

Policies to stimulate climate friendly innovation in the materials sector

Climate Friendly Materials Platform

WORKSHOP SUMMARY¹

Motivation for the workshop

Basic materials, such as aluminum, cement and steel, are important inputs for the construction of infrastructure and buildings, as well as manufacturing of industrial products. Their primary production is, however, carbon intensive. A portfolio of “climate friendly” technologies, practices and options are therefore required to contribute to the European Union’s deep decarbonisation objectives (such as the 80-95% emission reduction target for 2050 or climate neutrality, as agreed in the Paris Agreement).

The incremental improvement of existing production technologies, while important, will not be sufficient to reach these ambitious targets. Therefore further innovation to improve the economics and viability of key technologies, and to identify new business models and innovative value propositions, is urgently needed. The aim of this workshop has been to explore the design of innovation funding and support options. In particular we explored three dimensions, each addressed in one of the sessions: i) design of award of innovation support; ii) design of instruments of innovation support; iii) monitoring and ex post evaluation of funded projects.

Session 1: Design of award process for innovation support

In this session we addressed the general question of how can public policy makers decide on what technologies and projects to support?

This question first involves choosing award criteria, i.e., on which basis to choose between different technologies and different projects programs, and how these choices can maximize the potential of demonstration projects in terms of learning benefits, global diffusion of low-carbon technologies, and the transformation potential, as anticipated for example in sector road maps. The main insights gathered are that

- The main goals of innovation funds and demonstration projects are i) Technology diffusion; ii) Emission reduction; iii) Learning – knowledge creation and knowledge dissemination; iv)

¹ The workshop was funded by the Swedish Foundation for Strategic Environmental Research (MISTRA) as part of project Mistra Carbon Exit, and feeds into the “Climate Friendly Materials Platform” which we are setting up together with a network of leading academics/research institutions in this field. Convened jointly by Climate Strategies and DIW Berlin

Creation of new supply chains-redesign of supply chains; v) Technological diversity; vi) Scaling up; and vii) other political (e.g., geographical distribution) and economic (e.g., employment stimulus) objectives.

- The trade-off between encouraging diversity and lock-in avoidance on one side, versus stabilizing and bringing at least one technology to full scale is important.

Second, a question of design was discussed, namely how should the design of awarding innovation funds look like and how the structure of the award mechanism (e.g., between technology vs. within technology competition - “clustering” - and single-stage vs multi-stage) impacts incentives of funders and bidders. Lessons learnt from this session are the following:

- How broad should the clustering be? As CO₂ abatement costs are very different in different sectors, technology neutrality may result in a focus only on a single sector with the lowest abatement cost, which would not be sufficient to meet long-term climate goals. As such, a broader cluster may promote competition but hinder diversity.
- Cross-sector competition should be promoted, as different industries are enabled to learn from each other. In the context of innovation, levelling the playing field too much should not be a priority
- Given the limited number of demonstration projects in Europe (e.g., 5-6 for steel), the dialogue regarding innovation in the materials sectors must consider the roles of all potential players to lead the change and how competition between companies play a role
- Is it meaningful to pre-allocate a budget per cluster when technologies are evolving?
- The choice two-stage vs one-stage implies a trade off: on one hand two-stage can lower administrative burden (public funders only review full proposals of shortlisted applicants) and effort for applicants (they need to prepare a full-fledged proposal only if shortlisted) (e.g., two-stage approach was suggested for this reason in the innovation fund). On the other hand, reducing number of participants in a context with low number of players, could lower competition. Size of the project should be considered in the decision of Single-stage vs multi-stage also depends on size
- The choice of frequency and time distribution of tenders also implies a trade-off: less frequent tenders increase per-tender competition but may fail to match the funding needs of the R&D process

Third, a question on award governance is involved, i.e., who are the actors that should make the award decision

- Award of funds is a complex activity that requires discretion, which needs to be allowed for. It needs to be assessed at which stage/in which dimension of the award this discretion is least harmful. Where is there more professionalism and independence?
- If we minimize discretionality at the clustering (i.e., broad clustering: cross sector, cross technology competition), we need to be discretionary with award criteria (we need multi-criteria to choose the project, choose weights of criteria in scoring rule and appraise projects against those criteria). Vice versa, the more discretionary we are in the clustering (i.e., narrow clustering: sector-specific, tech-specific competition) the less discretionary we need to be with the criteria (projects in the same technological category can be evaluated simply on the basis of cost).
- Administrative capacity and State aid issues at the local level also suggest that decisions should be taken at more central, EU level but in coordination with lower levels (also because the EU funding would need anyhow to be complemented with national funds).

Session 2: Design of instruments for innovation support

The broad question that we aimed to answer in this session is: how can we design public financial support to stimulate private innovation investments that contribute to transformation? Based on a review and an assessment of current panorama of public instruments for innovation funding at EU and national (mostly Germany vs UK) level it was found that:

- Funds tend to be overlapping and not complementary
- Companies/ industries do not have a clear overview on what is the best fund program to apply to while governments do not have a clear overview on how funding programs are to each other,
- It is unclear if projects with EU funding can get additional national support for their project and under which scheme they can compete,
- There are limited number of programs for pilots or demonstration projects. This may be reflect believes that programs at this stage are sufficiently reliable for a company to make a business case out of it and acquire funding through other sources i.e. private equity funds
- There are issues on the efficiency of pre- allocation of fund and accountability,
- It is hard for big companies to apply as part of a consortium,
- There are funding gaps, while continuous funding is needed
- There is a need for funding programs to encapsulate different risk levels at different R&D stages.

In response to these issues, the following elements for a good design of innovation funding where proposed:

- The life cycle evaluations of projects are considered
- Good designs take into account the scalability and replicability of projects
- Based on technology needs, e.g. considering funding needs depending on the stage of innovation and the risk intensity of projects, e.g. more support is needed on the “Valley of death” (reference to the life cycle of innovation while as the risk decrease also public funding can decrease)
- Awareness of policy risk (i.e., decrease of ETS prices and/or decrease of the value of public funds) as key risk factor. Bankability is important – implying that expected cash flows are sufficient robust to also allow for bank loans/bonds to contribute to project finance
- Capacity to assess and respond early to information that indicate high likelihood of failure of a project

It was also highlighted the importance to take into account that innovation goes beyond new processes, but also includes new practices, materials and business models:

- Innovation instruments should be opened up to new practices, materials and business models (materials industries are less advanced than others in that). It is probably not about the scale of the funding available but rather the structure of the system in place now, rigidity of the industry, the value chain and the legislature.
- The role of tools from private finance was investigated, and it was argued that R&D outsourcing (to SMEs), corporate venturing and corporate accelerators (only 1 cement firm has started an accelerator) and incubators, Business angels, crowdfunding, could play a role for multiplying innovation in the context of materials as so far R&D is always done in house.
- All of these tools may benefit from / may require public innovation support – however possibly structured rather differently from innovation support for pilots of new production processes.

One key theme throughout the session was that private investment in innovation requires clarity on market opportunities for climate-friendly options:

- Industrial sector lack incentives in low-carbon innovation because i) they have other priorities, such as continuing operation and profitability ii) and often there are no markets for low-carbon innovations
- Therefore policies are needed to create incentives for innovation and create markets for first-movers. Credibility and predictability of policies is crucial, to give companies assurance that innovation they invest in is profitable with sufficient probability in the future.
- Green public procurement (GPP) can be a leading instrument in triggering innovation in the materials sector. Buy buying climate-friendly options public purchasers can create markets (allowing suppliers to realize economies of scale on large contracts) and thereby provide

credible incentives for innovation. By including environmental criteria in the award of contracts, e.g., through life cycle-costing, public purchasers can internalize the environmental impact of their purchases and advance greener options. However, GPP is currently underused and its potential largely underestimated and unexploited. Mostly because there is a lack of political commitment and mandate to adopt criteria other than purchasing cost in the award, and administrative capacity issue (officials lack legal and technical expertise on GPP and perceive it as time-consuming and complexity-increasing). Clear governance structure and specific training courses for officials could facilitate a broader implementation of GPP.

Session 3: Monitoring and ex post evaluation

The third and last session of the workshop focused on the after-award stage, i.e. on the performance of projects that were awarded the innovation support. We aim at answering the question: how can we ensure efficiency of funded projects and funders' willingness to take risk?

One main message learnt in the sessions was that programs are inherently risky. Appropriate monitoring of ongoing funded projects and ex post assessment of performance is needed to give policy-makers and public and private funders the confidence that resources are spent as planned and in the most efficient way, and support them in risk-taking.

- While monitoring is relatively easy, ex post evaluation (via impact evaluation analysis) is more challenging. This is also because the definition of success depends on the technology level available, as well as timing and maturity of underlying portfolio.
- How do we measure the success of innovation funding? It is not clear how to measure the outcomes of monitoring and ex post evaluation, namely on 1) whether innovation funding made a difference, which difference and at which stage 2) what was success and what not (e.g., for the ULCOS projects it is still unclear whether they were a success or a failure). These results should be formulated in a realistic and precise way.
- Some objectives of demonstration projects are easy to monitor and ex post evaluate, but some others, e.g. system transformation, are not.
- There is a clear opportunity to improve the communication between auditors, researchers and policy makers to better understand policy objectives of addressing urgent low-carbon innovation needs as well as better frameworks to characterize innovation risks so as to allow policy makers to manage and accept such risks and benefit from clarity and support from auditors in doing so.

The better we can develop indicators for riskiness and success of innovation funding ex ante the easier is to evaluate the program ex post. It is crucial to define ex ante (at the design stage of the fund) criteria that auditors can use for ex post evaluation of the performance.