



**More and better designed public support for energy
technology Research and Innovation**

Recommendations on supporting innovation in energy technology



**D2.5 Recommendations on supporting innovation in energy
technology**

WP 2 - Further define adequate financial strategies / T 2.4

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List of abbreviations and acronyms

EU: European Union

ETS: Emission Trading System

NECP: National Energy and Climate Plan

RES: Renewable Energy Sources

IEA: International Energy Agency

IRENA: International Renewable Energy Agency

TRL: Technology Readiness Level

R&I: Research and Innovation

WP: Work Package (in a project)

CCfD: Carbon Contract for Difference

Executive & publishable summary

This report gathers recommendations on how to support innovation in the clean energy sector to ensure a rapid and cost-efficient decarbonisation of the economy in line with Europe's climate goals. The focus is primarily on sources of funding for clean innovations, starting with a chapter on public funding instruments, followed by another on the conditions needed to boost private funding. This is followed by a discussion on the importance of mainstreaming the innovation aspect across policy areas for climate, energy and industry among others. The recommendations range from policy reforms on energy and climate, as well as sectorial legislation and best practices in the finance sector.

The recommendations to support clean energy innovation in this report were gathered in first line from the findings of the SMARTSPEND project and from relevant energy finance events that were organised in 2020 and 2021.

The findings of this report indicate that there are encouraging signs when it comes to clean energy technologies. Investors have noticed the market success of some clean technologies as well the mounting difficulties that are being faced by the fossil industry. Also public policies and funding instruments have been adapted to cater for a growing need to deploy new green technologies. Nonetheless, there are concerns that the pace of investment by public and private actors in Europe has to pick up to address the climate emergency and competition from abroad.

1. Introduction

One of the clearest messages in the IEA's flagship report "Net Zero by 2050"¹ is that "to reach net zero [carbon emissions] almost half the reductions will have to come from technologies that are currently only at the demonstration or prototype phase." It added that it is necessary to "quickly increase and reprioritise spending on research and development." In effect, clean technologies exist for the most part, but need investment, testing and development to be commercially available and competitive with existing alternatives. To keep the Paris climate commitments within reach, the next two decades must see the large-scale commercialisation of key clean energy technologies including next generation renewables, energy storage, transport fuels, heating & cooling, innovations in the industrial sector, energy efficiency and buildings.

This report may be read alongside the following [SMARTSPEND](#) reports: "Mapping report on funding instruments for energy innovation (update)" ([here](#)); "Analysis of the industry's funding needs" ([here](#)); "ETIPs supporting the SET Plan in the Horizon Europe era" ([here](#)).

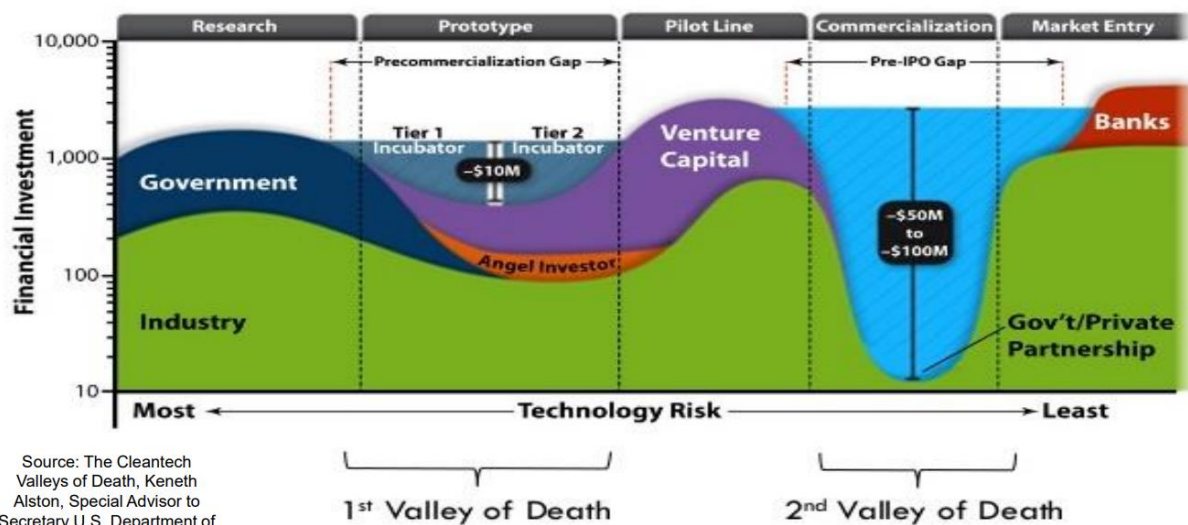
Here we draw mainly on the three sources below to summarise energy and finance experts' views on how to best to support clean energy innovation:

- Meetings organised under SMARTSPEND between clean energy industry representatives and national energy ministry officials during "[Roadshows meetings](#)" in 2019-2021 (WP 3).
- Outcomes from the 3 editions of SMARTSPEND's Access to Risk Finance Conferences: 1st on [20.09.2020](#), 2nd on [25-27.04.2021](#) and 3rd on [18.11.2021](#) (WP 4).
- Highlights from events, conferences and workshops on financing innovation that were organised by academics, industry federations, the European Commission and other organisations in 2020 and 2021.

¹ IEA, 2021: [Pathway to critical and formidable goal of net-zero emissions by 2050 is narrow but brings huge benefits, according to IEA special report - News - IEA](#)

2. Using public finance to support innovation

Public funding instruments are key to supporting clean energy technologies. Usually, it is directed at fundamental research and development at early stages of technology development in the energy sector as well as in other areas like medicine. While public funds do cover early research, increasingly there is an understanding that there are more hurdles – or valleys of death – along a technology’s development as it gets closer to being commercialised (see figure below). There may be situations where not enough capital is available. Diverse reasons may cause hesitancy among banks or potential investors to support new technologies, such as an actual or perceived technology risk, adverse macroeconomic circumstances, a risk-averse culture, uncertainty in the market or legal framework. In these circumstances, public support as grants, loans or equity may provide the decisive push in the latter stages of a project’s development to build pilot facilities or prepare for commercialisation.



The **covid crisis** is having a big impact on societies and economies across the world. In Europe temporary restrictions and long-term shifts threatened whole economic sectors and those employed in them. National governments and the EU reacted with short-term emergency measures protecting workers’ income and companies’ liquidity, then with grants and loans to “build back” and make Europe “resilient” against whatever lies ahead. The unparalleled stimulus of Europe’s economy - if spent right - offers the opportunity to speed up the decarbonisation of the continent.

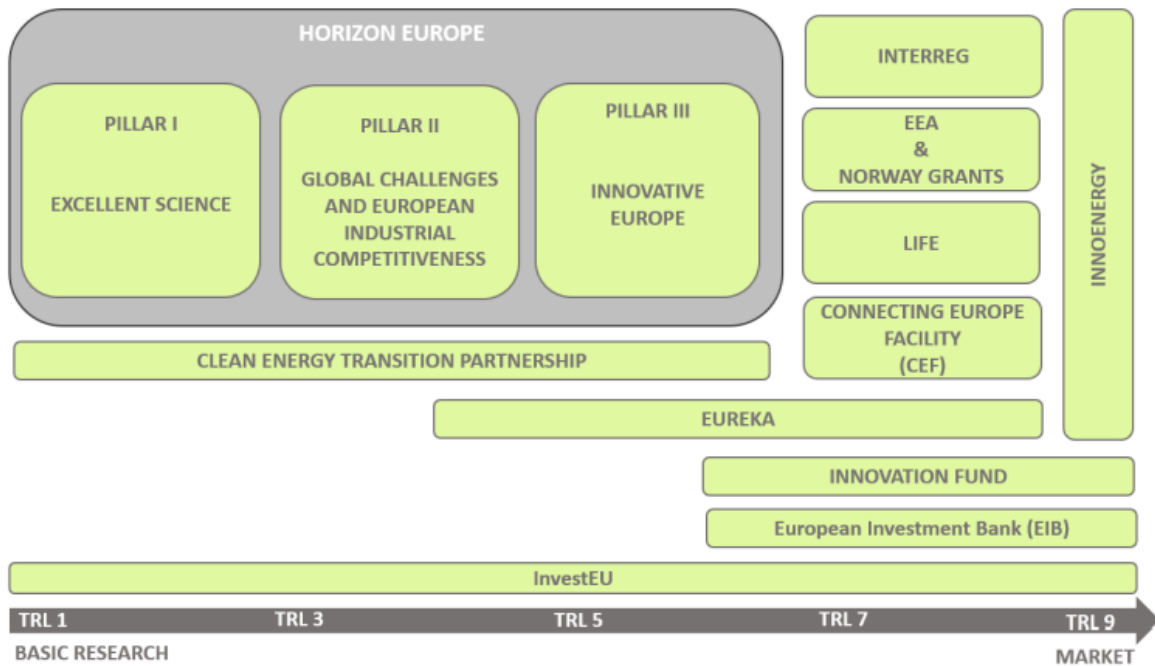
This section will consider several of the public financial instruments for clean energy technology and innovation that are currently available at European Union level, as well as features of national funding. Concretely, the aim is to provide recommendations to better target support towards innovative clean energy technologies.

2.1 Public funding at EU level

EU funding instruments evolve to keep up with the needs of the clean energy sector. For example, attempts are being made to bridge the ‘Valley of Death’ with the Innovation Fund, which is capable of providing grants of the scale of [hundreds of millions of euros](#). Meanwhile, an instrument to provide equity stakes ([Breakthrough Energy Catalyst](#)) is being offered in partnership with a private foundation.

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The illustration below from a recent SMARTSPEND [report](#) shows a non-exhaustive schematic overview of EU financial instruments relevant for energy innovation, classed by TRL priority.



Source: [D2.2 SMARTSPEND-Update-on-funding-instruments_v1.1.pdf](#)

Horizon Europe:

[Horizon Europe](#) is the EU's key funding programme for research and innovation with a budget of €95.5 billion for the period of 2021-27. Stakeholders who have been in close contact with SMARTSPEND (who for example participated in meetings arranged between clean energy actors in a Member State and the government of that country) have acknowledged its importance and point out four areas to improve:

Horizon Europe rules require at least 35% of its budget to be targeted at climate protection. Ensuring that that budget really is spent on topics that protect the climate is almost as important as the headline amount of money committed. The Commission uses the [Rio Markers](#) categorisation at the level of calls. Monitoring progress towards the target as Grant Agreements are signed remains difficult. It is also difficult to see how individual projects are categorised. More precise tools to assess climate relevance should be used.

The 2021-2027 **EU budget discussions** in the Council of the EU between net-contributing and net-beneficiary Member States have nearly resulted in large budget cuts for Horizon Europe in comparison to the initial European Commission proposal. It was right that in late 2021 the Council of Ministers, under pressure from the European Parliament, backed down on an idea reduce the annual budget of Horizon Europe for 2022.

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R&D Framework Programme² funding is a vital complement to national funding. In the energy field, its contribution currently equates to roughly 20 per cent of all European public funding to energy. More effort should be made to communicate on success stories of Horizon 2020 and Horizon Europe, including on clean energy innovation, to sustaining and strengthen support for it.

Without compromising excellence in Horizon Europe, more should be done to help applicants from Eastern Europe to catch up, whose success in applying is significantly lower than applicants from EU-15 Member States. More effort is needed to build capacity among potential applicants.

Recovery and Resilience Facility:

The EU's **Recovery and Resilience Facility** presented a unique opportunity to drive decarbonisation in Europe. It makes a total of €672.5 billion available as grants or loans, of which at least 37% must be allocated to climate protection. The financial assistance is conditional on the recipient country adopting regulatory measures where necessary³.

During 2021, Clean energy industry representatives in SMARTSPEND delegations to Spain, and Poland discussed the importance of prioritising green investments in those countries' national plans with national governments. They called for at least 50% of spending to be allocated to climate-friendly investments, and to "do no harm" by excluding all fossil fuel infrastructure including natural gas grids and gas condensation boilers. Further, to position the country to reap industrial rewards as a developer of technology, they suggested committing a tenth of Recovery and Resilience climate budgets to innovative technologies having high potential but that are not yet fully commercial.

The Recovery and Resilience Plans presented by Member States to access their RRF allocation have been [closely analysed by NGOs](#). However in at least one country running a national recovery plan in parallel with the RRF, [the claim has been made](#) that climate investments due to be made under the national scheme were shifted to the RRF in order to comply with the 37% rule, blunting the capacity of the EU funding to lead to additional investment in climate protection.

The extent to which the money targets energy subsectors differs from country to country. Support to PV manufacturing is directly and substantially supported by Italy with 400 M EUR, also by Romania and Croatia⁴, countries with no tradition in PV manufacturing hitherto. The Czech Republic has committed to install 10 GW of new PV capacity over the next five years.⁵

While the plans will ensure the deployment of known technology, concerns have been raised about their lack of attention to commercialising Innovative technology .A recent [report](#) by the Jacques Delors Institute has looked at green innovation within 14 recovery plans and found a mixed picture between EU countries, where larger green budgets do not necessarily result in more innovative projects (see graph below). It recommends the EU to develop more durable tools to support green innovation, including a fiscal reform to the Stability Growth Pact allowing for more green investment and developing a new European green investment programme to take over from the Recovery and Resilience Facility.

² Horizon 2020 and Horizon Europe are the latest iterations of R&D Framework Programmes, which have implemented European R&D policy since the early 1980s

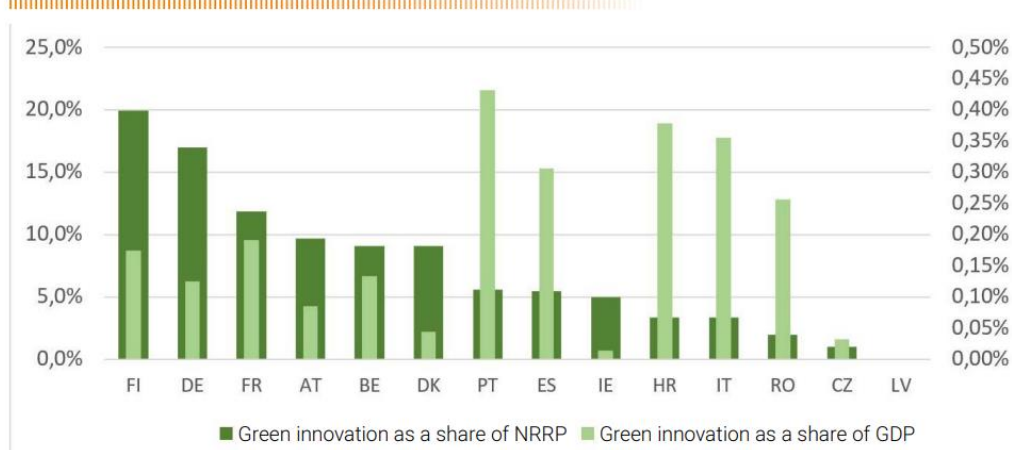
³ [Recovery and Resilience Facility | European Commission \(europa.eu\)](#)

⁴ [Solar Manufacturing in the national recovery and resilience plans](#), EMSC, Dec 2021

⁵ EUREW 2021. Presentation by Michaela Holl, Agora Energiewende (see [presentation](#))

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Figure 3 Green innovation spending as a share of NRRPs and national GDP



Sources: Eurostat (2021), European Commission (2021), Own Analysis

Note: GDP data is taken from 2019 to exclude the volatile data linked to the Covid-19 crisis.

Source: Jaques Delors Institute 2021, Policy Brief on “THE EUROPEAN RECOVERY PLAN AS A BREAKTHROUGH FOR GREEN INNOVATION?” See [here](#)

Clean industry advocates recommend, the European Commission keep a close eye on the progress of the projects that the money is committed to and to be strict about implementation of any national regulatory reforms that were agreed as a condition for the grants and loans.

Portugal Science Minister Manuel Heitor considers economic recovery from the covid-19 crisis can only succeed with a knowledge-based approach involving the reskill of workers. In his view, Europe needs to articulate fundamental research with innovative research approaches and it should open data sources whenever this is possible.⁶

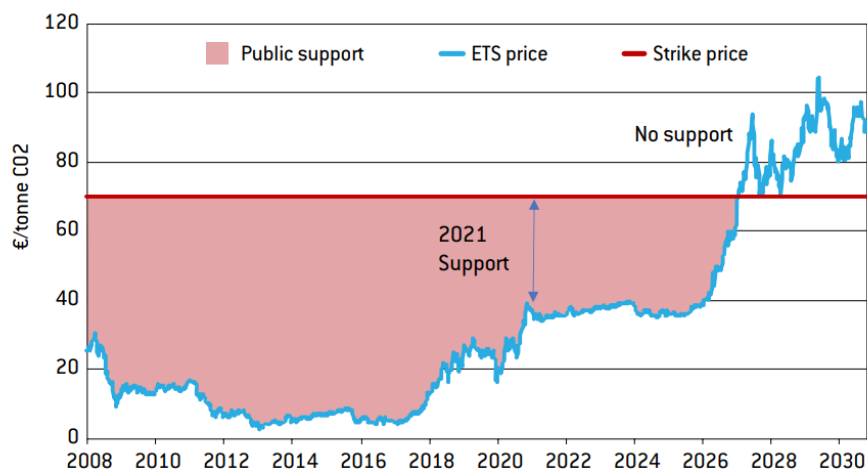
Statements by Manuel Heitor, Minister of Science, Technology and Higher Education of Portugal on 14 June 2021 (K4I’s [Innovation At The Heart of NextGenerationEU](#))

Emissions Trading Scheme:

A new financing instrument is described in the European Commission’s proposed revision to the Emissions’s Trading Scheme and its Innovation Fund: **Carbon Contracts for Difference (CCfDs)**. CCfDs remove carbon price risk from investment decisions helping, in theory, large-scale demonstration projects in renewable energy and heavy industry sectors like cement, iron smelting and ammonia plants to find financing. CCfDs can provide the extra security that is needed for private investors to develop such projects, by removing this variability and providing an agreed carbon strike price that supports both capital investments and operational costs. Moreover, it could be beneficial to differentiate the strikethrough price by sector depending on the additional difficulty and to bring in carbon emission savings. The new “Energy and Environmental State aid guidelines” should consider future use of CCfDs, either within a harmonised EU framework or applied nationally. The third edition

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Access to Risk Finance Conference dedicated a session to a novel instrument to support clean energy projects in heavy industrial sectors (the programme and presentations are [here](#))



Source: [Bruegel, 2021](#).

Under a CCfD, the CO₂ saved by a low-carbon production process compared to a traditional (high-carbon) process is rewarded at a constant price ('Strike price'). In the example illustrated above, public support makes up the difference to this price if the ETS price is too low. CCfDs can also be implemented such the plant operator makes a payment to the public when the ETS price exceeds the Strike price.

Stable CO₂ prices matter. The CEO of EDP Renováveis, Rui Teixeira⁷ has said that green hydrogen is the key to decarbonise industry and buildings, but a stable CO₂ price above €45 per ton is needed for large scale investments to build electrolyser capacity powered by renewables.

2.2 National Public funding for clean energy

The lion's share of public support for clean energy generally comes from national governments. Over the past decade national renewable energy support schemes throughout Europe have contributed towards a technological revolution. As a Portuguese Energy Minister recently stated⁸, a RES auction in Portugal during 2020 has resulted in the world's lowest photovoltaic price. He said that wind and solar have shown the way for renewables and will continue delivering new installed capacity via technology neutral tenders. Now Portugal's priorities for the next decade will include greater diversification of RES, storage and developing interconnections with the help of technology-specific tenders.

The PV industry recently called for "Hybrid auctions [that couple] renewable and clean technologies such as battery storage likely to provide services to the energy system, currently or in the future."⁹

⁷ Sustainable Energy Europe Summit 18-19 November 2020

⁸ João Pedro Matos Fernandes, Portuguese Minister of Environment and Energy Transition at the Sustainable Energy Europe summit on 28-30 September 2021

⁹ [Reply to Public consultation](#), 2021, Solar Power Europe

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While [BNEF considers wind and PV](#) to be the cheapest in large parts of Asia, Europe and the Americas, to achieve a fully decarbonised and diversified system, additional technologies will need to be scaled up and brought to market including more types of RES in the power and thermal sectors as well. Enabling technologies for storage and grid flexibility (cables and ICT) in are also vital. To continue developing technologies that are mature but not yet competitive, it is essential to maintain **technology-specific tenders** for clean energy, in particular for renewables and key enabling technologies, and within these to periodically offer “innovation tenders” similar to the ones in France and Germany¹⁰ (memo in French and German [here](#)). Such innovation tenders should explicitly be “ruled in” to the Climate, Energy and Environmental protection Aid Guidelines being prepared by the European Commission¹¹ (Box 2).

National R&I funding programmes are scarce and difficult to apply to in several EU countries, as industry representatives have explained during meetings with relevant ministry officials. Funds from national research programmes are difficult to access and selection criteria are often restrictive to the point that SMEs opt to apply instead for EU funding programmes. The selection criteria and focus of the calls in some national funds should be reviewed, along with the internal procedures of national funding agencies.

When it comes to EIB funding - often as loans and equity - the money is channelled by **national credit bodies** that liaise directly with the beneficiaries. In some countries, there is a lack of a clear strategy and technical knowledge of the clean energy sector within these national bodies that hinders the financing of promising projects. Ideally national credit bodies should hire specialised staff able to assess technological risks and market opportunities of clean energy technologies. A regionalised approach, as the one used by German Landesbanken, should be favoured over a centralised system with a single national contact for all applicants.

¹⁰ Franco-German office for energy transition, 2020. Memo on French and German Innovation Tenders (see [here](#))

¹¹ See for example Solar Power Europe’s input to the public consultation

3. Boosting private investment in clean technologies

Private sector spending in energy R&I is difficult to establish. Data from 2015 indicate € 23 billion was invested in the SET Plan priorities equating to 77% of the total, followed by public investments by national authorities (18%) and the EU (5% - see figure below). This evidences the central role that the private sector has in driving Europe’s clean energy innovation. The private sector has put a higher percentage of its investment into “sustainable transport” and “energy efficiency” when compared to national public investment, where the latter has given more priority to “nuclear energy” and “smart energy systems”.

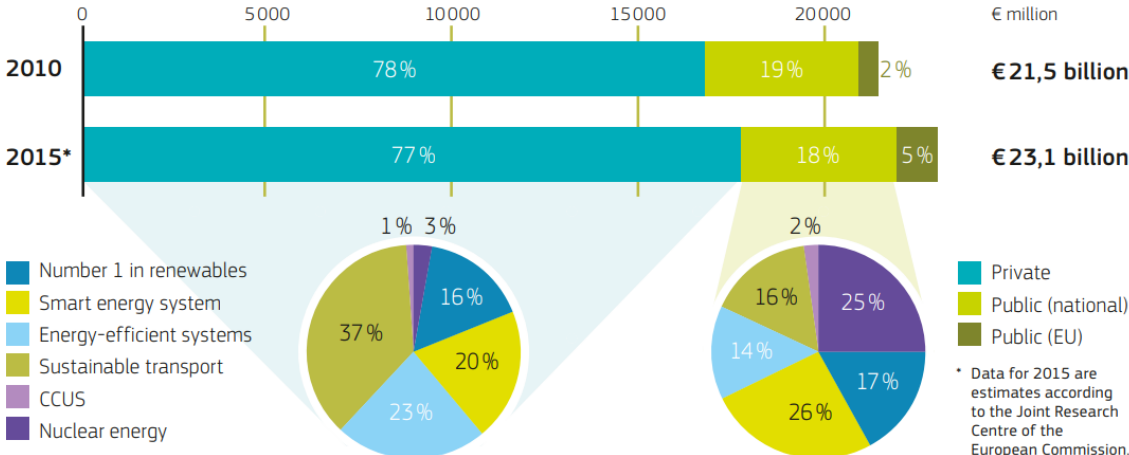


Figure 1: Investment in the Energy Union / SET Plan R&I priorities in the EU (2010-2015).
 Data sources: Public (national) investment: International Energy Agency RD&D online data service; Private investment: as estimated by SETIS/Joint Research Centre (detailed methodology available¹²); EU investment: Directorate-General for Research & Innovation. Note: public (national) and private data for 2015 are estimates.

Source: European Commission, 2017 [The strategic energy technology \(SET\) plan - Publications Office of the EU \(europa.eu\)](https://ec.europa.eu/energy/publications/energy-union-strategy)

3.1 Private investors’ views on green investment

Private investment from companies, investors, banks and other asset owners are involved in all stages of technology development. They take a central role the closer a technology, product or service gets to market, where the investment needs are typically at their highest. Europe’s large reserves of private capital are starting to flow rapidly into clean tech, with 11 bn EUR invested in EU cleantech in 2021, double the amount of 2020¹². More generally, the share of firms “investing to deal with climate change” is up from 41% in 2020 to 47% 2021. These are higher proportions than in US¹³.

Investors have noticed that, the fossil fuel sector is being hit hard by the COVID 19 crisis, while renewables have proved to be resilient said IRENA¹⁴ in late 2020. IRENA’s model shows that “doubling annual transition investments to USD 2 trillion over the next three years will provide an effective

¹² [2021 Cleantech for Europe Annual Briefing](#) (Jan 2022)
¹³ [EIB 2021-2022 Investment Report – Recovery as a Springboard for Change](#) (Jan 2022)
¹⁴ Statements by Director General Francesco La Camera at Climate Investment Summit (November 2020)

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stimulus and can leverage private sector investments by a factor 3-4¹⁵. This highlights the ability of public money to pump-prime.

At the Sustainable Energy Europe Summit¹⁶ private investors agreed that the **finance sector must adapt to cater for renewables**. Banks have witnessed the impressive progress RES cost reduction over last 10 years and they have invested massively in wind and solar projects. Individual RES installations can be smaller than fossil fuelled plants, they have lower running costs but need more upfront investment. Banks and other financiers need to develop financial products that aggregate such projects and spread risk. Fossil fuel projects generally get higher revenues, but renewables attract more investors and have a higher share value. Asset managers are **divesting from coal, due to regulatory risk on those assets** and increasingly from other fossil fuels as well.¹⁷

Green bonds are an attractive financial product for some investors including pension fund managers and other large investors and public authorities should issue more of them¹⁸. The appetite for these products is increasing, although retail investors who don't have the time to read the small print about what exactly the Green bond finances may be turned off by the EU's attempted inclusion of natural gas and nuclear in the Taxonomy (at the time of writing)¹⁹. The EIB is currently one of the biggest issuers of green bonds and they are key to the bank's strategy to be 100% climate aligned. The EIB is also helping emerging countries to create them.

3.2 Getting the right policy framework for private investment

Fatih Birol, Executive Director IEA said that "climate investment is the difference between meeting or not meeting our climate ambitions"²⁰. McKinsey has put a number on that difference: on average \$3.5 trn (€3.1 trn) per year to 2050²¹, needed on top of the \$5.8 trn (€5.1 trn) already being spent.

Some sectors have called for the **creation of a European Insurance and Guarantee Fund**, covering pilot/ pre-commercial renewable energy projects to insure and mutualise the technological risks of these projects at minimal cost²². Currently insurance products covering innovative technologies do not exist, meaning that the risks fall fully on investors, pushing up the projects' cost of capital. An European Insurance and Guarantee Fund of €70 million open to pilot and pre-commercial renewable energy projects is thought to be sufficient for the initial needs of around 10 projects.

The principle of creating an **EU Taxonomy for sustainable activities** has been widely welcomed in the finance sector. The concern by asset managers had been that while there is appetite for green investing, no definition of "green" existed. The expectation, still unfulfilled in the eyes of some²³, is that its definition will be intuitive and clear.

¹⁵ IRENA 2020 [report](#) on "Post-COVID recovery: An agenda for resilience, development and equality"

¹⁶ Sustainable Energy Europe Summit 18-19 November 2020

¹⁷ [Climate Investment Summit 3-4 November 2021](#)

¹⁸ [Climate Investment Summit 3-4 November 2021](#)

¹⁹ European Commission press release of January 2022: [EU Taxonomy: Commission begins expert consultations \(europa.eu\)](#)

²⁰ [Climate Investment Summit 3-4 November - 2021](#)

²¹ The net-zero transition: What it would cost, what it could bring – [McKinsey](#) (Jan 2022)

²² Investors at the 2nd Access to Risk Finance Conference See session 3 on Unlocking Private Funding for clean energy demonstration projects [European Conference on Access to Risk Finance for Clean Energy Technologies | Agenda \(b2match.io\)](#) and [position paper of renewable energy associations](#) (April 2021)

²³ [Sustainable Finance Platform's response to the Complementary Delegated Act](#), 21 Jan 2022



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Green private investments could also be positively impacted with the introduction of rules for clean energy consumer products. Consumers are increasingly aware of the need to minimise e-waste, and of the negative environmental impact of the products they buy. **Eco-design rules, energy labels and eco-labels** (which are applied to many sectors including electronics and clothing) can steer end-consumers towards products that are more sustainable, giving their manufacturers an incentive to innovate in that direction, too. **Green public procurement** linking a tender with an Eco-labelled product has been identified as a possible way to help European photovoltaic cell manufacturers. Modules produced in Europe from EU-made wafers and cells would have lower embodied carbon than those produced further field, especially in countries with higher-carbon electricity mixes. Use of this style of green public procurement by more countries than France would help make business plans for EU manufacturing capacity of PV more robust²⁴

²⁴ Presentation by Joaquim Nunes de Almeida, European Commission at ETIP PV Annual Conference 2021 'Solar PV Big & Beyond' – Delivering the 2030 Climate Targets <http://etip-pv-conference.eu/>



4. Mainstreaming innovation into climate, energy and industrial legislation

Fostering innovation has traditionally been seen as a responsibility of national science ministries and other decision makers with responsibility over R&I. This mindset needs to change because innovation is closely linked to the success of other public policies including industry energy and climate.

4.1. Integrating clean energy innovation in EU legislation

The European Commission has published in July 2021 and in subsequent months legislative proposals under its “[Fit for 55 Package](#)” with the aim of increasing Europe’s climate ambition through deeper cuts in GHG emissions: from –40 to - 55% by 2030 compared to 1990 levels.

Renewable Energy Directive:

A proven way of bringing new technologies to market is by setting binding targets, as the EU **Renewable energy Directive** has shown in the last decade. The ambition to increase renewables’ share from 27% to 40% of the EU’s gross final energy consumption is a signal for investors and governments that renewable energy generation deserves more attention and alongside it ancillary technologies for smart grids and energy storage. The signal gets clearer when the EU target is broken down into specific action for specific sectors in specific countries via National Energy and Climate Plans. The new Renewable Energy Directive should support the promotion of a mix of innovative renewable technologies, enabling the commercialisation of solutions that lead to a stable and cost-efficient decarbonised energy system, and ensuring support for them is elaborated in NECPs.

The revised directive should require each Member State to set an indicative target of at least 5 % of the total capacity it will install between 2020 and 2030 to be of innovative renewables.

By creating such a sub-target for innovative renewable energy technology, the EU can ensure the right conditions are created to upscale the next generation of renewable energy technologies, and support manufacturing, since Europe’s strategy in manufacturing is not to compromise on cost, quality or performance.

The permitting and licencing procedures for demonstration projects should be simplified as this will help the EU to maintain its competitive advantage in innovative renewable technologies. This can be done by extending the small scale ‘1 year’ procedure to demonstration projects ([article 16 §5](#)). Furthermore, any measure that hastens the installation of tried-and-tested renewable energy technology helps EU competitiveness and welfare in the short term through the cheap energy that comes from it.

Built environment

Buildings in the EU are responsible for 40% of our energy consumption and 36% of GHG emissions, making them the biggest user of energy and the largest source of emissions. Today, three quarters of the EU’s building stock is energy inefficient and the penetration of non-fossil heating sources is slow,

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which jeopardises Europe's ability to reach its 2030 and 2050 targets²⁵. The level of ambition for integrating renewables in **buildings and industry should be increased**. The current binding target to increase the supply of renewable heating and cooling in buildings by 1.1% per year should be revised upwards, to bring it in line with a share of 49% of renewable energy use in buildings by 2030. Industry's use of renewables must increase to further accelerate progress in industrial decarbonisation; we propose at a rate of minimum 1% per year until 2030.

The proposal for amendments to the **Energy Efficiency Directive** requires a near doubling of the annual energy savings obligation to 1.5% of end-use consumption for the 2024-30 period. We believe this will boost research and innovation across many key energy sectors, including industry, buildings and transport. The requirement for 3% of publicly owned buildings' total floor area to be renovated per year must be retained, as this can help to develop a strong ecosystem of SMEs working in the renovation sector with the latest technologies, as well as deliver the [Renovation Wave](#).

Data

Provisions encouraging the owners of renewable energy installations to **share high-quality data on plant operation** should be added to the Renewable Energy Directive. The collection of large datasets represents a great opportunity for a community of plant owners and the R&I institutes to collaborate, learn from each other and minimise the costs of reaching the 2030 goals. Anonymised and non-anonymised renewable energy data should be shared under strict confidentiality rules and contribute to the Common European Energy Data Space²⁶

[Article 14](#) of the proposal for a revision to the **Energy Performance of Buildings Directive** would ensure more use can be made of building performance data. A new requirement should be added to insist that in the case of publicly owned buildings, access to the data will by default be provided to researchers.

Carbon Border Adjustment Mechanism (CBAM)

As industries around the world adapt to toughening restrictions on emissions, the playing field must be kept fair. The EU's proposal for a CBAM intends to mitigate "carbon leakage" - the delocalisation of emissions to countries with lower environmental standards. A well-designed border adjustment mechanism will reassure investors in the more regulated region that expensive investments in green processes will not be undercut because of lax standards elsewhere.

4.2. Boosting innovation with national legislation

Innovation can and should be integrated in national energy, climate and industry legislation, in particular concerning:

²⁵ [In focus: Energy efficiency in buildings | European Commission \(europa.eu\)](#)

²⁶ See [COM\(2020\) 66](#) – A European Strategy for data

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National Energy and Climate Plans (NECPs). NECPs will next be revised by EU Member States 2023-2024. These plans will underpin countries' energy strategies till 2030 and therefore they should be made future-proof by integrating clean energy innovation aspects. They should contain measures to bring to market and upscale RES with high potential to provide low-cost or high-value energy to the energy system of the 2030s as well as enabling technologies necessary to decarbonise the energy mix such as energy storage and smart grids. Future NECPs should address the concern raised by the EC that in general Member States have given far too little attention to R&I in their NECPs so far, which have "[a severe lack of national objectives and funding targets](#)". Plans should also include general principles and incentives to share energy data from a wide range of actors including from utilities, industry and buildings and in a variety of ways as the situation requires: publicly (with the owner of the data identified, or with the data aggregated or anonymised), or in small groups under confidentiality.

Licencing procedures for new renewable energy projects are complex and take on average almost 4 years and up to 10 in the worse cases, timespans that increase cost. The procedures should take no more than 2 years as is required in the current EU Renewable Energy Directive, with local authorities given more resources if they need them.

Promote a prosumer approach and increase the end users' participation in the electricity market. This requires a combination of i) hardware (smart meters), ii) commercial agents able to trade a prosumer's consumption and/or production profile and iii) administrative arrangements that allow those owning microgeneration or micro-storage assets to club together with their neighbours who may not. The end-result will be a more flexible grid absorbing more renewables.

At an EU Industry Days event²⁷, industry representatives called for a **stop to fossil fuel subsidies**, in particular for gas in heating and cooling. Subsidising gas not only exposes Europe (its people, its industry) to countries it would rather not rely on too much, like Russia, but slows down investment and innovation in clean energy solutions in the buildings and industrial sectors.

The decarbonisation of the economy by 2050 will bring vast socio-economic changes. Some sectors will disappear, others will be created or transformed. If this transition is not done fairly, it could result in structural job losses, emigration from disadvantaged regions and shortages of skilled labour in the emerging sectors. It is necessary to **focus on people's skills**. Solutions should be tailored to the needs of particular localities, their strengths and their weaknesses. They should involve reskilling and training opportunities to these areas, which are often cut-off. Additional support should be given to universities and vocational training centres to develop reskilling and training programmes for the affected places regions and/or provide digital alternatives where possible.

At an event organised by the wind sector²⁸, turbine manufacturers said that skilled workers like engineers and IT specialists are in high demand but also in several other emerging sectors. Clean energy technologies will need to be able to attract and retain talent to be successful in the coming years. At a networking event²⁹, leading academics emphasised the importance of developing online

²⁷ Intervention by Iberdrola EU Industry Days of February 2021

²⁸ Event organised by Wind Europe "Getting Fit for 55 and set for 2050: Electrifying Europe with wind energy"

²⁹ Event on 22 & 23 February 2021 by Science|Business Annual Network Conference: R&I IN RECOVERY: WHAT CAN HORIZON EUROPE DELIVER?



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learning much more, with the screen-based contact required by the world's COVID-19 pandemic lockdowns a basis to build on.

5. Conclusions

The debate is constantly evolving on how to create the right conditions to speed up innovation in the clean energy sector. Over the past years, public authorities across Europe have been adapting their financial instruments to support a wider variety of innovative projects and technologies. Efforts have also been made to create a more coherent and stable legislative framework. While public instruments provide the foundation, the lion's share of the funding will need to come from private investors. Banks, pension funds and other large asset owners are noticing the sector and the advantages of green investments, but Europe is not yet at a tipping point where the funding floodgates open.

The next decade will be decisive in determining whether Europe's technological prowess in various RES and enabling technologies will result in products and services being scaled up and commercialised. Success in transitioning into a prosperous decarbonised economy will depend on the ability of decision makers, investors and the clean energy sector to work together towards the same goal.

