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The fight against climate change and economic performance[1]

1 Introduction

The war in Ukraine has put energy markets in considerable distress, leading to a sharp rise in both the level and volatility of energy prices that are putting upward pressure on inflation around the world. These developments have drawn renewed attention to the economic implications of changes in the price of energy for the transition to a low-carbon economy, which is instrumental to ensure attainment of agreed climate change targets. Two interrelated aspects are particularly important; first, the policy instruments that can be deployed to support the low-carbon transition; and second, the effects of decarbonization on economic performance and prices over the short and long term. This note discusses briefly both aspects in the light of recent analysis and empirical evidence.

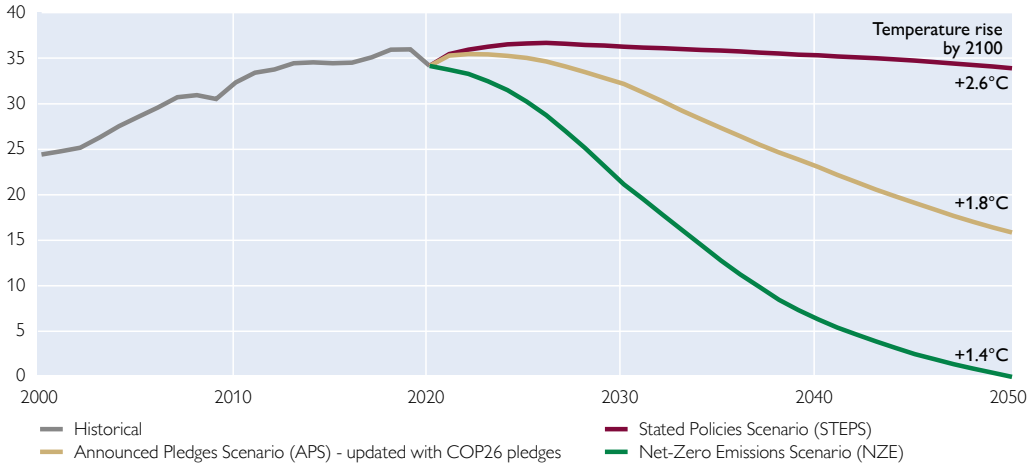
2 Policy options to support the low-carbon transition: what can be done?

Countries have made ambitious pledges to reduce emissions of greenhouse gases and announced climate change mitigation strategies to honor those commitments. Judging by publicly announced long-term commitments and goals, policymakers appear to be taking this seriously: Over 140 countries have so far adopted or announced targets of climate neutrality (Climate Action Tracker, 2021). Nevertheless, policy action remains out of step with stated ambitions, making it

Chart 1

Global emissions of greenhouse gases, 2000–2050

Scenarios of CO_2 emissions over time (2000–2050) and respective expected temperature rise by 2100



Sources: IEA (2021), CO_2 emissions in World Energy Outlook scenarios over time, 2000–2050, IEA, Paris; IEA (2021), Temperature rise in 2100, by scenario, IEA, Paris; and IEA (2021), World Energy Outlook 2021, IEA, Paris.

Notes: The Announced Pledges Scenario (APS) is updated with COP26[1] pledges as of November 3, 2021; the Net-Zero Emissions Scenario (NZE) shows the global energy-related emission pathway developed by the International Energy Agency (IEA) where technology, investments and policies are deployed in line with the objective of reaching net-zero emissions by 2050. Expected temperature rises by 2100 are relative to pre-industrial levels, and are subject to an upward risk due to uncertainties in the estimate and possible future changes in policy.

[1] COP26 stands for the 26th UN Climate Change Conference of the Parties that took place in Glasgow from October 31 to November 13, 2021.

[1] This note is based on a presentation made at the 49th OeNB Economics Conference and 35th SUERF Colloquium "The Return of Inflation" that took place in Vienna on May 24, 2022. The analysis and opinions reported in this note are the author's own and do not necessarily reflect those of the OECD or its member and partner countries.

unlikely that the 2015 Paris Agreement's goal of keeping the rise in world temperature to "well below 2°C above pre-industrial levels" will be met within relevant timeframes (*chart 1*). Given current policies, average temperatures are still expected to rise by about 2.6°C, increasing the likelihood of catastrophic impacts for societies and economies (IPCC, 2022).

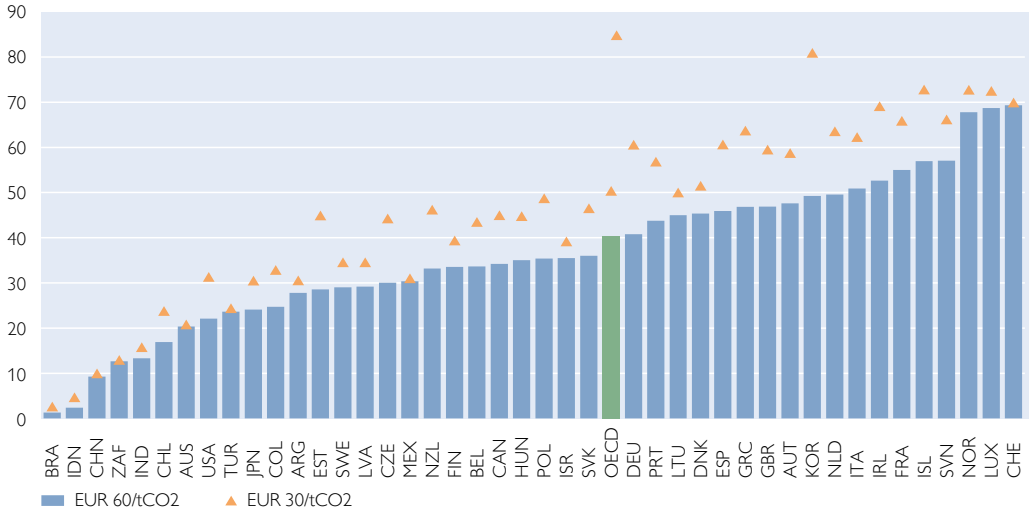
To redress this situation and ensure attainment of agreed climate change targets, steadfast policy action will be needed in the years to come. Success will depend largely on how well and how far policymakers use the policy instruments at their disposal, bearing in mind that countries differ in their economic structure, social preferences and political constraints, which influences policy choices. Rather than relying on a single instrument, given the complexity of the objective to be achieved, comprehensive decarbonization packages will be necessary to combine cost-effectiveness with social acceptability of the needed reforms (D'Arcangelo et al., 2022).

Decarbonization policy packages need to include a variety of mitigation instruments, such as market-based levers (i.e. carbon pricing and emission trading schemes) and non-market ones (i.e. subsidies, standards and regulations). These instruments have different abatement potential and associated costs that need to be quantified to the extent possible to inform policy choices. For example, carbon prices remain low around the world, in part due to concerns about their distributional implications, which motivates public opinion resistance (*chart 2*). Indeed, climate policies are more likely to be publicly supported if they are perceived to be effective at reducing emissions while not imposing higher burdens on low-income households.[2]

Chart 2

Carbon pricing, 2018

Carbon pricing score, %



Source: OECD, Effective Carbon Rates 2021 Database.

Notes: The carbon pricing score (CPS) measures the extent to which countries have achieved the goal of pricing all energy-related emissions for carbon costs, at certain benchmark values. For example, a CPS of 100% against a benchmark of EUR 60 per ton of CO_2 means that the country prices all energy-related carbon emissions in its territory at EUR 60 or more. In practice, EUR 60 is a midpoint estimate for carbon costs in 2020, and a low-end estimate for 2030. Pricing all emissions at least at EUR 60 in 2020 shows that a country is on a good track to reach the goals of the Paris Agreement to decarbonize by mid-century.

[2] *For evidence on public opinion support for climate change action, see A. Dechezleprêtre, Fabre, Kruse et al. (2022); further information is also available on the project website:* https://www.oecd.org/climate-change/international-attitudes-toward-climate-policies/

Policy instruments also differ in their impact on government budgets along the low-carbon transition path.

Non-market instruments, such as standards, regulations and subsidies, can effectively complement carbon pricing and other market-based policies. Non-market instruments include a variety of mechanisms, such as emission quotas, green certifications, technology mandates and others. They also need to be designed appropriately to avoid blurring price signals, blunting economy-wide incentives and complicating performance monitoring. These instruments are particularly useful in situations where firms and households do not respond strongly to explicit price signals. The costs associated with these non-market instruments can be seen as implicit prices on emissions and need to be quantified.

Comprehensive decarbonization packages also need to include policy instruments that can lower the economic and social costs of transition. This is because, as will be discussed below, these costs are heterogeneous among industries, firms, households and locations. A steady reduction of abatement costs driven by progress in low-carbon technology is moreover necessary to ensure that market-based mitigation policies are effective (D'Arcangelo et al., 2022). For example, new technologies may reduce the costs of abatement and can be supported through research and development (R&D) and innovation incentives. These incentives can take the form of grants, tax credits or innovation prizes. They can also be delivered through demand-side policies, such as public procurement. Appropriate regulation of product markets is essential to create an environment of contestability that is, in turn, crucial for business dynamism and the adoption and diffusion of innovation.

At the same time, safety nets and labor market policies will have to respond to the specific needs of those adversely affected by the transition. Low-income households are the most exposed to hikes in the price of goods produced using carbon-intensive technologies. In addition, workers in declining carbon-intensive ("brown") sectors may face persistent joblessness and earnings losses, whereas firms in expanding low-carbon ("green") activities may have to deal with shortages of workers with the necessary skills.

Policy action will therefore be needed in the form of education and training/retraining programs, as well as by making sure that labor mobility and market competition are not thwarted by ill-conceived regulation and other policy-related impediments. The same is true for active labor market policies and appropriate social safety nets for the most vulnerable. By emphasizing protection for workers, rather than jobs, these interventions have the additional merit of helping to muster public opinion support for climate change mitigation initiatives.

Leveraging the private sector will also require policy support, given the sheer volume of investments needed to finance the transition and adapt to climate change. In particular, green investments need transparent and consistent disclosure standards, as well as appropriate labels, taxonomies and rating methodologies to come to fruition. There are indeed many investment opportunities that could support a low-carbon transition, including in power system flexibility, public transport infrastructure, energy-efficient retrofitting of buildings, carbon capture facilities and renewable energy deployment. The financing needs for these investments are large and far outweigh the wherewithal of government budgets.

Effective strategies for the transition to a low-carbon economy will require international policy coordination. This is key, not only because the climate change mitigation goals are global in nature and

scale, but also because the risks of carbon leakage are required to be reduced, as countries pursue different standards with different levels of ambition and conviction.

The war in Ukraine has brought to the fore the heavy reliance of many countries, especially in Europe, on fossil fuel energy with a high risk of price shocks and even shortages (OECD, 2022). Redressing this situation requires policy action to improve the security of energy supply, encourage through appropriate incentives a move away from fossil fuels, boost investment in clean energy and energy efficiency, and support innovation to develop the green technologies needed to underpin the low-carbon transition.

3 What are the effects of climate change mitigation and environmental policies on economic performance and prices?

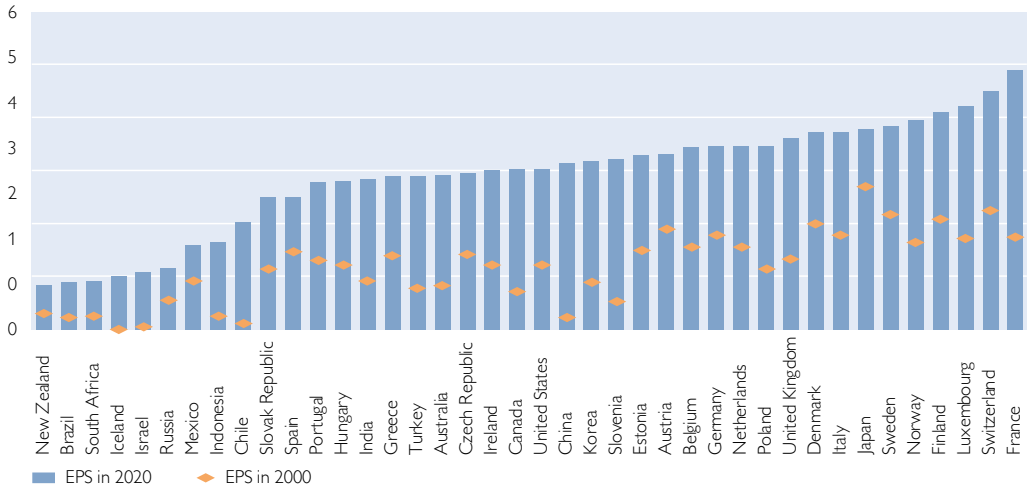
Environmental policy stringency has been tightened over time among OECD countries, albeit at different rates (*chart 3*),[3] raising concern about possible adverse effects on economic performance, such as productivity, competitiveness, employment and inflation. Adoption of more stringent environmental policies over the years has so far had limited adverse effects on aggregate economic performance, despite achieving clear environmental benefits, even though there are heterogenous effects that can generate winners and losers across industries, firms and locations (OECD, 2021).

In the case of trade, for example, empirical evidence shows that increasing the stringency of domestic environmental policies does not have a significant effect on overall imports and exports of manufactured goods, but it tilts the comparative advantage away from carbon-intensive industries (Kozluk and Timiliotis, 2016). In the case of productivity, empirical evidence shows that a tightening of environmental policy is associated with productivity gains in the most technologically advanced industries and

Chart 3

OECD Environmental Policy Stringency (EPS) index, 2000 and 2020

0-6 scale in ascending order of stringency



Source: OECD.

Note: The index covers 40 countries and 13 policy instruments over three decades (1990–2020).

[3] *The OECD has been developing proxies of environmental policy stringency (EPS) based on the measurement of implicit or explicit costs of environmentally harmful behavior. For more information, see E. Botta and T. Kozluk (2014) and T. Kruse et al. (2022).*

firms (Albrizio et al., 2014). An example is the introduction of the EU Emissions Trading Scheme – the largest trading scheme in the world – which has reduced emissions by about 10% between 2005 and 2012, without an assessed detrimental effect on the economic performance of the regulated firms (Dechezleprêtre, Nachtigall and Venmans, 2018).

As for prices, carbon taxes account for a small increase in energy prices. Analysis carried out by the IEA shows that supply and demand factors play a key part in explaining changes in energy prices over time (IEA, 2021 and 2022). The sharp increase in prices over the last few months is due to several factors, including primarily a strong rebound in demand post pandemic coupled with a decline in fossil fuel energy investments and an insufficient scale-up in clean energy sources over the past years. Unforeseen maintenance and repair works at liquefied natural gas (LNG) plants and weather-related factors (e.g. lower-than-average wind generation capacities in Europe) are additional culprits, in addition to low levels of gas storage and lower supply from Russia since the onset of the war in Ukraine.

More generally, the effects of decarbonization on prices vary along the low-carbon transition path and once it is achieved. During the transition, upward pressure on prices can come from the substitution of carbon-intensive ("brown") technologies, such as coal-powered plants, by new "green" ones, such as wind farms. This substitution may create frictions in global value chains that can lead to higher producer prices. Cost pressures can also arise from shortages of labor with the necessary skills to operate in a greener economy, as well as frictions in the reallocation of workers from more- toward less-polluting sectors and activities.

In the longer run, the transition to a low-carbon economy can affect prices predominantly via supply and demand factors. A successful transition can actually lead to lower energy prices to the extent that new, greener technologies reduce production costs, as well as lower energy demand, as a result of efficiency gains associated with innovation and technological change. The transition can also lead to more resilient energy supply chains to the extent that renewable energy resources (RES) intermittency is addressed and climate-related shocks that also tend to put upward pressure on prices (e.g. food shortages) become less frequent and intensive as a result of appropriate mitigation and adaptation policies.

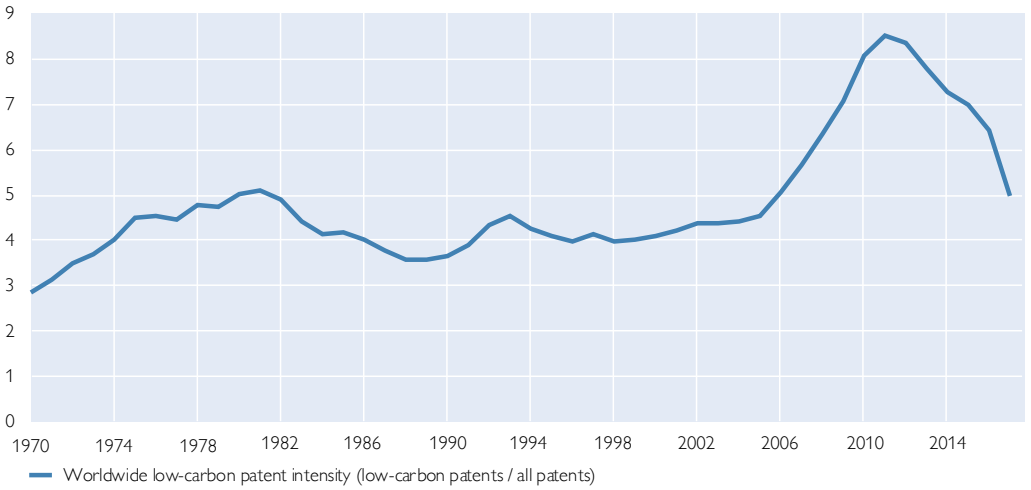
As noted above, support for innovation is an essential element in comprehensive decarbonization packages. Innovation can do much to reduce pressures on prices by lowering the cost of clean technologies relative to that of carbon-intensive alternatives, which facilitates the adoption and diffusion of clean technologies. However, patent filings in low-carbon technologies – one indicator of clean innovation activity – have declined over recent years (*chart 4*). This trend suggests that additional policy support may be needed to accelerate innovation in low-carbon technologies.

Along with innovation, cost differentials between carbon-intensive and clean technologies can be reduced through investment in clean technologies. The IEA estimates that clean energy investments need to increase more than threefold to reach USD 4 trillion annually by 2030 to put the world on track for net-zero emissions by mid-century (IEA, 2021). However, policy uncertainty can undermine investors' appetite for clean technologies, in particular in carbon-intensive industries. Empirical evidence indeed shows a negative relationship between frequent climate policy reversals and green investment (Dechezleprêtre, Kruse and Berestycki, 2022).

Chart 4

Worldwide low-carbon patent intensity, 1970–2018

Share of low-carbon patents in total patent filings, in %



Source: OECD based on PATSTAT.

Clear policy trajectories are therefore needed to provide longer-term investment horizons to firms to shift to clean technologies, thereby reducing cost pressures along the transition path. This is consistent with the evidence reported by the European Central Bank (ECB) that well-designed climate policies with clear price trajectories can do much to mitigate inflationary pressures (ECB, 2021).

3 Conclusion

The social and economic transformation of the scope and depth required to secure a smooth transition to a low-carbon global economy will create leaders and laggards, across and within countries. To be successful in terms of minimizing adverse economic and social effects while ensuring attainment of agreed climate change targets within relevant timeframes, the transition will require diligent use of policy tools in comprehensive decarbonization packages at the national level, as well as effective international cooperation. Policies that can reduce the cost of clean technologies relative to carbon-intensive alternatives (i.e. support for innovation), foster adoption and diffusion of these technologies (i. e pro-competition product market reforms) and facilitate the reallocation of capital and labor toward greener industries and firms (i.e. education and training/retraining and labor activation) will be instrumental to buttress economic performance while containing price pressures during the transition.

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