BANCA D'ITALIA
EUROSISTEMA

Covid-19 Notes
June 17, 2020

THE COVID-19 CRISIS AND THE FUTURE OF THE GREEN ECONOMY TRANSITION

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The Covid-19 pandemic is having multifaceted consequences on the energy sector and carbon emissions. Its medium-term implications might be crucial for the decarbonization of the productive system. Indeed, the pandemic could either accelerate the transition to a low-carbon economy or, paradoxically, stop it outright, possibly inducing a retrenchment back to fossil fuels. The role of forward-looking policies to avoid the latter effect and promote instead the former, then, is key.

The Covid-19 pandemic is having disruptive economic effects. The containment measures put in place to slow the spreading of the virus, with firms closed and minimized transport and mobility have generated a collapse in the global demand for energy. Oil prices have plunged to historically low levels; the contraction in energy use will be the largest on record, and this will substantially reduce carbon emissions across the globe. The medium-term implications of the pandemic will affect the pattern of future energy demand and may have profound consequences for the global transition to a low-carbon economy.

The Paris agreement to keep the increase in global average temperature to well below 2°C requires a sharp reduction of emissions in order to reach net zero emissions (climate neutrality) by 2050. In this 30-year horizon, the long lasting effects of the Covid-19 shock might either accelerate or stop this transition. On one side, the use of renewables, which seem to be more resilient than other energy sources to the current crisis, might increase, and investor preference for sustainable investment might remain strong as showed by inflows into sustainable assets. On the other side, macroeconomic uncertainty as well as shifts in households and firms' habits might keep oil prices low and reduce green investments, hampering the phase-out of fossil fuels.

In this note, we try to give some insights on the following questions: what are the short-term effects of the Covid-19 on the energy use and carbon emissions? What will be the implications for the transition to a low-carbon economy? What are possible policy responses to avoid a return to fossil fuels and strengthen the commitment to reach the Paris goals? As record-low fossil fuel prices can be an opportunity to introduce a global carbon pricing system, we believe that well-designed carbon taxes, which include the phase-out of fossil fuel subsidies, can align the much needed post-Covid economic recovery with climate objectives.

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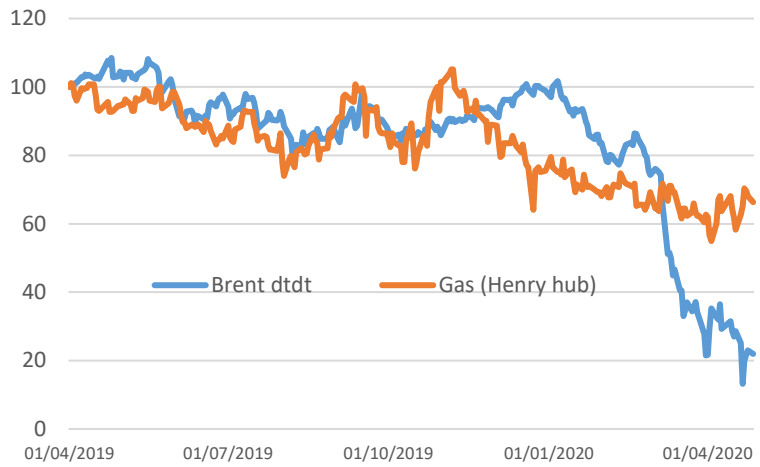
[1] Bank of Italy. The views here expressed are those of the authors and do not necessarily reflect those of the Bank of Italy.

The effect of the Covid-19 shock on carbon emissions and energy demand

The effect of the pandemic on energy demand is unprecedented. Demand for fuels to generate electricity (coal, gas, nuclear and renewables) and the demand for oil products for transport has dropped significantly due to the fall in business activity. The International Energy Agency (IEA) estimates that at the end of last April, between 40 and 50 per cent of global energy consumption was affected by the lockdown measures (IEA 2020). In 2020, these measures would result in a fall in global energy demand by about 6 per cent, the largest contraction on record.

The fall in demand has already reduced the price of energy commodities, albeit the effects have been differentiated. In case of oil, the fall in price caused by the Covid-related containment measures was amplified by Saudi Arabia's move in a price war against Russia, pushing oil prices to record lows. The price of other energy commodities (as natural gas) fell but to a much lower extent (Figure 1).[2]

Figure1: Oil and natural gas price drops
(*April 1st, 2019 = 100*)



Source: Refinitiv

In this context, the energy mix is changing, given the impact of Covid-19 on the different energy sources. The IEA predicts for 2020 a collapse in demand for oil and coal and a less dramatic fall for natural gas and nuclear energy (Figure 2 right panel). This suggests that the Covid-19 shock is reinforcing, at least in the short run, the ongoing substitution in the power mix. Indeed, a range of factors including technological advances have increased efficiency and lowered production costs for natural gas and renewables over time, which are progressively replacing coal in power generation. In times of Covid-19, renewables seem to be the winners, being the only fuel whose use is expected to increase: this is both because of their low generating costs and because they benefit from priority dispatch.[3] As a consequence, according to the IEA, low-carbon sources including nuclear would be the first sources for power generation in 2020.

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[2] At the end of April the Brent price was down 78 per cent compared with the average of April 2019 and the natural gas sold on the US spot market (Henry hub) 35 per cent. The same dynamics affected the coal markets: at the end March quote less than 35 USD per ton (67 USD in 2019).

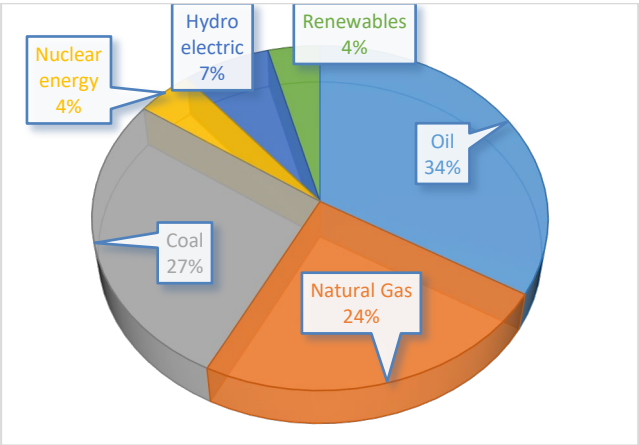
[3] In times of low demand power grid operators react by reducing power plants' output; but because renewables have priority dispatch into the grid over other sources of energy, they are shielded from lower electricity demand.

The unparalleled decline in energy demand will probably mean that in 2020 the world will experience the largest annual reduction in global CO2 emissions ever recorded. The Breakthrough Institute, an environmental research center, predicts that emissions will fall by around 5 per cent in 2020 if the pandemic disappears by the summer and by almost 8 per cent if it persists over the year (The Breakthrough Institute, 2020). The extent of the drop is the same according to the IEA, which estimates that 2020 global CO2 emissions will reach the lowest level since 2010. As a term of comparison, during the Great Recession global emissions decreased only in 2009, by 2 per cent. Using the IMF projections for GDP to estimate future emissions, the Breakthrough Institute finds that, the EU is expected to record the largest drop (-11 per cent) followed by the US and China (Figure 3, right panel).

Figure 2

Primary energy demand by fuel

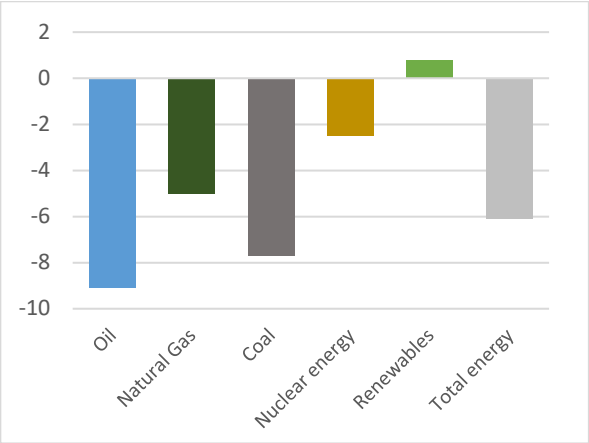
(*percentages, 2018*)



Source: Our computation on BP data.

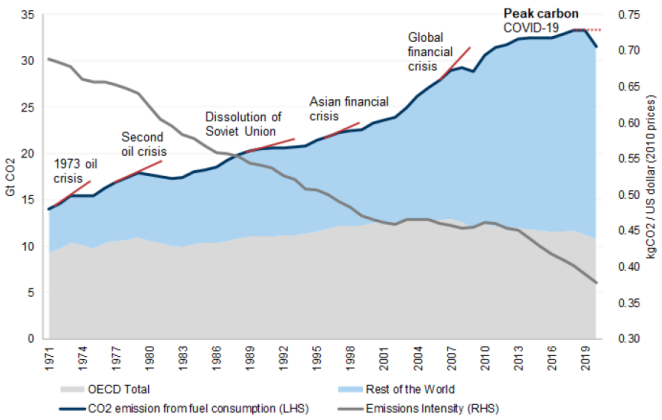
Projected change in primary energy demand by fuel

(*percent change between 2019 and 2020*)

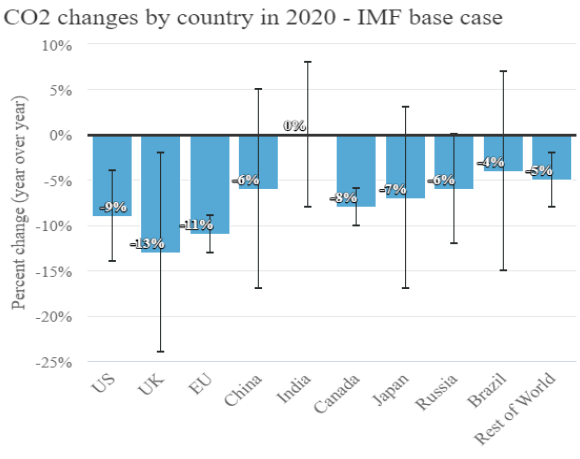


Source: IEA (2020).

Figure 3: Historical and projected change in global emissions
(*Gt of CO2, per cent change*)



Source: Goldman Sachs.



Source: The Breakthrough Institute.

Looking ahead

The bright side: oil rebound and ESG trends

While the fall in energy demand is a direct consequence of the lockdown measures, the Covid-19 shock might have implications for the energy sector and carbon emissions that go beyond its immediate effects. Indeed, a range of factors, including the effects of the pandemic on oil production, might spur the use of environment-friendly technologies accelerating the decarbonization of the economy.

One reason to expect an accelerating decarbonization of the economy is related to the observed market trends. The Covid-19 crisis has proven that the preference of investors for **sustainable investment** remains strong.[4] Indeed, mutual funds and ETFs with ESG label, i.e. funds that invest in assets with high Environmental, Social and Governance (ESG) scores, have suffered less than those investing in a wider range of securities during the big market collapse of March 2020. While this may be partly driven by compositional aspects – in particular, by a lower exposure of ESG funds to hardly hit fossil-fuel companies and by a greater exposure to resilient big US companies –, the preference for assets with high ESG scores seemed to have played a role.[5] During the recent market downturn, ESG funds have not only recorded better performances than their peers, but they also attracted substantial inflows: as data from Morningstar (2020) shows, during the first quarter of 2020 ESG mutual funds experienced *net inflows* (of 2.7 billion USD), while the broader equity mutual fund category had *net outflows* (of $5.7 billion). This stark difference will possibly drive flows towards ESG funds further and fuel new ESG fund launches in the post-coronavirus period, bringing funding to low-carbon sectors.

Another reason to bend for an accelerating transition is related to the **outlook for the oil sector**. At least two arguments suggest that a price rebound can occur in the medium run. First, with prices much below any breakeven price level, oil companies around the world have suffered large drops in value experiencing some defaults and the highest number of rating downgrades at sector level (Figure 4, left panel). While in the past some categories of producers restructured their production quickly (e.g., US shale companies after the last oil price downcycle 2014-16), this time it might not be the case. Expectations about exploration and production (E&P) investment in 2020 and 2021 have been revised downwards to the lowest levels seen in the post-GFC period (Rystad 2020). Less capital expenditure may reduce production in the medium run, and this might push prices up as soon as global demand recovers.

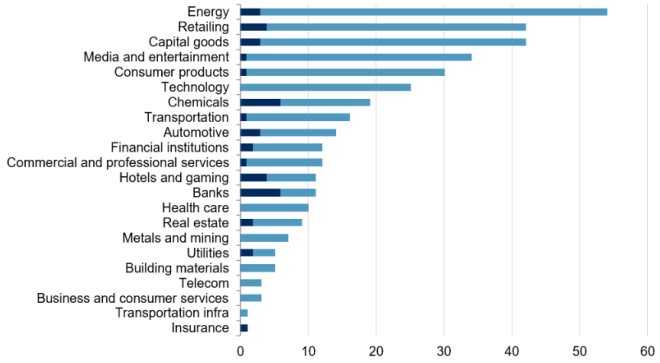
[4] In the literature there is evidence that ESG investments are used by market players to limit their losses in downturn: see for example Nofsinger and Varma (2014).

[5] According to JPMorgan (2020) and Financial Times (2020a), this could be explained by a heightened attention by investors to the social ("S") and governance ("G") aspects of the ESG, related to how firms protect their workers and re-organize business in response of the Covid-19 emergency.

Figure 4

Rating downgrades by sector

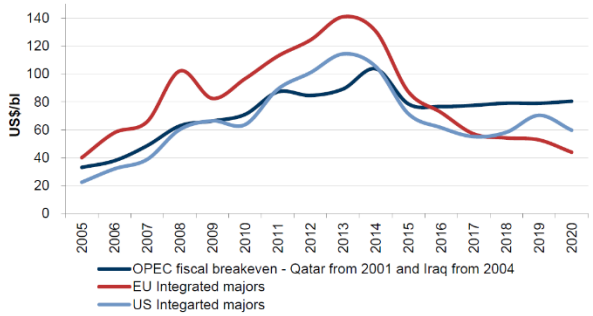
(*dark blue: investment grade, light blue: speculative grade*)



Source: S&P Global Ratings Research (as of April 28, 2020)

Fiscal breakeven (OPEC) and companies' breakevens

(*USD/bbl*)



Source: Goldman Sachs (2020d)

Second, OPEC+ countries have a strong economic incentive to support oil prices. According to Goldman Sachs (2020d), in the last 5 years oil companies in OPEC countries have lost their competitiveness against their peers in the EU and the US, where companies have increased efficiency and balance sheet resilience; as a result, OPEC "fiscal breakevens" have become the highest, reversing the situation prevailing in the 2010-2014 period.[6] All in all, if demand recovers sufficiently and the oil cartel (maybe in the OPEC+ version) is able to act in a coordinated way, prices may rebound in the medium run.

The dark side: economic outlook and "deprioritization"

While there are good reasons to think that the transition towards a low-carbon economy will not be stopped (and, on the contrary, may even be reinforced) by the Covid-19 shock, there are others suggesting that this process can be substantially slowed down, or even reversed. Three of them seem particularly relevant.

First, the **medium-term economic outlook** is highly uncertain. Net zero carbon emissions, the necessary condition to contain temperature increases in line with the Paris Agreement, will require 50 trillion USD in investment by 2050: a prolonged global downturn, as well as the long lasting effects of the pandemic, may hinder this process. While the IMF predicts, in its April 2020 World Economic Outlook, a fall in global GDP by 3% in 2020 and an increase of 5.8% in 2021, other empirical estimates suggest that the economic recession can last even beyond 2020 (Ercolani and Natoli 2020, among others). Moreover, the effects of the Covid-19 shock can also be long lasting. In the aftermath of historical pandemics, the natural real interest rate has decreased reaching a trough after 20 years, followed by a recover lasting other 20 years (Jordà et al., 2020). Because of its large dimension, the Covid-19 shock has been categorized as one of the "disasters" in the recent economic history, and the macroeconomic uncertainty that it generates will be highly persistent (Ludvigson et al 2020). Negative effects on future growth might come not only from high uncertainty: indeed, expectations of lower productivity growth in the future might induce less consumption today, leading to a stagnation trap via low firms' investment (Fornaro and Wolf, 2020). Overall, negative medium-

[6] An oil-exporting country's "fiscal breakeven" oil price is the minimum price per barrel that the country needs in order to meet its expected spending needs while balancing its budget.

term outlook can persistently weight on firms' balance sheets leading to a "deprioritization" of all ESG aspects of their business. At the present juncture, companies are trying to balance their near-term needs, or struggling just to keep them alive: as the analysis on the utility sector in Goldman Sachs (2020c) suggests, only those with greater financial resources have better potential to continue commitment to decarbonization efforts.[7]

Second, a **paradigm shift of the energy sector** is still ongoing. The contribution of renewable generation to global energy demand is still limited and concentrated in the power sector (at the present, it is just around 12 per cent including hydro - Figure 2, left panel). The role of renewables might increase in the medium run with the electrification of energy uses, a process that is, however, still in its infancy: in 2018, electricity provided less than a fifth of final energy demand. Moreover, total costs of renewable energy may not decrease over time. While power generation costs are trending downwards putting, as of now, most of renewable technologies within the lower cost range of the fossil alternatives, they will be increasingly supplemented with the additional costs arising from an increasing penetration of variable energy sources (wind and solar) into the power grid (i.e. storage costs, etc.). Finally, in the transport sector oil has not been seriously challenged by low-carbon alternatives.[8]

Third, the pandemic can induce **shifts in firms' and households' habits** that may have disproportionate effects on the oil sector, widening the gap in energy prices further. Remote working, which firms have incentivized to be compliant with the containment measures, can move energy demand from oil products (for transport) to housing-related energy sources (gas and electricity);[9] moreover, increased international transport costs due to Covid-19 restrictions can induce firms to "nearshore" their production, partially unwinding global value chains. While working from home and less business travel and shipping can be beneficial for the transition because they keep carbon emissions subdued, they also maintain global fuel demand at low levels putting downward pressure on oil prices.

Overall, the lack of green investment and persisting energy price gaps can ultimately **invert the decarbonization process** pushing back to a fossil fuel-intensive economy. In the transport sector, cheap oil slows down the decarbonization process based on biofuels: the break-even oil price for ethanol (biodiesel) production ranges between 50-76 (80-120) dollars per barrel (IEA, 2019b). In the power sector, the combined effect of a weak carbon pricing mechanisms[10] and lower prices for gas and coal may revert the recent growth of renewables. Estimates made using historical data show that the increase in the price of some commodities can stimulate consumption of substitutes, as seen in the case of oil and coal for a panel of 63 countries (World Bank, 2019a). If this scenario materializes, it could reverse the trend observed in the last 20 years, when the share of renewable in the energy mix has trended upwards spurred by the oil spike of 2007-2008, by the political support to contrast climate change and by technological advances in the industry.

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[7] The analysis compares utilities around the world based on their leverage (measured by net debt to EBITDA). Results show that Asian utilities have higher leverage coupled with the highest emission intensity and relatively lower momentum of improvement, while European companies predominate among the least carbon intensive and least leveraged.

[8] Although the uptake of electric passengers cars has been impressive (5.1 million in 2018, a 63 per cent increase compared with 2017) they still represent only a small fraction of total cars (about 0.5 per cent, IEA 2019a).

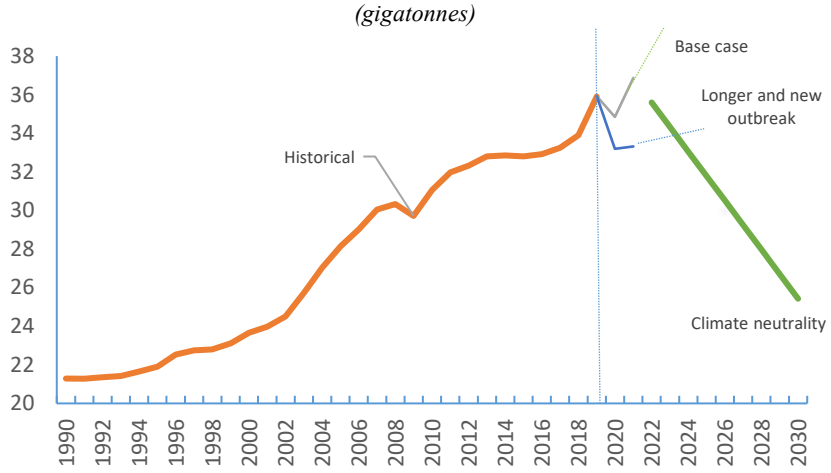
[9] The available evidence suggests that economy-wide energy savings from teleworking are modest (in some circumstances they could be negative or non-existent). See Hook et al., 2020.

[10] In the European Union, for example, because of the lockdown measures the carbon price set in the Emissions Trading System dropped by almost 40 per cent to a near two-year low (just above €15 per ton of CO_2).

Moreover, the path of global **carbon emissions** seems not in line with future climate neutrality. Emission reductions during economic crises have been followed by rebounds and new increases (Figure 3, left picture). Even if this should not be the case as emissions reached a peak in 2019, it is highly unlikely that their reduction will continue at the same pace estimated for 2020. According to simulations made by the Breakthrough Institute, even in the worst-case scenario for the global economy, they are not sufficient to put the world on the climate neutral path. The emissions' contraction will probably result in a temporary blip, as seen after the GFC in 2009: even in the worst-case scenario of a prolonged lockdown followed by a new outbreak of Covid-19 (blue line in Figure 5), emission trends are not on track to reach carbon neutrality after 2050.

Figure 5: World CO2 emissions possible impacts

(gigatonnes)



Source: Our computation on BP data and on The Breakthrough Institute simulations

The role of international policy in flattening the climate curve

With the outbreak of Covid-19, policy discussion on the future of the low-carbon transition has gained new traction. Many commentators are now comparing the risks of future pandemics with those related to climate change, defining the former as another "green swan" (Pereira da Silva 2020). While some similarities do exist - the secular trend of epidemics has become steeper, according to WHO (2019) - the most important lesson to be learned from Covid-19 is the **effectiveness of coordinated actions, both among institutions and countries**. During the emergency, cooperation at international level has allowed taking important decisions at a fast pace to contrast the short-term fall in productive activity. The established synergies should be maintained also with a longer-term goal, such as flattening the *climate* curve. In other terms, to ensure a smooth transition to a low-carbon economy, the global community should cooperate to put world emissions on a path compatible with climate neutrality. Postponing policy actions increases the chance that economies will increasingly suffer from disruptions due to climate change, making "behind-the-curve" interventions even more painful and expensive.

In the context of the current crisis, it is important to avoid that the urgency to boost economic activity undermines the effort to put the economy on a sustainable path. But, on the other side, as the low-carbon transition may be uneven and penalize some sectors or technologies, there can be **trade-offs** between economic growth and sustainability in the short-term. It is therefore important to engineer post-emergency stimulus measures that pursue, as much as possible, the two objectives at the same time, as the recovery framework for Europe by Anderson et al. (2020) proposes. A recent professional

survey found five areas where this convergence is possible (Hepburn et al., 2020),[11] although the "**win-win**" characteristic of these measures is controversial.[12] To avoid that the pandemic-related stimulus packages finance technologies that lock-in our energy systems into a fossil fuel-like future, we need a rapid and coordinated action to establish a common carbon price, which must progressively increase over time to reach the established goals and beyond, coherently with the climate ambitions of the global community.

Design a carbon pricing system consistent with the climate target

Carbon emission taxation is generally considered as the most powerful and efficient measure to reduce CO2 emissions (see for instance IMF, 2019). 96 out of the 185 countries that submitted their emissions reduction plans to the Paris Agreement are planning to use carbon pricing as a tool to meet their commitments, but only a fifth of global emissions is covered by existing or emerging carbon pricing initiative.[13] Most of the existing carbon pricing systems rely on cap-and-trade systems, while carbon taxation, the economists' favorite solution to fight climate change (Marron et al., 2015), encompasses a small part (3-4 per cent) of total emissions. Moreover, most of the emissions is priced 10 USD per ton or less (World Bank, 2019b) with a global average carbon price of 2 USD (IMF, 2019).

This is far below what is needed to keep emissions under control. According to the IMF, to limit global warming to 2°C large emitting countries should introduce a carbon tax set to rise quickly to 75 USD per ton by 2030 (IMF, 2019). Other simulations point to higher carbon prices ranging from 20 to 360 USD in 2030, and from 85 to 1000 in 2050, depending on the stringency of the target and on the availability of carbon removal technologies (Guivarcha and Rogeljb, 2017). This means that there is the need to start pricing the bulk of emissions, still not covered by a carbon price, and increase the price of those covered.

An international carbon pricing system for the post-Covid should be designed very carefully. Increasing taxes during a deep downturn is obviously risky. For this reason, a first move could be that of removing the existing *negative* carbon prices, i.e. **fossil fuels subsidies**, which range between 151 and 249 USD billion annually (OECD, 2018) and, including their external costs, a stunning 6 per cent of global GDP (Coady et al. 2019). Removing subsidies (since 2009 a relevant item of the G20 agenda) when fossil fuel prices are subdued decreases the related social costs; moreover, it does not only provide the right incentive to choose low-carbon sources and technologies, but it also allows to collect fresh resources that might be reinvested in low-carbon initiatives or in actions to help the most vulnerables.[14] **Introducing a cross-sectoral carbon tax could be thought of as the following step**. In this respect, countries need to join forces and adopt similar carbon taxes: there is empirical evidence that a coordinated action, coupled with a clear plan for revenue recycling of the resources

[11] Investment in clean physical infrastructure; improvement of buildings energy efficiency; investment in lifelong education; improvement ecosystem resilience and regeneration; clean energy R&D spending.

[12] The proposal to boost investment in clean energy, for example, will further feed an energy supply glut with unwanted consequences on the energy sector profitability and with possible spillover on financial stability (the fossil-based assets becoming stranded).

[13] https://carbonpricingdashboard.worldbank.org.

[14] For example, by improving the energy efficiency of social housing. In the literature there is evidence that revenue-recycling is an important selling point of a carbon tax (Beiser-McGrath and Bernauer, 2019).

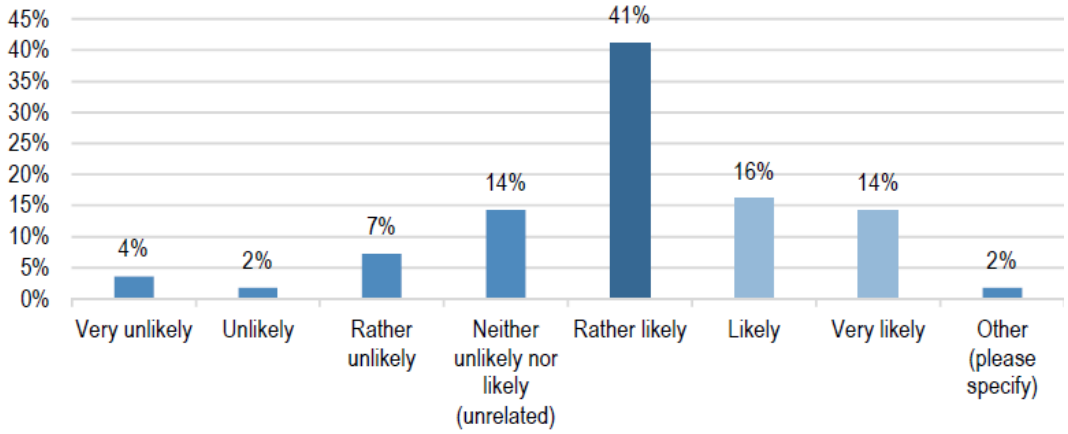
collected, could help achieve majority support for carbon tax levels of up to 50 to 70 USD per ton of carbon (Beiser-McGrath and Bernauer, 2019).[15]

Setting up carbon pricing is key to drive private investment in the right direction: when, in the aftermath of the current crisis, new investment resumes, relative energy prices will be able to provide a signal that can be easily received by the markets, where there are strong **preference for sustainable investment**. Survey evidence collected by JPMorgan in the midst of March 2020 market collapse (JPMorgan 2020) shows that investors saw the current crisis as a push factor for combating climate change (see Figure 6). To reverse such a strong preference, there would need very strong policy signals in the opposite direction.

What policy needs to avoid is, once again, rising **skepticism** towards climate change and the urgency of climate policies. Strong environmental preferences such as priority for climate policy actions can decline dramatically during economic downturns, as seen in the aftermath of the great financial crisis starting with the Climategate in 2009. But, as shown by Mildenberger and Leiserovitz (2017) in the case of the US, environmental preferences might depend even more from political cues than by individual economic fortunes or local economic conditions. This is one reason more to be pragmatic and go ahead with global climate policies.

Figure 6: Increased action on climate change after Covid-19

(*N=56*)



Source: JPMorgan (2020). Results from the survey "Tracking the ESG implications of the COVID-19 Crisis"

[15] Where a pricing mechanism is in place, the policy makers should also agree on mechanisms to adequate carbon prices to a sluggish energy demand. For example, a prolonged contraction in energy demand will put downward pressure on the demand for EU ETS emissions allowances and high carbon prices are key to displace coal and gas power generation. The European Commission should rapidly introduce a floor-price to avoid the repetition of what happened after the Great Recession (when carbon allowances quotations sank).

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