Green Finance Institute

29th January 2025

Workshop: Financing Europe's Industrial Decarbonisation

In partnership with

ERLG Energy Resilience Leadership Group

Agenda

Financing Europe's Industrial Decarbonisation

Welcome and opening remarks – ERLG	10 mins
Brief overview of barriers to industrial decarbonisation investments – GFI	10 mins
Overview of solutions proposed – GFI	15 mins
Open discussion on the suitability / relevance of solutions proposed, and whether and how they could be implemented at a national and European level to deliver the Clean Industrial Deal – ERLG and GFI	60 mins
Wrap up and next steps – ERLG and GFI	10 mins

Green Finance Institute

Energy Resilience Leadership Group

Scene setter

Problem statement

- New European Commission has the dual mandate of bolstering Europe's prosperity and competitiveness whilst achieving the EU's legal obligation to become climate-neutral by 2050.
- Given the **scale of investment required** (up to €800bn in additional annual investment into new tech and infrastructure according to the Draghi report[1]), the **bulk** of the financial effort must come from the **private sector** - which has historically been insufficiently mobilised.

Objective of the workshop

- Testing the relevance and applicability of GFI's UK analysis of the barriers and potential solutions to scaling private investment into industrial decarbonisation to the EU context.
- Facilitating dialogue between public and private sectors on the best options to unlock capital at scale.

Sources: (1) EU Commission (2024) EU competitiveness: Looking ahead

Importance and scale of the challenge

Decarbonising industry is key both to deliver Europe's climate commitments and to secure its future prosperity

Green Finance Institute

Energy Resilience Leadership Group

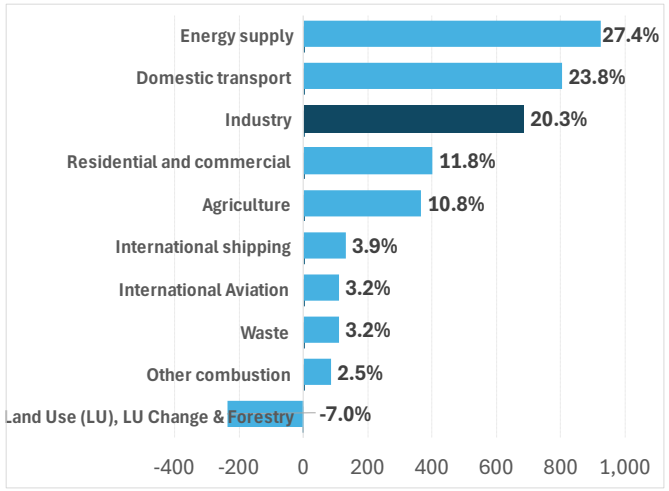
Why industrial decarbonisation matters

Industrial decarbonisation can make a significant contribution towards several of Europe's priority objectives

GHG reductions

With industry representing over 20% of total EU emissions, the first and most obvious outcome of industrial decarbonisation is that it can play a significant role in meeting the EU's target of achieving net zero by 2050.

Share of total EU27 emissions estimated in CO_2 equivalent (Mt) in 2022[1]



Achieving net zero for the EU's heavy industry sector alone would represent emissions savings of more than 500 Mt per year in 2050[2].

Competitiveness

Crucially, industrial decarbonisation can also contribute to securing Europe's future prosperity, notably through:

- **Creating jobs** – Strategic Perspectives modelling suggests that implementing the Clean Industrial Deal can generate an additional 1.6 million green jobs in net-zero manufacturing by 2035, rising to 2.1 million by 2040[3];
- **Making Europe a world leader in cleantech** as recommended in the Draghi report[4]; and
- **Achieving accelerated cleantech cost reductions from deploying at scale**

  A **clear link has been observed between deployment and cost reductions** for clean technologies that are now considered mature, the renewable energy technology sector being a prime example with the following historical learning rates[a] over the period 2010-2022[5]:

  – CSP: 18.1%

  – Offshore wind: 12.4%

  – Onshore wind: 20.6%

  – Solar PV: 33.1%

  See Appendix 1 for an illustration of this exponential reduction in renewable energy technology costs.

Energy security

Industrial decarbonisation will also support the EU's efforts to reduce its reliance on imported natural gas thanks to:

- **Reductions in fuel requirements** due to efficiency improvements; and/or
- **Fuel switching** from fossil fuels to electric, hydrogen and biomass waste-derived fuels.

Notes: (a) Average cost reduction experienced with every doubling of cumulative installed capacity

Sources: (1) European Environmental Agency (2024) Greenhouse gas emissions by country and sector (2) Material Economics (2019) Industrial Transformation 2050 – Pathways to Net-Zero Emissions from EU Heavy Industry (3) Strategic Perspectives (2024) Forging Economic Security and Cohesion in the EU (4) EU Commission (2024) EU competitiveness: Looking ahead (5) International Renewable Energy Agency (2022) Renewable Power Generation Costs in 2022

Green Finance Institute

Energy Resilience Leadership Group

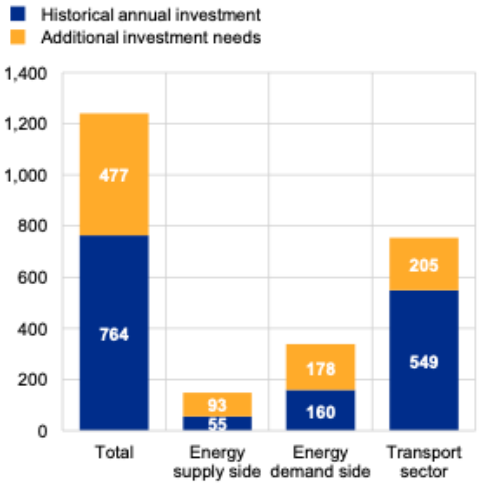
Industrial decarbonisation investment needs are massive

Deployment at scale is key to achieving the cost reductions and building the investor confidence required to deliver on Europe's competitiveness and energy security objectives as well as on its climate commitments.

Europe is facing significant green investment needs…

The European Commission has estimated that Europe will have to invest up to €1.2 trillion per year until 2030 to support the green transition in line with its 55% GHG reduction target. Despite a historical average of €764 billion per year having been invested towards reducing GHG emissions in the EU in the decade to 2020, this still represents a shortfall of €477 billion per year[1].

Annual green investment needs in the EU to 2030 (€bn)[1]



… of which industrial decarbonization investment needs represent a sizeable proportion

With different estimates using different methodologies and sectoral breakdowns as well as different time horizons, it is difficult to pinpoint a single figure for estimated industrial decarbonization investment needs across the EU. However, all sources reach the same conclusion that achieving net zero for the industrial sector by 2050 will require **hundreds of billions of Euros**. For example:

- The European Commission has estimated that €34bn would need to be invested annually into the industrial sector until 2030 to deliver its Fit-for-55 and REPowerEU objectives, which would represent almost three times the average investment in the decade to 2020[2]; and
- Allianz estimates that to decarbonize its industry sector the EU will require cumulative investments of €540bn until 2050, of which €330bn for carbon capture and storage (CCS) and over €100bn for electrification investments – the rest being almost equally split between hydrogen use, innovative production processes and new technologies[3].

As noted in the Draghi report, most of this investment will have to come from the private sector

Sources: (1) European Central Bank (2025) Investing in Europe's Green Future (2) European Commission (2023) Investments needs assessment and funding availabilities to strengthen EU's Net-Zero technology manufacturing capacity (3) Allianz (2023) The green industrial revolution

Green Finance Institute

Energy Resilience Leadership Group

Available investment data suggests that barriers remain

Capital deployment data, while incomplete, indicates that investment to date has been insufficient to deliver on 2030 – let alone 2050 – targets

Understanding existing flows of capital in the industrial decarbonisation sector

GFI's research and stakeholder engagement to date indicate that grants and public finance are currently the most sought-after financing products for industrial emitters, whilst balance sheet financing is the most common form of private finance. Debt and equity remain important mainly for large companies, indicating that loans and equity finance are inaccessible or unattractive to SMEs.

Financing type	Trends of note	Leading industries
Equity	• **Over $4.9bn** of equity was raised globally for low carbon industry in 2023, with the majority of funding going towards **metals**, **chemicals** and **cement**[1]. • Predominantly raised by either large established players or new companies that are developing innovative technologies or solutions.	Chemicals, steel & metals, cement
Debt	• Globally, energy transition debt has benefitted from interest rate drops, especially in the corporate bond market[1]. • Large companies are the most likely to leverage debt to fund decarbonisation measures[2]. • Over **$251m** in debt has been raised for **energy efficiency** measures in Europe since 2013, across 7 transactions, peaking in 2021[2].	Food & drink, power decarbonisation, chemicals
Public / development finance	• **Public finance** remains a crucial component in supporting industrial decarbonisation measures in Europe, through a range of products including grants, concessional debt, subsidies, and loan guarantees. • The European Investment Bank Group invested more than **€49bn** in climate action and sustainability, including industrial decarbonisation in 2023[3].	Energy intensive and heavy emitting sectors (steel, cement, glass, power etc.)

Data availability on existing investments into industrial decarbonization is poor

- Capital flow data on balance sheet financing and other types of private finance is not readily available.
- While information about individual transactions can be found, EU-wide investment reporting sources do not yet feature aggregated deal data for industrial decarbonization as a sector – in part because it overlaps with existing reporting segments such as cleantech, energy or with individual technology reporting.

However, some qualitative trends can still be inferred

- EU cleantech investment remained at the same level in 2023 as for the two previous years (c. €11bn)[4]. This shows resilience, but also that investment levels have plateaued – which is likely to be the same for industrial decarbonisation.
- Adding up publicly reported amounts across different sources doesn't come near the scale of investment required.

Sources: (1) BloombergNEF, Pitchbook (2) Analysis of Infralogic between 2013 and 2023 (3) European Investment Bank (2023) Our work- Our results in 2023 4) Cleantech for Europe (2023) Financial year briefing

Understanding the sector

Industrial decarbonisation is a broad sector which can be approached from many angles

Green Finance Institute

Energy Resilience Leadership Group

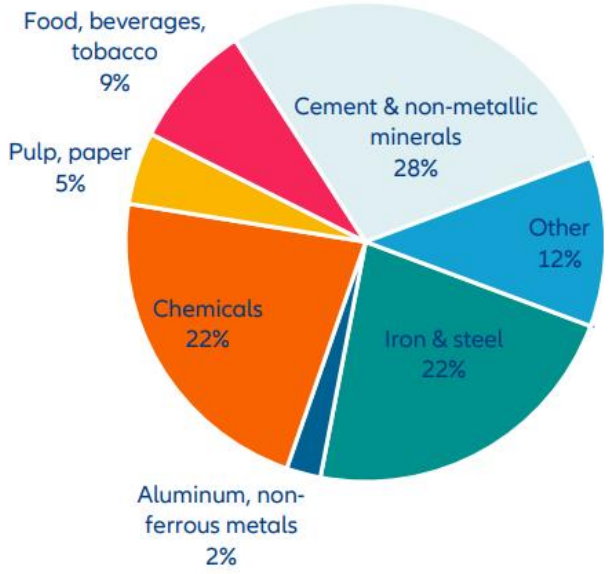
What do we mean by ‘industrials’?

A segmentation of the industry sector by sub-sector and/or end use can be useful to target interventions in the most emitting sub-sectors & processes

Emissions by sub-sector

- The industry sector was responsible for 650Mt of CO_2 emissions in 2020 – with CO_2 accounting for over 90% of direct GHG emissions from industry[1].
- The **cement**, **iron and steel**, and **chemicals** sectors are the largest contributors to emissions – they were responsible for approximately ¾ of total industry emissions in 2020[1].

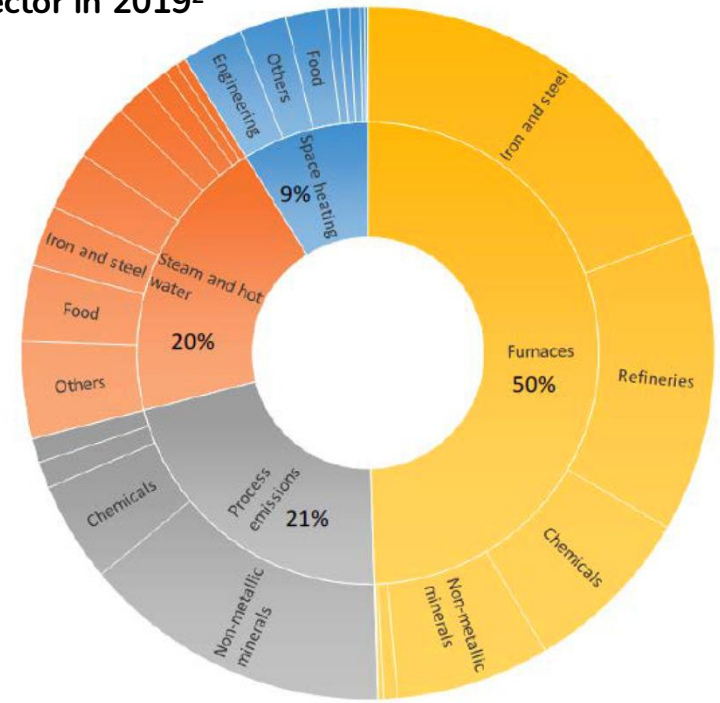
EU-28 industrial CO_2 emissions in 2020(%)[1]



Emissions by end use

- Half of all the emissions from energy-intensive industries are being caused by heating fossil fuels in furnaces for high-temperature processes[2].

Estimated direct emissions of industry in Europe by end use and sub-sector in 2019[2]



Sources: (1) Allianz (2023) The green industrial revolution (2) European Parliament (2020) Energy-intensive industries – Challenges and opportunities in energy transition

Green Finance Institute

Energy Resilience Leadership Group

Looking at the sector by type of intervention

Intervention	Description	Technology examples	Maturity level (TRL)[1,2,3,a]	NRMM[b]	Iron and steel	Chemicals	Bricks, Glass & Other manufacturing	Non-ferrous materials	Waste	Other industry[c]
Fuel switching	• Transition away from fossil fuels for energy use through capital upgrades to **electric** and/or **hydrogen** assets.	• Electric boilers, furnaces, ovens and compressors w/ renewables, hydrogen boiler w/ clean hydrogen.	9 7 5 3 1	✓	✓	✓	✓	✓		✓
Low-carbon feedstock	• Switch of existing fossil fuel-produced feedstocks to a clean alternative.	• Hydrogen for chemical processes or refining, biomass waste-derived fuels, renewable gas	9 7 5 3 1		✓	✓				
Energy efficiency measures	• Upgrades to plant equipment to reduce energy and process wastage.	• Commercial retrofits to improve insulation, process optimisation (SCADA system, new line belt), equipment upgrade (e.g. more efficient boiler), heat pumps.	9 7 5 3 1	✓	✓	✓	✓	✓	✓	✓
Resource efficiency & circular economy	• Reduction in new material usage through process changes, increases in use of recycled material and improved recycling rates.	• Recycling interventions, waste heat recovery, valorisation of by-products, sustainable packaging.	9 7 5 3 1	✓	✓	✓	✓	✓	✓	✓
Carbon capture, utilisation & storage[d]	• Post-combustion capture of carbon emissions through flue gas capture to facilitate long-term storage or use of CO_2	• Post-combustion capture, oxy-fuel combustion.	9 7 5 3 1		✓	✓	✓	✓	✓	

Notes: (a) Maturity level and TRL are indicative. The TRL of different interventions vary according to the specific technology and application. Indicative ranges are taken from multiple sources to show the range of TRLs for different technologies (b) NRMM is short for Non-Road Mobile Machinery, examples include construction machinery (excavators and bulldozers) and agricultural equipment (harvesters).(c) e.g. Automotive, food and drink, electronics, textiles, refrigeration and other industrial processes (d) Still emergent & mostly outside the EU so far

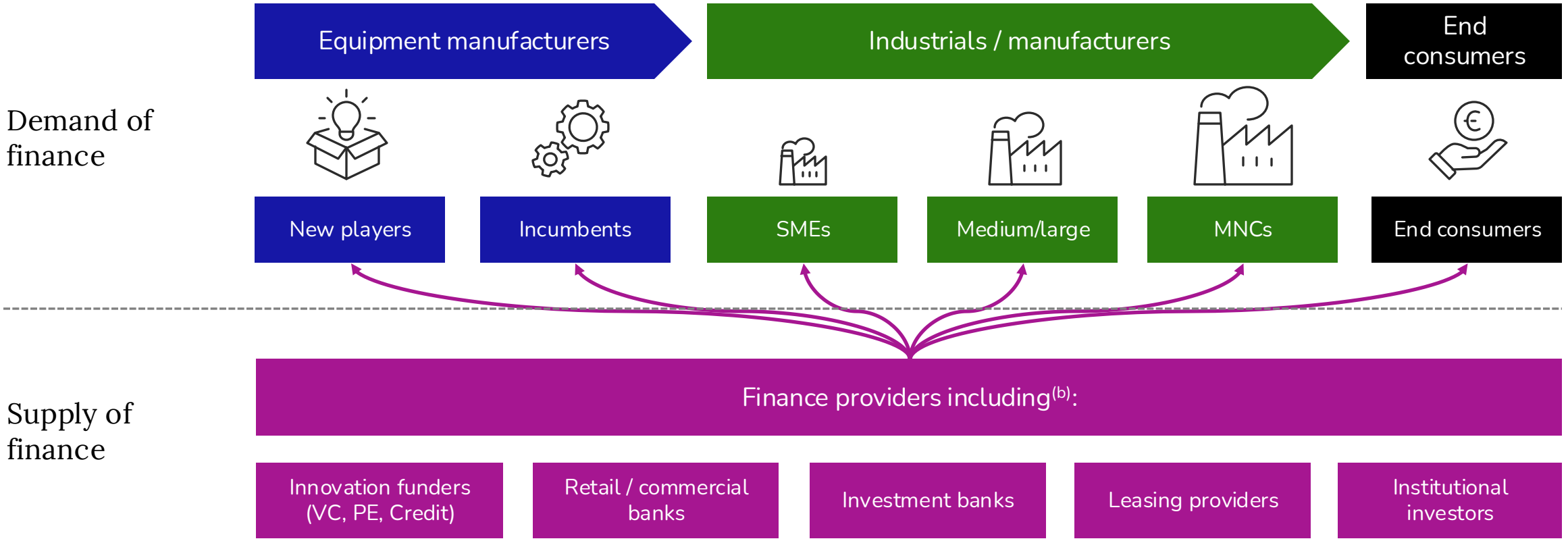
Sources (1) DESNZ (2023) Enabling Industrial Electrification (2) ElementEnergy (2018) Industrial Fuel Switching Market Engagement Study,(3) IEA (2024) ETP Clean Energy Technology Guide,

Green Finance Institute

Energy Resilience Leadership Group

Looking at the sector by type of stakeholder

Across the value chain, stakeholders can be broadly grouped into real economy players needing finance and finance providers [a]



For any project to go ahead, each stakeholder in the project needs to reach final investment decision (FID) stage based on their own investment criteria → **barriers to deployment can be understood by considering stakeholder profiles and decision-making processes**.

Notes: (a) There are also enablers such as (re)insurers and energy services companies – out of scope of this analysis; similarly, construction and operation contractors are out of scope as assumed to be ready to upskill on new tech once demand is there
(b) this list doesn't include public / development finance or capital markets.

Green Finance Institute

Energy Resilience Leadership Group

Overview of stakeholder profiles: demand for finance

Equipment manufacturers | Industrials / manufacturers | End consumers

	New players	Incumbents	SMEs	Medium/large	MNCs	End consumers
Typical profile	• Owned by founder(s) • New technology is proven but not commercialised • Looking for first contracts to demonstrate viability • Likely in pre-revenue stage, struggling to secure private capital	• Owned by founder(s) or institutional investors • Seeking to capture new markets by evolving existing technologies	• Owned by founder(s) • Can be spin-outs/offs from e.g. universities, larger businesses • Key objective to survive and grow business	• Owned by institutional investor • Expand role in value chain, taking equity stakes in own supply chain • Good awareness of net zero agenda	• Owned by institutional investors or publicly listed • Looking to capitalise on innovation opportunities • High awareness of net zero agenda, with dedicated resources available	• Can be corporate or individual buyers of the product • Variable awareness of net zero agenda
Typical sources of finance	• Government / public institution support • VC / PE	• Well-established relationships with commercial banks • Likely able to use own balance sheet • Can be institutionally owned	• Government support • Family-owned businesses have preference for debt but otherwise often seek equity (VC / PE)	• Preference for balance sheet finance but have access to better loans (inc. dedicated products) • Interest in project finance for connection into energy sources and infrastructure	• Budget from balance sheet • Loans or bond issuance from commercial banks • Participation in project finance for energy source and infrastructure	• Own working capital
Key decision drivers	• Secure intent / offtake contracts to unlock private finance	• Shareholder / board approval for higher risk investments • Investment returns • Uncertainty a factor when considering a move away from existing operations	• Ability to access public finance (awareness and application burden) • Ability to pay-back / access debt due to potentially weak balance sheet	• Need sufficient incentives to upgrade plant and machinery outside of usual 'end of life' • Need to see demand for green products • Costs associated with green production e.g. Opex, supply chain	• Need to see strong policy signals globally or within domestic market • Need demand certainty for green products • Require sufficiently attractive risk return on investment, content to be more patient with capital	• Largely driven by price and quality but some may be ready to pay a premium for green credentials depending on the product

Green Finance Institute

Energy Resilience Leadership Group

Overview of stakeholder profiles: supply of finance

	Finance providers				
	Innovation funders (VC,PE, Credit)	Retail / commercial banks	Investment banks	Leasing providers	Institutional investors
Typical profile	• High risk/high reward appetite • Often looking for companies that have secured 1-2 significant contracts • High awareness of net zero, many dedicated climate firms	• Deep relationship with industry, covering day-to-day banking, specialising products and advice/support on decarbonation • High awareness of net zero agenda with dedicated resources looking at transition opportunities.	• Largely global financial institutions (FIs) • Mainly exposed to larger MNCs • Co-invest alongside other global FIs • High awareness of net zero agenda, looking at opportunities within their portfolios and beyond	• Provide equipment to suit the needs of businesses of all sizes, generally over medium-term timeframes (3-5 years) • Strong relationships with industries of all sizes • Awareness of sustainability credentials of leasing equipment and how it can support businesses in their transition	• Largely global institutional investors with multi-bn/tn assets under management • Deep relationships with portfolio companies e.g. with seats on boards • Can be dedicated industrial decarbonisation fund
Typical financing products	• Equity investments	• Dedicated green loan products with small incentives (e.g. waived fees, holiday periods)	• Increased interest in project finance from industrial MNCs • Will prioritise commercial investments but appetite for innovative finance structures and co-investing alongside export credit agencies and PFIs	• Hire purchases (owned at end of contract) • Finance and operating leases • “As a service” with monthly fee, with option to keep/upgrade at end of contract	• Equity investments
Key decision drivers	• Achieving the desired rate of risk-adjusted return • Existence of co-benefits / additional incentives e.g. energy attribution certificates • Market access to industrials in Europe compared to rest of world	• Level of demand from industrials for dedicated products • Preference for lower-risk industries and larger companies with clear financial picture and better risk profiles, particularly in no revenue support mechanisms	• Strong policy signals – will prioritise markets in most competitive market • The existence of revenue support mechanisms is key, especially when comparing with other options globally	• Regulation/compliance which drives business changes • Policy certainty facilities long-term investments	• Performance of thematic funds • Long-term policy certainty • Fund mandate / specific investment criteria

Overview of key barriers across the value chain

Green Finance Institute

Energy Resilience Leadership Group

Barriers identified through UK stakeholder engagement (1/2)

Barrier			Description	Who is impacted (based on stakeholder feedback)[a]					
				Equipment Manufacturers		Industrials / manufacturers			Finance providers
				New players	Incumbents	SMEs	Med/large	MNCs	
Financial	Demand related barriers	Demand uncertainty	Uncertainty in market demand for low carbon products and lack of consumer willingness to pay a 'green premium' make investment in decarbonisation measures difficult for industrials.	✓	✓	✓	✓	✓	✓
		Limited offtakes	Low interest from industrials in agreeing letters of intent / offtake agreements makes it difficult for equipment manufacturers to unlock additional debt and equity finance for growth.	✓	✓	✓	✓	✓	
	Barriers related to investment returns considerations	High development costs	High development costs for new projects and assets pose a significant barrier and risk for developers which is limiting the number of projects achieving final investment decision (FID).	✓		✓	✓		
		High capital costs	Significant capex requirements of low carbon technologies, installation costs, and the cost of converting existing processes make investment challenging.	✓	✓	✓	✓		✓[b]
		High electricity prices	High operating costs (especially high energy costs in the case of electrification measures), low carbon price as well as a lack of revenue drivers result in long payback periods that are unattractive to investors, despite sustainability attractiveness.	✓	✓	✓	✓	✓	
		Lack of incentives	Investing in equipment upgrades before having fully amortised existing equipment would force industrials to write-off the residual value of old assets which doesn't make commercial sense.	✓	✓	✓	✓	✓	✓
		Unattractive investment vs. other sectors	Investment in industrial decarbonisation technologies seen as riskier and less profitable than investments in other clean tech (and vs. other sectors, e.g. technology).	✓	✓	✓	✓	✓	✓

Notes: (a) Based on research conducted with stakeholders in the UK (b) Only applies to institutional investors.

Green Finance Institute

Energy Resilience Leadership Group

Barriers identified through UK stakeholder engagement (2/2)

Barrier			Description	Who is impacted (based on stakeholder feedback)[a]					
				Equipment manufacturers		Industrials / manufacturers			Finance providers
				New players	Incumbents	SMEs	Med/large	MNCs	
Financial	Barriers related to risk perception	Insufficient track record	Lack of established performance history and revenue generation track record leads to uncertainty and increased risk aversion, resulting in a lack of investment in less proven companies.	✓		✓			✓[b]
		Technology availability & maturity	Some hydrogen and electrification fuel switching technologies are still in development (TRL 3-6); unproven technology; revenue support mechanisms not yet launched e.g. CDR and LDES; risk that in just a few years new technology could outperform current technology at the same price point			✓	✓	✓	✓
		Infrastructure, planning and supply chain risks	Larger industrial decarbonisation projects will be reliant on critical infrastructure to support their investment, e.g. fuel switching, electrification, hydrogen transport and storage, etc. In some cases, supply chains are undeveloped.		✓		✓	✓	
Non-financial		Resourcing requirements for securing finance	Complex and laboured administrative processes involved in securing loans, as well as lengthy response times and receipt of funds, result in pulled applications. It is an administrative burden and causes added costs.	✓	✓	✓	✓		
		Awareness and education	Lack of awareness and understanding of decarbonisation solutions, available finance and support schemes; businesses aren't sure of what solutions to prioritise.			✓	✓		✓
		Property and equipment control	Leased buildings and equipment provide further challenges in implementing upgrades where companies do not have the authority to make significant modifications.			✓	✓		✓[c]
		Skills shortage	Limited commercial skills in start-ups to make their companies attractive to investors; limited understanding by venture capital and other investors of unique risks in clean tech and how best to scale clean tech companies in the EU and internationally.	✓		✓			

Notes: (a) Based on research conducted with stakeholders in the UK (b) Leasing providers not notably impacted. (c) Only applies to institutional investors.

Sense check

- Does this description of the sector (interventions, stakeholder types & profiles) match your understanding and is it comprehensive?
  - Have we missed anything?

- Does the list of barriers match your experience of key barriers to financing industrial decarbonisation in Europe?
  - Are any key barriers missing?

Potential solutions

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (1/3)

Increasing 'leverage ratio[a]'

Solution ideas		Description	Key barriers targeted				Implementation level	Other comments
			Financial			Non-financial		
			Demand	Investment returns	Risk perception			
Grants (Lowest ratio of private vs. public capital)		Funding provided to an organisation by a public body for a specific purpose, with no expectation that any funds will be repaid.		✓	✓		EU / MS	Highly attractive to firms as no repayment requirement. Helpful for specific interventions e.g. subsidizing energy costs, funding researched, etc. and can de-risk exposure to corporate borrowers, so best for FOAK projects. Less efficient use of public capital after that.
Co-investment		Private sector matched funding alongside public funding.		✓			EU / MS	Allows private sector players to make their own financing arrangements at corporate level and to invest from company balance sheet rather than bringing in additional investors should they so prefer.
Repayable grants		Provision of grants with a portion that becomes repayable upon reaching certain project milestones. Allows available funding pot to be at least partially recycled, increasing the number of projects that can receive funding.		(✓)	✓		EU / MS	Can be offered at both devex and capex stages. Solution can work for all company sizes but likely to be considered as a financial obligation with similar treatment to debt in accounts. In an ideal world, helps bridge the gap between grants and commercial finance through introducing payback after certain conditions are met.
Blended finance fund model	**Equity**	Fund model bringing together public and private capital to provide concessional equity investment.		✓	✓		EU / MS	Can offer benefits to both public and private sector, with high potential for scalability and impact. Equity can be concessional, with public sector component having lower return requirements or deferring dividend.
	Debt	Fund model bringing together public and private capital to provide concessional loans.		✓	✓		EU / MS	Can offer benefits to both public and private sector, with high potential for scalability and impact. Debt can be provided at below market rates or over longer terms than commercial banks might offer.
	Guarantees (V. high ratio of private vs. public capital)	Fund model bringing together public and private capital with public money enhancing credit for debt/equity investment.		✓	✓		EU / MS	Can offer benefits to both public and private sector, with high potential for scalability and impact. Guarantees can improve the terms companies are able to achieve when financing through debt/equity. Note guarantees can also be provided at project level

Notes: (a) 'Leverage ratio': amount of private investment that can be deployed alongside each € of public capital. This will vary depending on the exact policy being implemented and it will vary across sectors and project types so the above assessment can only be qualitative

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (2/3)

Variable leverage ratio

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Revenue certainty mechanisms e.g. contracts for difference (CfDs)	Mechanism to facilitate investment by providing project developers with price certainty.	✓	✓	✓		EU / MS	CfDs in the electricity market are the most well-known examples, but revenue certainty mechanisms can also be used to support CDR, H_2 and SAF investments. Often agreed over 10-15 year time periods.
Tax rebates	Fiscal measures to incentivise capital expenditure		✓			MS	Already in place in some jurisdictions. Examples include enhanced capital allowances but have also taken the shape of investment tax credits in the US for example
Performance guarantees / warranties provided by insurance	Performance guarantees / warranties already exist but could be more specific towards technology / supplier performance; can support FOAK and NOAK projects.			✓		Market led / EU / MS	Insurers are able to provide similar products but need sufficient market scale to be comfortable offering products. Risk of double exposure to e.g. a bank financing a project. Examples of private performance guarantees already exist but there is room for more public examples
Product standards and mandates for low carbon materials V. high ratio of private vs. public capital	Inclusion of low carbon materials, e.g. steel, glass, etc. within product standards creates demand for lower carbon materials. Alternative could be mandating e.g. EU Taxonomy-aligned purchases for a % of public procurement.	✓				EU / MS	Could be viewed as controversial but would increase demand for low carbon materials, which could result in a green premium (the existence of which is currently in a number of sectors, thus limiting the attractiveness of investment in new equipment to produce more sustainable products). High private vs. public capital ratio

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (3/3)

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Aggregated purchasing Market led = highest ratio of private vs. public capital	In relation to e.g. high opex costs, aggregation of demand to support co-located or similar firms purchase in bulk at a suitable price.	✓	✓			Market led but needs EU level enabler	Addressing e.g. high opex costs through other interventions (policy or regulation) is likely to be more impactful and efficient. Note: while there are international examples of this in different sectors e.g. pharmaceutical industry or raw materials agreements where associated with national health or security issues, in the EU this solution would currently breach existing anti-trust law
Middle ground supplier transfer support	For industrials that may have historically made shorter term (2-3 year) purchases for coal but are now expected to commit to 10-20 year PPAs for new fuel source (e.g. hydrogen) with no supplier history.			✓		Market led	Only applicable for certain business types and so potentially a more limited impact across the value chain. Note that 1-year virtual PPAs are already becoming available
Technical assistance	Variable definitions but usually involves transferring knowledge or skills. This could be e.g. for government funding applications or preparing private sector investment case.				✓	EU / MS	Can be a supporting component for other solutions, in particular for blended finance solutions.
Municipality / regional connection role	Facilitating better connections between high emitting manufacturers and finance suppliers; particularly beneficial for smaller companies with limited resources.				✓	MS	Likely to be unique considerations for each municipality and so developing a consistent approach may be difficult, with efforts better applied through other solutions that can be more easily adapted locally.
Better awareness of financing options	Helping businesses understand / navigate public financing options, prepare applications, etc.				✓	EU / MS	Further work required to better understand awareness of financing options (by sector, company size, country, etc.).

Discussion

Qualitative assessment of selected solutions

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (3/3)

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Aggregated purchasing	In relation to e.g. high opex costs, aggregation of demand to support co-located or similar firms purchase in bulk at a suitable price.	✓	✓			Market led but needs EU level enabler	Addressing e.g. high opex costs through other interventions (policy or regulation) is likely to be more impactful and efficient. Note: while there are international examples of this in different sectors e.g. pharmaceutical industry or raw materials agreements where associated with national health or security issues, in the EU this solution would currently breach existing anti-trust law
Middle ground supplier transfer support	For industrials that may have historically made shorter term (2-3 year) purchases for coal but are now expected to commit to 10-20 year PPAs for new fuel source (e.g. hydrogen) with no supplier history.			✓		Market led	Only applicable for certain business types and so potentially a more limited impact across the value chain. Note that 1-year virtual PPAs are already becoming available
Technical assistance	Variable definitions but usually involves transferring knowledge or skills. This could be e.g. for government funding applications or preparing private sector investment case.				✓	EU / MS	Can be a supporting component for other solutions, in particular for blended finance solutions.
Municipality / regional connection role	Facilitating better connections between high emitting manufacturers and finance suppliers; particularly beneficial for smaller companies with limited resources.				✓	MS	Likely to be unique considerations for each municipality and so developing a consistent approach may be difficult, with efforts better applied through other solutions that can be more easily adapted locally.
Better awareness of financing options	Helping businesses understand / navigate public financing options, prepare applications, etc.				✓	EU / MS	Further work required to better understand awareness of financing options (by sector, company size, country, etc.).

Market led = highest ratio of private vs. public capital

It is proposed to leave solutions to non-financial barriers out of scope for the purpose of today's discussion - however, deployment is likely to be best incentivised by a combination of solutions to address all key types of barriers

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (3/3)

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Aggregated purchasing Market led = highest ratio of private vs. public capital	In relation to e.g. high opex costs, aggregation of demand to support co-located or similar firms purchase in bulk at a suitable price.	✓	✓			Market led but needs EU level enabler	Addressing e.g. high opex costs through other interventions (policy or regulation) is likely to be more impactful and efficient. Note: while there are international examples of this in different sectors e.g. pharmaceutical industry or raw materials agreements where associated with national health or security issues, in the EU this solution would currently breach existing anti-trust law
Middle ground supplier transfer support	For industrials that may have historically made shorter term (2-3 year) purchases for coal but are now expected to commit to 10-20 year PPAs for new fuel source (e.g. hydrogen) with no supplier history.			✓		Market led	Only applicable for certain business types and so potentially a more limited impact across the value chain. Note that 1-year virtual PPAs are already becoming available
Technical assistance	Variable definitions but usually involves transferring knowledge or skills. This could be e.g. for government funding applications or preparing private sector investment case.				✓	EU / MS	Can be a supporting component for other solutions, in particular for blended finance solutions.
Municipality / regional connection role	Facilitating better connections between high emitting manufacturers and finance suppliers; particularly beneficial for smaller companies with limited resources.				✓	MS	Likely to be unique considerations for each municipality and so developing a consistent approach may be difficult, with efforts better applied through other solutions that can be more easily adapted locally.
Better awareness of financing options	Helping businesses understand / navigate public financing options, prepare applications, etc.				✓	EU / MS	Further work required to better understand awareness of financing options (by sector, company size, country, etc.).

It is proposed to leave solutions to non-financial barriers out of scope for the purpose of today's discussion - however, deployment is likely to be best incentivised by a combination of solutions to address all key types of barriers

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (3/3)

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Aggregated purchasing	In relation to e.g. high opex costs, aggregation of demand to support co-located or similar firms purchase in bulk at a suitable price.	✓	✓			Market led but needs EU level enabler	Addressing e.g. high opex costs through other interventions (policy or regulation) is likely to be more impactful and efficient. Note: while there are international examples of this in different sectors e.g. pharmaceutical industry or raw materials agreements where associated with national health or security issues, in the EU this solution would currently breach existing anti-trust law
Middle ground supplier transfer support	For industrials that may have historically made shorter term (2-3 year) purchases for coal but are now expected to commit to 10-20 year PPAs for new fuel source (e.g. hydrogen) with no supplier history.			✓		Market led	Only applicable for certain business types and so potentially a more limited impact across the value chain. Note that 1-year virtual PPAs are already becoming available
Technical assistance	Variable definitions but usually involves transferring knowledge or skills. This could be e.g. for government funding applications or preparing private sector investment case.				✓	EU / MS	Can be a supporting component for other solutions, in particular for blended finance solutions.
Municipality / regional connection role	Facilitating better connections between high emitting manufacturers and finance suppliers; particularly beneficial for smaller companies with limited resources.				✓	MS	Likely to be unique considerations for each municipality and so developing a consistent approach may be difficult, with efforts better applied through other solutions that can be more easily adapted locally.
Better awareness of financing options	Helping businesses understand / navigate public financing options, prepare applications, etc.				✓	EU / MS	Further work required to better understand awareness of financing options (by sector, company size, country, etc.).

Market led = highest ratio of private vs. public capital

Similarly, it is proposed that purely market-led solutions be excluded from today's detailed discussion to focus on the solutions involving both the public and the private sectors

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (3/3)

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Aggregated purchasing Market led = highest ratio of private vs. public capital	In relation to e.g. high opex costs, aggregation of demand to support co-located or similar firms purchase in bulk at a suitable price.	✓	✓			Market led but needs EU level enabler	Addressing e.g. high opex costs through other interventions (policy or regulation) is likely to be more impactful and efficient. Note: while there are international examples of this in different sectors e.g. pharmaceutical industry or raw materials agreements where associated with national health or security issues, in the EU this solution would currently breach existing anti-trust law
Middle ground supplier transfer support	For industrials that may have historically made shorter term (2-3 year) purchases for coal but are now expected to commit to 10-20 year PPAs for new fuel source (e.g. hydrogen) with no supplier history.			✓		Market led	Only applicable for certain business types and so potentially a more limited impact across the value chain. Note that 1-year virtual PPAs are already becoming available
Technical assistance	Variable definitions but usually involves transferring knowledge or skills. This could be e.g. for government funding applications or preparing private sector investment case.				✓	EU / MS	Can be a supporting component for other solutions, in particular for blended finance solutions.
Municipality / regional connection role	Facilitating better connections between high emitting manufacturers and finance suppliers; particularly beneficial for smaller companies with limited resources.				✓	MS	Likely to be unique considerations for each municipality and so developing a consistent approach may be difficult, with efforts better applied through other solutions that can be more easily adapted locally.
Better awareness of financing options	Helping businesses understand / navigate public financing options, prepare applications, etc.				✓	EU / MS	Further work required to better understand awareness of financing options (by sector, company size, country, etc.).

Similarly, it is proposed that purely market-led solutions be excluded from today's detailed discussion to focus on the solutions involving both the public and the private sectors

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (2/3)

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Revenue certainty mechanisms e.g. contracts for difference (CfDs)	Mechanism to facilitate investment by providing project developers with price certainty.	✓	✓	✓		EU / MS	CfDs in the electricity market are the most well-known examples, but revenue certainty mechanisms can also be used to support CDR, H_2 and SAF investments. Often agreed over 10-15 year time periods.
Tax rebates	Fiscal measures to incentivise capital expenditure		✓			MS	Already in place in some jurisdictions. Examples include enhanced capital allowances but have also taken the shape of investment tax credits in the US for example
Performance guarantees / warranties provided by insurance	Performance guarantees / warranties already exist but could be more specific towards technology / supplier performance; can support FOAK and NOAK projects.			✓		Market led / EU / MS	Insurers are able to provide similar products but need sufficient market scale to be comfortable offering products. Risk of double exposure to e.g. a bank financing a project. Examples of private performance guarantees already exist but there is room for more public examples
Product standards and mandates for low carbon materials	Inclusion of low carbon materials, e.g. steel, glass, etc. within product standards creates demand for lower carbon materials. Alternative could be mandating e.g. EU Taxonomy-aligned purchases for a % of public procurement.	✓				EU / MS	Could be viewed as controversial but would increase demand for low carbon materials, which could result in a green premium (the existence of which is currently in a number of sectors, thus limiting the attractiveness of investment in new equipment to produce more sustainable products). High private vs. public capital ratio

Variable leverage ratio

V. high ratio of private vs. public capital

Finally, while changes at the EU level may be required to facilitate certain changes in national policies (e.g. with regards to State Aid), tax rebates are also proposed to be excluded from today's discussion, tax matters being purely within Member States' remits

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (2/3)

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Revenue certainty mechanisms e.g. contracts for difference (CfDs)	Mechanism to facilitate investment by providing project developers with price certainty.	✓	✓	✓		EU / MS	CfDs in the electricity market are the most well-known examples, but revenue certainty mechanisms can also be used to support CDR, H_2 and SAF investments. Often agreed over 10-15 year time periods.
Tax rebates	Fiscal measures to incentivise capital expenditure		✓			MS	Already in place in some jurisdictions. Examples include enhanced capital allowances but have also taken the shape of investment tax credits in the US for example
Performance guarantees / warranties provided by insurance	Performance guarantees / warranties already exist but could be more specific towards technology / supplier performance; can support FOAK and NOAK projects.			✓		Market led / EU / MS	Insurers are able to provide similar products but need sufficient market scale to be comfortable offering products. Risk of double exposure to e.g. a bank financing a project. Examples of private performance guarantees already exist but there is room for more public examples
Product standards and mandates for low carbon materials	Inclusion of low carbon materials, e.g. steel, glass, etc. within product standards creates demand for lower carbon materials. Alternative could be mandating e.g. EU Taxonomy-aligned purchases for a % of public procurement.	✓				EU / MS	Could be viewed as controversial but would increase demand for low carbon materials, which could result in a green premium (the existence of which is currently in a number of sectors, thus limiting the attractiveness of investment in new equipment to produce more sustainable products). High private vs. public capital ratio

Variable leverage ratio

V. high ratio of private vs. public capital

Finally, while changes at the EU level may be required to facilitate certain changes in national policies (e.g. with regards to State Aid), tax rebates are also proposed to be excluded from today's discussion, tax matters being purely within Member States' remits

Green Finance Institute

Energy Resilience Leadership Group

Solutions discussed in engagement to date (2/3)

Solution ideas	Description	Key barriers targeted				Implementation level	Other comments
		Financial			Non-financial		
		Demand	Investment returns	Risk perception			
Revenue certainty mechanisms e.g. contracts for difference (CfDs)	Mechanism to facilitate investment by providing project developers with price certainty.	✓	✓	✓		EU / MS	CfDs in the electricity market are the most well-known examples, but revenue certainty mechanisms can also be used to support CDR, H_2 and SAF investments. Often agreed over 10-15 year time periods.
Tax rebates	Fiscal measures to incentivise capital expenditure		✓			MS	Already in place in some jurisdictions. Examples include enhanced capital allowances but have also taken the shape of investment tax credits in the US for example
Performance guarantees / warranties provided by insurance	Performance guarantees / warranties already exist but could be more specific towards technology / supplier performance; can support FOAK and NOAK projects.			✓		Market led / EU / MS	Insurers are able to provide similar products but need sufficient market scale to be comfortable offering products. Risk of double exposure to e.g. a bank financing a project. Examples of private performance guarantees already exist but there is room for more public examples
Product standards and mandates for low carbon materials	Inclusion of low carbon materials, e.g. steel, glass, etc. within product standards creates demand for lower carbon materials. Alternative could be mandating e.g. EU Taxonomy-aligned purchases for a % of public procurement.	✓				EU / MS	Could be viewed as controversial but would increase demand for low carbon materials, which could result in a green premium (the existence of which is currently in a number of sectors, thus limiting the attractiveness of investment in new equipment to produce more sustainable products). High private vs. public capital ratio

Variable leverage ratio

V. high ratio of private vs. public capital

→ 9 main solution ideas to assess and consider in detail

Discussion - assessment of shortlisted potential solutions

Shortlisted potential solutions		Degree of improvement to the investment case?	Most helpful for which part of the value chain / innovation cycle?					Potential volume of private investment unlocked?	Efficient use of taxpayer money?	Potential effect on price point (any distortion)?	Ease & speed of implementation?	Any other criteria or comments?
			Equipment manufacturers		Industrials / manufacturers							
			New players	Incum bents	SMEs	Med/ large	MNCs					
Blended finance fund model	**Equity**	High thanks to concessional element of public funding	✓		✓	✓		High	High	Depends on design but should lead to learning rate in time	Similar vehicles already exist in other sectors	
	Debt	High thanks to concessional element of public funding	✓	✓	✓	✓	✓	High	High	Depends on design but should lead to learning rate in time	Similar vehicles already exist in other sectors	
	Guarantees	High thanks to concessional element of public funding	✓	✓	✓	✓	✓	High	High	Depends on design but should lead to learning rate in time	Similar vehicles already exist in other sectors	
Revenue certainty mechanisms / CFDs		Medium (lower risk but also potentially lower returns)			✓	✓	✓	Depends on design	Depends on design but could become unaffordable in time	Should lead to lower prices over time / with each auction	Low for CFDs (complex to design and administer)	
Grants		High	✓		✓			Medium (depends on size of the grant)	Low	No incentive to reduce price point	Well-known but less common at EU level	
Co-investment		Medium (depends on terms of public funding)			✓	✓		Medium (depends on terms of public funding)	Low	Depends on conditions	Well-known but less common at EU level	
Repayable grants		Medium (similar return / lower risk)			✓	✓	✓	Medium (particularly suited to devex)	Medium (depends on grant conditions)	No incentive to reduce price point	Relatively new at EU level	
Publicly-funded performance guarantees		Medium (lower risk / similar or lower return)	✓	✓	✓	✓	✓	Medium (helpful but not necessarily sufficient on its own)	High	Likely to increase price point via cost pass-through	Relatively new as a public instrument	
Product standards and mandates		Medium (through indirect creation of green premium)	✓	✓	✓	✓	✓	High	Low (due to creation of green premium)	Likely to increase price point through green premium	Well-known mechanism but slow to implement	

Wrap-up and closing remarks