stakeholders nonetheless stressed that the main benefit expected from the projects was not the direct CO₂ reductions to be generated by projects but the demonstration and promotion of a low carbon technology, which they regard as having great potential to contribute to the decarbonisation of the energy sector after 2020.

This view is consistent with scenario analyses done by the Commission, which foresaw that the CCS could account for some 15% of the reductions required by 2030 in the EU¹⁰².

However, stakeholders also underlined that the pace at which CCS could potentially gain momentum as a cost-competitive low-carbon technology not only depends on the demonstration of CCS, but also on the development of the regulatory framework, in particular the evolution of the carbon market. It is

100 The progress achieved in this regards is described in detail in the “Technology Matrix100” (2008) put together by the industry via the Zero Emissions Platform: <http://www.zeroemissionsplatform.eu/downloads/17.html>.

101 Some stakeholders felt that testing post-combustion capture on an installation of 100MW would have been sufficient for demonstration purposes, while, on the other hand, other stakeholders were of the opinion that for oxy-fuel and pre-combustion capture, a higher reference size should have been established as a minimum requirement.

102 DG CLIMA’s website, consulted in July 2011 (http://ec.europa.eu/clima/policies/lowcarbon/ccs_en.htm)

estimated that a price in the range of €30-50 per ton would be required for CCS to be cost-competitive once the technology is mature. The subsidies granted to other low-carbon technologies were also mentioned as a variable that would have an impact on the relative competitiveness of CCS.

Finding 53:

Stakeholders saw the CCS sub-programme as directly relevant to the greenhouse gas reduction agenda as it will contribute to the demonstration of CCS technologies, which they see as a key building block of the low carbon economy and the decarbonisation of the power sector.

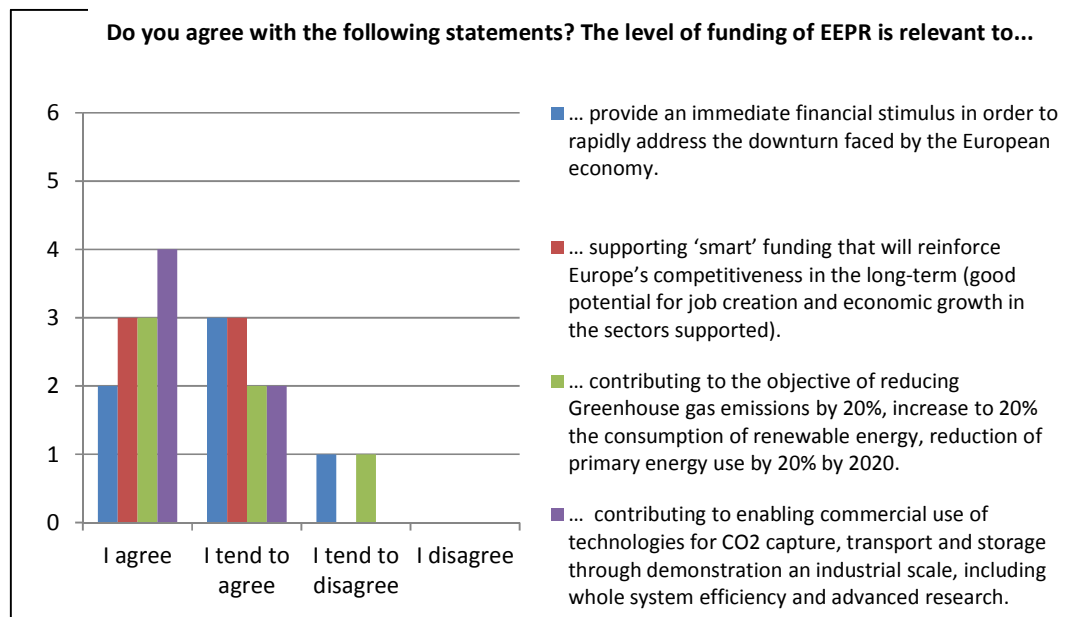
However, it should be borne in mind that support to the demonstration of CCS provided by the EEPR will not be successful if other conditions are not met, including an appropriate regulatory framework and sufficiently high carbon prices within the emission trading scheme.

5.2.4 The relevance of the resources made available for the sub-programme, relative to the objectives of the EEPR

The amount of funding made available was unprecedented for CCS. In comparison with the €1bn made available by the CCS sub-programme, the SET-Plan CCS Roadmap had estimated that some €8.5-13bn was needed between 2010 and 2020 to demonstrate existing CCS technology.

In their responses to the web-based survey, most beneficiaries either agreed or tended to agree that the level of funding made available for CCS were relevant to the objectives of the EEPR, including the specific objectives of the CCS sub-programme, as shown in the figure below.

Figure 17: Perceived relevance of EEPR funding level to economic recovery and energy policy objectives (by number of respondents)



Source: web-based survey

However, responses to the same survey revealed mixed feelings from beneficiaries about the level of funding made available for individual projects: when asked about their opinion on the level of EEPR funding in comparison with the eligible and total costs of their project, of six beneficiaries, three

found the EEPR funding level critical, one found it significant, but two found it low or moderate. As one survey respondent who rated EEPR funding level as critical put it

“The level of EEPR funding in comparison with total eligible costs of the action financed under EEPR for our project is in excess of 60% and we consider this to be a critical contribution to this development work. However, the level of EEPR funding in comparison to the total estimated cost of the overall project execution (construction of the entire end to end CCS chain) is only in the order of 10% so we consider this to be low.” Survey respondent

Some stakeholders stressed that the level of funding made available by the EEPR was relatively small compared to the total capital and operational costs of end-to-end demonstration projects and that the overall costs of producing decarbonised electricity using CCS could have been better taken into account when designing the EEPR programme. While EC funding covers more than or just under 50% of eligible costs of all projects (for a maximum of 80% set in the regulation), in comparison to the total capital costs the share of European funding falls under 20% for all projects but one, according to beneficiaries’ estimation of the total costs of their demonstration project. In order to better reflect the overall cost of end-to-end CCS demonstration projects, including the total capital costs described above but also the operational costs, some stakeholders suggested that the envelope should have been divided into a smaller number of end-to-end projects.

As underscored by the Commission this is consistent with the fact that EEPR was not meant to cover the implementation of entire end-to-end projects and was intended to be complemented by NER300 funding and/or Member State and industry funding. In all but one case these additional sources of funding have not yet been secured yet.

With this proviso in mind, one could argue that what is at stake is not necessarily the level of EEPR funding (which was in any case limited by the availability of resources) as such but the synergy with other sources of public funding on which the overall projects and in some cases the EEPR actions themselves relied.

Finding 54:

The amount of funding made available by the EEPR for the CCS sub-programme as a whole is unprecedented, and is relevant to the objectives of the EEPR and in particular to the financing needs identified in the SET-Plan.

In a context where the additional sources of public funding that were meant to complete project financing were not yet secured for most projects, some stakeholders stressed that the level of EEPR funding per project was small relative to the total costs of end-to-end demonstration projects. Nevertheless, the percentage of EEPR funding, even below 20%, remains an extraordinary EU support for this type of project.

5.3 EFFECTIVENESS/EFFICIENCY

To what extent are the financial resources made available by the EEPR Regulation being used and to what extent are they contributing to achieving the programme objectives?

5.3.1 Introduction

Considered as a very promising technology, the development of carbon capture and storage was at a very early stage when the EEPR regulation was adopted, not only from a technical perspective, but also from a legal and economic point of view. The regulatory framework had only just been laid out at EU level with the adoption of the revised Directive on the Emission Trading Scheme and of the Directive on the geological storage of carbon dioxide, whose deadline for transposition by Member States was set in June 2011. Besides, the regulatory, technical and economic uncertainties (in particular around the future price of carbon on the ETS market and around the cost of operating CCS), which are to some extent intrinsic to the nature of the demonstration phase of a novel technology, meant that the business case for investing in costly demonstration projects was not fully established yet.

The rationale for the CCS sub-programme was to reduce the level of risk placed on first movers so that a first batch of projects could already start in 2009-2010. The assumption underpinning the inclusion of CCS in EEPR was that some CCS demonstration projects, which had already developed “mature and feasible concepts” for the capture, transport and storage of CO₂, were ready to kick off and could already make substantial progress in 2009 and 2010¹⁰³ and achieve investment stage by the end of 2010. As required by the EEPR, these projects were expected to incur substantial capital expenditure by the end of 2010. The amount of expenditures actually incurred and the values of contracts signed with suppliers have been substantial for at least two projects but very low for at least one. While the EEPR has contributed to accelerate the setting off and early development phase of these projects and hence to technical advancement of the projects, these efforts have been to some extent undermined by delays in project implementation, which are largely inherent to the lack of maturity of the CCS sector. In particular, the regulatory uncertainties that remain until the Directive on Storage is transposed into national legislation have caused delays in project implementation.

As a result of these delays, combined with remaining uncertainties, the conditions have not yet been met for many demonstration projects to reach certainty as to whether it would go ahead in the short-term, as attested by the absence of final investment decisions on the part of project beneficiaries. These uncertainties were partly inherent to the lack of maturity of the CCS sector (regulatory and permitting uncertainties concerning storage; high costs combined with uncertainties around the economic and commercial prospects, which are largely dependent on the price of carbon within the Emission Trading Scheme) and partly due to the fact that additional public funding foreseen for these projects, including NER 300, has not yet been secured. In this context the EEPR has achieved mixed results with regards to decreasing the perceived risks of investing in end-to-end demonstration projects. Nevertheless, it worth noting that the situation is evolving for projects such as ROAD that should be ready to take a decision on the FID in the very short-term.

103 Recital (15) of the EEPR Regulation.

5.3.2 Extent to which the financial resources made available are being used

5.3.2.1 EFFECTIVENESS AND SWIFTNESS OF THE ALLOCATION MECHANISMS OF THE EEPR PROGRAMME

As a first-of-its-kind funding for full-scale CCS demonstration projects, the CCS sub-programme can hardly be compared to any existing funding programme as far as the selection and allocation processes are concerned¹⁰⁴.

In comparison with the timeline announced to project applicants at the information day in June 2009, the award decision was adopted in December 2009 instead of October-November as originally foreseen. One grant agreement was signed a few months later than initially planned in May 2010, instead of February as requested by the project promoter. It did not therefore constitute any issue for the project promoters.

The date of signature of the grant agreements did not affect the actions' starting date, which in any case ran as early as July 2009 for most of the projects (and the analysis of sample projects confirms that some actions claimed for costs incurred before the adoption of the award decision). The deadline to commit funds by the end of 2010 was respected. For CCS projects, a total of €1bn was committed, which is slightly less than the €1.050bn made available by the call for proposals, as the French project did not make it through the selection stage.

Overall beneficiaries found the selection/allocation processes reasonably swift or indeed fast for a minority of them (one-third of beneficiaries). Feedback showed that the timeframe allowed for applications was perceived as challenging as some projects were at an early stage of development when they were pre-selected in May 2009. The evaluation process was perceived as swift and efficient.

Finding 55:

Despite minor delays in relation to the signing of one grant agreement on the request of the contractor, the formal deadline to commit funds by the end of 2010 was respected as three projects were signed in December 2009 and further projects in February and spring 2010. Responses to the web-based survey show that beneficiaries were satisfied by the swiftness of the selection and allocation processes.

5.3.2.2 MATURITY OF THE SELECTED PROJECTS

Given the levels of development of the CCS sector and the demonstration character of the CCS sub-programme, CCS projects were not expected to have reached investment stage at the time of project selection in July 2009. The web-based survey confirmed that none of the projects had reached maturity, defined as reaching investment stage; none of the projects had secured construction and environment permits for the CCS installation; and none of the beneficiaries had taken the final investment decision. It was accepted that these elements were milestones along the way of project

104 Parts of the allocation processes were based on existing mechanisms used by DG TREN/ENER for FP7 (e.g. the comitology procedure, the grant agreement model).

implementation, and in some cases, achieving the investment stage with respect to one or several of these elements was actually the intended outcome of the EEPR-funded action¹⁰⁵.

What the selection process focused on under the CCS sub-programme was

- The work already done in defining the technical concepts and in particular for storage;
- The technical soundness and timing of the work plan and milestones;
- The level of expenditure foreseen by projects by the end of 2010;
- The overall soundness of the financial package for the full investment phase of the project.

Concerning the definition of technical options, the analysis of the project sample shows that the first years of the projects were to be dedicated to completing the appraisal and characterisation of potential storage sites and to completing the basic engineering design of the three technology blocks (capture, transport and storage), as illustrated in the table below, which provides an overview of the sample projects' milestones in terms of technological development and construction. Projects were nonetheless *relatively* mature at the time of signature of the grant agreement as the exploration of storage sites had started for the three projects and that a feasibility study had already been carried out for the capture unit for two projects (while the sub-contracting of the feasibility study was part of the action's scope for the third project).

Table 5: Timeline foreseen by beneficiaries toward project realisation

		2010				2011				2012				2013				2014				2015	
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Capture	FEED/basic design completed	X				X							X										
	Permits/compliance secured									X	X												
	Commissioning																	X					X
Transport	Route selected/FEED/basic design completed					X			X														
	Permits/compliance secured							X		X													
	Commissioning																	X					
Storage	Appraisal/characterisation completed/site selected					X			X	X													
	FEED/basic design completed					X								X									
	Storage permits/compliance secured													X	X								
	Commissioning																				X		
Financial Investment Decision					X	X					X												

Source: Deloitte based on European Commission data

105 In Compostilla EEPR funding covers the technology development phase and preparatory works for permitting applications. The process of taking the Final Investment Decision will only start when this first phase has come close to completion.

Concerning the securing of permits, all sample projects –and indeed all selected projects- had secured permits for the base power plant, although in at least one case, permits were revocable. As for the CCS installations:

- None of the projects was planning to obtain the permits and secure environmental compliance related to capture before 2012 (in fact none of the projects were planning to file permit applications before 2011);
- None of the projects was planning to obtain the permits and secure environmental compliance related to transport before mid-2011;
- None of the sample projects was planning to obtain permits for storage before 2013¹⁰⁶.

Regulatory uncertainties, in particular around the future requirements and allocation of liability to be defined in national regulation on storage, and the risk of delays or failure to obtain permits and authorisations for the different components of the CCS chain were identified by beneficiaries' risk management plans as significant risks. For some projects, this risk was compounded by potential issues resulting from lack of public acceptance, especially concerning transport and storage.

Concerning the adoption of the final investment decision (FID), two sample projects foresaw to take the FID by the end of 2010 and early 2011 respectively, while for the third project, the process of adopting the FID would only start when the technology development phase (pilot) and indeed the EEPR action has come to a close in 2012. In all three cases the obtaining of the storage permits was indicated as being a condition for the adoption of the FID. This threw uncertainty over the possibility to adopt the FID by end of 2010 or early 2011 as foreseen by two projects, since the deadline for transposing the EU Directive on storage into national legislation was in June 2011 and that most Member States have not transposed the Directive more rapidly than foreseen by the Directive.

In addition to the securing of permits, the technical validation and accurate cost estimation of the CCS value chain, as well as the securing of financing for the full investment are needed before a decision on adopting the FID can be made.

Concerning the soundness of the financial package for the full investment stage, the financial packages were regarded as overall sound for sample projects as for all selected projects. However, the analysis of the sample projects shows that significant uncertainty was factored in as most projects foresaw that NER300 funds would complete the financing, whereas, on the one hand, obtaining NER300 funding was subject to a separate call for proposals and, on the other hand, the levels of financing to be made available by NER300 were not fixed as they were dependent on carbon prices. In addition, the uncertainties around the economic and commercial perspectives, which are largely dependent on the price of carbon within the Emission Trading Scheme, were identified as risks not only for CCS technology overall, but for the EEPR-funded demonstration projects themselves. The sample analysis shows that only one project had planned to take the final investment decision before the end of 2010.

Beneficiaries' risk management plans also identified financial uncertainties resulting from the difficulties of drawing up accurate estimates at an early stage of implementation: one beneficiary explained that due to (amongst others) technological and market uncertainties, it was at that stage only

106 The deadline to transpose the EU storage directive into national legislation was 25th June 2011.

possible to give cost figures for the investment expenditures for the capture unit with an accuracy of 15%, which involved significant financial uncertainties for the project.

Finding 56

None of the projects had reached investment level at the time of the application. CCS projects were at an early stage of development at the time of signature of the grant agreements, not only from a technical perspective, but also with respect to permitting and financing aspects. Completing FEED studies, achieving administrative/permitting maturity and adopting the final investment decision were key milestones along the path to project implementation, or indeed in certain cases, the intended outcome of the EEPR-funded actions.

The early stage of development, combined with the first-of-a-kind nature of CCS projects implied potential risks for the timely implementation of the projects but also, potentially, for the ability of these demonstration projects to go ahead.

Despite being at an early stage of development as described above, the level of expenditure and commitments foreseen in the grant agreements of sample projects was significant. A majority of these costs were to be used to cover expenditure or commitments related to capture (for technical development/engineering and for the procurement of equipment and construction), and to storage (mostly for storage site characterisation). Most of the planned costs were meant to cover technological development and procurement activities, which in a majority of cases preceded the securing of permits (except for one project for which additional exploration permits needed to be secured before some of the storage assessment activities could go on).

For two out of three sample projects, it was foreseen that significant expenditures and/or commitments could be incurred by the end of 2010 while the Final Investment Decision (FID) would be taken later; while the third project planned to take the FID before the end of 2010, concomitantly to the commitment toward major contracts.

Finding 57:

Despite being in the early stage of development, projects foresaw that they would be able to incur significant expenditures on technological development and procurement activities before securing permits and full project financing.

5.3.2.3 BUDGETARY EXECUTION/CONSUMPTION OF EEPR FUNDS

The level of expenditure and commitments foreseen in the grant agreements of sample projects was significant. Altogether the three sample projects pledged to incur at least €550m of direct costs or legally-binding commitments by the end of 2010. This corresponds to more than 60% of the total action costs of these three projects taken together.

However, as far as the sample projects are concerned, the amount of expenditure and legally-binding commitments that were actually incurred by the end of 2010 was lower than foreseen even though the difference is mainly accounted for by one project.

The table below shows the share of the total action costs spent or committed by sample projects by the end of 2010 according to their financial and activity reports, in comparison to what was foreseen in the grant agreements.

Table 6: Expenditures and commitments incurred by sample projects by the end of 2010

	Expenditure foreseen (% of total action costs)	Costs actually incurred (% of total action costs)	Expenditure and commitments foreseen (% of total action costs)	Expenditure and commitments actually incurred (% of total action costs)
Sample project 1 ¹⁰⁷	47.4%	12.3%	Most of the costs for supplies and equipment to be compromised before the end of 2010.	59.2%
Sample project 2	Not specified	4.2%	39.2%	52.4%
Sample project 3	10.0%	4.4%	84.0%	5.1%

Source: Deloitte based on European Commission data

€57.7m were actually paid for by beneficiaries by the end of 2010, which is low compared to the total costs foreseen for these actions: it corresponds to 6.03% of the total eligible costs. However these low levels could be explained by the fact that payments for long-term contracts are to be made at the end of these contracts.

As for legally-binding commitments sub-contracted by beneficiaries, they are substantial for two projects as they exceeded 50% of their eligible costs. The third project faced delays in taking the FID and therefore had to postpone the signing of major contracts, which were planned to be signed by the end of 2010.

Finding 58

While the amount of expenditure actually paid for by beneficiaries is low compared to the total costs foreseen by EEP actions (around 6% of the total eligible costs), the value of the commitments sub-contracted by beneficiaries was substantial for two projects, while being very limited for one project of our sample, which largely accounts for the difference between planned and actual values.

5.3.3 Extent to which the programme objectives are being met

5.3.3.1 PROGRESS TO DATE IN THE IMPLEMENTATION/DELIVERY OF PROJECTS' EXPECTED OUTPUT

For the programme objectives to be met, the implementation of the projects needs to be on track. The web-based survey results have shown that a majority of projects (four out of six) were experiencing delays concerning their overall completion status. More specifically, as of May 2011

- All but one project were facing delays with the securing of administrative compliance and/or permits;
- Only one project had secured full financing, and none of the projects had adopted a FID;
- Most projects were on track and on schedule with regards to the definition of technical and technological options.

107 For this project the financial reporting period ended in July 2010.

Stakeholders' feedback as well as desk research on the project sample has confirmed that the securing of financing and of the FID on the one hand, and permitting on the other hand are the main challenges to the implementation of CCS projects supported by the EEPR.

Below we look in greater detail into the progress of CCS projects in comparison to their original schedule, with regards to their key components: capture, storage, transport, knowledge dissemination and public information campaigns, permitting, and financing, including the adoption of Final Investment Decisions (FID).

1. Progress with regards to capture

Significant progress has been made by CCS projects with regards to the capture component. As of April 2011 when the second EEPR implementation report was published:

- for most of the CCS projects (Belchatow, Jämschalde, Rotterdam and Hatfield), one or several Front End Engineering Designs (FEED) had been completed or was close to completion concerning the capture unit;
- for half of the projects a contractor had been chosen to build the capture unit, while in Compostilla and Porto Tolle the construction of pilot capture plants was either on-going or indeed completed.

As for the sample projects, they are overall on-track, or facing minor delays which are not expected to affect the overall project schedule with regards to technological development, selection of contractors and filing of permit applications.

One significant delay concerns the signing of the contract with the selected providers, which has been postponed as beneficiaries were not yet in a position to adopt the FID. To some extent the beneficiary was able to work around it by making use of a smaller engineering contract in order to proceed with the value engineering and detailed engineering before the larger engineering procurement and construction contract could be signed.

Finding 59

Overall good progress has been achieved with regards to capture as most projects have moved forward with the engineering works and the selection of contractors.

2. Progress with regards to storage

The second EEPR implementation report shows that, overall, significant progress has been made towards the characterisation of storage sites and, for several projects, towards the decision on the selection of the storage site. However, the report also underlines that some delays occurred, in part because of legal uncertainties concerning the details of CO₂ storage regulation resulting from the transposition of the CCS Directive into national legislation. This analysis is confirmed by the project sample as two out of three projects have encountered major delays due to the non-transposition of the storage directive (compounded, in one case by lack of public acceptance toward on-shore storage):

- For one project, the appraisal of two storage sites is delayed by at least one year due to the non-transposition of the EU Directive on Storage (which has put a hold on local approval processes for exploration/operation) and issues around public acceptance. This delay is expected to affect the overall project schedule and the adoption of the FID, as the beneficiary considers the securing of the storage permits as a pre-condition for taking the FID.

- For another project, the uncertainty over the provisions of the upcoming transposition of the Storage Directive into national legislation¹⁰⁸, as well as difficult commercial negotiations have led to delays in the final selection of the storage site and in the awarding of contract to the operator. This is one of the reasons that led to postpone the adoption of the FID by one year, and thereby to a delay of almost a year in the awarding of major contracts. As of June 2011, the issue was expected to be close to a resolution as a commercial agreement was in sight and the permit application was almost ready for submission. Beneficiaries hope that the storage permit could be granted before the end of 2011 aiming for FID by the end of 2011 or early 2012.

As of early June, the EU Directive on storage had been transposed in Spain and its transposition into national legislation was about to be adopted in the Netherlands. The European Commission will review the transposition in 2012.

3. Progress with regards to transport

Not all the CCS projects included the transport component within the scope of the EEPR-funded action, and only two of them included the actual construction of the pipeline. For the concerned projects, while some progress were made with regards to preliminary technical work (concept study, routing studies), the detailed engineering and the construction phase are subject to delays that are logical results of the delay in the selection of the storage site. For one sample project the delay is estimated to one and a half year.

Finding 60

Activities related to storage and transport have been subject to delays, due to the non-transposition of the EU Storage Directive and, in some cases, to public opposition.

4. Progress with regards to dissemination and public acceptance

The three sample projects have proven quite pro-active in setting up communication campaign toward the general public (including by offering guided tours of the power plants and setting up visitors' centres) and toward concerned stakeholders, including public authorities and potentially affected residents.

In addition, beneficiaries have taken part in a number of knowledge-sharing and dissemination events, including events organised by the CCS demonstration network, the Zero Emission Platform as well as other international events. Regular workshops were held by the CCS demonstration network and several reports were produced. An advisory body of European stakeholders has also been established to review progress and specify the knowledge that can most usefully be generated by the CCS Project Network.

Finding 61

The EEPR projects have been pro-active in setting up public information campaigns and in taking part in knowledge-dissemination events, in particular within the CCS demonstration network.

¹⁰⁸ In particular concerning the long-term liability of the operator.

5. Progress with regards to permitting

Permitting, and in particular permitting for storage has been a cause of significant delays in two out of three sample projects. This is mainly due to the late transposition of the Directive on storage, but also to some other changes in the regulatory regime affecting all permits as far as one sample project is concerned.

Besides, appeals against permits granted to the base power plants were a potential issue for the CCS projects in Rotterdam and in Porto Tolle. While a key European Court of Justice ruling of 26 May 2011 was a step which made it more certain that E.On's Maasvlakte power plant in Rotterdam could continue construction, the May 2011 ruling of the Italian Council of State against Enel's power plant in Porto Tolle has temporarily stopped the construction of the power plant altogether, hence preventing Enel from progressing quickly with its post-combustion demonstration project in Porto Tolle.

6. Progress with regards to securing financing and adoption of final investment decisions

As of May 2011, only one beneficiary reported to have completed the financing of its project, although this remained conditional to its own final investment decision, which still hangs in the balance. All the other projects were in the process of applying to the NER 300 funding programme to complete their financing. To some extent this was foreseeable as the FID cannot be adopted before the following conditions are met:

- The technical validation and accurate cost estimation of the CCS value chain;
- The securing of all the permits;
- The securing of external financing.

Stakeholder feedback has shown that completing the above sequence will not necessarily be a sufficient condition for the utilities to adopt a final investment decision on CCS demonstration projects. The strategic decision by utilities to invest in costly demonstration project depends on the economic prospects created by, one the one hand, the future price of CO₂ under the ETS and, on the other hand, the operating costs of CCS. Based on these two prospects and on the current levels of public financing, it is not yet clear till now whether the business case has been established as being robust enough to support the adoption of investment decisions.

Delay in adopting the FID and securing financing have not necessarily led to delay in the implementation of the projects yet, as beneficiaries had foreseen to undertake part of the EEPR-funded action before and independently of the adoption of the FID and the securing of extra funding. However, as stressed by stakeholders, uncertainty over the FID and over project financing means that none of the beneficiaries have yet reached certainty that their project will go ahead in the short term.

Finding 62

Permitting and sometimes public acceptance issues (in particular concerning storage), as well as delays in the adoption of final investment decisions have been the main challenges to the implementation of CCS projects.

For these reasons, combined with the remaining uncertainty over project financing and over the economic prospects of operating CCS, many beneficiaries have not yet reached certainty that their project will go ahead in the short term. Nevertheless, the situation is evolving as ROAD for instance should soon decide on the final investment decision.

5.3.3.2 THE EEPR CONTRIBUTION TO ACCELERATING PROJECTS

Feedback from beneficiaries and stakeholders shows that the ambitious schedule imposed by the EEPR made it possible for beneficiaries to put pressure on all stakeholders involved in the implementation cycle, including authorities and suppliers. A very clear-cut example of the role played by the EEPR in accelerating administrative processes is the state aid assessment procedure that was carried out on the ROAD project. It contributed to speed up processes that would otherwise have taken longer with one notable exception, which is the clarification of legal provisions around CO₂ storage via the transposition of the Directive on storage: by the deadline only one Member State had fully transposed the Directive. The non-transposition affected the schedule of sample projects. In some cases, it had a negative effect on the local permitting process for site exploration and, in another case, it made the commercial negotiations with potential storage operators more difficult, due to the uncertainties around the costs and responsibilities of running the storage site for operators.

Overall, the survey has shown that:

- all beneficiaries agree (two in six) or tend to agree (four in six) that the EEPR has contributed to speeding up processes that would otherwise have taken longer regarding administrative processes and environmental compliance;
- in relation to legal aspects, four of six beneficiaries felt that the EEPR has contributed to speed up processes that would otherwise have taken longer and to secure the overcoming of obstacles.

In their responses to the survey, five out of six beneficiaries agreed or tended to agree that the EEPR contributed to speed up the overcoming of technical obstacles. Feedback from stakeholders confirms that without the EEPR the testing of the full chain of CCS at an industrial scale would not have happened as early as 2009-2010. As far as capture is concerned, the EEPR has been a leverage for beneficiaries to swiftly move forward with the procurement processes and with the engineering phase (Front End Engineering Design) preceding the awarding of turnkey contracts. It has also given beneficiaries a leverage to obtain interesting offers and guarantees from suppliers (such as guarantee on the level of the efficiency penalty on the operation of the power plant) as suppliers of capture solutions have a key strategic interest in getting credentials in full-scale demonstration projects. It is less clear that such effects have taken place with respects to storage and/or transport, partly because the uncertainty around the legal provisions and around social acceptance limited the opportunities to make swift progress.

Finding 63

Feedback from beneficiaries and stakeholders shows that the ambitious schedule imposed by the EEPR in terms of making commitments and payments by the end of 2010 made it possible for beneficiaries to put pressure on all stakeholders involved in the implementation cycle, including authorities and suppliers in relation to the capture component.

The contribution to accelerate project development and implementation is less clear for the transport and storage components partly because the uncertainty around the legal provisions and around social acceptance.

5.3.3.3 THE EEPR'S CONTRIBUTION TO MITIGATING FINANCIAL AND INNOVATION RISK

Consultation of stakeholders and beneficiaries has shown mixed results so far regarding the contribution of the EEPR to reduce risks associated to demonstration projects.

On the one hand it appears that the EEPR has been critical in supporting the take-off of these projects, which in a majority of cases would not have happened without the EEPR or would have faced major delays¹⁰⁹. Five survey respondents expected that activities financed by the EEPR were going to contribute to securing the realisation of the project altogether and to accelerate the timing of the project. However, on the other hand, the uncertainty over the adoption of final investment decisions in the short term remains. The web-based survey shows that half of the beneficiaries found that EEPR contributed to reduce the perceived risk of their project to a significant or a critical extent, while the other half found that it contributed to a moderate extent.

In terms of financial and economic prospects, the remaining uncertainty is partly accounted for by the staged approach whereby EEPR funding was handed over prior to the securing of other sources of public funding on which the overall projects and in some cases the EEPR actions themselves relied.

However stakeholder feedback and public positions expressed by the industry¹¹⁰ indicate that the public funding prospects foreseen by EEPR, when realised, might not be deemed sufficient to incentivise industry's investment in demonstration projects. Based on the current estimations of the costs of CCS (including CAPEX and OPEX)¹¹¹, one key stakeholder judged that utilities' contribution could not be higher than 25% of the overall investments required by an end-to-end demonstration. Other sources of feedback seemed to concur with this estimated range. On the other hand, the developments in the EU carbon market are not sending strong signals to investors as CO₂ prices have followed a downward trend since 2009, which is in part due to the economic recession.

Finding 64

Data and feedback collected suggest that EEPR has achieved mixed results with regards to reducing the risk associated with CCS demonstration projects and with securing project financing.

This is partly accounted for by the fact that additional public funding expected to complete the financing of the projects has not yet been secured.

109 Three survey respondents thought that without EEPR their project would not have happened or would have faced major delays.

110 See for example ZEP's statement in May 2011: www.zeroemissionsplatform.eu/downloads/793.html

111 At the current stage of development of CCS technologies, beneficiaries and stakeholders expect the operational costs of CCS to be significant. A great part of these costs are due to the efficiency penalty on electrical output that results from capture: it is expected that in 2020, capture will still cause a loss of efficiency in the range of 25% of the electrical output.

5.4 IMPACT

What are the short and medium term impacts of the programme? What is the impact in terms of direct and indirect job creation, increase in consumption and investments? What is the macroeconomic multiplier effect of the EEPR investment spending?

5.4.1 Introduction

The analysis of the impacts undertaken in this section needs to be regarded with caution given that at the cut-off date of this study in May 2011, the EEPR had been running for less than two years. The EEPR sample and case study projects involving carbon capture and storage are at different, and generally early, stages of implementation, and it is therefore difficult to assess the socio-economic impacts with any precision, especially as the socio-economic benefits of CCS technology, including to competitiveness, will take longer to reap and are currently difficult to quantify.

The information is based principally on information provided to the Commission at the proposal stage, as well as other qualitative information (such as beneficiaries' response to our web-based survey). The socio-economic data on expected impact provided with the proposals is of variable quality and not always sufficient to form a judgement, and sometimes appear to be projected at the high end of the potential.

A wide range of CCS technologies and projects has been supported by the EEPR. The projects examined in this study illustrate this diversity, and the likely diversity in socio-economic impacts. Looking across the different projects, it is apparent that a number of strategic, economic benefits were anticipated to follow from EEPR funding. These include: advantages of being at the frontier of the new technology (first-mover advantages), and the potential for such projects to abate the CO₂ emissions from the associated coal-fired power plants.

In terms of jobs created which can potentially be attributed to the EEPR funding, CCS has generated about 1200 direct and indirect jobs. This is not surprising taking together the size of this sub-programme and the level of implementation of its projects. Around 84% of jobs created in the CCS projects are managerial/technical jobs, which is broadly consistent with the stage of development for the different projects, and the underlying nature of the projects.

Finally, in terms of the main location of suppliers and contractors, for 50% of CCS projects the main suppliers have been based in the same member state as the project, while for the remaining 50% of projects the main location was in another member state.

5.4.2 The broader socio-economic benefits

As with OWE, the socio-economic impact of the project was not a direct evaluation criterion for funding. However, the grant agreements examined the expected strategic impacts associated with each project, and in some cases included a consideration of various socio-economic criteria, including job creation. Accordingly, the discussion of sample projects and case studies in this section relies heavily on information and data contained in the grant agreements and in the evaluation of those proposals.

A number of expected strategic, economic impacts are expected to be associated with the CCS projects. Generally speaking, these include the advantages of being at the frontier of the new technology (first-mover advantages), and the potential for such projects to abate the CO₂ emissions

from the associated coal-fired power plants. In addition, some project proposers emphasised the difference in the technology associated with their projects as compared with other options. Other proposals focussed on broader economic impacts of the project, particularly in terms of the ‘know-how’ that would be developed in the execution of the project and that this would offer the potential for commercialisation of this knowledge to new markets, particularly in growing economies such as China.

In terms of the impact on economic recovery, one proposal noted that the project was expected to generate at least four types of positive impacts; (i) it would maintain jobs in the local coal mining facility; (ii) it would provide an economic boost for the region; (iii) the equipment and plant materials would largely be sourced from European companies; and (iv) there would potentially be high export potential for the technology to other parts of the world. Moreover, as the major investments and costs would occur in 2009 and 2010, and it was noted that the project would contribute to the economic recovery.

Particular emphasis was placed on the ability of some projects to generate employment, and although no specific projections were provided, in some cases, the promoters of the project drew comparisons with the employment impacts of other CCS projects. In this respect, it was expected that new employment would be generated across the CCS production chain, and that suppliers from different member states would be involved and would therefore benefit from the EEPR funding. Further, it was expected that for some projects the nature of a number of these jobs would be in highly skilled engineering areas.

Finding 65:

The expected socio-economic impacts associated with the CCS projects are in general terms associated with the potential long-term benefits of CCS, particularly in terms of opportunities to export the technology. Moreover, the development of CCS technology was cast in some proposals as an important aspect of ensuring that the European coal sector remains viable, while one proposal referred to the contribution to the competitiveness of Europe by allowing it to capitalise on the advances in CCS.

In terms of the financial prospects, it was acknowledged by the project proposers, that as expected with any demonstration initiative, the net present value (NPV) of the project would be negative over the life-time of the project. Nevertheless, it was suggested by the project promoters that there were various strategic arguments for the project which justified the financial support.

Finding 66:

The negative NPV of projects we examined confirms that due to their demonstration nature, CCS projects are not considered to be commercially viable and are reliant on public support (including the EEPR) for funding.

5.4.3 *The employment impacts*

This section reviews the results of the survey sent to respondents relevant to the assessment of the socio-economic impacts of these CCS projects. Perhaps more so than with the other EEPR sub-programmes, it is particularly important when reviewing the results presented below to bear in mind that the data may not be directly comparable given the significant variation in the types of project being funded.

All six respondents provided employment estimates in relation to the EEPR project funding – both direct, indirect and economy-wide – associated with each of the CCS EEPR funded projects to date. The main points from these responses are as follows:

- An estimated 411 direct FTE jobs are estimated to have been created or retained as a result of the EEPR projects in CCS, and roughly two-thirds of these jobs have been permanent. There is, however, considerable variation in the number of direct jobs created across the different projects examined with the bulk of direct employment being associated with one project.
- There appears to have been a considerable impact in terms of creation of indirect employment. Specifically, it is estimated that some 778 indirect jobs have been created across the supply chain of these projects, with only 1 additional indirect job having been created in the economy as a whole (outside the projects’ supply chain). Caution should be exercised when reviewing these estimates, as once again the majority of this indirect employment has been associated with one project.
- The majority of jobs created (84%) to date across the projects have been in managerial/technical activities with a small minority of jobs (14%) being administrative or technical in nature.
- Finally, in terms of the main location of suppliers and contractors, for half of CCS projects the main suppliers have been based in the same member state as the project, while for the other half the main location was in another member state.

Finding 67:

An analysis of responses to the web-based survey shows that around 1,100 jobs have been created to date (both direct and indirect) across the different CCS projects. The great majority of these jobs have been in management and technical tasks, and the location of the jobs have been roughly evenly split between the Member State in which the project is being undertaken and another Member State.

On the basis of the available data, we have estimated the implied employment multiplier effect associated with the EEPR funding, both in terms of indirect jobs and in terms of induced effects across the whole economy. The table below shows that for five projects it is possible to estimate the implied indirect employment multiplier, and for one project the induced economy-wide employment multiplier. This analysis suggests that, across the projects for which we have data, an average implied indirect multiplier effect of 2.9. This suggests that for every ten direct jobs created, another 19 indirect jobs have been created. However, it is important to note that these estimates are largely derived from two projects in the sample, which have a high-implied indirect employment multiplier of 3.6 and 3.0 respectively.

Table 6: CCS demonstration projects – Implied employment multiplier

	Direct	Indirect - Suppliers	Indirect - Economy wide	Total	Implied indirect multiplier	Implied induced multiplier
CCS	411	778	1	1190	2.9	2.9

Source: web-based survey

Finding 68:

The estimated implied multiplier associated with this employment is 1.9 indirect jobs for every direct job.

The table below builds upon this analysis to compare the direct and indirect jobs created as a function of the *actual* budget consumption, that is the employment created as a proportion of the budget consumed to date for a sample of *selected* EEPR CCS projects. As already noted, this analysis is seen as insightful insofar as one of the objectives of the EEPR programme was to provide an immediate and substantial employment stimulus to the economies, or put slightly differently, it was intended to provide substantial sums of money that could be absorbed and spent relatively quickly.

However, as already noted, the estimates presented are only indicative and should be treated with considerable caution on the basis that they only reflect the analysis of three CCS projects for which we have necessary data, and each project is obviously at a different stage of the development cycle (and therefore have different levels of costs and employment associated with them). Moreover, the estimates do not take account of the ‘leverage effect’ whereby firms place orders, or hire staff, on the expectation that funding will be forthcoming to cover those future outgoings/commitments.

Having regard to these points, the analysis suggests that, across the three projects examined, an average of 21.11 FTE jobs (both directly and indirectly) have been created per €1 million of budget consumed. This high estimate should be treated with caution as it reflects the relatively high level of employment associated with one project (accounting for 80% of the employment). It follows that the estimates may not be representative of all of the EEPR CCS projects.

Table 7: CCS demonstration projects – Employment per €1 million as per costs incurred

	Direct FTE (per € million)	Indirect FTE - Suppliers (per € million)	Indirect - FTE Economy wide (per € million)	Total (per € million)
CCS	7.18	13.93	0.00	21.11

Source: web-based survey

Finding 69:

In terms of jobs created as a proportion of the EEPR budget consumed to date, the analysis of a sample of three CCS projects suggests that approximately 21.1 jobs have been created per €1 million of the project budget consumed (although this number reflects the relatively high level of employment associated with one particular project).

5.5 UTILITY

To what extent is the EEPR contributing to achieving the EU energy policy objectives of security of supply, decarbonisation, competitiveness, completion of the energy single market, functioning of the energy markets?

5.5.1 Introduction

In terms of utility, CCS projects mainly aimed to contribute to Europe's decarbonisation and to long term competitiveness in the low-carbon energy sector via their expected role in the demonstration of CCS technologies. The projects selected under the CCS sub-programme have demonstrated a very good potential to contribute to the demonstration and replication of CCS technologies and the EEPR, and in particular the EEPR could contribute to the industrial validation of techniques already developed at pilot scale.

It is in essence arduous to evaluate the utility of a programme at mid-term and indeed to assess the actual contribution of EEPR toward the validation and demonstration of CCS technologies as of mid-2011, while the demonstration projects were intended to be operational in 2015. It nonetheless appears that due to the delays and uncertainties described in the effectiveness section of this report, the pace at which the demonstration process is unfolding is slower than had been hoped, in comparison to the assumption that selected projects could make major progress in 2009-2010. Current delays and remaining uncertainties in reaching the conditions to enter the full investment phase might hinder the ability of projects to be operational by 2015 and therefore the contribution of EEPR to keep track of the timeline envisaged for the development of cost-competitive second-generation technologies.

5.5.2 Extent to which EEPR contributes to immediate reduction in GHG emissions and to long-term decarbonisation

Most of the projects funded by the CCS sub-programme will directly result in significant reductions in CO₂ emissions from the power plants they cover. With a capture rate of 90% and a CO₂ stream of about 47 kg/s, the CCS demonstration project in Rotterdam is expected to capture and store about 5.5 million tons of CO₂ during the first five year of operation (1.1 million tons per year). This is not negligible in comparison to the 28 million tons of CO₂ emitted in Rotterdam every year. However this is less than one fifth of the emissions that are expected from the Maasvlakte plant (currently in construction) on which CCS will be applied.

As for the two other sample projects, they are expected to reduce emissions by levels similar to the Rotterdam project, or indeed higher levels: with its two capture units (one post-combustion unit and one oxyfuel unit), the Jämschalde demonstration project should allow the capture and storage of 1.7m tones of CO₂ per year (or 8.5 tons for the first five years of operation), and the Compostilla oxyfuel demonstration plant should capture about five millions tones of CO₂ during the first five years.

According to the web-based survey, five out of six projects expected that their contribution to reducing or avoiding CO₂ emission will be significant.

Finding 70

Beneficiaries expect that their projects will significantly contribute to avoiding CO₂ emissions. The main contribution of the EEPR programme in this respect comes from its expected role in demonstrating CCS technologies.

Below we look into the potential contribution of the EEPR-funded projects toward the demonstration and validation of CCS technologies. In order to assess the contribution of EEPR-funded projects to demonstrating large-scale CCS technologies, we looked at the (perceived) technical adequacy and complexity of the proposed projects and their replication potential. We also asked stakeholders about the added value of the progress already achieved.

Stakeholders were unanimous on the quality of the technical proposals put forward by the selected projects. Based on projects' evaluation and on stakeholders' feedback, it appears that

- the demonstration is based on state-of-art power plants¹¹²;
- the degree of complexity and innovation of individual projects is regarded as very high;
- the combination of projects covers the most promising capture technologies¹¹³ in the power sector;
- the combination of projects covers several types of storage sites¹¹⁴, which is particularly important in view of the uncertainty around the upcoming regulatory framework on onshore storage in several Member States;
- the replication potential of projects is regarded as significant by stakeholders and by beneficiaries¹¹⁵.

The sample of projects illustrates some of the benefits of testing different capture technologies, as different techniques are associated with different advantages. Post-combustion via chemical scrubbing is considered by some as the most developed and therefore the less risky, as well as the least expensive technology. It is also by definition the only possible technique that can be retrofitted onto existing plants or plants under construction. On the other hand oxyfuel when applied to newly built plants could offer high efficiency rates and superior capture rates compared to other options. It also has the advantage of being flexible to accommodate a range of different fuels, including domestic coals, as well as imported fuels (coals, pet coke), and biomass.

In terms of replication potential, the sample analysis shows some immediate applications that could possibly result from the projects, such as further retrofitting of additional plants operated by recipients of EEPR funds and the potential use of the CO₂ transport pipeline to be built in Rotterdam by other CO₂ emitters. The pipeline would be the basis of a "CO₂ hub", which, according to the vision of the Rotterdam Climate Initiative could serve several other CO₂ emitters in the Rotterdam region and could stretch toward Germany and Belgium. A similar multi-user scheme is foreseen by the Don Valley project.

112 As one of the main hurdles associated with CCS at this stage is the efficiency penalty caused by CO₂ capture, it is important to base the demonstration on highly efficient power plants.

113 Pre-combustion in Hatfield, oxyfuel and post-combustion in Jänschwalde, post-combustion in Rotterdam, Belchatow and Porto-Tolle, oxyfuel in Compostilla.

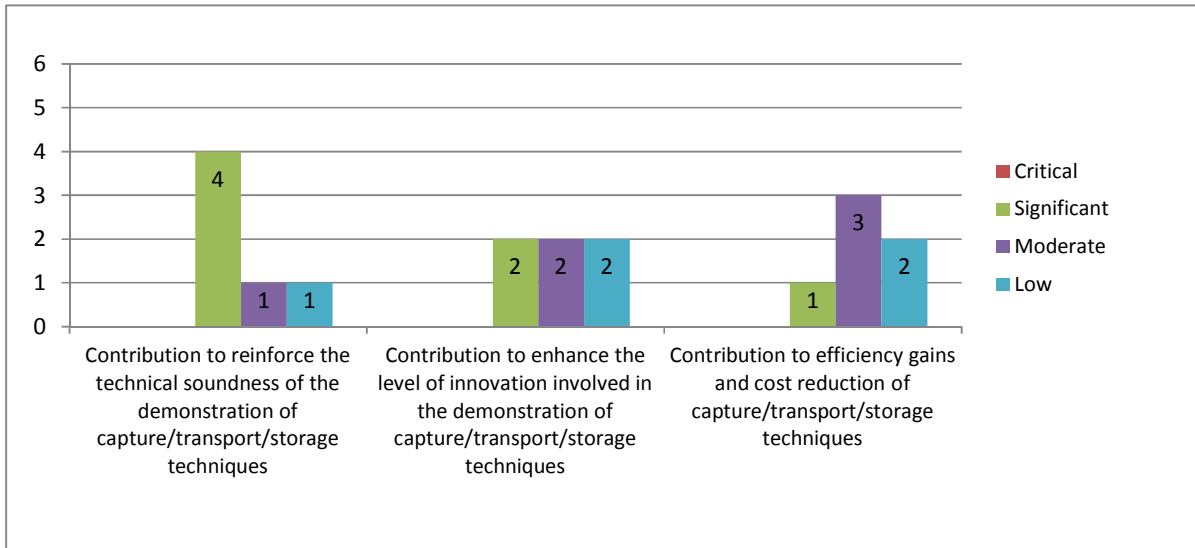
114 Storage in offshore saline aquifers (Porto Tolle and Hatfield), in offshore hydrocarbon fields (Rotterdam, Jänschwalde), and in onshore saline aquifers (Compostilla, Belchatow and Jänschwalde).

115 Five in six survey respondents rated the replication capability as "significant".

As explained above, the overall projects supported by the EEPR demonstrate a very good potential toward the demonstration and replication of CCS technologies. We shall look at how the specific actions covered by EEPR funding are expected to contribute to these priorities and whether tangible results have already derived from the technical works carried out so far.

The table below illustrates the responses to the survey about the type of contribution that beneficiaries expect from their action.

Table 8: Expected contribution of EEPR-funded actions to the demonstration of CCS technologies according to beneficiaries



Source: web-based survey

These responses, combined with separate feedback from stakeholders, show that the main *expected* contribution from EEPR-funded action is the technical validation of techniques already developed at a smaller scale (as opposed to the enhancement of innovation levels), at least as far as capture is concerned. Such validation corresponds to what suppliers of capture equipment actually need to start and develop second generation of cheaper capture technologies. The direct contribution of EEPR actions to achieving efficiency gains and cost reductions is expected to be low.

Finding 71

The projects supported by the EEPR have demonstrated a very good potential for the demonstration and replication of CCS technologies. As part of these projects, the activities covered by the EEPR mainly aim to validate techniques that have already been developed and, to a lesser extent to enhance the level of innovation and contribute to efficiency gains of CCS techniques.

Concerning the actual progress and perspective to date and the objective to make substantial progress in 2009-2010, feedback from some stakeholders indicated that the pace at which the demonstration process is unfolding has been slower than hoped.

Back in 2009, the ZEP platform had foreseen that in order to “facilitate the start of operation of the CCS demonstration plants in 2015 the investment decisions [had] to be taken sufficiently in advance, for instance by end of 2011”¹¹⁶.

Finding 72

The pace at which projects are contributing to the demonstration process has been slower than hoped. Current delays and remaining uncertainties in reaching the conditions to enter the full investment phase might hinder the ability of projects to be operational by 2015 and therefore the contribution of EEPR to keep track of the timeline envisaged for the development of cost-competitive second-generation technologies.

Concerning the (potential) dissemination of knowledge gained through EEPR projects to contribute to the SET-Plan objectives, the industry has demonstrated its willingness to share knowledge gained through EEPR projects and to cooperate and exchange on a variety of issues (including technical issues such as available results on amine use, as well as more strategic questions such as the communication strategies to enhance public acceptance, and permitting issues). The CCS Project Network established by the Commission has been the first European platform established for this purpose. Whilst the detailed sharing of knowledge is unlikely to cover the development of technical solutions (often protected by intellectual property and thus retained by the suppliers and sub-contractors), it could lead to meaningful exchange of performance data once the projects are further advanced in the testing and validation of these solutions. The Commission has reported satisfaction from beneficiaries as to the usefulness of the CCS Project Network to exchange best practices for overcoming crucial non-technical challenges and those associated with long-term CO₂ transport and storage.

Finding 73

The CCS project network has been useful to beneficiaries to exchange best practices for overcoming non-technical challenges including permitting and public acceptance issues, and those associated with long-term CO₂ transport and storage. Whilst the detailed sharing of knowledge is unlikely to cover the development of technical solutions (often protected by intellectual property and thus retained by the suppliers and sub-contractors), it could lead to meaningful exchange of performance data once the projects are further advanced.

116 ZEP Position Paper ‘Comitology Process’ - version 10, 30th March 2009: <http://www.zero-emissionplatform.eu/website/docs/ETP%20ZEP/ZEP%20Position%20Paper%20Comitology.pdf>

5.5.3 Extent to which the EEPR contributes to Europe's competitiveness, including through investments in the right skills and technologies in order to take advantage of the economic opportunities

Half of the beneficiaries expected their project's contribution to long-term competitiveness to be significant, while the other half thought it would be moderate or low.

According to the Commission's Roadmap for moving to a Low Carbon Economy in 2050¹¹⁷, the deployment of CCS could be one of the cost-competitive way to meet the EU long-term objective of reducing its emissions by 80-95% (from 1990 levels) by 2050 while continuing to use fossil fuels.

The potential contribution of the EEPR to long-term competitiveness depends on two elements. Firstly, it depends on the ability of the EEPR to contribute to the demonstration of CCS technologies and to the subsequent development of cheaper technologies. Secondly it depends on its ability to do so before it is done in other parts of the world so as to keep the EU's first mover advantage on CCS and to create opportunities to export new technologies, in particular to Asia, which, according to stakeholders' feedback, concentrates the greatest market opportunities.

While the industry and the stakeholders involved believe that CCS has the potential to be cost-competitive after 2020, as recently reiterated in the Costs of CCS report by the Zero Emission Platform¹¹⁸, the contribution of the EEPR programme to this objective has been limited so far. This is partly due to the early stage of implementation, and partly due to the pace of progress of CCS projects supported by EEPR. On the other hand, stakeholders stressed that other countries, including China, are moving on with the development of fully-fledged demonstration projects, and could offer a more supportive environment for suppliers to further develop CCS technologies. Stakeholders stressed that the European players must swiftly take the necessary steps to complete the regulatory framework and fill the financing gap, in order to reap the benefits of its first mover position. As the Zero Emission platform put it in a press release concerning the NER 300 support to CCS, "while the EU was indisputably first out of the gate in launching a CCS demonstration programme of substantial size and importance, it will only be able to ensure it crosses the finish line if appropriate CCS legislation is in place, funding is delivered and international cooperation is fully engrained in the development of CCS in Europe"¹¹⁹. The EEPR has provided the funding for some CCS projects and the basis for cooperation between them.

¹¹⁷ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *A Roadmap for moving to a competitive low carbon economy in 2050*, COM(2011) 112 final

¹¹⁸ The Costs of CO₂ capture, transport and storage, Post-demonstration CCS in the EU (<http://www.zeroemissionsplatform.eu/library/publication/165-zep-cost-report-summary.html>)

¹¹⁹ www.zeroemissionsplatform.eu/downloads/793.html

Finding 74

As in the case of its contribution to decarbonisation, the contribution of the EEPR to Europe's competitiveness depends on its ability to support the demonstration of CCS technologies.

While the EU was the first to adopt a regulatory framework and a demonstration programme for CCS in 2008-2009, stakeholders stressed that European players must swiftly take the necessary steps to complete the regulatory framework and fill the financing gap in order to reap the benefits of this first mover position.

5.6 CONCLUSIONS

- The CCS sub-programme was relevant to contributing to the decarbonisation of the energy sector and the development of a low-carbon economy, which are priorities of Europe's energy and economic policies. According to stakeholders the CCS sub-programme may not have been as relevant to the objective of providing an immediate economic stimulus and fostering economic recovery compared to the decarbonisation objective.
- The levels of funding mobilised for CCS via the EEPR were unprecedented and relevant to the financing needs, notably those identified in the SET-Plan. Although they were never intended to cover the full project costs, it was expected that they would leverage additional funding and thus trigger a final investment decision if all non-financial obstacles were to have been overcome. This has not yet been the case.
- The projects supported by the EEPR have demonstrated very good potential for the demonstration and replication of CCS technologies, and in particular with regard to the industrial validation of techniques that have already been developed on a pilot scale.
- The EEPR has contributed to accelerating the launch and early development phase of CCS demonstration projects. The projects have achieved good progress on capture but have yet to make as much headway in relation to transport and storage.
- Via the CCS Project Network, the European Commission has made CCS the leader in sharing knowledge and best practices arising from EEPR projects. This network has established a programme of disseminating progress and results from all large-scale CCS demonstration projects in Europe.
- Out of the sample, the amounts of expenditure actually incurred and the values of contracts signed with suppliers have been substantial for at least two projects but very low for at least one.
- The implementation of CCS projects has been subject to delays that are largely inherent to lack of maturity of the CCS sector. In particular, the regulatory uncertainties that remain until the CCS Directive is transposed into national legislation have caused delays in project implementation.
- After its first two years, the EEPR has so far achieved mixed results with regards to decreasing the perceived risks of investing in end-to-end demonstration projects. As a result of regulatory, financial and economic uncertainties related to CCS cost performance and the current ETS price, as of the time of study – May 2011 – no project was in a position to take a final investment decision in the then foreseeable future; however, there have been advances since then; One consequence is that the contribution to the demonstration of CCS technologies by 2015 is slower than had been hoped for.

- The socio-economic benefits of job creation will only be reaped in the longer term for CCS. In terms of jobs created so far it is estimated that CCS projects have accounted for about 1200 jobs. The great majority of these jobs have been in management and technical tasks, and the location of the jobs have been roughly evenly split between the Member State in which the project is being undertaken and another Member State.
- As a result of EEPR funding Europe remains one of the major players in CCS demonstration worldwide. However, if other regions are able to overcome the delays and obstacles they face more quickly than Europe, then Europe risks losing its opportunity to take advantage of this first mover position.

1. Annex 1: Our methodological approach
2. Annex 2: Documentation overview
3. Annex 3: Sample of electricity and gas projects

6.1 ANNEX 1: OUR METHODOLOGICAL APPROACH

In this annex, we explain the architecture of the programme and its intervention logic, our methodology and our work plan.

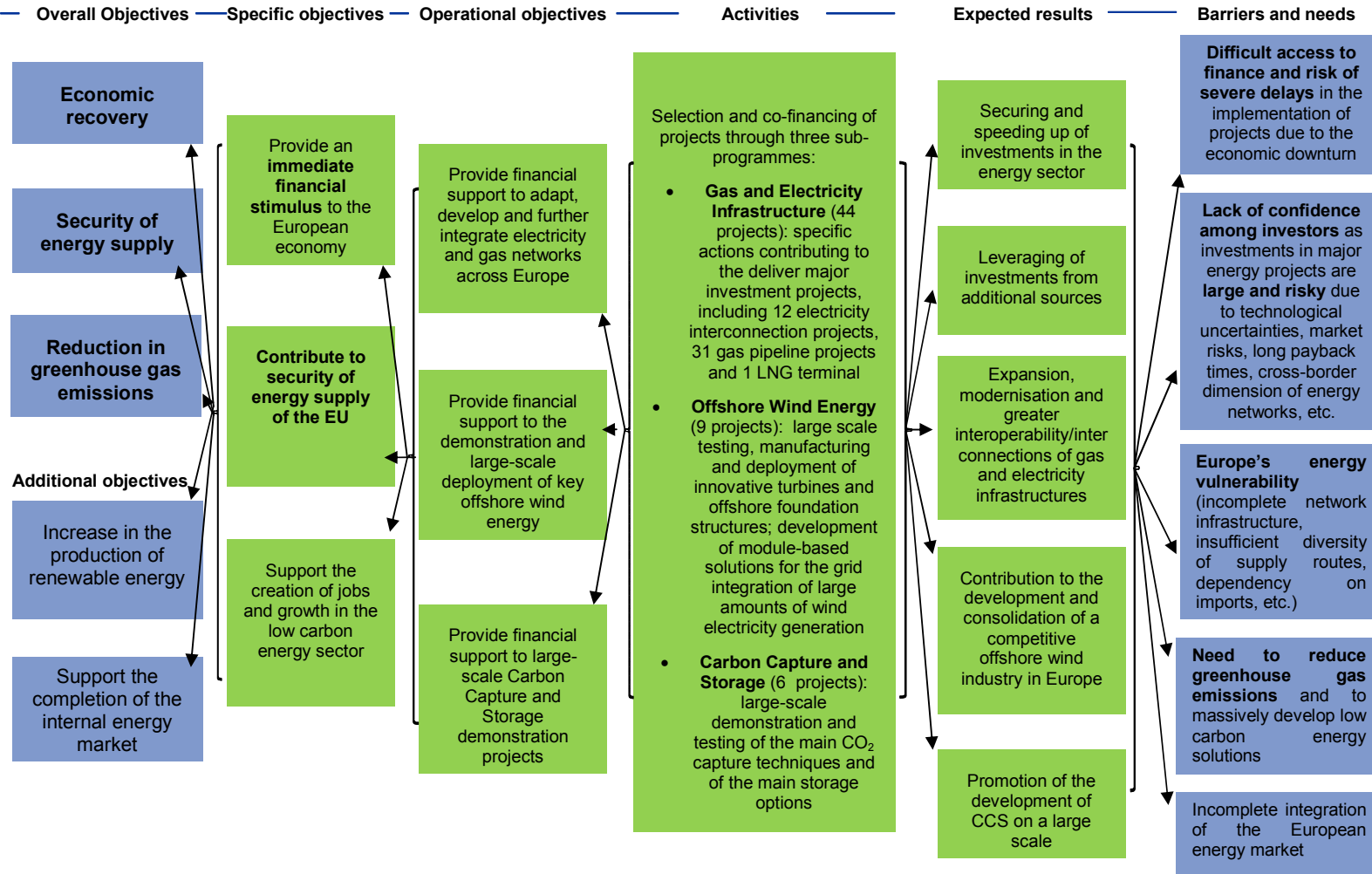
6.1.1 Intervention logic

We present in this section the intervention logic of the Programme. An intervention logic presents the rationale of the public intervention and the architecture of the programme, in this case the evaluated programme, i.e.:

1. To which policy objectives it should potentially contribute;
2. Consequently, what are its own objectives it aims to achieve in order to contribute to these strategic policy objectives;
3. The activities that the programme supports and finances to achieve its objectives;
4. The expected results of the programme's activities;
5. The problems, needs and barriers that the programme could overcome and or least contribute to overcome if it can achieve its results.

We performed analyses of relevant policy documents, namely the EEPER Regulation and other strategic EU documents, in order to map the intervention of the programme. We then conducted several interviews with DG ENER officials to *prevalidate* our understanding of the intervention logic.

Figure 18: Intervention logic of the programme



6.1.2 Analytical framework

Based on the evaluation questions from the Task specifications and on the intervention logic of the programme, we drafted the analytical framework of the evaluation. The analytical framework was the cornerstone of the evaluation as it presents all key information concerning the way we perform the evaluation.

The analytical framework maps the following elements by evaluation criterion:

- evaluation questions (and sub-questions when necessary) allowing a more focused approach to the evaluation criterion and main question/issue;
- judgment criteria that will allow us to formulate a judgment on the questions and issues;
- qualitative and quantitative key criteria/indicators that will be used to feed our judgment on the questions and issues;
- the method we propose to address the question/issue and collect the necessary information and the key sources of data and other input.

The use of a structured analytical framework has allowed the evaluation team to conduct robust, logical and solid evaluation work and to elaborate substantive conclusions based on the evaluation findings.

6.1.3 Work plan

This section briefly presents the work plan that we have applied for this evaluation.

We split the evaluation into three phases which are detailed in the following sub-sections:

- Phase 1: Preparation, Desk research, Structuring, and Inception;
- Phase 2: Data Gathering and Analysis;
- Phase 3: Judgement and Reporting.

6.1.3.1 PHASE 1 – PREPARATION, DESK RESEARCH, STRUCTURING AND INCEPTION

The first phase comprised seven steps and lasted one month.

Table 9: Phase 1 – Preparation, desk research, structuring and inception

PHASE 1
1.1. Kick Off Meeting
1.2. Commission Interviews
1.3. Preliminary desk research
1.4. Refine methodological approach (intervention logic, analytical framework)
1.5. Draft Inception Report

PHASE 1

1.6. Presentation of the Draft Inception Report to the Steering group

1.7. Inception Report (approved)

During this phase, the evaluation team met several DG ENER officials to deepen their understanding of the programme, its projects and overall rationale. These interviews were also an opportunity to complete our understanding and knowledge of the economic recovery and EU energy policies in order to draft the intervention logic of the programme and the analytical framework of the evaluation. In total, we met 11 officials.

Following the kick-off meeting and the initial interviews with the DG officials, we collected and *preanalysed* a first set of relevant documents, which has been enriched throughout the life of the project (cf. annex 2). We also collected valuable documents during our fieldwork in the different Member States or during interviews with stakeholders at EU level.

We collected some project files during the preliminary interviews in order to understand what kind of secondary information is available in the Commission's files and therefore what kind of primary data should be collected via interviews and surveys.

The preliminary interviews with the Commission officials and the initial desk research allowed us to further refine our methodology. We presented the work carried out during this first phase of the evaluation in the Inception report.

6.1.3.2 PHASE 2 – DATA GATHERING

The second phase of the project consisted of eight steps and its duration was 11 weeks from the inception report approval date.

Table 10: Phase 2 – Data gathering

PHASE 2

2.1. Desk research (project database, case studies, strategic papers...)

2.2. Web-based surveys to project promoters

2.3. Case studies preparation (interview guide, visits, travels...)

2.4. Interviews with EU stakeholders (DG ENER, ENV, CLIMATE, EIB...)

2.5. Fieldwork in 5 Member States - interviews/case studies

PHASE 2

2.6. Preliminary analysis of the first findings

2.7. Draft Progress Report

2.8. Progress Meeting

During phase 2 of the evaluation, we carried out extensive desk research. Desk research is used to gather secondary data for certain indicators where possible. For all information to be collected within the Commission, we asked for the necessary (strategic and operational) documents from the different Units as agreed during our preliminary interviews with DG ENER officials. We present in annex 2 the categories of strategic and operational documents we collected.

In order to extend the basis of our analyses to more than the case studies, interviews and surveys, we selected projects in each sub-programme to constitute a project sample. We selected 25 projects, including the six used for the case studies:

1. Electricity: three projects (and one case study – the Estlink 2 interconnector);
2. Gas: three gas interconnectors, one LNG terminal, one storage project, and five reverse or bi-directional flow projects (and three case studies – two reverse flow projects in Slovakia (one involving storage), and the Hungarian-Slovak interconnector);
3. Carbon Capture Storage: three projects, including one case study (the ROAD project in Rotterdam);
4. Off-shore wind: one power grid project, one offshore wind deployment centre, and three wind farm projects (including Borkum West II as a case study).

The full list is in annex 3.

We then asked the different Units to provide us with the relevant documents from their files related to these projects. We supplemented the case studies with 50 interviews (project coordinators, administrations and investors) in the Member States: Belgium, Estonia, Germany, the Netherlands and Slovakia.

We set up a web-based survey in English in order to collect primary data, views and opinions from the project promoters on the relevance, efficiency, effectiveness, utility and impact of the programme. Each sub-programme was covered by a specific survey with common and specific questions. The response rate of each survey was very good:

- At least one beneficiary answered for 27 of the 32 gas projects – a response rate of 84%. There were 30 respondents in all. Where there was more than one beneficiary per project, they did not necessarily hold identical views. This is logical as they are responsible for different parts of the project, and are often on different sides of a frontier, dealing with different administrative and regulatory authorities.
- For electricity infrastructure projects, 11 beneficiaries answered, covering 9 projects out of a total of 12 (75%).

- One beneficiary answered per project for the OWE projects.
- One beneficiary answered per project for the CCS projects.

At the end of this phase, the progress report provided the Commission with an update of the progress of the evaluation and the actions we had still to perform before finalising our analyses and produce the draft final report.

6.1.3.3 PHASE 3 – ANALYSIS, JUDGEMENT AND REPORTING

The analysis, judgement and reporting phase comprised five steps and its duration was 10 weeks from completion of the data gathering phase.

Table 11: Phase 3 – Analysis, judgement and reporting

PHASE 3
1.1. Final analysis of the findings
1.2. Writing draft final report
1.3. Steering group
1.4. Final Report writing
1.5. Final Report (approved)

With the comments received during the progress meeting and the full set of collected data, we were able to complete our preliminary analysis and to draw robust conclusions on the mid-term evaluation of the programme. We submitted the draft final report on 31 August and it was discussed with the Steering group on September 8.

We then fine-tuned the report in response to the comments of the Steering Group on the draft final Report.

6.2 ANNEX 2: DOCUMENTATION OVERVIEW

➤ EU Legislation, policy documents and studies

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- European Commission's Communication 'Second Strategic Energy Review, An EU energy security and solidarity action plan' – COM(2008) 781 final of 13 November 2008
- European Commission's Communication 'A European Economic recovery plan' – COM(2008) 800 final of 26 November 2008
- Green Paper Towards A Secure, Sustainable And Competitive European Energy Network, {SEC(2008)2869}
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➤ **Industrial Initiative/Technology Platform/TSO reports**

- ENTSO-E Ten Year Development Plan 2010-2020 – June 2010
- ENTSO-G Ten Year Development Plan - 2010-2019 – December 2009 & February 2011
- ENTSO-G European Ten Year Network Development Plan 2010 – 2019, attachment A : Capacity Development, Demand and Supply Scenarios by Country – December 2009
- Wind European Industrial Initiative strategy document produced by the TP Wind Secretariat – May 2010
- CCS European Industrial Initiative implementation plan 2010-2012

➤ **Studies from European institutions other than European Commission**

- European Central Bank, Energy markets and the Euro area macroeconomy (June 2010)
- European Parliament Eurobarometer (Standard EB 74.3 on Energy), The Europeans and energy (January 2011)
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- Pure Power, Wind energy targets for 2020 and 2030 - A report by the European Wind Energy Association - 2011
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6.3 ANNEX 3: LIST OF CASE STUDY PROJECTS AND SAMPLE PROJECTS

Table 12: Sample of electricity and gas projects (including case studies)

	Ref. EEPR project proposal	Decision adoption Date	Description of the action	Beneficiary(ies)
1	EEPR09-INTg-RF-SK-01 (case study project)	23 August 2010	Delivery and the construction of two parallel interconnection pipelines including relevant technical units and equipments to connect the two gathering stations of the existing Underground Gas Storage (UGS) Lab Complex between themselves and the two gathering stations above-mentioned as interconnected with the Central Station Gajary-Baden.	Nafta
2	EEPR09-INTg-RF-SK-02 (case study project)	9 July 2010	Engineering, purchase and installation of specific technical equipments in two existing gas transmission facilities in Slovakia (at node Plavecký Peter and at the compressor station Ivanka pri Nitre)	Eustream
3	EEPR09-INTg-SK-HU (case study project)	13 October 2010	Procurement of the basic pipeline material and related equipment required for the construction of the Slovakia-Hungary gas Interconnector respectively in Hungary and Slovakia	1) Eustream 2) Change of beneficiary pending as of May 2011
4	EEPR09-INTg-store-CZ-02	9 July 2010	Connection of the underground gas storage (UGS) Tvrdonice to the transit system and improve gas sources available for reverse flow in case of possible future gas shortages from the direction Ukraine	RWE Gas Storage

	Ref. EEPR project proposal	Decision adoption Date	Description of the action	Beneficiary(ies)
5	EEPR09-INTg-RF-AT-01	9 July 2010	Upgrading of Baumgarten gas hub to allow transport of gas from Germany to countries adjacent to Austria, in particular in case of a disruption of the supply of gas entering EU at the Ukraine / Slovak border	Baumgarten - Oberkappel Gasleitungsgesellschaft mbH
6	EEPR09-INTg-Poseidon	28 July 2010	Technical studies (detailed engineering) and the pipes for the 210km offshore pipeline between Greece and Italy	IGI Poseidon
7	EEPR09-INTg-RF-PT	30 July 2010	Building of 48km gas pipeline between Mangualde to Celorico da Beira.	REN Gasodotu SA
8	EEPR09-INTg-RF-RO	30 July 2010	Construction works within three existing compressor stations on the Romanian territory. It will implement the reverse flow between Romania and Bulgaria.	SNTGN Transgaz SA
9	EEPR09-INTg-RF-LV-LT	13 August 2010	Improvement of the infrastructure and equipment for bi-directional gas flow between Lithuania and Latvia.	Latvijas Gaze, AB Lietuvos Dujos
10	EEPR09-INTg-BE	19 August 2010	Procurement of pipes and the construction works (from Raeren (Eynatten) to Opwijk of a total length of 170 km).	Fluxys
11	EEPR09-INTg-RF-CZ-PL	19 August 2010	First phase of the construction of a high pressure natural gas pipeline interconnection between Poland and the Czech Republic (i.e. Třanovice - Cieszyn - Skoczów)	1) NET4GAS s.r.o. 2) Gaz System S.A)

	Ref. EEPR project proposal	Decision adoption Date	Description of the action	Beneficiary(ies)
12	EEPR09-INTg-LNG-PL	5 November 2010	Engineering, construction, mechanical and implementation of two LNG (Liquefied Natural Gas) storage tanks (Polskie LNG S.A.) and the berth (ZMPSiS) of the LNG infrastructure in Swinoujscie.	Polskie LNG sp. z.o.o, ZMPSiS S.A.
13	EEPR09-INTg-FR	25 November 2010	Increase of the interconnection capacities (from 3 to 13 bcm/y in 2015) between France and Spain. It includes the procurement of pipes (215 km in Rhone Valley), the building of a new compression station (Chazelles), the construction of a second gas pipeline (Bearn) and to develop a reverse flow pipeline (Lacal).	GRTgas SA, TIGF
1	EEPR09-INTe-Estlink-2 (case study project)	8 July 2010	Construction of the second electricity interconnection between Estonia and Finland as well as the required grid reinforcement in Estonia.	1) Fingrid 2) Elering
2	EEPR09-INTe-AT-HU	2 August 2010	New overhead line 400kV Wien(AT) -Győr(HU). Austrian side action is the new line; Hungarian side is substations modifications and extension.	1) VERBUND-Austria Power Grid; 2) MAVIR ZRt
3	EEPR09-INTe-ES-FR	23 September 2010	Construction of the interconnection between Spain (Santa Llogaia near Figueras) and France Baixas (Baixas near Perpignan). It includes the cables, the converter stations and the tunnel.	RED Electrica España, RTE-EDF Transport S.A.

	Ref. EEPR project proposal	Decision adoption Date	Description of the action	Beneficiary(ies)
4	EEPR09-INTe-MT-IT	7 July 2010	First submarine interconnection between Italy and Malta: 220kV HVAC cable (250MVA capacity)	Enemalta Corporation

Table 13: Sample of CCS projects (including the case study)

#	Ref. EEPR project proposal	Decision adoption Date	Description of the action	Beneficiary(ies)
1	ROAD (case study project)	09 December 2009	Demonstration of the full chain of CCS on a capacity of 250MW equivalent using post-combustion technology. Storage of CO ₂ in a depleted offshore gas field near the plant. The project is part of the Rotterdam Climate initiative that aims at developing a CO ₂ transport and storage infrastructure for the region	1) E.On Benelux 2) Electrabel
2	Compostilla	09 December 2009	Demonstration of the full CCS chain using Oxyfuel and fluidised bed technology on a 30MW pilot plant to be upscaled by December 2015 to a demonstration plant of more than 320 MW. Storage in a saline aquifer nearby.	Endesa Generacion

#	Ref. EEP project proposal	Decision adoption Date	Description of the action	Beneficiary(ies)
3	Janschwalde	09 December 2009	Demonstration of the Oxyfuel and post-combustion technologies on an existing power plant site. Two storage and transport options will be analysed.	Vattenfall Europe

Table 14: Sample of OWE projects (including the case study)

#	Ref. EEP project proposal	Decision adoption Date	Description of the action	Beneficiary(ies)
1	Borkum West II (case study project)	December 2009	400 megawatt large-scale offshore wind farm approximately 45 km north of the island Borkum. The project will consist of eighty 5 MW wind energy converters (WECs) based on tripod foundations, an offshore substation platform and interarray cabling between the WECs and offshore substation.	Trianel
2	BARD 1	January 2010	Installation of the 80 5.0 MW wind turbine generators on the BARD Tripile foundations in the project area of the BARD 1 wind farm	Ocean Breeze

#	Ref. EEP project proposal	Decision adoption Date	Description of the action	Beneficiary(ies)
3	Thornton Bank	April 2010	Optimised logistics and innovative substructures for the far-shore deep-water Thornton Bank wind farm	C-Power
4	Baltic-Kriegers Flak	November 2010	A fast-track, modular-based Combined Grid Solution for offshore grid connection of the Kriegers Flak area in the Baltic Sea.	1) Energinet 2) 50 Hertz
5	Aberdeen Offshore Wind Farm and Deployment Centre	December 2010	Combination of a smaller commercial wind farm with a deployment centre and technology enabler.	1) Aberdeen Offshore Wind Farm 2) Aberdeen Wind Deployment Centre 3) Aberdeen Renewable Energy Group 4) Technip UK 5) Vattenfall Wind Power