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IMPACT ASSESSMENT

Accompanying the document

Commission Delegated Regulation

supplementing Directive 2003/87/EC of the European Parliament and of the Council with regard to the operation of the Innovation Fund

{C(2019) 1492 final} - {SEC(2019) 87 final} - {SWD(2019) 86 final}

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1. INTRODUCTION: POLICY AND REGULATORY CONTEXT

1.1. Policy context

The EU has been, and continues to be a leader in the effort to mitigate climate change in recognition of the heavy economic, social and environmental cost of inaction[1]. The landmark Paris agreement of 2015 aims to put the world on track to avoid dangerous climate change by keeping global temperature rise well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.. The goal demands that we sharply reduce global greenhouse emissions and achieve zero net emissions in the second half of this century, which requires significant investment into innovation across a wide range of low-carbon technologies[2].

The **EU Emissions Trading System** (EU ETS) has been a core element of EU climate and energy policy since 2005 and is a key tool for achieving the EU's objective of reducing greenhouse gas (GHG) emissions cost-effectively. The EU ETS puts a price on GHG emissions and uses market forces to drive the necessary emission reductions. The EU ETS operates in 31 countries (all 28 EU countries plus Iceland, Liechtenstein and Norway) and limits emissions from more than 11,000 heavy energy-using installations (electricity production and energy-intensive industry) and airlines operating between these countries. In total, the EU ETS covers around 45% of the EU's greenhouse gas emissions.

The EU ETS Directive was revised in early 2018 for the next trading period from 2021 to 2030 ("phase 4") with a view to strengthening the incentives for the transition to a low-carbon economy and in order to contribute to the competitiveness of the European economy. Besides measures to strengthen the functioning of the EU carbon market and to prevent carbon leakage, the EU ETS Directive puts in place new funding mechanisms, which are financed from the EU ETS auctioning revenues, to help energy-intensive industries and the power sector meeting their innovation and investment challenges in the transition to a low-carbon economy.

In particular, the EU ETS Directive established the **Innovation Fund** ('the Fund' or 'IF') to support innovative low-carbon technology demonstration projects in energy-intensive industry, renewable energy, energy storage, carbon capture, use (CCU) or storage (CCS). The technologies, products, processes, and business models that can be supported through this Fund are numerous and diverse but can include, for instance, hydrogen-based steel production, oxyfuel carbon capture technology, floating wind power, tidal energy or algae biofuel production. Demonstration projects in the field of energy storage could among others include innovative battery manufacturing or energy storage at ports or on ships (see annex 4 and studies[3] for a more detailed description of the different sectors and low-carbon technology pathways).

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[1] Stern, N. (2007). The Economics of Climate Change: The Stern Review

[2] OECD (2017). Investing in Climate, Investing in Growth

[3] A more extensive but not exhaustive list of technologies is included in Ecofys (2018) Market Testing Study (hereafter: Ecofys (2018)) and in Climate strategy & Partners (2017) Expert workshops final report.

New technology development is essential to meet our EU and global climate change objectives, but is also a major contributor towards the EU's innovation, jobs and growth agenda. However, before these new low-carbon technologies can reach the marketplace, these technologies need to be demonstrated at scale. Such demonstration projects face high capital expenditure due to their scale while they also carry high technology risks and uncertainty about outputs and potential revenues. They are generally too risky to attract enough private finance and require various forms of government support to push the technology ahead. When technologies fail to progress beyond this stage, they are said to be stranded in the "valley of death". The Innovation Fund should help projects to overcome this "valley of death".

The Innovation Fund is a part of a larger landscape of both national and EU funding instruments, many of which include low-carbon technologies as a focus area (see Annex 5 for more details):

- The Innovation Fund will complement EU research and innovation efforts, currently funded through the Horizon 2020 programme, and in the next Multi-annual Financial Framework (MFF) via the Horizon Europe programme. The Innovation Fund should strive that eligible technologies which Horizon 2020 and Horizon Europe nurture do not end up in the 'valley of death' but are carried over into the market.
- The Innovation Fund also complements EU funding tools which catalyse investment into market-ready low-carbon technologies and infrastructure, such as InvestEU, the Connecting Europe Facility (CEF), the LIFE programme, the Modernisation Fund (as set up by the revised EU ETS Directive and financed from EU ETS revenues), and the Cohesion Funds.

1.2. Regulatory context

1.2.1. Framework for the Innovation Fund as set by revised EU ETS Directive

The EU ETS Directive has been revised on the basis of an Impact Assessment published in 2015[4]. The revised EU ETS Directive[5] defines the basic elements of the Innovation Fund, such as its size, scope, maximum funding rate (i.e. the maximum support that can be given to a project), and disbursement rules (see table 1 below).

The Innovation Fund is the successor to the current funding programme for innovative low-carbon energy demonstration projects from EU ETS revenues – the so-called NER 300 programme (as it is financed from the monetisation of 300 million allowances from the New Entrants Reseve (NER 300)). The NER 300 programme was conceived to

[4] SWD (2015) 135 - Impact Assessment accompanying the document Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC

[5] Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814

support the demonstration of environmentally safe carbon capture and storage (CCS) and innovative renewable energy (RES) technologies on a commercial scale.

The EU ETS Directive puts forth important changes for the framework of the Innovation Fund (compared to the NER 300 programme), namely by increasing its scope to innovation projects in energy intensive industries, increasing the maximum funding rate to 60% of relevant costs allowing a more flexible and milestone-based disbursement of the support to awarded projects (see table 1). The latter, in particular, will allow for upfront risk-sharing between project promoters and the innovation fund, rather than ex-post repaying successful innovators' additional costs.

Furthermore, the EU ETS Directive stipulates that the Innovation Fund will be endowed with higher resources, i.e. the revenues from the auctioning of at least 450 million allowances, which translates into a range of €6 billion (at carbon price of €15/tCO2) to €11 billion (at a price of €25/tCO2). In addition, any unspent revenues from the second call of the predecesor programme, the NER 300, will also be added as well as 50 million allowances, after 2025, if these are not used for free allocation to industry.

Finally, the EU ETS Directive allows for an early launch of the Innovation Fund before 2021 through the deployment of additional resources mentioned above.

Table 1: Basic elements of the Innovation Fund as set out in the revised EU ETS Directive EU 2018/410, compared to the basic elements of the previous NER 300 programme as set out in consolidated EU ETS Directive 2003/87

	NER 300	Innovation Fund	Impact
Size	300m allowances	**≥ 450m allowances**	Substantially increased funding
Scope	Scope limited to renewable energy and CCS	**Scope extended to energy-intensive industry and substitute products**	Greater technology coverage
Funding rate	Up to 50% of relevant costs	**Up to 60% of relevant costs**	Higher maximum funding rate
Disbursement of funds to projects	Disbursement of funds dependent upon the verified avoidance of CO_2 emissions	**40 % of support need not be dependent on verified avoidance of greenhouse gas emissions, provided that pre-determined milestones are attained**	Upfront risk-sharing between the fund and the project promoters and greater flexibility with regards to disbursement of funds

1.2.2. Implementation of the Innovation Fund

The Commission is empowered to adopt delegated acts concerning the rules on the operation of the Innovation Fund, including the selection procedure and criteria, to supplement the EU ETS Directive that sets out the basic features of the Innovation Fund as described above.

Based on the experience with the implementation of the NER300 programme, this Impact Assessment will analyse options for the rules that need to be set to make the Innovation Fund operational: definition of relevant costs and funding rate, disbursement of grants, projection selection procedure, monetisation of allowances, and governance (see Table 2 for the chosen operational rules of the NER300 programme that will be used to construct the baseline).

With regard to the NER 300 programme, Commission Decision 2010/670/EU set out the rules and criteria for the selection and implementation of the projects and the basic rules for the monetisation of allowances and for the management of these revenues. Those implementation rules sought to generate a balanced portfolio of projects across technologies and countries as well as to minimize the risk exposure of the programme. The architecture of NER 300 programme is described in more detail in the table 2 and annex 6.

A total of €2.1 billion was generated through the monetisation of 300 million allowances in 2011 and subsequently allocated to projects through two calls for proposals, in 2011 and 2013. In total 39 projects in 20 EU Member States were selected for funding by the NER 300 programme.

However, as not all selected projects could be successfully implemented (see section 2), the Commission decided[6] in 2017 to make unspent funds from the first call for proposals (at least €436 million) available to two existing financial instruments, the InnovFin Energy Demo Projects (EDP) under Horizon2020 and the Connecting Europe Facility (CEF) Debt Instrument, where they can be used to support demonstration projects for renewable energy and CCS.

Table 2: Implementation rules for NER 300 as set out in Decision 2010/670/EU

Decision 2010/670/EU – implementation rules for NER 300	
Level and disbursement of grants	• Definition of relevant costs as the additional capital and operating costs that are due to low-carbon innovation • Single funding rate (up to the maximum rate set in the ETS Directive) • Awarded grants are only disbursed once project is in operation and emissions reductions are realised • Disbursement of grants during development and construction phase only possible if guaranteed by Member State
Project selection procedure	• Two calls for projects in 2011 and 2013 • Eligible projects must fall into specific technology categories (e.g. four CCS or 34 sub-categories for

[6] Commission Decision (EU) 2017/2172 of 20 November 2017 amending Decision 2010/670/EU as regards the deployment of non-disbursed revenues from the first round of calls for proposals (OJ L 306, 22.11.2017, p. 24)

	renewable energy projects) and comply with specific requirements (e.g. capacity thresholds) • Successful projects are selected based on their cost-per-unit performance - a measure of how much public funding is needed per unit of CO_2 stored (for CCS projects), or of clean energy produced (for renewable energy projects) • At least one and not more than three projects per Member State can be supported (excluding transboundary projects)
Monetisation of allowances	• EU ETS allowances were monetised before grant award decisions
Mixed governance	• Member State: pre-selection and eligibility check, upfront funding, project contractual management • Commission: coordination, eligibility verification, ranking and award decisions • EIB: project evaluation, monetisation of allowances, disbursements

The experience with the NER 300 implementation provides valuable insights for the design of the implementation of the Innovation Fund:

- The lessons learnt from the implementation of NER 300 were analysed in a commissioned study[7] (hereinafter "NER 300 lessons learnt study"), the summary of which is included in annex 6.
- The NER 300 programme has also been recently audited by the Court of Auditors[8] (hereinafter "ECA report"), whereby annex 7 summarizes the key recommendations from this report).
- Several workshops and consultations were held where stakeholders and experts shared their experiences with the NER 300 implementation[9] (hereinafter "Public Consultation (PC) report" and "Expert workshops summary").

2. PROBLEM DEFINITION

The problem definition, the objectives for the implementation of the Innovation Fund and the assessment of the options will draw from the NER 300 experience. The NER 300 programme is the predecessor of the Innovation Fund. Therefore, it is appropriate to consider that the Commission could *mutatis mutandis,* i.e. to the extent that it is permissible under the revised EU ETS Directive, apply the implementing rules of NER

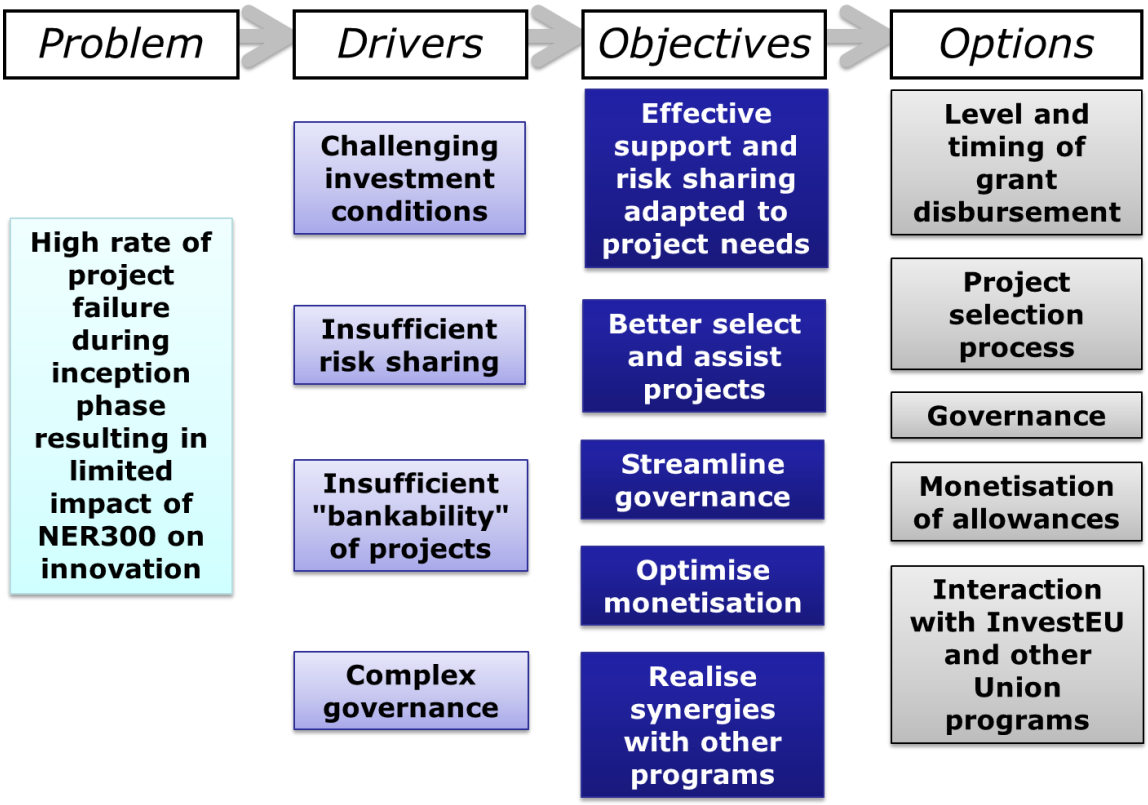
[7] ICF (2017) NER 300 Lessons Learnt Summary report

[8] Special Report of the European Court of Auditors "Demonstrating carbon capture and storage and innovative renewables at commercial scale in the EU" (2018)

[9] Ramboll (2018) Public consultation report and Climate strategy & Partners (2017) Expert workshops final report

300 as set out in Decision 2010/670/EU also for the Innovation Fund. The NER 300 implementing rules are therefore used as the baseline for this impact assessment.

Table 3: Intervention logic for this Impact Assessment based on NER 300 experience



This section relies on evidence collected as part of the ECA report, the NER 300 lessons learnt study, a dedicated Market Testing Study[10] (hereinafter "Ecofys (2018)" and the public consultation[11].

2.1. What is the problem?

Significant rate of project failure in the inception phase

At the beginning of 2018, only 6 out of the 39 selected projects by the NER 300 programme in 2012 and 2014 have entered into operation.

So far, 14 projects withdrew from the NER 300 programme freeing up €1 billion of funds:

- The most affected sector was the one of bioenergy: 7 out of total of 13 bioenergy projects have been withdrawn up to now.
- No carbon capture and storage project could be implemented.

[10] Ecofys (2018) Market Testing study

[11] Ramboll (2018) Report on the Online Public Consultation on the Establishment of the Innovation Fund, referred to in the text as Public Consultation report

- A number of the remaining projects are struggling and are at risk of missing the award deadlines.

No public resources have been lost because none of the failed projects have progressed beyond the inception phase. However, the resources freed up by failed projects could not be easily redirected to other worthwhile low-carbon technology demonstration projects. Thus, the NER 300 programme is not on track to achieve its intended impact for CCS and innovative renewable energy projects.[12]

2.2. What are the problem drivers?

Challenging investment conditions

Low-carbon technology demonstration projects are inherently high-risk endeavors, which tend to struggle to attract the required capital[13]. Challenging investment conditions, including uncertainty in regulatory frameworks and policies, hampered the progress of many NER 300 projects.

The ECA report confirms that the "adverse investment conditions, including uncertainty in regulatory frameworks and policies hampered the progress of many innovative renewable energy and CCS projects". At the time of conception of the NER 300 programme in 2008, the prices for oil, coal, gas and wholesale electricity prices were at very high historical levels, and there was an expectation that the carbon price, which at the time was about €30 t/CO_2 would increase further. As both the carbon price as well as the oil price remained at low levels in the last decade, it was challenging for innovative low-carbon projects to establish a business case. Further, CCS projects were affected by very low public acceptance of the technology.

The monetary reward from a CCS project is that power plants or industrial facilities capturing the CO2 for storage will not have to surrender allowances under the EU ETS. The cost of CCS was considered at least €60 t/CO_2. With a price of carbon of €30 t/CO_2, it was possible to close the financial gap with support from the NER 300 and national support. However, with a price of carbon at below €10 t/CO_2 and national governments withdrawing their support[14], the financial closure could not have been met.

Bioenergy projects were negatively affected by both the changes to the Renewables Directive in 2015 and unfavourable market evolution when the oil price fell. The business case for advanced biofuels is dependent on the support schemes available for biofuels in the Member States. Without certainty over the market conditions, investors did not take decisions to proceed.

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12 ECA Report (2018)

13 Market Testing Study, Ecofys (2018); ICF (2017) NER 300 lessons learnt study.

14 With regard to national support programmes, the NER 300 experience showed that the national support programmes could not provide sufficient co-financing to large-scale low-carbon demonstration projects. For example, the ETI programme in the UK, PIA programme in France and BMUB programme in Germany address pre-commercial demonstration projects in energy sectors and industry, however their support is limited in size for large-scale demonstration projects. The Innovation Fund offers complementary support, also allowing financing of larger demonstration projects.

The low carbon price in the past decade also reduced the revenues from the monetisation of the 300 million EU ETS allowances set aside for the NER 300. An increase in carbon prices is expected to have positive impacts on the overall monetary volume available for the Innovation Fund and to decrease the financial gap of projects.

A short example should show the impact of changing carbon prices both on the available revenues for the Innovation Fund and the profitability of projects:

- Assuming e.g. an average carbon price of €25 up to 2030, the Innovation Fund will be endowed with €11.25 billion from the auctioning of 450 million allowances. If the average carbon price changed by 40% (either to €15 or €35), the available funding would change by €4.5 billion.
- The impact on the profitability of projects (e.g. CCS with costs of €60 t/CO_2) is equally significant: A 40% change in the carbon price would change the funding gap for a CCS project by almost 30%.

The Union has taken several steps to improve the conditions for investments in low-carbon projects:

With regard to the carbon price, the revised EU ETS Directive has taken steps to strengthen the carbon market and higher carbon prices will increase the profitability of future projects as well as the revenues from the auctioning of the EU ETS allowances set aside for the Innovation Fund.

With regard to the general regulatory conditions, the adopted 2030 climate and energy framework should provide certainty in the medium term: The revised Directive on Renewable Energy should improve regulatory certainty in particular for bioenergy projects. The new Governance Regulation obliges Member States to set out their policy and investment policies in National Energy and Climate Plans (NECP) that should be submitted to the Commission in draft form by the end of 2018 and in final form by January 2020.

Finally, the upcoming Communication on the long-term strategy for reduction of greenhouse gas emissions will also provide an important signal for investments in zero- and low-carbon technologies up to 2050.

Insufficient risk-sharing and lack of flexibility for redeployment of funds

Low-carbon demonstration projects face three main types of risks that are largely beyond the control of the individual project operator:

- Technology risks related to the demonstration of technologies that have not yet been tested at large scale: Even if technologies work in the laboratory or at a small pilot facility, they may fail or underperform when operated at larger scale in operational environment.
- Market risks related to volatility in carbon, energy and commodity prices: As the experience of the last decade has shown, the current and expected price levels are generally not sufficient to incite private operators to invest into the demonstration of zero- and low-carbon technologies.

Risks related to policy changes: This is particularly relevant for investments in low-carbon technologies that may be in operation for 20 years or longer while their viability depends on specific support (e.g. carbon price or feed-in-tariff).

It is noteworthy that the NER 300 has left the technology risk largely with the project operator because the awarded grant was paid out fully if at least 75% of the planned reduction in greenhouse gas emissions were reached. The NER300 programme failed to de-risk the projects during the early stages of project development and construction because it only provided funding based on the verified emission reductions, after the project entered into operation. However, a large number of projects encountered difficulties during very early stages of development and construction, especially with regards to securing additional financing. The promise of a grant disbursement in case of successful entry into operation was not sufficient to entice third parties to provide additional financing upfront. Stakeholder consultations confirm this as a major hurdle.

Upfront funding was only possible if Member States guaranteed that funds would be returned in case of underperformance but this option had not been used extensively. Upfront funding has been foreseen for 12 out of 39 projects, however it has been paid so far to only 3 projects. All these 3 projects are on track in their preparation, whilst many others that did not receive it struggle. The NER 300 experience shows therefore that the national support programmes could not provide sufficient co-financing to large-scale low-carbon demonstration projects.

The revised EU ETS Directive already addresses these problem drivers by allowing for a more flexible milestone-based approach for which the specific rules, including disbursement conditions and timelines, will be provided for in the delegated act. Furthermore, the proposed Innovation Fund will be able to give at least 40% of the funding before performance can be verified making it much easier for projects to start construction.

As the NER 300 programme was limited to two calls in 2011 and 2013, it has not been possible to award grants to new projects since then. This severely limited the flexibility to re-use funds from projects that withdrew from the NER 300 programme. As explained in section 1.2.2, the Commission decided to redirect the unspent funds from the first call to other funding programmes for low-carbon technology but this involved a lengthy administrative process and was a second-best alternative to the NER 300 programme as originally conceived.

Insufficient "bankability" of selected projects and lacking project development assistance

The "bankability" of some selected NER 300 projects proved to be insufficient. This means that projects could not secure a sufficient revenue stream allowing them to service their debts and generate return on investments.

In part, this situation was caused by the single-criterion selection procedure, which ranked projects on the basis of a ratio between costs and technical performance of the individual project. This favoured projects at higher technical maturity but disregarded project development maturity. The design of the selection process placed insufficient

emphasis on the comparative quality, innovativeness, feasibility (e.g. acquiring of construction permits), and financial viability of projects.

The selection of projects was also obstructed by limited competition, especially in the second call of NER 300, which had been brought about partly by the strict geographical balance arrangements, which allowed a maximum of 3 projects per country. Furthermore, the application procedure – which did not screen projects first but immediately requested the submission of a complete application – implied significant administrative burden for project proponents, which could have further discouraged applications.

Lacking project development assistance further amplified the risks, particularly in early stages of project development, when project encountered issues with financing and permitting. In some instances, a lack of economic and legal capacity on the part of both project proponents and public authorities on which operation of these projects depend (e.g. transmission infrastructure operators) became apparent during the implementation. Some projects encountered issues with third parties, with one being blocked because key infrastructure was missing.

Complex governance structure

With NER 300, Member States were responsible for the pre-selection and nomination of projects as well as signature and management of contracts. Project selection was executed by the European Commission after due diligence performed by the EIB. The strong role of the Member States was supposed to ensure financial and regulatory support to the selected projects. However, this support has materialised only to a very limited extent, even though initial funding commitments were made. It has also led to a complex interaction between different parties, including project proponents, the Member States' authorities, the EIB and the Commission.

The ECA Report, found that *"the design of the NER 300 limited the Commission and Member States ability to respond effectively to changing circumstances"* and that *"Project selection and decision making procedures were complex."* These drawbacks were also confirmed by stakeholders.

More specifically from the proposal submission to award decision, it took 21 months for the first call and 13 months for the second call. Furthermore, any changes to the project (e.g. extension of deadline of entry-into-operation) involved a heavy administrative procedure (e.g. Commission decision with approval by Member States).

In addition, the design of the Innovation Fund should not be considered in isolation, but aim to exploit synergies with other programmes, so that project can fill any remaining funding gaps. The ECA report highlighted the lacking links between the NER 300 Programme and other EU programmes addressing innovation, in particular Horizon 2020 and EEPR, as well as the Strategic Energy Technology (SET) plan. Respondents to the public consultation also highlighted this issue.

Finally, the question of the optimal timing for the monetisation of allowances needs to be considered: Under the NER300, all allowances were put on the market upfront to have the revenues available before the calls available. As the Innovation Fund is endowed with

a substantially higher amount of allowances and the timing of auctioning them could influence the carbon price, different timing schedules should be considered.

Conclusions

The experience from the last decade has thus shown that the market fails to deliver investments in large-scale demonstration of low-carbon technologies. The carbon price is not at a sufficiently high level to make more risky projects – such as CCUS, bioenergy, and projects in energy-intensive industries – profitable for private investors.

The NER300 programme could not successfully remedy this market failure and the problem analysis could identify several drivers for the weak performance:

- NER300 failed to cover the risks with regard to technology demonstration as funds were only provided for successful projects;
- NER300 selected least-cost projects but not the ones with the highest emissions reduction potential; the selected proposals failed to crowd in the necessary private financing and public support from Member States.
- The NER300 governance was very rigid; rules were set upfront and could not easily be changed and the governance was complicated through the interplay of three actors (Commission, EIB, Member State).

The Innovation Fund should address the shortcomings of the NER300 programme and provide a better upside potential for projects, limit their downside risks, and be administratively simpler.

2.3. How will the problem evolve?

Without the adoption of the delegated act, it will not be possible to implement the Innovation Fund and deploy the funding for low-carbon demonstration projects as foreseen in the revised EU ETS Directive.

3. WHY SHOULD THE EU ACT?

3.1. Legal basis

The legal basis of the Commission Delegated Regulation is Article 10a(8) of the Directive 2003/87/EC, as amended by Directive (EU) 2018/410[15].

3.2. Subsidiarity: Necessity of EU action

The subsidiarity check has already been performed in the Impact Assessment[16] accompanying the Commission proposal for the revision of the EU ETS Directive. The

[15] Official Journal of the EU, L76, 19 March 2018
[16] SWD (2015) 135

implementation modalities discussed in the present Impact Assessment do not raise new subsidiarity issues.

3.3. Subsidiarity: Added value of EU action

The subsidiarity check has already been performed in the Impact Assessment[17] accompanying the Commission proposal for the revision of the EU ETS Directive. The implementation modalities discussed in the present Impact Assessment do not raise new subsidiarity issues.

4. OBJECTIVES

4.1. General objectives

The general objective stemming from the revised ETS directive is to contribute to achieving the EU climate goal of limiting global average temperature increase to not more than 2 degrees Celsius above pre-industrial level and achieve the needed emissions reductions up to 2050 in a cost-effective and economically efficient manner.

The Fund's objective is hence to help achieve breakthrough low-carbon technology innovation through demonstration projects involving energy-intensive industries, innovative renewable energy, energy storage, CCU and CCS. The Fund will thus contribute to the overarching political objectives to create jobs and growth through innovation and investment, to support affordable, clean and secure energy supply and contribute to the fulfilment of EU climate commitments.

4.2. Specific objectives

The specific objective for this initiative is to rapidly introduce new low-carbon technologies to the market, through bridging the financing gap of eligible projects by the efficient implementation of the Innovation Fund, in the framework given by the revised EU ETS Directive and taking into account the lessons learnt from the NER 300 Fund.

4.3. Operational objectives

On the basis of the identified problem drivers in Section 2.2, the operational objectives are the following:

Level and timing of funding

- To offer more effective financial support, limit the downside risks of projects, adapting to market needs and risk profiles of relevant projects, with a view to crowd-in additional public and private resources.

Project selection process

- To select more projects that are sufficiently mature and have the biggest potential to help decarbonise EU industry and power sectors with significant innovation impact across the Union, while ensuring broad geographical and sectorial coverage.

[17] Ibid

Governance

- To operate under a more efficient, simpler and more flexible management structure allowing seamless running of the programme with a view to ensure accountability, transparency, knowledge sharing, and synergies with other Union funding programmes for low-carbon innovation.

Monetisation of EU ETS allowances

- To monetise the allowances with a view to ensure timely availability of the revenues and to minimise the impact on the functioning of the European carbon market.

Interaction with investment support instruments and other Union programmes

- To provide for more effective interaction with investment support instruments (InvestEU) and other relevant Union programmes.

5. WHAT ARE THE AVAILABLE POLICY OPTIONS?

Policy options are available for the following implementing rules: i) the level and disbursement of grants (definition of relevant costs, funding rate and timing/conditionality of payments), ii) project selection process (selection criteria and application process), iii) governance and geographical balance and iv) monetisation of allowances. The impact assessment also discusses, to the extent possible, the options for potential interaction with other Union programmes (e.g. InvestEU, HorizonEurope, CEF).

The design of the Innovation Fund builds on the NER 300 programme's lessons learned (annex 6), but also other experience with similar EU and national programmes such as Horizon 2020[18]. Further, the analysis takes into account the results of the expert surveys[19,20], the feedback received on the inception impact assessment and the analysis of the public consultation results[21] (annex 2).

5.1. What is the baseline from which options are assessed?

The baseline constitutes a re-confirmation *mutatis mutandis* of the implementation rules for the NER 300 programme, as set out in Commission Decision 2010/670/EU. A description of the NER 300 programme is provided in the Chapter 1.2 and Annex 6.

5.2. Description of the policy options

This chapter describes the Innovation Fund design elements *(table 4)*. The design elements are then assessed in chapter 6, before being used to compare a set of policy options in chapter 7 and selecting the preferred option in chapter 8.

[18] ICF (2016) Innovative Financial Instruments for First-of-a-Kind, commercial-scale demonstration projects in the field of Energy
[19] Ecofys (2018), Market Testing study
[20] Climate strategy & Partners (2017) Expert workshops final report
[21] Ramboll (2018) Report on the Online Public Consultation on the Establishment of the Innovation Fund

Table 4: Design elements of the Innovation Fund

Design elements and their options	**Baseline: NER 300 implementation rules**	**Options**
Level and disbursement of grants		
Relevant Costs (C)	**C0:** **Additional costs of innovation – including capital and operating expenses (CAPEX and OPEX)**	**C1:** **Total capital expenditure (CAPEX)**
Funding rate (R)	**R0:** **Single maximum funding rate** for all projects (i.e. up to 60% of relevant costs).	**R1:** **Varied maximum funding rate** set **according to the TRL** (riskiness) of project, with maximum of 60% of relevant costs applicable to the lowest TRL projects.
Timing/ conditionality for payments (P)	**P0** **Disbursement of 40% at financial close and 60% upon delivery of verified avoidance of emissions**	**P1** **Disbursement of 40% at financial close and 60% along the project development milestones**
Project selection process		
Application process (A)	**A0**: **Single stage application**	**A1:** **Two-stage application**, comprising expression of interest and main call. Project development assistance available.
Selection criteria (S)	**S0:** A **single indicator** of cost *efficiency* – Cost per unit of performance (CPUP) (€/tCO2 avoided or €/kWh of renewable energy produced)	**S1**: A **combination** of **weighted** qualitative and quantitative **criteria** : - *Effectiveness* **(**GHG reduction/avoidance potential of the project**),** **- Innovation challenge** - *Scalability* (potential for wider application, cross-sector spill-over/cooperation, cost reduction potential/EU added value) - *Efficiency* (CPUP) - *Project viability and maturity*

Geographical balance (B)	**B0:** Set via **maximum number of projects per Member State.**	**B1: Achieved through dynamic management of calls for** proposals.	
Governance			
Governance and management (G0)	**G0: Mixed governance** by Member States, Commission and the EIB.	**G1: Streamlined governance at EU level** supported by a **public implementing body** (Executive Agency or EIB)	**G2: Streamlined governance at EU level** assisted by a **private implementing body**
Monetisation of EU ETS allowances			
Monetisation of allowances (M)	**M0: Equal spread**, annual monetisation	**M1:** Monetisation **upon expected demand** profile	**M2:** Monetisation with **bounded flexibility**

Interaction with InvestEU and other Union programmes

Investment support instruments and other Union programmes	**Cooperation with InvestEU to offer investment support instruments for demonstration projects of low-carbon technologies** **Cooperation with other Union programmes (i.e. HorizonEurope, CEF) to realise synergies between different support programmes for low-carbon technologies**

The NER 300 Decision set in detail the rules for the disbursement of grants as well as the project selection process, including the number of calls and their volume and types of solicited projects (technology categories and sub-categories). As the implementation architecture was firmly set by the NER 300 Decision, little margin was left for flexibility during the implementation of the Programme.

On the contrary, the proposed options – in particular P1, A1, S1, and B1 – should enable operational flexibility needed to reflect changing market conditions and lessons learned during the implementation until 2030. While the Delegated Act would set the key rules, a number of operational modalities would be left for the calls for proposals (e.g. specific application procedure for small-scale projects, calls' financial volume, specific selection criteria to address geographical balance) or the contractual arrangements with the selected projects (e.g. payment schedule). The following table provides more details on the split between the general rules, to bet set in the Delegated Act, and more specific rules to be defined in the calls for proposals.

Table 5: Split of operational rules between Delegated Act and call for proposals under options P1, A1, S1, and B1 for level and disbursement of grants as well as project selection process

ETS Directive	Delegated Act	Calls for proposals
Level and disbursement of grants		
General provisions on funding rate: up to 60% of relevant costs, out of which 40% need not be dependent on verified avoidance of greenhouse gas emissions, provided that pre-determined milestones are attained. Supported technologies shall represent breakthrough solutions or be sufficiently mature to be ready for demonstration.	Definitions of • Relevant costs, • Timing and conditionality of disbursement • Key milestones • General and specific recovery rules.	The call for proposal defines further the timing and conditionality of disbursements: • Full payment schedule and conditions (either set in a standard contract or negotiated for individual projects)
Project selection process		
General selection criteria: emission reductions potential well below the ETS benchmarks; potential for widespread application or lowering the costs; CCU projects shall deliver a net reduction in emissions and ensure avoidance or permanent storage of CO_2; also ensuring geographical balance.	Definitions of • Application procedure, • Selection criteria,	The call for proposal defines further: • Timing and volume (in €) of the call. • Types of solicited projects or sectors. • Details of the call, application procedure, selection procedures including methodology for evaluation and ranking. • Additional rules to ensure the geographical balance of Fund's portfolio if needed. • Specific rules for application and selection of small-scale projects.

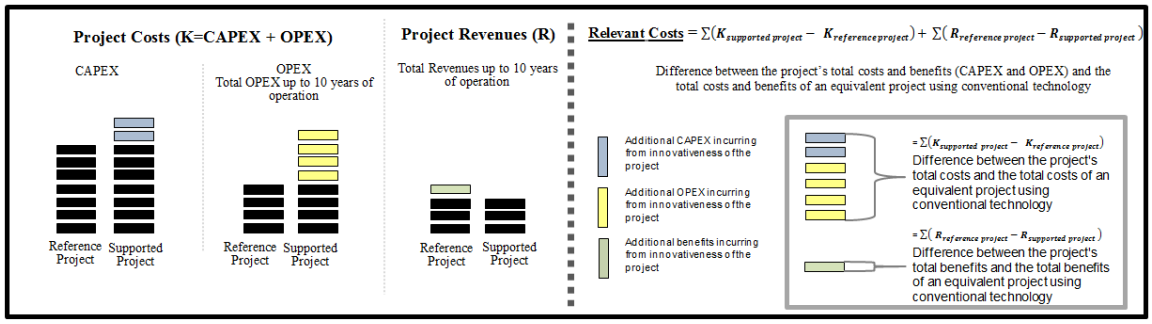
5.2.1. Level and disbursement of grants

5.2.1.1.Relevant costs (C)

The revised EU ETS Directive allows covering up to 60% of projects' relevant costs by the Fund's support.

Under the baseline **option C0**, used under the NER 300 programme[22], the relevant costs are defined as the **additional costs related to innovation**. These are calculated as the difference between the project's total costs (CAPEX and OPEX for certain period of projects' operation) and the total costs of an equivalent project using conventional technology (reference project). In practice, in the case of renewable energy projects, the difference between the project and a reference project of the same size over 5 years of operation was calculated. For CCS projects, the relevant costs were defined as the costs related to the operation of the CCS technology for 10 years of operation.

Figure 1: relevant costs definition under option C0



Under the second, **option C1, relevant costs are defined as capital expenditure (CAPEX) of the project**, without taking into account the additionality of costs related to the application of innovative technology**.** Project's operating costs (OPEX) and revenues are not considered, leading to a simplified calculation of relevant costs. This simpler definition could in particular be **used for small-scale projects**.

[22] Article 3 of the NER Decision2010/670/EU: The relevant costs of CCS demonstration projects shall be those investment costs which are borne by the project due to the application of CCS net of the net present value of the best estimate of operating benefits and costs arising due to the application of CCS during the first 10 years of operation. Relevant costs of RES demonstration projects shall be those extra investment costs which are borne by the project as a result of application of an innovative renewable energy technology net of the net present value of the best estimate of operating costs and benefits arising during the first 5 years compared to a conventional production (reference project) with the same capacity in terms of effective production of energy.

Figure 2: relevant costs definition under option C1

5.2.1.2.Funding rate (R)

The revised EU ETS Directive stipulates that the Innovation Fund can support up to 60% of project's relevant costs. However, up to this 60% limit, funding rate may vary according to the type of projects and their risks.

In the NER 300 programme, despite the maximum allowed funding rate of 50% of relevant costs, projects asked, in average, for grants covering 36% of relevant costs (this was mostly due to the CPUP (cost) indicator used for ranking and selection of projects discussed in chapter 5.2.1.4).

Option R0, derived from the NER 300 programme, but adapted to the funding rate foreseen in the revised EU ETS Directive, **entails a single maximum funding rate** of up to 60% of relevant costs for all categories of projects. This upper limit of available funding rate would be set for all types of projects without any up-front variation related to pre-defined specific project risks..

Option R1 entails a **variable funding rate** to be set up-front in the conditions for the call for proposals, **according to the projects' risk profile** expressed via the **technology readiness levels (TRL)[23].** This option assumes that projects with a lower TRL involve more risk and thus require a higher funding rate (up to 60% as set in the revised EU ETS Directive), while projects with a higher TRL are less risky, have better access to complementary financing, and therefore could be supported with a lower funding rate.

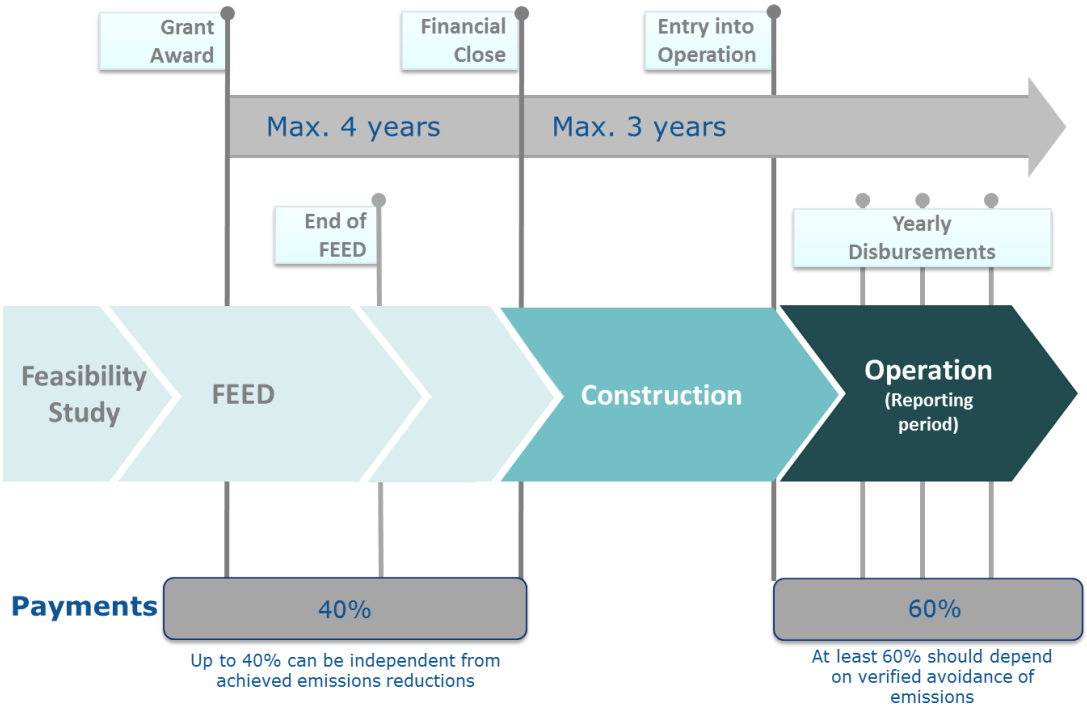
5.2.1.3.Timing and conditionality of payments (P)

Option P0 entails the continuation with the NER 300 practice, while taking into account the provisions of the revised ETS Directive that up to 40% of the awarded grant (i.e. 24% of relevant costs) need not depend on the verified avoidance of greenhouse gas emission reductions provided pre-determined milestones are met. Under this option, **40% of the Fund's support** would be **disbursed upon meeting the project's financial close** (pre-determined milestone), while the remaining 60% would be **disbursed to projects after**

[23] For the definition of TRL see Horizon 2020 – Work Programme 2014 – 2015, General Annexes https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf

their entry into operation. The amount of the remaining annual payments would be dependent on the projects' real production figures and hence avoided greenhouse gas emissions.

Figure 3: Exemplary schedule of payments under baseline option P0



Option P1 would fully use the possibility offered by the revised EU ETS Directive that up to 40% of the awarded grant (i.e. 24% of relevant costs) need not depend on the verified avoidance of greenhouse gas emission reductions. Furthermore, the remaining 60% of the grant would also be disbursed in a more flexible manner than under option P0.

The awarded grant would be disbursed upon meeting various project milestones. The consultation exercise confirmed that projects generally follow the same development steps: (1) feasibility study, (2) front-end engineering and design study (FEED)[24], (3) financial close[25], (4) commissioning, (5) ramp-up and (6) entry into operation.

The payments would be released if certain milestones are successfully met. Here is an illustrative example (see also the following figure 3):

- Up to 40% of the awarded grant would be paid out at the signature of the project's "financial close" agreement. According to the rules set out in the EU ETS Directive, the project proponent would not be liable to refund these payments to in case that the project failed.

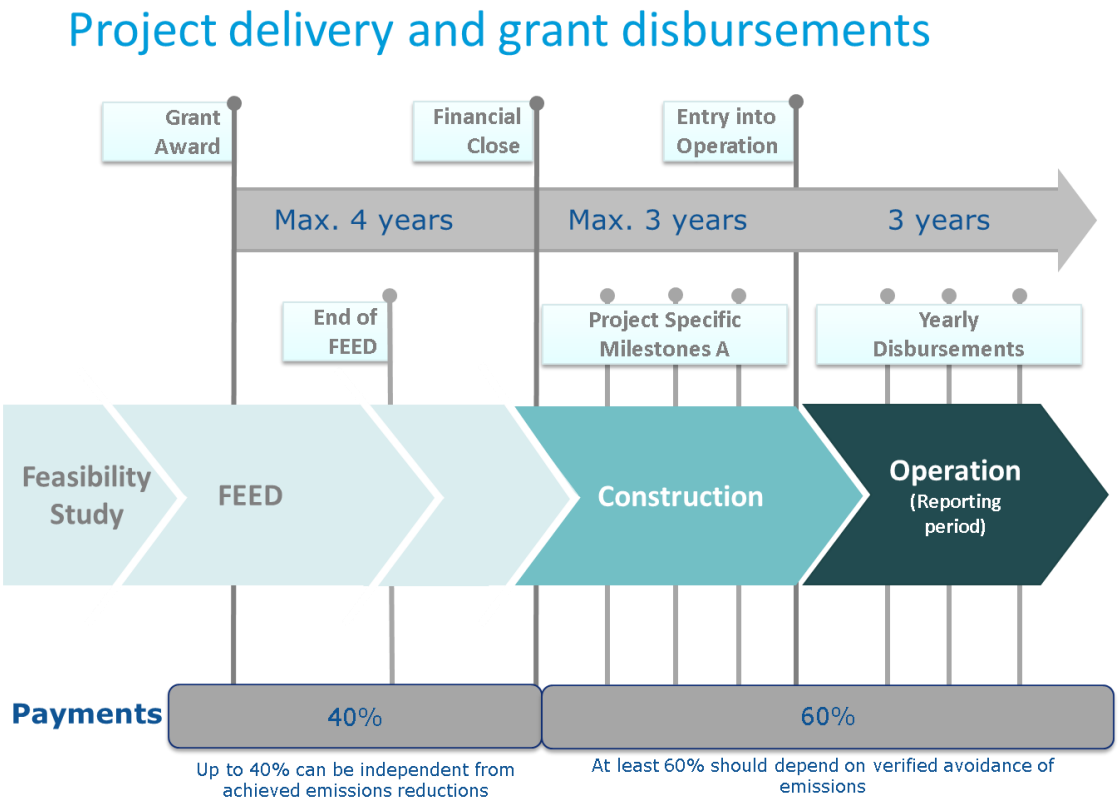
[24] The FEED is used as a basis for project's detailed design and engineering, investment decision with accurate total investment costs estimate and overall project execution planning and tendering documents.

[25] The EIB defines financial close as follows: financial close occurs when all the project and financing agreements have been signed and all the required conditions contained in them have been met

- At least 60% of the awarded grant should be progressively paid at milestones in the construction and operation phases. To provide sufficient incentives for the successful operation of the demonstration plant, the final payment tranches – after entry into operation – should be related to the extent to which the planned emissions avoidance is achieved. With regard to any payments during the construction phase, the project proponent will be liable to repay an appropriate share of the granted funds if the project did not deliver the planned emissions avoidance.
- If an agreed milestone was not met, it would be possible to suspend or reduce the payments or, in case of particularly serious breach, dissolve the award decision and stop the funding of the project and re-allocate the funding to the next call. This was also asked for by the stakeholders.

The detailed provisions as regards the grant disbursement and different applicable project milestones would be **specified in the calls for proposals** or set out in the **individual agreements** with project proponents**.** This follows the practise of other EU programmes.

Figure 4: Exemplary schedule of milestone-based payments under option P1



5.2.2. Project selection process

Under the NER 300 Programme, projects were selected through two calls for proposals, in 2011 and 2013, shortly after the programme's launch. The NER 300 Decision did not provide for an option of additional calls. This lack of flexibility was a major criticism by the ECA report and stakeholders, as the Decision did not foresee a situation of projects' failure and did not provide for the appropriate risk mitigation framework.

Therefore, it is proposed for the Innovation Fund to organize **regular bi-annual calls**. As requested by the EU ETS Directive, the first call should be launched in 2020 using the 50 million allowances from the Market stability reserve and any unused funds from the NER 300 programme. This also reflects the favoured position of stakeholders calling for regular Innovation Fund calls through to 2030, at the pre-determined dates[26]. The Commission should set for each call its exact timing, volume, and further details on the application and selection process (e.g. specific rules for small-scale projects).

Application process (A)

Option A0 used under the NER 300 Program entails **a single-step application procedure, i.e.** applicants would be required to submit the full project documentation in a single application, by the given call deadline.

The **option A1 would establish a two-stage procedure**: In the first phase of **expression of interest** (feasibility assessment) projects would have to be described in the form of a project factsheet. In the second phase, shortlisted projects would be invited to submit a detailed and fully substantiated proposal.

This option would be combined with the provision of **project development assistance** (PDA) to promising projects that would pass the expression of interest stage but would not be ready for the submission of full documentation, e.g. due to missing key documents such as FEED study. The aim would be to enable projects to be developed to a sufficiently mature stage and apply for support during a later call's second stage. Project development assistance for projects selected in the second phase would normally be an integral part of the project's support and could address, for example, support with permitting documentation, or assistance with the documentation required for financial close.

To ensure that the Fund is also open to eligible **small-scale projects**, the **application procedure** for these projects **could be simplified** and **documentation requirements** adapted. For the purpose of the first call for proposals, "small-scale projects" could be defined as projects whose total CAPEX would not exceed 5 million EUR. This is in line with responses received during the public consultations.[27] This ceiling may be adapted subject to the outcome of the first call.

5.2.2.1.Selection criteria (S)

To ensure fair and merit-based comparison and selection of projects, projects will compete and will be selected within their respective sectors (e.g. ferrous metals, renewables-ocean, CCS or cross-cutting technologies), against selection criteria which must ensure that the selected projects will meet the requirements of the revised EU ETS directive *(see chapter 1.2 for details)* while offering best value for money. The selection criteria must be the same for all sectors and projects, to ensure consistency and fair treatment. However, the selection criteria for small-scale projects may be simplified.

[26] Innovation Fund expert group meeting, June 2018, Minutes (Annex 2)

[27] 24% of respondents who expressed preference for the definition of small projects as a category indicated that small projects should be defined as projects between 500 thousand EUR and 5 million EUR.

The **baseline option S0,** used under NER 300 Programme, **is to continue with the single selection and ranking criterion of 'cost per unit of performance (CPUP)[28]'**, which represents quantitative ranking of the ratio between costs and technical performance of the individual project.

The alternative option S1 for selection criteria **would combine qualitative and quantitative criteria** enabling the assessment of a wider set of project characteristics. Five key selection criteria categories of effectiveness, innovation challenge, scalability, efficiency and project viability are proposed which should assess project's greenhouse gas abatement potential, innovativeness, economic viability, potential for wider application/replication and project costs. While the basic criteria would be set in the Delegated Act, each call for proposals should determine details of the scoring methodology (e.g. weighting of the selection criteria) and the types of solicited projects and activities in the eligible sectors. The final ranking would be established on the basis of the scores awarded in each of the eligible sectors. This option stems from the implementation practise of other EU Programmes, and reflects the feedback from Innovation Fund consultations.

Table 6: selection criteria

Criteria category	**S1: Selection based on matrix of criteria** **Criteria**		
1.Effectiveness	**GHG reduction/avoidance potential** of the project compared to the benchmark or similar reference where benchmark is not set.		
2. Innovation challenge	**Comparison of proposed technology to existing technologies on the market** (break-through versus incremental technology improvement)		
3. Project viability and maturity	Evidence of the contractual arrangements, soundness of the business case, and commitment of parties including Member States where the additional national public support will be required. A proof of an ability to reach the project's financial close within a defined period of time, for example up until 4 years[29] after the award decision.		
4. Scalability/ impact	**Potential for widespread application/ replication**	**Cross-sector spill-over/ cooperation**	**Cost reduction potential**
5. Efficiency	**CPUP** – Cost per unit of performance		

[28] expressed in EUR/tCO2 avoided/reduced/stored or EUR/kWh of renewable energy produced

[29] Building on the experience with NER 300 implementation, InnovFin EDP, but also other programmes such as ETI (UK) and PIA (FR), 4 years from signature of contract to the signature of financial close seems a reasonable time frame for projects involving innovative pre-commercial technologies.

In case the Fund would apply a two-stage application process (explained in chapter 5.2.2.1) composed of the "expression of interest" phase and "full application" phase, the selection criteria could be applied as follows:

1. At the expression of interest phase, projects would be assessed on the basis of their effectiveness, scalability/impact and viability.
2. At the full application phase, projects would be assessed on all the categories of criteria (effectiveness, innovativeness, scalability, efficiency, viability and maturity). This phase would include project's due diligence or similar technical, economic and financial assessment.

5.2.2.1.Geographical balance (B)

The NER 300 Decision imposed strict provisions trying to ensure an equitable geographical spread of projects with up to 3 projects permissible per Member State. The **baseline option B0** would continue with this practice, setting a **maximum number of projects per Member State**. Given that the Innovation Fund will be bigger in volume, the maximum number of projects set per Member State could be at a higher level than before. The maximum number pf projects would be set in the Delegated Act.

The alternative **option B1** would introduce a **dynamic call management**, without setting a maximum cap per Member State. Under this option, more flexible than under NER 300, subsequent calls could be adjusted to the evolution of the geographical coverage in the Fund's project portfolio, for example by providing specific (geographical) priority points during project evaluation to projects from under-represented Member States. This option would ensure that the geographical balance of the Fund's project pipeline would be achieved throughout its implementation, by 2030. In practise, should the first call prove delivering projects concentrated in few Member States, the subsequent call(s) would introduce priority evaluation points for projects from underrepresented Member States, which pass the minimum quality requirements. Considerations will also be given to the potential concentration of projects in industrial hubs across the EU.

Such specific selection criteria would be established in the relevant **calls for proposals**.

5.2.3. Governance

Under any of the options elaborated in this section, the key assumption is that the Fund's revenues will be maintained outside of the EU Budget[30].

Under option G0, the Innovation Fund would **continue with the mixed governance model applied under the NER 300**, based on the division of tasks between the Member States, European Commission, the European Investment Bank (EIB) and project proponents. However, taking into account the NER 300 lessons learned and findings provided in the recent ECA Report[31], the baseline option would be improved compared

[30] Integration of the Innovation Fund revenues in the EU budget has been assessed as not valid at this stage, due to the fact that it was not included in the proposed MFF package COM(2018) 321 final of 02.05.2018.

[31] ECA (2018) Special report of the European Court of Auditors: "Demonstrating carbon capture and storage and innovative renewables at commercial scale in the EU", see executive summary observations.

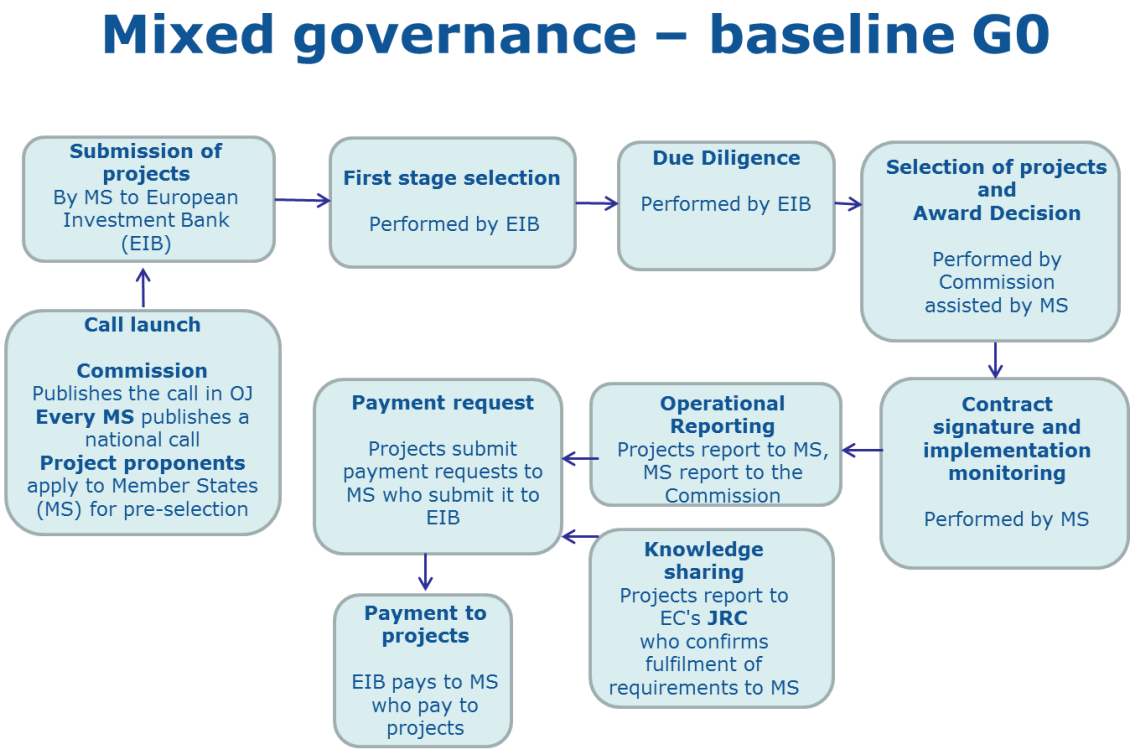
to the NER 300 governance. In practice (figure 4 below), projects would be submitted to Member States following the EU-wide call launched via Commission Decision and following national calls by Member States. Member States would send pre-selected projects to the EIB for an eligibility check (or feasibility pre-assessment in case of two-stage process), followed by the EIB's due diligence assessment. The Commission would then select projects based on the EIB's assessment, consult Member States ahead of the award decision and finally **Member States would sign and manage contracts** with awarded projects. Member States would ensure operational and financial monitoring of projects while the Commission would be responsible for the overall coordination of the Fund's operation. The JRC would be responsible for the management of knowledge sharing[32].

As the Fund's revenues would be managed outside the EU budget, Member states would remain the budgetary authority for the Innovation Fund revenues and transactions.

The specific tasks of involved governance parties would be set in the Delegated Act while the detailed rules of cooperation would be set out in separate agreements.

[32] Knowledge sharing would involve of regular events, e.g. through a 'Forum for Innovation', gathering market participants including awarded projects, public authorities, NGOs and financiers to exchange practical experience and knowledge gained through the demonstration of new technologies. Projects supported by the Fund would be required to actively share information with public and other market participants ensuring transparency and knowledge dissemination. A central interactive website and social media tools will be also used to share the knowledge gained through implementation of supported projects. The communication channels will also include other relevant Commission websites (such as the SET-Plan Information System (SETIS)), and any other relevant communication channels.

Figure 5: Mixed governance option G0 – actors, responsibilities and decision making



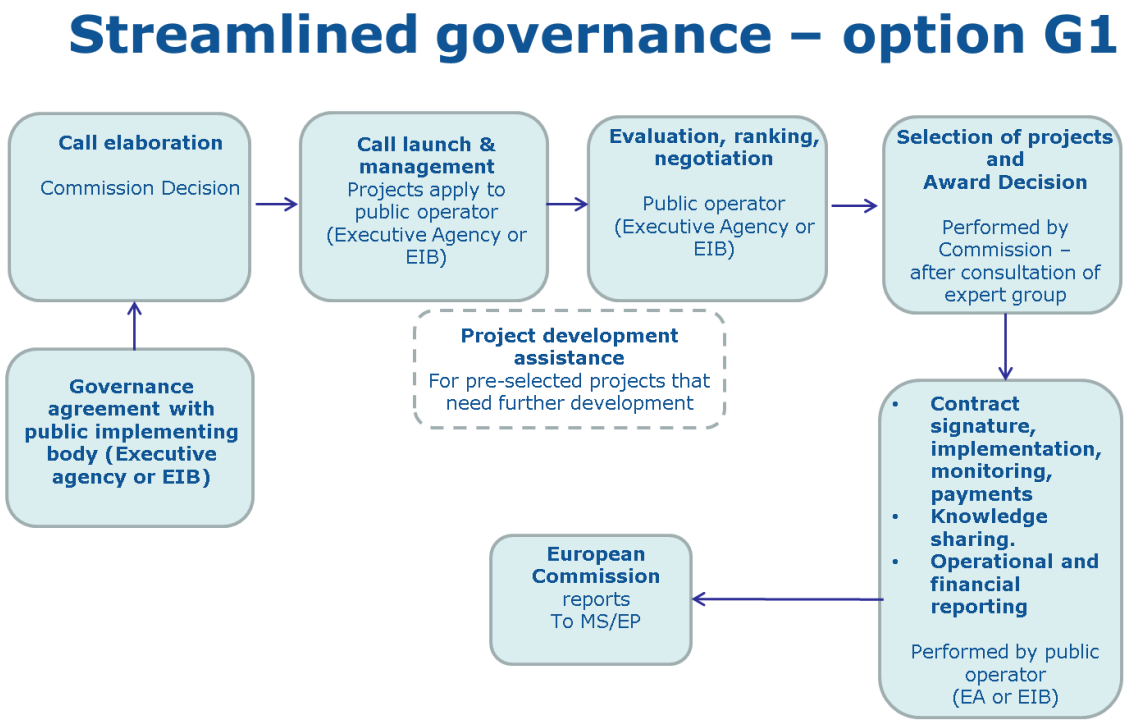
Under option G1, the Fund's **governance would be streamlined**, consolidating the **management functions and implementation responsibilities at the EU level** whereby **the Commission would be assisted by** a public body, either an EU Executive Agency – such as INEA, EASME or REA (see Annex 8 for short descriptions) – or the EIB. The entrustment of the implementing public body would follow the appropriate procedures, including a cost-benefit analysis as necessary and taking into account the legal, accounting, budgetary and operational considerations related to either of the options (e.g. a revision of the mandate of the executive agency).

The Commission would launch the EU-level calls for proposals; hence projects would apply at the EU level. The implementing public body would be responsible for the overall call implementation, including project evaluation (by hired market experts), ranking and contractual management of awarded projects, as well as the management of knowledge sharing. The Commission would be responsible for final projects selection and award through the award decision. The Commission would consult Member States ahead of the award decision. The implementing public body would report to the Commission, who would consequently inform the Member States and European Parliament as regards the Fund's implementation.

This governance system would be fully in line with good practice of other centrally managed EU programmes.

As regards the budgetary treatment of the Fund's revenues, i.e. outside of the EU budget, the Commission will report to the appropriate budgetary authority, i.e. Member States. Appropriate provisions for financial controls and audits will apply.

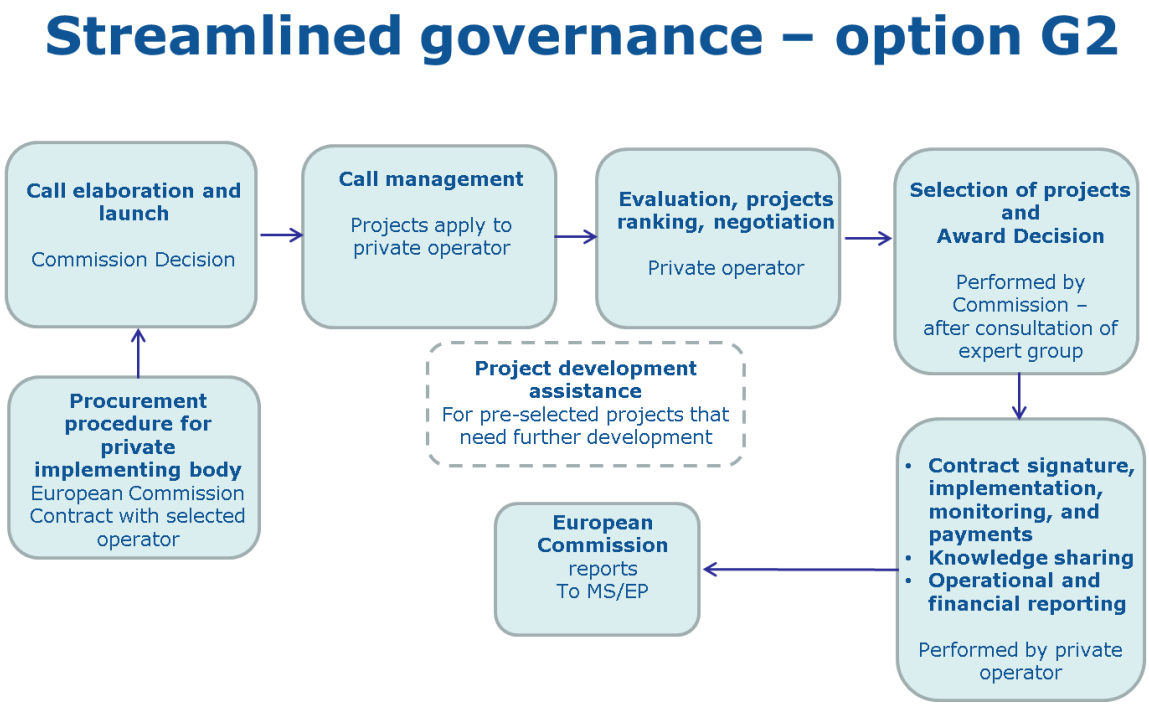
Figure 6: Streamlined governance option G1 – actors, responsibilities and decision making



Under option G2, the Innovation Fund would **externalise the management functions at the EU level to a contracted private sector operator** following an open public procurement procedure managed by the Commission. The Commission would consequently launch the EU-level calls for proposals through the Commission decision; hence projects would apply at the EU level. Project evaluation and ranking would be ensured via market experts hired by the operator, who would report to the Commission. The Commission would be responsible for the final project selection and award through the Award decision. The private operator would be responsible for the contract management and payments to awarded projects, as well as operational and financial reporting to the Commission, as well as the management of knowledge sharing. The Commission would consult Member States ahead of the award decision and inform Member States and European Parliament about the Fund's implementation results.

As the Fund's revenues would likely be managed outside the EU budget, Member states will remain the budgetary authority for the Innovation Fund revenues.

Figure 7: Streamlined governance option G2 – actors, responsibilities and decision making



5.2.4. Monetisation of EU ETS allowances

The Fund will be sourced with at least 450 million allowances and the unspent funds from the second NER 300 call. Another 50 million allowances would be added to the Fund post 2025, if these are not used for free allocation to industry. To generate revenue, the allowances of the Fund need to be monetised during the years 2020-2030.

This will be done at the EU ETS common auction platform, which is currently used by 25 Member States for the regular auctioning allowances and also for auctioning of a first batch of 50 million allowances for the Innovation Fund in 2020 sourced from the Market Stability Reserve.

Also the allowances of the Modernisation Fund[33] need to be auctioned on the common platform, as specified in legislation. The monetisation activities of the two funds could be streamlined, to ensure fair revenues for both and to minimise costs. This could be done as joint auctions on common auction platform. Further explanations on using the common auction platform can be found in Annex 9.

[33] For the Modernisation Fund, the revised EU ETS Directive explicitly provides that the EIB shall ensure that the allowances are auctioned in accordance with the principles and modalities laid down in Article 10(4) of the Directive, i.e. auctions taking place on the EU ETS common auction platform, and the EIB shall be also responsible for managing the revenues. The allowances of the Modernisation Fund would be equally spread as foreseen in legislation. The amount of the allowances of the Modernisation Fund would be 2% of the EU ETS cap, and the final size would depend on the use of the flexibilities available to lower income Member States for increasing the Modernisation Fund.

In relation to the timing for auctioning the allowances for the Innovation Fund, three options should be assessed:

Option M0 would see all of the EU ETS allowances of the Fund auctioned to a **fixed profile.** As it is proposed to organize regular calls up to 2030, the 400 million EU ETS allowances would be equally spread out over the period from 2021 to 2030, i.e. 40 million allowances would be auctioned per year.

Under Option M1, the annual auction volume would aim to follow the **expected demand** from the calls under the Innovation Fund. If e.g. large projects with relatively high investment volumes were submitted in the initial calls, more allowances would be auctioned and vice versa. The 400 million allowances would be auctioned as needed following an estimate of expected demand profile.

Option M2 – "bounded flexibility" – would be an in-between option between options M0 and M1, where in each year from 2021 to 2030 a fixed amount representing a significant share of the allowances would be equally spread as under option M0, whereby the remaining allowances are auctioned based on the expected demand for funding. The fixed amount would be decided before the start of phase 4 and it should also be decided whether and how this fixed amount could be revised at some stage during the Phase 4 e.g. before 2025, so as to take into account the actual allocation of money to projects. Such a revision could be useful in case of faster or slower than expected consumption of the available funds. For the remaining allowances more flexibility would be foreseen in order to be able to take account of the expected demand from the calls. The annual auction volume could be increased for each year and conditions would have to be formulated by when and by whom this decision is made. The decision on this would have to be done at least 9 months before the start of the given year to ensure predictability for the European carbon market.

5.2.5. Interaction with InvestEU and other Union programmes

The Innovation Fund occupies a well-defined space in-between support for research and investments. The Fund would exploit the synergies with other Union programs:

- The Innovation Fund should be open to projects that are currently supported at lower TRLs by the **Horizon 2020** programme and as from 2021 by its successor **Horizon Europe** programme, which would otherwise risk entering the 'valley of death'. In particular, partnerships or joint undertakings on sustainable and low-carbon technologies should provide the project pipeline for the Innovation Fund and support the project proponents to develop a viable proposal for funding under the Innovation Fund. The projects that Innovation Fund will support will have total costs well above the funds available from Horizon Europe for single projects.

- Similarly, the **LIFE programme** provides for support to the development and demonstration of innovative climate change mitigation technologies, systems, methods and instruments that are suitable for being replicated, transferred or mainstreamed. This can be achieved by a number of types of projects, including notably pilot projects, demonstration projects, best practices projects and capacity building projects. It can be expected that projects enabled at earlier stage of the

innovation cycle by LIFE programme would apply for the support from the Innovation Fund, which justifies close coordination between the two as in case of Horizon 2020 / Horizon Europe.

- The coordination of the support from the Innovation Fund with the **Connecting Europe Facility** may be instrumental in enabling and scaling up support to large and complex projects, by optimising their funding structure (where relevant components could be funded from the Innovation Fund and the Connecting Europe Facility, depending on their eligibility). This is mostly relevant for CCS and Hydrogen infrastructure components of innovative projects that could be co-financed by the CEF.
- The blending of **grant financing under the Innovation Fund with loans backed by InvestEU** will increase the financial viability of projects. This possibility is already foreseen in the Commission proposal on InvestEU and can build on the already established cooperation between NER300 and InnovFin EDP. The key synergies should therefore be realized at the project development stage (e.g. cooperation with InvestEU advisory hub), at the selection stage (e.g. check on project viability should take account of other public financing) and with the blending of different financial instruments (e.g. grant disbursement at financial close conditional on commitment by other public and private investors).

The Delegated Act should enable the channelling of the Innovation Fund to InvestEU and be open to the cooperation with other Union programmes. However, the Delegated Act cannot yet fix specific terms for this purpose as the legislative framework of the InvestEU and other Union programmes has not yet been agreed by the co-legislators.

The use of investment support instruments such as guarantees, loans, and equity can increase the impact of public funds by supporting projects which are economically viable, have a revenue generating capacity but which do not have sufficient access to capital markets.

In the context of the Innovation Fund, financial support instruments can play an important role in particular for the financing of more mature low-carbon demonstration projects (i.e. higher TRL levels) that are closer to the market and have secured sufficient revenues. As explained in section 1.2, unspent funds from the first NER 300 call have been transferred to two existing financial instruments, the InnovFin Energy Demo Projects (EDP) under Horizon2020 and the Connecting Europe Facility (CEF).

For the next MFF, it is expected that EU investment support instruments will be implemented through InvestEU Fund. The details of their operation will be set in the forthcoming legislation, investment guidelines, governance rules and term-sheets for specific products.

The possibility of blending of both non-repayable and repayable forms of support from Union sources other than the Union budget, such as the Innovation Fund, is recognised in Article 2(1) of the Commission proposal for the Regulation establishing the InvestEU

Program[34]. As explained in Recital (33) to the Commission proposal, smooth and efficient blending of grants and financial instruments, or both, should apply to situation where this is necessary to underpin investments to address particular market failures or sub-optimal investment situations.

The Innovation Fund could possibly interact with EU investment support instruments under the following, not mutually exclusive scenarios, where relevant and applicable:

a) *Blending grants from Innovation Fund with investment support instruments under InvestEU Fund:* Projects, which enter the call for the Innovation Fund, could have access to both grants and investment support instruments. Blending of Innovation Fund grants with InvestEU investment support mechanism would in particular aim at optimising the financial structure of Innovation Fund projects and thus achieving higher leverage effect of the intervention. It would be suitable for projects which are in line with Innovation's Fund eligiblity criteria, which are suitable for financing under InvestEU Fund but which still require a grant element to become bankable (i.e. where a grant from the Innovation Fund is necessary to achieve economic viability of an InvestEU project). Under this option the InvestEU would provide complementary financing to projects awarded IF grants.

b) *Contribution from innovation fund to InvestEU Fund under Research, Innovation and Digital Window*: The Innovation Fund could channel a part of its funding by topping-up the InvestEU guarantee, most likely under the R&I&D window, whose scope would be best aligned with the Innovation Fund. This additional support will enable higher risk-sharing capacity of the relevant InvestEU product(s) than it would otherwise be able to provide. The choice of the form of financing under the InvestEU (debt, risk sharing and/or equity) for such projects would be demand-driven and adjusted to funding needs of specific projects or categories of projects. This would build on the current approach where unspent NER 300 resources were reinvested through InnovFin Energy Demo Projects (InnovFin EDP) and financial instruments under the Connecting Europe Facility (CEF). Under this option, the Innovation Fund contribution would be provided through a guarantee or risk-coverage instruments, provided jointly (co-guarantee) or topping-up the support under the Invest EU Fund.

Details on the decision making process related to the attribution of the Fund's resources through Investment support instruments will be elaborated in the call and respective delegation agreements with the implementing partners under the InvestEU Fund. Details on how the financing provisions set in the EU ETS Directive would be applied in the context of investment support instruments would be defined in the respective term sheets or investment guidelines for the relevant financial products[35] once established.

How much Innovation Fund funding should be provided via topping-up investment support instruments or via a blending facility would be decided on the basis of market

[34] Proposal for the Regulation of the European Parliament and of the Council establishing the InvestEU Programme, 6.6.2018, COM(2018) 439 final (hereafter: Proposal for InvestEU Programme)

[35] This refers to any potential investment products under the InvestEU Fund aiming at supporting investment (debt, equity, quasi-equity, etc.).

demand (market testing for specific financing products) and in line with the requirements of the EU ETS Directive. It would be premature to estimate a division of resources between grant financing and investment support instruments in this Impact Assessment. Due to the on-going co-decision procedure on InvestEU, an interaction between the Innovation Fund and InvestEU will at earliest be possible in 2022. However, the first call of the Innovation Fund in 2020 could already deliver valuable insights on the demand for investment support instruments.

6. WHAT ARE THE IMPACTS OF THE POLICY OPTIONS

The successful implementation of the demonstration projects will have direct environmental, social and economic benefits. It is difficult to estimate these, as the sectors covered are heterogeneous and technologies covered very different, and the exact composition of the Innovation Fund portfolio is unknown at this stage. The market testing study[36] estimates that the potential investment volume could reach EUR 55 to 68 billion for demonstration projects in the relevant sectors (a conservative estimate as potential investments may be higher especially in cross-cutting technologies). The Innovation Fund should mobilize a maximum of this potential investment volume for demonstration projects in line with the objectives set out in section 4.

Table 7: Expected investment volumes for relevant potential low-carbon investments (total CAPEX) up to 2030[37]

Sectors	Estimated investment volume
Energy Intensive Industries EEI (incl. industrial CCS and CCU)	EUR 31-42 bn
Carbon Capture and Storage CCS (2 demonstration projects)	EUR 0.5-2.8 bn
Renewable energy generation (incl. wind, biofuels, solar, hydro)	EUR 15 bn
Transmission, distribution, storage for renewable energy	EUR 8 bn
Total	**EUR 55 to 68 bn**

It has not been possible to comprehensively estimate the share of the additional costs for these projects and thus the funding demand under option C0. Based on a sample of technologies and the NER 300 experience, it could be estimated that the additional costs account for about 50% of the total CAPEX. This would give very rough estimates for the maximum funding demand of €16bn to €20bn (60% of additional costs of €27.5bn to €33bn) under option C0 and €33bn to €40bn (60% of total CAPEX) under option C1. These estimates suggest that the funding demand goes well above the expected resources of the Innovation Fund (e.g. at an average carbon price of €25, the volume of the

[36] Ecofys (2018), Market testing study
[37] Ecofys (2018), Market testing study

Innovation Fund would amount to €11.3 billion). This makes the interoperability with other EU funding instruments as described in Section 5.2.5 above all the more important.

The immediate environmental benefits of the demonstration projects supported would be tangible. The market testing study[38] has estimated the overall greenhouse reduction potential for a sample of illustrative technologies[39]:

- Around €10bn of investments into demonstration projects in different industrial sector would generate reductions in greenhouse gas emissions in the order of 8.3 Mt CO_2eq (with current emissions intensity in electricity production). This would represent almost 1% of the current industrial emissions under the EU ETS.

- Around €5bn of investments into demonstration projects in different innovative renewable energy technologies would generate reductions in greenhouse gas emissions in the order of 3.8 Mt CO2eq (with current emission intensity in electricity production).

The ultimate benefits are expected to exceed the above, since the Fund aims at demonstrating the technical feasibility, commercial viability and overall soundness of technologies capable of a systemic positive impact on the decarbonisation and long-term competitiveness of the European industry.

This section will assess the impacts of the proposed options on the problem (high failure rate of demonstration projects) and its drivers (challenging investment criteria, insufficient risk coverage, insufficient bankability of projects, and complexity of the governance).

The assessment will be mostly qualitative because many of the elements of the delegated act implementing the Fund are of procedural nature. Also, where relevant, impacts on SMEs are assessed. Since the Fund will address a wide range of innovative technologies, many of which are not on the economic radar screen of markets or policy makers, specific data are unknown or highly uncertain. Quantitative assessments are made here on the basis of expert estimates[40], background studies[41], stakeholder consultations[42] or literature[43].

[38] Idem
[39] Idem
[40] Ecofys (2018), Market Testing study
[41] Idem
[42] Climate strategy & Partners (2017) Expert workshops final report and Ramboll (2018) Report on the Online Public Consultation on the Establishment of the Innovation Fund
[43] ICF (2016) Innovative Financial Instruments for First-of-a-Kind, commercial-scale demonstration projects in the field of Energy

6.1. Level and disbursement of grants

6.1.1. Relevant costs

The baseline **option C0,** as used under the NER 300 defines relevant costs as the **additional capital and operating expenses related to innovation** as compared to a reference project based on standard technology.

Stakeholder consultations pointed at the desirability of including in the definition of relevant costs both the capital and operating expenses, hence allowing flexibility to address the financing gap according to specific projects[44].

The additionality of financing under this option would ensure that only costs exceeding the costs of the reference project applied on the market are eligible for support, hence limiting the risk of market distortion. In particular, it should be noted that several low-carbon technologies – such as hydrogen – will lead to substantially increased operating costs (e.g. their energy demand can be several times higher compared to a conventional plant based on fossil fuels).

Nevertheless, the drawback of this option is the relatively complex formula to be applied to calculate the relevant costs and the need to define up-front the reference projects. Some stakeholders have also asked for a simpler definition of relevant costs. A solution, which has been suggested, could be to provide detailed guidance on the definition of reference projects as part of the call for proposals. This, however, does not radically alter the issue of complexity of such guidance and of its practical application.

Under **option C1, relevant costs would be defined as investment costs (CAPEX) of a project.** This could simplify administration, in particular for **small scale projects** or projects with novel technologies where the reference project is difficult to establish. As a drawback, this option would not allow for covering of the additional operating expenses during the first years of operation. This could result in higher risk of project failures or lower demand for the innovation fund support as many innovation projects do not generate stable revenues during the demonstration phase and public support may be crucial for their success. This has been confirmed through the public consultation as being the key drawback for many renewable energy projects, CCS or low carbon steel investments.

Table 8: Impacts of the options on relevant costs

Criteria / Options	C0 Additional CAPEX and OPEX	C1 Total CAPEX
Addressing the funding gap	- Covers the financing gap both during construction and operation	- Covers the financing gap only during construction. - Operation risks not addressed
Clarity and simplicity of definition of the relevant costs	- Requires definition of reference project which may be cumbersome for proponents (but can be mitigated through guidance document)	- No definition of reference project required - Simple definition of relevant costs, in particular for **small scale projects**

[44] Innovation fund expert group meeting, June 2018

Additionality/focus on innovation	- Financing is strictly additional and directly related to innovation costs	- Costs unrelated to innovation also financed by grant

6.1.2. Funding rate

Option R0 proposes a **single maximum funding rate.** This would simplify the application and selection process. It would provide more flexibility to applicants, who could request the amount of Fund's financing at a funding rate relevant to their specific technology and associated risks (however always up to the maximum of 60% of relevant costs). On the other hand, applicants could ask for higher Fund's support than they would actually need. However, as the selection criteria will measure project costs vs benefits including the potential avoidance of emissions, project proponents would have an incentive to calibrate the requested amount of Fund's financing carefully against expected project impacts in order to maximize their chances of success *(see the chapter 5.2.1.4 for details)*. Finally, as many demonstration projects are expected to use technologies at different TRL levels, a single funding rate provides for administrative simplicity.

Option R1 would entail setting the funding rate **at varying rates depending on the pre-defined level of maturity of a particular technology,** with higher funding rates granted to projects at lower TRL and lower funding rates for higher TRL. However, the classification of different technologies into TRLs is not a straightforward exercise, subject to subjective interpretation and constant change. The same applies to the decision regarding the funding rate appropriate for a given TRL. In some cases, such as CCS, higher TRL does not necessarily translate into lower financial risk. In fact, CCS projects are arguably those with the highest financing needs because the cost of reducing a ton of carbon is still much higher than carbon prices. This option would also lead to high administrative effort needed to establish and constantly update very granular database of all possible eligible technologies and their TRLs, while accuracy of such data could not be guaranteed. Finally, while the TRL is an established method to determine the general technological maturity, it has not been used to pre-determine the level of public financing because it relies on subjective judgement and may therefore be disputed.

Stakeholder consultation largely supported the definition of a single maximum funding rate, with few stakeholders preferring the alternative option[45].

Table 9: Impacts of the options related to funding rates

Criteria / Options	**R0** **Single maximum funding rate**	**R1** **Varying funding rates depending on TRLs**
Level of funding rate	- NER 300 experiences shows that competition between project proponents leads to an effective funding rate that is below the maximum funding rate	- Not evident that varying rates will reduce effective funding rate compared to baseline

[45] Innovation fund expert group meeting, June 2018

Clarity of rules and administrative costs	- Clear and simple rule for project selection - Low administrative costs.	- Assigning the project to specific TRL is subjective and will likely lead to disputes or litigation - High administrative effort needed to constantly update the TRL of all prospective technologies

6.1.3. Timing and conditionality for payments

The baseline option P0, entailing fund's **up-front payment** (up to 40% of funds' support) **upon reaching a single milestone** (e.g. financial close)**, and ex-post annual payments upon entry into operation** does not fully address the risk-sharing needs of innovative projects and still shifts most of the risks (financing) to project proponents. The Fund would **mostly provide re-financing support**, rather than pre-financing support for covering the construction costs. This was raised in the ECA Report and also confirmed in the stakeholder consultation as being one of the main weaknesses of the NER 300 Programme, as prospects of acquiring full project financing on the market for construction of risky innovative technologies are very thin. A likely impact is that a high number of projects will not materialise due to the persisting funding gap during projects' construction.

Option P1 enables the **release of Fund's payments upon meeting various project milestones** defined along the project development process. The project risks would be significantly reduced for project proponents, while higher risk would be assumed by the Fund. Payment schedules would be better aligned with financing needs and development stages of projects, whereby up to 40% of Fund's support could be paid upon reaching the project's financial close, and the remaining 60% of Fund's support would be paid during construction and operation phases, where the final amount of funding would depend on the achievement of emissions reductions.

This option also enables more effectively to stop funding projects which fail to meet the agreed milestones, hence enabling timely re-allocation of freed resources to new projects. This issue was clearly raised during expert consultations and recommended in the ECA Report[46].

Under this option, the beneficiaries of an award decision would have good prospects and the motivation to successfully implement their projects, due to risk-sharing during the development and construction phase and performance-related payments during the operation phase.

Table 10: Impacts of the options on timing/conditionality

Criteria / Options	P0 Disbursement of 40% at financial close and 60% upon delivery of verified avoidance of	P1 Disbursement of 40% at financial close and 60% along the project development

[46] Recommendation No.2: *"establish criteria for withdrawing funding in cases where projects do not meet agreed milestones"*.

	emissions	milestones
Number of successfully implemented projects	- Very low number of NER 300 projects that have entered into operation due to lack of sufficient funding during development and construction phases.	- Increased probability for project success through higher share of funding during development and construction phase
Timely withdrawal of support from failing projects	- Reallocation possible after missing the single milestone (financial close) or failing the entry into operation. Funds could be blocked for unnecessary long periods.	- More flexible re-allocation of funds to new projects as early withdrawal is possible at any milestone along the project implementation that is missed by a projects
Risk exposure of Innovation Fund	- Partial exposure as up-front grants are paid out upon reaching a single milestone (financial close).	- Increased risk exposure as larger volume of funds is paid out during development and construction phase, before entry into operation.
Administrative costs	Additional efforts to obtain guarantee by Member State for pre-financing (including State aid notification) that could be needed to cover construction costs beyond the pre-payment.	No additional administrative procedures and costs for pre-financing (no State aid notification)
Operational flexibility as regards the payment schedule	None. Payment schedule would be firmly set in the Delegated Act	High. Full definition of payment schedules with calls or in contracts will allow better reflecting individual needs of projects.

6.2. Project selection process

6.2.1. Application process

The NER 300 experience showed that applicants spent a significant amount of resources in preparing their full funding application taking on average about 6 months[47]. **Option A0** would require the project proponents to submit the entire **application and supporting documents in a single step.** As this means that projects would need to provide the full due diligence-level data, in a process with potentially high oversubscription, significant administrative costs would be put on unsuccessful project proponents.

Option A1 would split the **application procedure into two phases**. The first phase (expression of interest) would require a description of key project characteristics, and could mostly focus on effectiveness, scalability and project's viability (see selection criteria in chapter 6.1.4). This would simplify and speed up both preparation for applicants and allow identifying less mature project proposals upfront. The possible provision of project development assistance to immature but promising projects would

[47] ICF (2017) NER 300 Lessons Learned Summary Report

increase chances of projects to successfully conclude the application process. Shortlisted projects would be invited to apply for the second, full application phase, during which the full project information would be evaluated later on. This would provide project proponents more time to complete a higher quality application file, allowing for savings in terms of resources spent on the project proponents' side.

Whilst this procedure might be slightly slower and entail higher administrative costs on the side of the Fund manager due to the two phases of the application and consequent evaluation procedures, the process would be more proportionate than the alternative. The stakeholder consultation[48] and the Market testing study[49] clearly demonstrate that a two-phase application process is the preferred choice by stakeholders.

Table 11: Impacts of the options on the application process

Criteria / Options	A0 Single-stage application process	A1 Two-stage application process
Administrative costs for project proponents	- Significant administrative costs for proponents to develop a full-scale application	- Reduced administrative costs for proponents of unsuccessful projects at first stage
Administrative costs for the Fund manager	- Low administrative costs due to a single– step evaluation and selection.	- Possibly higher administrative costs due to two-step process, but could be offset by the fact that full assessment would be necessary for fewer projects in second stage.
Quality of applications	- Prospective but less developed projects would be eliminated from competition	- Project development assistance increases success rate for immature but promising projects -Identification of unpromising project applications already at first stage

Under option A1, the detailed requirements for applicants will be set in the calls for proposals, to allow for adjustments throughout the Fund's implementation, reflecting the lessons learned from previous calls.

6.2.2. Selection criteria

The option S0 provides for the selection based on the single selection criterion of cost per unit of performance (CPUP), already familiar to many stakeholders from the NER 300 programme. It incentivises proponents to request the lowest possible support to achieve good ranking. Hence, the economic impact of this option could be a wide portfolio of projects at least cost with relatively high leverage of public funds[50].

However, a single, cost-related selection criterion does not guarantee that selected projects will also meet the environmental and competitiveness objectives of the innovation fund. Least cost projects will tend to demonstrate rather technologies with

[48] Especially the Innovation fund expert group meeting, June 2018
[49] Ecofys (2018) Market Testing study
[50] Under the NER 300 Programme where CPUP was used as a single selection and ranking criterion, the NER 300 grant represented in average 39% of project relevant costs for renewable energy projects.

incremental emissions reductions compared to more costly, breakthrough technologies delivering more substantial results in the long run.

Least cost support as a criterion could also lead to project proponents artificially deflating costs in their applications, which may lead to Fund's high failure rate, as projects would not be able to reach financial close due to uncovered financial gap. This was demonstrated in the NER 300 Programme[51].

In terms of impact on SMEs, this option may lead to prioritisation of large-scale projects due to their economy of scale, hence putting certain disadvantage on small-scale projects.

Finally, this option may still not ensure the selected projects' "bankability" as their economic viability and wider application potential would not be assessed. This drawback was raised by the stakeholders and ECA Report.

The option S1 - a selection process based on assessment of a set of qualitative and quantitative criteria of effectiveness, innovation challenge, project viability, scalability and efficiency – would allow a comparison of projects based on a more comprehensive set of indicators (e.g. comparing projects with higher costs due to greater innovation and deeper decarbonisation potential with projects with lower cost but bigger up-scaling prospects and hence substantial GHG emission reductions/avoidance potential). It enables putting project costs in the context of wider project impacts in terms of GHG emissions reductions/avoidance, innovation and scalability. Assessment of a project's viability would also increase early identification and mitigation of projects' risks, for instance in terms of required co-financing and proof thereof. This has been recommended also by the ECA Report[52].

As regards the economic impacts, this option would allow the selection of projects with higher costs and higher demand for public funding, but with positive long-term effects on competitiveness of industries as such projects will demonstrate breakthrough technologies, crucial for their long-term economic sustainability. As "bankability" of projects would also be assessed, evaluation would lead to selection of more mature projects from the structuring and legal set-up perspective.

One expected result would be a balanced portfolio of small and bigger projects supported per call, ensuring that projects with substantial GHG emissions reduction/avoidance would be prioritized. In terms of impact on SMEs, the weighted matrix of criteria could provide level playing field for small-scale projects, as their efficiency and scalability could outweigh the absolute GHG emission reductions/avoidance, hence giving them better position in the competition compared to the Option S0.

In comparison, Option S1 will be more difficult to operationalize and more expensive administratively. The scoring and weighting of quantified selection criteria may be subject to imperfect judgements. Unsuccessful projects may more easily contest qualitative scores than quantifiable criteria. However, the long experience of running evaluations for EU research and innovation projects and the established redress procedures show that option S1 can be effectively implemented.

[51] ICF (2017) NER 300 Lessons Learnt Summary Report

[52] Recommendation 2: *"Improving project selection and decision-making procedures for the future Innovation Fund",*

Table 12: Impacts of the options for selection criteria

Criteria / Options	S0 Single selection criterion based on least costs	S1 Weighted multiple selection criteria
Number of successfully implemented projects	-Low success rate with current NER 300 as many selected projects lacked a viable business case	Higher probability for successful implementation due to screening of "bankability"
Impacts on competitiveness	- Least cost projects will likely deliver incremental innovations, at the expense of the breakthrough innovations	- Stronger prospects for demonstration of breakthrough technologies, benefitting the long-term competitiveness of EU industries
Environmental impacts (GHG reduction/avoidance potential)	- Least cost based selection will likely lead to the selection of incremental rather than deep decarbonisation projects	- Stronger prospects of a diversified pipeline of projects in terms of their size and depth of decarbonisation. - Incentivises the participation of complex cross-sector projects with significant emissions abatement potential.
Impacts on SMEs	- Negative impact, as small-scale projects may be in disadvantage compared to the large-scale projects which benefit from economies of scale (lower cost per unit of production).	- Higher prospects for small-scale projects to be selected due to their scalability potential.
Administrative costs	Low administrative costs due to straightforward implementation	Higher administrative costs due to development and implementation of more complex selection criteria
Operational flexibility	None. The selection would follow the single "least cost" rule set in the Delegated Act.	Higher flexibility. The scoring methodology could be continuously improved based on the experience from previous calls.

6.2.3. Geographical balance

Option B0, which sets **a maximum number of projects per Member State,** is simple to apply but does not guarantee that projects will be funded in each Member State. As the NER 300 experience has shown, projects were awarded in only 20 Member States. Furthermore, option B0 risks the exclusion of a – potentially highly innovative – project only because it is located in a Member State that has already reached the maximum number of projects. The competition within a call could therefore be negatively impacted as it has been the case with the second NER 300 call where projects from Member States, which had already exhausted the maximum number of projects, could not submit additional projects.

Thus, application of option B0 can likely lead to supporting projects with less economic/innovation impacts or effects in terms of reduction/avoidance of GHG emissions.

Option B1, based on the **dynamic management of calls for proposals** would allow the selection of the most prospective projects from both economic and environmental perspective, and cater for geographical adjustments to the Innovation Fund portfolio until 2030. This would ensure that projects (passing minimum quality requirements) from underrepresented Member States would be given "priority points" during evaluation process, without regulating the number of projects allowed to be supported in individual Member States. Option B1 should therefore achieve better geographical balance while delivering higher economic, environmental, and social benefits in the long-term as more innovative projects would be selected and demonstrated under the Innovation Fund.

It should also be considered that other funding programmes – as InvestEU, CEF or the cohesion fund – can support the roll-out of successfully demonstrated technologies across all Member States and thereby ensure the cohesion objectives.

Table 13: Impacts of the options on geographical balance

Criteria / Options	B0 Limited number of projects per Member State	B1 Dynamic call management
Geographical balance of projects (social impact)	NER 300 projects were awarded in 20 Member States	Preferential treatment of projects in Member States with few or no projects should achieve over time a geographical balance of projects across the EU
Competitiveness and avoidance of greenhouse gas emissions (economic and environmental impact)	Negative impact because highly innovative projects could be excluded from participation in calls in case that maximum quota is already reached in a Member State	Positive impact as all projects will be able to participate in the calls irrespective of their location
Operational flexibility	None. Firm quota per Member State set in the Delegated Act	High. No quota per Member State. Specific selection criteria on geographical balance are established in the calls for proposals if needed.

6.3. Governance

The baseline **option G0** is a **mixed governance model** where tasks are shared between the Member States, the Commission and the EIB.

The complexity and lengthy decision making procedures are due to distributed responsibilities among the involved parties and inevitably high number of inter-institutional iterations.

The strong role of the Member States under NER 300 was devised to ensure financial and regulatory support to the selected projects at the national level. However, under NER 300 Programme, this support has materialised only to limited extent, despite strong commitment at the time of the calls. Furthermore, the pre-selection of projects by Member States also limited the level of competition between the project proponents in the calls. This leads to a conclusion that keeping the multi-layered governance structure, both at the EU and Member States level, cannot guarantee effective implementation of the Fund and successful entry into operation of awarded projects. Another drawback of this option is essentially limited competition, as projects would be pre-selected at the Member State level.

As pointed out by the ECA report, the overall ownership and accountability for the NER 300 has been diluted between the different actors. The proposed options G1 and G2 would both improve upon the baseline G0 because more governance functions would be moved to the EU level, leading to clearer ownership and accountability of Fund's transactions, while maintaining the Fund's revenues outside of the EU Budget.

Option G1 would deliver simpler and **streamlined governance at the EU level, through a public implementing body.** This option would centralise the management and implementation functions with the Commission assisted by a public implementing body, either an executive agency or the EIB (entrusted following the appropriate procedures). This should create a direct and faster link between the Fund and project proponents and reduce the number of governance layers. Centralised governance functions would reduce the management complexity, speed-up decision making and reduce administrative burden. Project proponents would benefit from lower transaction costs as direct link to the Fund manager will also reduce the number of procedural iterations. Such an option has been strongly called for by stakeholders who asked for *"less red tape and greater speed with direct management at the EU level"*[53].

As innovative projects may require national co-financing or critically depend on national permits or infrastructure, Member States should be kept closely involved:

- Where relevant, project applications should include a firm commitment of support by respective Member States' authorities[54];
- Member States should be consulted ahead of the award decision to enable early detection and mitigation of important project risks to ensure Member States' stake in the selection procedure.

Such a model would also be in line with the feedback from stakeholders, including Member States.

This option would allow improving cooperation with other Union programmes: In case of an executive agency as Fund manager, synergies could be realised with e.g. Horizon Europe, CEF, or LIFE. It could be explored whether it is possible to streamline organisation of calls. The new governance model for Horizon Europe should further

[53] Climate strategy & Partners (2017) Expert workshops final report

[54] This is in line with the recommendation No1 of the ECA Report: *"where large, capital intensive projects needing a combination of national and EU support is put forward for funding under the proposed Innovation Fund ….ensure firm and transparent commitments are obtained from Member States before awarding EU funds"*.

improve the integration of the different funding programmes. In case of the EIB, project proponents would benefit from a "one-stop-shop" architecture, whereby the EIB would be in position to provide both grants and commercial finance. However, appropriate measures would need to be taken to avoid a competitive advantage of the EIB vis-à-vis other financial institutions (e.g. conflict of interest when providing both grants and commercial finance, and access rights to evaluation results).

The assistance by the EIB or an executive agency would lead to efficiency gains as it would allow using already developed programme implementation infrastructure including communication channels, management of the electronic data flows, financial management of contracts, payments mechanisms et cetera.

Option G2 – implementation through a private sector operator – would have similar impacts as option G1 as regards the streamlining of the governance. However, an **EU-wide tendering procedure** would be necessary for the selection of a private operator. Given the limited experience of private-sector operators with the management of EU grant schemes, it may be more difficult to find a private operator that could offer the services as cost-efficiently as experienced public operators.

With both options G1 and G2, Member States would save the majority of their administrative costs due to the transfer of the tasks to the public or private operator. The Innovation Fund itself would have a higher financial burden as it would directly reimburse the costs of the operator under options G1 and G2.

Centrally managed EU funds, like the Innovation Fund, are not subject to State aid control insofar as they do not constitute State resources under the control by a Member State within the meaning of European State aid law.

Table 14: Impacts of governance options

Criteria / Options	***G0 Mixed governance***	***G1 Streamlined governance with public operator***	***G2 Streamlined governance with private operator***
Decision making complexity and time	- High complexity due to distributed responsibilities - Long decision making chain due to multi-layered governance	- Simplified and streamlined decision making chain - Shorter decision times	- Similar to G1
Transaction costs for project proponents	- High transaction costs due to multi-layered governance procedures	- Significantly reduced costs due to single manager and shorter decision making procedures	- Similar to G1
Administrative costs for Fund operator (s)	- Costs difficult to estimate but presumably at higher end due to multi-layered governance.	- Lower overall costs, thanks to reduced governance layers and streamlined procedures - Higher administrative efficiency expected due	- Costs difficult to estimate due to limited experience with private operators as programme manager. Fees likely highest of all options.

		to management experience of public operators and synergy potentials with other Union programmes Administrative costs for the Fund manager would be off-set by the increased efficiency.	- Longest lead time and high administrative costs for Commission related to public procurement and contract signature with private operator
Fund's overall ownership, responsibility and accountability	- Diluted ownership and unclear overall accountability	- Clear ownership and improved accountability at the EU level incorporating principles of the Financial regulation	- Similar to G1, but more effort needed to ensure accountability at EU level

6.4. Monetisation of allowances

The timing of the monetisation of the allowances dedicated to the Innovation Fund will impact the supply of available funds for the individual calls for proposals. Furthermore, it will impact the functioning of the carbon market as the carbon price is a function of the number of allowances that are put on the market. It is important for the functioning of the auctions to know well in advance the amount of EU ETS allowances (e.g. the annual auction calendar is usually published in the preceding year). As the EU legislators have taken several measures (e.g. Market Stability Reserve) to reduce the market surplus of EU ETS allowances on the market and thus to strengthen the carbon price, the timing of the monetisation should neither impede the functioning of these measures and further increase the existing surplus nor in any other way negatively impact the carbon market.

The **baseline option M0 – equal spread of allowances up to 2030 –** would ensure a constant flow of proceeds throughout the years, which meets the criterion of predictability. Due to the equal spread of the auction volume over ten years, this option would follow the functioning of the regular auctions of allowances, which have been taking place successfully since 2013. This would have a predictable impact to the carbon market, including the Market Stability Reserve.

However, this option would not allow adjusting the available amount of funding to the demand from the calls for proposals. If a certain call showed a very high number of promising projects, it could be that several of them would have to put on a waiting list due to the limited amount of available revenues from the auctioning of the EU ETS allowances. Such a risk seems low for the first calls as substantial resources will already be available from the unspent NER 300 funds and the early monetisation of 50 million EU ETS allowances, even if there could still be a backlog of projects. Based on the NER 300 experience there could be flow backs of money back to the Fund from cancelled projects that would help finance projects of future calls.

The option M1 – where the timing of monetisation follows the expected demand – would offer more flexibility to adjust the auction volume to the expected funding demand from the calls.

However, this option could have a negative impact on the functioning of the carbon market mainly because of the unpredictability: If e.g. the first calls of the Innovation Fund showed indeed an extremely high demand for funding, a higher amount of allowances would be auctioned in 2022 and the following years. Such an increased auction volume would have an important impact to the functioning and the amount of allowances going to the Market Stability Reserve that is supposed to reduce the large surplus of allowances that will still be present in the early 2020s.[55] It could lead to negative price effects that would also reduce overall the auction revenues, including for the Innovation Fund.

Finally, a largely or fully discretionary timing of the monetisation would significantly reduce the predictability and would substantially increase the administrative burden for the operation of the EU ETS auctions.

The **option M2 – bounded flexibility –** provides more predictability than option M1 as significant share of the allowances would be spread equally over the period. At the same time this option provides more flexibility compared to Option M0 because it would be able to take into account the demand for project funding to some extent. The possibility to make use of flexibility can prove to be important during the later years of Phase 4 depending on the actual allocation of money to projects.

In terms of effects on the market, depending on the conditions and timing of the use of flexibility, there could be impacts on the surplus on allowances on the market and also the total amount of the raised revenues, but these would be limited. In fact this option would combine the elements of predictability, factored in by market, and flexibility that could be used to react in particular to the outcome of calls.

Table 15: Impacts of options on monetisation of EU ETS allowances

Criteria / Options	M0 Pre-defined monetisation volumes (equally spread up to 2030)	M1 Demand-driven timing of monetisation	M2 Bounded flexibility
Timely availability of funds	- Risk of mismatch between demand and availability of funds	- Funding supply would be better aligned to demand from calls	- Compromise between M0 and M1 to ensure predictability and better align demand and supply of money, while limiting the impact on the carbon market.
Functioning of the auctions and wider carbon market	- High predictability of auction volumes - Limited impacts to the Market Stability	- Lower predictability of auction volumes and higher administrative burden - Reduced predictability	- Limited impact on market functioning, due to a significant share being released according to a fixed

[55] If all of the Fund allowances would be auctioned in 2021-2025, this would have distributional implications between Member States due to the Market Stability Reserve legislation; this is further explained in Annex 9.

	Reserve	for the carbon market and risk of wider impacts to the operation of the Market Stability Reserve	schedule

6.5. Interaction with InvestEU and other Union programmes

Investment support instruments under InvestEU have the advantage that they can achieve a higher leverage than a grant instrument and can therefore finance a larger number of bankable projects. NER 300 showed a leverage ratio of up to 4.6 for grant financing. While this would not necessarily reflect the ratio under the Innovation Fund due to its different implementation modalities, a similar order of magnitude can nevertheless be expected. A higher leverage should be expected instead with a financial guarantee but detailed data for risky demonstration project is missing.

Table 16: Expected leverage with grants and financial guarantee

Grants		Financial guarantee
1.6 (min)	Calculated based on 60% of total project costs (option C1)	While EFSI achieved a leverage rate of 13.5, a lower leverage should be expected with more risky demonstration projects under the Innovation Fund because a higher public contribution will be needed to cover the higher risks.
4.6 (max)	Calculated based on effective funding rate under NER 300 (38%) and average share of additional costs (56%) of total project costs[56] (option C0)	

It must be borne in mind that, while the analysis referred to above points out to the potential usefulness of combining grant financing with investment support instruments, the latter have not yet played a significant role in the financing of low-carbon demonstration projects. In particular, the empirical evidence up to now shows that support by grants is an essential element for the support of low-carbon demonstration project and investment support instruments rather play a complementary role:

- The public consultation, the market testing study as well as independent studies confirm a persistent need for grant support[57].
- The FOAK study[58], NER 300 lessons learned study and expert survey all observe a similar pattern, whereby FOAK energy projects are financially structured with average equity share of 29%, average debt of 35% and grants representing 21%.

[56] based on ICF (2017) NER 300 Lessons Learnt Summary Report
[57] Ramboll (2018) Public Consultation report; Ecofys (2018) Market Testing study
[58] ICF (2016) Innovative Financial Instruments for First-of-a-Kind, commercial-scale demonstration projects in the field of Energy

- The market testing study concluded, based on a sample of technologies, that demonstration projects composed to about two thirds by lower TRL (5-7) and one third by higher TRL (8-9). The latter third of more mature projects may carry less risk and be better suited for investments support instruments, provided they are sufficiently economically viable.

The cooperation with InvestEU could limit administrative costs but some lead time for operationalisation of support will be needed, building on the consolidated rulebook at the EU level and existing implementation infrastructure. As InvestEU will only be operational with the start of the next MFF in 2021, the channelling of a share of the Innovation Fund through InvestEU instruments could, if needed and justified, only be operational as from 2022.

Table 17: Impacts of cooperation with investment support instruments

Criteria	
Spending efficiency	A higher number of projects can be supported as investment support instrument can achieve a higher leverage (i.e. lower public spending per project)
Demand for investment support instruments	Little demand is expected as grants remain the preferred support for riskier demonstration projects but investment support instruments can play a complementary role as support for more mature projects (e.g. high TRL) or as addition to grant financing

Benefits of the coordination with Horizon Europe include the potentially lower costs for proponents as the calls could be better aligned, as well as better awareness and understanding of the most appropriate funding instruments for the projects in different stage of innovation cycle. Further, aligned efforts of Horizon Europe and Innovation Fund may boost innovation investments of industries associated e.g. under relevant Joint Undertakings or addressed under common Innovation Missions.

Advantages stemming from complementary funding may be expected from the coordination between the Innovation Fund and LIFE Programme. As the Innovation Fund and CEF are complementary instruments, coordination of the two would allow addressing the needs of more complex, cross-cutting and challenging projects.

The Delegated Act will cater for interactions between the Innovation Fund and other Union Programmes, however specific modalities of such interactions (e.g. details on the potential contribution of the Innovation Fund to the financing products established under the InvestEU Fund) can only be set once the legal framework of the next MFF 2021-2027 is adopted.

7. HOW DO THE OPTIONS COMPARE?

This section provides an assessment of how the design options will contribute to the realisation of the Innovation Fund's objectives, as set in Section 4, in light of the following evaluation criteria:

- effectiveness – the extent to which options achieve the objectives;

- efficiency – the extent to which objectives can be achieved at least cost;
- coherence – the extent to which options are coherent with and contribute to other policy objectives, in particular synergies with other funding instruments for innovation.

Level and disbursement of grants

	Effectiveness	Efficiency	Coherence
Eligible (relevant) cost base			
C0: Additional capital and operating expenditure (NER 300)	0	0	0
C1: Total capital expenditure (CAPEX)	-	+	-
Funding rate			
R0: Single maximum funding rate (NER 300)	0	0	0
R1: Variable funding rates according to Technological Readiness Level (TRL)	0	-	0
Timing of payments			
P0: After meeting a single milestone (financial close) and entry into operation (NER 300)	0	0	0
P1: Upon meeting variable project milestones throughout project development and implementation	+	+	+

The baseline option C0 should be retained because it limits the grant support to the additional capital and operational cost that are not covered by the market (high effectiveness). This option is supported by the majority of stakeholders and coherent with State aid guidelines and other programmes supporting innovation (e.g. Horizon 2020). While it adds to administrative complexity (somewhat lower efficiency), providing better guidance on the definition and calculation of additional costs can reduce administrative costs for project proponents. The simpler but less targeted cost definition of total capital expenditure (option C1) should be preferred for small-scale projects because it saves administrative costs that are more significant relative to the small project size.

Baseline option R0 should be retained because a single maximum funding rate (option RO) is simple to apply and has worked well with NER 300 according to stakeholder feedback. Varying rates (option R1) would complicate rules and lead to higher administrative costs (hence lower efficiency) without offsetting benefits.

The absence of NER 300 funding during project development and construction has been identified as one of the key drivers for the low number of successful NER 300 projects. Option P1 should be preferred because milestone-based payments allow effective risk coverage when projects need it most, i.e. during development, construction and operation. Milestone-based disbursement also allows to timely stop the disbursement of grants to failing projects that do not meet their project milestones. The freed funds can be more swiftly re-allocated to new projects. Option P1 is supported by stakeholders,

follows the recommendations of the Court of Auditors[59] and is in in line with approaches used under Horizon 2020 (Europe) and InvestEU programmes (better than the baseline option under all three evaluation criteria).

The definition of relevant costs and the funding are set in the Delegated Act to ensure clear and predictable framework for project proponents. To allow for the operational flexibility and adjustment to specific needs of different project types and sizes, specific disbursement rules under option P1 may be adjusted through the calls for proposals and contractual arrangements with the project proponents if needed.. To mitigate the risks associated with higher risk sharing, effective recovery rules will be set in the Delegated Act and projects' contractual documentation, in line with the rules set by the Financial Regulation.

Project selection process

	Effectiveness	Efficiency	Coherence
Application process			
A0: Single-step (full application)	0	0	0
A1: Two-phase process (expression of interest followed by full application)	+	+	+
Selection criteria			
S0: Single criterion of CPUP (cost per unit of performance)	0	0	0
S1: Multiple criteria	+	+	+
Geographical balance			
B0: Maximum number of projects per Member State	0	0	0
B1: Dynamic call management	+	+	+

As the NER 300 selection process put exclusive focus on the cost efficiency of projects, it ignored other aspects such as the "bankability" of project. This contributed to the low success rate in project implementation as several selected projects struggled to find additional financing and to start construction (e.g. missing permits or infrastructure). Furthermore, as pointed by the ECA report, a project selection based on least costs may favour incremental instead of breakthrough innovation.

Option A1 should be preferred because it allows for a first screening of the most promising projects during the first stage (at low administrative costs for project proponents) and offers project development assistance to prospective projects that need development support, while enhancing their maturity and reducing risk of failure in later stages. Stakeholders almost unanimously called for a two-phase application process. This option therefore scores better than the baseline option under all three evaluation criteria.

Option S1 should be preferred because a weighted set of selection criteria, reflecting the quantitative and qualitative characteristics of projects, will allow reviewing not only the

[59] Special Report of the European Court of Auditors "Demonstrating carbon capture and storage and innovative renewables at commercial scale in the EU". ECA, 2018, Recommendation 2, see Annex 7

project's cost efficiency but also other relevant economic and environmental criteria (high effectiveness). Other programmes for innovation (e.g. Horizon 2020) use similar approach (high coherence). Stakeholders and the Court of Auditors called for merit-based selection against multiple criteria, with a major criterion being the GHG avoidance potential and strong commitments by Member States to support selected demonstration projects (contributing to efficiency)[60].

Option B1 should better achieve a geographical balance of projects across Member States (e.g. by providing priority points in project evaluation from Member States without any awarded projects) with less risk of distorting the call competition (as could happen under option B0 where promising projects could be excluded from the competition due to the maximum number of projects for a certain Member State). It thus scores better than the baseline option under all three evaluation criteria.

While the key principles will be set out in the Delegated Act, the specific rules of application process (e.g. to reduce administrative burden for small-scale projects), selection criteria and evaluation methodology, and the application of additional selection criteria ensuring the geographical balance will be set in the calls for proposals. This will allow adjusting the Fund's implementation framework to the lessons learned throughout the process, and reflect the changing market conditions.

The preferred options reflect stakeholder views and address the recommendation of the Court of Auditors[61].

Governance

	Effectiveness	Efficiency	Coherence
G0: Mixed governance (Commission, EIB, MS)	0	0	0
G1: Streamlined governance at EU level – public operator (Executive Agency or EIB)	+	+	+
G2: Streamlined governance at EU level – private sector operator	+	+	-

Stakeholders and the Court of Auditors have been critical on the complexity of the mixed governance under the NER 300 programme, its long delays in decision making and very low responsiveness to changing market conditions.

Option G1 should be preferred because streamlined governance with a public implementing body (e.g. EIB or an executive agency) will significantly reduce the complexity and increase efficiency of decision making. This reduces the administrative efforts of both project proponents and Fund operator (high effectiveness and efficiency). Contrary to a private operator (option G2), higher synergies can be realised with a public operator – as an executive agency or the EIB – that run other funding programmes like Horizon Europe, CEF, or InvestEU that invest into research or the roll-out of low-carbon technologies (high coherence).

[60] ECA (2018) Report, Recommendation 1, see Annex 7

[61] ECA (2018) Report, Recommendation 2; Ramboll (2018) Public consultation Report; Innovation fund expert group meeting, June 2018.

Monetisation of EU ETS allowances

	Effectiveness	Efficiency	Coherence
Monetisation of EU ETS allowances			
M0: Pre-defined auction volumes (equal annual volumes until 2030)	0	0	0
M1: Auctioning of allowances upon demand	+	-	-
M2: Equal annual volume with limited flexibility to adjust auction volume to demand	+	0	0

The timing of the monetisation will determine the availability of funds for the individual calls under the Innovation Fund but will also have an important impact to the functioning and the amount of allowances going to the Market Stability Reserve and could lead to negative price effects that would also reduce overall the auction revenues, including for the Innovation Fund.

Option M2 should be the best fit to have some flexibility for adjusting the auction volume to the demand from the calls of the Innovation Fund (high effectiveness) without risking a significant impact on the functioning of the carbon market (efficiency and coherence the same as under the baseline option) while ensuring stable and predictable supply of funds for the calls.

Interaction with InvestEU and other Union programmes

The Innovation Fund could complement its grant financing with repayable forms of support (debt, equity, guarantees) through blending of its financing with the InvestEU Fund, where appropriate and needed.

Investment support instruments enable a more effective use of public funds through a higher leverage rate. However, as the expert study and the stakeholder consultation confirm, the demand for investment support instruments seems more limited for demonstration projects because they are on average more risky and need grant financing to break even. Therefore, investment support instruments can be used as a complement rather than main financing vehicle for such investments.

Due to the lead time in the establishment of InvestEU, cooperation with the Innovation Fund will most likely only be possible as from 2022. However, the first call under the Innovation Fund in 2020 should deliver further insights on the demand for investment support instruments and the share of the Innovation Fund that could be set aside for such type of financing.

Close cooperation with other Union programmes – such as Horizon Europe, LIFE or the Connecting Europe Facility – has the potential to reduce administrative costs for project proponents and raise better awareness of the most appropriate funding instruments for the projects in different stage of the investment cycle. A coherent offer of appropriate funding instruments should increase the overall effectiveness of public funding. However, the exact cooperation possibilities will depend on the outcome of the current co-decision procedure on the MFF.

8. PREFERRED OPTION

Due to the challenging investment conditions and the riskiness of low-carbon demonstration projects, the Innovation Fund should continue to offer grant financing as its primary support instrument.

Based on the analysis in this impact assessment and taking into account the lessons learnt from the NER 300 programme, the report by the Court of Auditors, and a consultation of industry and stakeholders, the implementation of the Innovation Fund should be improved compared to the NER 300 implementation rules (baseline):

- a milestone-based grant disbursement with a view to better cover the projects' financial risks and to re-allocate more flexibly funds between projects (option P1),
- a selection procedure that is not only based on cost efficiency but also takes into account further criteria such as GHG emissions avoidance or economic viability of projects with a view to develop more mature and more effective projects (options A1, S1, B1),
- a more streamlined governance at EU level (e.g. EU executive agency or the EIB) to save time and costs for project promotors and public administrations (option G1).

With regard to the level of project funding, it is proposed to build on the NER 300 experience and to support up to 60% of the additional capital and operational expenses (options C0 and R0), with the exception provided for small scale projects to use total capital expenditure as an administratively simpler definition of relevant costs (option C1). For the timing of the monetisation of the EU ETS allowances a sound balance needs to be found between making funding available in a timely manner while avoiding hampering the functioning of carbon market (along the lines of option M2).

While the delegated act should set out the key operational rules, it should be possible to undertake some adjustments in the calls for proposals (options P1, A1, S1, and B1): i.e. disbursement rules (catering for heterogeneous types of projects); application process (addressing both large and small-scale projects); and project selection (ensuring merit-based selection while achieving the geographical balance). This flexibility should allow adapting to changing market conditions and learn from the experience of previous calls.

As requested by the revised EU ETS Directive, the first call for the Innovation Fund should take place before 2021 to provide as soon as possible public funding for the demonstration of first-of-a-kind low carbon technology in energy-intensive industries, energy storage, and renewables. This first call in 2020 should also provide valuable insights for the cooperation with other Union programmes – such as Horizon Europe, CEF, and the InvestEU programmes – that will support research and innovation of low-carbon technologies as from 2021 under the new Multi-annual Financial Framework.

The grants from the Innovation Fund should be complemented as necessary with investment support instruments (e.g. guaranteed loans, equity) under InvestEU. Furthermore, specific investment support instruments for eligible low-carbon projects

could be developed under InvestEU that are co-guaranteed by revenues from the Innovation Fund.

Due to the centralisation at EU level and the two-stage application procedure, overall administrative costs will be reduced for grant financing compared to NER300, in particular for Member State administrations and project proponents. With regard to the cooperation with InvestEU and other Union programmes, economies of scope should be exploited. The upcoming cost-benefit analysis for the next Multi-annual Financial Framework could quantify the benefits and costs of such cooperations.

The preferred option should lead to higher rate of project realisations, compared to NER 300 Programme. This will be measured in particular by the extent to which supported projects reach financial close and enter into operation, deliver planned GHG emissions avoidance, and lead to wider application of demonstrated technologies *(see chapter 9 for relevant indicators)*.

9. HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

The implementing body, to which the management of grant funding will be entrusted, will be tasked with monitoring these and producing annual reports, in line with the common practice. If support was also to be deployed through investment support instruments under the InvestEU Fund, then the reporting will be done annually in line with the standard practice associated with InvestEU Fund and the specific policy window.

The information from the monitoring report(s) would be analysed and actively used to adjust future calls and/or communication efforts. For instance, if the monitoring was to reveal insufficient geographical balance, the subsequent calls would be tailored to address the issue. Should an issue arise regarding the technological spread, the stakeholders would be informed and could be asked to assist the Commission in communicating within their sectoral networks.

The regular reporting will also be ensured through the Annual Management Plan and Annual Activity Reports of the Commission.

The following indicators are proposed:

1) Reductions of greenhouse gas emissions (addressing the objective of the ETS Directive and the Innovation Fund)
    - Total emissions reductions planned
    - Total emissions reductions achieved (ex-post)
    - Potential of emission reductions if the supported technology is scaled-up

2) Investments and efficiency of granted support (addressing the problem drivers of insufficient risk sharing and bankability)
    - Oversubscription rate overall

- Oversubscription rate per support type (grants vs. financial instruments)
- Percentage of projects awarded funding which reach financial close
- Percentage of projects awarded funding which enter into operation
- Percentage of projects that failed
- Total investment triggered
- Employment triggered
- Leverage and multiplication effects of the Fund's support
- Financing recovery rate

3) Effectiveness of project selection (addressing the problem driver of complex governance)

- Number of eligible projects applying compared to total applications
- Number of projects awarded compared to total applications (success rate)
- Percentage of small projects
- Number of projects per Member State
- Number of countries with at least one project
- Number of projects per sector covered
- Number of cross-sectoral applications

4) Efficiency of governance (addressing the problem driver of complex governance)

- Time to grant
- Time to pay (from call to disbursement)
- Administrative costs

5) Monetisation of the allowances for the Innovation Fund

- No additional indicators needed. The impact will be monitored through the existing arrangements for the auctions on the common auction platform, as set out by Regulation No 1031/2010 (Auctioning Regulation), in particular the publication of auction results and other relevant information and the mechanisms to avoid deviations from the price on the secondary market.

6) Synergies with other Union Programmes such as Horizon Europe and InvestEU (addressing the problem drivers of insufficient risk sharing and bankability)

- Number of projects benefiting from the support of multiple EU programmes

The success of the Innovation Fund implementation will be measured by the extent to which supported projects will succeed to financially close, enter into operation and deliver planned emission reductions. As well, the wider application of supported technologies will be part of the Fund's evaluation.

Monitoring indicators may not be sufficient to provide an adequate evaluation of the effects of the Fund. For this reason, impact evaluations of the effects of specific projects/interventions on selected outcomes (such as levelised cost of electricity for renewable energy projects) would be carried out. The Commission will perform external evaluations of the Innovation Fund. These will assess the Fund’s performance in terms of

relevance, effectiveness, efficiency, and EU added value. The first interim evaluation will be carried out in 2025 so as to assess the initial progress and to inform the decision making process on the successor instrument. This evaluation will also assess the the coherence and interaction with other EU Programmes). The final evaluation will take place after the implementation period. These evaluations will also address causality between the intervention and the observed results.

Annex 1 – Procedural information

Lead DG, Decide Planning/CWP references

Lead DG: DG CLIMA
Decide planning/WP Reference: PLAN/2017/916

Organisation and timing

DG CLIMA is the lead DG on this Impact Assessment. Other Commission Services (Secretariat General, Legal Service, DG ENER, DG RTD, DG GROW, DG ECFIN, DG BUDG, DG COMP, and DG JRC) were consulted in the Inter-service Impact Assessment Steering Group.

The first meeting was organised on 31 March 2017. DG CLIMA presented the state of play of the ETS review process, outlining the key elements of the Commission proposal in relation to the Innovation Fund. DG CLIMA presented the planning and indicated that while preparatory work on the market testing study, impact assessment and consultative steps is foreseen to proceed in the course of 2017, the timing of the further steps will depend on the developments of the primary legislation.
DG CLIMA specified that the work on the Innovation Fund Impact Assessment will also build on the related public consultation and the dedicated workshops with Industry. Services were asked for comments on the Inception Impact Assessment.

The second meeting was organised on 24 November 2017. DG CLIMA informed the group about the outcomes of the EU ETS Directive negotiations and presented the key provisions of the Innovation Fund as set forth in the ETS. Further, DG CLIMA presented the main outcomes of the series of sectorial expert consultation workshops organized throughout the year. The discussion focused on the Public consultation questionnaire and main elements of the implementation of the Fund to be covered in the Impact Assessment.

The third meeting took place on 1 March 2018. The group discussed the first chapters of the Impact Assessment, problem definition and objectives.

The fourth ISG meeting was organized on 19 April 2018. DG CLIMA presented the results of the expert survey done as a part of the Market testing study, which also informed the identification of the key design elements of the Innovation Fund to be put forward as policy options in the Impact Assessment. The group discussed chapters 1-5 of the draft text.

The fifth ISG took place on 12 June 2018. The group discussed chapters 1-6 of the Impact Assessment main discussion was focused on the assessment of options and underlying assumptions.

The sixth and last ISG meeting was organized on 5 September 2018. The ISG assessed the finalized draft of the impact assessment, and mostly discussed outstanding clarifications and overall readability of the document. The comments by the ISG are reflected in the final draft submitted to the RSB.

Consultation of the Regulatory Scrutiny Board (RSB)

The upstream meeting with the RSB took place on 9 February 2018, to inform about the initiative, the underlying legal basis, and discuss the scope of the Impact Assessment, which should focus on "how" and not "what". DG CLIMA presented the initial framework of the Impact assessment, and foreseen design elements/options of the Innovation Fund. It was stressed that the work should take into account the lessons learned from the NER 300 Programme, reflect the stakeholders' feedback, ensuring that the Impact Assessment will focus on operational elements of the Innovation Fund.

The RSB received the draft version of the present impact assessment report on 12 September 2018 and following the Board meeting on 10 October 2018 issued a positive opinion with reservations on 12 October 2018.

The Board made the following recommendations, which were addressed in the revised impact assessment report as indicated below.

Main RSB considerations	**Response**
The report does not present sufficient evidence about why the NER 300 programme failed to deliver. It is not clear to what extent failures were due to programme design, organisation, or unexpected market developments. The rationale for shifting to ex-ante grant allocation and for other changes is not well supported.	Sections 1.2 and 2 provide further evidence, discuss the problem drivers related to monetisation of allowances, and summarize the conclusions of the problem analysis: The NER 300 programme failed due to the combination of (i) adverse investment conditions negatively affecting the business model of supported innovative projects; (ii) essentially re-financing nature of the NER 300 programme (which provided ex-post financing); (iii) rigid implementation framework with no room for adjustments during the programme implementation and (iv) complex governance with shared responsibilities but unclear ownership.
The report does not make sufficiently clear what this delegated act should decide. It does not substantiate the proposed level of flexibility for individual calls for proposals. It does not examine options for how much flexibility is desirable to successfully administer the innovation fund.	The explanations are provided in section 1.2.2 and 5.2. A table explaining the split of operational rules between the ETS Directive, Delegated Act and call for proposals including further explanation was added in Chapter 5.2, and relevant explanations were also added under options P1, A1, S1, and B1 for level and disbursement of grants as well as project application and selection process in sections 5 and 6.
The report does not sufficiently explain how the Innovation Fund complements other EU programmes (i.e. InvestEU, LIFE, Horizon etc.) by supporting demonstration projects.	The complementarities and cooperation between the Innovation Fund and other EU programmes are better described in sections 5.2.5, 6.5 and 8.
The report is not sufficiently clear regarding how to evaluate success.	The success of the Innovation Fund implementation will be measured by the extent to which supported projects will succeed to financially close, enter into operation and deliver planned emission reductions.

	As well, the wider application of supported technologies will be part of the Fund's evaluation. Sections 8 and 9 were updated accordingly.

Further RSB considerations and adjustment requirements	**Response**
In the absence of a formal evaluation of the NER 300 programme, the problem analysis should make available whatever evidence there is on what worked, what did not, and why. The report should explain how implementation problems stemmed from technologies and features of priority sectors and project types. This should include CCS, CCU and biofuel projects as well as missed forecasts of carbon prices. The report should explain why national governments did not provide guarantees for NER 300, choosing instead to e.g. adopt national programmes that investors may have found more attractive.	The "adverse investment conditions, including uncertainty in regulatory frameworks and policies hampered the progress of many innovative renewable energy and CCS projects. With a real price of carbon at below €10 t/CO2 and national governments withdrawing their support, the financial closure could not have been possibly met. Bioenergy projects were negatively affected by both the changes to the Renewables Directive in 2015 and unfavourable market evolution when price of petrol fell. Other renewable energy projects were also affected by changing national support schemes. Thus, the real financial gap was wider than at the time of the application and most projects in such circumstances did not find a way to close it. The related explanations are provided in section 2.2, including additional information on national programmes.
The report should include a sensitivity analysis with respect to carbon price and oil prices – the external factors arguably responsible for the failure of NER 300. It should be made clear how the future carbon price determines the resources available for the innovation fund as well as demand for support to demonstration projects depending on the level of technology readiness levels.	The requested analysis is provided in section 2.2.
The report should better explain its interpretation of risk sharing. It could show that NER 300 failed to cover risks that are beyond the control of innovators, justifying risk sharing. The report should better explain the consequences of the risk sharing approach, and what safeguards and mitigation measures are proposed. The problem analysis for governance structure should explore in more detail where links between NER 300 and other EU programmes may have been lacking.	The relevant sections 2.2, 6 and 7 were updated to provide for more explanations. The NER 300 has left the technology risk largely with the project operator because the awarded grant was only paid out if at least 75% of the planned reduction in greenhouse gas emissions were reached. The Innovation Fund, in contrast, offers more effective risk sharing framework, with at least 40% of its support provided up-front, and the remainder of support during projects' construction and operation, depending on the achieved emissions avoidance. As a safeguard for the higher risk-taking by the Fund, effective recovery rules will be considered should projects fail to meet the project milestones or deliver their GHG emission

	avoidance.
The report should clarify what has been decided in the ETS Directive, and what this delegated act now needs to establish. What can and needs to be left for the specific calls for proposal should also be clear. The report should explain the reasons for this split, and clarify what room there is to adjust the division. It should elaborate on the risk that this approach might create planning and operational uncertainties for innovators and investors, and hence affect their interest to engage in long-term projects under the fund. If one objective is to ensure maximum flexibility in the way the fund would operate, this should be reflected both in the statement of the objectives and in the range of options. If the fund is to operate in a highly flexible way, the report should also be clearer on what success would look like and how to assess it operationally.	The table explaining the split of operational rules between the ETS Directive, Delegated Act and call for proposals including further explanation was added in Chapter 5.2, and relevant explanations were also added under options P1, A1, S1, and B1 for level and disbursement of grants as well as project application and selection process in sections 5 and 6. Due to the challenging investment conditions and the high risk involved in low-carbon demonstration projects, grant financing will remain the main delivery mode for the Innovation Fund. An optimal mix between predictability and flexibility is sought for the rules on grant financing, in particular for the rules on grant disbursement and selection procedure. Any cooperation with other Union programs, as InvestEU, will be an important complement to grant financing but cannot be a substitute for it.
The justification for such a flexible approach would benefit from a broader discussion on how the innovation fund would complement other policy instruments at EU level that support innovation activities, demonstration projects and research and development in general.	The complementarities and cooperation between the Innovation Fund and other EU programmes are described in sections 5.2.5, 6.5 and 8. The Innovation Fund occupies a well-defined space between low-carbon research activities, to be funded by Horizon Europe, and support for roll-out of technologies and infrastructure, to be funded by e.g. Connecting Europe Facility.
The range of options should reflect the implicit flexibility in the fund's operation. The report should consider options that would ensure the viability of both small and large projects, allowing for support to technologies of different market readiness, in terms of eligible costs, payment disbursements or the type of financing.	The reasoning has been updated across the chapters 5 and 6.
The preferred option combines elements that could lead to an overall increase in cumulative administrative costs. The report should discuss this possibility and ways to mitigate the increase. Where possible, it should give quantitative indications based on the experience with the implementation of NER300 and other innovation related EU funds.	The reasoning in section 7 has been improved. Due to the centralisation at EU level and the two-stage application procedure, overall administrative costs will be reduced for grant financing compared to NER300, in particular for Member State administrations and project proponents. With regard to the cooperation with InvestEU and other Union programmes, economies of scope should be exploited. The upcoming cost-benefit analysis for the next Multi-annual Financial Framework could quantify the benefits and costs of such cooperations.

Evidence, sources and quality

The Impact Assessment[62] on the EU ETS revision for Phase 4 was carried out in 2015 and included the assessment on the principles of the Innovation Fund.

The following studies were undertaken for the current impact assessment:

- Innovation Fund Market testing study and its two reports: "Market Testing for Low-Carbon Innovation Support to Energy Intensive Industry and to Power Generation: Demand for Innovation Support" and "Impact on the Environment and the Economy of Technological Innovations for the Innovation Fund in the Fields of Energy-intensive Industries, Renewables, Carbon Capture and Storage / Use (CCS/CCU), Energy Storage,". Ecofys in consortium with Fraunhofer ISI, GreenStream and Adelphi (2018)

- NER 300 Lessons Learnt Summary Report, ICF (2017)

- Expert consultations summary report: Finance for Innovation - Towards the ETS Innovation Fund, Climate strategy & partners (2017)

- Innovation fund public consultation report (2018)

[62] https://ec.europa.eu/clima/sites/clima/files/ets/revision/docs/impact_assessment_en.pdf

Annex 2 – Expert survey and stakeholder consultation

In preparation for this impact assessment, DG CLIMA conducted several stages of consultations with concerned stakeholders:

1. Sectorial workshops from January to June 2017
2. Task 2 of the framework contract on IF Market Testing Study in the course of 2017
3. Public on-line consultation opened from January to April 2018.
4. Innovation Fund Expert Group consultation, 8 June 2018

1. Sectorial Workshops (SW)

In January 2017, DG CLIMA launched an extensive consultation process with around 250 representatives of the energy-intensive industries, energy sector and finance sector starting with a high-level conference and followed by expert roundtables over the following three months and concluded with a final public event in June 2017. The objective of the workshops was to collect expert views on potential pathways for low-carbon innovations and on how the proposed Innovation Fund could be designed to mobilise the required investments. The following energy intensive industrial and energy sectors participated: ferrous metals, non-ferrous metals, pulp & paper, oil refining, chemicals & bio-based industries, cement & lime, glass & ceramics, renewable energy, energy storage and CCS. Workshop moderators, selected for their expertise in the field, were asked to develop session feedback, which formed the basis for this summary report and its recommendations.

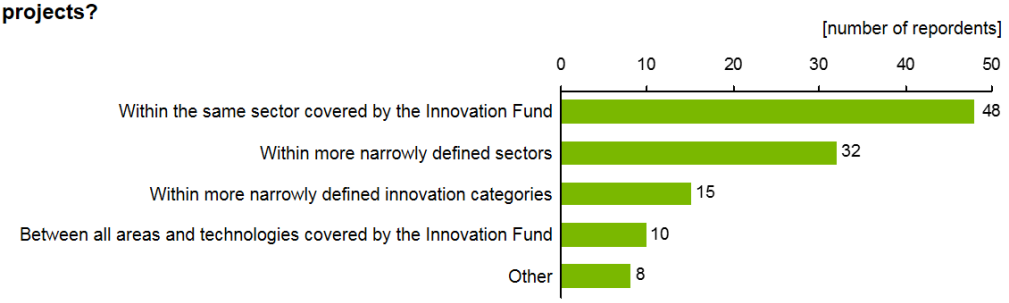
2. Expert Survey (ES)

Another key input for this report was a survey (the Expert Survey; ES) on the Innovation Fund that the consortium carried out to test the market for design options. For this survey, 493 stakeholders were selected in agreement with the Commission to fill in a questionnaire, including 12 pilot questionnaires, based on the findings of the work thus far. The purpose of the ES was to predict the performance of and potential market of the Innovation Fund once it is launched in the EU Member States.

Expert survey – relevant charts

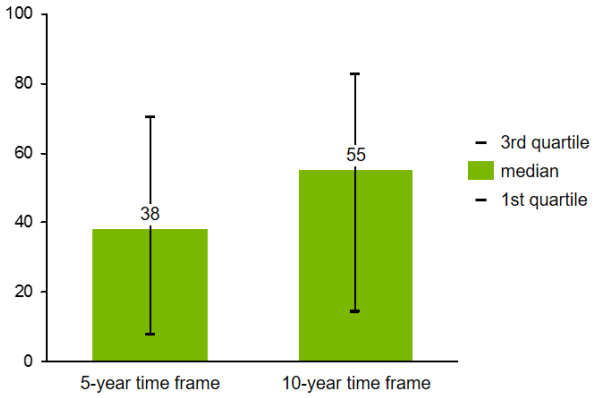
Most of the respondents would consider competition within sectors or subsectors appropriate for selection of supported projects

Assume, hypothetically, that the selection of innovative projects to be supported by the Innovation Fund will be based on a competitive process. What do you think is an appropriate scope for competition among projects?



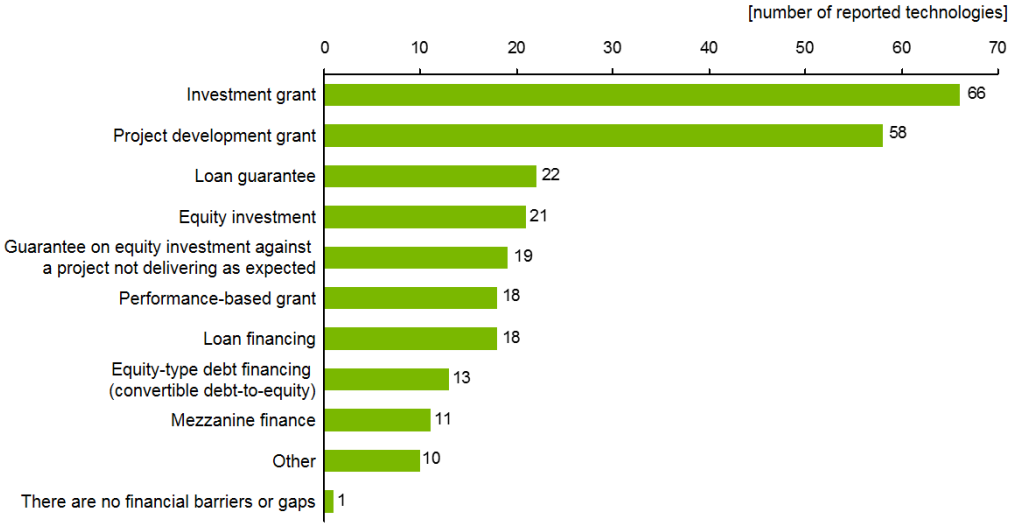
Additional OPEX is typically a substantial share of the total additional costs of applying an innovative technology, although this differs a lot project by project

Additional OPEX as share of additional CAPEX+OPEX
[%, n=16]

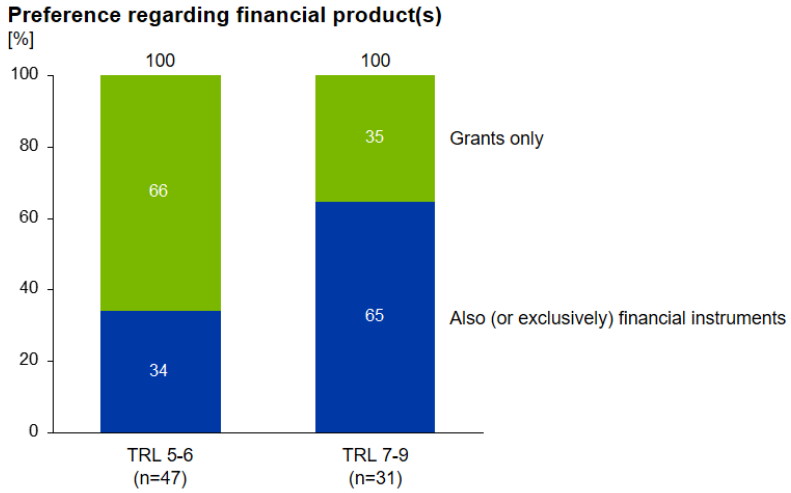


Grants are the most appropriate financial products to help innovative technologies to develop

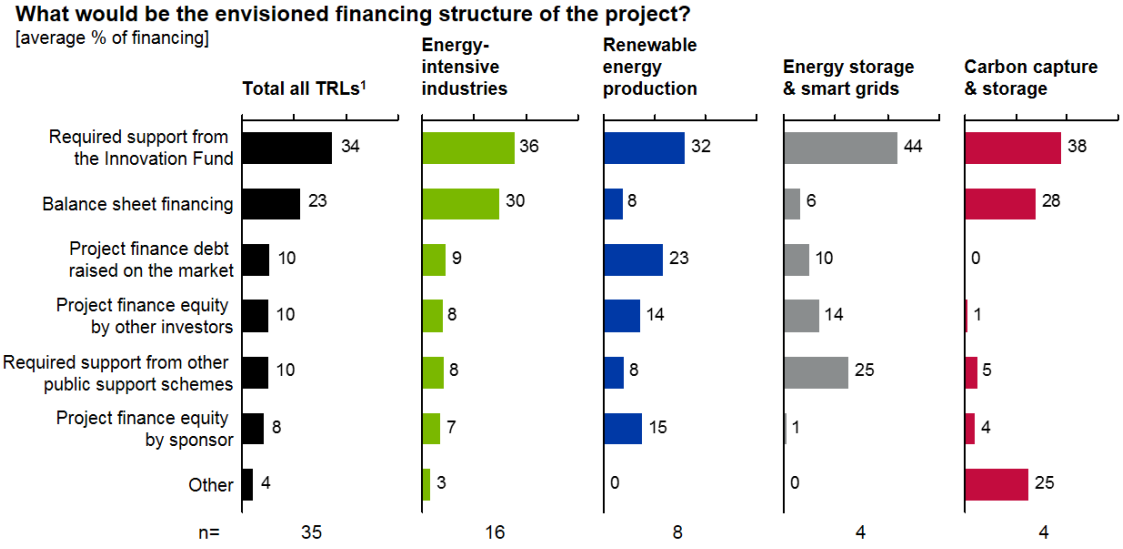
What would be the most appropriate financial product(s) to help the innovative technology proceed to the next TRL?



Most technologies in TRL 5 and 6 have a preference for grants only, while most technologies in TRL 7 to 9 also prefer other financial instruments



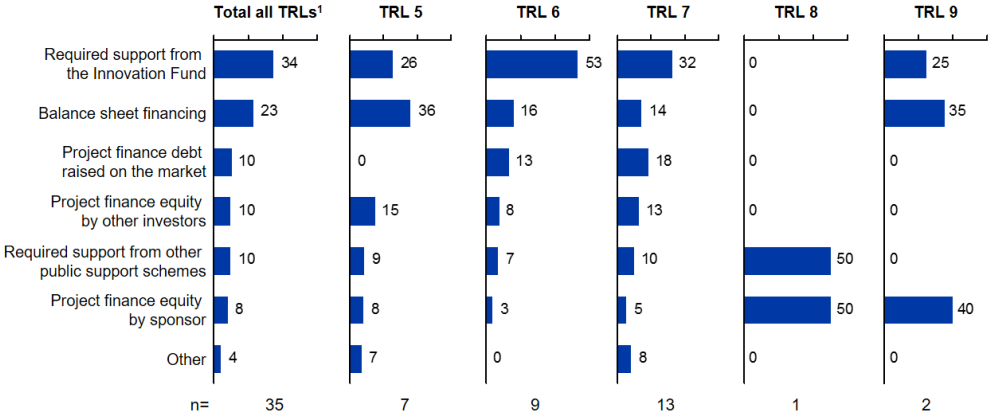
Average financing structures differ between sectors, with energy storage and smart grid projects having the highest average need for Innovation Fund support



NOTE: Only projects that could be assigned to a single sector are included in the sector results. Cross-sectoral projects such as electrolysis are excluded from sector results, but are included in the total of all sectors.

Required support from the innovation fund ranges from 25 to 53% of financing, and lower TRL technologies rely more on balance sheet financing

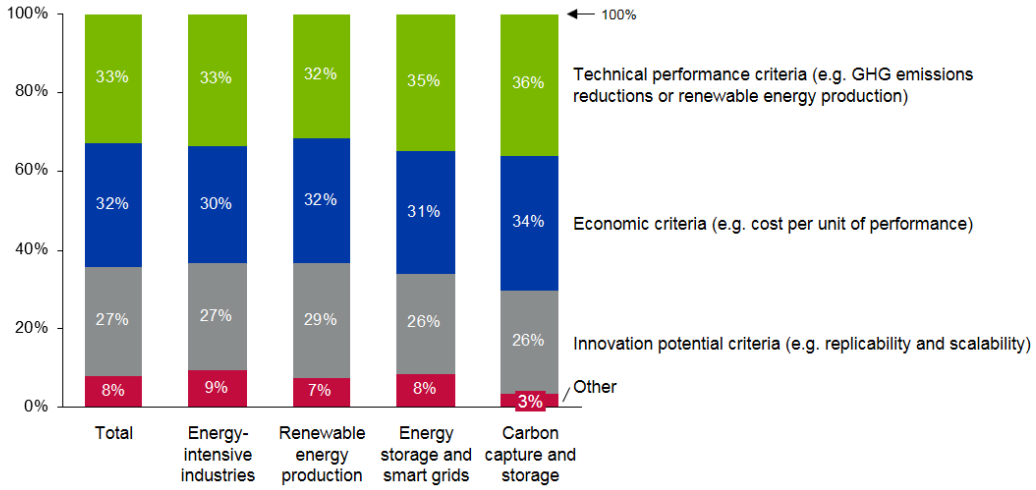
What would be the envisioned financing structure of the project?
[average % of financing]



Technical, economic and innovation potential criteria are considered of approximately equal importance in selection of projects for Innovation Fund funding

In the selection of projects, what ranking criteria do you find more appropriate? Please divide 10 points over the different criteria, where the highest scoring criteria is most important

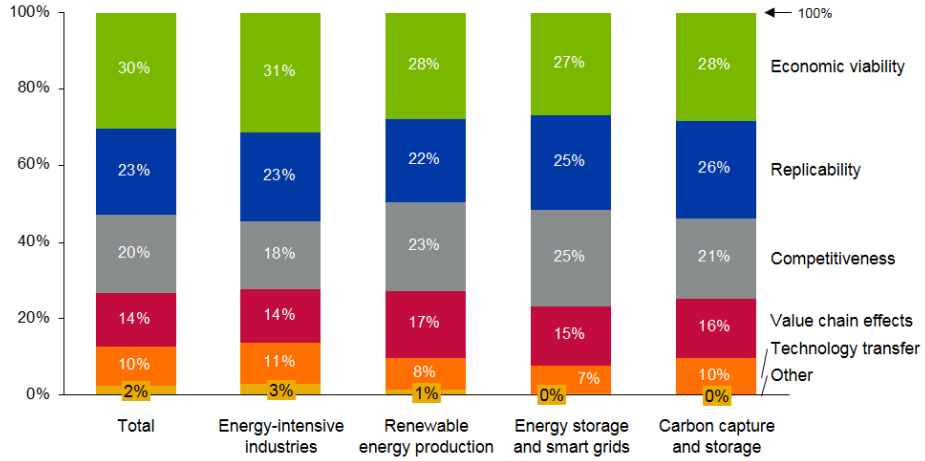
[average relative importance, n=87]



Economic viability, replicability and competitiveness are considered the most important qualitative criteria in selection of projects for Innovation Fund funding

How would you score the following qualitative criteria for selecting projects? Please divide 10 points over the different criteria, where the highest scoring criteria is most important

[average relative importance, n=85]



3. Public consultation (PC)

Prior to adoption of the Innovation Fund Delegated Act, a 12-weeks period was open to public consultation as of 10 January 2018. Consultations were conducted through on-line surveys, offering the possibility for users to comment on the modalities of the Innovation Fund. The resultant dataset contains 222 responses, 90% in their professional capacity. During the inception phase of the impact assessment, in September 2017, the Commission had received 12 contributions, all of them from professional participants which would afterwards contribute to the Public consultation.

The main findings of the different rounds of consultation are presented as follows:

Market failures and expectations

- There is no shortage of **low-carbon technology ideas**. Experts from the SW have identified over 80 known specific technologies or technology groups for decarbonisation pathways, some of them cross-cutting (CCS, CCU, green Hydrogen and Energy Storage).
- Drivers differ according to the level of maturity of technologies: investment in low TRLs relate to strategic considerations while investing in higher TRLs is based on reliable business case.
- Among the key **business drivers**, the carbon price was highlighted as well as international level-playing field for low-carbon innovation to become a competitiveness factor.
- Identified barriers and risks were also highlighted beyond the IF. Experts considered that the regulatory framework should be innovation-friendly and stable over time from submission to full commercial roll-out and that implementation steps (permitting, licensing, etc.) are taken swiftly.
- The ES also pointed to a variety in the nature of risks, but all translate into a lack of financing.

Investment Needs

- According to WS respondents, total needs for the next decade amount from €33 to €43Bn for EII, and from €10 to €25Bn for renewables, storage and CCS.
- The choice of the technologies is crucial as typically plant lifetime spans over 25 years, and only a minority (35%) can benefit from retrofit.
- The ES found that the IF could cover from 25 to 53% of the funding needed, with an average of 34%. In order to cross the valley of death, additional sources of funding are needed.
- An overwhelming majority of the PC respondents agreed to the possibility of combining various sources of funding. 76% of them indicated that complementary funding should come from other EU programmes, 20% from national programmes, and 38% gave general recommendations for complementarity, without defining at which level it applied.
- The SW also found a need for complementarity between the Innovation Fund and other EU and national funds, but no overlaps. In practical terms, support conditions should vary according to TRLs, or relevant costs definition.

Type of support

- Grants are the type of support typically preferred by the market, but there is also interest for financing instruments.
- According to the SW, The IF should mainly offer grants, complemented with partial grants and / or de-risked loans or equity (depending on the maturity of the technology) with higher levels of grant intensity for early stage projects.
- However, the SW Summary Report reported that experts agreed that the IF should be a revolving fund, which implies the use of other types of financing products (grants do not lead to a revolving fund). This implies that grants need to be complemented by other financial instruments.
- The ES clearly found that (investment and project development) grants are the most appropriate financial products to help innovative technologies to develop, and that for higher TRL projects (TRL 7 to 9) also financing instruments can be appropriate
- The ES results show that, according to the market:
    a. For loans, the minimum tenor period would typically be 10 years, and the maximum interest rate would typically be 3%;
    b. For equity, the minimum holding period would typically be 5 years, and the maximum return on equity would typically be 8%.
- Support is generally linked to CAPEX, by nature for financial instruments and for the sake of simplicity for grants. However, in some sectors (CCS notably), OPEX support is an essential requisite to get to a robust business case.

Eligibility and Selection criteria

- TRLs should be comprised between 6 and 9, although it is unclear whether this range applies to TRL at application stage (according to SW and PC) or expected TRLs upon completion of the project (according to ES).

- In Industry, funding is needed for relatively large projects with CAPEX typically from EUR 5m to EUR 200m, so eligibility criteria for project size should account for that. CAPEX requirements may differ significantly from project to project; around a quarter of the projects would have CAPEX higher than EUR 200m.
- 58% of respondents in the SW concluded that as the IF does not know from the start the technologies that may be invented in the future, the projects should not be restricted to a predetermined list of technologies. But a majority of ES respondents reported that a share of the innovations is predictable, indicating that technology corridors can be an option.
- Most of the respondents to the PC consider competition within sectors or subsectors appropriate for selection of supported projects. A number of stakeholders repeatedly highlighted the need for a fair funding balance between sectors (energy, industry) and technologies.
- IF is encouraged to promote cooperation across sectors and support partnerships with technology service providers that have the potential to cross-fertilize different industries with key low-carbon technologies. IF might incentivize the formation of "collaborative consortia" with "cross-sectorial" technologies through awarding extra points in consideration of Stage 1 scoring. Projects should be assessed based on multiple criteria. The SW showed a preference for a multiple criteria assessment of projects. Among the selection criteria, the PC respondents ranked decarbonisation potential first and scalability as #2, followed by innovativeness, bankability and expected performance.
- The often used IRR (internal rate of return) metric was found inadequate for project evaluation of high-risk investments by many of the experts in the SWs. The pilot of the ES gave the same picture; the reason for this inadequacy is that the purpose of (especially relatively low TRL) innovative projects is to learn from the project rather than to earn money with the project.
- A majority (79% of the PC respondents) indicated that the eligibility criteria *should* set deadlines for reaching specified milestones, either relating to construction steps (40%) or investment steps (33%).

Application Process

- Aid intensity required by the market ranges from 10-53% of the financing need, depending on the sector. According to the ES, required support from the innovation fund ranges from 25 to 53% of the financing structure, and lower TRL technologies rely more on balance sheet financing, which might be counter intuitive, as one would expect these to require the bigger share of funding from the innovation funds.
- IF funding should be provided when the project has a funding gap, leading to a form of contracted "funding against milestones" approach. This has the advantage of providing timely funding to successful projects, which are meeting their milestones and also quickly terminating those which fail, freeing up spare capital for new innovation funding rounds.
- There was a consensus from experts for a two-stage IF application process with stage 1 being "light" to pre-qualify projects against a grid of criteria and then stage 2 would involve a fuller project description and more detailed due diligence. A two-stage process is expected to reduce the administrative and

financial cost of non-qualification and make the application process more user friendly and clear, encouraging a broader participation and range of ideas in the first round.

- The market prefers a two-staged application process, and ideally would have a ”one-stop-shop” for all innovation support. The SW found a consensus on the preference of a two-stage IF application process with stage 1 being “light” to pre-qualify projects against a grid of criteria and then stage 2 would involve a fuller project description and more detailed due diligence. The expected time needed for preparing an Innovation Fund application is 6 months As this is a significant investment, companies prefer a due diligence process that is effective, with less no-go criteria (i.e. “red tape”) and greater speed, according to the SW.
- A project development service for prospective but less mature projects would add value and reduce the lead times. The type of **development assistance** indicated by most PC respondents was that of technical pre-feasibility studies (indicated by 68% of the respondents), followed by financial analysis (60%).
- The market preference is divided between continuous opening and annual calls for applications. The ES respondents' preference is divided between continuous opening and annual calls, with considerably lower support for a system with biennial calls. But a clear (76%) majority of PC respondents indicated that the application process should be organised through regular calls, at pre-defined dates.
- The market needs a fast, transparent process involving independent experts. The SW consensus was that the IF should be independent, have robust and transparent procedures, and have a short evaluation process involving independent sector experts. The projects assessment due diligence processes should be transparent and known to applicants in advance. ES Experts felt that the evaluation process should be “short” (1-year timeframe was proposed from submission in Stage 1 to decision after Stage 2).

4. Consultation of the Innovation Fund Expert Group

A first Expert group meeting was organised on 8 June 2018. The Group is composed of about 60 representatives of industrial sectors, Renewable energy sectors, CCS, Member States, Financiers, Applied research institutes and relevant NGOs.

Key take-aways from the discussion, which focused on the design elements and options:

Relevant cost to be supported by Innovation Fund: A large majority of experts favoured supporting both additional CAPEX and additional OPEX as for many new technologies, OPEX are too high to be competitive. Some experts suggested considering full project cost over entire life time rather than only additional costs.

Type of support: Almost all experts favoured a mix of grants and financial instruments, with majority stressing that grants should be the main focus of the Fund. Financial instruments should be considered as complementary support, where needed.

Funding rate: Views were mixed on this topic, with the majority of experts preferring a single maximum funding rate, while some experts preferred a varied rate, depending on TRL and financing needs.

Timing of calls: Regular calls received a positive response from almost all experts.

Application process: There was almost unanimous support for a two-stage application process. The idea of project development services was welcome by a number of experts.

Selection criteria: Almost all experts favoured a mix of quantitative and qualitative criteria. It has been widely argued that CO_2 savings should be an important criterion, but not on a project basis alone: scalability and replicability should also be considered.

Governance structure: There was strong support for simplification and streamlining of the governance process, but views on whether or not Member States (MS) should be strongly involved, and how, differed. Some experts were in favour of minimising the role of MS while other, in particular MS experts, preferred MS to be involved especially before the award decisions are taken.

Geographical balance: Many experts were in favour a dynamic call management system, whereby the number of projects per country would not be regulated upfront but instead calls would allow for targeting and selecting projects from under-represented countries. Some experts preferred to continue with the current NER300 system, with a maximum number of projects admissible per country.

Detailed meeting summary is attached as a separate document, also uploaded to the Register of Commission expert groups.

Annex 3 – Who is affected and how?

Practical implications of the initiative

The Innovation Fund will primarily affect the following categories of stakeholders:

Category of stakeholders	Impact
1. **Businesses**	
1.1. Businesses eligible for the support from the fund: • Energy-intensive industries: ferrous and non-ferrous metals, cement and lime, glass and ceramics, pulp and paper, chemicals, oil refining • Innovative renewable energy generation: concentrated solar power, photovoltaics, off-shore wind, ocean, geothermal, and bio-energy • Carbon capture and storage, carbon capture and utilisation • Energy storage • Other ETS Annex 1 businesses or cross-cutting ventures	Direct impact by bridging the financing gap faced by pre-commercial low-carbon technologies and improving the risk profile to the level acceptable by the market. As compared to NER 300: access to simplified, faster and more efficient structure to support innovative projects. The projects enabled by the fund will also benefit from: • revenues from the sale of excess allowances (as a result of lower GHG emissions as compared to reference projects); • revenues from technology transfers; • reduced OPEX (applicable to some projects mainly in innovative renewable energy generation); Indirect impact through the development of new business models, partnerships with technology service providers and cross-fertilization through the creation of collaborative consortia for cross-sectorial technologies.
1.2. Other businesses, including SMEs	Indirect benefits across value chains resulting from the adoption of low-carbon technologies; also some potential for technology transfer.
1.3. Technology service providers	Development of new markets and new business models.
1.4. Providers of financial services (public and private), including financial intermediaries for the fund	New opportunities in sustainable finance contributing to the achievement of sustainable finance targets, diversification of investment portfolio.
2. Citizens/Consumers	Positive externalities resulting from better and more efficient technologies passed on through the value chain and improving access to sustainable

	products and services. Positive environmental impacts.
3. Public administrations / Member States	GHG reduction/avoidance achieved through the operation of the fund contributing to the achievement of Member States' emission reduction targets. Opportunities for co-financing projects supported by the fund and the creation of parallel and/or synergetic funding mechanisms. Low administrative costs under the preferred option as compared to NER 300 implementation.
4. Academia / research community	New opportunities for commercialization of research related to low-carbon technologies; potential for cooperation with technology service providers and businesses mentioned in 1.1.

Summary of costs and benefits

Since the Innovation Fund will operate until 2030, there are many uncertainties as regards market evolution, carbon price, costs and achievements of the demonstrated technologies. Potential significant increase in the carbon price will not only directly result in proportionate increase of the budget of the Innovation Fund, but also likely reduce the funding gap of supported projects, leading to higher leverage of the intervention.

I. Overview of Benefits		
Description	***Amount (due to uncertainties presented as indication of the magnitude of impact)***	***Comments***
Direct benefits		
Estimated investment volume for low-carbon technologies	**55 to 68 billion EUR**	The investment volume, which the Innovation Fund will effectively be able to support, will critically depend on the carbon price. The carbon price will determine the size of the Fund and profitability of projects.
GHG emissions avoided (projects supported by the Fund)	Avoided emissions are a function of the undertaken investments	A comprehensive estimation was not possible for the expected emissions reductions. A more detailed analysis of a sample of technologies showed emissions

		reductions of **10 to 23 million tons** for an illustrative sample of technologies with investment volume of **14 billion EUR**.
Employment	Generated employment is a function of the undertaken investments	A comprehensive estimation was not possible.
Indirect benefits		
Roll-out of low-carbon technologies after 2030 (broader adoption of low carbon technologies due to demonstration effect and technology transfer)	+++	
Increased competitiveness of EU industry (global leadership on low carbon technologies)	+++	

II. Overview of administrative costs – Preferred option (compared to baseline)						
	Citizens/Consumers		Businesses		Administrations	
	One-off	Recurrent	One-off	Recurrent	One-off	Recurrent
Direct costs	None	None	*reduced*	*reduced*	*reduced*	*reduced*
Indirect costs	None	None	None	None	None	None

Citizens: The Innovation Fund will incur no costs for the citizens.

Businesses: The main costs for businesses will be one-off costs related to the application process, administrative and legal costs related reporting and audits and their volume will vary widely depending on the size and complexity of the projects. Part of these costs will be covered fully or partially by grants provided by the Innovation Fund. Recurrent costs will involve reporting related to the achievement of milestones at the commissioning, ramp-up and entry into operation, audits, as well as periodic reporting during the operation. Since these reports will be mainly fed by standard accounting and other records produced by beneficiaries as business as usual, recurrent costs specifically related to reporting under the Investment Fund will not be significant.

Administrations: The preferred option reduces the administrative burden for Member States. The administrative costs for the public implementing body of the Innovation Fund will be covered from the resources of the Innovation Fund.

Annex 4 – Current status of low-carbon innovation in the sectors covered by the Innovation Fund

Energy Intensive Industry

Currently, the industrial sector accounts for around 30% of global greenhouse gas (GHG) emissions. Of this, steel, cement and chemicals together make up over 70%.[63] Incremental energy efficiency improvements would only be able to reduce industrial emissions by around 27% by 2050, but on their own will not be enough to offset growth in demand[64]. The stakeholder consultation shows[65] that there is a wide range of low-carbon technology options, which can be broadly categorised into:

- process innovations (like switching from fossil fuels to biomass, hydrogen or electricity),
- new products,
- end-of-pipe solutions such as CCS, and
- new business models, e.g. CCU in industrial symbiosis.

Yet, most of those breakthrough innovations are still in the development phase and require significant investment for demonstration at industrial scale. Relevant projects are not undertaken, especially given the risks involved and the large investments needed to demonstrate their technical feasibility at scale.

Innovative renewable energy technologies

The costs of mainstream renewable energy technologies have come down sharply, with levelised cost of electricity from utility– scale photovoltaics dropping by 36% and from wind by 24% in the last four years alone. Although in some locations solar and wind energy installations approach grid parity, there is still a considerable potential for innovations that improve productivity in diverse environments. The deployment of renewable energy technology innovation was driven by the carbon price and renewable energy targets, which gave rise to national support mechanisms, such as feed-in tariffs, which are now increasingly being replaced by competitive bidding. Emerging innovative renewables such as ocean energy, floating wind, some geothermal, concentrating solar power technologies and advanced bioenergy continue to struggle to achieve the critical mass in demonstration that would enable further significant cost reductions and spur roll-out at scale.[66]

Electricity storage

Electricity storage is key to accommodate the high level of variable renewable generation required to decarbonise the electricity sector. Beyond 2050, the electricity system will need to accommodate a share of generation from variable renewables upwards of 50% in

[63] IEA (2010)
[64] IEA (2016)
[65] Innovation Fund expert consultation summary
[66] ICF (2016) Innovative Financial Instruments for First-of-a-Kind, commercial-scale demonstration projects in the field of Energy

order to reach climate goals. A rule of thumb is that for every GW of intermittent renewables, 1 GWh of storage is required.[67] In addition, the development of e-mobility in the road transport sector in the next decade is expected to lead to a surge in market demand for batteries (reference to CO2 cars proposal and IA) . In this context, the Commission is setting up a Batteries Action Plan with a view to develop a strong battery value chain in the EU. This will also require the demonstration of advanced battery technology manufacturing. Large-scale demonstration of innovative solutions has been particularly slow in the renewable heating and cooling technology category, including storage, which is of high importance given that heating and cooling in buildings and industry accounts for half of the EU's energy consumption.

Carbon Capture Storage (CCS) and Carbon Capture Use (CCU)

Current low-carbon pathway projections rely heavily on Carbon Capture and Storage (CCS) to meet emission targets. In the Energy Technology Perspectives 2DS scenario of the IEA, CCS contributes to 14% or 6 Gt/yr of emissions reductions by 2050.[68] Of this, approximately 30% is from industrial emissions. CCS provides one of the few options for heavy industrial processes such as steel, cement and chemicals to achieve low or even zero-carbon processes. Furthermore, negative emissions technologies such as bioenergy with CCS (BECCS) would benefit from the advancement of conventional CCS. All components of carbon capture, transport, injection and storage have been demonstrated at commercial scale outside the EU[69]. However, large-scale demonstration of CCS, especially including industrial capture and utilisation in clusters, is an urgent priority to overcome the challenges of whole systems integration across the carbon capture, use and storage (CCUS) chain.[70] The number of installed carbon capture and storage facilities is much lower than expected because the cost of the technology has so far precluded a wide-scale adoption. CCS is today a technology that requires higher carbon prices to be competitive. In addition, CCS projects require integration into complex industrial chains, which further increases the project risk. It is therefore important to maintain support for commercial-scale demonstration projects, gain experience, bring down costs by demonstrating the viability of projects and demonstrate safe and reliable underground storage of CO_2 in the EU.

[67] Budischak et al., (2013)
[68] IEA (2016)
[69] Florin and Fennell (2010)
[70] LCICG (2014)

Annex 5 – Union support for low-carbon technology research and roll-out

Support for low-carbon technology innovation is an integral part of current EU energy and climate policy until 2020, with research and innovation (R&I) being one of its key components. The Integrated SET-Plan is an initiative reinforcing the coordination of R&I efforts under the Energy Union framework. Published in 2015, it defined, inter alia, the overall objectives and direction of European support for research and technology development in energy research by 2030.

Research and innovation is primarily supported through the Horizon 2020 programme, and in the next MFF via the Horizon Europe Programme. Horizon 2020 supports a wider range of activities, from basic to applied research to large-scale product validation and market replication. Horizon 2020 also helps companies engaged in research and innovation across all sectors gain easier access to loans, guarantees, counter-guarantees and hybrid, mezzanine and equity finance via financial instruments such as InnovFin EDP.

The Innovation Fund will complement the Horizon Europe programme, ensuring that eligible technologies which it nurtured do not end up in the 'valley of death' but are carried over into the market. With its ability to support large-scale projects, the Innovation Fund fills an important gap in the EU funding instruments portfolio with regards to demonstration of innovative technologies.

The European Fund for Strategic Investments (EFSI), which has been recently extended until 2020 by 'EFSI 2.0' regulation[71] has an investment target to EUR 500 billion, 40% of which will aim to contribute to climate action. In the next MFF, an InvestEU Fund[72] will replace EFSI and consolidate under its umbrella all EU financial instruments. The form and target of the financial instruments under InvestEU is not yet known but it can be expected that Financial Instruments under the R&I window (one of the four policy windows of the Fund) will be in line with objectives and targeted sectors of the Innovation Fund.

Important synergies can also be achieved also between the Innovation Fund and the Connecting Europe Facility (CEF). For 2021-2027, the Commission proposes strengthening the environmental dimension of CEF, with a target of 60% of its budget contributing to climate objectives. CEF will support the cooperation on cross-border renewable generation projects, in order to promote the strategic uptake of market-ready renewable energy technologies. Furthermore, projects of common interest under CEF such as CO_2 transport infrastructure projects will likely provide the enabling infrastructure for Innovation Fund projects, such as on CCS.

[71] Regulation (EU) 2017/2396 of the European Parliament and of the Council

[72] Proposal for a Regulation of the European Parliament and of the Council establishing the InvestEU Programme, 6.6.2018, COM(2018) 439 final

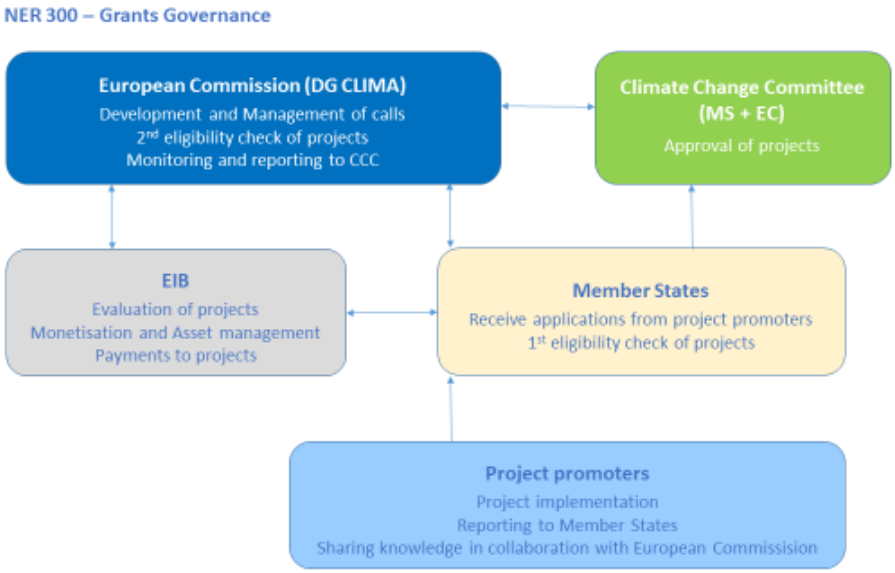
Annex 6 – NER 300 programme and lessons learnt

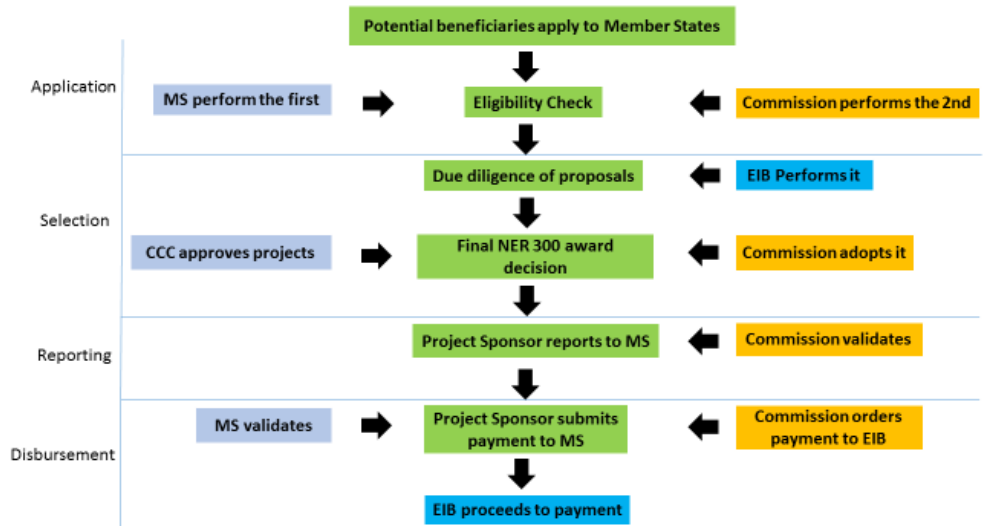
How does NER 300 work?

NER 300 Programme has been financed through the sale (monetisation) of 300 million of ETS allowances. The monetisation was executed by the EIB. The resulting EUR 2.1 billion has been allocated to 39 projects through two calls for proposals, in 2012 and 2014.

Projects were submitted by the promoters first to Member States who managed the first eligibility check and pre-selection phase, following which the Member States submitted the pre-selected projects to the European Commission and the EIB. The EIB performed the due diligence, based on which the European Commission negotiated the selected projects with the Member States and decided on the NER 300 award to the selected 39 projects. Member States then had to sign the "legally binding instrument = contract" with the project promoters, and are responsible for following closely the projects implementation, under overall coordination of the Commission. Once projects enter operation, the NER 300 support is paid upon performance (verified GHG emission reductions or renewable energy produced) during 5 years (10 years for CCS), in annual payments. Member States are certifying the performance of projects; JRC is checking the fulfilment of the knowledge-sharing requirements while the EIB executes the payments to projects.

NER 300 Governance Diagram





Current state of play of the NER 300

By 31 July 2018, the state-of-play in the development of the NER 300 projects is as follows:

- 6 projects are operational
- 19 projects are currently at various stages of development:
  - 8 projects from the first call of proposals have to enter into operation before 31 December 2019 (to remain eligible for the disbursement of the grants);
  - 11 projects from the second call have to reach the so-called "final investment decision" by 30 June 2018, 2 projects have already met this condition;
- 14 projects have been withdrawn.

The withdrawals have been caused by a range of issues, with the majority due to the difficult economic situation in recent years and policy changes at national level with regard to financial support. Since the launch of NER 300 in 2010, the economic and policy environment globally and in the EU has seen significant turmoil. NER 300 projects therefore find it difficult to raise sufficient risk finance, either private or public. Another element that contributed to withdrawals is the inflexible design of the NER 300, as legislated in the NER 300 Decision (2010/670/EU) and related Award Decisions.

The resources freed up as a result of withdrawal of project funded under the **first call** amount currently to €487 million and will be reinvested through two existing instruments that are managed by the European Investment Bank (EIB), namely InnovFin Energy Demonstration Projects (EDP) and Connecting Europe Facility (CEF):

- InnovFin EDP can provide loans to projects in innovative renewable energy, carbon capture and storage (CCS), smart energy systems;
- CEF can provide debt finance to projects which enable the innovative use of renewables in the transport sector.

The funds that are freed up as a result of withdrawals from the **second call** amount currently to €515 million. These funds will be transferred to the innovation fund, as set out in the revised Emissions Trading Directive.

NER 300 - Lessons learned[73]:

The grant award to projects and the resulting portfolio of projects is based on a combination of programme modalities. The main modalities comprise:

The calls for proposals were based on a single step procedure with fixed deadlines for submission of project documentation. There were two calls for proposals, in 2011 and 2013, launched at the EU level, followed by national calls launched by Member States. The projects were pre-selected by Member States. Project documentation was then sent to the Commission to check that Member States have follow procedures correctly, which was followed by due diligence performed by the EIB. In the final stage the Member States prioritized projects in case of more than 3 projects were selected for funding. The maximum 3 projects per Member State rule was meant to ensure geographical balance. The only exception to the rule was possible for transboundary projects: applied only for one project. The Commission adopted the Award Decision, following which the Member States signed a contract with the project promoters.

■ Eligibility checks and due diligence of individual projects submitted by Member States in terms of the compliance of each project with eligibility criteria, and assessing levels of innovation and project feasibility prior to project ranking and award;

■ The technology sub-category – establishing the type of projects to be funded, and used to rank projects that have succeeded in satisfying the due diligence appraisal, ensuring technological diversity in terms of innovation and market maturity, and projects of various sizes;

■ The Cost Per Unit Performance (CPUP) of the project in each sub-category, where costs comprise the additional capital and operating costs less the revenues over 5 years of operation for RES (10 years for CCS), and performance relates to the energy capacity (MWh) and hence carbon savings (for RES projects) or carbon storage (CCS projects);

■ Where additional costs used in the CPUP are estimated on the basis of comparison with a 'business as usual' reference plant proposed by the Member State;

■ Grants are awarded of up to 50% of relevant costs. Payment of the grant is subject to the demonstration of operational performance and verified carbon savings (RES) or storage (CCS);

■ Where up-front payment is required, project sponsors have to acquire a Member State guarantee for the amount of pre-paid NER 300 funding;

■ Limiting the selection of projects to a maximum of three per Member State to ensure geographic balance.

[73] ICF (2017) NER 300 Lessons Learned Summary Report

Examining each modality, following lessons learned can be drawn:

■ **Due diligence** – Following eligibility checks, projects are subject to appraisal to demonstrate the technical and commercial feasibility to succeed, recognising that the rationale for the Programme is to address the commercialisation 'Valley of Death' and risks posed to investors and lenders The risks, especially financial, faced by projects have generally been under-estimated – for example, where a feed-in tariff is no longer available or increased technological costs have arisen due to a required change in design – reflected in the need for additional time to address project risks and requests for time extensions. This is in part due to an overreliance on assessing technology readiness, compounded by the difficulties of anticipating rapid market and regulatory changes (e.g. in the bioenergy market) for sponsors and appraisers. Faced with such uncertainty, more detailed market and business model risk analysis should have been required to confirm "bankability" (i.e. the ability of the project cash-flow projections to be able to service debt and satisfy lenders).

■ **Technology sub-category** – the use of detailed categories (38 are defined, of which 20 were used) has resulted in technological diversity and support for technologies at various stages of commercial maturity and proximity to market. However, 38 categories suppose perfect knowledge and sometimes inhibit technological innovation by preventing more 'hybrid' technologies that cut across the subcategories. The classification would need to be updated for each call (under the Innovation Fund) to reflect technical progress and market development. This can entail more than 100 technology categories to be defined (due to the Innovation Fund's scope being much broader than under the NER 300) and regularly updated;

■ **Project size** – the use of sub-categories also ensures projects of various sizes, ranging from for example an ocean energy project of EUR 24 million total costs, to large offshore wind farms of EUR 1,209 million total costs. The effect of size thresholds which specify the minimum size of projects and the CPUP as a main ranking criterion have resulted in a number of projects being larger than necessary for the commercial demonstration of the technology, and potentially restricts some smaller projects of interest. The size thresholds also limited the opportunities for some project sponsors to bid into the Programme. The lowering of some thresholds could therefore be considered, especially for less mature technologies.

■ **The CPUP measure** – this measure provides a common metric that can be used to rank projects within each sub-category. Given the high capital intensity of some projects, the metric is largely determined by capital expenditure and could be simplified by just focusing on additional capital costs and capacity in some sectors.

■ **The estimation of additional costs** – the approach to estimating additional costs (defined as the 'relevant' costs to be funded) is based on a comparison with a reference 'business as usual' plant, often a modern gas fired power plant is used. The use of specific reference plants for each project has caused some sponsors difficulties in trying to specify and estimate relevant costs. To simplify and provide greater guidance, the Programme could specify the reference plant to be used. These would need to be updated for each call to reflect market trends. The formula to compute the relevant cost could also be simplified by focusing on capital cost only, where relevant.

■ **The award of grant subject to verified carbon savings** – the Programme condition that the grant awarded should not be automatically available until projects enter into operation (unless guarantees are provided) has substantially limited the ability of the Programme to fully address the financing risks which are the rationale for the Programme. For some projects, Member State guarantees have been secured allowing the release of grant and scope for up-front funding. Upfront-funding have been associated with projects that have made faster progress, but this was only available in some Member States. Finance risks could potentially be reduced by an approach linking part of the disbursement of awarded funds to the achievement of progress, via key milestones, during earlier stages of project development.

■ **The restriction to three projects per Member State** – this restriction is imposed to ensure a geographic balance to the Programme, and has resulted in 20 Member States being awarded funding. To the extent that future programmes are larger, more projects per Member State should be allowed.

Annex 7 – Recommendations of the European Court of Auditors' special report

Recommendation 1 – Increasing the potential for effective EU support to low carbon energy innovations

To increase the effectiveness of Union financial support to innovative low carbon energy demonstration projects, the Commission should:

a) where large, capital intensive projects needing a combination of national and EU support are put forward for funding under the proposed Innovation Fund and other relevant centrally-managed EU programmes, assess their consistency with national climate and energy plans and ensure firm and transparent commitments are obtained from Member States before awarding EU funds.

Target implementation date: by the end of 2021.

Recommendation 2 – Improving project selection and decision-making procedures for the future Innovation Fund

In view of the planned launch of the new Innovation Fund in 2021, the Commission should improve critical elements of the project selection and decision-making process as compared to NER 300. In particular it should:

(a) establish criteria for withdrawing funding in cases where projects do not meet agreed milestones;

(b) assess aspects of projects' economic viability ('bankability'), including those referred to under Recommendation 1;

(c) define precise and measurable thresholds for each of the due diligence/award criteria;

(d) make available in confidence the results of the due diligence assessment to concerned Member State authorities prior to the award decision;

(e) support projects for which the selection procedure showed that they are likely to contribute the most towards meeting EU priorities;

(f) simplify the procedure for project change requests so that it does not require changes to Commission legal acts.

Target implementation date: by the end of 2020.

Recommendation 3 – Ensuring flexibility of the Innovation Fund to respond to market and technology developments

The Commission should ensure that the Innovation Fund design allows for more flexible responses to technology developments and project withdrawals than the NER 300 design did. These may include:

(a) a flexible approach for defining and updating eligible technologies and thresholds;

(b) organising rolling calls for proposals and award decisions;

Target implementation date: by the end of 2021.

Recommendation 4 – Better Commission coordination for more coherent targeting of EU support

To enhance the coherent and effective targeting of EU support to low carbon energy innovation the concerned Commission services (in particular DGs RTD, ENER, CLIMA, GROW and ECFIN) should:

(a) perform cross-service assessments to demonstrate that the Innovation Fund, H2020 and InnovFin EDP (and their successors after 2020) are complementary and coherently targeting low carbon energy demonstration projects;

(b) streamline project selection processes between programmes to reduce inefficiencies and overlaps.

Target implementation date: by the end of 2021.

Recommendation 5 – Ensuring accountability

In view of the launch of the new Innovation Fund in 2021, the Commission should improve critical elements of the governance and accountability as compared to NER 300, in particular:

(a) clarify the ownership and accountability provisions for the Innovation Fund and unspent NER 300 funds;

(b) ensure that all such funds for which the Commission exercises stewardship are recorded in the budget and balance sheet and subject to annual audit and discharge by Parliament and Council;

(c) include in the legal framework provisions on regular progress reporting to budgetary authorities.

Target implementation date: by the end of 2021.

Annex 8 – Executive agencies for research programmes

Name	Description	Advisory/ project support	Programmes managed	Budget	Eligibility criteria	Evaluation & selection	Grants	Financial instruments
INEA	Innovation and Networks Agency. Sectors: transport, energy. Started operating in 2014.	TA, if and when applicable to managed programmes	TEN-TEA	€ 8 bn	TEN guidelines	Independent experts EC Validation	Studies < 50% eligible costs Works: 20-50% eligible costs	N/A
			CEF	€27.4 bn	CEF regulation	Independent experts EC Validation	Max 60% of eligible costs	N/A
			H2020	€ 6.7 bn		Independent experts EC Validation	Grants, covering from 70% (Innovation) to 100% (R&D, coordination) eligible costs	Legally possible, currently not used.
REA	Research Agency Started operating in 2009	TA, if and when applicable to managed programmes	FP7	€ 6 bn (12% of budget)		Independent experts EC Validation	Funding rate/elig.costs : 100% (coordination), 75% (non-profit bodies, SMEs, research institutions), 50% (others)	N/A
			H2020	€ 17 bn (18% of budget)		Independent experts EC Validation	Grants, covering from 70% (Innovation) to 100% (R&D, coordination) eligible	Legally possible, currently not used.

							costs	
EASME	Agency for SMEs; Started operating in 2014	Yes, broad range of TA and capacity building activities. No PDA.	EIP / Eco-innovation initiative				50% eligible costs	N/A
			H2020		TRL 6 or above	Independent experts EC Validation	< for phase 1 (feasibility study) 500K<x<2, 5M€ for phase 2 (concept to market). 70% of eligible costs ceiling.	N/A
			LIFE				50% eligible costs	N/A
			COSME				40 - 60% eligible costs	N/A

Annex 9 Additional assessment on the timing options for the monetisation of allowances

Auctioning of the EU ETS allowances should be organised on the EU ETS common auction platform referred to in Article 26 of the Auctioning Regulation[74] as this is the most economically efficient option. The operator of the common auction platform was chosen by a tender procedure. The auctions of the EU ETS common auction platform follow the principles set out in Article 10(4) of the EU ETS Directive and in the Auctioning Regulation with regard to predictability, cost-efficiency, fair access to auctions and simultaneous access to relevant information for all relevant parties. Furthermore, auctioning at the EU ETS common platform allows for alignment with the auctioning of the allowances of the Modernisation Fund, which keeps the administration costs lower and ensures better price alignment. Detailed modalities for this would be set out in the Auctioning Regulation.

If the relevant allowances are auctioned on the common auction platform, the possibility of auctioning jointly the allowances of the Fund and those of the Modernisation Fund together with the regular auctions should be considered. This would limit undesirable impacts on the market and reduce price risks. Organising joint auctions for the Fund, the Modernisation Fund and regular auction volumes would also ensure the same annual average price for allowances, while choosing any sub-set of auction dates would most likely result in a different average price from the average annual price for regular auctions.

Until the next common auction platform is appointed and the necessary legislative framework is set up to perform joint auctions including allowances of the Fund and the Modernisation Fund with regular auction volumes in a steady phase, auctions for the Fund and the Modernisation Fund would need to take place on the common auction platform as separate joint auctions. Appropriate contractual arrangements involving inter alia the EIB and the EU ETS common auction platform would be needed for both phases.

1) Ensuring timely availability of auction revenues for the Innovation Fund

Monetising a majority of the available Fund allowances in the early years of phase 4 ('frontloading') might be considered as one of the options. However, there are important reasons to be cautious about frontloading. First, a significant amount of unspent NER 300 funds is available for the first call of the Fund, rendering frontloading less necessary[75]. Second, 50 million allowances from the Market Stability Reserve are foreseen to be monetised for the Innovation Fund already in 2020, which can also be used for the first call or calls. Third, experience with the NER 300 programme has shown that there is a large time gap between the selection of a project and the actual disbursement of funds. Fourth, in order to make a good estimation of an appropriate

[74] Commission Regulation (EU) No 1031/2010 of 12 November 2010 on the timing, administration and other aspects of auctioning of greenhouse gas emission allowances pursuant to Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowances trading within the Community

[75] This is the case for all three options under assessment, but important to keep in mind when assessing the criterion of timely availability of funds in the early years of operation.

volume to be monetised, one needs a reliable 'demand profile', that is a prognosis on the number and size of eligible projects applying for the Fund, expected failure rate and the timing of monetary flow-backs from failed projects. There is a high level of complexity involved in accurately assessing the expected failure rate of projects and the timing of monetary flow-backs from failed projects. Sixth, also taking into account the prevailing large surplus of allowances on the European carbon market, frontloading would add to this surplus and thus trigger larger Market Stability Reserve feeds. In view of this, a large degree of front-loading is not considered a viable alternative in any of the options assessed.

2) Limiting the impacts on the functioning of the European carbon market and its distributional impacts across Member States

The amount of allowances, which is auctioned ("monetised") every year, can either be fixed, as in Option M0, or be adapted to the demand profile (so-called "front- or back-loading"). As monetisation may temporarily increase the amount of auctioned allowances in a given year, there will be a directly impact on the demand-supply balance on the European carbon market and thus the price across years. Moreover, there is currently a large surplus of allowances on the European carbon market, which is being addressed by the Market Stability Reserve (Decision on the establishment and functioning of the Market Stability Reserve (EU) 2015/1814).

The allowances monetised for the Fund would always have an impact on the operation of the Market Stability Reserve and in particular on the feeds into the Market Stability Reserve, as long as the surplus is above 833 million allowances, which current expectations by most market analysts foresee for the beginning of phase 4.

A surplus of emission allowances has built up in the EU ETS since 2009. To address the current surplus of allowances on long-term, a Market Stability Reserve will start operating in January 2019. The reserve will also improve the system's resilience to major shocks by adjusting the supply of allowances to be auctioned. The reserve will operate according to pre-defined rules. Each year, the Commission will publish by 15 May the total number of allowances in circulation. This will serve as the indicator on placing (if the surplus exceeds 833 million allowances) and releasing (if the surplus is below 400 million allowances) allowances from the Market Stability Reserve. If during the years 2019-2023 the surplus exceeds 833 million, amount of allowances corresponding to 24% of the surplus is placed in the reserve, which would have been otherwise auctioned.

According to the EU ETS directive, 10 % of the total quantity of allowances to be auctioned is distributed to certain Member States for the purposes of solidarity, growth and interconnections. From 2021, these Member States are Bulgaria, Czech Republic, Estonia, Greece, Spain, Croatia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Portugal, Romania, Slovenia and Slovakia. These 10% of allowances are exempted from feeding into the Market Stability Reserve feeds until the end of 2025. This means that other Member States will have to feed a higher amount of allowances into the Market Stability Reserve and will receive accordingly lower auction revenues.

If all the allowances of the Fund were auctioned during 2021-2025, there would be an increase to the surplus of allowances on the market compared to auctioning the allowances over a longer period (as in option M0). This would lead to increased feeds into the Market Stability Reserve during the years when the surplus exceeds 833 million allowances and thus lower auction revenues for Member States. As lower-income

Member States benefit from the "solidarity" exemption, the reduction in the auction volumes would particularly affect the higher-income Member States.

3) Forecasts by market analysts

The monetisation of allowances dedicated to the Innovation Fund should ensure fair value for the allowances, timely availability of revenue and avoid or limit negative impacts on the functioning of the European carbon market with a goal to find an approach which ensures all three objectives to be achieved in a balanced manner. External carbon market analysts have recently estimated the revenues that would result from the auctioning of the Innovation Fund allowances based on different timings, namely in 2 years (2021-2022) with auctioning of 200 million allowances per year, five years (2021-2025) with auctioning of 80 million allowances per year and ten years (2021-2030) with auctioning of 40 million allowances per year.

Because these market analysts at this stage differ widely in predicted trajectories for the carbon price over the coming years (see table below), no robust picture related to revenue forecasts for the Innovation Fund emerges. Choosing specific years for auctioning a large share of the Innovation Fund allowances could create considerable price risks not only for Innovation Fund allowances but also for wider auction revenue. Considering this, the safest way to ensure fair value, would be to spread them out rather evenly over the period, leaving some flexibility to respond to funding needs, if necessary.

Differences are not limited to the carbon price, another element is the impact on the operation of the MSR. Some analysts see a gradually increasing price development over phase 4 of the EU ETS, while others forecast a high price levels in the middle of the period, which a decrease towards 2030. The following table presents selected impacts from available forecasts:

	ICIS - 2 years (2021-2022)	**TRPC - 2 years (2021-2022)**	**ICIS - 5 years (2021-2025)**	**TRPC - 5 years (2021-2025)**	**ICIS - 10 years**	**TRPC - 10 years**
Total revenue of the Innovation Fund for the 400 million allowances (bn euros)	12.9	7.1	15.1	7.4	12.5	7.9
Total revenue of the Innovation Fund for 50 million early auctioning allowances (bn euros)	1.3	0.91	1.3	0.93	1.3	0.97
MSR feeding 2019-2025 (bn allowances)	1.7	1.9	1.6	1.83	1.6	1.79
Average carbon price in 2021-2022 (euros)	32.2	18	35.3	18	36.4	19

Source: Thomson Reuters Point Carbon (TRPC) and ICIS Tschach-Solutions

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Annex 10 – Investment volumes and environmental impact – description of analytical method

The Market Testing Study, Ecofys (2018) provides the analytical basis for the impacts of the Innovation Fund on investments triggered in a set of illustrative technologies that would be eligible for funding under the Innovation Fund and their potential environmental impacts.

The methodological approach for the quantitative assessment comprises of 5 steps:

(1) Setting up low-carbon technology matrix "Typology of Innovative Technologies versus Technology Readiness Level (TRL)" for each major product from workshops

The information collected from the different sector-workshops run during first half of 2017 and from an expert survey (110 replies) is condensed in the form of a matrix which clusters the different low carbon technologies by type of mitigation option and by Technology Readiness Level (TRL). Each important sector discussed during the sector workshops is covered by a set of 4-5 generic technology groups, which presents the main technological and economic features discussed during the sector workshops and covered by the expert survey. The matrix does not strive for completeness in the details of covering low carbon technologies but nevertheless allows for a broad coverage in terms of clusters of mitigation options, in terms of TRL and in terms of size of options. This results in a suitable mixture of larger and smaller reduction options which may be most adequately describing the real submission and selection of projects rather than the projects with highest emission reduction potential. For some sectors, in particular for the chemical sector, the coverage of innovative technologies can only be partial due to the high number of innovative pathways. Overall, the coverage of the industrial sector with around 30 innovative technologies, CCU is included in the industrial sector, of the renewables with around 25 technologies and of CCS with 5 technologies, in total around 60 innovative technologies, is sufficiently large to provide an illustrative portfolio of technologies relevant for the Innovation Fund.

(2) Collect in the low carbon technology matrix typical performance data

After having selected the set of generic technologies in step 1 for each product in the matrix typical performance data in terms of energy/CO_2 reduction, fuel used, investment/ maintenance costs, maximum shares for diffusion etc. are collected. For each cluster of mitigation options there could be a number of variants (for example different CCS technologies for industrial processes with different carbon reduction rates and different investment costs). If necessary such variants are considered; however typically the modelling focuses on one major variant. The information sources are the presentations during the sectoral workshops, the reports of the discussions, the collected surveys, literature provided by stakeholders before and during the meetings, additional discussions with sector experts.

(3) Broad coverage of innovative technologies versus narrow coverage

The principle of a broad coverage of production with several innovative technologies is followed, rather than a narrow coverage with just one or two technologies. This is justified by the fact that in many cases different technological routes are under discussion

and followed at present. It is therefore too early to operate a selection in the assessment of impacts.

(4) Assessment of the impacts

In this step quantitative impacts are assessed for the energy-intensive industries, for renewables, CCS and energy storage, according to the different option packages differentiated by sectors/TRLs as set up in the previous steps. The outcome of this step are:

- Possible CO_2/energy reduction achievable with the low carbon technologies
- Comparison of these reduction levels with the benchmarks established under the ETS
- Total investment volumes for each of the product groups analysed. The latter is based on investment figures collected from the surveys and from considerations made during the roundtables on financial volumes for the low carbon technologies.

These figures are specified as bands or categories, as quite often, technologies are in a too early stage to provide for example investment volumes with enough certainty for fixed values.

(5) Investment volumes

Together with the impacts on energy consumption and GHG emissions the necessary investment volumes are established, once the technology is penetrating. The innovative set of technologies focuses for each major technology route only on one representative innovative technology. For example for the iron/steel sector, one representative technology for example is considered for CCS, for hydrogen-based steel and for direct electricity use. The rationale for this is that on a first approach, industrial stakeholders would not be able to handle and develop a number of variants for one route in parallel; hence, the investment volume calculated for the impacts is based on realistic view of how many technologies could develop in parallel. For the very heterogeneous sector of chemicals (and to some degree also for the bio-based processes in refineries) only a limited set of products could be represented in the set of innovative technologies.

Annex 11 Glossary

Term or acronym	*Meaning or definition*
CAPEX	Capital Expenditure
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilization
CCUS	Carbon Capture, Use and Storage
CEF	Connecting Europe Facility
COSME	EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises
CPUP	Cost Per Unit of Performance
EFSI	European Fund for Strategic Investments
EIB	European Investment Bank
EIF	European Investment Fund
EU ETS	EU Emissions Trading System
FCH JU	Fuel Cells and Hydrogen Joint Undertaking
FEED	Front-End Engineering and Design
FOAK project	First-of-a-kind project
INEA	Innovation and Networks Executive Agency
InnovFin EDP	InnovFin Energy Demonstration Project facility
InvestEU	InvestEU Programme
IPR	Intellectual Property Rights
JRC	Joint Research Centre is a European Commission Directorate General providing independent scientific

	advice and support to EU policy
JU	Joint Undertakings
KIC	EIT's Knowledge and Innovation Communities
LIFE	The EU's funding instrument for the environment and climate action
MFF	The European Union Multi-annual Financial Framework
NER 300 (programme)	EU Funding programme for innovative low-carbon energy demonstration projects
OPEX	Operational Expenditure
PDA	Project Development Assistance
PIA	Programme Investissements d'Avenir ("Investments for the Future"), France
PPP	Public Private Partnership
RES	Renewable Energy Sources
SET-Plan	European Strategic Energy Technology Plan
SPIRE	Sustainable Process Industry through Resource and Energy Efficiency
TRL	Technology Readiness Level