High-Level Symposium

# Pro-Competitive Policies for a Sustainable Economy

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# Discussion paper

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# Pro-competitive Policies for a Sustainable Economy: Discussion Paper

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# 1 Introduction: Rationale and objectives of the policy debate

A high-level symposium on "Pro-competitive Policies for a Sustainable Economy" was held at the OECD on 23 January 2023 to help shape the debate on how economic growth and the green transition may be attained in parallel and how the two depend on well-functioning and competitive open markets.

This policy discussion focused on how both economic growth and the green transition may be attained in parallel and how they depend on well-functioning and competitive open markets (domestic and international). It aims to underscore that competition policy – or the principles of effective competition – must be at the heart of policy design for a sustainable economic growth and recovery, across innovation, industrial, environmental, energy and trade policies. Thanks to its role shaping the interplay between public interventions and markets, in stimulating innovation and private sector ingenuity, competition policy should be an integral part of a whole-of-government approach to ensure a strong and sustainable economic growth and recovery.

Many governments are announcing significant funds for the green transition. Examples include the Next Generation EU, US Inflation Reduction Act, the Japanese Green Growth Strategy and Korean packages, that together amount to more than 1.29 trillion USD.[1] Such funds are part of the investment push that is needed for countries to transition to greener technologies to meet international climate goals. But these public resources need to generate even greater private sector investments through the efficient rollout and implementation of these governments' packages. To achieve this, policy measures will need to go hand-in-hand with well-functioning open markets that can deliver ongoing and increasing private investments in new technologies and innovations and deployment. Importantly, such private investments should not stop when public resources are withdrawn.

These packages also come at a time when both fiscal and monetary space is reduced given the significant public expenditures under Covid-19 and the current inflationary pressures.[2] It is thus vital that scarce public resources are used in the most effective manner. Support measures need to be well-designed and targeted to maximise the effectiveness of private capital and markets. Competitive markets are a well-known mechanism to deliver the entrepreneurship, innovation, managerial and cost efficiencies that will drive a growing economy. Open markets, domestically and internationally, should lie at the heart of measures to maximise the efficiency and public benefits of this support. Transparency of support measures is critical in underpinning open markets and enabling assessment of whether programmes are achieving their intended aims, at what cost, and to identify spillover effects, including on global markets.

Competition policy can be thus an important tool to help make markets work better and help ensure the efficient allocation of these public funds. Competition principles based on a level playing field between firms regardless of nationality or ownership, lowering barriers to entry, and not allowing market power to be created and misused provide a disciplining effect of firm rivalry and allows the selection between efficient and inefficient firms – which are a key driver of productivity and economic growth. The mechanism of market competition encourages innovation, working as a virtuous cycle whereby innovative firms will spur their rivals to compete and innovate. It also accelerates the adoption of new technologies and can act as key driver of structural changes for the green transition. It is this mechanism that then "*leads to the*

*macro-economic benefits boost of growth, benefits that accumulate over time, increasing prosperity in the long run*" (OECD, 2020[1]).

This policy debate aims at responding to the political and societal needs to better align our economies with global carbon-emission targets, whilst preserving and even promoting growth, employment and living standards and ensuring the benefits of open and transparent global markets. This discussion is intrinsically linked to the OECD strategic priorities of a sustainable transition and future-oriented green recovery as well as that of open markets and rules-based international trade.

Tools such as innovation strategies, industrial strategies, trade policies and regulation (hereinafter, together referred to as "the Policy Tools") may be all useful for the transition to a sustainable economy. Cutting across the application of these Policy Tools is competition policy, which, in the different markets where these tools are deployed, guarantees the free and open markets which lead to continuous, vibrant innovation and low barriers to entry.

Together with other political economy considerations, competition principles should thus be integrated into the Policy Tools that governments have at their disposal to achieve a sustainable economy and multiply public money and create the market conditions for private investments to be unleashed (Maximiano, 2021[2]). Open and competitive markets can provide the right conditions for private investments to generate returns, that in turn attract more investment, making the production at scale of green products and services profitable and scalable thanks to "learning by doing" that leads to significant cost reductions (Way et al., 2022[3]).

This discussion paper is organised as follows:

- Section 2 discusses the role of competition policy in fostering innovation and trade for the green transition and reducing barriers to entry in the green economy. This includes, but it is not limited to, competition enforcement activity by competition authorities.
- Section 3 focuses on the interaction of competition and industrial strategies for green innovation and its deployment.
- Section 4 addresses the role of pro-competitive regulation and standards in stimulating the creation of new green technologies and products and their wide dissemination to consumers.

# 2 Competition policy as a tool to foster innovation for a green economy

The more recent literature on the mechanisms and outcomes of competition on innovation has settled on a model of "Inverted U" relationship, as developed by Aghion et al. (2005[4]). This model shows that, when competition is low, an increase in competition intensifies the average innovation rate. The opposite occurs if there is very high levels of competition, meaning that there is an optimum level of competition to produce the optimum levels of innovation.[3] Analysing the empirical and theoretical papers to date, Griffith and Van Reenen (2021[5]) conclude that "*On average…the relationship between innovation and competition tends to be more positive than negative"*. The implication is that in many markets more competition is needed to foster more innovation. Ultimately, however a determination on the need for more competition in a market needs to be done by policymakers at an industry or even market level.

Gilbert and Melamed (2022[6]) describe a number of pathways in which competition can promote innovation. First, the higher the number of firms are engaged in R&D the higher the likelihood of successful innovation. Second, when there are more competitors, there are more firms from which to "steal" sales by a successful innovator.[4] Third, the cannibalization or replacement effect of sales from an innovative product on the incumbent's rents means it has less incentives to innovate as it is not only adding profits it is also losing the profit stream on its older products.[5]

Many of the main industries where green technologies are needed exhibit steep learning curves with potential spillovers across firms. The industrial sector is not only better at learning, but it also generates more externalities - more learning benefits - than the rest of the economy (Stiglitz and Greenwald, 2014[7]). This means that whilst production costs are initially high, they decline rapidly with cumulative experience. There is significant empirical evidence that confirms the significance of such learning-by-doing effects.[6],[7] Like scale economies, learning costs fall with increased output and like successful R&D efforts, they are irreversible (Dasgupta and Stiglitz, 1988[8]).

Empirical data on renewable energy costs shows that increased scaling led to exponential price decreases, following Wright's Law (Way and Ives, 2022[9]). This is a forecasting method which predicts that costs drop as a power law of accumulated experience from production.

Given the importance of manufacturing processes in the deployment of many green technologies, for instance, renewable energy, electric automotives, and green hydrogen technology, it can be forecast that these will be reliably cheaper over time and scale due to experience or learning curves and R&D, which will in turn increase demand, in a virtuous loop of market incentives driving the speed of uptake of clean tech[8]. It is therefore fundamental to set the right incentives in the creation and deployment of subsidies and other policies, as well as considering the time dimension in the design of policies.

Similar to R&D investments, it may be argued that in a competitive environment where a number of rivals are manufacturing and learning-by-doing, the likelihood of perfecting a successful learning-by-doing green process or product is higher. Therefore, the more efficient players there are in a market, the more learning-

by-doing leads to cost reductions for substitute products and services, which in turn attracts more demand, and therefore more private investments. Indeed there is some evidence of productivity spillovers between firms with different efficiency levels (Smarzynska Javorcik, 2004[10]), even if much knowledge remains firm-specific.[9]

The smoother this virtuous circle of innovation – learning – demand – private investment become, the faster the transition to greener products and services is, being led directly by competitive market forces. It is to be noted that this virtuous circle may need to be triggered by well-designed State support measures. This is because there are a number of market failures[10] that prevent the matching of supply and demand from occurring efficiently on its own (Tirole, 2022[11]) (see also, on the role of industrial strategy in this context, Competition policy and industrial strategies below 3). The risk of poorly designed State support measures is that they can undermine and distort well-functioning markets thereby reducing the ability or the incentives of innovators to enter and compete in the market. Poorly designed State support and its implementation can create barriers to entry and expansion for such efficient innovators.

## 2.1. The role of market access and reducing barriers to entry

Barriers to entry make it difficult for new firms to enter a given market. There are different types of such barriers, including structural barriers that consist of technology challenges and patents, regulations, and licensing requirements, as well as strategic barriers to entry, such as predatory strategies and other exclusionary practices undertaken by incumbent firms to keep rivals out of the market. A barrier to entry does not have to prevent firms from entering a market on a permanent basis to affect competition; delaying the entry of new firms may already be sufficient.[11]

One specific type of barrier to entry may be domestic industry protection policies (such as tariffs or regulations), which may deny or make more difficult market access. This may have at least three effects: i) one is related to access to the raw materials needed for the new green technologies; ii) another to decreased technology dissemination and green technologies uptake, and iii) finally a third one to how this can affect scaling and the related impact on costs.

As regards access to critical inputs, the OECD's export restrictions database[12] shows that restrictions on exports of critical raw materials for the green transition has been significantly increasing the last decade. At the same time, it also shows that the global production of critical raw materials has become more concentrated amongst producing countries, which emphasizes the role that international trade and supply chains play in processing and delivering these materials but also indicates risks of disruptions in the supply chains that lead to green technologies and products. The reduced flow of critical raw materials can have significant impact on the production of the green technologies affected, limiting market competition internationally and domestically, and therefore also on the speed of the green transition.

As regards the technology dissemination, the competitiveness of green technologies depends on the access to the more advanced and more efficient technologies available internationally. Imports of the most advanced technologies also helps to dislodge older technologies faster (see the empirical work undertaken by Garsous and Worack (2021[12]) in the context of wind turbines). Furthermore, difficulty of access to critical inputs – and export restrictions on critical raw materials for the green transition are increasing.

Access to another jurisdictions' market naturally increases the size of the market available to a firm and, according to Griffith and Van Reenen (2021[5]), "*larger markets will encourage innovation*". Where R&D is important, such as for green technologies, having access to a bigger market spreads these fixed costs across more units. This is also particularly relevant where learning-by-doing is at play since scaling plays an important role in reducing costs and in increasing innovation.

These three factors mean that "green protectionism" risks hurting trade, how markets work and ultimately therefore the speed of the green transition.

## 2.2. Competition enforcement

Whilst competition authorities typically focus on price effects, it is well-accepted that negative impacts on the ability and incentives to innovate can have much larger effects over time[13] (Gilbert, Riis and Riis, 2022[13]).

More recently, and as will be shown below, some competition authorities have started to look more systematically into the effects of mergers, cartels and abuse of dominance on non-price effects, such as innovation, quality and choice.

Indeed, recent work by Griffith and Van Reenen (2021[5]) suggests that in sectors where firms have similar technologies, they may use anti-competitive behaviour to try and escape competition, either by engaging in strategic foreclosure strategies or by merging, instead of racing to innovate. To stimulate innovation, competition enforcement is therefore most needed in such markets to spur innovation.

### *2.2.1. Merger control*

Mergers can promote innovation in different ways, namely by:

- bringing together complementary assets to increase the ability of the merging parties to innovate;
- allowing the merging parties to benefit from the innovation efforts of the other party (knowledge spillovers), especially when there are frictions for the diffusion of ideas, thereby increasing their incentives to innovate; or
- increasing the size of the market through the increasing demand for their products.

Mergers can also harm innovation, however. In particular, mergers are likely to reduce innovation incentives when:

- there are only a small number of firms competing to innovate;
- there is a cannibalisation effect of at least one of the merging firms' existing profit streams; and
- complementary assets or spillover effects that benefit the merged entity are not expected to be significant (Gilbert and Melamed, 2022[6]).

An added complexity to merger control is that price reductions due to cost efficiencies following from a merger can be outweighed by the loss of innovation and long-term economic harm, due to a reduction in competition from the merger. Nonetheless, there has been an increase in the importance given by authorities across the world to innovation theories of harm in merger control. For example, a 2016 survey of US merger cases found that between 2004 and 2014, one-third of all merger challenges by US antitrust agencies have included allegations of harm to innovation[14] (Gilbert and Greene, 2015[14]). When narrowing down the merger challenges to those in R&D intensive sectors (high expenditures of R&D in relation to sales or to expenditures per worker), nearly all the merger challenges allege innovation concerns.

A recent example in the US is the action brought by the US FTC in 2020 that challenged Facebook's strategy of acquiring potential competitors, such as Instagram and WhatsApp (see 2.2.3 for more details). The allegation is that Facebook's acquisitions deprive consumers of the benefits of competition, including increased choice, quality, and innovation.

In the EU, the European Commission has recently prohibited (early 2022) the Illumina / Grail merger since, if completed, the merger would have stifled innovation, and reduced choice in the emerging market for blood-based early cancer detection tests. According to the European Commission "*GRAIL and its rivals are currently engaged in an innovation race to develop and commercialise early cancer detection tests. While there is still uncertainty about the exact results of this innovation race and the future shape of the market for early cancer detection tests, protecting the current innovation competition is crucial to ensure that early cancer detection tests with different features and price points will come to the market*".[15]

This comes on the back of a number of other high-profile cases based on the reduction of innovation, some of which are related to green innovation, such as the Dow/DuPont. For example, in that case, the European Commission considered the fact that the parties were two close competitors in certain R&D parts of the agribusiness and analysed the change in incentives to developing new and better environmentally friendly products. In the case, the Commission prohibited the merger on the basis that the parties would have reduced incentives to innovate.[16]

A case in the recycling business, where such concerns were also analysed by the European Commission, was the M. 9409 Aurubis/Metallo merger. Even if there was no intervention based on innovation theories of harm, a concern that the European Commission had during its Phase I investigation was the extent to which Metallo was a strong innovator in recycling technologies, and whether and how incentives to continue to innovate might change (lessen) following the merger with Aurubis.

### *2.2.2. Green killer acquisitions*

In a scenario of technology displacement, where green technologies replace more polluting ones, new entrants and innovators are expected to play a significant role in driving the innovations and their commercialization in the marketplace. In the past, the rise of steam power, railroads, electrical power or the IT has taken place this way (Perez, 2010[15]).

As innovations take place and start to be deployed, the role of startups will be crucial to drive the economic green shift. Like in the digital area, this is therefore an area where the role of start-ups and new entrants is of particular importance. According to the IEA's World Energy Outlook 2021, capital has been flowing to clean energy technology start-ups, with investments in 2021 "*expected to surpass the USD 4 billion in early-stage equity raised in 2019, which was the previous peak year*".[17]

In a similar way to what has been found in other high-tech industries, such as pharma and digital, incumbent players may use defensive strategies such as acquiring the new or start-up players that have developed the new green technologies, processes or products. Such mergers may have the effect of reducing competition to innovate and overall market green innovation by reducing the need for the incumbent to develop rival technologies or products, or to limit the speed of roll-out of these new technologies. Allowing them may reduce innovation, which play a particularly important role for the green transition. Such mergers have been dubbed "killer acquisitions". [18]

Focusing on the R&D heavy pharma sector, Cunningham et al. (2021) provided empirical evidence for the impact of the replacement effect on lowering incentives to innovate, showing that innovations are less likely to be developed when the acquirer already has products that are competing with the target entity's products – i.e. there is a high cannibalization effect.

Competition authorities have recently been developing such theories in merger control. At the end of 2019, the US, the acquisition by the incumbent Illumina of its small competitor Pacific Biosciences in the next generation DNA sequencing market was challenged by the FTC, as Illumina was alleged to eliminate a "nascent competitive threat". By using a unilateral effects framework, the merger harmed competition, in particular innovation competition in a context of high market barriers where entry was "*time consuming and extremely difficult*" given the complexity of the DNA sequencing systems and that the "*intellectual property landscape surrounding existing sequencing technologies is broad, dense, and difficult to invent around*".[19]

Similarly, the European Commission raised issues in Google's acquisition of Fitbit regarding the possibility that Google might foreclose start-ups and small players that would otherwise "*compete and contribute to innovation and diversification of the digital healthcare sector*".[20]

With the recent change in policy relating to Article 22 of the EU Merger Guidelines in 2021, it can be expected that the European Commission will now be better able to ascertain jurisdiction in such types of green killer or nascent types of acquisitions, that have the potential to eliminate green innovators.[21]

### *2.2.3. Abuse of dominance*

As seen above, at the same time that start-up players can be expected to play a big role in developing and bringing to market many new green innovations, these new players active using new technologies face many particular challenges when entering a market: in particular they will have to develop and source raw materials, needing to set up supply chains as well as then convincing new customers and developing new distribution channels. This makes them particularly vulnerable to exclusionary business strategies by incumbent operators.

Indeed, incumbents may use strategic anti-competitive behaviour to exclude competitors and avoid the need to innovate or to reduce such pressures. A well-documented example is the telecoms industry in the US in the 60s and 70s, where a number of innovations were being promoted by new players (such as the modem) and where the incumbent AT&T impeded these potential entrants from getting a grip in the marketplace. To do so it employed multiple tactics such as "*blocking the emergence of standards and punishing customers who did business with AT&T's competitors*" (Wu, 2012[16]).

This example of a shift towards a new technology (internet) in the telecom industry may explain why there has been several recent cases in which the negative effects on innovation from unilateral conduct by a dominant firm has been examined in the digital space. In the US, the DOJ and eleven states filed a civil lawsuit against Google for a number of exclusionary practices to restrict the scale of innovative new rivals and therefore limiting their capacity to develop and compete effectively, reducing quality, lessening choice and impeding innovation.[22]

Also in 2020, the US FTC sued Facebook by seeking a permanent injunction to stop it from imposing anti-competitive conditions on software developers, amongst other allegations (see the afore-mentioned allegations relating to potentially anti-competitive mergers). This is because the US FTC considered that by depriving consumers of more competition, they were being deprived of innovation (such as the development and introduction of new functionalities); quality improvements (such as improved features), and/or consumer choice (such as enabling users to select a personal social networking provider that more closely suits their preferences, including, but not limited to, preferences regarding privacy options).[23]

A number of recent cases in Europe also provide examples in which the negative effects on innovation played a more prominent role in the concerns of competition authorities. Such examples included some of the Google cases brought by the EU and the Facebook case in Germany where "*the use of data entail a severe potential to stifle innovative offers by competitors, raise entry barriers and enshrine the paramount significance of the order's addressee*".[24]

Business exclusionary strategies by dominant firms can also occur in the green technology, (OECD, 2021[17]), such as refusing to deal with trading partners (even potential) who do not meet environmental criteria above the regulatory standards or entering into long-term exclusive arrangements. An example of the latter has already been investigated and subject to commitment decision by the Competition and Markets Authority of the UK ("CMA") in the context of concerns regarding agreements between electric vehicle charge point operators and motorway service area operators and the abuse of their dominant positions.[25] The decision considered that the long-term exclusive agreements seemed to go beyond what was acceptable from the point of view of recovery of investment in nascent sector, and could act as major barriers to increasing investment and competition in electric vehicle en-route charging, with impacts also on innovation.

### *2.2.4. Co-operation agreements*

The complexity of the green transition has brought into focus in jurisdictions like the EU, the importance that industrial alliances may play. In the EU several alliances have been announced, such as the Alliance for Zero-Emission Aviation, European Solar Photovoltaic Industry Alliance, the European Battery Alliance

to name but a few.[26] These alliances bring together a wide range of public and private partners in a given industry or value chain and must comply with competition rules.

Indeed, like mergers, co-operation agreements between competitors may also have ambiguous effects, as they can serve to increase or reduce competition and innovation. Many forms of co-operation between enterprises do not create or strengthen market power, raise barriers to entry and reduce competition on prices, innovation, quality, and choice, and, as such, they are unlikely to distort competition. Typically, relatively low-risk co-operation involves joint R&D, joint purchasing arrangements, joint advertising, standards setting arrangements, and technology licensing agreements.[27]

Due to the ambiguous effects of co-operation, the role of competition authorities may be to prohibit agreements where companies refrain from competing on green quality or innovation, or to provide guidance to companies where such agreements are to protect competition as well as the environment, accounting for their effects on green quality, choice and innovation, in addition to prices.

There have been some discussions in the public sphere, particularly in Europe, that antitrust laws may potentially have a chilling effect on green innovation by deterring co-operative agreements between competitors.[28] This uncertainty would be due to the difficulties of the self-assessment that is often required of companies to analyse the lawfulness of such agreement and the complexities of determining in advance whether such assessment aligns with that of the relevant competition authority.

Examples of this sort of agreement may range from agreements to voluntarily set common objectives to reduce carbon emissions, sustainability standards or labelling systems or agreements to phase out a more polluting product (Maximiano and Volpin, 2022[18]). The business community, particularly in Europe, has been increasingly vocal in requesting guidance on the assessment of these types of agreements. As a result, many competition authorities have decided to issue guidance (general and specific) or undertaken initiatives such as regulatory sandboxes to orient business behaviour. As an example, the European Commission has recently published the new EU Guidelines for Horizontal Co-operation Agreements, which includes a novel section entirely devoted to sustainability agreements that may impact green quality and innovation. Another example is the current ongoing public consultation of the European Commission on how far agricultural producers should be able to cooperate to achieve “sustainability standards”.[29]

A number of recent examples show that authorities have been increasing their focus on collusive behaviour that include sustainability considerations. One recent example is the AdBlue case, where the European Commission investigated and fined three large car manufacturers for colluding to prevent the development of advanced fuel cleaning technologies. The vehicle producers agreed to slow down the deployment of the AdBlue technology, which reduced the pollution emitted by the cars in the exhaust gas stream.[30]

As many economies invest in their green transition, an issue that may arise soon is that certain industries will see its competitiveness, or even relevance, decrease, such as for some fossil fuels, which may lead to subsequent structural overcapacity. If so, it is crucial to carefully manage such transition, and competition authorities may have an important role to play as proposed solutions in some jurisdictions may lie in industrial restructuring via cartel-like agreements. It is possible that some of these agreements may be even directly or indirectly promoted by governments, to limit or avoid employment losses or facilitate rationalisation of a sector with excess capacity, for example. Competition authorities, via their enforcement prioritization powers and their advocacy powers, may be called to assess the impact on the market of such agreements and the indispensability of the agreement to manage a specific industry shift (OECD, 2020[1]).

# 3 Competition policy and industrial strategies

The process of innovation takes place in the context of numerous factors that determine the uncertainty of its outcome. These include changing technologies, incomplete information, organizational inertia, corporate incentives, limited resources as well as numerous different paths for technological development, meaning that decisions about investments in innovation development are taken under non-optimal conditions (Porter and Van der Linde, 1995[19]).

Recent work has shown that the existence of market power and externalities can impact and distort the direction of innovation (Acemoglu, 2023[20]). Specifically, as regards innovation in green technologies existing technology gaps can have significant impacts as to the direction of innovation over time. According to the growth model developed by Acemoglu et al. (2016[21]) and using firm-level data in the US energy sector, the gap between clean and dirty technology development means that without suitable public policy "*in the long run, clean technologies disappear completely and dirty technologies take over the entire economy*". This work was further developed by Acemoglu et al. (2019[22]) with reference to shale gas, where the authors describe two effects: a substitution effect which reduces pollution and a scale effect which increases pollution with increased consumption. Their findings show that the introduction of lower cost shale gas leads to short term reduction in pollution but to long term effects of delayed innovation in green innovation due to path dependency.

Indeed, following on this work Aghion, Antonin and Bunel (2021[23]) make the point that, due to path dependency, firms that have been investing in certain technologies tend to continue investing in the same technologies over time. For these reasons, industrial policy tools and industrial strategy may be required to make them switch to investing in greener alternatives (Aghion, Antonin and Bunel, 2021[23]).[31]

In recent times, there has been an increasing use of industrial policy tools and of industrial strategy across OECD members and other large economies, possibly accelerated by the issues faced in relation to post-pandemic supply chain mismatches and rising geopolitical tensions. These measures have been often adopted to tackle societal challenges like climate change. Examples include industrial strategies such as the European Green Deal (2019), the Next Generation EU fund (2020), the EU New Industrial Strategy (2021), the American Rescue Plan Act (2021), the US Inflation Reduction Act (2022), the Korean New Deal (2020) and Japan's Green Innovation Fund Project (2022).

Industrial policy can be defined as "*interventions intended to improve structurally the performance of the domestic business sector*" (OECD, 2022[24]) and can have a number of different goals, from innovation and productivity growth to more recent goals of increasing strategic autonomy, ensuring technological leadership, boosting domestic production and jobs, and or as a contribution to supply chain and resilience. Sometimes industrial policy may have several parallel objectives. For instance, an industrial strategy focusing on clean energy may aim to improve innovation, productivity growth and strategic autonomy.

Moreover, such industrial policies can include a wide range of measures, including R&D support, tax credits or other government support, regulation, procurement, and others aimed at restructuring declining industries or developing new ones.

It is useful to distinguish between horizontal policies (applicable to all firms) and targeted policies (available to more limited number of eligible firms). Horizontal policies are generally closer to being competitively neutral, whilst more risks to the level playing field between firms exist if specific firms are targeted for support.

Technological breakthroughs are needed for a successful and speedy transition to a low-carbon economy.[32] Tailored industrial and innovation policy measures, supported by competition principles, can help ensure the most efficient allocation of resources to encourage R&D directed towards clean technologies (OECD, 2020[1]). This is because horizontal instruments, such as R&D tax credits, may be insufficient to foster clean technologies that are far from the market and require long development timelines (Anderson et al., 2021[25]). However, care needs to be taken to ensure that targeted support addresses market failures and does not itself become a barrier to entry.

There may be regulatory and market failures[33] that make it difficult for markets to deliver the most efficient outcomes. Market power is a market failure, for instance, which "*limits the diffusion of a product, service, or technology to downstream firms and end-users*" (Tirole, 2015[26]). Other examples are when markets have externalities (costs that are not borne or considered by the economic agent) such as environmental impacts or that suffer from public good problems, both relevant for the green transition, in which case public investment, public procurement, competition and regulatory interventions may be needed for these markets to work. For instance, the deployment at scale of electric vehicles will require consumers to trust their ability to charge their vehicles when needed, which, in turn, depends on the quality and dissemination of the charging infrastructure.[34] Therefore to unlock private investments and allow markets to develop and work well, government support and regulatory oversight may be needed.

Given the evidence that industrial policies are more successful when they are implemented in markets with at least some competition (Cai et al., 2015[27]), competition should be one of the important elements to consider in carefully designed industrial policy measures (OECD, 2020[1]). Choosing the right instrument as part of an industrial policy requires close consideration of the impact on the affected markets and on how competition can function in those markets.

Government intervention and policies can impact (positively and negatively) how markets function and the level playing field between firms at domestic and international level, with wide-ranging and potentially long-term implications on productivity and growth. The type of potential impact will depend on the type of government policy used.

## 3.1. Different instruments to solve different market failures

Given the different stages of development of green technologies and markets, and the different market failures that may apply, there is no single "right" government policy to be used across the board for all technologies, industries, and markets (OECD, 2022[24]). The most effective policy may depend on how developed a technology is, for example.

For those in the earliest phases, such as ultra-long-duration energy storage, high power batteries,[35] or ultra-strong plastics, supporting basic R&D may be more appropriate. Due to market failures related to knowledge spillovers and given that basic R&D is far from the market, subsidies for R&D may raise few issues related to competition, for example.

For those technologies at the initial commercialization phases that do not benefit yet from scale economies, policies may be needed to allow for or facilitate their scaling. These can be demand-pull subsidies, like the solar and wind tax credits in the US or Europe's Feed-In Tariffs. As manufacturing activities that are at the core of many green technologies benefit from learning by doing - knowledge that is continually accumulating and non-rivalrous, with spillovers across industries and our economies, this can be a consideration for the support that may be most effective.[36]

It should be noted in this context that according to the IEA's Net Zero by 2050 roadmap (International Energy Agency, 2021[28]), while most of the CO2 emissions reductions by 2030 will result from technologies that are already available in the marketplace, the picture changes for the longer term, whereby by 2050 almost half of expected reductions in emissions will result from technologies that are not yet being commercialised and that are currently at a demonstration or a prototype phase.

## 3.2. A portfolio of pro-competitive State measures

When policymakers are aware of the principles of competitive neutrality and the importance of a level playing field and how these can be integrated into their policymaking, the policies they design are better equipped to allow for competition and the allocative and productive efficiencies that it can bring (OECD Recommendation of the Council on Competitive Neutrality, 2021).

Examples of pro-competitive targeted strategies may be those that are made up of or integrate mainly demand-side policies as they affect all firms, regardless of size, age or links to government and can help create the demand that is needed to push up scaling (OECD, 2022[24]). Examples include renewable electricity purchase tariffs or using public procurement and public sector demand to foster green innovation (see further below). As mentioned previously, such policies may be more appropriate only for relatively mature technologies that need scaling as they push technologies that are closest to the market (Anderson et al., 2021[25]).

Additionally, measures aimed at fostering competition in the market through, for example, the promotion of start-ups in specific markets considered too concentrated, or not having enough resilience to shocks; or the reduction of regulatory barriers to entry, may be imbedded into wider industrial policy agendas (see Box 1 below).

### Box 1. The US meat-packing rescue package to foster competition

In January 2022, the US Government announced the decision to spend $1 billion in post-pandemic economic recovery funds to boost competition in the US meatpacking sector – an industry in which four firms control 85% of all beef processing and 70% of the pork market. The decision is aimed at bringing new players into the meat-processing chain or strengthening competition between the existing ones, to stimulate more choice, lower prices for consumers and enhance the resiliency of the food supply chain.

With this package, the US Department of Agriculture ("USDA") Rural Development made $150 million available in grants to fund start-up activities in the meat and poultry processing sector. At the same time, it also announced it was making a further $150 million in grants of "up to $25 million each to expand processing capacity through a variety of activities, including but not limited to construction, expansion of existing facilities, and acquisition of equipment". By being more targeted at newer players these measures are intended to create market alternatives and therefore increase choice and increase competition.

To accompany such measures, a number of other competition-driven initiatives were also announced, including a joint initiative between DOJ and USDA to identify potential violations of competition laws, and a preparation of a report on the conditions of access to retail as well as competition's role in protecting new market entrants in meat processing.

One of the reasons provided by the Administration for this approach, was that disruptions in meat processing during the pandemic was due to the high level of concentration. During the pandemic, one of the four firms had closed two large processing plants due to the coronavirus, leading to significant

reductions in pork and beef productions and requiring an Order for abattoirs to remain open under the Defense Production Act.

Source: https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/03/fact-sheet-the-biden-harris-action-plan-for-a-fairer-more-competitive-and-more-resilient-meat-and-poultry-supply-chain/ and https://www.usda.gov/media/press-releases/2022/02/24/usda-commits-215-million-enhance-american-food-supply-chain

Policymakers should however be wary of targeted measures that pick industry champions. In particular, the process of choosing winners is ridden with difficulties such as information asymmetry, capture and protectionism (Tirole, 2022[29]). Indeed, Coyle (2020[30]) makes the point that for reasons of competition this "*should rule out support for big businesses, except in clearly defined circumstances*".

Further, what is also often not accounted for when targeting specific industry "winners" is the impact on dynamic incentives and the effects on innovation, as the process of dynamic improvement is incited by both domestic and international competition. The true champions are those that arise from stable macroeconomic environments, with competitive and stable fiscal policies, with access to high quality and competitive infrastructure and utilities, to a skilled workforce, and operate under neutral economic regulation and an effective judicial system. The incentives to invest are shaped by competition rather than by artificial protection.

Governments should therefore move from "picking the winner" to "picking the sector", i.e. picking a portfolio of promising innovators where market failures are clearly identified (Coyle, 2020[30]). This may be done, for instance, via competitive tenders, as well as by identifying at the outset and focusing on the right indicators to measure the success of the state policy, see (OECD, 2020[1]) and (Rodrik, 2014[31]). This might be to foster a general-purpose technology (with applications in many sectors) or to support an entire industrial ecosystem (i.e. taking into account several sectors along the value chain, e.g. from lithium mining to battery manufacturing and the automotive sector).

Some investments will pay off directly in commercial terms. Others may not but there may positive overall effects on an industry, that governments may want to consider, such as, for instance, significant technological spillovers, or a significant increase in patent applications (even in other markets). These may be indicators that, at least from the perspective of the public stimulus to innovation, the public support was successful (Rodrik, 2014[31]).

### Box 2. Possible lessons from Solyndra

In the United States, Solyndra—a start-up solar cell manufacturer founded in 2005, went bankrupt in 2011 after having received USD 535 million in loan guarantees from the US government's Department of Energy in 2009 and USD 450 million private investors. It went bankrupt despite having met its own technological and cost-reduction goals set at the time of the loans.

Solyndra's technology for producing PV cells relied not on silicon but on another material (CIGS) as a semiconductor, which was cheaper but less efficient than silicon at converting solar energy. Solyndra's competitiveness therefore was premised on high silicon prices. As new capacity was introduced in the People's Republic of China (hereafter 'China"), production costs were lowered and prices decreased significantly (nearly five-fold). At the same time global PV capacity increased more than 6 times from 2007 to 2010. This meant that market circumstances changed very significantly, and that the premises that had led to the state investments did not hold over time.

Some commentors have noted that whilst Solyndra failed, others in the same funding programme succeeded. Rodrik notes that at around the same time, Tesla Motors obtained a loan from the DOE for

USD 465 million, which has been successful, and that governments should not expect every company it subsidises to succeed and that every loan to be recovered. In fact, Rodrik also argues that given the technological and environmental externalities involved it should not be expected that every loan portfolio will be successful.

This has led to much discussion between commentors about the reasons for the Solyndra failure. According to Rodrik, the lesson to be taken from this case is that safeguards need to be put in place that allow to insulation from politics and allow for removal of subsidies if the expected performance is not being met.

One of the observations made by Rodrik is that the initial programme of which Solyndra was a beneficiary did not have a clear set of performance benchmarks and ongoing monitoring of performance.

Source: Dani Rodrik, Green industrial policy, Oxford Review of Economic Policy, Vol. 30/3, 2014, pp. 469–491.

When governments do not employ the right performance metrics or accompanying "correcting" measures that lower barriers to entry of new players, with new technologies or more efficient processes, industrial policies may be more likely to benefit incumbent players (that may be less efficient), due to their connections and administrative know-how.

Therefore, as referenced in the common document jointly published by the IMF, OECD, World Bank, and WTO, "*It is possible to design subsidies that encourage innovation and economies of scale by including performance metrics or sunset clauses that promote market competition in the future*" (IMF, OECD, WTO, World Bank, 2022[32]).

In addition to developing the right performance metrics and disciplining effect of the removal or withdrawal of support measures, there are several ways in which governments can ensure that the desired results of targeted measures are achieved in the most effective way (Criscuolo et al., 2022[33]). This is particularly important in the light of the fact that the evidence on effectiveness of targeted industrial policy instruments and their potential pitfalls (such as those deriving from lack of information by government and capture by certain incumbents) are ambiguous (Criscuolo et al., 2022[34]). One way to maximise the effectiveness of their measures is for governments to undertake regular policy evaluation exercises to assess the effectiveness of a policy measure, including its effect on market competition and functioning.

In particular, to heighten the chances of effectiveness of targeted industrial policy measures, attention must be devoted to several issues:

- clear and transparent reasons for the strategy,
- well-functioning governance to ensure that new innovative firms are not excluded,
- specifying goals and not technologies, with clear ways to measure progress,
- include from the outset regular assessments of performance, and
- integrate clear exits, or removal of the industrial policy instrument, in case of progress not being met or the goals having been completed (OECD, 2022[24]).

This means that policymakers, such as competition authorities in particular, should advocate for state support to (OECD, 2020[1]):

- Be subject to a high level of transparency
- Be objective and subject to non-discriminatory criteria
- Have a limited duration
- Ensure competitive neutrality, minimizing distortions between firms in the domestic and global markets

- Apply to sectors, ecosystems or technologies and not specific firms
- Incorporate a restructuring plan and an effective and transparent exit strategy
- Include correction measures, if needed
- Be targeted to firms that are not in financial distress.

## 3.3. Potential trade impacts of industrial policy

State support measures can also have significant cross-border spillover effects, either directly through the export channel or indirectly through global prices.[37] Significant concerns have been expressed about the extent of government support in a range of sectors in international markets, with particular concerns about the lack of transparency on subsidies in industrial sectors. This issue is set to become even more important in light of rising government support to promote the green transition, including across countries with different economic models.

Competition and trade policies can help magnify positive spillover effects and also mitigate potential negative spillovers from national industrial and innovation policies. Policies that are competitively neutral to nationality, ownership and even technology are more focused on effectively attaining a policy goal and less on protecting national players or a national eco-system.

In contrast, state support measures that have elements of domestic protection may lead to snowballing effects, whereby individual countries respond to subsidies by providing more support of their own in the form of direct subsidies, state-backed guarantees for their domestic firms or preferential domestic treatment. The resulting subsidy races risk eroding support for the multilateral trade rules that have brought many economic benefits, and to the detriment of countries with less fiscal capacity to engage in large-scale support for their own firms.

Further, policies such as demand-pull measures which normally would promote or have limited impact on competition may not do so when they include local-content requirements. These requirements may be discriminatory of firms that do not comply with those domestic requirements and risk undermining market competition and trade.

Subsidy races or poorly designed government support also harms the subsidising countries themselves. Expected environmental or consumer benefits may not materialise where support hinders market entry by more innovative, competitive, or cheaper products. Opportunity costs for scarce public resources can also be significant at a time when the green and digital transformations are calling for additional public investments in education, social protection and physical and digital infrastructure.

The role of international cooperation will be crucial to ensure that any such negative effects are taken into account in the design and operation of such policies. Subsidies is seen as a critical area for strengthening rulebook for international trade and is a subject of ongoing discussions at the World Trade Organisation (WTO). Strengthening existing rules and boosting international cooperation more broadly will require evidence and transparency on the existence, scope and magnitude of those policies as well as an analysis of their potential impact cross-borders. The OECD itself has made considerable progress over the past five years in documenting and quantifying industrial subsidies but more needs to be done (OECD, 2021[35]) (OECD, 2019[36]) (OECD, 2019[37]).

All countries have an interest in avoiding costly and wasteful subsidy wars. An important starting point is to ensure the transparency of support measures taken across countries to enable assessment of whether measures are achieving their stated aims, at what cost and with what spillovers and impacts on global markets. Countries seeking to make targeted use of well-designed public support have a clear interest in understanding the nature and scale of support measures already taken by others in any given sector to ensure the effectiveness of their own measures.

## 3.4. Competition and procurement as a demand-pull strategy

As mentioned above, another important lever at the disposal of governments for the recovery and the support of new green technological solutions is the strategic use of public procurement to trigger large-scale demand. Public procurement instruments can be used to incentivise innovation, for instance by reducing risks linked to the total market size,[38] or help to "demonstrate" a new product with public clients leading then the private sector to follow on those that work well and can be further scaled. Examples of where the state may undertake green procurement might be for the improvement of buildings to increase energy efficiency, or the purchase of electric vehicles for transport and state services.

Competitive tender processes should also be used for the allocation of subsidies when such instruments are used, to ensure that those firms that are most efficient have access to the funds needed for commercialization or scaling of new efficient technologies.

Tender criteria that are solution-oriented and allow choosing between different technologies are more conducive to the development, dissemination and deployment of innovative solutions. Competition authorities in their advocacy role with procurement authorities in ensuring that green public procurement criteria do not distort but actually promote competition (OECD, 2021[17]).

# 4 Pro-competitive regulation and standards

Regulations are a crucial part of policymakers' toolkit to achieve policy objectives. For example, to ensure that the public support measures outlined in the previous sections achieve effectiveness, in many instances they will need to be accompanied by smart regulatory solutions that consider dynamic effects and the interests of new entrants, lest they lead to subscale firms that do not find it possible to scale up due to regulatory barriers.

Regulations can play an important role to support market functioning and competition by providing the legal and economic frameworks in which product and service rivalry between firms can take place. At the same time, given that such frameworks can significantly affect firms' incentives to compete, invest and innovate in the short and long-runs, policymakers and regulators need to consider these incentives when drawing up rules and regulations to ensure there are no competition distortions.[39]

Indeed, one of the main barriers to entry of new firms, technologies and business models can be the regulatory environment. By limiting innovation and the possibility for market disruption, regulations can have significant negative effects, even if such effects may not be apparent as they may block new technologies not being offered in the market, for example. This is because certain rules and regulations may make it difficult for new technologies and disruptive players to start commercializing their offering or achieve sufficient scale to be competitive, even if they are more efficient in their use of resources.

Regulations are also key to ensure market openness. This is recognised by WTO disciplines that, while recognising the sovereignty of countries to achieve legitimate policy objectives via regulation, seek to ensure that regulations, standards and conformity assessment procedures are non-discriminatory and do not create unnecessary obstacles to trade. Similarly, disciplines in relation to services trade recognise the key role of regulations in creating the conditions for market entry and operation.[40]

There is a significant body of empirical research which shows that there are a range of regulatory barriers to entry: from absolute restrictions on the number of firms in a market to unnecessarily high administrative costs, that reduce the ability and incentives for new firms to enter the market. For example, Fan and Xiao (2015) found slower than expected entry into the telephone market in the US after the liberalization of the telecoms market, the main reason being the high cost of the administrative process for certification (OECD, 2017[38]).

While regulations may in certain instances act as barriers for introducing new technologies, they may also help create incentives for firms to innovate. In their meta review of the literature concerning environmental policy instruments and eco-innovation, Sanchez and Deza (2015) conclude that firms' incentives to invest in innovation can be affected by their outlook on what they expect from future regulations. Should they expect that new regulatory standards will be introduced in the future, this may incentivize them to innovate in order to preserve their competitive presence in the market after the introduction of the new regulations.

Such considerations are particularly important for the sustainable economy at a time where many of the announced public investments following the pandemic have been in innovations related to clean energies, with the objective of reducing barriers to the emergence of new technologies.

The US has been recently focusing on the risk posed by concentration to its economy and prompting collaborative efforts across agencies. In that context the Executive Order required that a number of agencies submit reports to the White House Competition Council on the state of competition across various sectors with the view to developing proposals to make those sectors more competitive.[41]

This is an approach that has been used with quite significant success also by the OECD Member Countries in a number of sectors where they have been called upon to analyse laws and regulations with a view to lowering barriers to entry.[42]

However complex, the evaluation of how competition may be affected by existing or regulation under development should include not only price effects but also the other dimensions of competition - choice, quality and innovation. Indeed, dynamic effects resulting from competing on innovation can often be more important in the medium/long term than short-term price effects. Such innovations mean that incumbent players face competitive pressures from a new product, technology or business model, forcing them to counteract with their own innovations, in a self-perpetuating cycle.

Regulatory barriers may vary, from regulation that limits the ability to build clean energy infrastructure such as lengthy processes for licensing of wind farms to regulations that exclude innovations as they refer to existing technology rather than to best available solutions. Whilst high regulatory hurdles can lead to disruptive technologies (e.g., Uber/Lyft), these can be few and far between.[43] The systematic huge technological disruptions observed in the last decades brought progress, but it also allowed first movers to develop market power and to stifle competition, reducing the overall pace of innovation and deployment.

The effects of regulatory barriers include unnecessarily high costs of compliance adding to the costs of entry, as well as diverting already limited and stretched funding for new entrants to other competing areas within the firm, such as its R&D functions, or in developing new supply and distribution chains as well as the needed marketing to conquer new customers.

Not only are many of the innovative new firms (such as clean tech) operating capital-intensive business models[44] (often needing hi-tech manufacturing plants)[45] they also need to build from scratch both supply chains and distribution channels. For this to happen, and to attract investors, a certain level of regulatory certainty is required. This may mean that new regulations for the green transition may have to set criteria or parameters not only allowing, but actually promoting clean tech solutions.

Some commentators, such as Cecere and Corrocher (2016), however, found that while more strict regulation can positively influence the likelihood of innovation in waste recycling, this effect was also non-linear, so that that there was a level above which regulation could dampen innovation in waste recycling. These authors argued that the "*optimal level of regulation should be focused on outcomes to allow flexibility in respect of the production and distribution and that regulatory processes should be stable and predictable*".

To induce innovation, rules and regulations need to be goal and outcomes-based as opposed to linked to a particular technology, thus allowing market players to meet requirements in different ways. They also need to facilitate reaching and exceeding those goals. Indeed, the Porter Hypothesis (that regulations are flexible and market based) posits that well-designed environmental regulations can stimulate innovation, which may lead to efficiency gains or even profit increase for regulated firms.

Competition authorities can help policymakers develop regulatory frameworks by using their powers and know-how to guide them to more targeted pro-competitive solutions. One way in which competition authorities can support policymakers is undertake competition market studies to gain a thorough understanding of the industry and identify issues that may need to be addressed by regulatory changes and therefore participate actively in regulatory design (OECD, 2020[39]). Market studies are already a tool that many competition authorities have actively used to propose regulatory reform to tackle the crisis (OECD, 2020[1]).

### Box 3. Electric Vehicle Charging Market Study in the UK

In December 2020, the Competition & Markets Authority (CMA), launched a market study on the electric vehicle (EV) charging market. This was in the context of the objective of the CMA to support government goals to ban new petrol/diesel cars by 2030, as the switch to EVs is considered critical to achieve Net Zero. To encourage a fast shift to EVs, a comprehensive EV charging network needs to be developed ahead of demand to build trust and confidence in users.

This was seen as an opportunity by the CMA to embed competition and consumer protection straight into the design and development of the sector, by having an early look, spot potential risks and make pro-competitive recommendations. This had implications for the approach followed as it was a fast-track study that took 8 months to complete (normally market studies take 12 months in the UK). This investigation took a sharp focus on supply side issues in segments where initial evidence indicated greatest concern in terms of barriers for competition and investment (en-route charging and on-street charging). Such barriers and challenges could reduce EV take-up.

To do so the CMA engaged with a wide range of stakeholders (including government, Ofgem as energy regulator, new entrants, and investors) to understand the key issues, often resorting to written requests for documents, data and facts. Key to the analysis was the potential different models of competition identified: from competition within the market, by giving consumes more choice, for example, to competition for the market, for example tendering out on-street sites.

The CMA found that parts of the sector such as destination areas like shopping centres/supermarkets, home and workplace charging were developing well. However other parts were facing difficult challenges, such as slow/fast on-street kerbside charging and en-route rapid charging along motorways and in rural/remote/tourist areas. The scale of the challenge is significant and due to externalities and first mover disadvantage (the so-called 'chicken & egg' problem), the CMA found that governments' funding support and regulatory oversight will be important to unlock private investment and have the benefits of effective competition, in particular for those areas where the challenges were identified.

The CMA report sets out eight key measures to help the development of a well-functioning competitive EV charging sector, including proposing to set up an open data and software standards for home charge points. The CMA has also decided to open a competition law investigation into lengthy exclusive agreements at motorway service stations, which led to the imposition of remedies. Finally, the CMA has signalled the importance of flexibility and responsiveness of regulatory interventions given the uncertainties as to how the sector will evolve.

Source: UK CMA, Electric Vehicle Charging Market Study - Final Report, 23 July 2021, https://www.gov.uk/government/publications/electric-vehicle-charging-market-study-final-report/final-report; UK CMA, Press Release, CMA to open up electric vehicle charging competition on motorways, 17 November 2021, https://www.gov.uk/government/news/cma-to-open-upelectric-vehicle-charging-competition-on-motorways.

## 4.1. Standard setting for innovation

It is difficult to generalize regarding how regulations should be designed, as that depends on the sector and market in question, the role of innovation, the existence and stage of the new technologies in their development and deployment as well as the market structures. The need for and the coverage of regulation in more uncertain markets with fast changing technologies with different technologies competing, can differ significantly from markets where there is more certainty as there is less technical innovation, for example.

Standards and standardization processes driven by the market can also play an important role to foster technological change (Vollebergh and van der Werf, 2014[40]).[46] In this regard, empirical studies show, on the one hand, that standards (driven mainly by the market) may be better suited than regulations to foster innovation in markets with high degrees of uncertainty (Blind, Petersen and Riillo, 2017[41]).[47] On the other hand, according to the same authors, in markets with less technological uncertainty, a limited number of incumbent firms can exercise their influence in the design of standards for that market, which could lead to higher costs for all other firms and to lower levels of overall innovation, and so regulations could be better suited (Blind, Petersen and Riillo, 2017[41]). A specific example in the green transition space, is the role for promoting international standardisation, hydrogen infrastructure, and sound regulatory standards for hydrogen technology thereby reducing market and investor uncertainty (Cammeraat, Dechezleprêtre and Lalanne, 2022[42]).

New innovative firms are often not consulted or participate in standard setting, or creation of regulation and approval processes, as the private sector in these processes are often mostly represented by large incumbents with significant vested interests.[48] Further, large incumbents have more resources to engage on a continuous and substantive basis with regulatory processes (without even considering the issue of potential regulatory capture). Such firms have the incentives to restrict competition in a market by encouraging regulatory restrictions on entry to raise barriers to entry for new players. Incumbent firms also have fiduciary duties to maximize the shareholder value of existing assets, so that the regulations and standards they defend may serve to slow new innovations or their deployment at scale. Furthermore, incumbents have an informational advantage over the regulators and may try and use this information asymmetry to influence the regulation in their favour.

This means that often small and new innovating firms are not taken into account when formulating regulatory policies or setting standards. Evidence collected by the CMA shows, however, that where policymakers do not include in their evaluation new entrants, or other firms with new technologies or different business models, the risk of badly designed regulation that harms competition increases significantly.[49] The effect is that this may lead to structural barriers that reduce the rate of market penetration of such new firms and innovations.

This is because regulation affects larger and smaller firms differently, and regulations should take both these into account. Regulations which may have a disproportionate impact on smaller firms, can be especially problematic. Furthermore, the evidence also shows that regulations which tilt the playing field towards the larger incumbents can results in lower levels of innovation and higher prices. A similar risk is entailed when standard settings processes are conducted in a non-inclusive fashion.

Private-driven business initiatives present the advantage of providing flexible solutions to well-identified issues. As noted by the CMA, for example,

> *agreements between firms may be particularly appealing to policy makers as they may help achieve policy goals without the requirement of government legislation or explicit regulation. Such agreements have the potential of allowing firms to pursue actions that secure beneficial environmental outcomes in as efficient a way as possible (OECD, 2010[43]).*

Performance standards may be more conducive to innovation than technological standards as they leave firms a higher degree of freedom to discover technological solutions that minimise compliance costs.

In this sense, a role for competition authorities may be to follow closely the development of the standards by private businesses to ensure that such coordination is not impeding entry and competition. This would also offer the advantage of engaging competition authorities throughout the duration of the cooperation for the implementation of the standard, for example by ensuring that there are not exchange of commercially sensitive information that may reduce competition, as well as by terminating the cooperation when not anymore justified by pro-competitive reasons.

# 5 Main points of the High-Level Symposium Discussion

The discussion was rich and numerous challenges were identified for a market-driven green transition, starting with the urgency with which effective competition, regulatory and innovation policy measures need to be taken to move our economies to net zero. These measures should be accompanied with a careful evaluation of the risks of action that may play out in the future, and therefore the importance of a more long-term perspective.

Some consensus seemed to emerge that those multiple challenges require an array of measures, from taxes, to subsidies, competition policy and trade, always considering that different technologies and sectors present different dynamics, characteristics, and economics. Obstacles to innovation and the green transition may have different causes, including regulation that erect unnecessary barriers to entry, lack of clarity as to what is allowed under competition law, or lack of access to financial market can also act as barriers.

The importance of taxing the carbon externalities was underlined by some speakers as an important component of the green transition by making use of market mechanisms. At the same time some of the same speakers made the additional point that the green transition is also an opportunity for economic growth and that subsidies can help increase the take-up speed of clean technologies and increase green innovation. In this context, transparency of subsidies and ensuring they are designed in a way which is respectful of competitive neutrality and competition principles more broadly was considered important to foster investment incentives. In this regard the discussion showed that stronger cooperation between the trade and the competition communities is very important that the OECD, thanks to its neutral role which does not involve rulemaking, could be well placed to develop this cooperation.

More specifically as regards competition policy, the discussion highlighted the importance of facilitating a demand driven push for cleaner technologies, incentivising the market to allow active participation so as to trigger the virtuous circle of green innovation that will drive the move to net-zero. There was also a discussion around the need to analyse whether competition enforcement may need to adapt to support the green transition, in particular in relation to standard-setting and data-sharing.

The importance of a multi-disciplinary approach to the green transition and the need to have competition policy interacting with other policy areas, such as regulation, trade, innovation and industrial policy arose from the High-Level Symposium was often highlighted.

For the future, there was also some consensus this should be only the beginning of a much broader discussion to develop this co-operation between policy areas. An example was the need for further work on the transparency of subsidies as this could be useful to understand what distortions they imply and what is the most appropriate and least disruptive proportionate response to promote a level playing field, as well as the best industrial policy design.

# Endnotes

[1] See preliminary data resulting from the OECD Low-carbon Technology Recovery database currently being prepared and that is reported in the Issue Note "*Will post-COVID-19 recovery packages accelerate low-carbon innovation?*", Frida Aulie, Antoine Dechezleprêtre, Fernando Galindo-Rueda, Inès Pitavy, Alzbeta Vitkova, (2022[52]) prepared for the OECD GGSD Forum of 22-23 November.

[2] OECD Economic Outlook, Interim Report September 2022, (OECD, 2022[61]) – "With the impacts of the COVID-19 pandemic still lingering, the war is dragging down growth and putting additional upward pressure on prices, above all for food and energy."

[3] This mechanism is explained by Griffith and Van Reenen, (2021[5]).

[4] This is the Schumpeterian effect.

[5] This is Arrow's replacement effect.

[6] For an overview of the empirical literature on learning by doing costs, see for example Historical construction costs of global nuclear power reactors, (Lovering, Yip and Nordhaus, 2016[59]).

[7] For the construction of nuclear power plants, for example, M. Zimmerman calculated that the completion of a first plant lowered a firm's cost of building a second one by 11.8 per cent, in Learning effects and the commercialization of new energy technologies: the case of nuclear power, (Zimmerman, 1982[53]), Bell Journal of Economics, 13 (1982), pp. 297-310.

[8] Even if there may short run fluctuations with increase in production costs, due to increases in price of raw materials.

[9] Based on firm-level data from Lithuania, Javorcik finds evidence consistent with productivity spillovers of local suppliers when they have contact with local subsidiaries of foreign-owned firms as a result of technological spillovers.

[10] See (European Commission, 2023[54]), Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (2023) C(2023) 3445 final, paras. 519 ss.

[11] (OECD, 2005[48]).

[12]See https://qdd.oecd.org/subject.aspx?Subject=ExportRestrictions_IndustrialRaw Materials.

[13] For example (Solow, 1957[44]).

[14] See (Gilbert and Greene, 2015[14]).

[15] https://ec.europa.eu/commission/presscorner/detail/en/ip_22_5364.

[16] (European Commission, 2017[55]), M.7932, Dow/DuPont, decision of 27 March 2017, paras 1977 and 1979-1980. Other cases include the M. 6166 Deutsche Börse/NYSE Euronext, confirmed on appeal to the General Court where structural concerns over innovation were also underlying the prohibition, and where

a unilateral effects analysis with innovation as the theory of harm rather than an increase in prices was considered, leading to considerations of a reduction in the incentives to innovate.

[17] At p.31. "*The United States still accounts for around half of the capital being invested, but Europe was the only major region to increase investment in 2020 and China's share of the market has risen from 5% in the 2010-14 period to over 35% in the last three years*".

[18] See OECD, (2020[45]), Start-ups, Killer Acquisitions and Merger Control, for a full treatment of such types of cases, with a focus on digital and pharma industries.

[19] See paras 52 et seq. https://www.ftc.gov/legal-library/browse/cases-proceedings/1910035-illumina-incpacific-biosciences-california-inc-matter.

[20] Case No. 9660 Google / Fitbit, recital 529.

[21] Commission Guidance on the application of the referral mechanism set out in Article 22 of the Merger Regulation to certain categories of cases, published on 6 March 2021, C(2021) 1959 final.

[22] Complaint of the DOJ to the District Court for the District of Columbia to "stop Google from unlawfully maintaining monopolies through anticompetitive and exclusionary practices in the search and search advertising markets and to remedy the competitive harms" - https://www.justice.gov/opa/pr/justice-department-sues-monopolist-google-violating-antitrust-laws.

[23] Complaint of the FTC for Injunctive and other Equitable relief: https://www.ftc.gov/system/files/documents/cases/051_2021.01.21_revised_partially_redacted_complaint.pdf.

[24] Germany contribution to the Abuse of dominance in digital markets OECD GFC Roundtable, https://one.oecd.org/document/DAF/COMP/GF/WD(2020)32/en/pdf.

[25] On 8 March 2022 the CMA published its decision to accept commitments from Gridserve Holdings Limited, MOTO Hospitality Limited and MOTO Holdings Limited, Roadchef Limited and Extra MSA Property (UK) Limited and a number of its subsidiaries - https://assets.publishing.service.gov.uk/media/622634d28fa8f5490d52ef91/EV_decision_to_accept_commitments_V2_070322.pdf . Being a commitment decision, the CMA closed its investigation with no decision made as to whether or not there was an infringement of the Competition Act.

[26] A full list may be found here: https://single-market-economy.ec.europa.eu/industry/strategy/industrial-alliances_en.

[27] To be clear, excluded from the scope of this section is agreements that are considered to be cartel conduct, such as price fixing, bid rigging and customer or market allocation, that are per se illegal in all jurisdictions.

[28] See for example, Jay Modrall in CPI Column "The EU's Draft Horizontal Guidelines: Chilling Innovation on Sustainability?", which explains that "*businesses are constrained from entering into agreements to achieve sustainability objectives (sustainability agreements) by fear of antitrust liability*" (2022[56]).

[29] Sustainability agreements in agriculture – consultation on draft guidelines on antitrust exclusion, https://competition-policy.ec.europa.eu/public-consultations/2023-sustainability-agreements-agriculture_en.

[30] European Commission, Press Release 8 July 2021 '*Antitrust: Commission fines car manufacturers €875 million for restricting competition in emission cleaning for new diesel passenger cars*'.

[31] Similar findings result from Acemoglu et al. (2016[63]) that sets out that "*given that the initial distribution of technology gaps, dirty innovation is more profitable, and with no policy intervention, most R&D is initially targeted to the dirty technology*."

[32] See for example, Issue Note "*Will post-COVID-19 recovery packages accelerate low-carbon innovation?*" (Aulie et al., 2022[52]), prepared for the OECD GGSD Forum of 22-23 November.

[33] A regulatory failure exists where, whilst regulatory intervention may be needed, it is inadequate, insufficient, to come or missing. A market failure exists where the market cannot efficiently distribute goods and services. See for example, (Tirole, 2015[26]).

[34] See for instance, Taking charge: the electric vehicle infrastructure strategy, UK Government - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1065576/taking-charge-the-electric-vehicle-infrastructure-strategy.pdf.

[35] A comprehensive review of stationary energy storage devices for large scale renewable energy sources grid integration, (Kebede et al., 2022[58]).

[36] See Section 2.

[37] While this section discusses the design of new measures, there are important benefits to be had from the removal of existing subsidies with environmentally harmful effects, notably in relation to fossil fuel subsidies and certain forms of agricultural support. See further: (OECD, 2022[60]), Agricultural Policy Monitoring and Evaluation 2022: Reforming Agricultural Policies for Climate Change Mitigation, OECD Publishing, Paris.

[38] Reducing the demand side problem, as it provides higher certainty and thus increases incentives to invest in product development (Hausman and Rodrik, 2003[62]).

[39] Porter 1995 – "regulation can be an important influence on the direction of innovation, either for better or for worse".

[40] To note that the OECD tracks these measures in services sectors under the OECD Services Trade Restrictiveness Index, (OECD, 2022[51]), which covers 22 sectors in 50 countries.

[41] Executive Order on Promoting Competition in the American Economy of July 09, 2021. The Executive Order sets out that "Agencies can and should further the polices… of this order by, among other things, adopting pro-competitive regulations and approaches to procurement and spending, and by rescinding regulations that create unnecessary barriers to entry that stifle competition". The following five reports have been released so far: Comprehensive Plan for Addressing High Drug Prices: A Report in Response to the Executive Order on Competition in the American Economy—Department of Health and Human Services (HHS), Office of the Assistant Secretary for Planning and Evaluation State of Competition within the Defense Industrial Base—Department of Defense (DOD) The State of Labor Market Competition – Treasury Department Competition in the Market for Beer, Wine, and Spirits—Treasury Department Agricultural Competition: A Plan in Support of Fair and Competitive Markets—U.S. Department of Agriculture (USDA).

[42] An example is the OECD Competition Assessment of the Mexico Gas Sector, (OECD, 2019[50]).

[43] Erika Färnstrand Damsgaard, Per Hjertstrand, Pehr-Johan Norbäck, Lars Persson, Helder Vasconcelos, (2017[57]), 23 Nov 2017, Fostering breakthrough entrepreneurship state that "*policies designed to reduce entry costs could stimulate entrepreneurship, but entrepreneurship that takes too little risk from a point of view of a society in which consumers benefit from breakthroughs that challenge incumbents. Put another way, an entrepreneurial policy leading to a significant decrease in the cost of commercialisation can give rise to more entrepreneurial entry, but at the same time to a reduction in the likelihood of breakthrough inventions*".

[44] Bak (2017) has estimated that Investment in R&D by Canadian clean technology firms has hovered at 10 percent of revenue per year which compares to the aerospace industry, and is twice that of the pharmaceutical industry.

[45] According to the survey in Bak (2017), 62 percent of clean technology firms manufacture some or part of their own product. At the same time, as the roll-out of supply chain develops and more specialisation takes hold, it can be expected that intermediaries may provide some/many of the components, which at the start may need to be undertaken by the innovating firm itself.

[46] According to the authors, the wide-spread deployment of important innovations such as the intermodal shipping containers or smartphones would not have occurred without standardisation.

[47] Blind, Petersen and Riillo, (2017[41]) found that the use of formal standards and regulation could impact firms' innovation efficiency differently depending on the extent of the uncertainty of that particular market. A possible explanation offered by the authors is that "formal standards decrease technological uncertainty as they give direction for further technological developments".

[48] Bak (2017) relating to Canada which finds that in a survey of 83 innovative energy and clean technology firms "access to capital and ability to intervene in regulatory reviews were highlighted as the most pressing issues in the short to medium term".

[49] (CMA, 2020[49]), Regulation and Competition, A Review of the Evidence.

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# Annex A. High Level Symposium Agenda

| | |
|---|---|
| **PART I: Integrating Competition into Government Measures** | |
| 14:00 – 14:15 | **Welcome remarks by Kerri-Ann Jones, Deputy Secretary-General, OECD**<br>**Opening remarks by Carmine Di Noia, Director of Financial and Enterprise Affairs, OECD** |
| 14:15 – 14:30 | **Keynote Address by Frédéric Jenny, Competition Committee Chair, OECD** |
| 14:30 – 16:30 | **Panel Discussion on Integrating Competition into Government Measures for Sustainable Growth**<br>Discussants:<br>• **Marion Jansen**, Director of Trade and Agriculture Directorate, OECD (moderator)<br>• **Sabine Weyand**, Director General for Trade, European Commission<br>• **Margarida Matos Rosa**, Head of Portuguese Competition Authority<br>• **Pablo Hevia-Koch**, Head of Renewable Integration and Secure Electricity, IEA<br>• **Julia Reinaud,** Senior Director, Breakthrough Energy<br>Lead Interveners(s):<br>• **Debora Revoltella**, Chief Economist European Investment Bank<br>• **Michael Grenfell**, Executive Director, Enforcement, CMA<br>• **Thorsten Käseberg,** Head of Competition Policy, German Federal Ministry for Economic Affairs and Climate Action<br>Discussion and questions from the floor |
| 16:30 – 16:45 | **Break** |
| **PART II: Competition, Innovation and Industrial Strategies for Sustainable Growth** | |
| 16:45 – 18:30 | **Panel Discussion on Competition, Innovation and Industrial Policy for Sustainable Growth**<br>Discussants:<br>• **Andrew Wyckoff**, Director, Science, Technology and Innovation, OECD (moderator)<br>• **Daron Acemoglu**, Professor MIT<br>• **John Van Reenen**, Ronald Coase School Professor LSE<br>• **Kelly Sims Gallagher**, Professor of Energy and Environmental Policy, Tufts University<br>• **Diane Coyle**, Professor Bennett Professor of Public Policy, University of Cambridge<br>• **Cristina Caffarra**, Managing Partner and Head of Keystone<br>Lead Interveners(s):<br>• **Jacques Crémér**, Professor Toulouse School of Economics<br>• **Simon Evenett,** Professor of international trade and economic development, University of St. Gallen<br>• **Jeromin Zettelmeyer**, Director, Bruegel<br>Discussion and questions from the floor |
| 18:30 – 18:40 | **Conclusions from Frédéric Jenny**, OECD Competition Committee Chair |
| 18:40 – 20:30 | **Networking event** |