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#CLIMATE RACE  
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# EUROPE NEEDS TO INNOVATE TO BECOME A FRONT-RUNNER IN THE GLOBAL GREEN ECONOMY RACE



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Of all the surprises that 2020 held for humankind, there may be one with longer-lasting effects than the COVID-19 pandemic: we now live in a world where **75% of the global economy aims to become climate neutral in the next decades**.

While the European Union led the way in 2019 with its Green Deal's climate neutrality by 2050 commitment, Chinese President Xi suddenly announced last September at the United Nations that China will become carbon neutral by 2060<sup>1</sup>, while the new U.S. Administration under Joe Biden sets the climate neutrality by 2050 objective for the U.S.A.. Alongside them came a wide range of countries, from the United Kingdom to Japan and Argentina. Each country is setting its own course to climate neutrality. The road will be bumpy. There will be many surprises and likely a few setbacks.

Two elements are however certain. First, reaching climate neutrality is achievable only with a **major acceleration in clean energy innovation**, a message echoed by Bill Gates' latest book. Second, as each country changes its regulations, taxation and investment priorities, global markets for climate-neutrality goods and services **continue to boom**.

As the global race to seize the clean energy opportunities has begun, this policy brief dives into the state of green innovation in Europe, with a specific look at the buildings, energy, industry and transport sectors. It proposes **five policy actions EU policy makers can undertake in 2021 to accelerate clean energy innovation**, and thus **strengthen the competitiveness of the EU economy** while increasing humanity's chances to **avoid a climate disaster**.

# 1 ■ The state of clean energy innovation in Europe

## 1.1 ■ European support to clean energy innovation promotes global climate action

The EU27 represents 5% of global population, 10% of global greenhouse gas emissions, 15% of global GDP and 25% of the global scientific publications.<sup>2</sup>

Getting the European economy to climate-neutrality is laudable, necessary, but insufficient by itself. The aim has been and always will be to deliver global change. **By using its diplomatic, economic and innovative strengths, Europe goes way beyond decarbonising its own economy: it leads the way and inspires other countries to do so.** It thus helps to reduce emissions around the world. In this regard, green innovation is of critical importance as the rest of the world can import, or take inspiration from EU innovations.

There is moreover an economic case to be made. European research centres and companies are currently the world leaders in green technologies. As the European Investment Bank recently recalled: "Europe registered 50% more patents in green technologies than the United States, with Japan and China further behind".<sup>3</sup> And as China and the USA

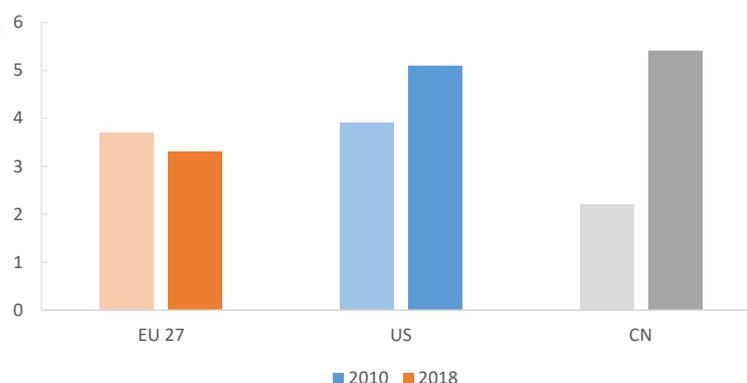
now move towards climate-neutrality, Europeans have a lot to gain by consolidating this technological leadership and turn it into a **green competitive edge** that will lead to the creation of millions of jobs.

## 1.2 ■ Public investments in clean energy research and innovation have been decreasing in Europe.

Despite all their big talk on climate action, **the 27 Member States of the European Union reduced public support for clean energy research and innovation during the last decade.** While in 2010 those EU countries were only aiming to cut greenhouse gas emissions by 20% by 2020 and did not even had a legally binding objective for 2050, they invested €3.7bn of public money in clean energy research and innovation (R&I). But while in 2018 those same countries had ratified the Paris Agreement and started to discuss the objective to become climate-neutral by 2050, they had *reduced* public investment in clean energy R&I in the meantime, making up €3.3bn in 2018.<sup>4</sup>

In the meantime, US public authorities increased their investment in clean energy R&I, to end up **investing more under Donald Trump (€5Bn in 2018) than Barack Obama (€4Bn in 2010).** During the same period China even tripled its level of investment (from €2Bn to €5,5Bn). (see figure 1)

Figure 1 ■ Public clean energy R&I (in €bn, current prices)



Source : Jacques Delors Institute, based on JRC and the International Energy Agency's *Energy Technology RD&D Budgets, 2020 edition*

This is a bad omen, both for the real European contribution to global climate action and for Europe's competitiveness in the future. **Under-investing in clean energy R&I means that fewer green innovations will be created. It makes the green transition harder to perform**, especially in the so-called "hard to abate" sectors where viable technical solutions do not exist yet, such as aviation. It makes the green transition more economically costly, as less innovation means that the promises of cheaper renewables, batteries and building renovations will be slower to materialise. It also increases the geopolitical risk that the green technology leaders of tomorrow will all be non-European companies, compelling future Europeans to rely on US and/or Chinese green technologies the way they currently rely on US and Chinese digital technologies and suppliers.

In short, **the last decade of national policy decisions to cut clean energy research and innovation spending constitute an economic and political risk** for the European Union and the success of the European Green Deal.

### 1.3 ■ Global private investments in fossil fuel R&I are still higher than investments in clean energy

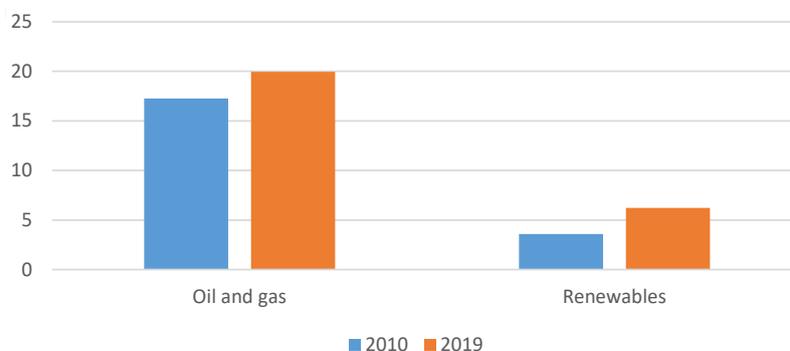
While European States failed to rise to the occasion, what happened in the private sector? As data on EU-level private invest-

ment in clean energy R&I is lacking, this section looks at global corporate research and development investments.

Before the COVID-19 crisis, **we saw a steady and significant increase of global private research and development (R&D) investment, especially in renewable energy technologies** where private R&D doubled between 2010 and 2019 -from \$3bn to \$6bn (see figure 2).

Meanwhile, **incumbent oil and gas companies did not sit on their hands and wait to be overtaken by newcomers. They invested to reinforce the fossil fuel system**, including through private investment in 'dirty' energy innovation, such as increasing the productivity of shale oil extraction. As a result, we see an increase in global corporate R&D spending in oil and gas (see figure 2). In 2019, corporate investment in R&D by globally listed oil and gas companies were estimated to be more than three times higher than investments in renewables (\$20bn for oil and gas, compared to \$6bn for renewables see figure 2). This, combined with the fact that **oil and gas companies invest less than 1% of their total capital expenditure in renewables**, points to a **current policy failure: global oil and gas companies as a whole are not yet convinced that they should swiftly embrace the energy transition**. European and global efforts are critical to change this *status quo*, and the European Green Deal plays a key role in that endeavour.

Figure 2 ■ Global corporate R&D spending in energy-related sectors, 2010-2019. In USD (2018) billion.



Source: Jacques Delors Institute, based on International Energy Agency, *Energy Technology RD&D Budgets 2020*, IEA, Paris, 2020.

## 1.4 ■ The COVID economic crisis impacts clean energy innovation

After the 2010s, came 2020 and its COVID-triggered economic recession. Its full impact on energy innovation remains to be analysed.

Some already available data point to a risk of drastic decline in private R&I investment with many companies entering in a 'survival mode' where short-term budgetary constraints outweigh medium-term economic imperatives, such as the need to invest in R&I to survive in a competitive economy and a changing regulatory environment. In a recent report, the European Investment Bank indeed points to a general decrease of private investment, with 45% of EU firms expecting to reduce investment in 2021. This is also the case of 43% of firms with climate-related investment, and is set to particularly impact smaller scale investments in renewable energy and energy efficiency.<sup>5</sup>

Yet, other data points to a genuine resilience of the clean energy innovation ecosystem. According to an upcoming report by [Clean-tech Group](#), venture capital investment in EU27 actually increased in 2020, reaching \$6 billion dollars over close to 470 deals.

## 2 ■ Five concrete ways for the European Union to support clean energy innovation in 2021

Against this backdrop, the European Union can and should act in 2021 to accelerate clean energy innovation in the 2020s and 2030s. We now focus on five policy actions:

- Maximise the impact of the EU budget,
- Incentive Member States to invest more in clean energy innovation,
- Drive private investment, thanks to a strengthened EU regulatory framework,
- Engage globally to support clean energy innovation,
- Support specific industrial alliances.

## 2.1 ■ Maximise the impact of the EU budget

In December 2020, EU policy makers reached a deal on the EU budget for the next seven years (2021-2027). After intense negotiations, the European Parliament obtained a significant increase in Horizon Europe, the EU's flagship programme for R&I. It now has €95.5bn for the 2021-2027 period, including at least €33.4bn specifically earmarked for climate R&I. Furthermore, Member States will receive **€338bn of EU grants** to support their national recovery programmes, and the EU demands that 37% of this funding goes to green investment.<sup>6</sup>

To make good use of this money, the European Union relies both on well-established tools, from the [European Research Council](#) to the [European Institute of Innovation and Technology](#), and on newcomers like the [European Innovation Council](#) (EIC). This brief recommends that:

1. The European Commission and European Investment Bank further engage Member State, to improve the process that matches EU funding with smart and green local projects. This will likely require an increased presence of the European Commission and the European Investment Bank in the European regions with the greatest needs for public support to the scale-up of early-stage companies, as well as in the cities that will be taking part in the [EU Research & Innovation Mission to make 100 EU cities climate-neutral by 2030](#).
2. The EIC establishes a regular annual Green Deal call to ensure that clean energy innovators can access EIC support. Without such call, there is a risk that green innovation becomes the collateral damage of a lack of consideration of the [characteristics of clean energy start-ups vis-à-vis digital start-ups](#). Such call would build on the [success of the 2020 EIC Green Deal call](#).

## 2.2 ■ Incentive Member States to invest more in clean energy innovation

Despite its importance, the EU budget only accounts for less than 5% of the overall European research and development investments, while national governments impact 30% of those investments (i.e. 10% from direct national government investments, and 20% being investments by higher education organisations).<sup>7</sup>

In most national energy policies, clean energy innovation tends to be only an afterthought. Most EU countries have a siloed approach, with a ministry doing its R&I policy in relative isolation to the long-term and short-term decisions taken by the economy, environment, energy, transport and industry ministries. As a result, when the European Commission looked at the national energy and climate plans (NECPs) of each Member State, it could only conclude that such **national plans “fail to pay sufficient attention to R&I needs for delivering on climate and energy objectives”** and found “a severe lack of national objectives and funding targets that show concrete and relevant pathways to 2030 and 2050”<sup>8</sup>. In EU jargon, those sentences are a harsh criticism.

The only genuine remedy will come from Member States themselves. Based on this assessment, we suggest that:

1. the European Commission uses the NECPs as a way to push Member States to invest more in clean energy innovation. A specific minimum target (e.g. increase climate-related R&I public funding to a specific level) could be set in that context.
2. the European Commission, together with the International Energy Agency, further showcases best practice examples, coming from EU and non-EU States that actually manage to come-up with realistic and ambitious clean energy innovation strategies. It is in particular critical to fix the lack of coherence of the German and French policies,<sup>9</sup> as those are the two biggest economies inside the Union.

3. the European Commission proposes a **reform the European Stability and Growth Pact to make it fit for the European Green Deal**. Such reforms should enable national governments to invest more in climate-related research and innovation. One option would be to exclude such investments from those fiscal rules, as those investments can be clearly defined using existing reporting methods, and represents very small amounts –e.g. current spending account for around 0,02% of the EU27 GDP (cf. section 1.2).

## 2.3 ■ Drive private investment, thanks to a strengthened EU regulatory framework

While public money is **vital for a vibrant innovation ecosystem**, most innovation investments are done by the private sector. In order to support private clean energy innovation in the 2020s, EU policy makers have a once-in-a-decade chance from June 2021: when the European Commission will propose to revamp the entire European building, energy, transport and carbon pricing frameworks, the so-called ‘**fit for 55 package**’.

Ambitious regulations can successfully drive private sector innovation<sup>10</sup> when they create **incentives to develop new solutions**, and provide predictability to investors and innovators. We recommend the European Commission to closely look at all its forthcoming proposals through an innovation lens, especially to:

1. Provide clear long-term and binding objectives for the sectors which would require massive research and innovation for 10-20 years before being able to come up with a market-ready green solution. This is for instance the case for aviation.
2. Use public procurement, clean product standards and national targets to trigger the emergence of niche markets in areas where green options are ready, but still more expensive. **Niche markets are indeed vital to scale-up green innovation**. Providing niche markets for

- specific green products, such as green steel, would provide a secure market for innovators to compete fairly and scale up their solutions. This can be done through regulation, and through subsidies, including **carbon contracts for difference**.
3. Fully use the power of EU regulation to oust inefficient technologies and products from the market. This is a critical signal that reduces the market risks taken by private sector businesses and investors. For instance, as the market share of electric vehicles is booming, it is now time for EU policy makers to organise the *de facto* phase-out of new oil-powered two-wheelers, vans and passenger cars. Such a phase-out should **occur in the 2030s** if the European Union wants to be consistent with its climate neutrality by 2050 objective.

## 2.4 ■ Engage globally to support clean energy innovation

As climate change is a global phenomenon, it requires global action. 2021 constitutes a major window of opportunity for the EU to boost global cooperation on clean energy innovation. Indeed, the next major international climate conference (COP26) takes place in November 2021 in Glasgow, and can already benefit from the **climate leadership of US President Joe Biden** and the new **Chinese commitment to reach carbon-neutrality by 2060**.

In that context, we suggest that:

1. The European Commission fleshes out its proposal for an EU-US “**Green Tech Alliance**”. We suggest that the European Commission and the US Biden Administration build such proposal in a way that makes it inclusive so that other major partners that are innovation powerhouses aiming to reach climate neutrality, such as Japan, can also participate in that Alliance.
2. The European Council calls the G20 to deliver a “**political declaration on green innovation**” that provides sufficient political cover for policy makers to accelerate domestic fiscal and regulatory

decisions.<sup>11</sup> Politically, such declaration could be spearheaded by the new Italian Prime Minister Mario Draghi, as Italy assumes the G20 Presidency in 2021.

3. The European Commission and the European Council further engage international partners after COP26, to promote green innovation globally. With its vast diplomatic network, France could play a key role in such an endeavour during its Presidency of the Council of the European Union (January-June 2022).

## 2.5 ■ Support specific EU industrial alliances: the new frontier of EU green innovation policy

In the last decade, the European Union started to embrace an industrial policy approach to the energy transition, building on the concrete successes of the **European Battery Alliance**. The March 2021 update of the EU Industrial Strategy is the right moment for the European Commission to go a step further in the creation of a European green industrial strategy.

The challenge is to gear all the EU policy tools towards a single direction. The aim is to provide certainty and public resources to help innovators test, pilot, demonstrate, scale up and industrialise green solutions in Europe. Together with Member States, the European Union should:

1. identify core technology and innovation gaps. Such analysis should be delivered by an independent, science-based centre of technical expertise, **such as the European Climate Change Council proposed under the European climate law**.
2. based on the aforementioned analysis, the EU should boost public and private investment in research and innovation (see sections 2.1 and 2.2) in specific technologies relevant for specific industrial alliances. This will surely tackle areas where such alliances already exist (batteries, green **hydrogen**) as well as other alliances that can be launched in the future, such as **next-generation solar photovoltaic panels**,

3. provide confidence about the existence of domestic green markets (see section 2.3),
4. provide the right level of flexibility of EU State Aid rules to ensure that investments are well supported, for instance through the **Important Projects of Common European Interest**,
5. adapt EU trade policy to ensure fair competition (cf. the debate on **carbon border adjustment mechanism**<sup>12</sup> and on clean product standards) and easier European access to new green markets, especially in China and the USA.
6. ensure sufficient high-level political leadership to provide political impetus, like the one given by **Maroš Šefčovič, Peter Altmaier and Bruno Le Maire** on batteries.

## CONCLUSION ■

Now that **75% of the global economy aims to become carbon neutral by 2050/2060**, the global race to seize the clean energy opportunities enters a new phase. For Europeans, this is a moment of truth.

The worst case scenario would be for Europeans to repeat the mistakes they made twenty years ago on digital: doing too little too late. Because of those past mistakes, today, not a single sizable digital technology company is headquartered within our borders. The more policymakers increase green public investment and adopt strong regulations in sectors like energy, transport and buildings, the more they can help EU innovators so that the Apple, Google and Baidu of the green transition end up in Europe, not in Silicon Valley or Shanghai.

## End notes ■

1. There are still uncertainties whether China's goal only concerns carbon dioxide emissions (carbon-neutral), or whether it concerns all greenhouse gas emissions (climate-neutral).
2. Those simplified numbers are based on the following sources & calculation: 5,77% of the global population according to Eurostat for EU 27 population in 2020 & **Countrymeters** for global population in 2020, 9,47 % of global greenhouse gas emissions based on **EEA estimates** for EU27 GHGs in 2019 and **JRC Edgar report 2020** estimates for global GHGs in 2019, 16.14% of global GDP according to **World bank data** for EU27 in 2018, and 23.37 of all world's scientific articles, based on data from the **National Science Foundation** for EU27 in 2018.
3. European Investment Bank, **Investment Report 2020/2021**, January 2021, p. 11.
4. This decrease is partially or entirely compensated by a rise of EU-level investment during the same period. But comparable data is lacking, especially prior to 2014.
5. European Investment Bank, **Investment Report 2020/2021**, January 2021, p. 4-5.
6. All figures in this paragraph are in current prices.
7. Eurostat data for R&D expenditures.
8. European Commission, **An EU-wide assessment of National Energy and Climate Plans**, p. 21.
9. According to the European Commission, the R&I dimension of **Germany's plan** "lacks clear and measurable objectives" while **France's plan** "is impossible to evaluate" because of "a lack of quantified national objectives and quantified targets".
10. For a review of the history of the demand pull model of innovation, cf. Godin, Benoit, and Joseph P. LANE. "Pushes and Pulls: Hi(S)Tory of the Demand Pull Model of Innovation." *Science, Technology, & Human Values*, vol. 38, no. 5, 2013, pp. 621–654. *JSTOR*, [www.jstor.org/stable/23474818](http://www.jstor.org/stable/23474818). Accessed 19 Feb. 2021.
11. Such declaration should also refer to the experience of **Mission Innovation**. It should also become the starting point for a global endeavour to better map clean energy research and innovation investments in key global economies and companies, especially to use clean energy innovation investment as a proxy to track the willingness of the global oil and gas companies to be part of the solution to climate change.
12. Pascal LAMY, Geneviève PONS, Pierre LETURCQ, **A European Border Carbon Adjustment Proposal**, Europe Jacques Delors, June 2020.

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