Presented at European Parliament

by Peter Sweatman, Author and CEO
Climate Strategy on 11th October 2018.

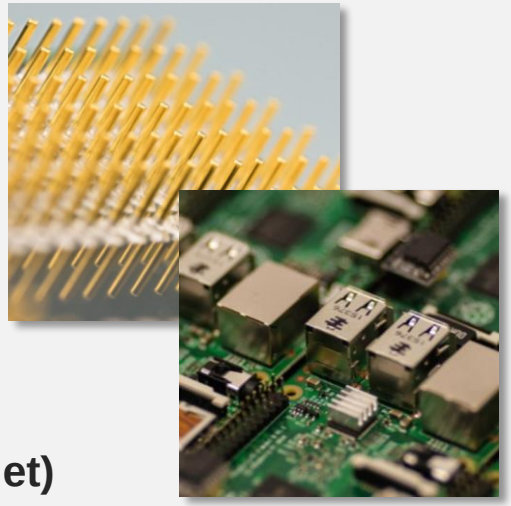
NET ZERO 2050

CLIMATE & STRATEGY PARTNERS

Building upon ECF's Net-Zero 2050 Climate Scenario models, 50 experts were engaged on Funding R&I…

Sectors Assessed:

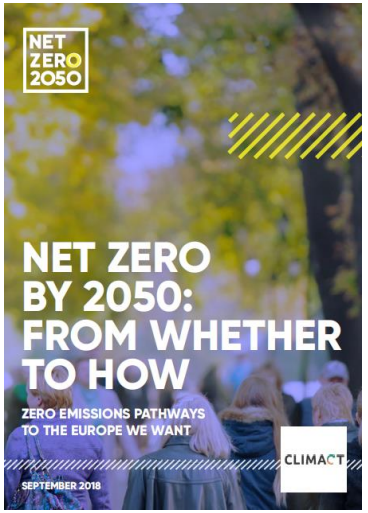
1. Power
2. Transport
3. Buildings
4. Industry
5. AFOLU (Agriculture, Forest, Land-Use & diet)



- A survey asked for expert opinions on **58 decarbonisation strategies** for the five sector pathways to reach net-zero by 2050
- And, specifically about how the EU investments in research and innovation (R&I) in its next **budget cycle (2021-27)** could **accelerate** long-term, economy-wide and net-zero **decarbonisation**

This report builds its approach upon ECF's:

- Energy 2050 Project: Developing zero-carbon energy scenarios for Europe
- European Net-Zero 2050 Climate Modelling Project



While Climate-related R&I is hard to track, current R&I investment levels are insufficient to reach net-zero

Finding #1:

Europe's climate-related R&I investments are not currently commensurate with the scale of the net-zero challenge

- Europe invests around **2% of GDP**, or just over **Euro 300 billion** annually, in research and innovation across all sectors and most Member States are far from reaching the pledges made in 2000 to increase R&I investment intensity to **3% GDP**

- Only **3-4%** of private R&I investments, **Euro 7.2 bn** annually, is being invested by 102 companies directly in climate-relevant sectors.

- Public and private climate-related R&I is hard to track.

- This creates a clear climate-related **opportunity** for the EU's planned **Horizon Europe** programme

Finding #2:

Concretely, Europe needs to increase its climate related R&I in the 2021-27 period by a third to reach the Paris Agreement goals

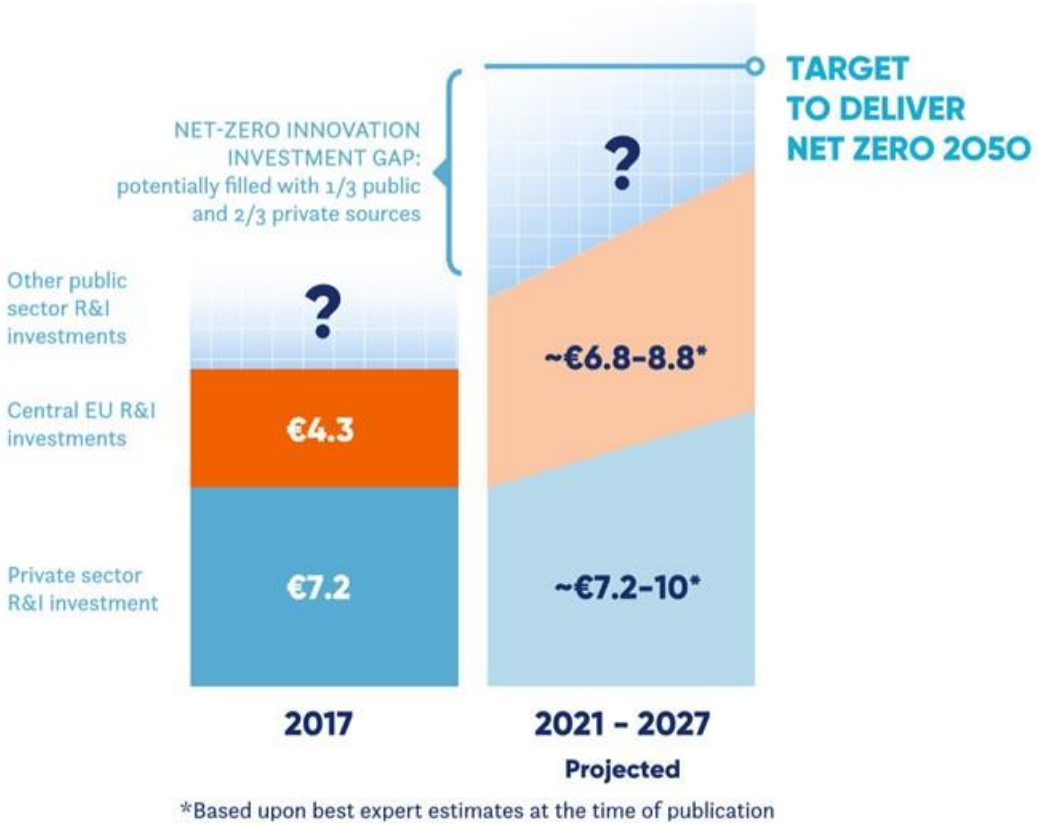
- Europe should increase its **climate-related R&I** in the **2021-27 period** to allow new innovative technologies, products and businesses the time to scale and deliver:
  - Economy wide decarbonisation required under optimal pathways
  - The maximum societal benefits of this transition

- The **magnitude** of this increase ought to be by **at least one third**, in line with Member States' year 2000 commitments to increase overall R&I investments to **3% of European GDP by 2020**

Experts identified five R&I Priorities to enable Net-Zero Decarbonisation Strategies by 2050

1. Climate-related R&I investment is key to deliver net-zero emissions by 2050
2. Europe can build competitive advantages in many of the decarbonisation pathways
3. Innovation is required at many levels, not just in the production of new technologies, but in products, business models and in society
4. Public and Private R&I investments need to scale-up together
5. Five “sector decarbonisation missions” can combine to deliver Net-Zero 2050 outcomes

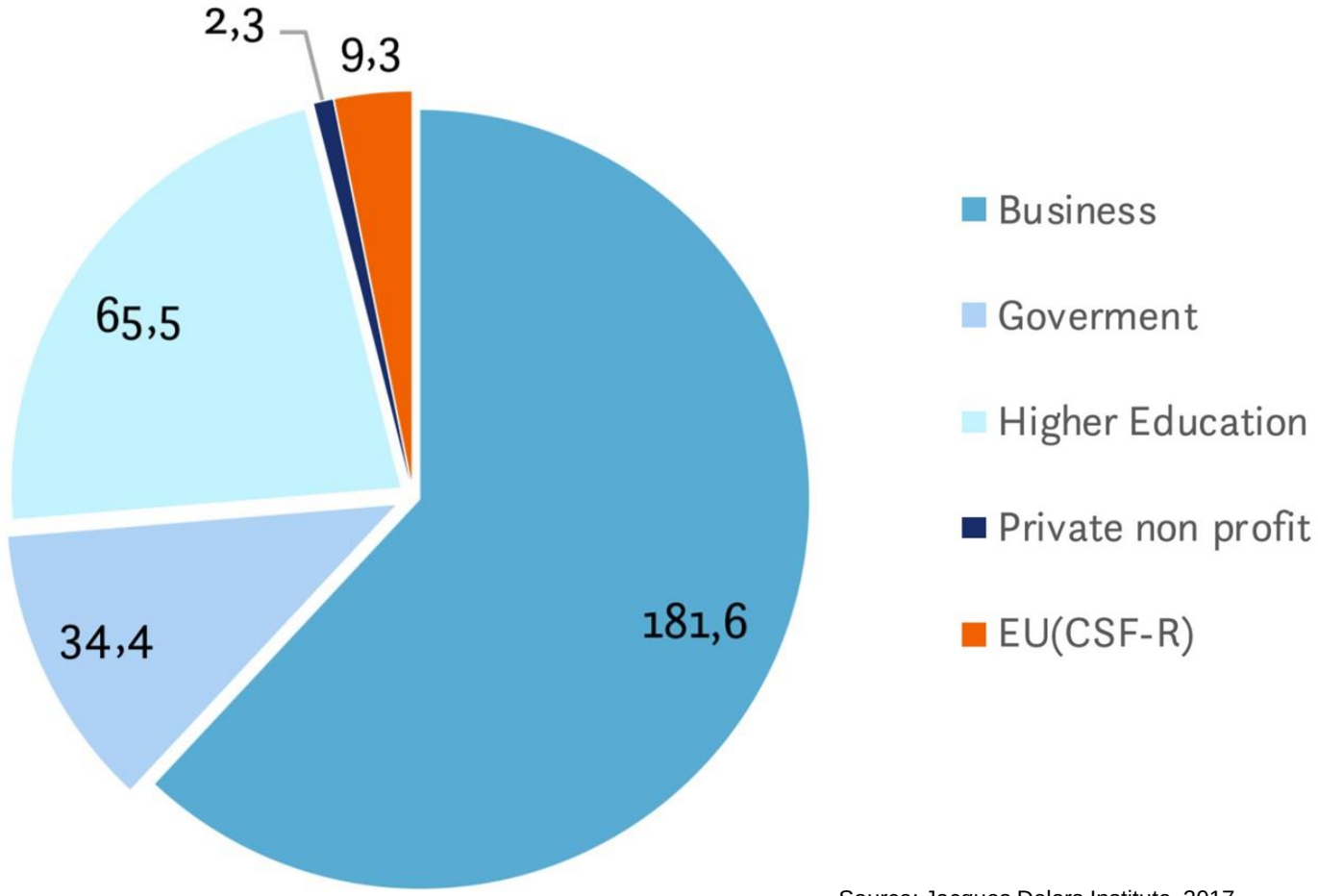
Climate relevant R&I Investments (€ billions)




Funding
Innovation
in Europe

Europe invests c. Euro 300 billion in R&D per annum, 1/3 public and 2/3 private sourced

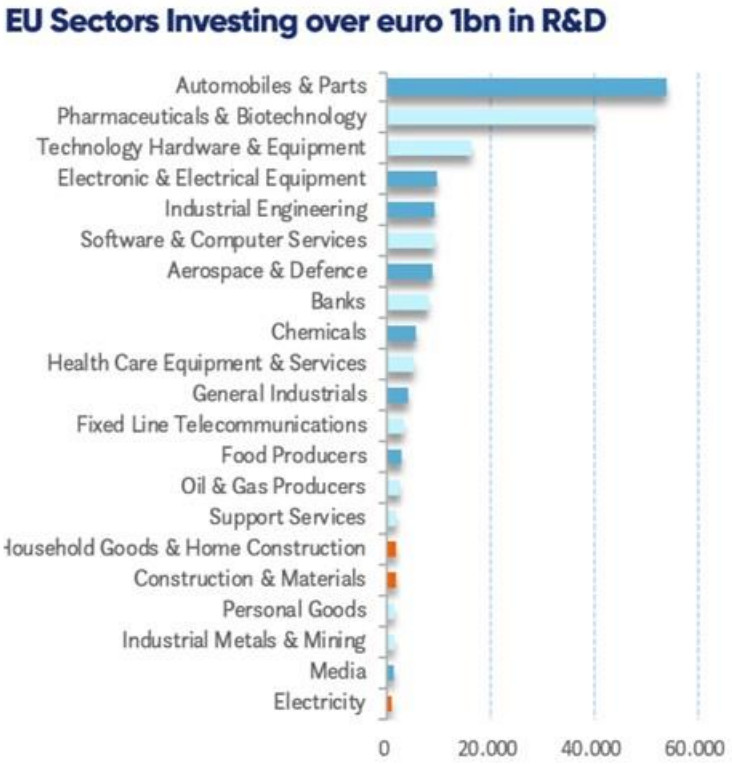
R&D expenditure in the EU by source of funds in 2014 (in billions of euros), of which an estimated 3-4% is climate-related

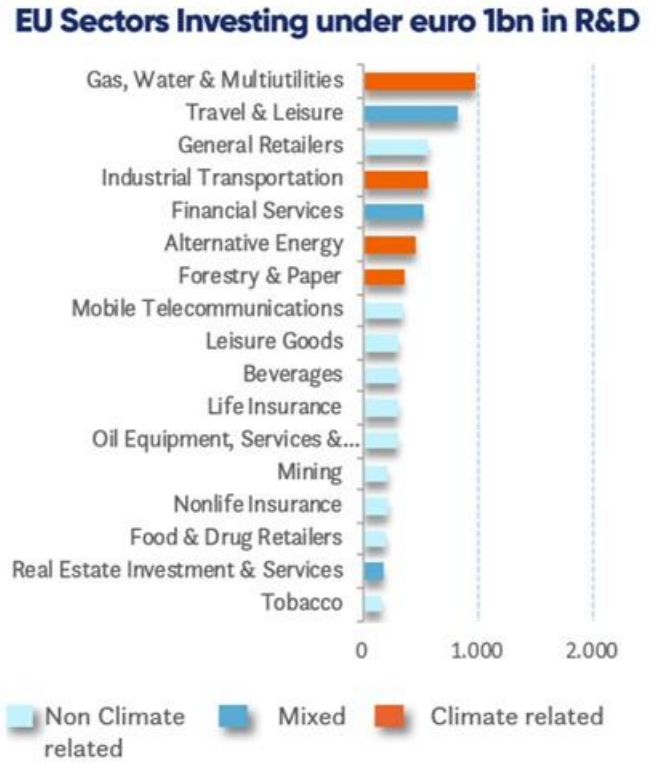


Source: Jacques Delors Institute, 2017

Private Sector R&D - Euro 200 billion – is invested by 1,000 companies and concentrated by sector

EU Companies, R&D Investments by Sector (in billions of euros)





- Among the top 1,000 European companies, investing around Euro 200 billion in R&D, just six are “alternative energy”:
  1. **Vestas**
  2. **Nordex**
  3. **SMA Solar Technology**
  4. **Senvion**
  5. **Solarworld**
  6. **Centrotherm**

- Euro 7.2 billion is invested by 102 companies in “climate related” sectors.

- Among European utilities, there are just two whose R&D investments stood out in 2017:
  - **Electricite de France (at Euro 660 million)**
  - **Iberdrola (at Euro 211 million)**

Private Capital (PE & VC) of Euro 71 billion in 2017 is limited in climate-relevance and overall size

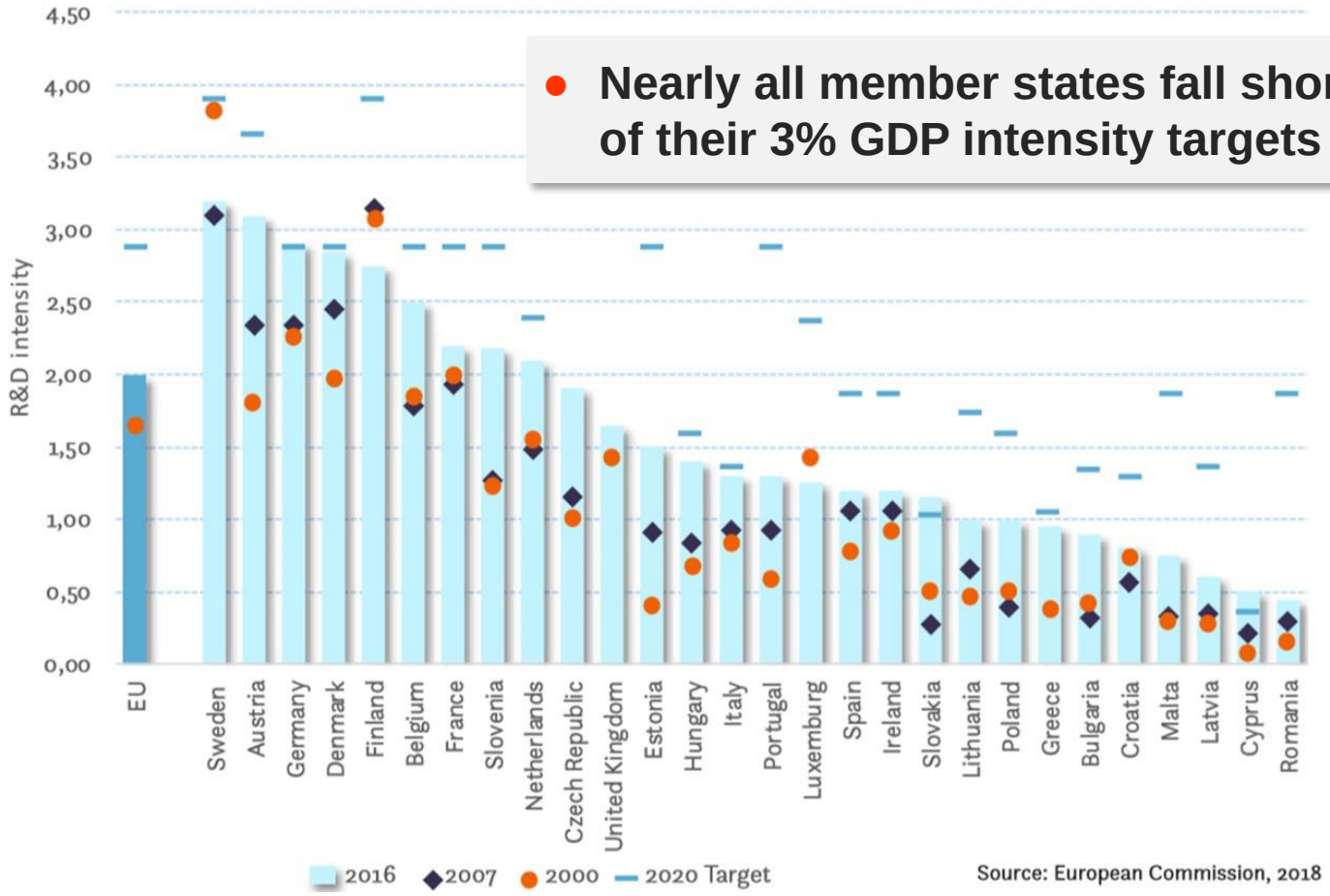
Sector distribution of Euro 71 billion private capital (of which € 6.2 bn is VC) invested in 7,000 European companies in 2017

- **87% of recipients are SMEs, limited appeal for capital-intensive sectors**

Public R&D - Euro 100 bn - is led nationally, in higher education (60%) and has geographic diversity

"Europe tends to be better at Research than Innovation"

Chart 5: R&D intensity 2000, 2007, 2016 and 2020 target



Source: European Commission, 2018

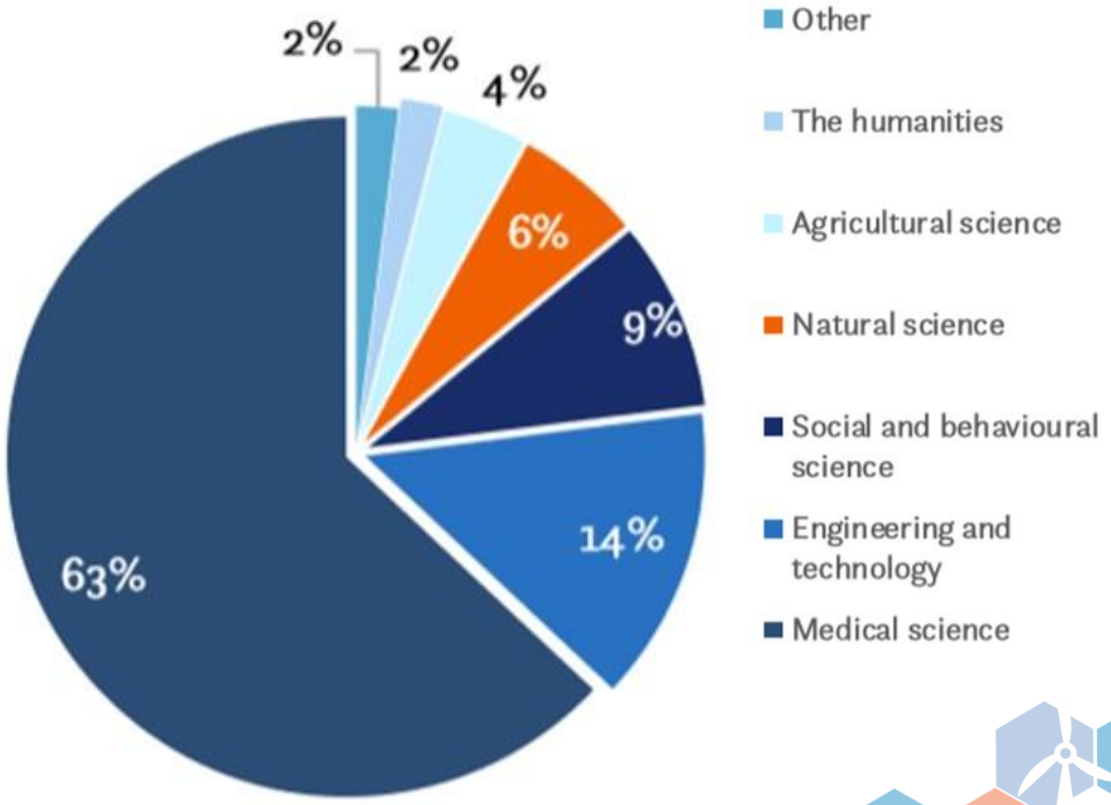
- **Nearly all member states fall short of their 3% GDP intensity targets**

- R&D Intensity is uneven among EU Member States
- Tracking the climate theme at national level is difficult

1,000 European Foundations provide Euro 5bn R&D funding, without a clear climate-focus

- Foundation funding has been stable, and is strongly skewed towards EU Member States with a long tradition of foundation activity and thematically towards medical science
- There is a skew towards medicine (63%) and no easily identifiable climate-focus
- Expected that <10% is “climate related”

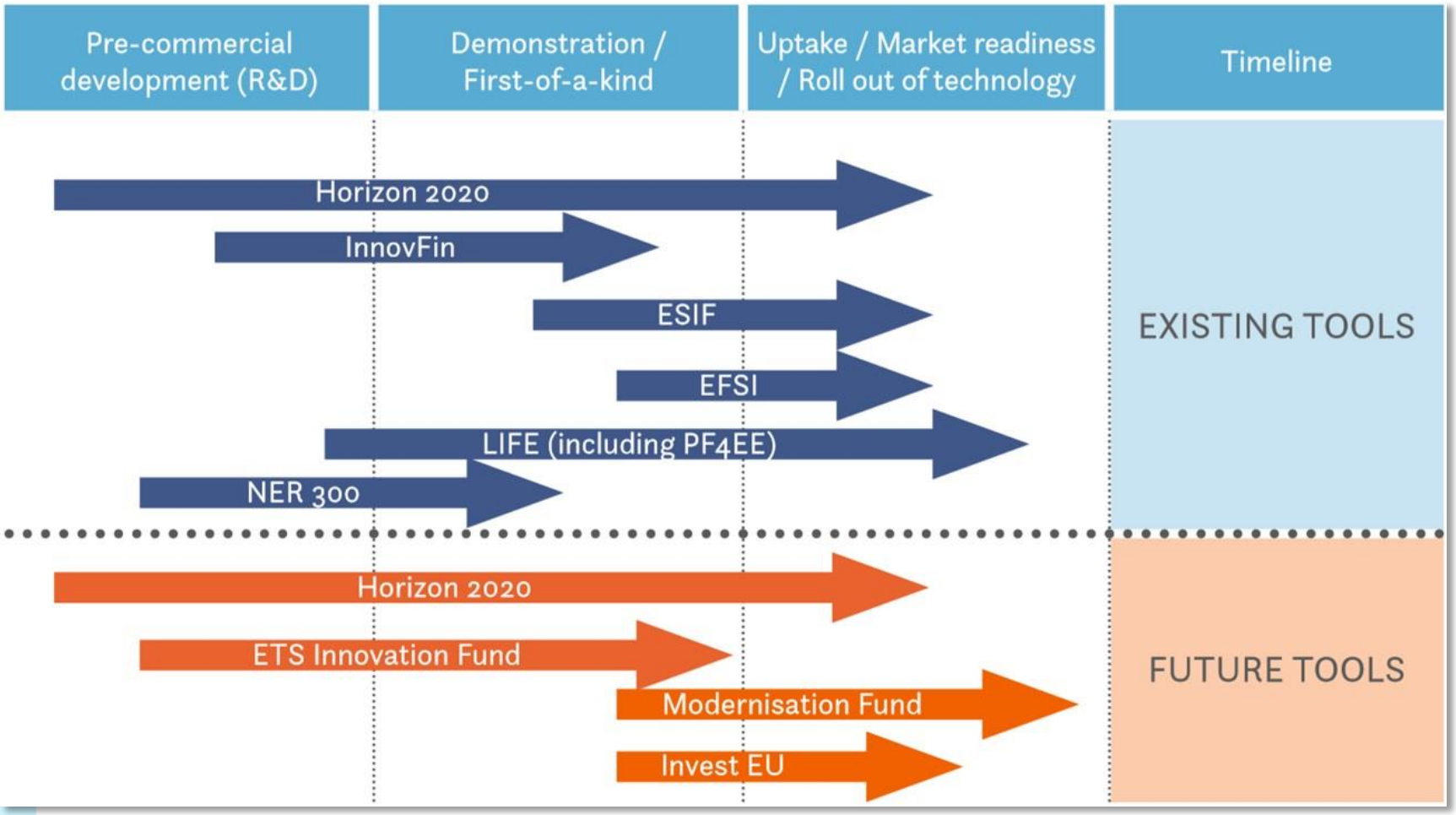
Foundation Funding among EU Members by Research Areas



Source: European Commission, 2015

EU-level programmes can make a marked impact on climate-related R&I investments

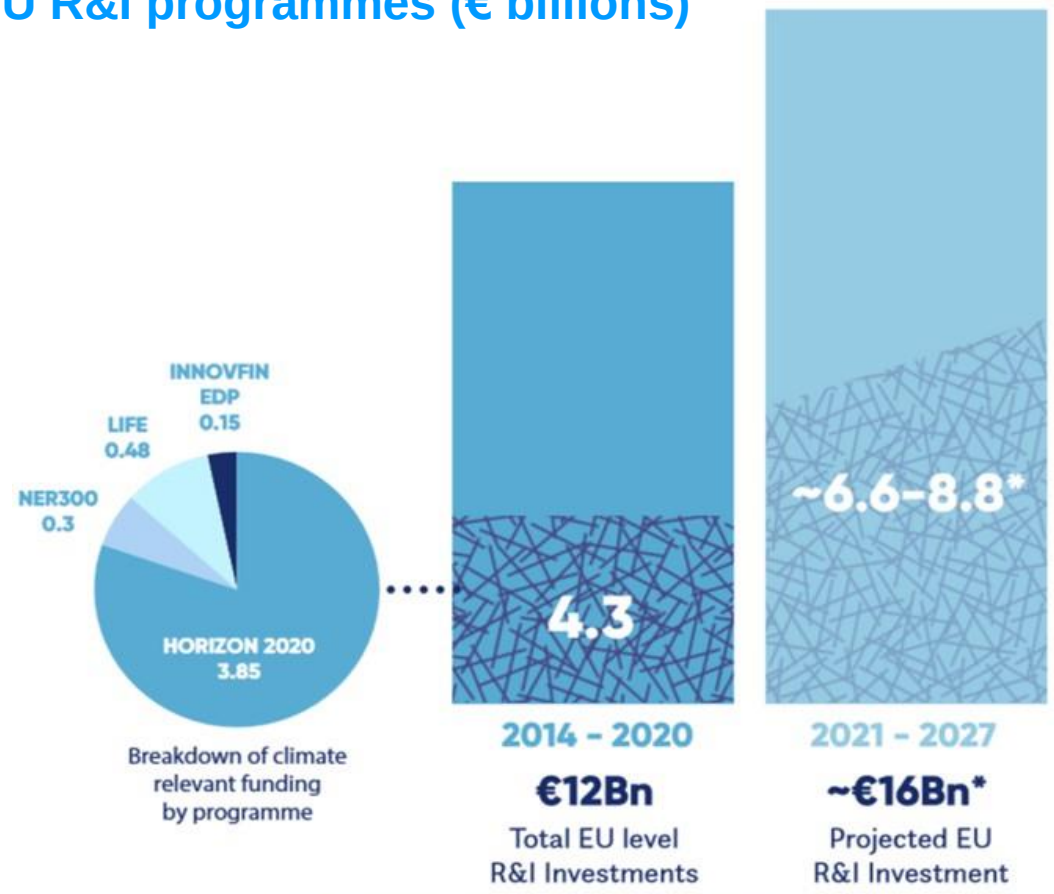
EU Programmes for Low-Carbon Innovation



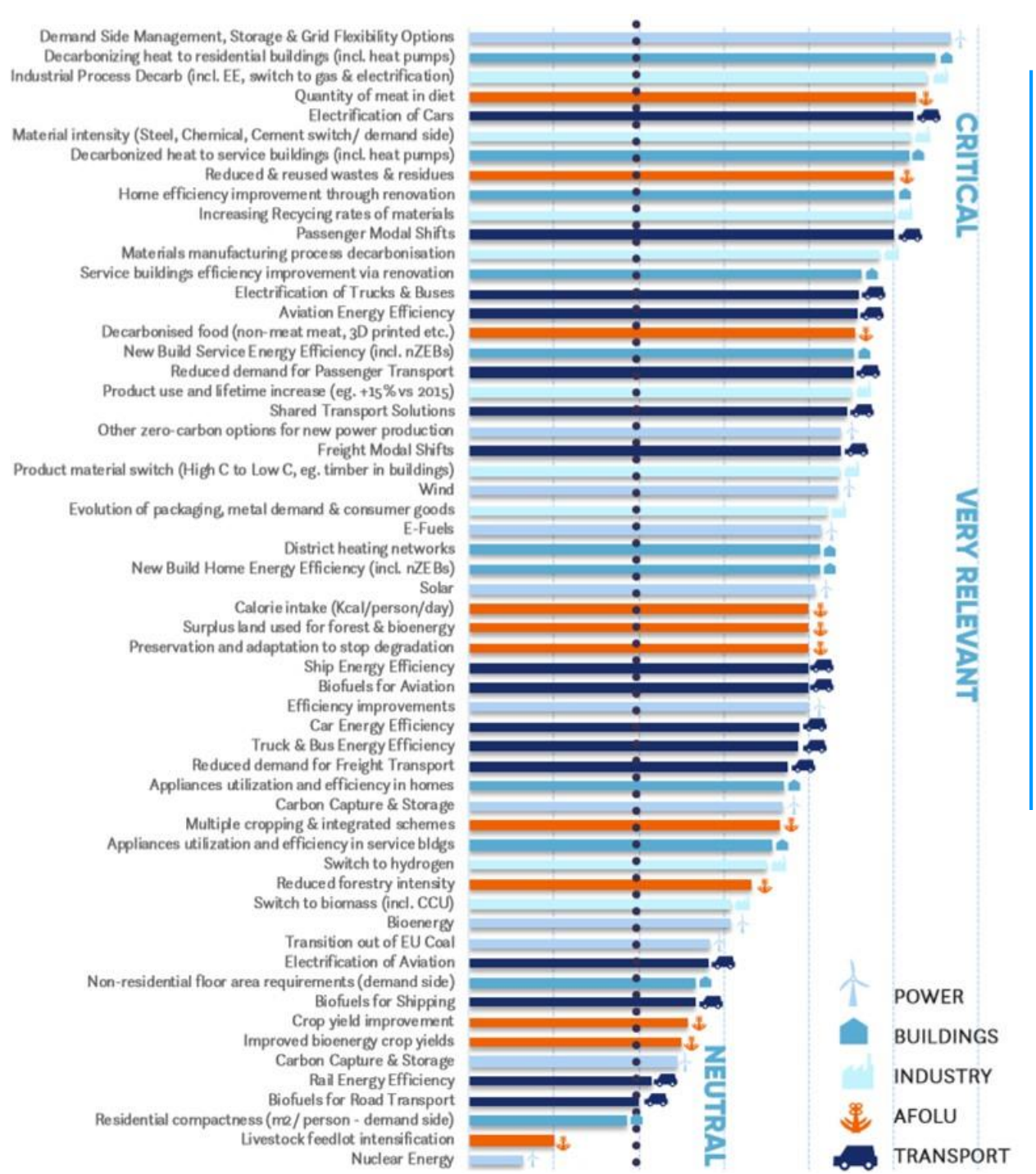
EU-level funding, Targeting the crowding-in of other public and private sector resources

- EU-level funding can also explicitly target the crowding-in of other public and private sector resources through:
  - **Instrument choice**
  - **Institutional collaboration**
  - **Partnerships**
  - **Building climate-impact pathways for R&I**
  - **Mission-oriented sector calls**

Climate relevant funding in selected EU R&I programmes (€ billions)




Expert Insights
into Sectoral
Innovation for
Decarbonisation
Challenges



Ranking of Innovation Needs to deliver Net-Zero emissions in Europe by 2050

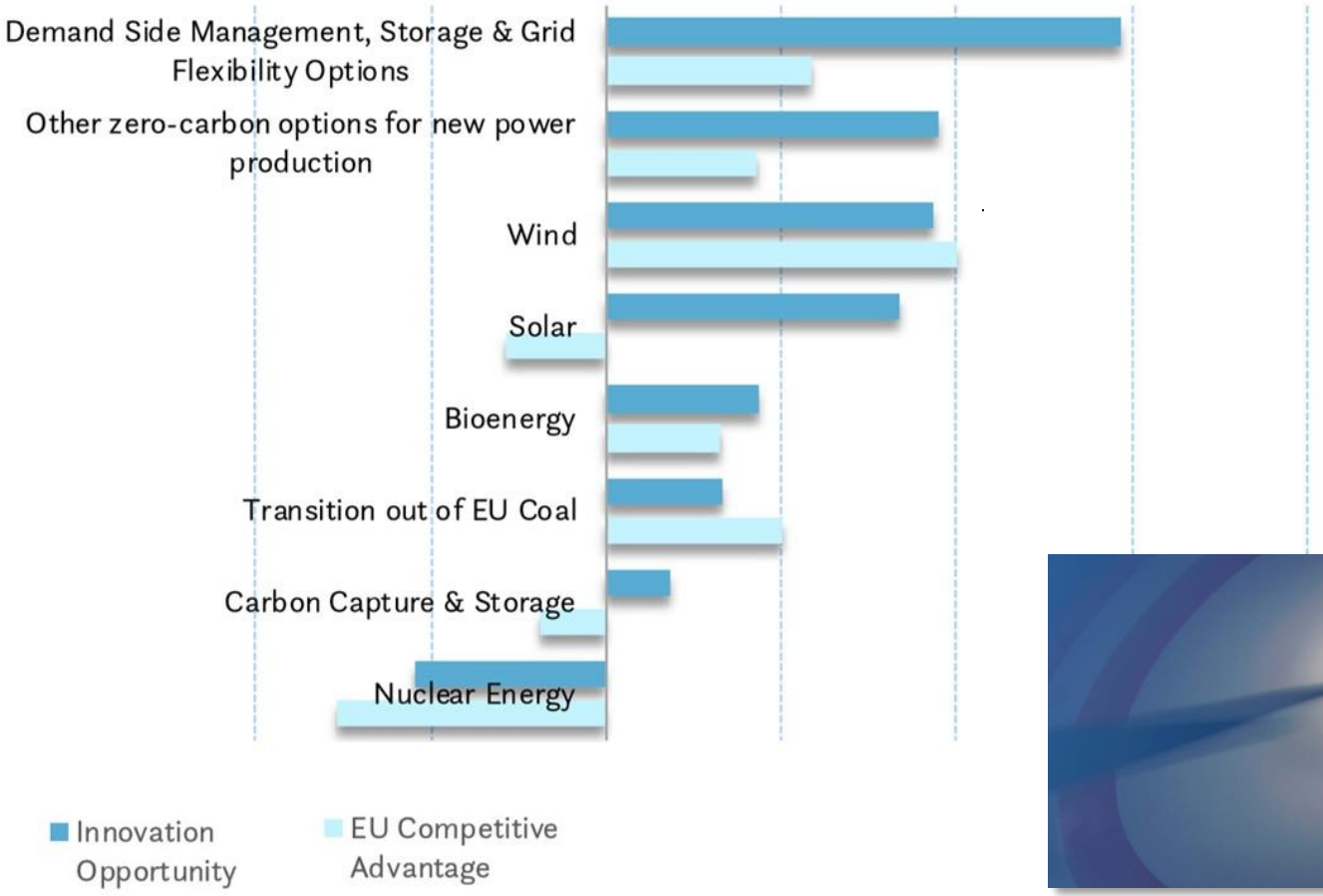
Relevance of Innovation in decarbonizing five sectors:

Power, Transport, Buildings, Industry & AFOLU

Power:

Smart grids, flexibility and storage innovation leads

Innovation Needs to Decarbonise the Power Sector & their Correlation with an EU Competitive Advantage

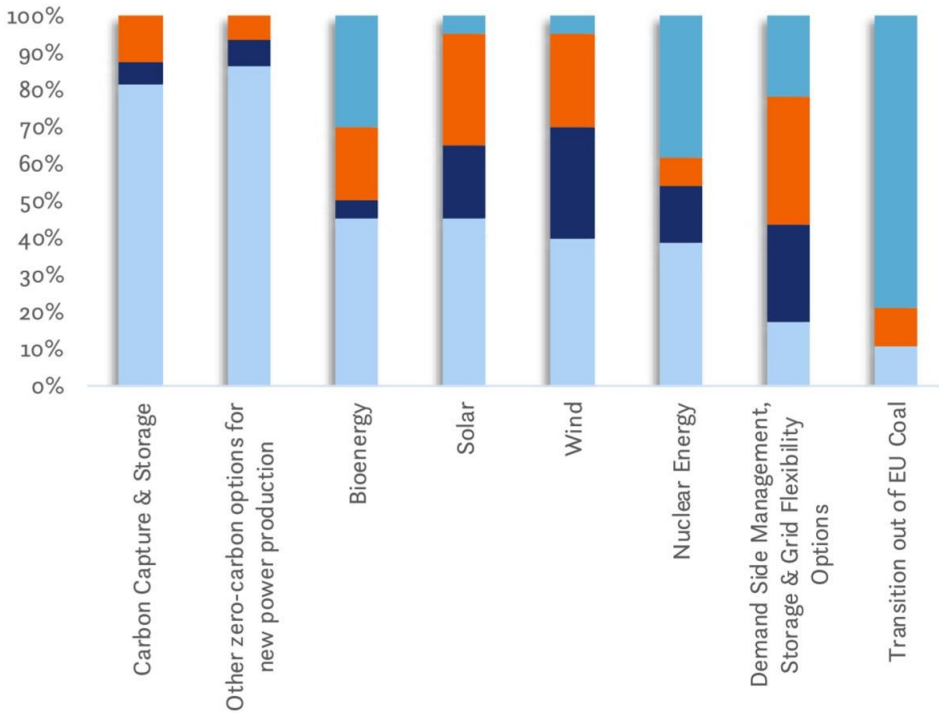


- Except in solar, experts see a reasonable correlation between the innovation opportunity and the potential to build, or build upon, a European competitive advantage

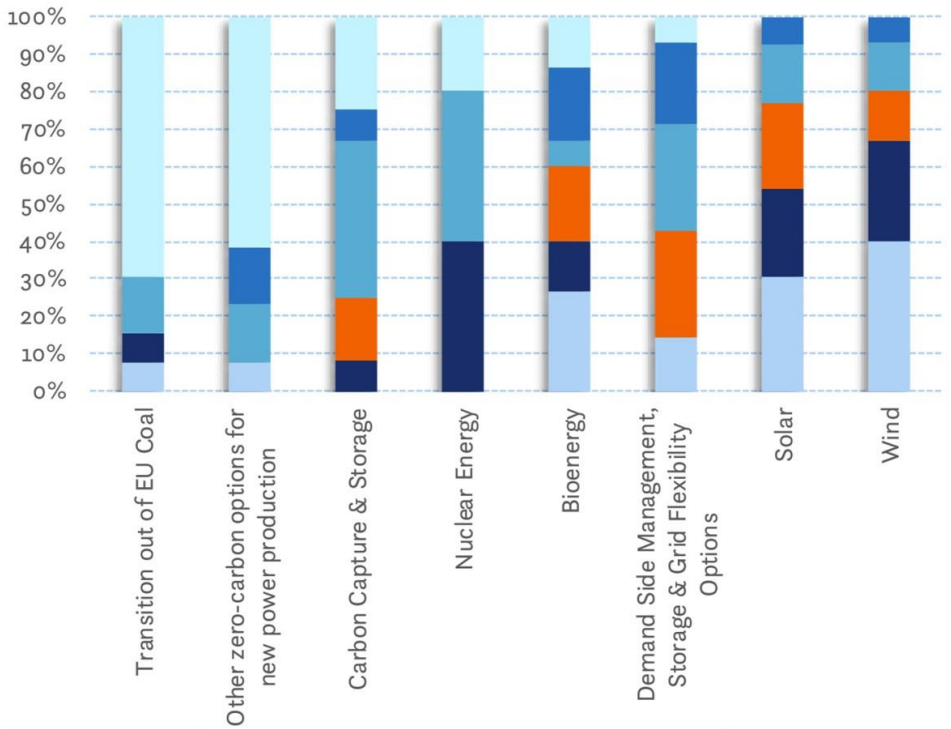
Power:

Smart grids, flexibility and storage innovation leads

Innovation Type Required for each Component of Power Sector Decarbonisation



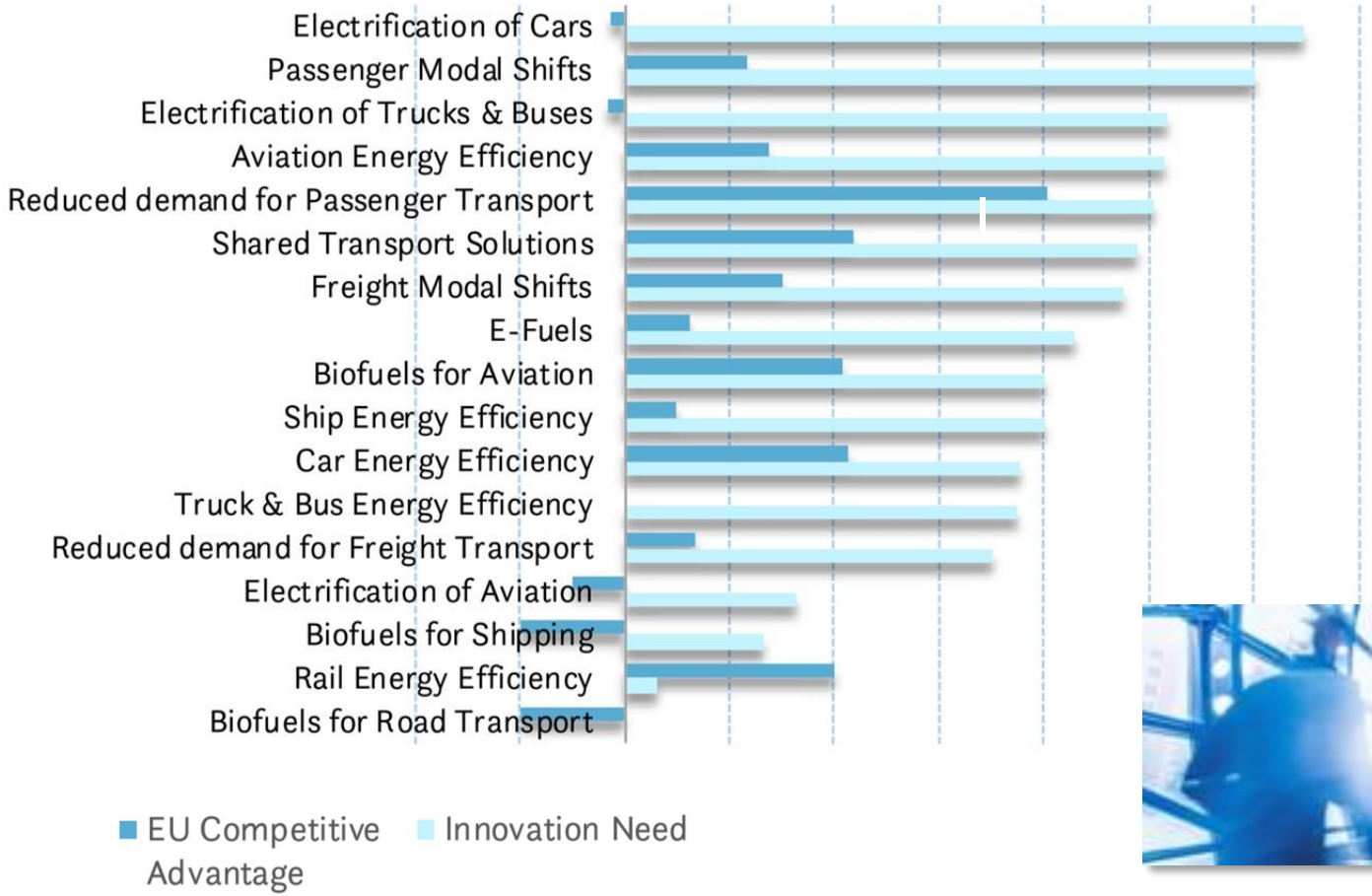
Finance Instruments Identified to Enable Innovation in each Power Sector Component Strategy



Transport:

Innovation for Electrification and Mobility as a Service

Innovation Needs to Decarbonise the Transport Sector & their Correlation with an EU Competitive Advantage

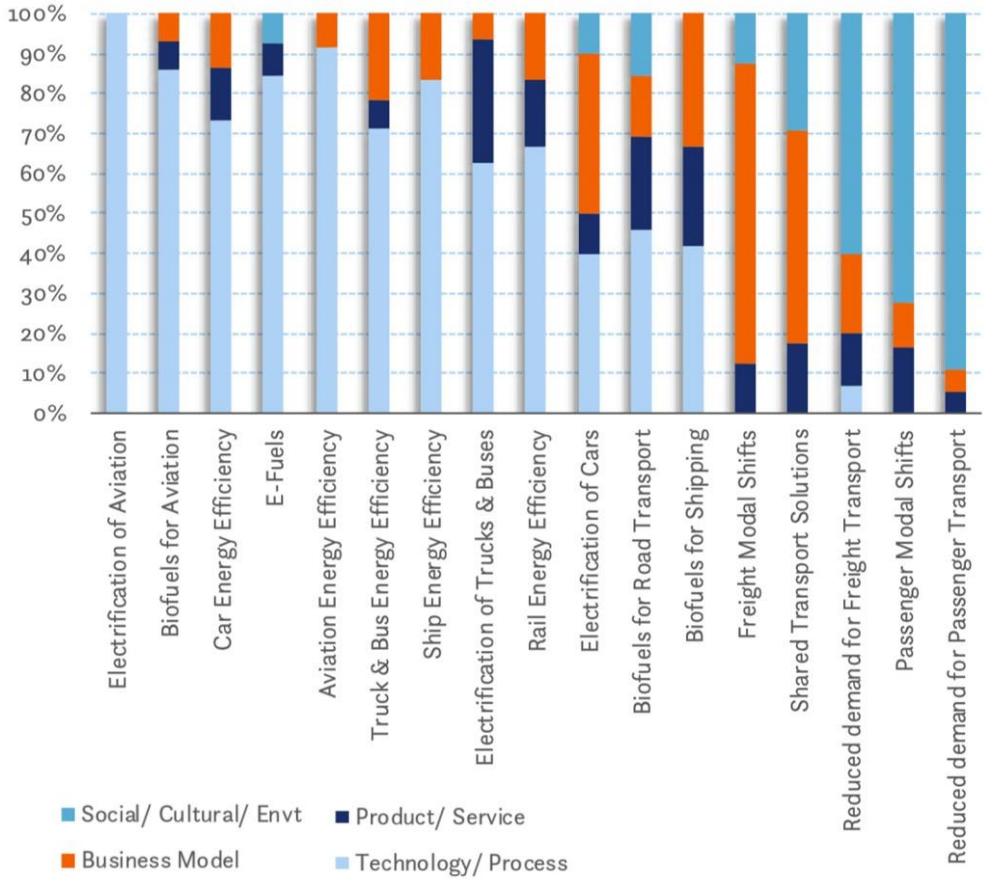


- The potential for EU competitive advantage in transport is **less well correlated** with innovation need than in power or in buildings
- Demand side action combined with modal & “mobility as a service” models are interesting opportunities for Europe

Transport:

Innovation for Electrification and Mobility as a Service

Innovation Type Required for each Component of Transport Sector Decarbonisation



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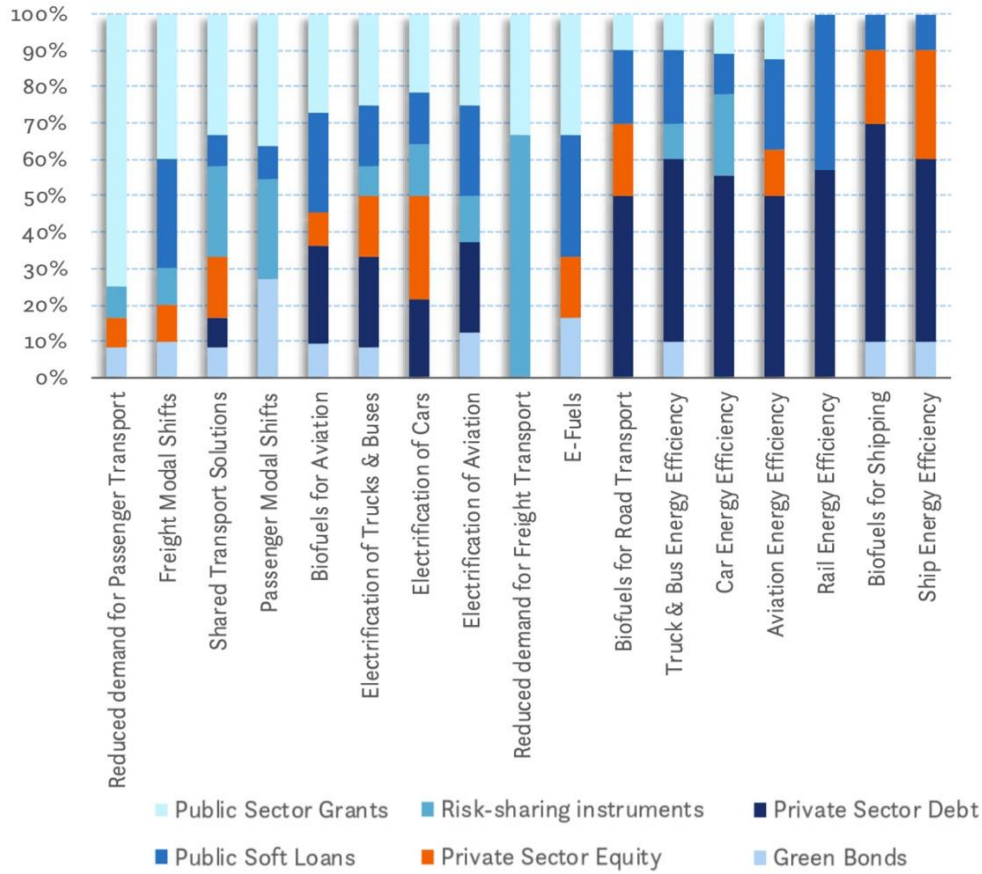
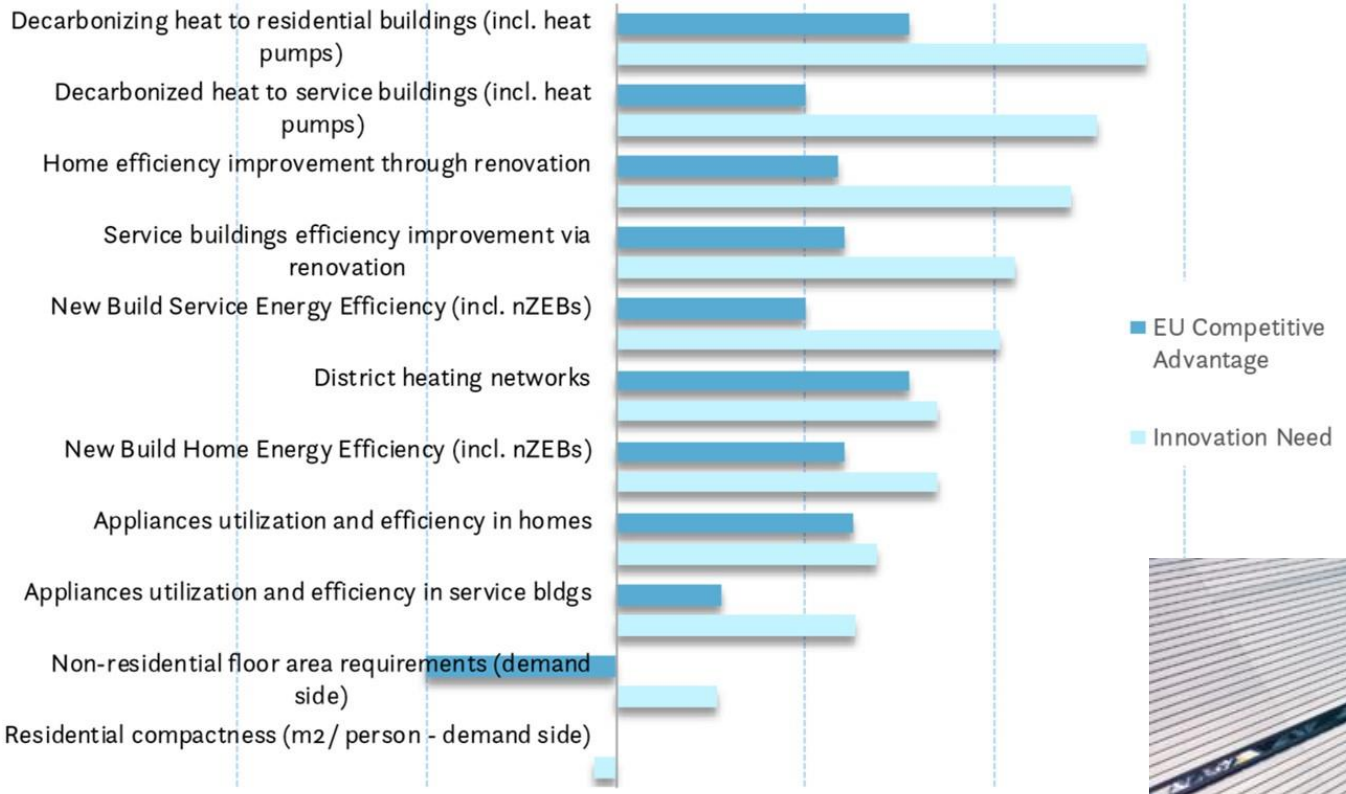


Buildings:

Business Model and Financial Innovation Challenge

Innovation Needs to Decarbonise the Buildings Sector & their Correlation with an EU Competitive Advantage

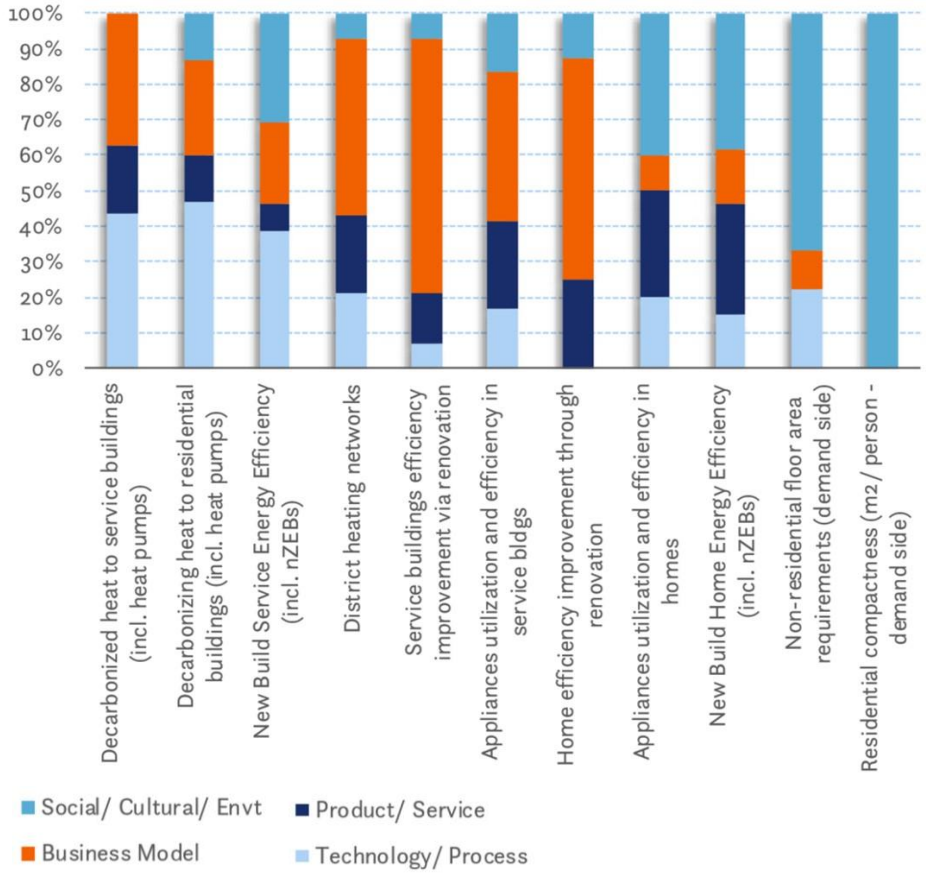


- Decarbonising heat for residential and service buildings together with energy efficiency upgrades are seen by experts as
  - **The leading areas for R&I investment for the full decarbonisation of Europe's buildings**

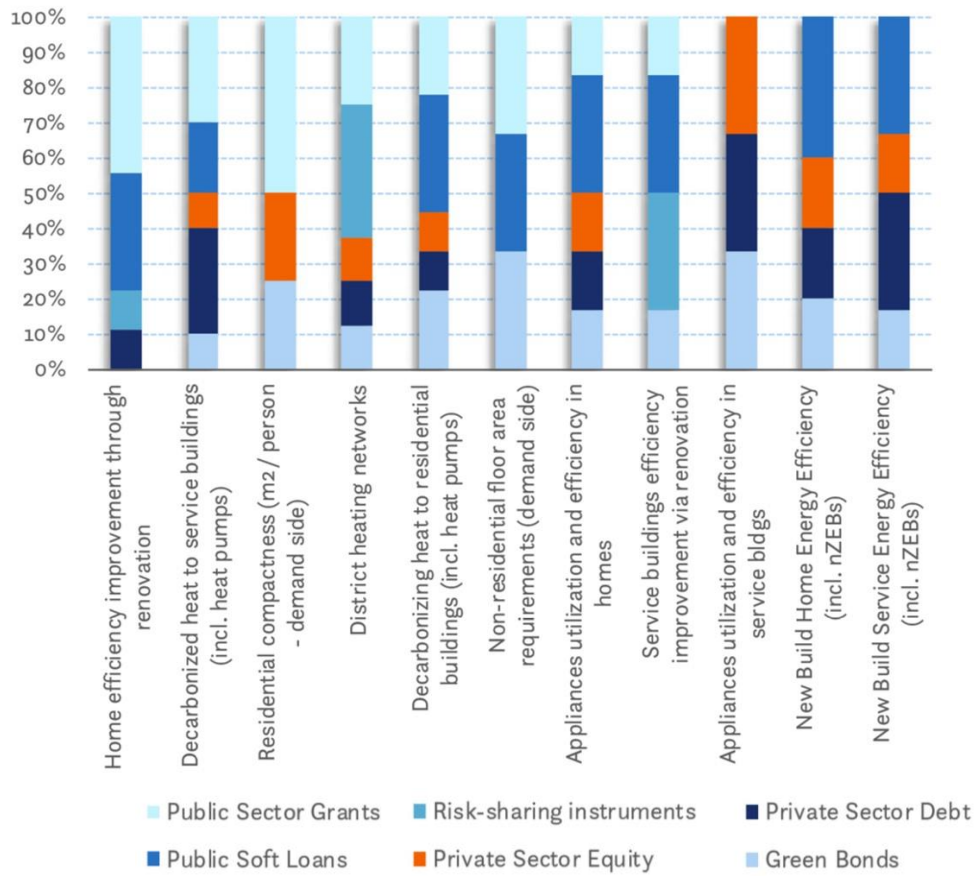
Buildings:

Business Model and Financial Innovation Challenge

Innovation Type Required for each Component of Buildings Sector Decarbonisation



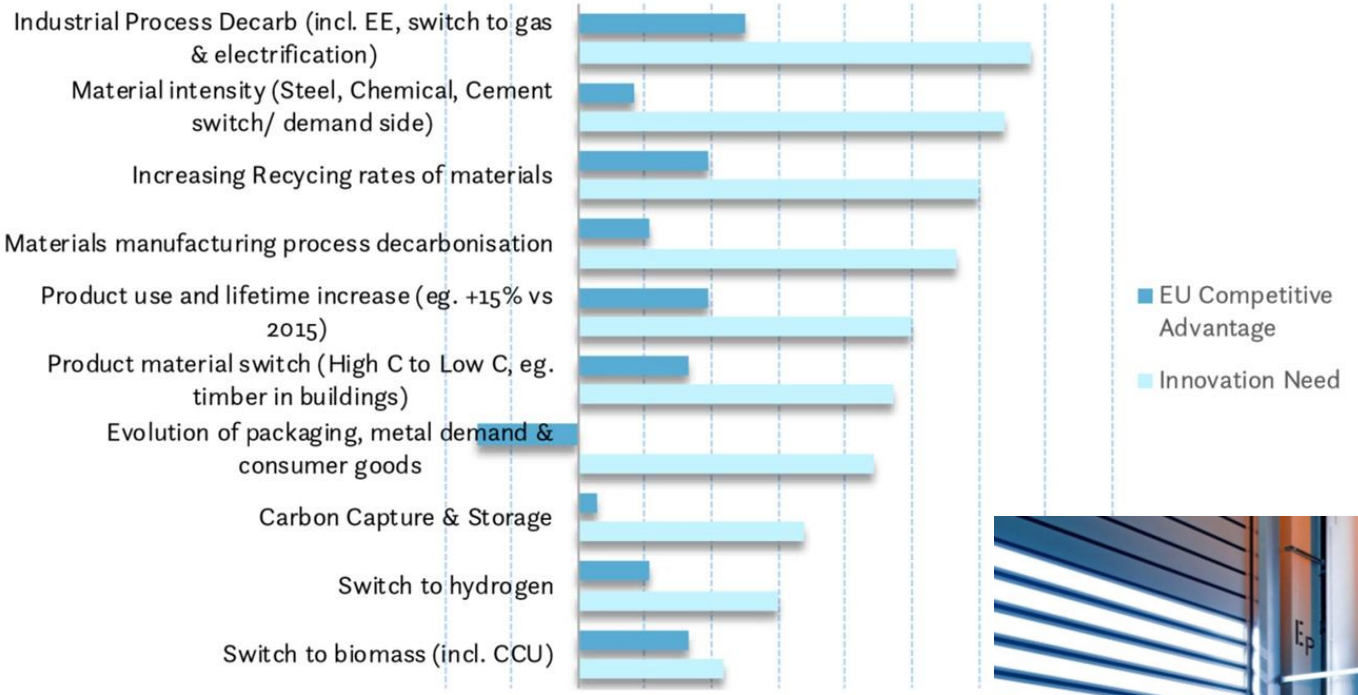
Finance Instruments Identified to Enable Innovation in each Buildings Sector Component Strategy



Industry:

Innovation to deliver “Circularity First”

Innovation Needs to Decarbonise Industry & their Correlation with an EU Competitive Advantage

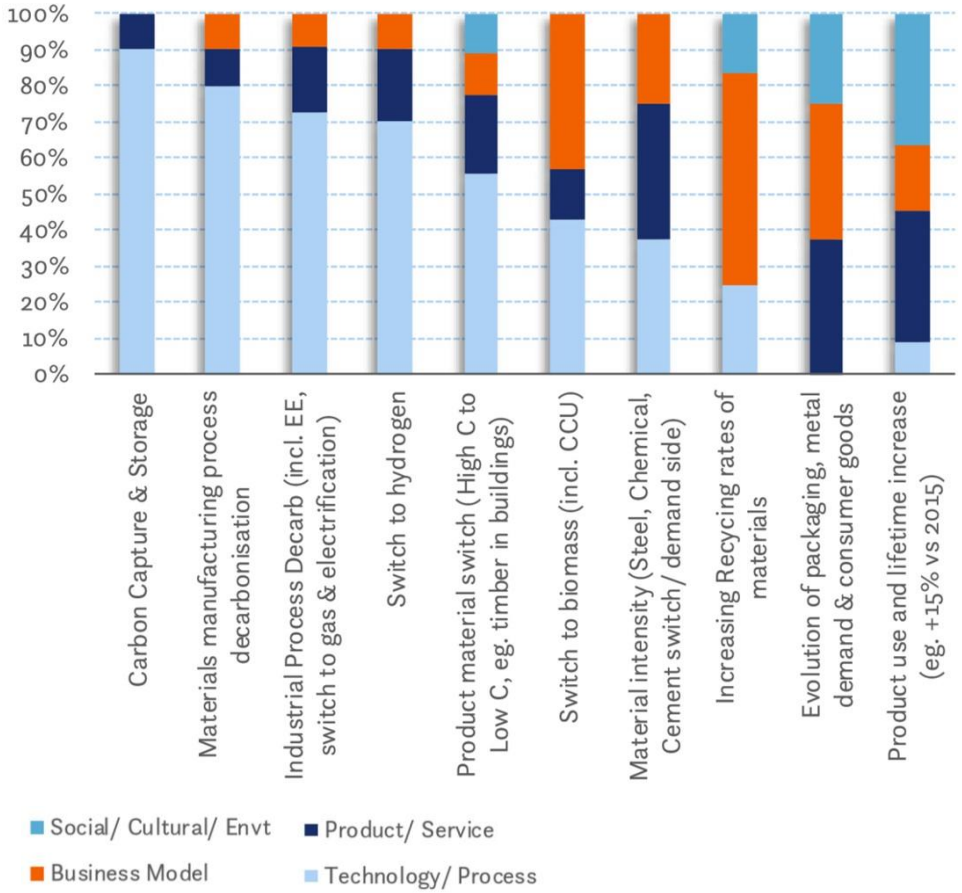


- Experts noticed a very strong need for innovation across the net-zero modelled strategies for industrial decarbonisation
- Especially in process efficiency, decarbonising materials and increased recycling rates.

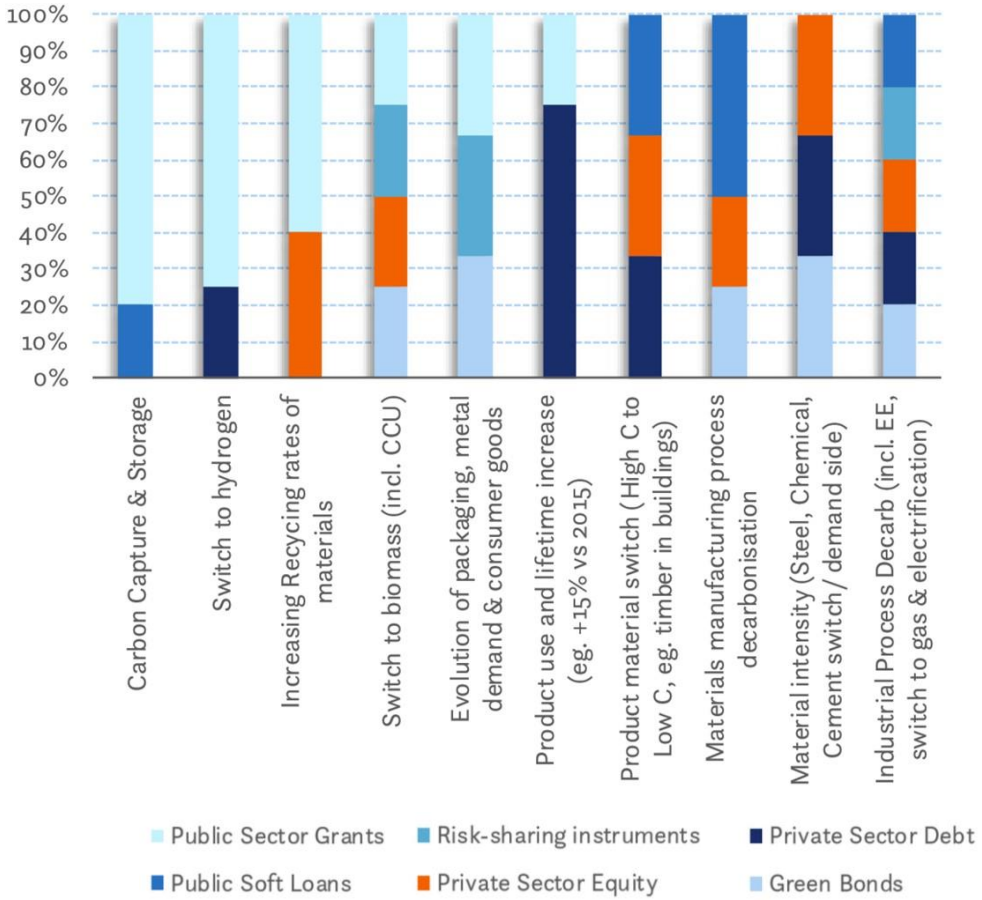
Industry:

Innovation to deliver “Circularity First”

Innovation Type Required for each Component of Industry Decarbonisation



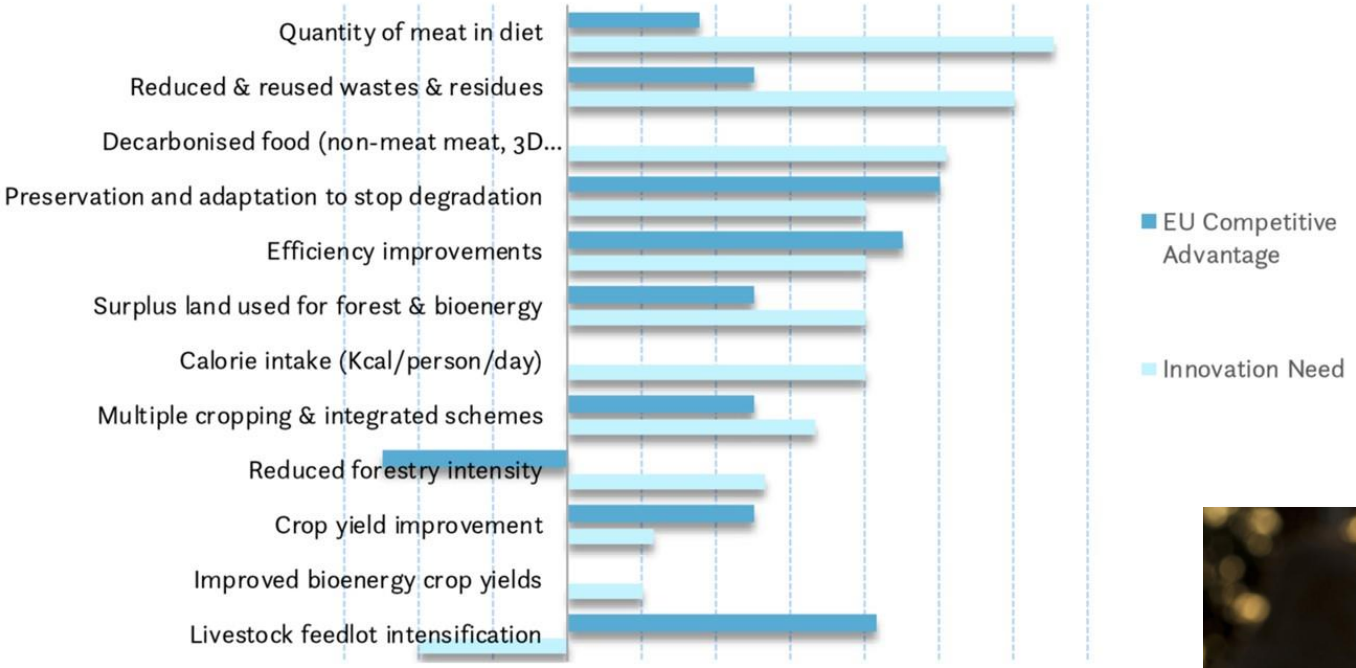
Finance Instruments Identified to Enable Innovation in each Industry Component Strategy



Agriculture, Forest, Land-use & Diet (AFOLU):

Connecting Health and Climate

Innovation Needs to Decarbonise AFOLU & their Correlation with an EU Competitive Advantage



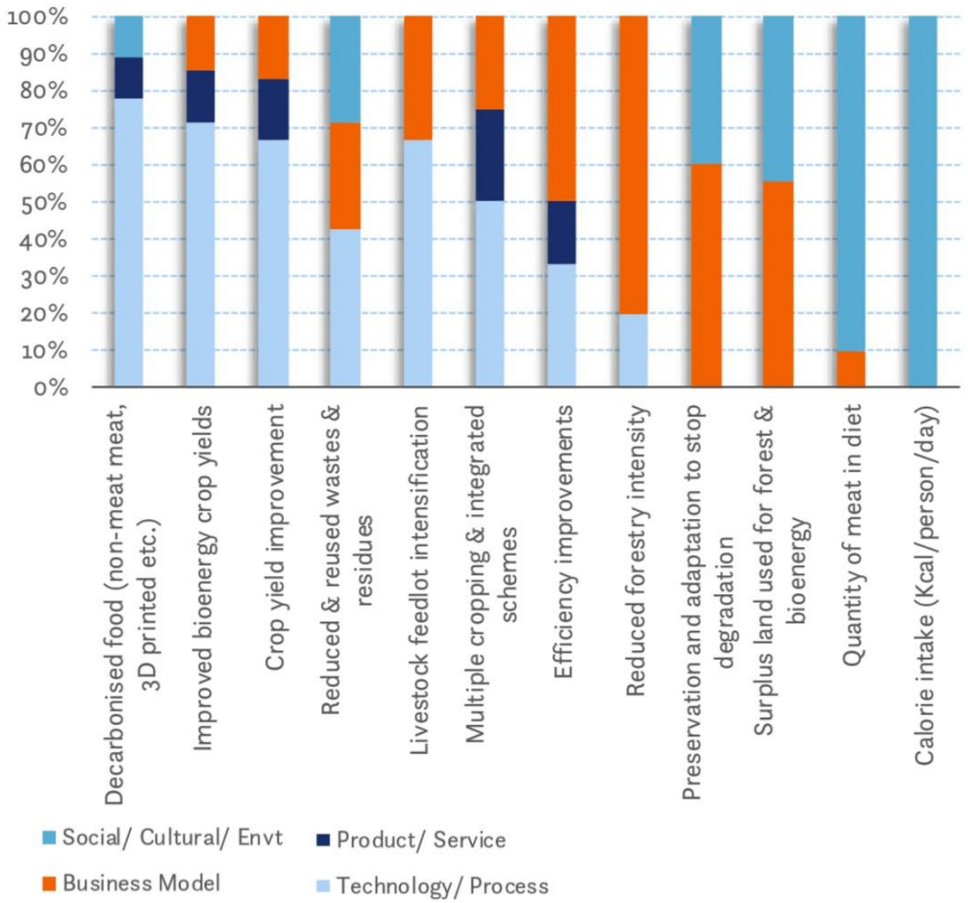
- In the survey, experts articulated three main levers for which innovation is deemed critical to enable a net-zero emissions economy by 2050:

1. **Reducing meat consumption**
2. **Reduced and reused waste**
3. **The decarbonisation of food production**

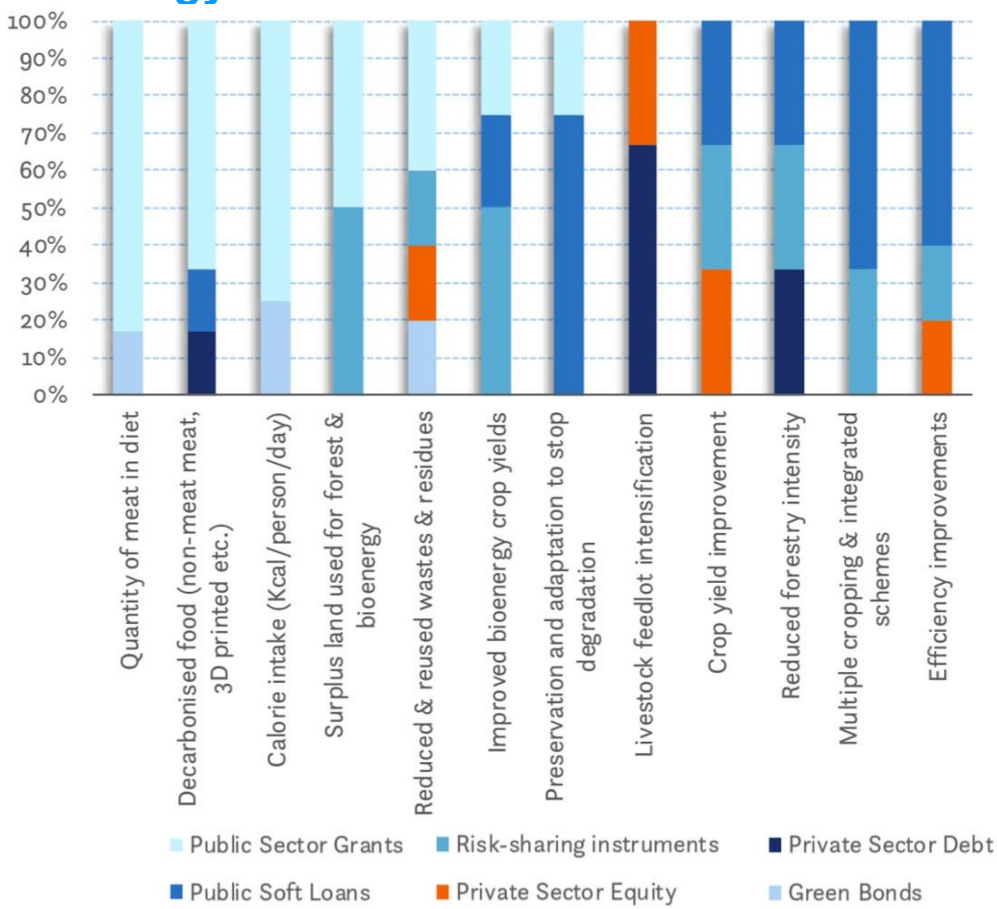
AFOLU

Connecting Health and Climate

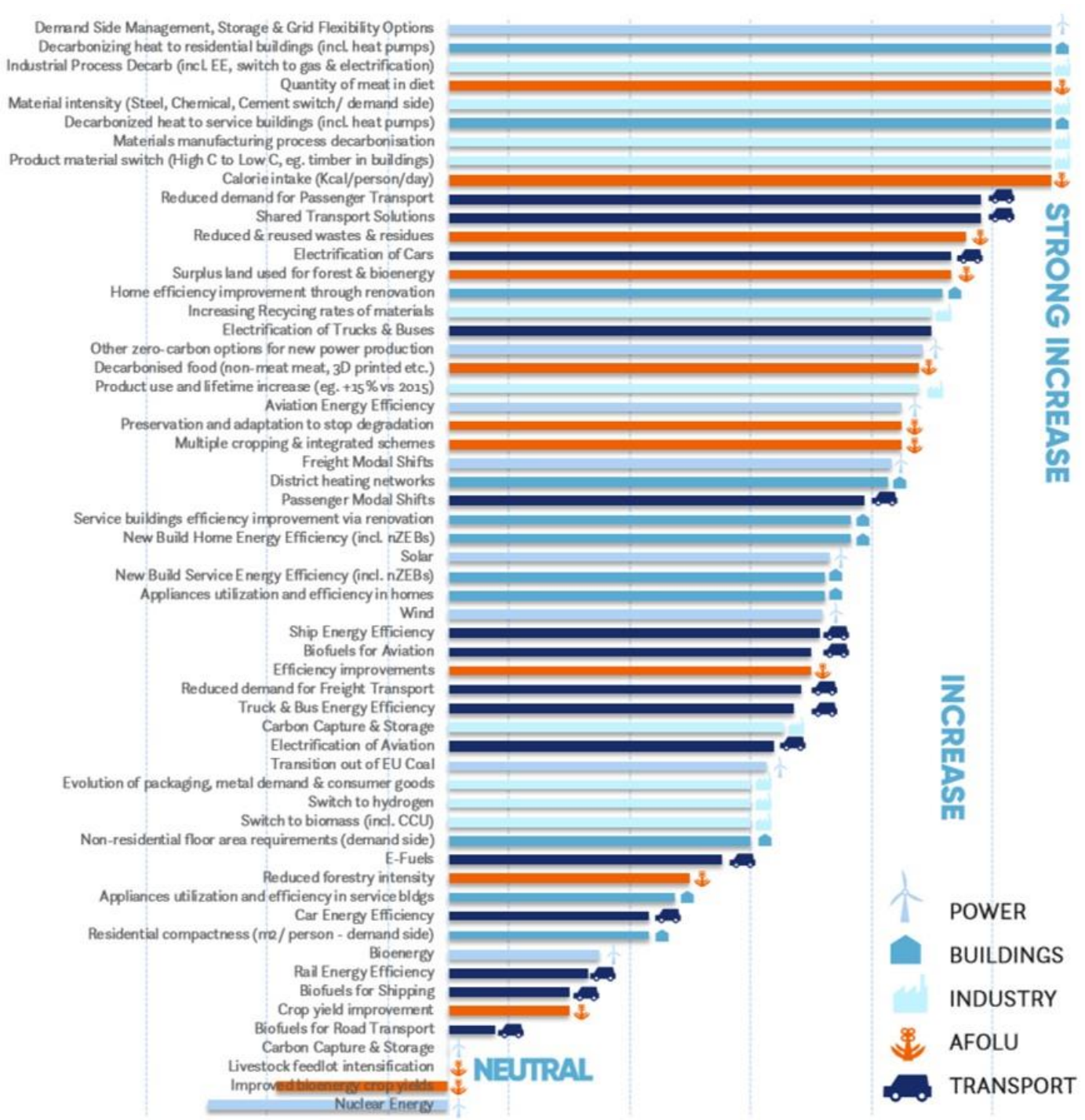
Innovation Type Required for each Component of AFOLU Decarbonisation



Finance Instruments Identified to Enable Innovation in each AFOLU Component Strategy




Conclusions

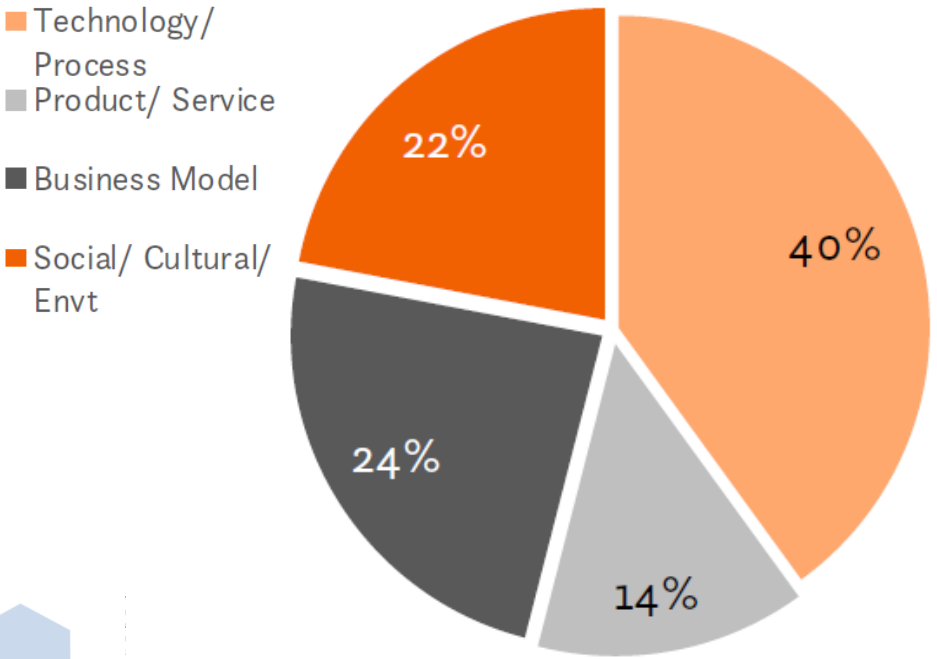


R&I investments Needs for Decarbonisation Strategies, Order of Magnitude

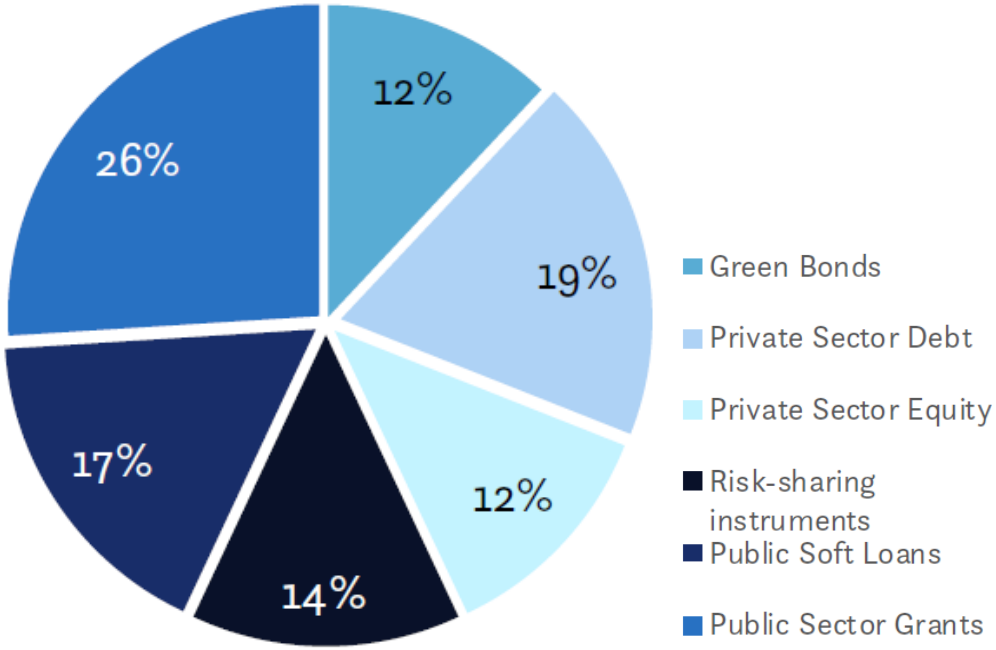
- The clear message from experts is that research and innovation investment all but four strategies need to increase
- **For 75% of these the increase is strong or marked**

Not all Net-zero 2050 Innovation is Technology-related, and it requires a balanced array of funding instruments

Aggregate Innovation Type Needed For Net-zero 2050



Aggregate Funding Instruments Needed For Net-zero 2050

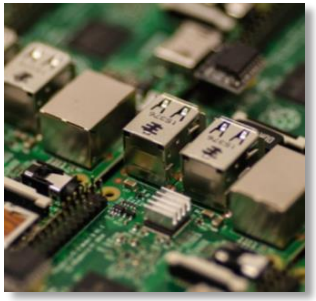


Source: Consolidation of all expert responses to survey, 2018

Five high-level conclusions from the expert contributions to this report:

1. Climate-related R&I investment is key to deliver net zero emissions
2. Europe can build competitive advantages in many of the decarbonisation pathways
3. Innovation is required at many levels, not just in the production of new technologies
4. Public and Private R&I investments need to scale-up together
5. Five “sector decarbonisation missions”

EU-level Policy Recommendations



1. **Horizon Europe's climate-related R&I allocation should increase to up to 50%**

2. **The climate element and impacts of R&I investments need to be more transparently and better tracked in Horizon Europe, but also better disclosed by the private sector**

3. **Net-Zero emissions in Europe by 2050 requires concerted collaboration on climate-related R&I collaboration between the public and private sectors**

Thank you

Report available at: www.europeanclimate.org/net-zero-2050
And www.climatestrategy.com – comment @ClimateSt

European Climate Foundation

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