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Conclusions

Europe needs to substantially increase its climate-related R&I in the period 2021-27 to allow new innovative technologies, products and businesses the time to scale and deliver the economy-wide decarbonisation strategies required to deliver optimal net zero pathways and the maximum societal benefits of this transition.

The clear message from experts is that research and innovation investment all but four strategies need to increase. For 75% of these the increase is strong or marked, as illustrated below in the chart below. Experts were asked to indicate whether R&I investments should increase or decrease compared with the past for each of 58 decarbonisation strategies identified across the five sectors. They were provided with Horizon 2020 R&I allocation data as shown in chart 8 in Section 2 as a reference. This strongly correlates with the conclusion of the ECF Net-Zero 2050 modelling that innovation must increase by around one third from current trajectories.

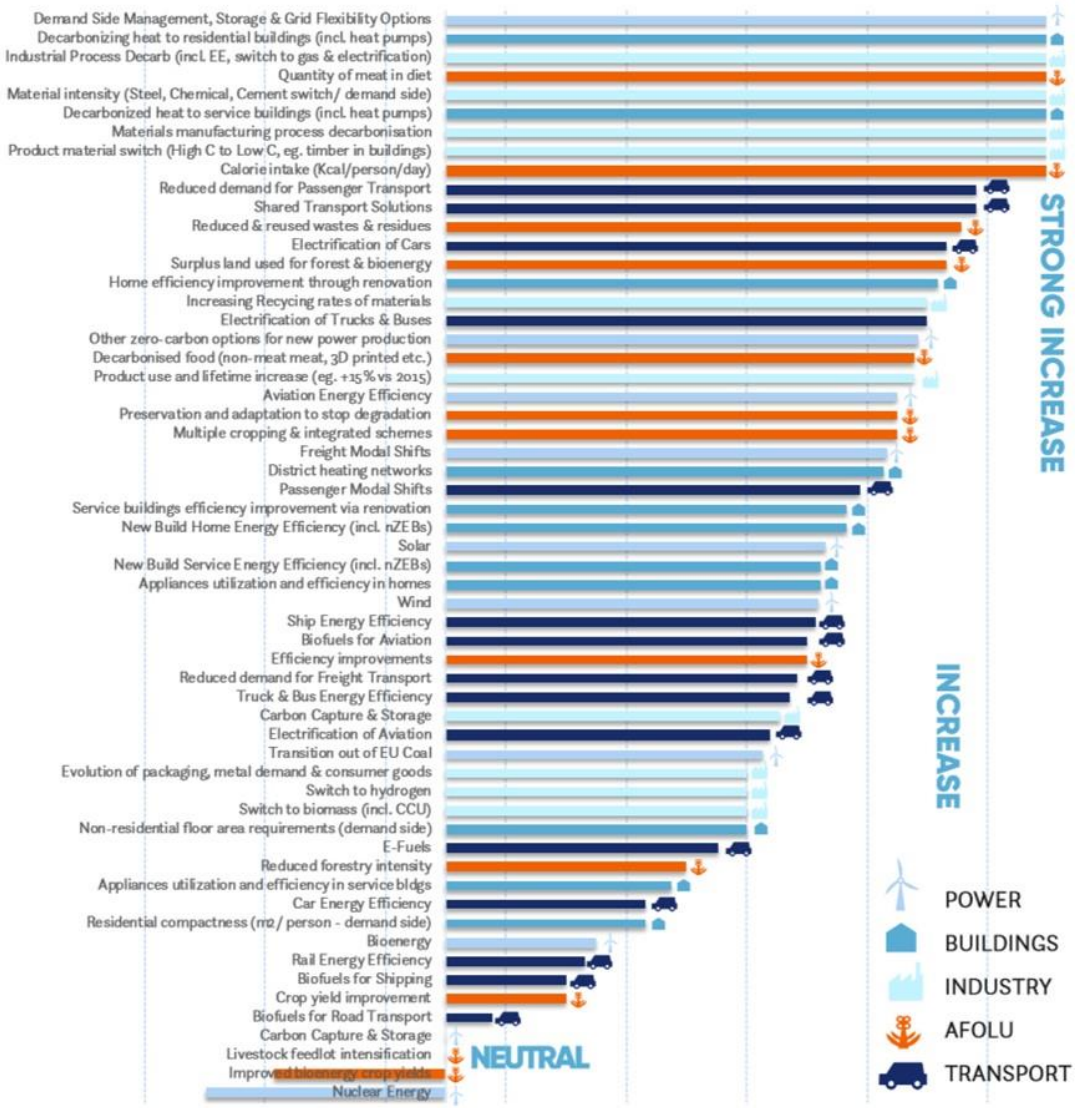

Chart: R&I investments Needs for Decarbonisation Strategies, Order of Magnitude

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Overall, the five high-level conclusions from the expert contributions to this report can be summarised as:

1. **Climate-related R&I investment is key to deliver net zero emissions:** R&I is very relevant in 80% of the component decarbonisation strategies in Power, Transport, Buildings, Industry and Agriculture, Forestry and Land Use to deliver net-zero emissions. Responders to our survey identified that R&I funding needs to increase in three quarters of the strategies to deliver net-zero 2050 outcomes and the contributors to ECF's climate modelling[1] saw the "innovation gap" as being 25% additional innovation over a 75% increase aligned with existing efforts;

2. **Europe can build competitive advantages in many of the decarbonisation pathways:** Experts see opportunities for Europe to build global competitive advantages through R&I investment in all of the five climate-relevant sectors, however this opportunity is not evenly spread and some of the 58 decarbonisation component strategies offer greater potential competitive advantages than others;

3. **Innovation is required at many levels, not just in the production of new technologies:** While experts identify that the largest proportion (40%) of the necessary R&I is required to develop new or improve existing technologies, Europe's decarbonisation challenges also require substantial innovation at the product, business model and societal levels, in turn supporting a more mission-oriented approach to decarbonisation (e.g. full sector decarbonisation or zero-carbon cities);

4. **Public and Private R&I investments need to scale-up together:** While Experts identified the need for a balanced instrument mix to fund European decarbonisation split evenly between private and public sector R&I investment instruments. Experts flagged that just a quarter of identified R&I investments would require public sector grants, meaning that it is equally important to upscale soft loans and risk sharing instruments in order to facilitate an increase in private sector equity and debt products;

5. **Five "sector decarbonisation missions" could help deliver Net-Zero 2050 outcomes:** Experts identified five sector level missions in Power, Transport, Buildings, Industry and AFOLU that would accelerate their decarbonisation. While it remains unclear whether a sector-level mission is sufficiently broad and ambitious, these can be used to inspire and contribute to an over-arching EU-level mission to deliver the innovation requirements to reach net-zero emissions in the whole economy before 2050.

Two of the most important EU-level instruments that can facilitate the identified R&I increase and up-scaling of low carbon assets are Horizon Europe and InvestEU, respectively. Horizon Europe has a proposed Euro 100 billion budget, making it the largest ever European R&I programme. InvestEU seeks to catalyse Euro 650 billion in

[1] ibid

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sustainable infrastructure; research, innovation and digitisation; small and medium-sized businesses; and social investment and skills; through the provision of Euro 38 billions of EU budget guarantees syndicated to projects through the collaboration of EIB, European international financial institutions and national promotional banks. In this context, and considering expert conclusions, the following EU-level policy recommendations are supported:

- **Horizon Europe's climate-related R&I allocation should increase:** R&I invested between 2021-27 is likely to be the last significant R&I funding to have time to deliver new low carbon innovation that can scale-up to deliver a net-zero economy by 2050. ECF's Net-Zero 2050 climate pathway modelling identifies a necessary one third increase in innovation to enable this net-zero decarbonisation by 2050. In this context, Horizon Europe should require nearly half (47%, up a third from 35%) of its funding to be relevant to climate action.

- **The climate element and impacts of R&I investments need to be more transparent and tracked in Horizon Europe, but also better disclosed by the private sector:** Firstly, a climate impact pathway should be defined for Horizon Europe and its R&I allocations should be tracked against the EU's long-term climate and energy targets, and the Paris Agreement. To deliver this transparency, as a part of the grant agreement, lead beneficiaries of Horizon Europe funding should estimate the climate-relevant percentage of their projects' outcomes. This level of climate-related tracking and transparency should also be a priority for InvestEU and other EU-level funding instruments. This would allow increased connectivity to, and stimulation of the later stage public and private investments which are also required, subsequently to R&I, to deliver successful decarbonisation missions.

- **Net-Zero emissions in Europe by 2050 requires concerted collaboration on climate-related R&I collaboration between the public and private sectors:** EU-level R&I funding instruments, together with other public sources, should increasingly enable and facilitate increased private sector climate-related R&I. The public sector alone is unable to deliver the product and business model-level innovation and therefore economy-wide transformation required. This means that Horizon Europe, European Innovation Council and the R&I window of InvestEU can use mission-led and sector-level decarbonisation pathways to further direct and increase private sector coinvestments through more innovation partnerships and collaborative financing structures. Given the extensive debate on mission scope among experts, and the five "sector level" missions described in this report, perhaps the only EU-level Mission required is that to deliver Net-Zero emissions by 2050.

Notwithstanding the encouraging progress in several of the five sectors which need to reduce their emissions to net-zero by 2050, the levels of R&I investment to enable the timely delivery of Europe's long-term climate targets and the goals of the Paris Agreement within the constraints of a carbon budget are significant. The faster Europe responds to this challenge, the greater the competitive advantage it can gain and the more time it will have to scale-up the required technologies and deliver the society level benefits of a net-zero emissions economy.