GATEWAY

This project is funded by the European Union

Grant Agreement Number:
657263

Action acronym:
GATEWAY

Action full title:
Developing a Pilot Case aimed at establishing a European infrastructure project for CO_2 transport

Type of action:

H2020-LCE-19-2014-2015

Starting date of the action: 2015-05-01
Duration: 24 months

D4.4
Assessment of synchronised funding from various sources. The Berlin model

Original due delivery date: 2017-03-31

(Amended with European Commission Approval to 30 April 2017)

Actual delivery date: 2017-05-05

Organization name of lead participant for this deliverable:
SINTEF Energy Research

GATEWAY

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Deliverable number:	D4.5
Deliverable title:	Assessment of synchronized funding from various sources. The Berlin model
Work package:	WP4 Pilot Case: defining a European infrastructure project for CO_2 transport – a Project of Common Interest (PCI)
Lead participant:	SINTEF

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Abstract

This report is one of the final deliverables of the H2020 GATEWAY project, called *Assessment of Synchronized Funding. The Berlin Model*. In order to pursue the GATEWAY Pilot Case, Rotterdam Nucleus, a potential Project of Common Interest (PCI) after the official end date of the H2020 GATEWAY project (May 1st 2017), funding sources must be further addressed.

The Berlin Model concept as a possible funding route has been investigated. The concept does not seem to have succeeded so far due to a number of issues and obstacles. However, disregarding the involvement of the European Commission, the main idea behind it – a bottom-up approach for how to synchronize funding and efforts between Member States – is still relevant. A Revised Berlin Model has therefore been suggested in order to keep the concept relevant. Several scenarios have been considered, three of which has been presented. The first scenario (RBM1) implies a direct revision of the existing Berlin Model. The second scenario (RBM2) links the Berlin Model and the ECRIA concept. The third scenario (RBM3) launches the idea to create European Centres of Excellence based on Member States' existing strategies and priorities. In all three scenarios, the original Berlin Model idea of a bottom-up approach for how to organize and fund projects between Member States has been (more or less) safeguarded. To pursue a 'Revised Berlin Model' project, it is recommended to address Member States who have expressed interest and committed time and resources through groups like ETIP ZEP, EERA Joint Programme for CCS, North Sea Basin Task Force (NSBTF) and Mission Innovation. It would also be beneficial to leverage the work of the ACT countries who in an efficient manner have managed to synchronize funds despite different (financing) procedures within the Member States.

In addition to the Berlin Model concept and synchronization of national funds, European public funding sources has been assessed. There are many funds, but not all of them are equally relevant for CCS and for a CO_2 infrastructure. The predominance of CCS funds seems to be intended for a 'research line', related to research, innovation and coordination. It is therefore recommended that the European Commission prioritizes the infrastructure part of CCS, possibly within the new Innovation Fund. For the continuation of GATEWAY in the short term, the most relevant funds per time seems to be the Connecting Europe Facility grants, H2020 Coordination and Support Action grants and the upcoming Innovation Fund/NER400 which is expected in the reform of the Emissions Trading System (ETS).

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Abbreviations

ACT	Accelerating CCS Technologies
BM	Berlin Model
CCS	Carbon capture, transport and storage
CCUS	Carbon capture and use
CEF	Connecting Europe Facility
CF	Cohesion Fund
CfD	Contract for difference
CoE	Centre of Excellence
CSA	Coordination and Support Action
DG	Directorate General
EC	European Commission
ECRIA	European Common Research and Innovation Agendas
EDP	InnovFin Energy Demo Project
EEEF	European Energy Efficiency Fund
EERA	European Energy Research Alliance
EERP	European Economic Recovery Plan
EIB	European Investment Bank
EIF	European Investment Fund
ERA	European Research Area
ERDF	European Regional Development Fund
ESFI	The European Fund for Strategic Investment
ESIF	European Structural and Investment Funds
ETIP	European Technology and Innovation Partnership
ETS	Emissions Trading System
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas Emission
GNI	Gross National Income
H2020	The Horizon 2020 framework programme
JP	Joint Programme
LCE	Low Carbon Economy
MS	Member State
NFA	National Funding Agency
NSBTF	North Sea Basin Task Force
NSON	North Sea Offshore and Storage Network project
PCI	Project of Common Interest
R&D	Research and Development
R&I	Research and Innovation
RBM	Revised Berlin Model
RES	Renewable Energy Systems
RFCS	Research Fund for Coal and Steel
RIA	Research and Innovation Action
SET-plan	Strategic Energy Technology Plan
TEN-E	Trans-European Network in Energy
TWG	Temporary Working Group
WP	Work Programme
ZEP	Zero Emission Platform

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1 INTRODUCTION

The 2-year H2020 project GATEWAY (May 2015-May 2017), aims to develop a comprehensive model Pilot Case which, intentionally will pave the ground for carbon capture and storage (CCS) deployment in Europe. The project's chosen Pilot Case is Rotterdam Nucleus, which is based on the development of Rotterdam as a southern North Sea hub with captured CO_2 being tunnelled through the port to offshore depleted gas fields, with potential additional transboundary cluster connections (see Figure 1). The Pilot Case is described in more detail in the GATEWAY deliverable 4.1, "Pilot Case Definition" and in deliverable D4.3 "Prospectus: Business Case development"[1].

So as to maximise the impact of the project, the GATEWAY project intends that the Pilot Case will be developed as a European 'Project of Common Interest' (PCI), which will provide faster and more efficient permit-granting procedures and improved regulatory treatment – and, under certain conditions may receive funding under the Connecting Europe Facility (CEF).

In order to pursue the chosen Pilot Case, and add to a potential PCI after the official end date of the H2020 GATEWAY project (May 1st 2017), funding sources must be further addressed. In the long term, it will likely require a mix of grants, loans, and/or guarantees. But at this early stage, it is widely accepted that public funding will prevail, due to the commercial uncertainty of CCS. This implies that the basis for a transnational public initiative must be defined subject to common objectives, synchronized national funding programmes, European stimulus packages, and other funding mechanisms. One possibility for synchronized funding is a three-step approach, often referred to as the Berlin Model, specifically mentioned in the project's call[2]. As such, this report will particularly address the Berlin Model concept and whether it is feasible to create a Berlin Model project for the continuation of GATEWAY and the Pilot Case.

The report is structured as follows: chapter 2 addresses the Berlin Model concept. Chapter 3 looks into how a revised Berlin Model concept can be used to synchronize and leverage national funding. Chapter 4 looks into European public funding sources that could be of relevance to the Pilot Case. Conclusions follow each of the chapters.

The public funding sources will be in focus, and the deliverable will not go into detail about the different funding phases of the Pilot Case, like the pre-FID (financial investment decision) phase, the construction phase and the operations phase. The main focus will be how to ensure funding for the next phase(s) of GATEWAY, mainly the project development phase, which to a great extent will be a feasibility study.

The information obtained in this deliverable was obtained through a combination of literature reviews and interviews with representatives from the European Commission and academia. Given that this delivery should be openly available, the interviewees have been anonymized. Some interviews were conducted via telephone, others via email. A presentation of parts of this work was also given at the GATEWAY final event on April 24th in Rotterdam, to the GATEWAY key stakeholders.

[1] https://www.sintef.no/projectweb/gateway/results/
[2] LCE-19-2014-2015 Supporting coordination of national R&D activities

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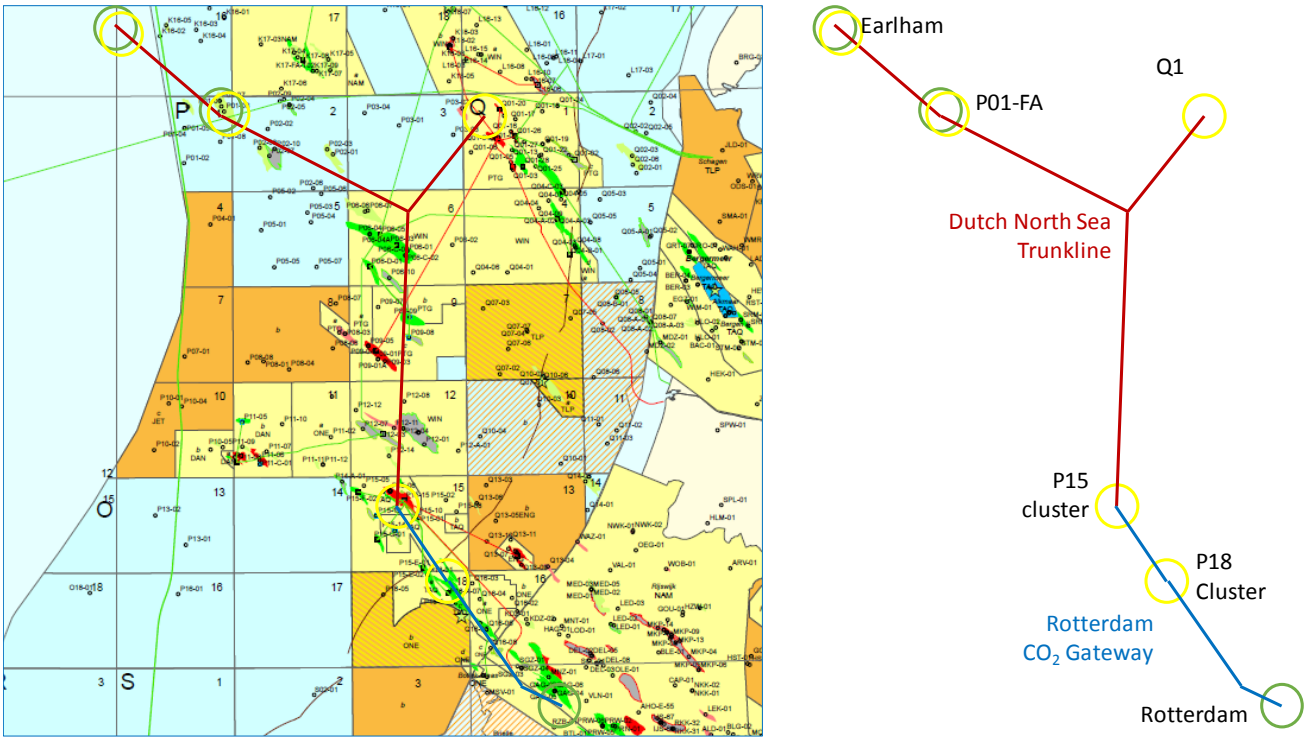

Figure 1.1: Left: A simplified outline of the PCI structure overlain on a map of Dutch offshore. Right: the PCI structure repeated for clarity of the PCI elements. Green circles represent CO_2 sources, yellow circles indicate CO_2 storage locations. The offshore gas fields Earlham and P01-FA first deliver CO_2, from separation from the produced gas, and become CO_2 stores after the end of gas production. The pipeline structure is divided into two segments: the Rotterdam CO_2 Gateway (blue) and the Dutch North Sea Trunkline (red) [3].

[3] GATEWAY D4.3 PCI prospectus – business case development

2 THE BERLIN MODEL

In this chapter, the Berlin Model as a three-step funding concept will be investigated. First, the origins and logic behind the Berlin Model will be outlined. Second, the Berlin Model standpoint in Horizon 2020 will be presented. It will show that the topic appeared in the 2014/2015 Work Programme, but was later removed due to several reasons, one of which was that it was not in line with the intended simplification of Horizon 2020. Third, project promoters' attempt to interpret and use the Berlin Model will be accounted for. The described cases show that the Berlin Model has been used in different ways by the project promoters. However, neither of them have fully succeeded in pursuing all the three steps. Fourth, possible explanations on why the design of Berlin Model has not succeeded will be presented, followed by a suggestion on how to revise the concept while at the same time safeguarding the unique bottom-up approach. A key proposal is to establish clear guidelines and to exclude the criteria of top funding from the Commission - rather making it a two-step process with an optional third step. It is argued that establishing European Centres of Excellence co-funded by the European Commission, and where money is specifically earmarked for projects following the revised design of the Berlin Model, may give the funding model its long awaited renaissance.

2.1 The origins of the Berlin Model

The Berlin Model was first presented at a German Innovation Fund conference in Berlin in March 2012[4]. The Berlin Model suggests a bottom-up approach on how to organize and fund large projects as an alternative to the existing (funding) instruments. The method is meant to allow motivated countries with a strong common interest to take on a joint challenge as a coordinated effort with a minimum of "red tape"[5]. The project should be a well-coordinated effort involving research teams and industry from the respective countries and with the countries funding their own research actors through National Funding Agencies (NFAs) and/or private partners[5]. If the effort is on the EU's list of priorities, it could be top funded by the European Commission.

The original Berlin Model suggests a three-step procedure in order to identify, coordinate and implement joint projects between Member States[4]:

1. Potential project partners from different Member States identify a joint research project and present a draft proposal (idea, partners, estimation of the expected costs) to their National Funding Agencies respectively.

2. Upon positive evaluation of the draft proposal by all NFA, project partners submit a full proposal (in line with the different funding rules of the participating countries).

3. After the Decision of the full proposals by the NFA or Governmental Bodies, project partners ask the European Commission for additional support to incentivize the collaboration and coordination (European dimension, added value to the Union).

[4] Follow up of the Berlin Conference, Dr. Menzen G., BMWI, 2012
[5] EERA JPWind newsletter, winter 2014

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2.2 The logic of the Berlin Model concept

The Berlin Model is not an established funding mechanism; rather a concept that allows for a particular way of thinking about how to fund joint projects. The bottom-up approach illustrates the importance of national priorities and expertise, and the three stages secure an automatic alignment of national and European funding. Naturally, in line with their mandate, national funding agencies will require that the projects they support economically are in line with existing research and innovation (R&I) strategies and thus the broader political priorities. When the project promoters then turn to the EU for additional support, national interests have already been safeguarded.

Figure 3.1: Logic of the Berlin Model concept: to make the puzzle pieces fit together; to make sure European funding supports national strategies and priorities. *Foto: Shutterstock.*

Hence, the logic of the Berlin Model concept is to establish national R&I priorities as a prerequisite for European financial support. Given that EU funding alignment with Member States' strategies and priorities is efficient, investigating how the Berlin Model concept has been used and how it can be used in the future may have a great value not only for a potential continuation of the GATEWAY project, but also for the broader R&I environment, Member States/national funding agencies and the European Commission.

2.3 State of the art - The Berlin Model's standpoint in H2020

In the research and innovation programme Horizon 2020 (H2020), a majority of the calls put "fresh money" on the table to establish *new* projects without a requirement to build on something already existing. Thus, most calls do not follow the logic of the Berlin Model; to establish an explicit link between the national and EU funding based on national strategies/priorities.

Nevertheless, the picture is not entirely one-sided. The EU has some financial instruments and calls which require either alignment with national policies and/or already existing nationally funded projects within the same field and which combines national and European funding – synchronized funding.

2.3.1 Berlin Model Topic appearing in the H2020 2014/15 Work Programme

The Berlin Model topic appeared for the first time in H2020 in the 2014/15 Work Programme as the call *LCE-19-2014-15 Supporting coordination of national R&D activities*[6] (open both in 2014 and 2015). This was a so called Coordination and Support Action (CSA) – for more information on CSAs, see section 4.2.4. This unique CSA, is the only call observed in the European Commission's Work Programmes that explicitly opens up for Berlin Model projects. In this call it was stated that "[…] EU funding remains a limited part of the overall funding across Europe", and that "The

[6] https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/lce-19-2014.html

challenge is to drive synchronisation of funding processes by fostering cross-border cooperation among partners supported by national projects and programmes"[6].

The proposed activities should focus on supporting either:

I. *"The transfer of knowledge among participants and other dissemination activities, activities to foster the use of research outcomes by industry of a project resulting from synchronised funding processes of at least three Member States, or*
II. *The coordination of call for proposals of at least three Member States, for instance, through support to networking activities of public funding bodies, leading to the promotion of the use of single peer-reviewed evaluations, development and use of harmonised monitoring and review methodologies, support to the preparation of high risk, high cost large scale pilots for joint actions with or without EC funding, linking national research programmes and other funding mechanisms and building partnerships with the necessary scale and scope etc"[6].*

Despite being a Berlin Model 'pilot', it was not straightforward to recognize the call as a Berlin Model project call; only the first bullet point (I) relates to step 3 of the Berlin Model process, while the second bullet could be understood as an expansion of the concept[7].

This call was the foundation for the current GATEWAY project, addressing procedure I.

2.3.2 Removal of the Berlin Model Topic from the H2020 2016/17 Work Programme

From the European Commission's (EC) perspective, the Berlin Model was put forward to support two types of actions[8]:

1) Ongoing projects which request additional funding for dissemination purposes and to demonstrate a European dimension, and
2) activities to coordinate and synchronize calls for proposals across several countries.

After the evaluation of the proposals submitted to the Berlin Model calls in the Work Programme 2014/15[9], the EC decided to withdraw the Berlin Model topic from the Work Programme 2016/17.

The reason was that the EC legal service was against continuing to support such actions via CSA, as it is was regarded not to be in line with the design of the H2020 programme; a dedicated separate model was not in line with the intended simplification of Horizon 2020[8]. In addition, the Commission legal services does not have access to the Member States' accountings, such that the EU auditors cannot check the Member States' budgets[10].

The decision was made on the basis of evaluation scores, feedback from evaluators, as well as the legal checks performed by the EC. The Berlin Model would require very specific eligibility

[7] Representative from the European Commssion, DG Research & Innovation
[8] Written procedure: Energy work programme 2016-2017 to the members of the Energy configuration of the Horizon 2020 Programme Committee, 2015.
[9] Horizon 2020 Work Programme 2014-2015, 10. Secure, clean and efficient energy
[10] Representative from the EERA secretariat

conditions and supporting documents, adding a layer of complexity which would discourage proposal submissions. It was further argued that the two types of actions could be supported without a separate Berlin Model: Type 1 proposals could be supported via the CSA instrument. Type 2 proposals, aiming at coordinating joint calls in Member States, were seen to be too similar to the ERA-NET co-funding instrument[8] (see section 4.2.4).

2.4 Berlin Model Project attempts

Through a literature review and some interviews, it became clear that there are not many cases where the Berlin Model has actually succeeded. A few years ago, the European Energy Research Alliance (EERA) tried to establish Berlin Model projects[11]. The EERA partners have experience in working closely together in the EERA Joint Programmes (JPs) on aligning national R&D efforts under the same strategy, and thus should have a good foundation for establishing Berlin Model projects. Nevertheless, in the aftermath, only two such projects were identified among the 200 EERA partners[11]: The North Sea Offshore and Storage Network project (NSON) and the BIGH2 project. In addition, there was recently an open call (jointly developed by Finland and Germany) based on the Berlin Model, where project promoters were encouraged to submit their project proposals.

The three attempts to use the Berlin Model concept (NSON, BIGH2 and the Finland-Germany call) are described in the following sections. As can be seen from these examples, the project promoters have interpreted and used the Berlin Model concept in different ways.

2.4.1 NSON – The North Sea Offshore and Storage project

The North Sea Offshore and Storage Network project (NSON) is considered as a purely Member State funded Berlin Model Project. It deals with large-scale wind integration and was established by the EERA JPs Wind and SmartGrid in January 2014[12].The three initiating project promoters were Fraunhofer IWES (Germany), SINTEF Energy Research (Norway) and University of Strathclyde (UK). The Technical University of Denmark (DTU, Denmark), ECN (Netherlands) and University College Dublin (UCD, Ireland) joined in 2014[13].

The project's starting point was a common interest to deal with the challenges and opportunities in the North Sea.[14] In the autumn of 2011, the project promoters met in London to share opinions and ideas, and to identify the possibilities for cooperation. The project promoters agreed on the basic principles, and to use the Berlin Model to "[…] ensure speed and volume"[15]. The next step was to gather the funding agencies from the stakeholders' countries, the aim being to identify their willingness to fund the project and, if so, to discuss how to proceed in the process.

The national funding agencies took interest in the project idea and in following up on the Berlin Model concept, even though the concept was new to all. They required the project idea to take the form of three independent (sub) projects in each of the three countries. Each project promoter should

[11] https://according2research.com/2016/12/27/measuring-success-in-coordination-national-research-in-europe/
[12] SINTEF, North Sea Offshore Network - NSON
[13] http://www.irpwind.eu/Knowledge-Transfer/IRPWIND-Newsletters/Newsletter-winter-2014
[14] Representative from Norwegian research institution
[15] NSON, Dr. Korpås, M., SINTEF Energi 20q14

apply for funding from their respective National Funding Agencies. The projects should thus be interlinked, but also capable of "standing on its own". The funding agencies further stated that it would be positive for each project application to include a document that short outlined how the three projects were related to each other and a documentation signaling the project promoters' commitment to collaborate (e.g. in Letters of Intent).[16]

The project promoters followed the agencies' guidelines, and after some time all the three projects were in operation and new partners joined. Project promoters thus had to take part in the standard competition for national financing, and the projects had to be considered and approved by the boards of the funding agencies and fit within the call description. There was no exclusive call in the Member States. However, since this was the first time that the Berlin Model concept was used and the national funding agencies wanted to test it, in Norway, the project proposal was lifted out of a pile of applications and treated partly outside the normal evaluation procedure.

In line with the third step of the Berlin Model, the project promoters looked to the EU in order to request additional support. They looked for opportunities in existing financial instruments and submitted an application to two calls in the H2020 Work Programme: *LCE-19-2014 Supporting coordination of national R&D activities*[17] and the *LCE-33-2016 European Common Research and Innovation Agendas (ECRIAs)* in support of the implementation of the SET Action Plan[18]. Both calls highlight the need to align national and European research efforts in order to maximize the outcome (see section 2.3.1 and 4.2.4.3). Similar to the national call, the NSON consortium competed with other project proposals. Finally, neither of the applications were granted. Per March 2017, the NSON project remains a project financed only by national funding agencies and have not succeeded to realize the third step of the Berlin Model.

2.4.2 BIGH2 – Enabling Pre-Combustion CCS Plants

The BIGH2 project was established as cross border collaboration, with the joint goal of developing a new generation of hydrogen-powered gas turbines. SINTEF Energy Research (Norway) had already cooperated with the German DLR (The Deutsches Zentrum für Luft und Raumfahrt) in the BIGCO2 project[19] and in European programmes (ENCAP20) along with SIEMENS (Germany) and ALSTOM (Switzerland). This formed the basis for further cooperation with the European gas turbine producers[21].

The project was mainly financed by Gassnova (Norwegian public funding), supplemented with public funding from the German COORETEC program and private funding from Swizz ALSTOM[21]. There was no contribution from the European Commission.

[16] Representative from Norwegian research institution
[17] *LCE-19-2014 Supporting coordination of national R&D activities*
[18] *LCE-33-2016 European Common Research and Innovation Agendas (ECRIAs) in support of the implementation of the SET Action Plan*
[19] https://www.sintef.no/projectweb/bigco2/
[20] http://www.encapco2.org/index.htm
[21] \\sintef.no\se\prosjekt\500121_Gassteknologi\502001076 GATEWAY EU H2020\WP4 Pilot Case\Berlin model\Background info\2eera_annual_congress_2014__berlinmodel1.pptx

The BIGH2 project is often referred to as a Berlin Project. It can indeed be seen as a Berlin Project in that it is a bottom-up project between three Member States, funded by the Member States. However, the contribution from the EC (the third step of the Berlin Model concept) is absent, just as for the NSON project. The experiences from the BIGH2 project suggests that there was less administrative work than in EU funded projects, but that the work with the consortium agreement was at least as complicated[21].

2.4.3 Finnish–German Funding Call – Second Phase of bilateral cooperation following the Berlin Model

Germany and Finland have an ongoing bilateral cooperation. They recently launched a call (closed 31 March 2017) for the second phase of what they refer to as a "bilateral cooperation following the Berlin Model".[22] Their intention is to launch projects with participation from both countries and provide funding through the national programs, approved by the Federal Ministry of Economics and Energy (BMWi) and managed by the Project Management Organization Jülich (PTJ) in Germany and by Tekes, the Finnish Funding Agency for Innovation in Finland[22]. Finland and Germany invited proposals for joint R&D&I projects contributing to the objectives of the European Strategic Energy Technology Plan (Innovation Fund). The decision of which projects will be granted will be made together with the national funding agencies, and the funding granted according to both countries' funding principles. German funding law requires a real competition between the applicants, which is why this was launched as an open call[23].

Tekes has reserved €1 Million for the universities and research organisations for this call, but the companies have no limit, so the specific budget will be specified when they see the proposals[23]. Jülich and Tekes have discussed the call with the European Commission which is supportive of their initiative, but they will not ask the Commission for additional funding[23]. As such, the third step of the Berlin Model concept is excluded also in this case.

2.5 Possible explanations on why the Berlin Model has not succeeded

As seen from the previous sections, despite the interest, ambitions and attempts in 2012 and 2013 after the Berlin Model concept was launched, there are surprisingly few 'Berlin Model Projects' today, i.e. projects built on the Berlin Model concept. And the few existing examples do not seem to fulfil all the three steps of the Berlin Model process. In this section, we look into possible reasons why the concept has not succeeded and how the Berlin Model can be revised in order to safeguard the concept

2.5.1 Issues related to the existing Berlin Model

- Issue #1: the European Commission's (EC) legal department's issues with the Berlin Model (and thus the removal of the Berlin Model topic from the Energy Work Programme 2016/17), which in practice makes it impossible to carry out the third step of the original Berlin Model concept. This

[22] Finnish–German Funding Call supporting the European Strategic Energy Technology Plan (Innovation Fund) – Second Phase of bilateral cooperation following the Berlin Model

[23] Contact person for the Finnish–German Funding Call

lack of commitment from the EC has a discouraging effect and makes the threshold and experienced risk too high.

- Issue #2: the lack of a common framework with "rules of the game", templates for proposals, coordinated deadlines and evaluation criteria between the Member States. Without these things in place, the process takes too much time, and the probability of success is very low. What was originally intended as a faster and non-bureaucratic method turned out to be more complicated in practice.

- Issue #3: lack of previous examples / success stories. There have been (and still are) attempts to pursue the idea, but with varying methods and results, and thus it is not straightforward to label the project as a Berlin Model Project. How do you measure success? Does all three steps of the Berlin Model concept need to be fulfilled? In most cases, it boils down to bilateral cooperation, with minimal intervention from the Commission.

2.5.2 Revising the Berlin Model concept

There are definitely challenges related to the Berlin Model as it stands today. However, the need for a structure or platform on which Member States representatives can discuss new initiatives with each other and with research institutions is still there. And the core idea of the Berlin Model concept – bottom-up cross border collaboration, without being dependent on the initiative of the European Commission – is still relevant.

We therefore suggest to revise the existing Berlin Model. Several scenarios have been considered, three of which will be presented in the following. The first scenario (RBM1) implies a direct revision of the existing Berlin Model. The second scenario (RBM2) links the Berlin Model and the ECRIA concept. The third scenario (RBM3) launches the idea to create European Centres of Excellence based on Member States' existing strategies and priorities. In all three scenarios, the original Berlin Model idea of a bottom-up approach for how to organize and fund projects between Member States will be safeguarded. The scenarios also suggest that there should be a clear framework and "rules of the game", templates for proposals, joint deadlines and evaluation criteria between the Member States.

Scenario 1 (RBM1): Direct revision of the Berlin Model

The first scenario implies a direct revision of the existing Berlin Model. In RMB, Berlin Model projects is built on a collective decision by Member States and is based on established formal processes. It contains three steps:

1. Potential project partners from minimum three Member States identify a joint (research) project and present a joint draft proposal (idea, partners, estimation of the expected costs and a timeline with decision gates) to an advisory council consisting of councilors from their National Funding Agencies (NFAs) respectively. Common decision gates are established.

2. The advisory council evaluates the draft proposal and, upon positive evaluation, the full the proposal. The advisory council gives its recommendation to the final decision-making body

consisting of 2-3 board members from each of the respective national programmes/NFAs. The project will be described in a standard template for Berlin Model project applications.

3. OPTIONAL: The European Commission establish a Berlin Model grant to provide top funding to projects that fulfil some clear defined requirements. The quality is ensured by Member States' evaluation. Projects receiving top-funding should support European utility and dimension e.g. project must support core European strategies and interests and the project outcome must be possible to transfer to other Member States.

Today, national funding to research and innovation reflects the Member States' priorities – they allocate money to defined areas. Regarding the funding of future Berlin Model projects, the idea is that Member States allocate a part of this national funding directly to Berlin Model projects. The funding will be handled by the advisory council consisting of representatives from all the national NFAs. They will only fund projects on topics the Member States have agreed should be treated at a European level. The design gives sufficiently decision making power to the Member States and the evaluation will be more efficient. The RBM is bottom-up, and allows for a speedy process and involvement of Member States.

Scenario 2 (RBM2): RIA with ECRIA requirement

Another scenario which seeks the same as the Berlin Model is RIA with ECRIA (described in more detail in section 4.2.4.3). Both designs can be said to have a bottom-up approach and intends to align national and EU funding. However, the models are different. Whereas the Berlin Model Concept starts with "blank sheets" where projects are developed without any pre-defined requirements, a RIA with ECRIA call demands that project ideas draw on already existing projects in Member States. Thus, whereas the Berlin Model Concept provide the carrot (i.e. top funding from the Commission) as a reward after a project has been initiated, RIA with ECRIA provides the carrot in advance to encourage projects initiatives. RIA with ECRIA requirement is an initiative from the top (European Commission), but is met by a bottom-up process. A benefit with ECRIA is that it provides quality assurance and an identification of research gaps. This enables holistic projects where project results are spread throughout Europe.

Scenario 3 (RBM3): European Centres of Excellence to fill research gaps

The third scenario is suggested to really provide momentum. Like the two previous scenarios, the third scenario highlights national strategies and common European research needs. Today, so called Centres of Excellence (CoEs) - ranging from year-long research projects to laboratories - are funded by Member States and are viewed as representing the country's best of research environment, and ongoing national research is largely linked to the centres' activities. Accordingly, national CoEs represent clear national priorities. This scenario suggests that the European Commission puts money on the table and holds an open competitive call for clusters of CoEs in which existing national Centres of Excellence in European countries can build a consortium. The EU funding will be in addition to national funding, and strengthen the European collaboration in a long-term perspective. It will also connect national research strategies and priorities at the European level.

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The call could have a research and innovation focus encouraging industry involvement. Also, the Commission could possibly link the call to the thematic focus on Mission Innovation topics due to already committed funding. A part of the mandate of the European CoEs could be to use the mechanisms of the Revised Berlin Model and/or ECRIA.

The creation of European Centres of Excellence would ensure an automatic alignment between national and EU funding. Not the least, European CoEs could match the world's leading research communities, e.g. those in the US, China and South Korea. It would provide better resource utilization, division of labor and gives the opportunity to build a profound knowledge environment that is relevant in a broader context. It would improve coordination of cross-border efforts to solve the challenges of social change.

It is considered that investigating the proposed design should receive attention from the Member States and the EU, seeking input from other stakeholders when suitable. It would allow for a more detailed analysis and description of this design's benefits and possible challenges.

2.6 Summary and conclusions

This chapter has investigated the Berlin Model. The Berlin Model has not lived up to the good intentions of making it possible to take well-coordinated joint efforts on common challenges. The Berlin Model is not a well-known concept, but there exists some projects that are referred to as Berlin Model projects, such as NSON and BIGH2. These do not fulfill all the three steps of the pre-defined Berlin Model process; typically the third step – top funding from the European Commission (EC) – is left out. It could be argued that the European Commission's legal department's issues with the Berlin Model actually makes it impossible to carry out the third step of the original Berlin Model concept. Based on the experiences of these projects, the reason there are not more Berlin Model projects seems to be the lack of an established process and guidelines on how to implement the Berlin Model concept (and to co-finance it) either on Member State or the EU level. The risk and threshold simply becomes too high. Rules of the games need to established.

However, it has been argued that the core idea of the Berlin Model concept – bottom-up cross border collaboration, without being dependent on the initiative of the European Commission – is highly relevant and needed. We therefore suggest to revise the existing Berlin Model. Several scenarios have been considered, three of which has been presented. The first scenario (RBM1) implies a direct revision of the existing Berlin Model. The second scenario (RBM2) links the Berlin Model and the ECRIA concept. The third scenario (RBM3) launches the idea to create European Centres of Excellence based on Member States' existing strategies and priorities. In all three scenarios, the original Berlin Model idea of a bottom-up approach for how to organize and fund projects between Member States has been (more or less) safeguarded. The scenarios also suggest that there should be a clear framework and "rules of the game", templates for proposals, joint deadlines and evaluation criteria between the Member States.

The next chapter addresses national public funding and its relevance for the Berlin Model concept. In addition, to ensure short term funding for the continuation of GATEWAY, it is necessary to review other European public funding sources. This will be addressed in chapter four.

3 NATIONAL PUBLIC FUNDING

This chapter addresses national public funding to see whether (parts of) the Berlin Model concept can be realized through synchronized funding of national funds. Some European governments have set aside funding for CCS projects, like the Norwegian government. However, Member State's commitment to fund CCS is not necessary predictable. The UK had £1 billion set aside for the Carbon Capture Scheme Competition, which was unexpectedly cancelled in 2015[24]. This cancellation caused great concern among Member States. Based on discussions among public institutions and research organizations there are reasons to believe that the Norwegian Ministry of Petroleum and Energy in particular is increasingly concerned that it could be left alone in what should be a joint effort towards large scale CCS deployment in Europe. Given the current insecurity related to CCS funding from Member States, it becomes even more important to synchronize and align existing resources.

So far, it has been argued that synchronized funding of a joint project between Member States using the revised Berlin Model approach would be the most effective way to capitalize on the national funds. The chapter starts by presenting the co-funding call ACT, and explains why this call design has been successful. Secondly, the chapter shows that there are also other roads to synchronized funding. It will be argued that a good starting point is to address Member States which have already committed time and resources in CCS through organisations such as NSBTF, EERA CCS, ETIP ZEP, and Mission Innovation among others.

3.1 ACT – the first ERA-NET Cofund on CCS

ACT (Accelerating CCS Technologies) is an ERA-NET Cofund initiative (see section 4.2.4.2) to facilitate R&D and innovation within CCS. ACT will be in action for a five year period from 2016 to 2020. The process towards creating the ACT call as an ERA-NET Cofund project was comprehensive and took more than two years[25]. Norway (by the Norwegian Research Council) took the initiative, and they have driven the process towards ACT together with Germany[25]. The established consortium had partners from nine European countries:

Table 1: List of ACT partners and their contributions[26].

Country	Partner	Contribution
Germany	Forschungszentrum Jülich GmbH Projektträger Jülich (FZJ/PtJ)	€ 6 M
Greece	Centre for Research and Technology Hellas (CERTH)	€ 0
The Netherlands	Ministry of Economic Affairs/Rijksdienst voor Ondernemend Nederland (RVO)	€ 4 M
Norway	The Research Council of Norway (RCN) and Gassnova SF (GN)	€ 6 M
Romania	Executive Agency for Higher Education, Research and Innovation	€ 1 M

[24] http://www.telegraph.co.uk/finance/newsbysector/energy/12016882/autumn-statement-2015-UK-scraps-1bn-carbon-capture-and-storage-competition.html
[25] http://www.climit.no/no/store-muligheter-for-norske-akt%C3%B8rer-i-cofund
[26] http://www.act-ccs.eu/about-us/

	Funding (UEFISCDI)	
Spain	Spanish Ministry of Economy and Competitiveness (MINECO)	€ 0.3 M
Switzerland	Swiss Federal Department for the Environment, Transport, Energy and Communications (DETEC)	€ 4 M
Turkey	The Scientific and Technological Research Council of Turkey (TUBITAK)	€ 2 M
United Kingdom	Department of Business, Energy and Industrial Strategy (BEIS)	€ 5.5 M

The European Commission has granted € 12.2 million to ACT in addition to the contributions from each country, adding up to € 41.2 million for the first joint call[26]. To realize this top-funding, the Commission was involved throughout the whole process, from the first meeting set to gather as many countries as possible for building the first consortium. Despite the positive outcome, this process has been very costly for the Norwegian Research Council as coordinator[27]. For that reason, it is not likely that top funding from the Commission will be requested for later calls[27].

The key to still making ACT a success was to a large extent the ACT member countries' curious and dedicated approach to marketing/promotion of the possibilities that ACT offers to the academic society and relevant industry. There were communication activities in several of the countries both before (pre-announcement) and after the call was launched. Meetings with the target groups was a part of this communication strategy[27].

ACT can almost be seen as a Berlin Model project, except from the fact that it was originally based on a top-down initiative – the ERA-NET Cofund call. All 9 nations took an active part in the further development of ACT, the consortium, the work packages, the agreements, the scope, the call text, communications strategy, evaluation and monitoring procedures[27]. In addition, ACT made its own research priorities based on the call set by the Commission in December 2014 for Low Carbon Technologies. It was necessary for the first call to cover the different national priorities, so these call topics were quite broad. It is expected that the topics of the next call(s) will be much narrower[27].

The financing procedures differs from country to country, and to some extent reflects the national policies. As can be seen from the first call, Germany, the Netherlands, Norway and UK are in the lead of the budget, and also happen to have a big saying and a strong will for CCS deployment in Europe.

The lack of alignment between financing procedures in the Member States is seen as the biggest issue for synchronized funding between the MS. It would therefore be beneficial to leverage the work of the ACT countries who in an efficient manner have overcome this obstacle.

[27] Representative from the Norwegian Research Council

3.2 Other pathways to synchronization of funds between Member States

The will for CCS deployment in Europe is stronger for some countries than others – as can also be seen from the first ACT call. The reasons (economic, political, public perceptions etc.) are complex and difficult to alter in the short term. As such, in quest for cooperation between Member States, there is good reason to address Member States who are positive to CCS and have already expressed a desire for action towards CCS deployment.

A good starting point would be to address Member States which have already committed time and resources in CCS through organisations such as NSBTF, EERA CCS, ETIP ZEP, and Mission Innovation among others.

3.2.1 The North Sea Basin Task Force

The North Sea Basin Task Force (NSBTF) was established in 2005 by the Governments of the United Kingdom and Norway[28]. Today the Task Force is composed of public and private bodies from Norway, the United Kingdom, the Netherlands, Germany and Flanders. They work together to find common solutions to issues arising around the transport and storage of CO_2 beneath the North Sea[28]. All the Governments represented on the North Sea Basin Task Force have devoted considerable efforts to removing legal obstacles and supporting research, development and demonstration of CCS[29].

In particular, the NSBTF has done some work to help facilitate an incremental construction of a future transport and storage CO_2 network for the North Sea through an overarching strategic regional 'plan'. They recognize PCIs as a suitable vehicle to realize collaborations and as the natural first steps towards a larger future European transport network[28].

3.2.2 EERA Joint Programme on CCS

The European Energy Research Alliance (EERA)[30] contributes through its Joint Programmes (JPs) to coordinate a massive public research effort to develop more efficient and cheaper low carbon energy technologies. The EERA CCS Joint Programme involves over 31 members and eight associated members from more than 12 countries who have committed more than 270 person years/year to carry out joint R&D activities within CCS. The CCS JP does not have any formal role in getting countries to synchronize funds, but the alignment of research in the joint programme could implicitly align the use of national funds on CCS. It also happens that some calls in the framework programmes specifically encourage JPs to submit proposals.

3.2.3 ETIP ZEP

ETIP ZEP (Zero Emission Platform, now also a European Technology and Innovation Partnership), advisor to the European Commission on the research, demonstration and deployment of CCS, has put considerable effort in developing a strategy and providing an action plan for the future CCS

[28] https://www.cslforum.org/cslf/sites/default/files/documents/london2016/Svenningsen-NorthSeaBasinTaskForce-Workshop-Session3-London0.pdf
[29] http://www.npd.no/en/Publications/Reports/One-North-Sea/Executive-Summary/
[30] https://www.eera-set.eu/

deployment in Europe[31]. As an ETIP, they are recognized as a key industry-led community for the implementation of the SET Plan priorities along the innovation chain[32]. Together with the Netherlands and Norway, ZEP is leading the Temporary Working Group (TWG) to develop the implementation plan for the SET Plan action no. 9, CCUS, where one of the targets is to establish a PCI on CO_2 transport[33]. It is relevant to follow the process of the SET Plan CCUS implementation plan and/or possible working groups arising to stay updated on allocation of resources and Member State interest.

3.2.4 Mission Innovation

Mission Innovation is a global initiative of 22 countries: the Governments of Australia, Brazil, Canada, Chile, China, Denmark, France, Germany, India, Indonesia, Italy, Japan, Mexico, Norway, Republic of Korea, Saudi Arabia, Sweden, the United Arab Emirates, the United Kingdom, the United States, and the European Commission on behalf of the European Union[34].
The member governments represent more than 80 percent of global clean energy investment, and have pledged to double their clean energy research and development funding over five years[34].

3.3 Summary and conclusions

This chapter has looked into whether (part of) the Berlin Model concept can be realized through synchronized public national funds. There is no clear answer: ACT has been presented as a successful way of synchronizing national funds. However, it was also pointed out that the coordination of ACT has been time consuming and holds an initial top-down approach instead of the pure bottom-up approach of the original Berlin Model concept. The lack of alignment between financing procedures in the Member States is seen as the biggest issue for synchronized funding between the MS. It would therefore be beneficial to leverage the work of the ACT countries which in an efficient manner have overcome this obstacle.

Another alternative is to build a project bottom-up by addressing Member States which have already committed time and resources in CCS through organisations such as NSBTF, EERA CCS, ETIP ZEP, and Mission Innovation among others.

To ensure short term funding for the continuation of GATEWAY, it is necessary to review other European public funding sources. This will be addressed in the following chapter.

[31] http://www.zeroemissionsplatform.eu/about-zep.html
[32] https://setis.ec.europa.eu/about-setis/community
[33] Draft CCUS implementation plan, 13 April 2017
[34] http://mission-innovation.net/wp-content/uploads/2016/06/MI-Enabling-Framework-1-June-2016.pdf

This project is funded by the European Union

4 EUROPEAN PUBLIC FUNDING

As an alternative to the Berlin Model thinking, this chapter looks into European funding sources. There are a number of EU programmes holding funding for CCS. There exists some overlapping/parallel work in this field. ZEP's Executable Plan for CCS in Europe, Annex 3: *Mapping EU public funding and Carbon Capture and Storage*[35] (included as Annex 1 in this report), provides a good overview of key EU funding programmes relevant for CCS in the period 2015-2020. They conclude that there are great opportunities for a potential major project to be constructed under the Connecting Europe Facility (CEF), and that there are good research money available under Horizon2020 and the LIFE programme and potentially from the Innovation Fund, depending on the legislative process. Bellona played a leading role in the work with the ZEP Executable Plan. Bellona also published the report "Manufacturing our Future: Industries, European Regions and Climate Action – CO_2 Networks for the Ruhr, Rotterdam, Antwerp & the greater Oslo Fjord"[36] in 2016, with a chapter devoted to European funding schemes.

In addition, ZEP is currently involved in some work on a *'Smart funding pathway to CCS'*. This work focuses on early stage commercialisation, how to take CCS projects, scale them and bring them to the market[37]. The consultancy company Element Energy is doing some similar work that will be leveraged through ZEP. Element Energy has been commissioned by the European Climate Foundation to develop a roadmap/vision that shows how existing European funds and other financing instruments can be leveraged to successfully deliver one or more industrial CCS clusters in Europe[38]. The process will highlight any existing funding gaps and eligibility constraints, and will indicate how these can be addressed to meet the requirements of industrial CCS cluster projects[38]. Similar to GATEWAY, Element Energy see the Port of Rotterdam as a strategic location for the development of the first European industrial CCS project, and have chosen a Rotterdam based hypothetical CCS project for their study[38]. This work is expected to be completed during the spring of 2017.

On the basis of the ZEP Executable Plan for CCS in Europe, Annex 3 Mapping EU public funding and Carbon Capture and Storage (CCS), this chapter will present an overview of the key EU-led funding streams – mainly intended as a complementary contribution, as there has been some development since the ZEP report was published in June 2015. The information is obtained with the continuation of the GATEWAY project and the Rotterdam Nucleus PCI in mind.

4.1 European stimulus packages

In 2008, the European Commission proposed a European stimulus plan (also referred to as the **European Economic Recovery Plan (EERP)**), where […] "almost 4 billion were assigned to

[35] http://www.zeroemissionsplatform.eu/downloads/1556.html
[36] http://network.bellona.org/content/uploads/sites/3/2016/10/MANUFACTURING_OUR_FUTURE_-INDUSTRIES_EU_REGIONS_AND_CLIMATE_FINAL.pdf
[37] ZEP representative
[38] Element Energy workshop slides, 7 April 2017

co-finance EU energy projects that would boost the economic recovery, increase the security of supply and contribute to the reduction of greenhouse gas emissions"[39].

In addition to gas and electricity infrastructure and offshore wind, carbon capture and storage projects were one of three sectors meeting these conditions[39]. The EEPR sub-programme on CCS initially consisted of 6 projects and € 1 billion of support to aim at demonstrating the full carbon capture, transport and storage process[40]. However, most of the projects were terminated due to the challenges in finding the necessary complementary funding. The ROAD project is the only one of the six projects originally supported that still has any realistic prospect of being realized in the short term[41]. The project was originally intended to reach a final investment decision at the end of 2010, but has faced a series of delays associated with permitting, complex commercial negotiations and, most seriously, funding[41]. They are currently trying to solve the funding problems and allow construction to finally start. It might be able for ROAD to reallocate the EEPR funds they were granted, but it is not possible for new CCS projects to access any unspent money under the EEPR.

Under the EEPR, the European Commission also launched the **European Energy Efficiency Fund (EEEF)[42]** to which some of the unspent EEPR money was transferred. The EEEF offers financial products such as loans, guarantees, or equity participation to energy efficiency investments made by local, regional, and national authorities. This fund, however, does not seem to include CCS.

4.2 European grants

4.2.1 Connecting Europe Facility (CEF)

The Connecting Europe Facility (CEF) fund supports the development of trans-European networks in energy (TEN-E), transport (TEN-T), and telecommunications (eTEN)[43]. It aims to facilitate the construction of Projects of Common Interest (PCIs). As stated in the Annex, ZEP envisions CEF as an important opportunity for a CCS infrastructure given that there would actually be a call for a CO_2 infrastructure PCI.

4.2.1.1 The road leading up to the first call for PCI projects in the area of CO_2 transport

The TEN-E Guidelines Regulation of 2013[44] lays down the rules and procedures to be respected in the identification, selection and treatment of energy PCIs. CO_2 transport is one of four main energy infrastructure categories included in the TEN-E networks, along with electricity, gas and oil. Up to 2016 there had been no PCIs selected in the CO_2 infrastructure category. As such, an interpretation of the criteria for selection of CO_2 projects of PCIs provided in the TEN-E Regulation had to be made. It was drafted by Milieu Ltd to support the European Commission DG Energy on the identification of

[39] http://ec.europa.eu/energy/eepr/projects/
[40] https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v6_0.pdf
[41] Read, Andy, et.al. Update on the ROAD Project and Lessons Learnt. Energy Procedia, 2014.
[42] http://www.eeef.lu/objective-of-the-fund.html
[43] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1316&from=EN
[44] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0347&from=EN

future carbon dioxide transport networks through the TEN-E network. The whole process is outlined in more detail in the Milieu final report[45].

The first call for candidate PCI projects in the area of CO_2 transport was expected in February 2017, but launched 1 March 2017, with a deadline 15 April 2017. Mid-March, the Commission tried to expedite the deadline for project submission from 15 April to 31 March for the Carbon Dioxide transport infrastructure Group (to ensure better alignment between the timetables of the different Regional Groups under the TEN-E framework). However, two days later, the deadline was changed back to 15 April – probably due to a wave of complaints. As per end of April 2017, at least two CO_2 PCI have been submitted: one of them is the GATEWAY project's Pilot Case, Rotterdam Nucleus.

4.2.1.2 CEF funding

CEF offers both grants and financial support (to complement grant funding)[46]. The Innovation and Networks Executive Agency (INEA) implements most of the CEF programme budget, in total €27.4 billion out of €30.4 billion (€22.4 billion for Transport, €4.7 billion for Energy, and €0.3 billion for Telecom)[47].

The next relevant **CEF call for grants** is expected after the formal adoption of the PCI list, which is scheduled for the end of 2017. This means that normally calls will be open in beginning 2018. PCI Project promoters can apply for *grants for studies* and *grants for construction works*. Grants for works, seems to be available only to those that […] *"face difficulties in their commercial viability despite their positive impact in contributing to the ending of isolation, to solidarity, to security of supply or to technological innovation"*[48].

All PCIs are also eligible for **CEF financial support**, however the ultimate decision lies with the financing institutions, such as the European Investment Bank (EIB). Unlike the CEF grants, the management of the funds to be allocated as CEF financial support via financial instruments will not be done through calls for proposals. The use of financial instruments under the CEF encompasses the *CEF debt instrument* and the *CEF equity instrument*[48].

- The CEF Debt Instrument was launched in 2015 jointly by the European Commission and the EIB, and is currently implemented by the EIB. The goal of the CEF Debt Instrument is to offer an alternative to traditional grant funding by offering competitive financial products for priority investments in transport, energy and telecommunications[46].
- The Equity Instrument is currently under development and is expected to become operational in mid-2017. It aims at providing equity or quasi-equity financing to smaller and riskier projects in the field of broadband, transport, and energy. The Fund will get support from the

[45] Milieu final report
[46] https://ec.europa.eu/info/business-economy-euro/growth-and-investment/financing-investment/connecting-europe-facility-cef-financial-instruments_en
[47] https://ec.europa.eu/inea/en/connecting-europe-facility
[48] http://europa.eu/rapid/press-release_MEMO-15-6108_en.htm

European Fund for Strategic Investments (EFSI) and from the Connecting Europe Broadband fund[46].

GATEWAY submitted a PCI proposal for the Pilot Case Rotterdam Nucleus April 15th 2017. If included on the PCI list, this will be followed up by asking for grants for study under the CEF call for grants in early 2018. Parallel to the quest for CEF funding, it is important to look for other sources of funding, as a plan B and/or as complementary funds. The CEF level of financing (i.e. the EU co-financing rate) is typically 50 % of the eligible costs of studies and/or works.

4.2.2 Funding foreseen under the reform of the Emissions Trading System (ETS)

The EU Emissions Trading System (ETS) is the world's biggest emissions trading market, and the cornerstone of the EU's drive to reduce the emissions of manmade greenhouse gases (GHG)[49]. As the European Commission' factsheet[50] from September 2016 so nicely explains it: *"The system works by putting a limit on overall emissions from covered installations which is reduced each year. Within this limit, companies can buy and sell emission allowances as needed through a 'cap-and-trade' approach, to give companies some flexibility in cutting their emissions in the most cost-effective way"*. The market price of allowances – also known as the 'carbon price' – creates a greater incentive for companies to invest in technologies that cut emissions[50].

Nevertheless, the ETC "[…] continues to face a challenge in the form of a significant surplus of allowances, largely due to the economic crisis which has substantially depressed emissions"[50]. Therefore, in line with the European Council conclusions of October 2014 on the 2030 climate and energy policy framework, the Commission has proposed a revision of the EU ETS for phase 4[50]. The key aspects of the proposal are to lower the overall number of allowances, better allocation of allowances and to establish new support mechanisms to help the industry and the power sectors meet the innovation and investment challenges of the transition to a low-carbon economy[50]. These include two new funds: **the modernisation fund** and **the Innovation Fund**, to which some of the **NER300 funds** will be reallocated.

4.2.2.1 Reallocation of NER300 funding

Revenues from the sale of 300 million allowances in the EU ETS (5% of the allowances available in the period 2013-2020) was set aside in a funding programme called NER300 to co-finance large-scale demonstration projects carbon capture and storage, and innovative renewable energy Systems (RES)[50]. Member States could apply for NER300 funding to finance 50% of a RES or CCS project if the national government guaranteed funds to cover the remaining 50% of the costs[51]. There were two calls for proposals: the first one was awarded in December 2012, the second in July 2014[51]. Still, only one CCS project, the White Rose project, succeeded with the application process[52]. The project

[49] https://ec.europa.eu/clima/policies/ets_en
[50] https://ec.europa.eu/clima/sites/clima/files/factsheet_ets_en.pdf
[51] https://sequestration.mit.edu/tools/projects/eu_ccs_background.html
[52] Representative from the former White Rose project

was awarded up to €300 million from the NER300 Programme in July 2014, but when the UK government cancelled the UK CCS Commercialization programme in November 2015, they failed to meet the criteria of 50% government funding, and so the White Rose project was cancelled[52].

The Commission would like to build on and learn from the NER300 experience by directing further revenues from the ETS towards the demonstration of innovative low-carbon technologies in the industry and power generation sectors[53]. There will be one lot from the first NER300 call that will largely go to *InnovFin Energy Demo Projects (EDP), The European Fund for Strategic Investment (EFSI, see section 4.3.2)* and to *CEF cleaner transport*[54]. In addition there will be one lot from the second NER300 call that will get rolled into the new *Innovation Fund* (see section 4.2.2.2)[55]. The InnovFin EDP provides loans or loan guarantees to first-of-a-kind commercial-scale demonstration projects in the fields of renewable energy and hydrogen and fuel cells, helping them to bridge the gap from demonstration to commercialisation[56]. Unfortunately it seems to exclude CCS.

4.2.2.2 The ETS Innovation Fund (NER400)

The ETS Innovation Fund (or NER400) is intended to be the main funding mechanism of low-carbon technologies during the next phase of the ETS (phase 4, 2021-2030) to breakthrough innovation in industry[35]. As per Council conclusions, the Innovation Fund should build on the proceeds of the NER300 for CCS and RES, but with an extension of the scope to low-carbon innovation in energy intensive industry (as they were not successful with the power industry in the first phase)[35].

400 million allowances (representing up to around € 10 billion when sold) will be reserved from 2021 onwards for this fund[57]. In addition, 50 million unallocated allowances from 2013-2020 (free allocation allowances that were not allocated due to closures of companies or reductions in production) will be set aside to enable the Innovation Fund to start before 2021 and include projects to support breakthrough technologies in industry (for example CCS)[57].

The ETS Innovation Fund's niche will be that it provides grant funding, possibly to be complemented by other financial instruments available from other facilities[58]. To ensure flexibility, a mechanism that allows transfer of budget from one category to another will be incorporated. The practice of periodically 'flushing' cash from failed ETS Innovation Fund projects to EDP Innovfin (or its post-2020 successor), will become standard[58].

Energy projects will need to meet one of a list of defined technological challenges and selection criterion; Innovativeness, targeted industrial sectors and superior technologies are favoured[58]. In contrast to NER300, the list is expected be updated often in a relatively transparent process[58]. If the

[53] http://ner400.com/
[54] http://www.ner300.com/
[55] Representative from the Carbon Capture & Storage Association (CCSA)
[56] http://www.eib.org/products/blending/innovfin/products/energy-demo-projects.htm
[57] http://europa.eu/rapid/press-release_MEMO-15-5352_en.htm#_ftn3
[58] http://ner400.com/

NER300 rules are kept, the funding rate could be up to 50% of the relevant costs, or maximum 15% of the total of available funds[59].

The fund will be open for projects in all EU Member States, and co-funding between them is possible[60]. The European Parliament and Council are expected to reach agreement on the fourth phase of the ETS and the ETS Innovation Fund by the end of 2017/early 2018[55]. **GATEWAY will continue to follow the development and look for opportunities for funding for the later stages of the Rotterdam Nucleus PCI within the Innovation Fund.**

4.2.2.3 The Modernisation fund

Between 2021 and 2030, 2% of the ETS allowances (310 million allowances in total), will be set aside to establish the Modernisation Fund[48]. The purpose of the Modernisation Fund is *"[…] to support lower income Member States in meeting the high investment needs relating to energy efficiency and the modernisation of their energy systems"*[48]. All Member States are expected to contribute to the fund, but per today it will benefit only 10 Member States with a GDP per capita of less than 60% of the EU average (in 2013): Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia[48]. **As such, the Modernisation Fund as it stands today is not directly relevant for the initial phases of the Rotterdam Nucleus. However, it could be of relevance to lower income countries that might want to connect to the CO_2 transport network at a later stage. The fund is expected to be reviewed in 2024**[36].

4.2.3 European Structural and Investment Funds (ESIF)

To enhance the coordination and complementarity between the EU's main funding instruments, the Commission adopted a 'Common Strategic Framework' for five European Structural and Investment Funds (ESIF or ESI Funds)[61]. Over half of the EU funding is channeled through these 5 European ESIFs[61].

Two of the ESI Funds, the **European regional development fund (ERDF)** and the **Cohesion fund (CF),** contribute to low-carbon investments, more specifically: energy efficiency, renewable energy, sustainable urban mobility, an energy-efficient and decarbonized transport sector (e.g. rail and multimodal transport), and a smart energy infrastructure[62].

The Cohesion Fund is aimed at Member States whose Gross National Income (GNI) per inhabitant is less than 90% of the EU average – which excludes both the Netherlands, the UK, and Belgium[61]. The eligibility of CCS in the ERDF is unclear as the ESIF funds do not currently apply to activities listed in Annex I of the ETS Directive (where CCS is included). That is, unless the project comes under a research line related to installations or parts of installations used for research, development and testing of new products to enable the shift to a low-carbon economy[35]. **The latter could be of**

[59] http://europa.eu/rapid/press-release_MEMO-10-549_en.htm?locale=en
[60] https://www.iea.org/media/workshops/2015/sally/MariaVelkova.pdf
[61] https://ec.europa.eu/info/funding-tenders/european-structural-and-investment-funds_en
[62] https://ec.europa.eu/commission/sites/beta-political/files/key-energy-union-climate_en.pdf

relevance for a feasibility study of the GATEWAY Pilot Case and should be investigated further.

4.2.4 Horizon2020

Horizon2020 is the 8th framework programme for research and innovation. Both the 2014-2015 and the 2016-2017 work programme of the Societal Challenge 3 “Secure, Clean and Efficient energy” include the “Competitive low-carbon energy” category and a number of calls addressing CCS. As seen in section 2.3.1, the Coordination and Support actions are relevant for projects like GATEWAY. Some of the H2020 calls also addresses synchronized funding (or Member State co-fund) similar to the Berlin Model concept. Co-fund actions have purpose to supplement individual calls or programmes.

4.2.4.1 H2020 Coordination and Support Actions

Coordination and Support Actions (CSA), are 100% funded actions consisting primarily of "[..] accompanying measures such as standardisation, dissemination, awareness-raising and communication, networking, coordination or support services, policy dialogues and mutual learning exercises and studies, including design studies for new infrastructure and may also include complementary activities of strategic planning, networking and coordination between programmes in different countries"[64]. The current GATEWAY project is indeed a H2020 CSA project, which has worked out well. **There are reasons to believe that there will be a highly relevant CSA call in the 2018/2019 work programme for the continuation of GATEWAY and the Rotterdam Nucleus. H2020 funding can be considered only a minor funding source, but it is important for the continuity of the project and for the road towards greater funding.**

4.2.4.2 H2020 call: ERA-NET Co-fund

The ERA-NET Co-fund is a joint transnational call in Horizon 2020 which supports public-public partnerships, based on the argument that Europe should increasingly build *"partnerships that build the necessary scale and scope, and achieve greater impact from scarce public and private resources*[63]*"*. The ERA-NET Co-fund is based on the merger of the former ERA-NET and ERA-NET Plus actions.

In practice, the projects coming out of these calls are cooperation between national funding agencies. In the ERA-Net Co-fund project, all the funding agencies provide fresh money and create a joint call with two stages for the research environment and industry to apply for. Projects proposals must be trans-national and involve at least two independent entities from two different EU Member States or associated countries.[64] In the first stage, based on a shorter project description, a review at the national or trans-national level is conducted. In the second stage, approved projects submit a full project proposal and considered in a single international peer review. Consortium partners with

[63] LCE-18-2015 Supporting Joint Actions on demonstration and validation of innovative energy solutions

[64] DG RTD (2014). HORIZON 2020 Work Programme 2014-2015, General Annexes, D. Types of action: specific provisions and funding rates

granted projects from the ERA-NET Co-fund will receive financial support from their national funding agencies and top-funding from the EU (maximum of 33% of the total eligible costs of the action).

ACT (Accelerating CCS Technologies)[65] as described in section 3.1 is the only ERA-NET Cofund addressing CCS. **There might be additional calls on CCS, but it is difficult to say at this time whether it will be of relevance to the continuation of GATEWAY and the Rotterdam Nucleus.**

4.2.4.3 H2020 call: Research & Innovation action with ECRIA requirement

The first Research and Innovation Action (RIA) with the requirement of a European Common Research and Innovation Agendas (ECRIAs) was launched for the first time in the Horizon 2020 Work Programme (WP) for 2016-2017[66]. RIA is not a new type of instrument; it is a common call in H2020. What is new and unique, is the ECRIA requirement.

The ECRIA project proposals will bring ongoing and future national efforts together on a European scale, in order to improve the exploitation of national activities and their results in areas of significant complexity and importance. ECRIA projects will describe how to define a common research and innovation agenda (i.e. an ECRIA) between national activities in areas identified in the SET Integrated Roadmap, including CCS. The intention is to identify research gaps and to develop a critical mass of research capacity in Europe.

The evaluation of ECRIAs started in the autumn of 2016, and the European Commission is considering whether to launch new ECRIA calls. Hence, in the spring of 2017 it is still unclear whether it will be possible to seek funding through an RIA-call with ECRIA requirement.

4.2.5 Research Fund for Coal and Steel

The Research Fund for Coal and Steel (RFCS) supports industrial research projects in coal and steel sectors. These projects cover: production processes; application, utilization and conversion of resources; safety at work; environmental protection and reducing CO_2 emissions from coal use and steel production[67]. The Zero Emission Platform (ZEP) has had a role in deciding the priorities in RFCS[35]. Every year around € 55 million is made available through open calls to universities, research centers and private companies to fund projects[68]. Here, funds relevant for CCS are only available for CCS technologies for the reduction of CO_2 emissions from coal and steel technologies, i.e. CO_2 capture.

4.3 Loans and other financial incentives

As stated by Element Energy, grants alone are insufficient to meet the requirements of industrial CCS cluster projects[38]. Loans and other financial incentives have not been the focus of this work, but a few

[65] http://www.act-ccs.eu/about-us/
[66] The full name of the call: LCE-33-2016 European Common Research and Innovation Agendas (ECRIAs) in support of the implementation of the SET Action Plan
[67] http://www.eesc.europa.eu/resources/rfcs-presentation_gibellieri_-01_09.pdf
[68] https://ec.europa.eu/research/energy/eu/index_en.cfm?pg=funding-other

sections are included below as a glimpse of what exists outside the grants. Further details are expected in the upcoming European Climate Foundation/Element Energy roadmap.

4.3.1 The European Investment Bank (EIB)

The European Investment Bank (EIB) is the EU's bank, providing backing and management for many European financial programmes as well as finance and expertise for investment projects, including on climate action and strategic infrastructure[69]. It is a not-for-profit, policy driven institution aligned with EU policy, having the motivation to try to support the EU in its ambitions and programmes[70]. The EIB is prepared to look at CCS as an important technology and take on higher risks than other banks[52]. Nevertheless, the EIB requires suitable guarantees (by the government, for instance) to ensure project bankability[52].

Of relevance to CCS the EIB plays an important role in managing several key funds such as the EFSI (see section 4.3.2) and the former NER300 fund as well as being a source for loans. Related to NER300, the EIB was important for the White Rose Project[52]. They were looking to get up to 50% of their commercial debt from the EIB[52]. EIB's support was on the basis of the UK contract for difference (CfD), and not the NER300 funding. The potential NER300 funding was ignored due to its uncertainty[52]. A new Swiss company is starting up in the spring of 2017, with the intention to support companies and institutions in developing CCS projects and/or commercialising new low-carbon energy technologies based on the White Rose project's experiences and know-how gained through the UK CCS development programme and NER 300 funding mechanism[52].

4.3.2 The European Fund for Strategic Investment (EFSI)

The EFSI is a flagship programme which is part of the European Commission's president Jean Claude Juncker's Investment Plan for Europe. EFSI was launched jointly by the EIB Group - European Investment Bank (EIB) and European Investment Fund (EIF) - and the European Commission to help overcome the current investment gap in the EU by mobilizing private financing for strategic investments[71].

The fund aims to unlock public and private investments in the real economy of at least €315 billion in the period 2015-2017[71]. Of this amount, €240 billion will be allocated to 'Strategic Investments of European Energy' in energy, transport, broadband, education, research and innovation[71].

Large corporates, special purpose vehicles or companies with up to 3,000 employees can benefit from project loans or loans to finance research & innovation. The criteria for the selection will be EU added value (i.e. projects in support of EU objectives and consistent with EU policy priorities); economic viability, potential of leveraging other sources of funding, size and scalability[71]. EFSI will focus on projects which could not have been carried out without EFSI support. Projects supported by EFSI thus typically have a *higher risk profile* than projects supported by EIB normal operations[71].

[69] http://www.c-energy2020.eu/eu-funding/eu-funding-opportunities/
[70] https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/EIB%20workshop_Roland%20Schulze.pdf
[71] http://www.eib.org/efsi/

As stated in Annex 3 of ZEP's Executable Plan for enabling CCS in Europe[35], CCS could be considered a high risk investment area, particularly because of costs and regulatory uncertainty. However, it is yet unclear how CCS projects could fit in this fund due to the *necessity for the return on investment*, which is problematic when there is no commercial market for CCS. For that, a framework that enables large-scale investments in CO_2 transport and/or storage facilities is necessary. It is further stated in the Annex that, *"any framework that would enable large-scale investments in CO_2 transport and/or storage facilities could alter this situation by creating a commercial market, albeit limited in scope"*. And that *"if a market maker model or equivalent is adopted, then the ESFI could provide valuable upfront capital funding"*[35].

4.3.3 The LIFE programme

The LIFE programme is EU's financial instrument supporting environmental, nature conservation and climate actions projects throughout the EU[72]. Under the LIFE sub-programme for climate, priority area 'Climate Change Mitigation' is the relevant funding pillar to CCS[35]. Compared to H2020, the focus here is less on research and more on supporting "traditional" projects, i.e. best-practice, demonstration, pilot or information, awareness and dissemination projects[72]. Synergies with H2020 as well as transnational projects and cooperation is favoured. The total budget for the 2014-2020 period is €3.4 billion, and the maximum EU co-financing rate is 60 % of the total eligible project costs[35]. There are annual calls for proposals.

However, unlike the Connecting Europe Facility, even though CCS is included under actions for this priority area, the construction of CCS infrastructure is outside of the scope of the LIFE Programme – that is, projects where the cost of a "single item of infrastructure" exceeds €500,000[35]. Only CCS projects where infrastructure forms a small part of the overall project, and where it is not the main focus of the project, are eligible[35]. **It has to be investigated further whether an early stage feasibility study for the Rotterdam Nucleus could be eligible under the LIFE programme.**

4.4 Summary and conclusions

This chapter has looked into European funding sources with the aim to find relevant funding sources for the continuation of GATEWAY and the potential Rotterdam Nucleus PCI. There are many funds, but not all of them are equally relevant for CCS and for a CO_2 infrastructure.

For the continuation of GATEWAY in the short term, the best source as of today (May 2017) seems to be the **Connecting Europe Facility grants** by the PCI. GATEWAY submitted a PCI proposal for the Pilot Case Rotterdam Nucleus April 15th 2017. If included on the PCI list, this will be followed up by asking for grants for study under the CEF call for grants in early 2018.

Another source is **the Innovation Fund/NER400** which is expected to be the main funding mechanism of low-carbon technologies during the next phase of the ETS (2021-2030). Some funding might be available for the Innovation Fund to start before 2021 and include projects to support breakthrough technologies in industry (such as CCS). GATEWAY will continue to follow the

[72] http://ec.europa.eu/environment/life/

development and look for opportunities for funding for later phases of the Pilot Case when the details for the Innovation Fund will be available in early 2018.

The eligibility of CCS in the **'regional funds'** (European regional development fund, ERDF) is a bit unclear, but it might be possible as long as the project comes under a research line related to installations or parts of installations used for research, development and testing of new products to enable the shift to a low-carbon economy[35]. Something like a feasibility study of the GATEWAY Pilot Case might qualify.

Within **H2020**, there are reasons to believe that there will be a relevant CSA call in the 2018/2019 work programme for the continuation of GATEWAY and the Rotterdam Nucleus PCI that should be looked further into. In addition, it has to be investigated further whether an early stage feasibility study for the Rotterdam Nucleus could be eligible under the **LIFE programme**, possibly in synergy with a H2020 project.

One note that should be made is that there seem to be few funds available in order to build a large, trans-European CO_2 transport infrastructure system. The predominance of funds are intended for a 'research line', related to research, innovation and coordination. It is recommended that the European Commission prioritizes the infrastructure part of CCS, possibly within the new Innovation Fund.

This project is funded by
the European Union

APPENDIX: MAPPING EU PUBLIC FUNDING AND CARBON CAPTRUE AND STORAGE. APPENDIX 3 IN ZEP'S EXECUTIBLE PLAN FOR CCS IN EUROPE

Mapping EU public funding and Carbon Capture and Storage (CCS)

June 2015

Contents

Executive summary

There are a number of EU programmes that could be tapped for funding for the development of Carbon Capture and Storage (CCS), this memo provides an overview of the key funding streams and, where appropriate, recommendations for potential actions to leverage future funding. Please note that this covers the EU-led funding streams, not the potential co-funds available at Member State level.

In the past, funding programmes directed specifically at CCS including the European Economic Programme for Recovery and the NER300 have had very limited success in deploying CCS – it is therefore crucial for the long term roll out of CCS that the next frameworks are both well designed and well used.

The Multiannual Financial Framework Funds

Funding programmes generally fall under the recently adopted **multiannual financial framework (MFF)** for the period 2014-2020. The MFF sets the maximum annual amounts (ceilings) that can be spent by the EU in different policy areas (headings) over a period of at least 5 years.

There are a total of six headings, of which two contain funding programmes relevant for CCS:

1) 'Smart and Inclusive Growth', which includes two sub-headings: Competitiveness for growth and jobs, with the **Connecting Europe Facility (CEF)** and the **Horizon2020 programme**. Of these two, Horizon2020 focuses on research and the CEF on infrastructure projects.

2) 'Sustainable Growth', which includes the **LIFE programme.**

Of these, in terms of calls of relevance to CCS, there are several important opportunities due in September from the Horizon2020 programme and a call has just been launched by the LIFE programme for action grants which could cover some aspects of CCS programmes.

It is also worth noting the "Research Fund for Coal and Steel" (information here), which ZEP has had a role in when it comes to deciding the priorities. Here funds are made available *inter alia* for the reduction of CO_2 emissions from these technologies.

However, for several funds, additional preparatory work will need to take place in order for long term funding to become available. In such cases, WS has provided some recommendations as to which steps would now need to take place. On the **CEF,** for example, work is now ongoing to put in place the framework conditions that could allow CO_2 transport projects to be added to the next Project of Common Interest list in 2017.

In addition, under the economic pillar, when it comes to the **European Structural and Investment Funds (ESIF),** which cover the important regional funds, there is a clear issue to resolve in terms of the eligibility of CCS. This is because activities under Annex I of the ETS Directive are excluded. There may be potential under research headings, but work would also need to be carried out at Member State level as they develop their programmes. This implies that a clear vision for post-2020 funding for CCS will be important, since there could be opportunities when the ESIF is revised in 2017.

New funding frameworks

Several new funds are also featured here. This includes the fund which is considered to be the pre-eminent source of money for CCS, the **Innovation fund / NER400,** which is currently under development

as the Commission reforms the EU ETS. There could also be money available through new funds structured under the ETS, such as the "Modernisation Fund". The question is when the funding will be able to come into play.

A section has also been provided on the flagship programme of the Juncker Commission, **the European Fund for Strategic Investment**, which has not yet been fully finalised. It is as yet unclear how CCS projects could fit in this fund due to the necessity for the return on investment. In this context, we have also provided an explanation of the workings of the **European Investment Bank** which provides the backing and management for many European financial programmes.

Conclusion

In the period 2015 to 2020 there are a number of opportunities for CCS, including a potential major project to be constructed under the Connecting Europe Facility, research money available under Horizon2020 and the LIFE programme and potentially from the innovation fund, depending on the legislative process. In addition, it will be important to assess how the Member State co-funds could be used. Finally, should Member States be keen to drive a CCS project there might be other possibilities through certain budget lines in the Regional funds or the EFSI.

Please see further details on the key programmes below.

EU funding programmes and CCS

Connecting Europe Facility (CEF)

SUMMARY: The CEF is considered to present an important opportunity for a CCS infrastructure project, but only for the next call in 2017. In order to get to this point, however, several preparatory steps will need to be taken to set up the correct structures and criteria.

Introduction

- The CEF supports the development of trans-European networks in energy (TEN-E), transport (TEN-T), and telecommunications (eTEN). It aims to facilitate the construction of Projects of Common Interest (PCIs) that would not be initiated by the market without support (see here for EC Memo).
- In 2013, the Regulation on "Guidelines for trans-European energy infrastructure" (available here) was adopted. Its aim is to ensure that strategic energy networks and storage facilities are completed by 2020 and it identified 12 priority corridors and areas covering electricity, gas, oil and carbon dioxide transport networks.
- Carbon Capture and Storage is included among the '*Priority Thematic Areas*' and the Regulation specifically refers to the development of a Cross-border carbon dioxide network and infrastructure between Member States ' *in view of the deployment of carbon dioxide capture and storage'.*
- The Regulation allows the Commission to adopt every two years a list of key energy infrastructure PCIs which help Member States integrate their energy markets. Storage facilities, both for electricity and gas, may also apply for a PCI status providing they fulfil the eligibility criteria.
- Once selected as a PCI the projects benefit from accelerated licensing procedures, improved regulatory conditions, and under certain conditions access to financial support totalling EUR 5.85 billion from the Connecting Europe Facility (CEF). PCIs are only funded for CAPEX, not OPEX. However preparation activities, including studies, can be funded.
- In October 2013 a list of key infrastructure projects was adopted (see here for the list) and in 2014 €647 million was allocated in grants. A new list of projects should be adopted by autumn this year and a total of €650 million in grants is planned for PCIs in 2015. Please note that the funding for each project ranges from around €100,000 for a technical study to circa €295 million for the Lithuania-Poland Gas interconnection.
- As a consequence, infrastructure for CO_2 transport may be eligible for funding as an energy infrastructure project. This would require the project to be recognised as a Project of Common Interest (PCI). It has to benefit at least two Member States, contribute to market integration, further competition, enhance security of supply, and reduce CO2 emissions.
- Currently work is ongoing in DG Energy to assess how a project on CO_2 infrastructure could be practically implemented.

The European Fund for Strategic Investments (EFSI)

SUMMARY: The EFSI is a flagship initiative, aimed at stimulating growth and jobs, but although CCS has been identified as a key breakthrough technology by the Task Force it is considered a high risk investment area. The fund is now in the process of being adopted by the institutions and some initial projects could soon be launched. It will be important to assess whether in fact some CCS projects could be envisaged, for example from UK proposals. As CCS develops further, it may be that this could provide funds in the long term.

- The Regulation establishing the EFSI was tabled by the Commission on 13 January 2015. The Investment will have the aim to unlock public and private investments in the real economy of at least €315 billion over the next three years (2015-2017).
- This will be a joint effort between the European Investment Bank (EIB) and the European Commission. Member States, National Promotional Banks, regional authorities and private investors will also be encouraged to contribute.
- According to the text, the Commission will establish a Guarantee fund of €16 billion under the EU budget while the EIB will commit €5 billion for a total of €21 billion at EU level.
- From this initial sum, the fund will aim to mobilise extra private finance in specific sectors and areas with an expected multiplier effect of 1:15 in real investment in the economy to achieve the total amount planned of €315 billion.
- Of this amount, €240 billion will be allocated to 'Strategic Investments of European Energy' in energy, transport, broadband, education, research and innovation. Funding will be accessible for companies having up to 3,000 employees, with a focus on SMEs.

Task Force on Investment in the EU

- A first list of potential projects eligible for funding was put together by the **Task Force on Investment in the EU**, composed of experts from the Commission, the EIB and Member States and presented to the European Council.
- The final Report presented mapped a total of €1.3 trillion of potential investments and it also identified a number of projects of European importance currently developed under different EU initiatives.
- The Report contained an annex listing potential projects 'showcased' by Member States that could potentially fall under the scope of the new investment fund. However, the list has been removed from the EU institutions' websites, apparently under pressure by Member States themselves who argued that it created confusion and show funding commitments towards the projects identified.
- According to the report, preference will be given to projects with higher risk bearing capacity, covering new products and providing new delivery modes in cooperation with National Promotional Banks and private sector financial institutions.
- The criteria for the selection will be EU added value (i.e. projects in support of EU objectives and consistent with EU policy priorities such as, for example, the 2030 climate and energy package, Europe 2020 Strategy and other long-term EU strategic priorities); economic viability, potential of leveraging other sources of funding, size and scalability. There will be no definitive list of projects that will be guaranteed financing by the EFSI.

Governance of the EFSI – the steering board

- As for the governance of the fund, the EFSI will have a steering board that will set the overall strategy, investment policy and risk profile of the fund to be included in a set of investment guidelines to be adopted**.**
- It will be composed of Members from the Commission and the EIB only and take decisions by consensus, while regularly consulting stakeholders.
- An independent investment committee will select the projects. It will be chaired by a managing director and bring together eight independent experts. Decisions will be taken by simple majority and any project supported by the EFSI will require approval also by the EIB.
- Member States can contribute to the EFSI in guarantees or cash, while third parties can contribute only in cash.
- Third parties, including member states' national promotional banks, will be able to co-finance projects together with the EFSI, either on a project-by-project basis or through investment platforms. To date Luxembourg, Germany, France, Italy, Spain and Poland have contributed to the fund.
- Regarding the identification of new projects, a European investment advisory hub will provide advisory support for the identification, preparation and development of projects across the EU and manage a European investment project portal to improve investors' knowledge of existing and future projects.

State of play and next steps

- An agreement on the final text of the regulation between Parliament and Council was reached after intense negotiations last 28 May 2015. The ECOFIN Council is expected to ratify the agreement on 19 June and Parliament´s plenary is scheduled to vote on 24 June. At a more technical level, the Commission and the EIB are working on the investment guidelines and the selection of the members of the investment committee. The Commission expects the plan to start funding the first projects in early autumn.
- Meanwhile, on 22 April 2015, the first projects and transactions earmarked to benefit from the EFSI guarantee fund were approved by the Boards of the European Investment Bank (EIB) and the European Investment Fund (EIF). These first projects cover investment in healthcare research in Spain, expansion of a key airport in Croatia, the construction of 14 new healthcare centres across Ireland and backing for industrial innovation in Italy.
- On May 19 2015, the EIB approved 21 projects to support renewable energy and strategic infrastructure projects, including four projects earmarked for support from the EU budget guarantee under the EFSI and subject to agreement by the European Commission.

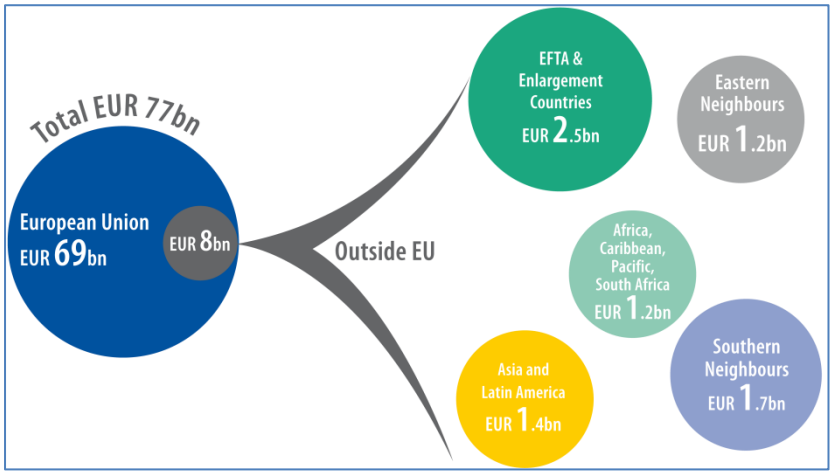
CCS and the EFSI

- The final report by the Task Force on investment in the EU (see above) identifies CCS among 'the most important break-through technologies with prospects for high economic returns that are ready for implementation' (p.33), being also one of the new energy technologies identified in the European Strategic Energy Technology Plan (SET-Plan).
- CCS is mentioned as one of the high risk investment areas, particularly because of costs and regulatory uncertainty and the report sees the public private partnerships or co-investments through equity, mezzanine and/or debt as a solution to invest on large-scale CCS demonstration projects. It also provides one example of a CCS Project in the UK and investment barriers (p.35) that is currently under appraisal by the EIB for funding.

The European Investment Bank (EIB)

SUMMARY: The EIB is the EU's bank and provides finance and expertise for investment projects, including on climate action and strategic infrastructure. Of relevance to CCS it plays an important role in managing several key funds such as (in the future) the EFSI and currently the NER300 as well as being a source for loans.

- The EIB is the European Union's bank and provides finance and expertise for investment projects which contribute to EU policy objectives.
- In 2014, the European Investment Bank lent €77 billion in projects in support of the objectives of the European Union: €69 billion in the Member States of the Union and €8 billion in the partner countries. Please find the full list of projects here and a list of projects to be financed here (523 entries).
- Its main priorities are: 1) Innovation and skills, 2) Access to finance for smaller businesses, 2) Climate action and 3) Strategic infrastructure.
- More than 90% of its activity is focused in Europe, but it also supports the Union's external development policies. With the European Investment fund (EIF), a specialised entity providing SME risk finance, it is part of the EIB Group. The EIB is the majority EIF shareholder with the remaining equity held by the European Commission and other European private and public bodies.



- The EIB funds its operations by borrowing on the capital markets through bond issues rather than drawing on the EU budget and enjoys decision-making independence within the EU's institutional system.
- In general, the EIB finances one third of each product, but the loan can also cover up to 50% of an activity.
- The EIB has three decision-making bodies: the Board of Governors (composed by the 28 Ministers designated by each Member State), the Board of Directors (appointed by the Board of Governors and decides on loans, guarantees and borrowings), the Management Committee (the permanent collegiate executive body) and an independent Audit Committee.
- In a nutshell, the EIB's three main activities can be summarised as **'Lending'** (project loans, intermediate loans, venture capital, microfinance, equity), **'Blending'** (unlocking sums from the EU budget) and **'Advising'** (assistance to project management, administration and implementation).
- Financing decisions by the EIB follow a **Project Cycle** (visual here) that is divided in four steps: **applying for a loan**, **project appraisal**, **procurement**, **monitoring**.

Applying for a loan

- In order to apply for a loan there are no specific formalities: '*project promoters are required simply to provide the Bank's Operations Directorate with a detailed description of their capital investment together with the prospective financing arrangements and the required documentation'*.

- Discussions on a proposed project can take place in any form (telephone, meeting, email).
- The Project promoter has to provide the EIB sufficient information to allow the EIB to assess the suitability of the project with the EIB's lending objectives and make sure that it is in line with environmental and procurement standards.
- The appraisal of a project is carried out by the EIB's teams of engineers, economists and financial analysts, in close cooperation with the promoter.
- The assessment criteria are tailored to each specific project and the results are included in the project report to the Board of Directors for a financing decision. An eligible project has to contribute to EU economic policy objectives. These can range from the promotion of economic and social cohesion to the development of EU transport and telecommunication or energy networks.
- As for procurement procedures, the EIB verifies that a fair process of international tendering takes place according to procedures set out in the EIB Guide to Procurement.
- The monitoring of projects is divided into three steps: the financial monitoring, the physical monitoring and the ex-post evaluation. The EIB carries out the whole process to ensure that the physical execution of the project is in accordance with the contract and evaluates the results of the investment.

The EIB and the EFSI

- Even before the political agreement reached by the Commission, the European Parliament and the Council on the Regulation of European Fund for Strategic Investments (EFSI), the EIB expanded its financing for sectors and project types to be targeted by the new investment fund.
- The EIB will **host and manage** the new fund which will complement existing EIB group lending and *expand its current lending to projects with higher than average risk profile.*
- As highlighted in the section on the EFSI in this memo, the EIB has already approved a series of loans under the EFSI.
- All of these Projects will be submitted to the European Commission and the newly established governance bodies of the EFSI to determine whether the EU guarantee can be used to back them.
- The EIB Group is committed to taking the projects on its balance sheet even if the guarantee should be found not to apply

The EIB and CCS

- The EIB has a key role in advising the Commission with the implementation of the NER300 initiative, the world's largest funding programme for carbon capture and storage demonstration projects.
- A specific cooperation agreement details the respective roles of the two institutions in implementing the NER300 Decision.
- The EIB is mainly involved in the *'Monetisation'* of the 300 million EU allowances set aside in the New Entrants Reserve of the EU Emissions Trading System for the initiative and, more importantly, in the appraisal of projects submitted for funding.
- To date the Commission, made two calls for proposals under the NER300 initiative. The EIB carried out the technical and financial due diligence of the projects and advised the Commission in deciding on the assignment of the funding for respectively 23 and 19 projects. Please find more information here and here.
- At present, the EIB is currently appraising the 300 million GBP funding awarded under the NER300 to the WHITE ROSE CCS project. The project consists of the design, implementation and operation of a large-scale (up to 450 MW gross) coal-fired power plant, adjacent to an existing power station in Selby, North Yorkshire (UK). By using oxy-fuel combustion technology, the project is designed to capture 90% of its CO_2 emissions (2 Mt/year). Further information on the project is available here.

European Structural and Investment Funds

SUMMARY: The European Structural and Investment Funds is the second largest budgetary line of the EU MFF but it does not currently apply to activities listed in Annex I of the ETS Directive – unless – the project comes under a research line related to installations or parts of installations used for research, development and testing of new products to enable the shift to a low-carbon economy.

General provisions

- The European Structural and Investment Funds (ESIF) represent the second largest budgetary line of the EU Multiannual Financial Framework (MFF); for the 2014-2020 period, the budget allocated to the Funds amounts to a total of €376 billion.
- All the Funds are regulated by a common legislative framework (the Common Provisions Regulation 1303/2013), which sets out the overall objectives and priorities that the Funds will pursue.
- As established by Article 9 of the Common Provisions Regulation, "in order to contribute to the Union strategy for smart, sustainable and inclusive growth (…) each ESI Fund shall support (…) shift towards a low-carbon economy in all sectors".
- In turn, the specific regulations for each the Funds translate this thematic objective into investment priorities, based on which Member States propose their Operational Programmes to be co-financed by the EU Funds.

European Regional Development Fund

- The structure of the European Regional Development Fund (ERDF) is defined by Regulation 1301/2013; the overall objective of the ERDF is to redress "the main regional imbalances in the Union through the sustainable development and structural adjustment of regional economies, including the conversion of declining industrial regions and regions whose development is lagging behind".
- It is significant that Article 3.3(b) of the ERDF Regulation clearly states that "the ERDF shall not support (…) investment to achieve the reduction of greenhouse gas emissions from activities listed in Annex I to the ETS Directive 2003/87/EC". This means that many CCS installations could therefore be excluded.
- However, the ERDF's investment priorities under the objective "shift towards a low-carbon economy in all sectors" include "promoting research and innovation in, and adoption of, low-carbon technologies".
- Moreover, the exclusion of the activities listed in the ETS Directive does not include "installations or parts of installations used for research, development and testing of new products", making these activities eligible for ERDF funding within the areas of research, technological development and innovation. Under this investment priority, the "research and innovation strategies for smart specialisation" could potentially offer a basis for ERDF funding in support of R&D activities related to Carbon Capture and Storage.
- Under the current legislative framework, smart specialisation strategies are defined as "national or regional innovation strategies which set priorities in order to build competitive advantage by developing and matching research and innovation own strengths to business needs in order to address emerging opportunities and market developments in a coherent manner, while avoiding duplication and fragmentation of efforts".
- Moreover, besides the financial support that Member States can claim under research and development, the general use of the European Structural and Investment Funds must be seen as a complement (rather than as a support basis) for the commercial roll-out of Carbon Capture and Storage projects.

- While the ERDF Regulation excludes funding for projects aimed at the reduction of GHG emissions from sectors covered by the EU ETS, the General Provisions Regulation provides strategic guiding principles in order to achieve “an integrated development approach using the ESI Funds coordinated with other Union instruments and policies” (Common Strategic Framework, Annex I of the Regulation 1303/2013). As part of these principles, the General Provisions Regulation states that “Member States shall ensure that financing from the ESI Funds is coordinated with support from the NER300 Programme, which uses the revenues from auctioning 300 million allowances reserved under the new entrants reserve of the European Emissions Trading Scheme”.

Funding foreseen under the reform of the Emissions Trading System

SUMMARY: The funds foreseen under the ETS are seen to be the pre-eminent funds for CCS. Unfortunately, the NER300 did not run as planned and only one CCS project was awarded funding. It will be key for the next generation of funding to lead to a number of successful projects. The framework for this funding will come in July in the form of the EU ETS Reform.

- As laid out by the European Council Conclusions on the 2030 climate and energy framework, adopted in October 2014, the European Commission is currently drafting the reform of the Emissions Trading System.
- Key elements will include the Innovation and Modernisation Fund.
- The Innovation Fund is considered to be the primary fund for supporting the development of CCS technology. It is the successor to the NER300 and is intended to be the main funding mechanism of low-carbon technologies during Phase 4 (2021-2030) of the Emissions Trading System (ETS).
- Discussions on the exact mechanisms will form part of the legislative debate on the ETS review. The legislation should be proposed before the summer (likely July) and will then be scrutinised under the Ordinary Legislative Procedure by the Council and the Parliament.
- However, both the Member States and the European Parliament have given certain indications on the preferred elements of the fund. These can be found in the European Council conclusions on the 2030 climate and energy framework adopted in October 2014 (see here). The intended scope is expected to include CCS for the power sector as well as Energy Intensive Industries. Please see below for an overview of the potential structures.
- The preliminary agreement reached between Parliament and Council on the Market Stability Reserve proposal (MSR) also gives an idea of potential additional funding opportunities for CCS projects (see here). Plenary is expected to vote on 6 July and, following endorsement by Council, the Commission is expected to propose the ETS review shortly after. Legislative discussions will likely last another 2 years.

Innovation Fund (NER400) as per the Council conclusions:

- It should be focussed on 'Low carbon demonstration'.
- It should include 400 million allowances
- It should build on the NER300 for CCS and RES but there should be an extension of the scope to low carbon innovation in industrial sectors. It should be open for projects in all EU Member States.
- Currently we understand that the Commission is thinking along the lines of beginning the NER400 in 2018, which in conjunction with a potential recycling of unused NER300 funds, could bridge the gap between now and 2020.

Modernisation Fund as per the Council Conclusions:

- This fund should focus on 'Modernising energy systems in lower income Member States' – GDP less than 60% of EU average (currently 10 Member States but this should be reviewed in 2024).
- 300 million allowances
- Member States to manage the fund, but EIB involved in the selection of projects.

Solidarity allowances in Council conclusions:

- 10% of total auctionable allowances.
- For 'solidarity, growth and interconnections' in Member States with lower incomes.

Additional innovation funding in the MSR agreement:

- The full agreement is yet to be fully confirmed and we understand that there are issues with this agreement.
- ETS review to consider fund of 50 million allowances for 'low carbon industrial innovation projects'.
- To operate before 2021 and to supplement projects under NER300.

Horizon2020

SUMMARY: Horizon2020 is a key funding source for CCS R&I. Several projects have been launched this year. In addition a new section of calls will open formally in mid-September for 2016 -2017 (when the info day is scheduled), which will likely include a number of lines on CCS.

- The Horizon2020 programme provides funding from basic research to market innovation. Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness (see here for the regulation). The primary goal is to ensure Europe has world-class science, barriers to innovation are removed and collaboration between the public and private sectors is facilitated in order to deliver innovation.
- The programme has three sections: Societal Challenges, Excellent Science, and Industrial Leadership. 'Secure, Clean and Efficient Energy' is categorised under societal challenges. The total funding for energy projects is €5.4 billion in the period up till 2020, with 85% earmarked for non-fossil fuel energy research. The remaining 15%, constituting €750 million, may be used for CCS funding, but also for shale gas, flexible operation of power plants etc. However, it also includes hydrogen.
- The 2014-2015 work programme was split into three focus areas, including 'Low Carbon Technologies' (see here for the programme) and included two calls relating to CCS (see here and here). The deadline for both calls was 3 September 2014. Results were expected at the end of 2014 and the second stage of the proposal process had a deadline of March 2015.
- The SINTEF led Gateway project has been confirmed as a beneficiary (details here), which) to define a subsequent initiative, referred to as the Pilot Case, providing a model for establishing a European CO2 infrastructure project, targeting a gateway transferring CO2 from source to sink. The gateway will form the first leg of a cross-border network, allowing multiple sources and multiple sinks. b) to make profound assessments of the substantial funding needs and available resources. c) to solicit strong actions by the partners involved (member states of the EU and other countries) with a three-step approach (Berlin model).
- Similarly to the previous one, the 2016-17 programme of the Societal Challenge 3 "Secure, Clean and Efficient energy" should also include a "Competitive low-carbon energy" category and a number of calls for CCS.
- An information day will be held on 14 and 15 September (programme here) to present the programme and for in-depth session on various elements including CCS. Registration will open in June.

LIFE programme

Summary: The LIFE Programme aims to contribute to the shift towards a resource-efficient, low-carbon and climate-resilient economy. They have just launched a call for proposals for Action Grants which includes CCS in its scope – but only where infrastructure forms a small part of the overall project and where it is not the main focus of the project. The Programme aims to encourage synergies with Horizon2020 and will score transnational project highly, in cases where it is essential to guarantee climate objectives. The maximum EU co-financing rate is 60 percent of the total eligible project costs for 2014-2017. The most recent call closes on 15 September at 16:00.

- The LIFE Programme aims to improve the implementation of EU environment and climate policy and legislation (see here for the Regulation). Of relevance to CCS, the programme seeks to contribute to the shift towards a resource-efficient, low-carbon and climate resilient economy.
- Compared to Horizon2020, the focus of the 'LIFE sub-programme for climate' priority area 'Climate Change Mitigation', the funding pillar relevant to CCS, is less on research and more on supporting demonstration, pilot and best practice projects. These are so-called 'Traditional Projects'.
- There are annual calls for proposals. Currently, there is a call for proposals for LIFE Action grants (see here for more information). The call covers proposals for both environment and climate action sub-programmes. The Executive Agency for Small and Medium-Sized Enterprises (EASME) is responsible for managing the call for traditional projects and capacity building projects.
- The total budget for the 2014-2020 period is €3.4 billion. During that period the Contracting Authority plans to launch one call for project proposals per year.
- There are two programming periods: 2014-2017, and 2018-2020. The first multi-annual work programme runs from 2014 until 2017 and foresees a total budget of €449.2 million for the climate action sub-programme, with 10 percent going towards governance and information and the rest divided equally between mitigation and adaptation.
- The total budget for this call is €240,811,337, with €56,670,000 allocated for the climate action sub-programme and €184,141,337 for the environment sub-programme.
- There is no minimum size for project budgets. In the past large projects over €5 million have been financed several times, while small projects below €500,000 are rarely selected typically due to low added value.
- Member States may, on a voluntary basis, provide support to applicants (National Contact Points can be found here).
- The main focus for projects under the Climate Change Mitigation priority area should be to contribute to the transition towards a low emission and climate-resilient economy. While CCS is included under actions for the priority area, the construction of CCS infrastructure is outside of the scope of the Programme.
- Types of Action Grant projects eligible for funding under the Climate Change Mitigation priority are best practice, demonstration, and pilot projects.
- The deadline for proposals is 15 September 2015 (4pm Brussels time) with individual grant agreements expected to be signed in May-June 2016, and the earliest possible starting date for projects 15 June 2016. For 'Traditional Projects' applicants must use the eProposal tool available here.
- There is no predetermined duration for projects, but most projects run for 2-5 years. Extensions are granted only under exceptional circumstances. Beneficiaries are encouraged to include an appropriate safety margin, e.g. 6 months, in their timeline.
- The maximum EU co-financing rate is 60% of the total eligible project costs for 2014-2017 (on average €1-2 million EU finance). The coordinating beneficiary and any associated beneficiaries are expected

to provide a 'reasonable' financial contribution to the project budget. Where public bodies are involved as coordinating and/or associated beneficiaries in a project, the sum of their financial contributions to the project budget must exceed (by at least 2%) the sum of their salary costs charged to the project for personnel who are not considered 'additional'.

- The beneficiaries must inform the Contracting Authority about any related funding they have received from the EU budget, as well as any related on-going applications for funding from the EU budget. In addition, at the project revision stage, the national authority may also be required to indicate the steps taken to ensure the coordination and complementarity of LIFE funding with other EU funding programmes.
- The LIFE Programme encourages the uptake of the results of environmental and climate-related research and innovation of Horizon 2020 in projects, and offers co-financing opportunities for projects with clear environmental and climate benefits that ensure synergies between the LIFE Programme and Horizon 2020.
- Projects dedicated to the construction of large infrastructure fall beyond the scope of the LIFE Programme. These are projects where the cost of a "single item of infrastructure" exceeds €500,000. CCS projects where infrastructure forms a small part of the overall project, and where it is not the main focus of the project, are still eligible.
- While selecting the projects to be co-funded, the Contracting Authority will pay particular attention to transnational projects, when transnational cooperation is essential to guarantee climate objectives. If such evidence can be provided, the proposal will be considered for a higher scoring in the project selection process and will therefore have a higher chance of being selected for co-funding.