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No net zero without SMEs: Exploring the key issues for greening SMEs and green entrepreneurship

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OECD SME and Entrepreneurship Papers

No Net Zero without SMEs

Exploring the key issues for Greening SMEs and Green Entrepreneurship

SMEs and entrepreneurs are of critical importance for reaching climate objectives. They have a significant environmental footprint on aggregate, but also make important contributions to reaching net zero through their innovations and greening efforts. This paper discusses the importance of taking entrepreneurs and SMEs into account in climate and environmental policies. It analyses the drivers and barriers of green entrepreneurship and the greening of SMEs, and discusses policy options to support these objectives.

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Keywords: small and medium-sized enterprises, SMEs, small business, entrepreneurship, start-ups, government policies, climate, environment

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Executive summary

For a long time, despite their significant potential in shaping the green transition, **SMEs and entrepreneurs have received limited attention in analysis and in the policy debate regarding climate change. However, that pattern is changing**. A number of national, sub-national and international policy initiatives are now being developed to foster green entrepreneurship and to SME greening.

Environmental issues are important from an SME and entrepreneurship perspective for several reasons. On the one hand, on aggregate SMEs have a significant environmental footprint. Environmental degradation can also generate challenges for SMEs survival and growth. On the other hand, SMEs and entrepreneurs are, and can be even more of, a source of innovation and solutions by developing the technologies needed to address environmental challenges. Finally, the transition to a more sustainable economy can lead to the development of new green markets that open up new opportunities for SMEs and entrepreneurs. However, data and analysis of the environmental footprint of SMEs and the contribution of entrepreneurs to eco-innovation are scarce.

Evidence shows that SMEs are increasingly rising up to the challenge to reduce their environmental footprint, and that cost reduction is the primary driver for this, along with changing consumer demand. However, pressure from actors within the SME eco-system plays a significant role as well, including not only consumers but also employees, and investors, and other, typically larger, firms looking to develop greener supply chains.

Well-designed environmental and climate policies can go hand-in-hand with profitability, but the business case for SME greening is often complex. Better insights at a more granular level are needed on the business case for different SME greening actions and the (possible) government action needed to support this.

SMEs and entrepreneurs also face a number of barriers in their greening efforts. In addition to complexity around business cases, a lack of awareness, information and knowledge on changing environmental requirements and needs present other challenges. SMEs also have a more limited access than larger firms to resources do for greening, such as skills, finance and technology, and have to deal with uncertainties in markets and policies that make greening investments challenging. Sustaining the environmental transition of SMEs and entrepreneurs requires a better understanding of their financing needs to invest in greening, along with the identification of appropriate financial products and policies, including through the exchange of good practices.

Although countries have put in place an increasing number of policies to reach climate objectives, these are not always well adapted to SMEs and entrepreneurs. Such policies typically target the broader business population, focussing on the provision of information and advice, regulation, as well as economic incentives such as grants and loans. Better insight on the type of policies best suited to support green entrepreneurship and the greening of SMEs is needed to ensure a coherent and integrated policy approach that recognises differences across types of firms.

Furthermore, there is a wide variation in how countries address SMEs in environmental and climate policies. There is important scope for mutual learning between countries and sharing of experiences on

what works and what works less well, in particular in light of the various recent initiatives in this area. In addition, there is room to further explore the most effective mix of SME oriented and more generic policies in relation to the various environmental challenges and opportunities SMEs encounter (eco-innovation, new green markets, energy and resource efficiency, waste management and the circular economy). Given the large heterogeneity of SMEs and entrepreneurs, and the different environmental challenges they face, it is clear that one-size fits all policies are not the solution.

The COVID-19 pandemic has exposed vulnerabilities of SMEs, and is having a deep and continuing impact on their performance. While rescue policies focused on liquidity support had a strong SME orientation, this is less the case for the recovery packages that have been launched in many OECD countries, in particular with regard to greening. Taking an SME perspective into account in greening measures in recovery packages as well as complementary measures is essential to enable progress on reaching climate mitigation objectives.

Accelerating up-take of greening by SMEs requires mainstreaming this issue in broader SME and entrepreneurship policy frameworks, and ensuring that climate and environmental policies take the perspective of SMEs and entrepreneurs better into account. An integrated whole of government approach, including across levels of government, to SME and greening policies can help mitigate the potential trade-offs between improving environmental and business performance.

Through its Committee on SMEs and Entrepreneurship, the OECD is playing an important role in developing the evidence and policies that enable SMEs and entrepreneurs to adapt to, and thrive from, the green transition. In November 2021, the OECD established a Platform on Financing SMEs for Sustainability, bringing together key stakeholders, including public and private financial institutions, policy makers and SME representatives, with the aim to foster knowledge sharing on sustainable finance for SMEs and identify practical financial solutions to accompany SMEs on their journey to net zero. Current work focuses on better understanding the drivers and barriers for green entrepreneurship and the greening of SMEs, taking account of their different types of sectors, places, and business models ,, in order to assess the implications for policy design (including in recovery packages from COVID-19) as well as on the demand and supply of sustainable finance for SME greening. Strengthening the evidence-base on the greening of SMEs and entrepreneurship is of key importance to reach climate objectives in the years to come.

1 Introduction and background

Mitigating climate change is among the most central issues on the global policy agenda. An increasing number of countries – almost all countries in the OECD -- have committed to reach 'net zero' greenhouse gas (GHG) emissions by 2050. Net zero emissions refers to the situation where greenhouse gasses (GHG) going into the atmosphere are balanced by removal of others out of the atmosphere. The COP26 conference in November 2021 in Glasgow brings further momentum, including for the steps towards emissions neutrality to be undertaken by 2030. These efforts have also taken on a new urgency and impetus in the wake of the COVID-19 pandemic. Various OECD countries have launched recovery packages, which include environmental objectives and measures to 'build back better'[1].

Although the business-climate nexus has been an integral part of climate change discussions, including in the OECD Green Growth Strategy (OECD, 2011[1]) (OECD, 2015[2]), for a long time, small and medium-sized enterprises (SMEs) have often been absent from this debate. The key focus has historically been, with few exceptions (Mazur, 2012[3]), on large emitters, in part because data on the environmental footprint of SMEs were scarce. When smaller companies were part of the debate, this was mostly in the context of green entrepreneurship and eco-innovation (OECD, 2013[4]) (OECD, 2017[5]) (Koirala, 2019[6]) (OECD, 2020[7]). In short, SMEs and entrepreneurs were seen mainly as part of the solution, and less as part of the problem, given the various examples of successful green innovation by SMEs and entrepreneurs.

Currently, there is a growing awareness of the role of SMEs in climate policies and analysis, for several reasons. First, with climate mitigation ambitions and milestones becoming more concrete and more urgent (focused on 2030 as well as 2050[2]) it has become increasingly clear that all actors in the economy must play a role and that, although the impact of individual entrepreneurs or SMEs may be limited, collectively they play an important role. Second, a growing number of countries are launching SME Strategies and other comprehensive approaches to SMEs and entrepreneurship, which, in many cases, include a focus on environmental issues. Third, the COVID-19 pandemic demonstrated the importance and vulnerability of SMEs (OECD, 2020[8]) (OECD, 2021[9]). While governments put liquidity support to SMEs at the heart of their responses to the crisis, SMEs are less targeted in recovery measures, leading to discussions on how green recovery measures could take the circumstances and needs of SMEs better into account (OECD, 2021[10]) while avoiding a negative impact on SME competitiveness.

Against this background, this paper provides a stocktake of data, analysis and policies in relation to the greening of SMEs and green entrepreneurship, and explores the key issues. It first discusses the relevance of the topic. It then provides an overview of insights on what drives or hinders green entrepreneurship and SMEs' greening performance, and their ability and motivations to become more active innovators and contributors to the reduction of GHG emissions. Finally, the paper discusses recent developments in SME and entrepreneurship policies, including COVID-19 recovery measures, and how they can support the greening of SMEs and green entrepreneurship.

This paper is about the greening of SMEs and green entrepreneurship. Given the urgency of combatting climate change, its focus is on the role of entrepreneurs and SMEs in reducing GHG emissions (net zero), and in particular CO2 (carbon neutrality). However, where relevant, the paper also reviews other aspects of environmental challenges, including in relation to waste and circularity. The paper uses the term 'greening' as the most generic term on measures to protect the environment.

[1] https://www.oecd.org/coronavirus/en/themes/green-recovery

[2] As in the Fit for 55 proposals by the European Commission launched on 14 July 2021 (https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541).

2 The role of SMEs and entrepreneurs in the green transition

Environmental issues are important from an SME and entrepreneurship perspective for several reasons. First, SMEs on aggregate have a significant environmental footprint. To achieve environmental and climate objectives it is important for policies to provide the right incentives and resources for SMEs according to their needs and circumstances, to enable them to participate in the green transition. Second, SMEs and entrepreneurs can be a source of innovation and solutions to develop the technologies needed to address environmental challenges. Third, environmental challenges can also generate challenges for SMEs survival and growth. From rising sea levels to land degradation or water scarcity and quality, SMEs in both OECD and non-OECD countries face the consequences of environmental degradation, and may encounter specific challenges regarding adaptation and resilience. Fourth, new environmental technologies and new markets, for instance in the circular economy, can provide opportunities for SMEs to grow and create jobs. However, climate policies that are not well designed can also affect SME competitiveness and risk putting many viable ones out of business. The environmental footprint of SMEs

On aggregate SMEs contribute significantly to emissions and pollution…

Information and research on the contribution of SMEs to pollution in its different forms as well as their strategies for reduction, is scarce, scattered and dated (Aragón-Correa et al., 2008[11]) (Redmond et al., 2008[12])**.** Table 1 provides an overview. A seminal study, which includes widely quoted data on the environmental impact of SMEs, is a report for the European Commission by (Calogirou et al., 2010[13]) (see also (Miller et al., 2011[14])). Using a combination of data sources (including data on SME compliance with environmental legislation they conclude that SMEs contribute to 64% of industrial pollution in Europe. 40-50% of SMEs are considered to have a large impact on the environment, mostly relatively large SMEs (with more than 50 employees) in relatively polluting sectors. According to the study, micro firms account for 30% of environmental impact. Other studies, that use different methodologies, point in the same direction and suggest the SME environmental footprint is on aggregate substantial. (Mitchell et al., 2011[15]) suggest that SMEs in the EU account for 60-70% of total industrial waste. (Blundel, Monaghan and Thomas, 2013[16]) suggest that SMEs cause 43% of serious industrial pollution incidents in England and Wales and are responsible for 60% of commercial waste. In addition, one third of UK SME expenditure on energy is wasted through inefficient practices.

(Hill, 2015[17]), describing SMEs as the 'neglected middle', suggests that in the United States small businesses contribute to USD 60 billion in annual energy costs and nearly half a billion metric tons of annual carbon emissions, equivalent to powering half of the homes in the US every year. An IEA study concludes SMEs account for 13% of energy use worldwide (IEA, 2015[18]). Data analysis by the LEAD4SME platform on European SMEs, estimates that the share of SMEs in gross inland energy consumption ranges between 9% and 29%, and that in some European countries (Italy, Poland, Slovakia, Greece, Croatia) SMEs rank as companies with a medium to high energy intensity (energy consumption/value added), whereas in other countries (Austria, Portugal, United Kingdom) their energy intensity is low (Reuter, Lackner and Brandl, 2021[19]). (Sheenan and Lee, 2012[20]) In their study on greenhouse gas management by SMEs in Canada suggest that transport makes up 40% of the greenhouse gas (GHG) emissions by SMEs, followed by heating (25%).

Table 1. Overview of recent estimates of the environmental footprint of SMEs and entrepreneurs

Firm size	Country	Findings	Source
		Pollution and environmental impact	
SMEs	European Union	SMEs contribute to 64% of industrial pollution in Europe, with differences in sectors between 60% and 70%. 40-45% of SMEs are considered to have a large impact on the environment, mostly in companies of over 50 employees and/or in sectors of a relatively polluting nature, such as the manufacturing sector A very large proportion of companies, estimated at 55- 60% of SMEs, are SMEs with a low impact on the environment.	(Calogirou et al., 2010[13])
Micro firms	European Union	Micro firms account for 30% of environmental impact.	(Calogirou et al., 2010[13])
SMEs	England and Wales	SMEs cause 43% of serious industrial pollution incidents in England and Wales and are responsible for 60% of commercial waste. One-third of UK SME expenditure on energy is wasted through inefficient practices.	(Blundel, Monaghan and Thomas, 2013[16])
SMEs	European Union	SMEs in the EU cumulatively cause 64% of total industrial pollution and account for 60-70% of the total industrial waste	(Mitchell et al., 2011[15])
		Emissions	
SMEs	United Kingdom	14% of SMEs are involved in the top six emitting sectors, which (cumulatively) account for 57% of total business driven emissions. At the other end of the spectrum, over half (54%) of SMEs are active in sectors emitting just over 3% of UK business-driven greenhouse gasses overall. SMEs make up at least half of the UK business driven emissions or around 35% of total GHG emissions	(British Business Bank, 2021[21])
MSMEs	World	Small firms make up for 50% of GHG emissions	(ITC, 2021[22])
		Energy use	
SMEs	United States	SMEs as the "neglected middle", suggests that in the US small businesses contribute to USD 60 billion in annual energy costs and nearly half a billion metric tons of annual carbon emissions, equivalent to powering half of the homes in the US every year.	(Hill, 2015[17])
SMEs	Europe	SMEs account for 9-29% of gross inland energy consumption. In some countries (Italy, Poland, Slovakia, Greece, Croatia) energy intensity of SMEs is medium to high, whereas in other countries it is low (Austria, Portugal United Kingdom).	(Reuter, Lackner and Brandl, 2021[19])
SMEs	World	SMEs use more than 13% of global total final energy demand (74 exajoules).	(IEA, 2015[18])
SMEs	United Kingdom	SMEs account for 42% of energy use in the non-domestic building stock SMEs account for 54% of all energy consumption in the business sector, of which 20% by medium sized firms (100-250) and 34% for micro and small firms.	(BEIS, 2016[23]) (Blundel and Hampton, 2021[24]) (UK Government, 2017[25])
SMEs	United Kingdom	57% of electricity and 50% of gas in the industrial and commercial sector is consumed by SMEs	(DECC, 2015[26]) (Fawcett and Hampton, 2020[27])
SMEs	Australia	The proportion of business energy use by firms with less than 200 employees is 29% for electricity and 27% for natural gas	(ABS, 2016[28])[3] (Fawcett and Hampton, 2020[27])
SMEs	United States	The share of firms with 1-249 employees in business energy consumption for all purposes is 36%; the share for firms with 1-499 is 56%.	(U.S. Energy Information Administration (EIA), 2018[29])[4] (Fawcett and Hampton, 2020[27]) (Trombley, 2014[30])

[3] https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4660.0Main+Features12014-15

[4] https://www.eia.gov/consumption/manufacturing/data/2018/#r1

		Energy demand of manufacturing SMEs is about 5.4 EJ or half of total final industrial energy demand.	
SMEs	China	SMEs on aggregate consume 2.5 times as much energy as larger firms.	(IFC, 2112[31])
SMEs	Italy	Manufacturing SMEs' energy demand is 70% of the total industrial sector energy demand.	(Trianni and Cagno, 2011[32])
SMEs	Sweden	SMEs account for 30% of industrial energy use	Statistics Sweden (Paramonova, Backlund and Thollander, 2014[33])
SMEs	Canada	Transport makes up 40% of the GHG emissions by SMEs, followed by heating (25%).	(Sheenan and Lee, 2012[20])

...although the lack of precise data at more granular level hinders a more detailed diagnosis

These estimates suggest that, on aggregate, SMEs have a substantial environmental footprint, although this finding receives relatively limited attention in analysis and policy discussions. At the same time, interpreting these figures poses challenges. Since SMEs on average in OECD countries account for 60% of employment and 50-60% of value added, (Walker et al., 2008[34]) suggests that SMEs are more 'pollution-intensive' than big business, but this masks the wide diversity that exists across countries, firms and sectors, on which more recent and more precise granular data are lacking. Even when data exist, they differ by what aspect(s) of pollution are measured, what their source is (for instance permits or actual emissions), what the sectoral scope is (for instance ETS[5] or non-ETS sectors) and if and how data can be compared. In fact, according to some studies, emissions are highly concentrated among a limited number of firms. For instance, the Climate Accountability Institute finds that the 20 major fossil fuel companies can be linked to more than one third of global greenhouse gas emissions since 1965.[6] Similarly, the NGO Climate Action suggests that the world 100 largest emitters account for two-third of global emissions.[7] These findings seem to contradict the suggested large share of SMEs found in other studies, although methodological differences may mean that the contradiction in reality is limited.[8]

Many SMEs undertake efforts to reduce their footprint…

SMEs are taking steps to reduce their environmental footprint. (ERC, 2020[35]) analysis in the United Kingdom suggests that 72% of SMEs took steps to reduce their environmental footprint in 2020. (European Commission, 2015[36]) finds that 87% of SMEs in Europe undertake some action to be more resource efficient in waste, energy or water. The percentage in the US is slightly higher. (European Commission, 2018[37]) suggests that resource efficiency efforts by SMEs intensified in recent years. (European Commission, 2020[38]) reports that 91% of SMEs undertake at least one form of environmental or social sustainability action, ranging from 61% in recycling or reusing materials to 52% in reducing energy and the consumption of natural resources (see Figure 1).

This change in attitudes of SMEs towards greening is a gradual process. In 2010, (Revell, Stokes and Chen, 2010[39]) suggested that "SMEs may be coming around to the idea that there is a business case for sustainability, although there is still some scepticism on the overall profitability of environmental action". More recently, the UK Carbon trust indicated that "more than half of SMEs see a greener economy as a threat, about half of small businesses believe that benefitting from the green economy requires a lot of investment capital, and only 22% think that investing in green products and services will lead to higher

[5] Emission trading system

[6] https://climateaccountability.org/

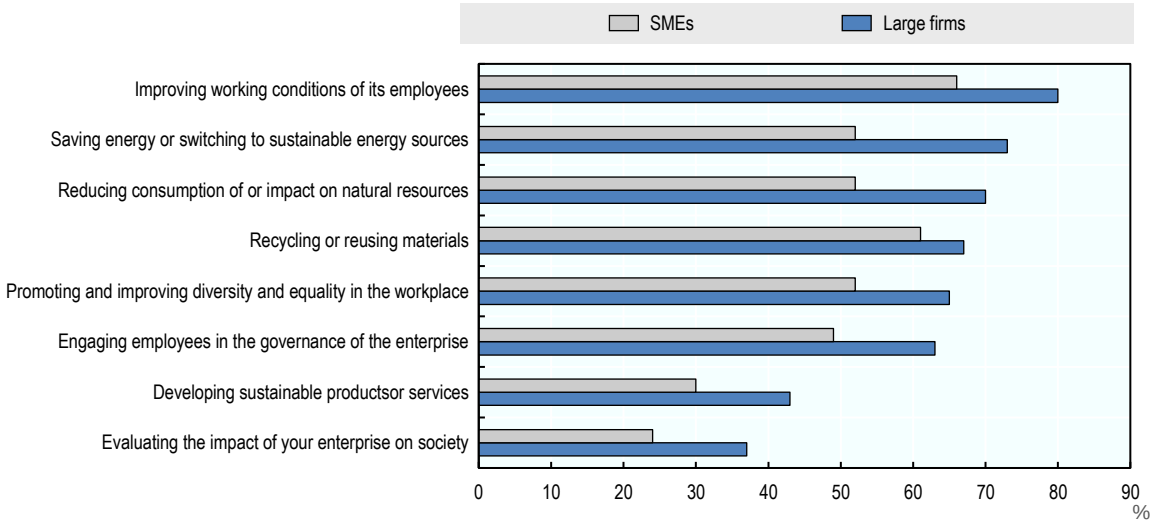
[7] http://www.climateaction100.org/

[8] The Climate Accountability study looks at emissions over a longer time horizon and includes emissions not just related to the production but also the use of fuel. The Climate Action study focuses on industrial CO2 emissions, with SME emissions possibly being more significant in agriculture and other sectors.

profits" (OECD, 2018[40]). Finally, a survey by Bpifrance suggests that SME owners as citizens support climate objectives, but do not see this as priorities for their business.[9] This shows how attitudes towards greening do not always lead to concrete abatement steps.[10]

Figure 1. Environmental and social sustainability action by firm size

In terms of environmental and social sustainability, which of the following actions, if any, is your enterprise actively taking? (Multiple responses possible)



Note: Sample covers 12 615 firms in European Union Member States. The survey was conducted between February and May 2020.
Source: (European Commission, 2020[38])

…although less so than larger firms…

Figure 1 shows that in Europe, large firms take more steps to improve their environmental performance than smaller firms do. Data from the European Investment Bank from 2020 and 2021 further document this difference, with 38% of SMEs indicating they have already invested in tackling the impact of weather events and reducing carbon emissions, compared to 53% of large firms; regarding investments in energy efficiency, the difference in the share between SMEs (35%) and large firms (60%) is even larger, with investment by larger firms also increasing more rapidly (EIB, 2021[41]). A survey by Bpifrance shows that both SMEs and larger firms increasingly see net zero as a priority (60-62%), but that while 63% of large companies take action, 54% of SMEs do so, and 41% of micro-enterprises.[11] A survey by the International Trade Centre shows similar results for MSMEs in Africa: whereas 60% of large firms in Africa invested in measures to counter the impact of environmental change, only 38% of MSMEs has so far done so (ITC, 2021[22]). Research by Rabobank in the Netherlands shows considerable differences between large firms and SMEs in steps taken towards a greener economy, with a score of 6.5 (out of 7) for larger firms, but 5.7-5.8 for micro and small companies,; these differences in greening efforts have been amplified during the COVID-19 pandemic (Groenewegen et al., 2021[42]).

Figure 1 also shows that the gap between SMEs and large firms varies: it is large in the reduction of energy or natural resource use, but relatively small for other activities, notably recycling and reusing materials

[9] https://lelab.bpifrance.fr/get_pdf/1817/bpifrance_le_lab_climat_110x177_062020_cl_num_v10.pdf

[10] Upcoming work by the German Institute for SME Studies in Bonn will further explore this.

[11] https://www.mazars.fr/Accueil/Insights/Publications-et-evenements/Etudes/Les-dirigeants-face-a-la-neutralite-carbone

(61% for SMEs and 67% for large firms). This suggests that SMEs face fewer firm size-related barriers in regard to the circular economy than for other types of activities.[12]

…and large differences in greening efforts exist among SMEs

Differences also exist within the SME population. In an earlier study, (Miller et al., 2011[14]) find that the 40-50% of SMEs that have a relatively large impact are also the ones most likely to invest in environmental tools and solutions. (European Commission, 2020[38]) reports that start-ups and scale-ups are more likely to have a sustainability strategy than other SMEs.

Evidence on magnitude and impacts of SME greening efforts remains scarce

Companies that actively promote actions to reduce their environmental impact, or the "green segment", account for 3-4% of the micro companies, 7-8% of the small companies, 6-7% of the medium-sized companies and 16-17% of large companies (Calogirou et al., 2010[43]). In their study of waste management practices, (Mitchell et al., 2011[15]) suggest that even though SMEs are 'well intentioned' towards engagement with environmental issues, in the EU only 24% of SMEs were acting to reduce their environmental impact. Similarly, the EIB country scoreboard on SMEs shows that 38% of SMEs have made some investment in addressing climate risk, while 19% have plans to invest in climate change (EIB, 2021[44]).

The German SME bank KfW estimates a volume of roughly EUR 5.8 billion in climate action investment by SMEs for the year 2019, but concludes there are no reliable data in this area (Borger et al., 2020[45]). KfW surveys show that investment aimed at saving energy or improving energy efficiency has gained importance among SMEs in the past, and that an awareness shift is visible. Besides preserving resources, the aim is to achieve greater independence from energy price fluctuations and, not least, falling energy costs as a reward for additional efforts. Between 2014 and 2016 (in the absence of more recent data), 37% of all SMEs in Germany implemented measures aimed at improving energy efficiency and saving energy costs. Whereas less cost-intensive and easy-to-implement measures tended to dominate in the past, there were sharp increases particularly in capital-intensive energy efficiency measures. Box 2.1 provides an overview of recent survey analysis on SMEs and greening.

Box 2.1. Surveys on SME environmental performance and attitudes

In recent years, various organisations have undertaken surveys to obtain better insights in SME environmental performance, both in terms of their footprint and their intentions and efforts around reductions. In fact, many of the studies discussed in sections 2.1 and 2.2 rely on surveys, given the limited availability of official statistics on SMEs and the environment. Banks, in particular business and development banks with a focus on SMEs, such as the British Business Bank, Bpifrance, KfW, the Business Development Bank of Canada and the EIB group, have been a primary source for surveys. Research institutes (such as IFM Bonn, ERC) are also increasingly including environment related questions in SME surveys they undertake. The European Commission and the International Trade Centre also play an important role.

COVID-19 has contributed to a remarkable growth of wider SME surveys across the world, which focused on impacts of the pandemic, for instance by SME organisations and platforms, with limited focus on environmental issues so far (OECD, 2021[10]). The inclusion of key aspects of SMEs and climate and environmental issues in surveys, and a greater uniformity in the survey questions asked, could enhance cross-country comparable insights into SMEs and the green transition.

[12] A relevant question for further analysis could be if and how firm size related barriers and drivers differ for various efforts to reduce environmental footprints (circularity, energy/resource efficiency, waste).

In recent years, **Bpifrance** has undertaken various surveys among SMEs in France with a specific focus on actions they take to reduce their environmental and carbon footprint.[13]

The **KfW** SME Panel of 15,000 German SMEs includes questions related to energy use and efficiency measures by SMEs in various special issues (Borger et al., 2020[45]) (Schwartz and Brüggemann, 2018[46]) (Schwartz and Braun. Marlene, 2013[47]).

The **British Business Bank** in 2021 has launched a survey among SMEs with a focus on net zero as part of the preparations for the COP26, which includes questions on both the environmental footprint of SMEs, as well as their actions and plans for reducing it.[14]

In the United Kingdom, the **Department for Business, Innovation, Energy and Industrial Strategy** (BEIS) runs a regular Longitudinal Small Business Survey (LSBS) at national scale, which has a number of relevant questions on energy use.[15]

The United Kingdom **Office for National Statistics** (ONS) runs a regular Business Impacts of Coronavirus (BICS) which in its 33rd edition differentiates by firm size which added question around emissions showing that small companies (0-9 employees) are almost three times as likely than large firms (more than 250 employees) in not intending to take initiatives to cut emissions in the next 12 months.[16]

The UK **Enterprise Research Centre** (ERC) includes questions on SMEs and the environment as part of its annual State of Small Business Britain reports (ERC, 2020[35]) (Kesidou and Ri, 2021[48]).

The **Institut für Mittelstandsforschung Bonn** (IfM Bonn), in Germany undertakes surveys among SMEs with a focus on environmental issues, with an emphasis on behavioural aspects.[17]

The **Austrian Institute for SME Research**[18] has also done surveys in this area, for instance surveys among 2000 self-proprietors on sustainability and surveys among innovation leaders on eco-innovation in the circular economy context.[19]

The **Business Development Bank of Canada** in 2021 has done a survey on SMEs and the environment (BDC, 2021[49]), Within the **Montreal Group**, discussions among business banks have started on the surveys held on this topic.[20]

The 2021 **International Trade Centre**'s SME Competitiveness Report is based on a worldwide survey among SMEs, which for the 2021 edition had a focus on climate and environmental issues (ITC, 2021[22]).[21]

The **European Commission** has focused on SMEs and greening through its Eurobarometer surveys, both in surveys that explicitly focus on the topic (European Commission, 2015[36]) (European

[13] See for instance: https://lelab.bpifrance.fr/Etudes/les-dirigeants-de-pme-eti-face-a-l-urgence-climatique/motion-de-l-etude-les-dirigeants-de-pme-eti-face-a-l-urgence-climatique; https://lelab.bpifrance.fr/Etudes/les-dirigeants-de-pme-eti-face-a-l-urgence-climatique; https://lelab.bpifrance.fr/get_pdf/2372/bpifrance_le_lab_les_ressorts_de_l%27action_4_profils_de_dirigeants_mars_2021.pdf; https://lelab.bpifrance.fr/get_pdf/1817/bpifrance_le_lab_climat_110x177_062020_cl_num_v10.pdf; https://www.mazars.fr/Accueil/Insights/Publications-et-evenements/Etudes/Les-dirigeants-face-a-la-neutralite-carbone

[14] https://www.british-business-bank.co.uk/forthcoming-research-smes-and-net-zero/

[15] https://www.gov.uk/government/statistics/small-business-survey-2019-businesses-with-employees

[16] https://www.ons.gov.uk/economy/economicoutputandproductivity/output/datasets/businessinsightsandimpactontheukeconomy

[17] https://www.ifm-bonn.org/statistiken/forschungsdaten-des-ifm-bonn;https://www.ifm-bonn.org/forschung/mittelstand-gesellschaft-und-staat/detailansicht/artikel/herausforderungen-und-chancen-des-klimawandels-fuer-den-mittelstand-1

[18] https://www.kmuforschung.ac.at/?lang=en

[19] https://www.ffg.at/sites/default/files/downloads/WiMon_2020_final.pdf

[20] https://www.themontrealgroup.org/en/news/123-non-financial-se rvices-sustainability-one-off-benchmark-call.html

[21] https://www.intracen.org/smeco2021/

Commission, 2018[37]) and as part of wider surveys on SMEs (European Commission, 2020[38]), including through the Enterprise Europe Network.[22]

The 2021 **EIB Investment Survey** includes questions on the twin transition (digital and green), which differentiate by firm size in a number of climate and energy related investments (EIB, 2021[41]).

Surveys are also held among start-ups in relation to their eco-innovation and environmental efforts, including for instance in the circular economy (Bauwens et al., 2019[50]).

Small business organisations are including questions on climate change in their surveys as well, for instance the Quarterly Economic Survey by the UK business organisation Business West[23], surveys by the British Chamber of Commerce[24], and surveys by Business South Australia.[25]

NGOs dealing with energy and environmental issues have launched surveys as well for instance Carbon Trust.[26]

Consultancy firms also hold regular surveys among SMEs, which increasingly include questions on attitudes towards net zero, for instance the PWC family business survey[27] and a survey by Sage[28] in Canada.

SMEs as sources of environmental innovation

SMEs and entrepreneurs are in a good position to contribute to eco-innovation…

Several OECD studies analyse the participation of SMEs and entrepreneurs in environmental innovation (OECD, 2013[51]) (OECD, 2017[5]) (Koirala, 2019[6]).[29] These studies document how SMEs and green entrepreneurs contribute to eco-innovation in its different forms (incremental, disruptive, radical) and what the drivers and barriers are for this:

- Radical innovation occurs when an entirely new solution is created and leads to a full-scale shift in the technological regime at the time. This has been the case, in recent times, of the revolution in information and communications technologies. Advances in the renewable energy sector such as solar, wind or geo-thermal power come closest to fitting this definition, although they have not yet resulted in a full-scale change in regime.
- Disruptive innovation consists of changing how things are done or specific technological functions are fulfilled, without necessarily changing the underlying technological regime itself. Disruptive innovations typically, though not exclusively, take the form of changes in organisational practices or business models.
- Incremental innovation occurs by modifying existing technology to raise the efficiency of resource and energy use, without fundamentally changing the underlying core technologies or system architecture. An example of incremental eco-innovation is the use of more energy efficient heating systems by SMEs.

[22] https://ec.europa.eu/eusurvey/runner/SME_Panel_Sustainable_Prod_Init

[23] https://www.businesswest.co.uk/resources/quarterly-economic-survey-q2-2021

[24] https://www.britishchambers.org.uk/news/2021/08/carbon-footprint-a-mystery-to-9-out-of-10-small-businesses

[25] https://www.business-sa.com/Commercial-Content/Policy/Research-Insight/climate-change-an-sme-view

[26] https://www.carbontrust.com/resources/smes-and-energy-efficiency

[27] https://www.pwc.com/ca/en/private-company/family-business-survey-canadian-insights-2021.html

[28] https://www.globenewswire.com/news-release/2021/07/15/2263602/0/en/Canadian-businesses-see-pandemic-as-an-opportunity-to-improve-environmental-social-and-community-impact-Sage-study-finds.html

[29] Similarly, the OECD has worked extensively on social entrepreneurship and social innovation, often with a link to environmental aspects of sustainability, see for instance (OECD, 2021[126]) and OECD, Policy Brief on the Social & Circular economies: Fostering Synergies for a Green and Inclusive transition (forthcoming 2021). This work includes various country reviews on sicla entrepreneurship and the social economy (see https://www.oecd.org/cfe/leed/social-economy/).

According to (OECD, 2013[51]), smaller firms, as new entrants to the market, are more likely to pioneer radical and disruptive innovations by exploiting the market opportunities neglected by larger firms. Green entrepreneurs can play a role in leading incremental changes, as well as in catalysing radical eco-innovations, since these innovations tend to challenge existing business models, giving more established firms little incentive to adopt them. Hence, disruptive or radical innovations tend to be pioneered by smaller firms, or new entrants to a market, which often exploit technological or market opportunities that have been neglected by more established firms. (UNEP, 2014[52]) suggests eco-innovation can give access to new and emerging markets, increase profitability along the value chain, help firms to stay ahead of standards and regulation, help attract investment, and increase productivity and technical capacity. (Catapult, 2021[53]) provides examples of how entrepreneurs contribute to innovations to reach climate objectives. SMEs and entrepreneurs can also play a strong role in strengthening resilience and adaptation: they are well suited to reach vulnerable communities in low-income countries, they help communities to become more resilient and they provide resources and innovations for communities to adapt to climate change (Dougherty-Choux, 2014[54]).

…although empirical evidence on the scale and impact is scarce

Although numerous examples and case studies exist of SMEs involved in eco-innovation, empirical evidence on the scale and impact of these innovations is scarce and largely survey-based (OECD, 2013[4]). (OECD, 2017[5]) mentions that in the UK and Finland, SMEs represent more than 90% and 70% of clean tech companies respectively. (OECD, 2013[51]) shows that the share of patents related to climate change mitigation held by firms started after 2000 (amongst which presumably many SMEs) is higher than the share of patents held by these firms for all technologies. The European Commission has developed an eco-innovation scoreboard and index.[30] Finally, evidence on eco-innovation has been identified by (Blundel and Hampton, 2021[55]), including the questions how SMEs can be supported to lead the diffusion of sustainable technologies. However, (OECD, 2013[51]) concludes that “empirical evidence on the role of SMEs and young firms in eco-innovation remains scarce.”

Even when empirical evidence is available, data often do not allow for an analysis of SME eco-innovation in its different forms at more granular level. (Gibb and O’Neill, 2014[56]) In their analysis of green building entrepreneurs in the UK, for instance warn against taking the diversity of green entrepreneurs insufficiently into account. Several studies have proposed typologies to help better understand these differences. (OECD, 2013[51]) distinguishes between three types of SMEs: Eco-innovators, Eco-entrepreneurs and Eco-adopters. (Walley and Taylor, 2002[57]) point to differences among green entrepreneurs and propose a typology to better understand these (opportunist, champion, maverick). In a UNEP study for the G7, (McDaniels and Robins, 2017[58]) propose that green SMEs can be either green performers or green innovators. The distinction between new and incumbent SMEs may be relevant as well. Although these typologies help to avoid generalisations by classifying firms/entrepreneurs according to relevant attributes, the classifications are largely conceptual and appear not to have been tested empirically. It also appears that they have been not interpreted as to the specific opportunities or challenges the types face that may be relevant from a policy perspective (see also Box 4.21).[31]

For some environmental innovations the trade-off with business performance may be larger than for others: measures aimed at reducing energy and/or resource-use lead to greater profitability, whereas innovations aimed at reducing emissions do not by themselves do so, although adjustments in regulatory measures can change that (Ghisetti and Rennings, 2014[59]). From the perspective of greening SMEs and entrepreneurship, this suggests it is important to better understand which of their eco-innovations and abatement steps pay off through reduced resource use costs, and which do not. (OECD, 2018[40]) mentions process efficiency, product design, waste disposal, source of raw material, infrastructure efficiency and

[30] https://ec.europa.eu/environment/ecoap/indicators/index_en

[31] Raes, S. (2021) Understanding SME Heterogeneity: Towards policy relevant typologies for SMEs and entrepreneurship, OECD SME and Entrepreneurship Papers (forthcoming).

packing and transport as areas where eco-innovation can help reduce costs. In other areas, trade-offs may exist between eco-innovation and business development through the uncertainty that such innovations entail (in technology, demand and policy), as well as in opportunity costs of making use of SMEs scarce resources for the purpose of eco-innovation.

New green market opportunities for SMEs and entrepreneurs

There is evidence that responses to environmental challenges create new business opportunities for SMEs and entrepreneurs

Structural changes due to environmental challenges, opportunities and policy responses may also contribute to new markets in which SMEs can benefit. A 2015 consumer survey suggests that such a market is indeed growing, with 66% of global respondents indicating they are willing to pay more for sustainable goods, up from 50% in 2013 (Nielsen, 2015[60]). A widely quoted study by McKinsey and the Ellen McArthur Foundation suggests that adopting the circular economy approach could boost Europe's resource productivity by 3 percent by 2030, generating cost savings of EUR 600 billion a year and EUR 1.8 trillion more in other economic benefits (McKinsey, 2017[61]). (OECD, 2013[51]) lists a wide range of studies that document this growing demand for green. However, this study also concludes that "evidence is still scattered and not comprehensive".

A study by UNEP (UNEP, 2014[52]) suggests that SMEs and entrepreneurs are particularly well placed to exploit these opportunities given their ability to act and react quickly, as does (OECD, 2013[51]) which describes the transition to green growth as creating 'enormous new opportunities for green entrepreneurs'. SMEs and entrepreneurs can leverage eco-innovations done by others to increase their market share and capture new markets since "green" products, services, practices and business models present previously untapped opportunities. This includes the emergence of new markets such as the circular economy, which, hold potential for job creation, increasing GDP and boosting productivity (Laubinger, Lanzi and Chateau, 2020[62]). Such opportunities for SMEs and entrepreneurs can be particularly relevant at local level, for instance where a growing number of buy local initiatives in communities can support locally produced and often green SME sales (OECD, 2020[63]).

Indeed, SMEs appear to see these developments as an opportunity. Various surveys by the European Commission show that one third of SMEs offer green products or services or are planning to do so in the near future, a share that remained roughly stable over the last five years (European Commission, 2015[36]) (European Commission, 2018[37]) (European Commission, 2020[38]). This is below the share of large firms pursuing these activities (43%).

(OECD, 2013[51]) suggests that opportunities particularly exist in the services sectors associated with greener manufacturing. Highly creative and innovative SMEs in the service industry, such as design and architecture firms or bioenergy solution providers, contribute increasingly to eco-innovation and can support and diffuse transformation across a broad range of industries. However, the exact size of opportunities may still be limited. One third of those SMEs reporting to undertake green activities, indicate that such sales remain less than 5% of total (European Commission, 2018[37]).

Environmental degradation affects growth and jobs in SMEs

In both OECD and non-OECD countries, SMEs face the consequences of environmental degradation

In recent years, there has been a steady increase in studies on the impact of environmental degradation on SMEs, in particular in the context of adaptation to climate change, both in OECD countries and non-OECD countries in the developing world (Gannon et al., 2020[64]). In a study based on interviews with SMEs, (Zurich Insurance Group, 2016[65]) find that 80% of SMEs world-wide see an effect of climate change on their business, with 94% in the US and 75% in Europe. 68% of SMEs in Sub-Saharan Africa see environmental change as a significant risk (ITC, 2021[22]). The perceived risks include flooding (mostly

Europe), heavy rain (mostly US, Latin America) and droughts (Asia, Africa). Recent research by the UK Federation of Small Business suggests that two thirds of small businesses were negatively affected by severe weather in the previous three years, with average costs amounting to GBP 7,000 per affected business. Although 93% of small business see severe weather as a risk for their business, only a quarter of micro-businesses have a resilience plan in place that includes adverse weather (Federation of Small Businesses, 2015[66]). (ITC, 2021[22]) finds that 68% of the companies interviewed for ITC's SME Competitiveness Surveys in sub-Saharan Africa said that environmental risks were significant for their businesses, with the share rising to 93% among firms in the primary sector. The EIB Investment Survey shows that 55% of SMEs in Europe expect a major or minor impact of climate change on their operations (EIB, 2021[41]).

3 Drivers and barriers for SME greening and green entrepreneurship

While data on the SME carbon footprint and abatement steps are relatively limited, a significant number of studies focus on what drives or hinders SME environmental performance and innovation (see (Álvarez Jaramillo, Zartha Sossa and Orozco Mendoza, 2019[67]) and (European Commission, 2020[68]) for recent overviews). Drivers point mostly to economic motives, such as consumer demand and cost reduction, whereas barriers include lack of information and awareness, insufficient access to resources and attitudinal aspects. The OECD is currently undertaking work on better understanding the drivers and barriers for green entrepreneurship and the greening of SMEs, and the implications for policy, and on the demand and supply of sustainable finance for SME greening.

Drivers

Consumer demand and cost reductions are key motives for SME greening…

Surveys suggest that about half of SMEs indicate that their main motive to offer green products and services is consumer demand (European Commission, 2018[37]) and hence commercial benefit, since consumer surveys suggest that two-thirds of consumers are willing to pay more for green products (Nielsen, 2015[60]). These commercial benefits can be even greater if there is potential to secure intellectual property rights on green products or services, which creates a competitive advantage in the green marketplace (Koirala, 2019[69]). An example of this is the clean tech sector, where exclusive ownership of a technology allows for commercialisation across multiple organisational channels (OECD, 2013[70]).

Even without launching new products or moving into new markets, SMEs and entrepreneurs can potentially improve the performance of their business by realising efficiency gains and cost reductions by greening their products, services and processes. For instance, 68% of SMEs indicate that costs saving is the primary motivator for resource efficiency actions (European Commission, 2015[36]). According to (IEA, 2015[18]), numerous studies have indicated that the cost savings potential of SMEs is in the range of 10% to 30% of their energy demand. This is a common motive for SMEs but also a challenge because many SME managers and entrepreneurs are not always aware of how this can be achieved. These cost reductions can be achieved in several ways (OECD, 2019[71]):

- *Process efficiency*: SMEs can minimise inputs and waste production by optimising current processes or introducing new, more efficient ones.
- *Product design*: SMEs can re-design their products to reduce the required inputs while maintaining the product's utility.
- *Waste disposal*: SMEs can reduce waste by improving process efficiency, which reduces the cost of waste disposal. Moreover, SMEs may be able to reuse already-generated waste or identify other firms that may be able to use it.
- *Raw materials*: SMEs may be able to reduce the cost of raw materials by using recycled materials.
- *Infrastructure efficiency*: SMEs can generate savings by using more energy efficient technologies (e.g. more efficient heating systems).
- *Packaging and transport*: SMEs can reduce costs by reducing the volume of packaging and utilising local suppliers to reduce shipping and delivery costs.

…although it is unclear how much these amount to exactly

While many SMEs are aware and motivated by such savings (European Commission, 2018[37]), the scale of potential savings varies sectors and countries (and among SMEs and entrepreneurs). SMEs often report that high energy prices are a strong driver of eco-innovation (OECD, 2013[70]), so there are likely greater incentives to adopt green practices in energy-intensive sectors even though the marginal benefit may be lower. However, more recent OECD analysis reports that this impact of higher prices may be smaller for SMEs than for larger entities (Dussaux, 2020[72]). Similarly, (Siedschlag and Yan, 2021[73]) report stronger drivers for green investments for large as compared to smaller firms.

Pressure from the SME eco-system plays a significant role as well…

More than in other areas, barriers to, and drivers of, improved environmental performance for SMEs are related to external stakeholders from employees, investors, customers in the supply chain and the local communities in which SMEs operate. (Walker et al., 2008[34]) for instance regard pressure from internal and external stakeholders as an important driver of better environmental performance. Similarly, (Gadenne, Kennedy and McKeiver, 2009[74]) analyse the connection between external pressure from legislators, environmental groups, suppliers and financial institutions as well as employees on awareness, action and improved environmental practice by SMEs, and show how such connections have different impact. Interaction with governments (through regulation) results in more awareness and willingness to change environmental strategies. Interaction with suppliers can provide an incentive to reduce waste, but less to the adoption of improvements within firms, such as environmental management systems. Finally, reputation, and its relevance for consumers, investors and employees can be a driver as well.

Supply chains and business linkages can play an important role in driving green behaviour by SMEs and entrepreneurs

Participation in supply chains and global markets and business links can also be an important driver for green behaviour among SMEs and entrepreneurs. This influence can occur through several mechanisms, including the necessity to comply with more stringent environmental standards in other markets and through supply chain interactions. SMEs and entrepreneurs that are suppliers to large firms may be required to meet certain energy or transport standards, which can be a strong incentive for adopting green behaviours.

A 2014 report by the Intergovernmental Panel on Climate Change (IPCC) indicates that clustering of SMEs can have a positive impact on competitiveness, as well as contribute to mitigation by limiting resource use, enhancing by-products exchange (including waste heat), enabling infrastructure sharing and joint purchase (e.g., of energy efficient technologies).[32] On the other hand, a lack of cooperation among SMEs can represent a barrier to improving environmental performance. (Triguero, Moreno-Mondéjar and Davia, 2013[75]) explore the drivers of different types of eco-innovations and find that entrepreneurs who give importance to collaboration with research institutes, agencies and universities, and to the increase of market demand for green products are more active in all types of eco-innovations. Supply-side factors seem to be a more important driver for environmental processes and organizational innovations than for environmental product innovations.

…along with policy and regulation

Behavioural changes in SMEs can also be driven by policy and regulation. There is an increasing number of initiatives to foster corporate social responsibility (CSR), responsible business conduct (RBC) and environmental and social governance (ESG). Sometimes these are private initiatives undertaken by individual firms or collectively in supply chains, but governments plan an important role in this as well, which increasingly include SMEs in their scope.

[32] https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter10.pdf

Furthermore, environmental policy can require SMEs to invest in becoming more resource efficient such as installing more efficient heating and lighting. While it is clear that such policies and regulations have the potential to improve firm efficiency and drive them to participate in green markets, it is not always clear if the benefits (e.g. productivity, competitiveness) will outweigh the costs.

According to the European Energy Efficiency Financial Institutions Group (EEFIG) the key drivers for energy efficiency investment in SMEs differ from those of larger entities. While return on investment is the key driver for all size categories, for SMEs the existence of public subsidies and financial support for technical assistance are far more important than other factors (EEFIG, 2015[76]).

Barriers

SMEs face various barriers to meet opportunities and challenges related to the environment…

At the same time, SMEs may face both internal and external barriers to make use of the opportunities that greening offers and deal with environmental challenges (see for instance (OECD, 2013[51]) (OECD, 2018[40]) (UNEP, 2017[77])). These generally fall into the following categories:

i. Lack of information and awareness;

ii. Barriers related to resources, such as time, skills, capacity and funding;

iii. Uncertainty.

Information related barriers

Information related barriers can limit significantly SME greening…

A lack of information and awareness of opportunities, environmental regulations and support options can constitute a significant barrier for greening efforts by SMEs and entrepreneurs. They may lack knowledge of current and upcoming policy requirements, possibilities and opportunities to reduce resource use and available financial or advisory support measures to assist them. This lack of awareness and information is a feature of wider analysis of barriers and drivers of SME performance, but receives particular emphasis in the environmental domain, in part because of the perceived technical and economic complexity of the domain. For instance, (OECD, 2018[40]): “SMEs are often unaware of many financially attractive opportunities for environmental improvement. There is a widespread misperception that protecting the environment is associated with technical complexity, burdens and costs.” The Porter Hypothesis proposes that there is a strong business case for environmental improvements by SMEs, and that the primary bottleneck relates to making entrepreneurs more aware, and providing them with the information and tools to move forward (see Box 3.1).

Box 3.1. The business case for SME greening: the Porter Hypothesis

Several studies suggest that improving SME environmental performance also improve their business and financial performance. (OECD, 2013[51]), referring to the 2011 OECD sustainable manufacturing toolkit, indicates that the business case for environmental sustainability appears quite solid, with most studies finding that the environmental performance of a firm also improves its financial performance. (OECD, 2018[40]) suggests therefore, “the challenge is to convince SMEs that green practices actually reduce costs and make for better business”.

Many studies have explored this issue, in testing the so-called Porter Hypothesis. The Porter Hypothesis asserts that firms can benefit from environmental policies, arguing that well-designed environmental policy and regulation can stimulate innovation, which will in turn increase the

productivity of firms or the product value for end users (Porter, 1991[78]; Porter and Linde, 1995[79]). Thus, it suggests that there is no trade-off between economic growth and environmental protection.

There is a large literature that seeks to confirm the Porter Hypothesis. (Aragón-Correa et al., 2008[11]) report that SMEs with the most proactive environmental practices exhibited a significantly positive financial performance. (Clemens, 2006[80]) finds a positive relationship between green and financial performance of small firms, and suggests that the existence of small firm-oriented green economic incentives helps improve both small firm environmental and business performance. (Sheenan and Lee, 2012[20]) suggest a USD 400 potential cost saving for SMEs per tonne of CO2 equivalent. (Pacheco, Dean and Payne, 2010[81]) argue that entrepreneurs can play a role in finding new solutions to overcoming market failures related to environmental issues. (Caldere, Desha and Dawes, 2017[82]) examine how SMEs can use 'green and lean tools' to improve both environmental performance and reduce costs. (van Leeuwen and Mohnen, 2017[83]) find that resource-saving eco-innovations can improve processes and lead to an increase productivity for firms, but pollution-reducing innovation tends to reduce productivity. (Hessels, Bouman and Vijfvinkel, 2011[84]) find a significant positive association between environmental actions and firm performance in terms of profits. (Jayeola, 2015[85]) studied 98 SMEs in the United Kingdom, and found that pollution prevention and control is positively and significantly associated with profit. A Eurobarometer survey indicates that 41% of SMEs that take resource efficiency actions decreased their production costs over the last two years and 4% said that the decrease in costs had been significant (European Commission, 2015[36]) (European Commission, 2018[37]). The reduction in costs was more likely for larger SMEs (54%) than for micro-enterprises (39%), and more in manufacturing (49% than in retail (34%). According to the IEA, cost-effective energy efficiency measures can save SMEs energy use by 22 exajoules (30%), which amounts to the total energy consumed in Japan and Korea per year (IEA, 2015[18]).

In a useful overview study of these issues, (Ambec et al., 2013[86]) discuss the literature on both the weak (stricter environmental regulation enhances innovation) and strong (stricter environmental regulation enhances business performance) version of the Porter Hypothesis. They conclude that while empirical evidence for the 'weak' hypothesis is clear, this is less the case for the 'strong' variant. It is likely that the potential trade-off is larger in some sectors than others and also may affect groups of SMEs differently than larger firms. There currently is a lack of granular data and analysis about the groups of SMEs for which the business case for greening is as solid as studies suggest, and for which this is not or less the case.

Finally, OECD analysis on environmental policy and technological innovation[33] shows the importance of innovation policies for the decoupling of economic growth and environmental degradation.

…although sometimes a strong business case is not enough to spur action

However, in practice, even when well informed, owner–managers of small firms are 'struggling to bridge the gap between their environmental attitudes (aspirations) and their environmental behaviour (practices)' (Tilley, 1999[87]). (Zowada, 2018[88]) in their study of green logistic practices by SMEs in Poland, likewise conclude that whilst most SME managers are aware of the environmental footprint of their logistic processes, in many firms this has not translated into greening practices. In many cases, the business case may be clear, and indeed informing SMEs on opportunities and obligations is important. However, for environmental improvements by some (and potentially large) groups of SMEs, the business case may be less clear-cut, and hence go beyond information problems. The business case for LED lighting in a

[33] https://www.oecd.org/env/consumption-innovation/innovation.htm

warehouse may indeed be very different from replacing refrigerator systems in a food processing plant. Further analysis at more granular level that distinguishes between the type of greening practice as well as the heterogeneity of firms in size and sector, will be important to better understand the greening dynamics and develop the necessary policies to support the transition. While it is clear that there is potential for eco-innovation and eco-adoption to improve business performance, the transition to a green economy can exacerbate existing challenges for SMEs and entrepreneurs and also create new ones. These challenges will differ across SMEs, depending on the sector and type of investment implied.

Resource constraints

Resource constraints can affect SME capacity for greening…

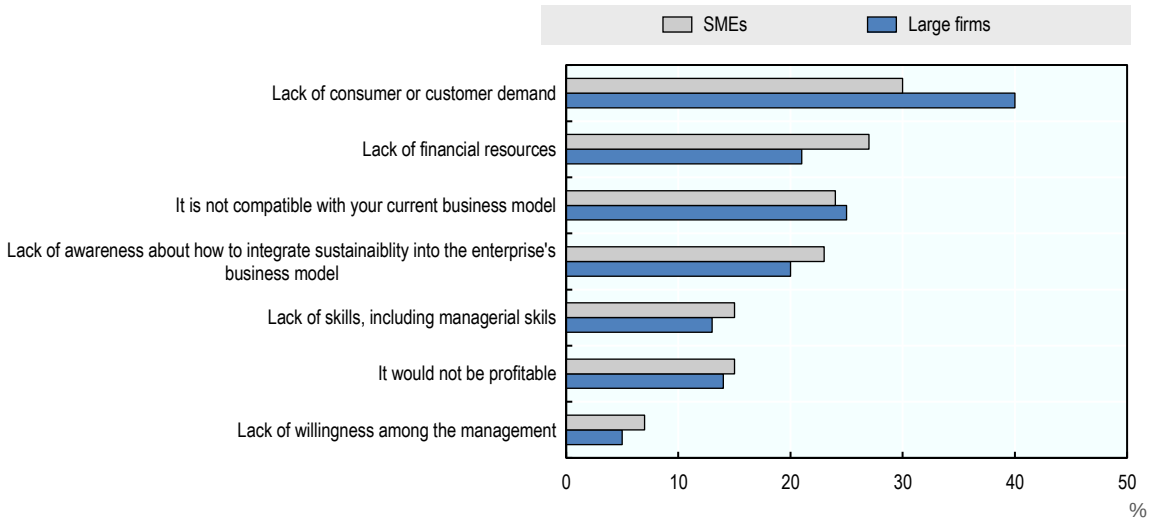
(OECD, 2018[40]) indicates that SMEs willing and capable of adopting sustainable practices and seizing green business opportunities generally face size-related resource constraints, skill deficits and knowledge limitations. Even when SMEs are aware of the potential of better environmental performance to improve a firm's competitiveness, a lack of appropriate skills and expertise commonly prevents firms from acting upon win-win opportunities. At the same time, the lack of resources often leads to SMEs being risk-averse and less willing to invest in new technologies, partly because of the uncertainly about the payback period. For instance, SMEs may be less able than larger firms to access environmental technologies to reduce emissions, either because of imperfections on capital markets, or because of economies of scale in the adoption of environmental technologies. SMEs may also lack the expertise or information on such new technologies. Like in other technology domains, SMEs developing environmental innovation may face challenges in finding capital and in access to government support schemes. Government policy to support the transition to more climate and environment-friendly societies may be more costly to access for small producers than for larger ones. Finally, the availability and development of new technologies, for instance in digitalisation, may affect the internal and barriers that SMEs face in environmental issues and their ability to address them.

…more than for large firms...

Surveys document that resource constraints in the environmental domain regarding both skills and finance are higher for SMEs than for larger firms (Figure 3.1). In the EU, 27% of SMEs see a lack of financial recourses as an important constraint for greening, versus 21% of larger firms; for skills, the shares are respectively 15% and 13%.

Figure 2. SMEs face greater resource constraints than larger firms

Which of the following, if any, are currently preventing your enterprise from becoming sustainable, i.e. combining long-terms success and profitability with a positive impact on society and the environment? (Multiple responses possible)



Note: Sample covers 12 615 firms in European Union Member States. The survey was conducted between February and May 2020.
Source: (European Commission, 2020[89])

…and appear to be greater for environmental than other aspects of SME performance

These resource-related barriers for environmental action by SMEs largely mirror the more generic resource barriers identified in the SME literature. However, (Pinget IREGE and Bocquet, 2014[90]) point out that resource-related barriers for environmental innovation for SMEs are both larger and more widespread than for SME innovation at large. Uncertainties and information asymmetries in accessing finance for environmental improvements and innovation may differ from the more general size-related resource constraints. (Cuerva, Triguero-Cano and Córcoles, 2014[91]) find that technological capabilities such as R&D and human capital foster conventional innovation in SMEs but not green innovation. (Álvarez Jaramillo, Zartha Sossa and Orozco Mendoza, 2019[67]) find that out of 175 identified barriers to sustainability in SMEs, resource based barriers (lack of resources, high initial capital costs and lack of expertise) were the most important. (De Haas et al., 2021[92]) find that organisational constraints hold back the green transition in SMEs. Further reflection on the more specific or generic nature of resource-related barriers for SMEs in dealing with environmental challenges and opportunities seems important, because it may shed light on whether these resource constraints for SMEs in the environmental domain require specific policy attention.

Access to finance

Access to finance is a key resource constraint for SMEs…

As Figure 2 indicates, access to finance is considered one of the main challenges that SMEs face in the green transition, which is acknowledged by various other studies (British Business Bank, 2021[21]).[34] SMEs have a different standing on capital markets than larger entities, and yet investment is central for the climate transition. In a study on sustainable SME finance for the G7, (McDaniels and Robins, 2017[58]) suggest

[34] See also this Bpifrance analysis: https://lelab.bpifrance.fr/Etudes/les-dirigeants-de-pme-eti-face-a-l-urgence-climatique and the Business West survey: https://www.businesswest.co.uk/resources/quarterly-economic-survey-q2-2021

there are five types of barriers for SMEs in accessing finance for greening: insufficient data on what SMEs need; information asymmetries between SMEs and financial institutions making risk-assessment complex; insufficient availability of financial products for SMEs in different stages of their development; institutional barriers; and awareness and capacity.

Capital requirements differ by type of greening activity. For example, for SMEs that try to reduce their environmental footprint by taking resource efficiency actions, one of the main challenges is the large upfront costs of changing to resource efficiency processes. In France, at least four out of ten SMEs face this difficulty (44%), followed by 32% in Spain and Romania. SMEs in Estonia, Denmark, Ireland, Sweden, Ireland, and the United Kingdom reported this as the most common barrier. When SMEs are asked what would be helpful for their company to be more resource-efficient, the most common responses were grants and subsidies (36%) and advice on funding possibilities (22%) (European Commission, 2018[37]).

Similarly, for SMEs seeking to produce sustainable goods and services, the main challenge is the low return they get in the short term. 45% of SMEs agreed that financial incentives are the most helpful support for expanding the types of green products or services, with an increase of 10 percentage points in the share of respondents answering this since 2015. Furthermore, access to finance is also considered the best incentive for SMEs that currently do not offer green products or services to start doing so. This incentive is more relevant for SMEs than technical support or assistance in identifying potential markets (European Commission, 2018[37]). Research by (Fleitera, Schleich and Ravivanpong, 2013[93]) on German SMEs shows that high investment costs impede the adoption of SMEs' energy efficiency measures, even if these measures are deemed profitable.

…although it is difficult to quantify the exact size of the SME finance gap for net zero

As discussed in section 3.1, SME financing needs regarding greening follow from a combination of the pursuit of economic opportunities, pressure from stakeholders and supply chains and policy ambitions, in particular the reaching of net zero by mid-century. Various estimates[35] exist on the investment needed for reaching the net zero ambitions at large (Lenaerts, Tagliapietra and Wolff. G., 2021[94]):

- The Energy Transitions Commission estimates that an annual additional investment of USD 1 to 2 trillion is needed to reach net zero by 2050.[36]
- The Green Growth Knowledge Partnership estimate an annual USD 750 billion in additional global investment in nature is needed to reach the SDGs.[37]
- According to the European Commission, Europe has to close a yearly investment gap of almost EUR 180 billion to achieve EU climate and energy targets by 2030.[38]
- The IEA indicates that net zero requires and expansion in annual investment in energy from just over USD 2 trillion globally on average over the last five years to almost USD 5 trillion by 2030 and to USD 4.5 trillion by 2050.[39] Total annual capital investment in energy in net zero rises will rise from around 2.5% of global GDP in recent years to about 4.5% in 2030 before falling back to 2.5% by 2050.[40]
- According to the IMF, an estimated additional USD 6 to 10 trillion in global investments, both public and private, are needed in the next decade to mitigate climate change. This amounts to a

[35] https://ec.europa.eu/environment/action-programme/pdf/IP5-Env_Investement_Gap-%20Final.pdf; see also OECD 2022) Financing SMEs and Entrepreneurs: an OECD Scoreboard (forthcoming).

[36] https://www.reuters.com/article/uk-energy-transition-idUKKBN2670OA

[37] https://www.greengrowthknowledge.org/webinar/ggkpwebinar-closing-financing-gap-investing-natural-capital-achieve-sdgs

[38] http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1483696687107&uri=CELEX:52016SC0405

[39] https://www.iea.org/reports/net-zero-by-2050

[40] https://blogs.imf.org/2021/07/22/reaching-net-zero-emissions/

cumulative 6-10 percent of annual global GDP. According to International Energy Agency data, about 30 percent of additional investment, on average globally, is expected to come from public sources—that is a cumulative 2-3 percent of annual GDP for the decade 2021 to 2030. The remaining 70 percent would be private.[41]

- (Lenaerts, Tagliapietra and Wolff. G., 2021[94]) discuss several studies and estimate that reaching net zero by 2050 requires 2% of world GDP in additional investment costs in energy and transport.

No data are available that specifically focus on the investment costs for SMEs to reach net zero. However, given the fact that on aggregate they contribute significantly to greenhouse gas emissions, it is likely that reaching net zero by SMEs necessitates a significant investment envelope for these firms. As Table 1 showed, estimates of SME greenhouse gas emissions indicate a share of between 50-70% in business sector emissions and between 10-30% of energy consumption. Taking the IEA estimate that SMEs worldwide account for 13% of total energy use, and assuming constant investment costs per unit of energy, ensuring that SME energy use conforms to net zero could amount to between USD 550-650 billion per year.[42]

Uncertainty

Uncertainty constitutes a barrier for SME greening and green entrepreneurship

One of the greatest barriers that SMEs face in greening is uncertainty. This uncertainty can stem from technology, markets, and policy and regulations, as well as the impact of climate itself (ITC, 2021[22]).

Technical uncertainty often arises from questions about the technical feasibility of adopting new innovations and solutions, as well as their potential implications. SMEs often do not have technical expertise and will likely have questions about the functionality, usefulness, or quality of new innovations and how they can improve the performance of the business. This uncertainty leads to an under-investment by SMEs.

Market uncertainty is frequently identified as one of the main barriers to greening in surveys of SMEs and entrepreneurs. SMEs often view environmental measures as reducing profits while simultaneously presenting uncertain market benefits. For many SMEs, greening will likely have a net cost and therefore "greening" can be viewed with scepticism. This obstacle is typically greater for SMEs (OECD, 2013[70]), and is a major hurdle for eco-entrepreneurs since they typically need to build a market for a product that does not yet exist.

Policy and regulatory uncertainty can also be an obstacle to greening since policy volatility can contribute to market uncertainty. This is particularly true for eco-innovation and eco-entrepreneurship. Moreover, while regulation is considered a powerful driver for environmental innovation, environmental regulation is often more arduous for SMEs than for larger firms (Brammer, Hoejmose and Marchant, 2012[95]) since they have less resources to dedicate to navigating a complicated regulatory system that may require certifications and compliance inspections.

Externalities

Externalities constitute a further topic that needs to be discussed in the context of barriers to SME greening. In environmental analysis, externalities are often discussed as negative externalities, where behaviour by firms has a negative environmental impact for society. Environmental regulation aims to reduce these externalities and ensure that the polluter pays for the environmental degradation caused.

[41] https://blogs.imf.org/2021/07/22/reaching-net-zero-emissions/

[42] Assuming the IEA estimates of annual global cost on energy of between USD 4.5 and 5 trillion per year discussed above and a 13% SME share in total energy consumption.

Positive externalities are important as well. Similar to wider innovation, positive externalities may occur in eco-innovation, where the benefit of such innovation for society is larger than that for the company who invents and develops the new technology, and hence there is a risk of underinvestment from a societal point of view. Governments can have a role in reducing that gap between private and societal return on investment in innovation, for instance through financial support for R&D. An important question regarding eco-innovation is if these externalities: i) are different for small and young firms compared to larger firms, and ii) are different in climate and environmental technologies than in other technology areas. A further relevant question is if and how scale effects play a role in eco-innovation.

Positive externalities may also play a role in the adoption of more greening business practices by SMEs where, as discussed before, the business case for investment in greening may not be self-evident at firm level, whereas for society at large such steps are important. Especially given the urgency of the required climate transition, SMEs may need financial support to take the necessary steps to reach net zero.

4 Policy measures to enable SMEs and entrepreneurs to achieve the green transition

Governments increasingly recognise the importance of SMEs and entrepreneurs for reaching greening objectives…

For many years, SMEs and entrepreneurs were at margins of the global policy debate on climate and the environment. For instance, the various IPCC reports scarcely seem to include reference to SMEs. SMEs also seem to be absent in the United Nations Framework Convention on Climate Change (UNFCCC) and the COP25 Paris Agreement. Similarly, the OECD Green Growth Strategy, with some exceptions (Mazur, 2012[3]), pays limited attention to firm size (OECD, 2015[2]). In their climate policies, national governments as well focus on large emitters first and foremost, and to a rather limited extent on the smaller ones. The European Union has a longer tradition of including an SME perspective in its climate and environmental policies (Box 4.1).

Box 4.1. SMEs and sustainability in the EU

The EU has a long tradition of including an SME perspective in its climate and environmental policies. The 2014 European Commission Green Action Plan (GAP) for SMEs[43] aims to help SMEs seize the opportunities created by the green economy, which includes several actions: Greening SMEs for more competitiveness and sustainability, Green entrepreneurship for the companies of the future, Opportunities for SMEs in a greener value chain, Access to the market for green SMEs, and Governance.

In the context of the Circular Economy Package, the European Commission launched a pilot to assist SMEs in the transition to a more circular economy.[44] The pilot acknowledges the hurdles faced by SMEs to adopt circular economy practices and aimed to pilot which route to bring assets (e.g. knowledge, networks and tools) to SMEs to address these hurdles is most effective and efficient.

Furthermore, with the Climate Bank Roadmap (CBR) 2021-2025, the EIB Group has placed sustainability at the heart of its initiatives (EIB Group, 2000[96]). The CBR outlines a development plan for the EIB Group's green finance activities in support of the European Green Deal. It maps the next stages in the journey to a sustainable planet and provides a framework to counter climate change. The continued development of SME finance products supporting green transformation is a key business development priority of the European Investment Fund (EIF), the EIB Group's provider of risk finance to European SMEs.

The EIF will support European SMEs green transition through the use of intermediated debt products, provided in the form of guarantees, counter-guarantees or credit enhancement. The

[43] https://ec.europa.eu/growth/content/green-action-plan-smes-turning-environmental-challenges-business-opportunities-0_en

[44] https://ec.europa.eu/environment/sme/circular_economy_boost_en.htm

main purpose will be to accelerate the transition to green energy production, low-carbon emission transport and to reduce greenhouse gas emissions and energy consumption in residential and industrial sectors, among others.

In addition, the EIF will continue to support innovative technologies through intermediated green equity activities. New verticals currently under development include blue economy and agritech-foodtech. Furthermore, targeted themes under equity funds will be similar to debt financing: (i) clean energy transition; (ii) bio-economy; (iii) environment and resources; (iv) sustainable information and communication technologies; and (v) future mobility and transport.

The European Commission taxonomy on sustainable activities provides a classification of environmentally sustainable economic activities.[45] It aims to provide a 'common language' for companies (including SMEs) and investors on what is meant by sustainable. From an SME and entrepreneurship perspective, an important question is if the classification sufficiently reflects their greening activities, and if and how reporting on these matters can take their needs and circumstances into account.

Finally, the European Commission 2020 SME Strategy also includes a focus on SMEs in relation to sustainability (see Box 4.2).

This pattern is currently changing, for at least three reasons. First, the urgency of addressing climate change has only increased since COP25 in 2015, with the COP26 in Glasgow in November 2021 providing further momentum. The increased urgency comes with the need to be more specific on how to achieve these ambitions, and how different stakeholders – including SMEs and entrepreneurs - can contribute. For instance, a 2019 declaration by the UN Environmental Assembly of UNEP on sustainable business practices referred to the importance of including micro, small and medium-sized companies in the green transition.[46] The Declaration of the 2018 OECD Ministerial Conference on SMEs also underlines the importance of SMEs for sustainable and inclusive growth (OECD, 2018[97]). Various other international initiatives are being launched regarding SMEs and net zero (see Box 4.2). Furthermore, as part of the preparations for COP26, the UK Government launched the 'Together for our Planet' campaign with an explicit focus on SMEs and net zero. [47] Although data on the SME footprint remain incomplete, it is clear that given their aggregate emissions, realising net zero without them is impossible.

Box 4.2. Recent international initiatives on SMEs and net zero

The International Chamber of Commerce (ICC), the Race to Zero initiative of the UNFCCC and other organisations in 2020 launched the SME Climate Hub.[48] Through this initiative, SMEs are invited to commit to realising greening ambitions. The International Trade Centre (ITC) proposes a 20 point plan Green Recovery Plan to support small businesses (ITC, 2021[22]). Through ITCs Green to Compete program,[49] it assists MSMEs in developing economies in their greening efforts.

Bankers for Net Zero is a recent initiative that brings together banks, businesses and regulators in the United Kingdom to investigate how banks can contribute to net zero, and what policies are needed from government to finance the net zero transition. The group published a report

[45] https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

[46] http://wedocs.unep.org/bitstream/handle/20.500.11822/28500/English.pdf?sequence=3&isAllowed=y

[47] https://www.gov.uk/government/news/calling-all-small-businesses-to-lead-the-charge-to-net-zero

[48] www.smeclimatehub.org

[49] https://www.intracen.org/greentocompete/

with recommendations how SME finance for net zero can be strengthened (Bankers for Net Zero, 2021[98]).[50]

The EU Corporate Convenant is a pilot initiative for companies (in particular SMEs) to commit to pursue clean energy transition and climate measures (Mac Nulty et al., 2021[99]).

Second, SME and entrepreneurship policies in recent years have received stronger focus in various countries. Several countries, ranging from Germany to New Zealand and from Korea to Spain, have formulated national SME Strategies that acknowledge the importance of SME and entrepreneurship and offer comprehensive policy approaches to support them (OECD, 2021[100]). Various other countries have developed action plans or other frameworks to support SMEs, often with a strong digitalisation component (OECD, 2021[101]). Many of these SME policy vehicles also include reference to greening and sustainability, including the EU SME Strategy (see Box 4.3).

Box 4.3. Sustainability aspects in SME Strategies

The **German** SME Strategy[51] underlines the importance of SMEs for sustainability and includes an extensive section on energy and climate issues. It highlights the challenges for SMEs of high energy and climate costs and includes several measures in this area, including KfW's "Climate Campaign for the SME Sector", providing planning certainty to SMEs and other companies in carbon pricing through ETS, reducing electricity costs by lowering the Renewable Energy Act (EEG) surcharge and favourable tax treatment to the energy retrofitting of buildings that SMEs can make use off as well.

The **Spanish** SME Strategy[52] includes several measures to help SMEs improve their environmental performance, including awareness-raising through seminars workshops, events, advance in the simplification and application of environmental-friendly regulation, and facilitate the shift towards circular economy

The **Czech** SME Support Strategy 2021-2027 (2021)[53] provides a comprehensive strategy for the development of SMEa, which lists resource efficiency and the transition to a low carbon economy as priorities.

In March 2020, the **European Commission** launched the EU SME Strategy[54], which focuses in particular on the twin transitions, and aims to considerably increase the number of SMEs engaging in sustainable business practices. It proposes the introduction of sustainability advisors for SMEs within the Enterprise Europe Network, who will help assess the needs of SMEs and provide advice on investment in more resource-efficient and circular processes and infrastructure, finding relevant commercial partners, and encouraging peer-to-peer collaboration.

Source: (OECD, 2021[100])

In addition, the COVID-19 pandemic has demonstrated how important and vulnerable SMEs can be, and has severely affected small business owners across the globe. Governments have responded in an unprecedented manner and deployed SME targeted policy measures as in the first half of 2020 in response

[50] https://volans.com/project/bankers-for-netzero/

[51] https://www.bmwi.de/Redaktion/EN/Publikationen/Mittelstand/german-sme-strategy.html

[52] https://industria.gob.es/en-us/Servicios/Paginas/marco-estrategico-politica-PYME.aspx

[53] https://www.mpo.cz/en/business/small-and-medium-sized-enterprises/studies-and-strategic-documents/the-czech-government-has-approved-the-sme-support-strategy-for-the-period-2021---2027--263515/

[54] https://ec.europa.eu/info/sites/info/files/communication-sme-strategy-march-2020_en.pdf

to the pandemic on a scale never seen before (OECD, 2021[10]). What is more, governments are now launching recovery packages, often with a strong focus on greening. Since these policies aim both to support recovery, including of hard hit SMEs, and to build back better, they put forward the question how they can support sustainable and green growth of SMEs (see also Box 4.20).

…and put in place a variety of policies that aim to improve the environmental performance of SMEs

Several types of policies have been put in place to support SME greening. (OECD, 2018[40]) and (OECD, 2021[102]) distinguish between three types of policy instruments (Table 2).

Table 2. Types of policy instruments used to enable the greening of SMEs

Category of policy instruments	Specific policy levers
Regulatory tools	• Simplification of regulatory requirements for SMEs • Regulatory incentives for environmental management system use • Sector-specific strategies for compliance assurance
Information-based instruments	• Advice to individual SMEs • Dissemination of information on compliance and good-practices • Eco-labels and recognition awards • Networking and cooperation among SMEs
Economic incentives and financial instruments	• Grants • Tax incentives and low interest rate loans • Green public procurement • Green investment funds • Green bonds • Green commercial mortgage backed securities

Source: Adapted from (OECD, 2018[103])

…which, however, make up for only a small share of total greening policies

However, SME oriented policies make up only a modest share of climate and environmental policies. For instance, a large new IEA database on energy and climate related policies since 1990, which includes a total number of 6250 measures (July 2021), includes 97 entries for SMEs, 114 for start-up and 35 for entrepreneur, suggesting the share of SME related policies is 4%.[55] This may be a matter of concern, since studies suggest that targeted measures for SMEs are needed to allow them to invest in environmental protection (Siedschlag and Yan, 2021[73]).

The IEA database also allows for assessing the types of policies most frequently used towards SMEs. SME oriented policies consist (considerably more than for the total number of policies in the database) of financial support measures and information and education measures, and less of regulation (Table 3).

Table 3. Type of energy and climate policy support instrument

Type of instrument	SME (total 97)	Total (6250)
Payment, finance and taxation	60	2490
Payment and transfers	49	1786
Grants	32	956
Regulation	27	2473
Information and education	22	951

Source: IEA (https://www.iea.org/reports/sustainable-recovery-tracker)

[55] https://www.iea.org/reports/sustainable-recovery-tracker

Regulatory tools

Regulatory tools provide incentives for SME and entrepreneur greening efforts …

Regulatory measures aim to set incentives for actors to green their activities. They aim for instance to increase the price of carbon and/or energy, to incentivise economic actors to reduce their energy use and GHG emissions. Examples include the emission trading schemes (ETS) in many countries. For instance, the Fit for 55 proposals by the European Commission include an extension of ETS to the building and transportation measures, and various further measures to reduce emissions of relevance to SMEs (European Commission, 2021[104]). Regulation also can set standards for environmental performance, providing clarity on expectations and incentives for innovation.

…but *may be less effective for SMEs than for larger entities*

Various studies suggest that such regulatory measures that raise the price of carbon may be less effective and efficient for SMEs than for larger entities. For instance, (Dussaux, 2020[72]) shows how carbon taxes and rising energy prices may be a less effective instrument to reduce energy consumption in SMEs than in larger firms. (OECD, 2018[40]) also suggests that environmental regulation of SMEs can represent a major challenge due to the diversity of SMEs' activities and respective environmental issues, the substantial number of operators, and the lack of information available to the regulator about their levels of compliance. Lack of capacity of SMEs to conform to regulatory requirements also plays a role.

…and are rarely SME-specific…

Regulatory tools in environmental regulation rarely use SME-focused size-contingent regulation per se. To quote (OECD, 2018[40]): 'No environmental regulation specifically targets SMEs, instead distinguishing low-risk activities and installations, although regulatory guidance usually keeps in mind particular features of small businesses. Environmental enforcement authorities are not systematically aware of the number of SMEs they regulate and do not collect this information.' Since these risks are hard to define, and regulators understandably have a low tolerance on what constitutes acceptable risk, in practice this means that SMEs need to fulfil the same obligations as larger firms.

…although regulation often takes SME considerations into account…

However, an increasing number of environmental regulators in OECD countries are establishing special regimes for low risk installations, the vast majority of which relate to SMEs. This often involves a shift from permitting requirements to rules-based regimes and standardised regulatory requirements, where activities that remain under certain thresholds are exempted from notification or face simplified and more standardised requirements for this. For instance, some countries use "general binding rules", which ensure standard conditions specific to a type of activity or a sector, either with obligatory notification of environmental authorities before engaging in an activity (such as in the Netherlands), or without such requirement (such as in the United Kingdom (OECD, 2018[40]). In the European Emission Trading System (ETS), Member States can exempt firms (including SMEs) from participating in ETS if their annual CO2 emissions are below 25,000 CO2 equivalents, although, in such case, the SMEs still need to realise a similar reduction through other (non ETS) means.

(Williamson, Lynch-Wood and Ramsay, 2006[105]) suggest that developing regulatory structures that provide minimal standards is the most effective means to foster environmental performance by SMEs and to enhance the business case for sustainability in the medium and longer term. Likewise, (Coria and Kyriakopoulou, 2015[106]) suggest that emission standards (unlike emission taxes and performance standards) lead to reduced emissions and help preserve small businesses. Although some studies analyse the possible growth trap related to special regimes for SMEs (for instance (Qi, Tang and Xi, 2017[107]) and (Qi, Tang and Xi, 2015[108])), no evidence could be found that such regimes in environmental legislation hamper SME growth above threshold levels, which is not surprising because they are not size-contingent as such.

…but administrative and regulatory costs for SMEs can be considerable…

A further important issue is how better regulation can help minimise unnecessary costs from environmental legislation for SMEs, for instance through simplification of administrative requirements and e-government. This issue has been discussed widely in the literature. (Calogirou et al., 2010[13]) for instance indicate that SMEs find it more difficult to comply with environmental legislation than their large counterparts. In general, the smaller the company, the more difficult this appears to be. Environmental legislation is mostly horizontal in nature and aimed at preventing and reducing negative environmental impacts, and therefore does not always take into account the specificities of SME operations. The study also suggests that SMEs frequently lack the information on applying environmental legislation. Given the large differences between firms, the study concludes that one-size-fits-all policies may not work. Several other studies conclude that environmental legislation can lead to substantial administrative barriers for SMEs, for instance the study by (Gubbels, Pelkmans and Schrefler, 2013[109]) on REACH, European chemical legislation and a more generic study by (Centre for Strategy&Evaluation Services, 2007[110]). (ITC, 2021[22]) shows that more than a quarter of African firms see environmental regulation as an obstacle.

…which are not always fully assessed in RIAs

Regulatory impact assessments (RIAs) aim to ensure that regulatory proposals do not include unnecessary costs, including for SMEs. However, in practice RIAs not always provide sufficient insight in the impact on SMEs. The assessment of impact on SMEs of environment and climate regulation through SME tests is important (Box 4.4).

Box 4.4. Impact assessments and SME tests in the environment domain

OECD countries increasingly use regulatory impact assessments (RIA) that include an SME test to assess the expected impact of regulatory proposals on SMEs [GOV/RPC(2020)14/REV1] This includes proposals for environmental and climate regulation, for instance the RIA on stepping up Europe's 2030 climate ambition[56].

However, in practice SME testing regarding climate and environmental policies could be strengthened. The before mentioned regulation on the 2030 climate ambitions is quite positive on the expected impact on SMEs[57], even though in the RIA itself SMEs are barely referenced and the report indicates that the methodologies used "do not provide direct insights on specific outcomes for SMEs"

Furthermore, in various instances policies with regard to the environment and climate do not take the form of a regulation, and hence are not subject to SME testing. For instance, for the Green Deal strategy[58] announced by the European Commission in 2019, no impact assessment was executed. Similarly, the Next Generation EU proposals on post COVID-19 recovery, which include a strong emphasis on greening, have not been reviewed through a RIA or SME test. The practice of EU countries themselves assessing the impact on SMEs of their recovery plans varies, with some countries (such as Spain) putting significant emphasis on this, whereas for others this was less the case. A further example is the Netherlands climate

[56] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020SC0177

[57] The RIA summary reads: "Impacts on the EU's overall competitiveness are positive, by improving energy efficiency and circularity and promoting innovation. The EU gains from a first mover advantage with increasing global action on climate change. Free allocation under the EU Emission Trading System could still contribute to preventing carbon leakage but other measures are also under consideration. SMEs are expected to play a key role in the transition, notably as a source of innovations in all economic sectors."

[58] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

agreement from 2019, for which an impact assessment was undertaken, but without a specific SME test. Only after pressure from Parliament, did the government undertake such SME test. [59]

Furthermore, the focus of impact assessments on SMEs and environmental regulation often has a strong cost focus, assessing the size and impact of administrative and regulatory costs of regulation for SMEs, and possibilities for reducing these, for instance through exemptions and lighter regimes. Given the more limited capacity of small entities to absorb such costs, this is an important issue. However, at the same time this cost and exemption focus may have as a consequence that SME tests pay less attention to how SMEs can be included in the green transition and to ensure that policies and support systems accommodate that.

Financial regulation is increasingly important for SME greening

Emerging sustainability regulations are incentivising financial institutions to green their products and portfolios, with potential repercussions for SMEs. Financial institutions are increasingly required to increase reporting on sustainable financing but lack information about the environmental footprint of their clients, especially SMEs. SMEs, which are not capable of offering this information, may face additional barriers to finance. SMEs will need to start complying with the financial institutions' requirements increasing significantly the cost of debt for SMEs. Considering that 70% of SMEs in Europe, and 40% of SMEs in the United States rely on bank financing (Koreen, Labour and Smaini, 2018[111]), research and recommendations on how to avoid bottlenecks for SME access to sustainable finance requires further investigation. Current OECD work focuses on an in-depth analysis of sustainable finance for SMEs, and implications for policy.

These emerging regulatory frameworks to achieve sustainability in the financial sector can affect SMEs, and thus merit further exploration. For example, in Europe, SME associations have flagged the potential effects on SMEs of the EU Taxonomy[60], which provides a common understanding of what can be defined as sustainable, and sets up a comprehensive framework for investors to target their investments towards such activities. The additional reporting requirements requested of large companies can also indirectly be a source of administrative burdens for SMEs that supply large enterprises, as they also need to comply with such requirements to continue to be suppliers. There is a concern that SMEs lack the resources to meet additional reporting obligations and might face a loss of competitiveness (Koreen, Labour and Smaini, 2018[111]).

Information-based instruments

Information-based instruments play an important role in SME greening

Information-based instruments aim to address barriers related to a lack of awareness by SMEs of opportunities and obligations as well as to influence attitudes. This includes issues such as effective messaging on the benefits of greening by SMEs and minimum legal requirements, pro-active and tailor-made information dissemination, web-based guidance tools, direct capacity building and technical assistance, and the recognition of green best-practices, certification and eco-labelling.

Several studies have looked into the merits of information and advice instruments. For instance, several evaluations exist that summarize and evaluate existing programmes to assist SMEs with compliance to environmental regulation, see for instance (Monkhouse et al., 2006[112]) (Miller et al., 2011[14]) (Federation of Small Businesses, 2012[113]). (Labonne, 2006[114]) concludes that policy instruments aimed at information provision and technical assistance have a great role to play in modifying environmental behaviour, and

[59] https://www.rijksoverheid.nl/documenten/kamerstukken/2020/06/29/kamerbrief-over-onderzoek-impact-klimaatakkoord-op-het-mkb

[60] https://www.smeunited.eu/publications/joint-comments-on-sustainable-finance-taxonomy-report-

should be targeted toward SMEs to maximize their effectiveness. (Walker and Redmond, 2014[115]) analyze the effectiveness of a targeted education intervention program in Australia that encouraged enhanced environmental management practice by SMEs, and find an increased awareness in most of the businesses in regard to environmental issues, as well as improvements in attitudes and behavior. (Ambec et al., 2013[86]) discuss positive results of dedicated programs that offer workshops and non-voluntary consultancy advice on environmental performance, which reduced both costs and pollution for SMEs.

Self-assessment tools can help SME to improve insights in their footprint and means to reduce this

Governments, business organisations and non-governmental organisations, have set up numerous websites and tools to help SMEs with their transition.[61] Box 4.5 provides a number of examples of such tools.

Box 4.5. Self-diagnostic tools for SME greening

Various organisations have set-up tools to help SMEs better assess their environmental performance and ways to improve this. The Green Industry Platform's SME Support Centre[62] and the SME Climate Hub[63] provide useful overviews of such tools (see also (Fresner and Krenn, 2021[116])). These tools generally allow SMEs to measure their footprint, benchmark their performance to their peers and identify options to improve this. Given the many initiatives that are currently in development, best practice exchange and mutual learning across governments and stakeholders are important.

I-GO Self-Assessment tool

The I-GO self-assessment tool, developed by the Green Industry Platform, is a tool that aims to both help SMEs access resource efficiency support services most adapted to their specific needs and provide them with tailored guidance on how to advance on their individual resource efficiency journey. The tool first assesses an SME's current resource efficiency status and then, taking into account also their location, sector of activity and size, provides the SMEs with customised recommendations on the most relevant resource efficiency action and directions to the most relevant support services available to them to help them implement these actions.[64]

OECD Sustainable Manufacturing Toolkit (OECD, 2011[117])

The tool helps SMEs in manufacturing to measure and improve their environmental performance.[65]

Energy Efficiency Quick Estimator

This tool, developed by the EIB, aims at making energy lending easier, in particular for SMEs.[66]

The SME Climate Hub

This is an initiative by the ICC, the Race to Zero initiative of the UNFCCC and other organisations that aims to provide one-stop shops for best-in-class tools for SMEs to help them measure emissions and develop a climate strategy.[67]

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[61] See for instance https://www.carbontrust.com/small-to-medium-enterprises/; https://www.hiscox.co.uk/business-blog/carbon-neutral-easy-for-the-big-guns-but-how-can-small-businesses-do-it/; https://coolcalifornia.arb.ca.gov/small-business; (United States Environmental Protection Agency, 2017[150]); https://www.eib.org/en/stories/energy-efficiency-bank-loan

[62] https://www.greenindustryplatform.org

[63] https://smeclimatehub.org/tools/

[64] https://www.igosolution.org/

[65] https://www.oecd.org/innovation/green/toolkit/48704993.pdf

[66] https://www.eib.org/en/stories/energy-efficiency-bank-loan

[67] https://smeclimatehub.org/

EPA Tool for Resource Efficiency

This tool helps companies to assess the level of resource efficiency of their company.[68]

European Resource Efficiency Knowledge Centre self-assessment tool[69]

This interactive tool aims to support business to assess potential energy and resource savings.

SME 360X

This digital platform for SMEs, developed by GIST, aims to assess and improve their environmental performance.[70]

SME Carbon Footprint Calculator

Carbon Trust has developed a tool for SMEs in the UK to assess their carbon footprint, including fuel and energy use.[71] The organisation also developed an energy management self-assessment tool.[72]

SME Solutions suite

This tool, developed by Moody's, offers investors and other companies the means to do a risk and opportunity assessment in their supply chains with respect to Ecological and Social Governance, including SMEs.[73]

Climate Action Toolbox, New Zealand

The Climate Action Toolbox of the New Zealand Government helps SMEs assess their carbon footprint and means to reduce this.[74]

EnterPRIZE

This resource developed by Generali aims to inspire SMEs to adopt sustainable business models and offers a platform for debate, best practices and research on the subject.[75]

Resource Check

Resource Germany offers a tool for measuring resource efficiency and potential cost savings.[76]

Climate Expert

Climate Expert offers a quick company assessment, especially designed for SMEs.[77]

Circular Economy Self-assessment tool

The Spanish Eco-innovation studio Inèdit offers a tool for firms to assess the circularity of their business.[78]

Sustainability self-assessment tool

The Dubai Carbon Centre of Excellence offers a self-assessment tool on sustainability.[79]

[68] https://greenbusiness.ie/sme-efficiency-and-cost-reduction-questionnaire/

[69] https://www.resourceefficient.eu/en/self-assessment-tool

[70] https://www.gistimpact.com/post/sme360x-in-action

[71] https://www.carbontrust.com/resources/sme-carbon-footprint-calculator

[72] https://www.carbontrust.com/resources/energy-management-self-assessment-tool

[73] https://esg.moodys.io/sme-solutions

[74] https://www.tools.business.govt.nz/climate/

[75] https://www.sme-enterprize.com/

[76] https://www.resource-germany.com/tools/

[77] https://www.climate-expert.org/en/home/tools-trainings/quick-company-assessment/

[78] https://circular.ineditinnova.com/index/es

[79] https://dcce.ae/assessment/

Advisory support for SMEs can help them address greening challenges and opportunities

Countries have also set-up advisory support for SMEs, to help them in identifying greening possibilities and accessing resources. Box 4.6 provides examples of such policies.

Box 4.6. Climate advice and information

Various countries have introduced services for advice and information to SMEs on climate and greening. In most cases, these are operated by government business support agencies and networks.

For several years, there have existed municipal energy and climate advisors in **Sweden** whose services have been free. Evaluations have shown that they tend to focus on the household sector, but lacking qualifications or knowledge to serve local SMEs. Swedish Coaches for Climate and energy program is aimed at developing knowledge and capacity in order to meet needs from SMEs too. Thus, the program foresees that accurate and relevant energy efficiency advice should be extended to companies with energy consumption less than 300 MWh/year.[80]

The **Irish** Green for Micro programme, an initiative from the Local Enterprise Offices with support from Enterprise Ireland, is being rolled out nationwide in March 2021 to help prepare small businesses for the low carbon, more resource efficient economy of the future. With the help of a Green Consultant, small businesses with up to ten employees can get free advice and technical support on resource efficiency, how to better understand their carbon footprint and how to implement an environmental management system to reduce costs and lower greenhouse gas emissions.[81]

The **German** SME Initiative energy transition and climate protection supports SMEs in the implementation of the energy transition. It provides companies with information about financial support for energy saving measures. The programme offers help by providing information and qualifications and brings companies together with experts.[82]

The **EU** SME Strategy includes the establishment of sustainability advisors for SMEs through the Enterprise Europe Network.[83] The EU Corporate Convenant also aims to provide advisory services to SMEs.[84]

In the **United States**, the Environmental Protection Agency (EPA) runs a Small Business Gateway[85], which, among others, provides information on environmental assistance and technical help available from the Agency. In addition, the US Small Business Environmental Home Page[86] is intended to be a “one-stop shop” for small businesses and assistance providers who seek information on a wide range of environmental topics. It directs users to compliance information (including links to state websites), fact sheets on environmental best management practices in ten SME sectors (bakeries, service stations, retail stores, etc.), key small business publications, information on upcoming events, etc.

[80] https://www.iea.org/policies/1342-coaches-for-climate-and-energy?page=1&q=SMEs&status=In%20force

[81] https://www.gov.ie/en/press-release/80cdd-tanaiste-announces-new-green-support-at-start-of-local-enterprise-week/

[82] https://www.iea.org/policies/823-sme-initiative-energy-transition-and-climate-protection?page=2&q=SMEs&status=In%20force

[83] https://ec.europa.eu/growth/smes/sme-strategy_en

[84] https://etendering.ted.europa.eu/cft/cft-display.html?cftId=8694

[85] www.epa.gov/smallbusiness

[86] www.smallbiz-enviroweb.org

Energy management systems and audits can help reduce SME energy use

In the late 1990s and the early 2000s, many OECD governments provided direct financial support and extensive technical assistance to businesses, especially SMEs, for the establishment and certification of an environmental management systems (EMS) (OECD, 2018[40]). Many studies look at the promotion and use of EMS. (Labonne, 2006[114]) concludes that the adoption of environmental management systems can have an impact on environment-related innovation of SMEs. Likewise, (Irvine and Moore, 2018[118]) show that a lack of knowledge on the advantages of environmental management systems and inefficient energy and resource planning are important causes of the environmental footprint of SMEs, and propose an online toolkit of energy and waste management tools that can help address this and foster circular economy business models and planning. (Commission for Environmental Cooperation, 2005[119]) document the usage of environmental management systems by SMEs in Canada, Mexico and the US, and government efforts to promote these. The report concludes that: 'Most SMEs face few incentives and many difficulties in implementing environmental management systems. The owner of a business must believe that an EMS will create real tangible value for the business. Yet most SMEs do not know what an EMS is and, if they do, how it could benefit their business. Even if they are familiar with the concept of an EMS, many smaller businesses lack the technical expertise and resources needed to develop and implement one. (Thollander, 2009[120]) in a study on energy end-use policy activity in Sweden concludes that providing SMEs with energy audits free of charge and involving local authority energy consultants shows promising results.

Box 4.7 provides examples of policies supporting the take up of environmental management systems and use of energy audits.

Box 4.7. Energy management systems and audits

The availability of energy management systems and energy audits can help foster the performance of SMEs to reduce energy use. A survey by the EIB shows for instance that SMEs that have done an energy audit are more than twice as likely to invest in energy efficiency (EIB, 2021[41]). Various countries have set-up support schemes to improve access to energy management systems and audits (Leap4SME, 2021[121]).

The **Austrian** Energy management systems in SMEs is a funding scheme to support the implementation of energy management systems in SMEs (EUR 5 Million in total).[87]

The **Chilean** Energize your SMEs programme is a joint program by the Ministry of Energy and the Energy Sustainability Agency, which allows SME of all productive sectors access to up to CLP 8 million co-financing and support in limiting their costs of electricity and fuels through initiatives of energy efficiency and renewable energy for self-consumption. It is expected that 500 SMEs will benefit from this program and its budget consists of CLP 1200 million.[88]

In **Japan**, the energy resources special account earmarks revenue obtained through the special purpose energy tax from oil, coal and natural gas for energy efficiency. As part of this spending, in 2017, 1 billion yen was allocated to support energy management for SMEs.[89]

Italy offers energy audit –co-financing, intended to promote energy efficiency and energy audits in SMEs. EUR 15 million per year have been allocated until 2020, and the call will be replicated in the coming years. The public notice 4/8/2016 made available EUR 15 million to cover 50% of the costs associated to the energy audit implementation in SMEs.[90]

[87] https://www.iea.org/policies/8510-energy-management-systems-in-sme-energiemanagement-in-kmu?page=1&q=SMEs&status=In%20force

[88] https://www.iea.org/policies/12969-energize-your-small-and-medium-enterprise-sme-programme?page=1&q=SMEs&status=In%20force

[89] https://www.iea.org/policies/7320-subsidies-to-support-energy-management-in-smes?page=1&q=SMEs&status=In%20force

[90] https://www.iea.org/policies/591-energy-audit-co-financing?q=SMEs&sector=Buildings&status=In%20force

Policies focused on cooperation and networking among SMEs show promising results

In various countries, policy instruments with respect to information and learning do not focus on individual firms but on cooperation and networking among them (Box 4.8). Such models offer interesting possibilities for further analysis and mutual learning.

Box 4.8. Networking

Policies to support SME greening practices not only focus on individual SMEs but also aim to strengthen networking among them, as a means of overcoming size-related barriers, for instance with regard to expertise and skills. Various examples of such networking approaches exist, mostly financed by participating companies themselves:

Switzerland developed the Energy Model, supported by the Swiss energy agency, where participating companies collectively work towards energy saving objectives (Paramonova, Backlund and Thollander, 2014[33]).

In **Germany**, the LEEN model (learning energy-efficiency networks) bring together 10-15 SMEs across sectors in a specific location to enhance cooperation and learning on energy efficiency steps (Rohde, Mielicke and Nabitz, 2015[122]).

Sweden set up the Hackfors model, where networks, coordinated by one of the firms, develop common and individual targets with respect to energy efficiency.[91]

The Green Deal approach in the **Netherlands**[92], where the government stimulates cooperation among stakeholders, including SMEs, in reaching sustainability goals is broader than energy efficiency, but takes a similar perspective on cooperation,

Evaluations of these programmes show promising results, also as part of regional development support and fit well within the regional ecosystem perspective on entrepreneurship.[93] Since 2016, the networking approach is included in a wider policy perspective on SMEs and energy efficiency.[94]

Eco-certification and labelling initiatives can benefit from taking the circumstances of SMEs into account

Sector-specific green certification (of business practices) and eco-labelling schemes (for products) can contribute to an increased demand for green business practices. SMEs can benefit from such schemes when the business benefits outweigh both the direct costs in terms of fees that must be paid to obtain certification and the indirect costs of staff time to be spent complying with their requirements. It is important to communicate to a broad audience to raise the recognition of the certification or eco-label, starting at a very early stage of the scheme's development. Trade associations can help design marketing and promotional materials which a business could use to display to its customers its "green credentials" (OECD, 2018[40]). Box 4.9 provides examples of an SME oriented certification scheme in Norway.

However, for SMEs certification and labelling schemes can also be costly, especially given the large and increasing number of initiatives. (ITC, 2021[22]) reports that only 5% of micro and 13% of small firms interviewed by ITC globally were certified to a sustainability standard.'

[91] https://www.eceee.org/library/conference_proceedings/eceee_Industrial_Summer_Study/2018/1-policies-and-programmes-to-drive-transformation/the-swedish-national-energy-efficiency-network-program-for-smes-a-review-of-methodology-and-early-experiences/

[92] https://www.rijksoverheid.nl/onderwerpen/duurzame-economie/green-deal

[93] https://energy-evaluation.org/wp-content/uploads/2019/06/2017-johansson-paper.pdf; https://www.interregeurope.eu/policylearning/good-practices/item/3716/energig-energy-efficiency-networks/

[94] https://ec.europa.eu/regional_policy/en/projects/Sweden/helping-swedish-smes-become-more-energy-efficient

Box 4.9. Environmental certification of SMEs in Norway

The Eco-Lighthouse Programme is a programme for environmental certification of SMEs in Norway. With this programme, companies are supposed to reduce their impact on the environment, reduce costs and make use of an environmental profile in their marketing. The Programme is supported by the Norwegian Ministry of the Environment.

The Eco Lighthouse Office is responsible for marketing at the national level and the continuous development of the programme (including developing and improving trade demands in co-operation with consultants, companies and branch organisations). The office also arranges training courses for consultants who conduct environmental audits and local government staff responsible for certifying companies.

The municipalities recruit new companies, establish contacts between consultants and companies, make use of the media and carry out inspections before the environmental certificate is awarded. The municipalities also issue the certificates when the companies have implemented the action plan to satisfy the established requirements.

Source: Eco-lighthouse Foundation (2017), www.miljofyrtarn.no/eindex.htm (OECD, 2018[40])

Counties have also introduced recognition schemes as a means to raise awareness on SMEs, entrepreneurs and greening. The Sustainable Energy Authority of Ireland for instance runs an annual Energy Award, including a category for SMEs.[95] Similarly, the United Stated Department of Energy runs an Annual Small Business Rewards Program.[96] These initiatives can help inform and motivate SMEs and entrepreneurs in their greening ambitions and activities.

Information and advice can also support SME eco-innovation

Information and advice are also important for eco-innovation by SMEs. (UNEP, 2017[77]) for instance points at the role of service providers in supporting eco-innovation in SMEs. Professional, technology and innovation service providers can assist in developing and implementing eco-innovation policy. Service providers can contribute to eco-innovation policy at each stage of the policy cycle (problem framing, formulation, implementation, monitoring, and evaluation) through their role as intermediaries between companies, especially SMEs, government and other relevant institutions. Their experience in assisting governments to review existing policy frameworks, training policy-makers and informing relevant public sector stakeholders of business environmental challenges and opportunities for eco-innovation has generated useful lessons, which can serve as practical guidance for developing and implementing policies for eco-innovation.

Local and regional governments can play an important role in information and awareness raising

Providing information and raising awareness are not only important for central governments. Local and regional governments play a key role as well, being able to provide services that are well tuned to the needs of the local and regional ecosystems. Box 4.10 provides an example of a city initiative in countries on the Baltic Sea. OECD analysis on the role of cities and regions in the circular economy (OECD, 2020[63]), and on more generally on the need for a territorial perspective on greening that includes governments at different levels (Matsumoto et al., 2019[123]) provides further documentation to this.

[95] https://www.seai.ie/events/sustainable-energy-awards/

[96] https://www.energy.gov/osdbu/programs/annual-small-business-awards-program

Box 4.10. The NonHazCity project: reducing emissions of hazardous chemicals by SMEs into the Baltic Sea

Eleven cities in eight countries (Belarus, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden) joined efforts to reduce emissions of hazardous chemicals into the Baltic Sea. The project addresses small-scale emitters, including municipalities, small and medium-sized enterprises, and households and aims to reduce the use and emissions of hazardous chemicals. The project recommended public awareness campaigns and dialogue with small and medium-sized enterprises to guide purchasing choices and behaviour. Municipalities can develop and implement clean chemicals strategies and reduce their use of hazardous chemicals through public procurement. Procurement criteria should include hazardous substances and address compliance with relevant legislation. Public authorities can also assist local projects by facilitating networking and knowledge exchange through workshops, innovation or implementation agencies, or by establishing (digital) platforms. Another option is to provide exemptions from regulations that hinder particular innovations or entrepreneurship.[97]

Information needs differ among SMEs and entrepreneurs

Where there seems to be ample evidence on the merits of information-based instruments, studies mostly do not include an analysis of differences across SMEs. As (OECD, 2018[40]) also suggests, the optimal architecture of such instruments will vary by sector, but probably also by other attributes of firms, including the environmental challenge/opportunity they face. Whereas arguably adequate information is a *conditio sine qua non* for SME greening, the kind of information required, the means through which this is offered, as well as the question if the lack of information is the sole or primary bottleneck, will differ widely by firm. (Mazur, 2012[3]) therefore suggests outreach instruments should be carefully tailored to the nature and needs of small businesses, and that website based information does not work for large groups of SMEs (OECD, 2018[40]).

Economic incentive schemes

Economic incentives encompass a wide range of instruments and are used on various aspects of SME greening. They include for instance financial support for green investment or eco-innovation through tax exemptions, grants and vouchers, as well as green public procurement and supply chain measures.

Sustainable finance for SMEs is an increasingly important policy priority

Reaching net zero will require large-scale investments from the private sector, including by banks and institutional investors. Various initiatives are underway to support sustainable finance, including by making the criteria of what constitutes sustainable finance and sustainable investment (see Box 4.11).

Research shows that various support measures, including the provision of sustainable finance to SMEs, are of critical importance, in particular in developing economies (World Bank, 2017[124]). Given the specific circumstances of smaller companies, an important challenge is to ensure that financial support is provided according to their needs. As a report on private investment in climate adaptation suggests, 'the problem is that existing direct instruments as well as international donors are more suited to supporting large companies.'[98] Similarly, (ITC, 2021[22]) underlines that 'there is policy space for governments, international and business support organizations to facilitate access to climate finance by SMEs.' Finally, (Macfarlane

[97] European Environment Agency https://www.eea.europa.eu/soer/2020

[98] file:///C:/Users/Raes_S/Downloads/climate_change_adaptation_and_the_role_of_private_sector-_can_europe_report.pdf

and Kumar, 2021[125]) argue that tailored concessional financial products to stimulate SME investment in the zero-carbon transition are needed as well as the scaling up of green venture capital.

Box 4.11. Sustainable finance initiatives

Various countries are setting up mechanisms to strengthen the availability of sustainable finance. In some cases, such initiatives are targeted to SMEs.

The Green Finance Market Market Place in the **United Kingdom**, launched by Funding Options in July 2021, aims to bring greater transparency and awareness of the funding options available to support SMEs - with financial products increasingly rewarding businesses that consciously seek to reduce their carbon footprint.[99]

In **Norway**, for instance, the Nordic Project Fund (Nopef) launched a fast track green recovery financing for Nordic SMEs. The aim of the loan programme is to scale-up green solutions from SMEs. The loan can be used for investments, business development and working capital with the requisite that the SME must commercialize green technologies to apply to finance; it includes energy efficiency renewable energy, circular economy, sustainable food production and agriculture.[100]

In **Egypt**, the EBRD, the European Union, and the Green Climate Fund with EUR 70 million fund the recently created Green Value Chain programme. It will allow SMEs to invest in climate mitigation and adaptation solutions to improve their competitiveness and enhance the development of green value chains. In addition, the Green Economy Financing Facility (GEFF) will provide up to EUR 150 million of green finance to SMEs across agricultural, construction, commercial and manufacturing sectors.[101]

The Nordic Green Bank NEFCO finances green projects by SMEs in **Denmark**, **Finland**, **Iceland**, **Norway** and **Sweden** that aim to go international, helping to scale-up green solutions.[102]

In July 2020, the Nordic Investment Bank NIB) signed a EUR60 million ten-year loan agreement with the Danish Ringkjøbing Landbobank (RLB) for financing for environmental projects and to SMEs in **Denmark**. This initiative is part of NIB's special support for sustainable business during the COVID-19 pandemic.[103]

Source: OECD (2022) Financing SMEs and Entrepreneurs: an OECD Scoreboard (forthcoming)

International organisations also aim to strengthen the availability of sustainable finance for SMEs. Box 4.12 documents the new initiative by the OECD establishing an OECD Platform on Financing SMEs for Sustainability.

Box 4.12. The OECD Platform on Financing SMEs for Sustainability

Building on its pioneering work in the area of SME and entrepreneurship finance, in November 2021, the OECD launched a Platform on Financing SMEs for Sustainability, bringing together policy makers, public SME banks, private financial institutions, SME representatives and other players in the sustainable financing ecosystem. The Platform provides a forum to foster global collaboration, dialogue and knowledge sharing in this area. By sharing research and experiences

[99] https://www.smefinanceforum.org/post/funding-options-launches-first-green-finance-marketplace-for-smes

[100] https://nopef.com/news/new-green-recovery-financing-for-nordic-small-and-medium-sizedcompanies/.

[101] https://www.ebrd.com/news/2020/ebrd-eu-and-partners-boost-green-finance-in-egypt.html.

[102] https://www.nefco.int/

[103] https://www.nib.int/who_we_are/news_and_media/news_press_releases/3536/nib_finances_environmental_projects_and_smes_in_denmark

on approaches and instruments to tackle demand- and supply-side barriers to sustainable finance for SMEs, it aims to accelerate the development and implementation of concrete solutions for SMEs, and promote good practices among public and private financial institutions. Founding members of the Platform include the British Business Bank and the Business Development Bank of Canada.

Box 4.13 provides background to the Energy Efficiency Financial Institutions Group (EEFIG).

Box 4.13. Energy Efficiency Financial Institutions Group (EEFIG)

The European Commission and United Nations Environment Programme Finance Initiative (UNEP FI), and addresses barriers to energy efficiency finance established the EEFIG.[104] EEFIG addresses barriers to energy efficiency financing through both policy design and market-based solutions to increase the scale of energy efficiency investments across Europe. Composed of over 300 representatives from more than 200 organisations, EEFIG's strength are its members - spanning public and private financial institutions, industry representatives and sector experts. EEFIG works through working groups that target specific themes. Through a multi-level stakeholder dialogue, working groups identify opportunities and barriers in the long-term financing for energy efficiency, and propose policy and market solutions. Its Industry Working Group includes a focus on SMEs and contributes for instance to the de-risking of projects to enable green investments in SMEs. EEFIG also provides resources, such as a database on energy efficiency projects (DEEP[105]) and analysis on energy efficiency, including by SMEs (EEFIG, 2015[76]).

Local and regional initiatives for sustainable finance

Economic incentive schemes are also used at local and regional levels, tailored to the needs of SMEs in local and regional eco-systems. Box 4.14 provides examples of such schemes in Paris. OECD analysis on territorial approaches to environmental issues (OECD, 2020[63]) (Matsumoto et al., 2019[123]) and on social innovation at local level (OECD, 2021[126]) further documents this.

Box 4.14. Paris Green Fund

In France, the city of Paris launched in 2018 the Paris Green Fund (*Paris Fonds Vert*) to support private innovation and SMEs in support of the ecological transition of Paris. The city of Paris allocated EUR 15 million into the fund initially, with a first target to reach EUR 200 million thanks to the involvement of private investors. The Fund has three main functions: first, to serve as a growth equity fund aiming at financing companies that are already in a growth phase and/or at a more mature stage in their development; to serve as a green fund to invest in several sectors transport, energy, energy efficiency, waste management, buildings and digital innovation and to serve as a territorial fund. All activities funded through the Paris Green Fund must demonstrate a positive impact on the ecological transition of the city of Paris. The territorial impact of the Fund will be evaluated by an external body according to six main metrics: carbon impact (induced and avoided emissions); energy impact; impact on air quality; overall economic impact and just transition; resilience to the consequences of climate change; recycling and waste reduction.

Source: (OECD, 2021[127])

[104] https://ec.europa.eu/eefig/index_en

[105] https://deep.eefig.eu/

Public procurement can be an important vehicle for greening SMEs

Green public procurement (GPP) can play a significant role in creating demand for green products and services and boosting the market where private consumer demand for them is insufficient (OECD, 2015[128]). By using their purchasing power to choose goods and services with lower environmental impact, public authorities can help to drive down the costs of such purchases and make them more affordable generally. Green public procurement also increases market acceptance of green products (e.g. by demonstrating their commercial feasibility). Countries increasingly recognise that GPP can also be a major driver for innovation, providing industry with incentives for developing green products and services, particularly in sectors where public purchasers represent a large share of the market (e.g. construction, health services and public transport) (OECD, 2018[40]).

Public procurement can also be an instrument for greening SMEs for instance in the circular economy (UNEP, 2018[129]). However, whereas various countries specifically focus on SMEs in their procurement, and various countries have adopted sustainable procurement practices, combining an SME and sustainability perspective in procurement seems rare. Whereas several OECD studies exist on public procurement, these include little reference to the SME-environment intersection. (OECD, 2018[130]) discusses procurement and SMEs. It does not extensively analyse green procurement for SMEs, but includes an overview of policies in a number of countries where public procurement is used for greening. (OECD, 2015[128]) on the other hand, provides best practices for sustainable procurement, but does not include any reference to SMEs. A recent (UNEP, 2018[129]) report on sustainable procurement, includes a number of SME case studies. While in the literature there is ample attention for procurement, innovation and SMEs, studies that explicitly provide empirical evidence on the procurement-SME-environment nexus appear scarce. Taking the perspective of SMEs into account in sustainable procurement can be important to allow SMEs to benefit and improve greening practice.

Examples of policy measures

Promoting SME energy efficiency is a key policy objective…

Various countries have introduced economic support policies to support energy efficiency in SMEs. These schemes provide loan or grants to assist SMEs in making the investment to reduce their energy use. Information and advice can complement these financial incentives to make the policies more effective (Box 4.15).

Box 4.15. Policies to support energy efficiency in SMEs

Various countries have introduced support schemes to support investments in energy efficiency in SMEs (Leap4SME, 2021[121]).

Since 2008 the **German** Federal Ministry for Economic Affairs and Energy (BMWi) together with the KfW bank have operate an initiative aimed at overcoming barriers to energy efficiency investments by SMEs. The BMWi and KfW have established the "Special Fund for Energy Efficiency in SMEs" to tackle both the informational and cost barriers faced by SMEs. The programme has two components; the advice component and the financing component. The advice component provides grants for SMEs to obtain advice and consultation regarding energy efficiency. Advice can also be "in-depth", referring to an in-depth energy analysis undertaken in order to prepare a comprehensive strategy for energy-saving measures. The Financing

component provides SMEs with low-interest loans for investment in energy conservation measures.[106]

The "TEVMOT- Promoting Energy-Efficient Motors in Small and Medium Sized Enterprises (SMEs) in **Turkey**" Project is a 5-year project covering 2017-2022 period, funded by the Global Environment Facility (GEF). The project aims to encourage additional investments in the field of energy efficiency in industry through market transformation of electric motors used in SMEs. Currently, a financial support mechanism has been established with KOSGEB, and SMEs have started to avail the mentioned support.[107]

The **Mexican** National Energy Efficiency Programme for SMEs supports the industrial SMEs through financing schemes with attractive rates to replace inefficient equipment. The financing program focused on micro, small and medium-sized enterprises (MSMEs) for the acquisition of efficient equipment in energy terms. The programme is operated by the Fideicomiso para el Ahorro de Energía Eléctrica (FIDE), but in its implementation the Energy Secretariat (SENER) and the Ministry of Economy (SE) participate as contributors of the resources, Nacional Financiera (NAFIN), which administers the line of credit and the Federal Electricity Commission (CFE) that collects the loan through the electricity billing receipt (FIDE, 2014).[108]

In the **United Kingdom**, the Carbon Trust since 2007 ran an interest-free loans scheme for SMEs. This provided financial assistance to help SMEs acquire and install energy efficient technologies by providing interest-free loans. The scheme is now closed. A new GBP 100 million scheme was introduced in 2020 to help households and small businesses invest in low carbon heating systems, and consulting on introducing a Green Gas Levy to increase bio methane production for the gas grid.[109]

Colombia in December 2020 launched measures that will help improve SME productivity and energy efficiency with an USD 8 million credit approved by the Inter-American Development Bank (IDB) to the Banco de Comercio Exterior de Colombia S.A. (Bancóldex). It will promote a reduction in greenhouse gas emissions by scaling financing to SMEs investments in energy efficiency projects. The operation will benefit some 200 SMEs from all sectors of the economy requiring access to medium and long-term credit to invest in energy efficiency plans.[110]

Starting in 2008, the **Swedish** Energy Agency launched several initiatives to improve energy efficiency in small- and medium-sized enterprises (SMEs). Given SMEs are hard to reach through conventional information channels, the Swedish Energy Agency is working to find new channels which are considered credible by SMEs to reach this target group. A regional pilot project is underway which provides companies with better knowledge on and ways to improve energy efficiency through new and established networks. Cooperation with local and regional authorities has been intensified since 2016.[111] The Swedish Energy Agency has also started a scoping study for a pilot programme to cooperate with companies primarily in the industry sector through industrial associations. Another scoping study is examining the possibilities to begin working on energy efficiency through the supply chain. By collecting experiences from these and other activities the Swedish Energy Agency is aiming to share best-practice and good examples, either

[106] https://www.iea.org/policies/289-kfw-special-fund-for-energy-efficiency-in-smes?page=2&q=SMEs&status=In%20force

[107] https://www.iea.org/policies/12280-improving-energy-efficiency-in-manufacturing-sector?page=1&q=SMEs&status=In%20force

[108] https://www.iea.org/policies/2610-national-energy-efficiency-program-for-small-and-medium-enterprises-smes?page=2&q=SMEs&status=In%20force

[109] https://www.iea.org/policies/1753-energy-efficiency-loans-for-small-or-medium-sized-enterprises-smes?page=2&q=SMEs&status=In%20force

[110] https://www.iadb.org/en/news/idb-supports-colombia-improve-smes-productivity-and-energy-efficiency

[111] https://ec.europa.eu/regional_policy/en/projects/Sweden/helping-swedish-smes-become-more-energy-efficient

through seminars, published materials, the website, the Energy and Climate Counsellors or the media.[112]

Spain operates a grant scheme for SMEs and larger firms in the industrial sector to boost energy efficiency and reduce CO2 emissions. This program will facilitate the implementation of saving measures and energy efficiency as identified by the proposed industrial or energy audits to reduce energy consumption in industrial processes. The program has been allocated with a maximum budget amounting to of EUR 600 million, coming from the National Energy Efficiency Fund, approving urgent measures for growth, competitiveness and efficiency. [113]

…which shows positive impact…

Various evaluation studies on energy efficiency measures do exist and point at their effectiveness. (EIB, 2019[131]) assesses the impact of energy audits on the implementation of energy efficiency investments by SMEs, interactions with financial constraints, and how energy audits can be promoted, and confirms the importance of such tools, especially for SMEs. (Fleitera, Schleich and Ravivanpong, 2013[93]) in a study of German SMEs, conclude that high investment costs impede the adoption of energy-efficiency measures by SMEs, even if these measures are deemed profitable. According to them, investment subsidies or soft loans (for larger investments) may help accelerating the diffusion of energy-efficiency measures in SMEs. They also underline the importance of the quality of energy audits. In Australia, the 2014 evaluation of the Energy Efficiency for Small Business Programme showed significant energy and cost savings had been achieved**.**[114] (Hirzel et al., 2016[132]) reports positive effects of European measures on energy audits and environmental management systems.

…and can benefit from mutual learning

Policies to support SME energy efficiency can benefit from best practice exchange and mutual learning. The Leap4SME initiative provides a platform in Europe to make energy efficiency policies towards SMEs more effective and strengthen the knowledge base on the topic (see Box 4.16).

Box 4.16. LEAP4SME

LEAP4SME[115] is an initiative by European National Energy Agencies, co-ordinated by the Italian agency ENEA, to support Member States in establishing or improving effective policies for SMEs to undergo energy audits and implement cost-effective, recommended energy-saving measures through identifying the barriers for unlocking energy efficiency measures, mobilising private stakeholders, and proposing effective solutions to realise both energy and non-energy benefits. The LEAP4SME initiative is funded under the European Commission H2020 programme. It has mapped energy use by SMEs in a number of countries (Reuter, Lackner and Brandl, 2021[19]) as well as policies to improve energy efficiency in SMEs (Leap4SME, 2021[121]) and aims to support policy makers in designing better policies towards SME energy efficiency.

(Leap4SME, 2021[121]) provides an overview and analysis of 173 policies in eight European countries to support energy-efficiency with particular emphasis to energy audit. 61% of these policies involved financial instruments, 31% information and advice. Based on the analysis, a first set of policy recommendations to

[112] https://www.iea.org/policies/650-energy-efficiency-in-smes?page=2&q=SMEs&status=In%20force

[113] https://www.iea.org/policies/2654-fneeaids-to-smes-and-large-companies-in-the-industrial-sector?page=1&q=SMEs&status=In%20force

[114] https://www.environment.nsw.gov.au/research-and-publications/our-science-and-research/our-research/social-and-economic/sustainability/energy-efficiency-programs-evaluation/energy-efficiency-for-small-business-program-evaluation

[115] https://leap4sme.eu/

be used by policy developers has been released, including: further evaluate a combined approach with a mix of different instruments; awareness raising and communication of existing policy instruments for SMEs, simplification of application processes, as well as support for SMEs during the application phase; assessment of the effectiveness of focused obligations for SMEs to conduct energy audits; development of more tailor made approaches at the intersection of firms size.

Green building support can benefit SMEs

Many countries have put policies in place to make the existing and new building stock more energy efficient (Matsumoto et al., 2019[123]).[116] These policies rarely have an SME dimension, apart from supporting smaller firms in the construction industry. Box 4.17 provides examples of policy initiatives.

Box 4.17. Green building and SMEs

Improving energy efficiency of buildings and boosting the use of small-scale renewables is high on the agenda as a means to reach net zero. According to OECD data, 28% of global energy-related greenhouse gas emissions come from buildings.[117] Globally, building floor space is expected to double by 2060, whereas according to the World Economic Forum currently only 3% of investment in new construction is green and efficient (Nesler, Poh Lam and Lasternas, 2021[133]).

For SMEs, emissions related to the energy use in the buildings accounts for a significant share of the total as well. Furthermore, green building can also provide an opportunity for SMEs as a new green and growing market.[118] However, data that distinguish energy use or efficiency of buildings according to the size of their occupant are currently limited, although information is growing.[119] Policies to support green building currently are primarily directed to households, not so much to (smaller) companies. The assumption underlying this is that companies (more than household) would be able to invest in the retrofitting of buildings on the basis of expected return in energy savings. However, for several reasons this may be less the case for SMEs. First, the buildings from which SMEs operate are often rented housing, causing complications in investing in their energy efficiency. Also, as discussed before, awareness of SMEs of the possible savings as well as more limited access to resources can limit their ability to invest in energy savings.

Countries use a variety of measures to incentivise the retrofitting of existing buildings and the greener building of new ones, for instance to stimulate energy efficiency in the built environment and the use of renewables connected to the grid, such as solar panels on roofs.

Some countries have developed policies specifically targeted at the greening of SME buildings. As part of the September 2020 **French** Resilience and Recovery plan, EUR 6.7 billion were earmarked for measures specifically dedicated to energy upgrades, in an effort to reduce emissions and improve buildings' energy efficiency. These measures include energy renovation of SMEs, to improve thermal insulation & energy efficiency.

The SME Smart Lighting Pilot Scheme in **Ireland**, launched in 2017, provides funding for SME to adopt new efficient lighting technologies, reducing their lighting bills and benefiting from improved lighting conditions. The scheme is open to all SME's. In 2017, 60 businesses benefited from the

[116] See also upcoming work on building energy efficiency in cities and regions (https://www.oecd.org/cfe/cities/energy-efficiency-cities.htm).

[117] https://www.oecd.org/cfe/cities/energy-efficiency-cities.htm

[118] https://www.smartcitiesdive.com/ex/sustainablecitiescollective/expansion-green-buildings-small-business-sector/1295452/

[119] For instance, the EEFIG database DEEP includes various examples of investments in green building (https://deep.eefig.eu/). The OECD has launched a survey to assess green building and measures taken to boost this across countries.

financial support. With the new lighting technology, the businesses generated cost savings of EUR 540,000. Building on the learnings from the 2017 pilot scheme, a new updated scheme is now open, where up to EUR 3 million in funding from DCCAE is being made available.[120]

As part of its 2020 Budget, the **United Kingdom** introduced a new GBP 100m scheme to help households and small businesses invest in low carbon heating systems, and consulting on introducing a Green Gas Levy to increase bio methane production for the gas grid.[121]

Some countries, such as **Estonia** and **Germany**, support SMEs in the construction sector by boosting demand for green building by households and corporations.[122]

Italy aims to spend EUR 19.4 billion on green building as part of its recovery plan.[123]

The **European Commission** Fit for 55 proposals put strong emphasis on green building, including the building sector in the European Emission Trading system.

Fostering eco-innovation by SMEs and green entrepreneurs is an important policy objective

Various countries have introduced measures to support eco-innovation by new firms or existing SMEs (Box 4.18). These policies are often part of wider policies to support environmental innovation, but sometimes explicitly target start-ups and SMEs. A relevant question is if SMEs and start-ups can best be supported through targeted measures or can make use of more horizontal support mechanisms.

Box 4.18. Eco-innovation and start-ups

The **Netherlands'** SME Innovation Incentive in Top Sectors (MKB Innovatiestimulering Regio en Topsectoren (MIT)) is a subsidy scheme to support R&D for top sectors. This does not focus specifically on energy efficiency but can be used in respect of innovations for energy efficiency. The Ministry of Economic Affairs uses the MIT scheme to encourage SMEs to cooperate and innovate within this top sector.[124]

In April 2020, **Austria** launched a EUR 4.4 million support scheme for Eco Tech start-ups.[125]

The **United Kingdom** in May 2020 launched a new effort to support green start-up companies across the UK, joint-funding a GBP 40 million venture capital fund to supercharge the development of next generation clean, low-carbon technologies.[126] The Clean Growth Fund will contribute towards the UK's plans to reach Net Zero by 2050 and will be accessible to UK-based companies driving green technology across the power, transport, waste, and building energy efficiency sectors.

The **European Innovation Council** has funded over EUR 307 million to start-ups and SMEs that contribute to the objectives of the European Green Deal Strategy.

[120] https://www.iea.org/policies/2462-sme-smart-lighting-pilot-scheme?page=1&q=SMEs&status=In%20force

[121] https://www.gov.uk/government/news/budget-2020-what-you-need-to-know

[122] https://www.kriis.ee/et/uudised/valitsuse-liikmed-kiitsid-heaks-covid-19-lisaeelarvega-seotud-kriisimeetmed

[123] https://www.bruegel.org/publications/datasets/european-union-countries-recovery-and-resilience-plans/

[124] https://www.iea.org/policies/7737-mit-innovation-credit-for-smes?page=2&q=SMEs&status=In%20force

[125] https://brutkasten.com/%20aid%20package-startup-rescue-parachute-corona-crisis%20/

[126] https://www.gov.uk/government/news/government-launches-new-40-million-clean-growth-fund-to-supercharge-green-start-ups

France introduced a support mechanism to provide financial assistance to young entrepreneurs, volunteering in green companies.[127]

Canada supports start-ups and scale-up companies to enable pre-commercial clean technologies to successfully demonstrate feasibility as well as support early commercialization efforts.[128]

The **German** Federal Ministry of Education and Research since 2007 operates the SME Innovative programme aimed at strengthening the innovative potential of SMEs in top level research regarding resource efficiency. The programme is also included in the German post COVID-19 recovery plan.[129]

The **Italian** recovery plan includes a programme for venture capital and start-up support towards the ecological transition and support for sustainable innovation.

In August 2021, the **United States** Department of Energy (DOE) announced a plan to provide USD 37 million for small businesses pursuing climate and energy research and development (R&D) projects as well the development of advanced scientific instrumentation through a funding opportunity announcement (FOA). The projects, in support of efforts to build the American economy back better, range from atmospheric science and critical materials to quantum information sciences and accelerator technologies. This funding will be administered by DOE's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, which were established to encourage participation of diverse communities in technological innovation, as well as to increase technology transfer between research institutions and small businesses.[130]

Various countries have set-up green incubators and accelerators that focus on green innovations and green entrepreneurship. Examples include the EcoComplex "Clean Energy Innovation Center"[131] and the Green Exchange[132] in the **United States**, the Carbon Trust[133] in the **United Kingdom** and the Greencubator[134] in **Denmark**. Initiatives to set-up climate technology incubators also exist in developing countries (UNFCCC, 2018[134]).

SMEs and the circular economy

SMEs are important for achieving objectives regarding the circular economy, both by making their business operations more circular and by contributing to the innovation that can strengthen circularity across economies. Box 4.19 provides a number of country initiatives in this area.

OECD analysis also highlights the important role of cities and regions in fostering a circular economy, including for SMEs (OECD, 2020[63]). This includes case studies on various cities such as Granada, Spain, and Glasgow, United Kingdom, and approaches to the circular economy in these urban contexts, where cooperation with SMEs often constitutes an important part of the agenda.[135]

[127] https://www.economie.gouv.fr/files/files/directions_services/plan-de-relance/annexe-fiche-mesures.pdf

[128] https://www.canada.ca/en/environment-climate-change/news/2020/12/a-healthy-environment-and-a-healthy-economy.html

[129] https://www.fona.de/en/measures/funding-measures/sme-innovative-resource-efficiency.php

[130] https://www.energy.gov/science/articles/doe-announces-37-million-small-businesses-climate-energy-and-scientific-rd

[131] https://ecocomplex.rutgers.edu/

[132] https://www.greenexchange.com/

[133] https://www.carbontrust.com/

[134] https://greencubator.dk/

[135] See for further background on this: https://www.oecd.org/regional/cities/circular-economy-cities.htm

Box 4.19. SMEs and circular economy

Circular economy and SMEs is also a topic that receives increasing attention, including in the various recovery packages. UNEP, for instance, underlines the importance of SMEs for reaching circularity objectives.[136] The (KPMG, 2019[135]) evaluation of the European Commission pilot to support SMEs in the circular economy through training and advice, which reached 800,000 SMEs, showed promising results.[137]

The **Belgian** Recovery plan includes a project regarding the circular economy, with specific emphasis on SMEs (Build Back Circular). Raising awareness and informing SMEs about the circular economy is essential for support and accelerate their transition to a sustainable and resilient economy. Concretely, this will be done through 1) a website bringing together relevant information on the transition assistance measures offered to SMEs to switch to an economic model circular; 2) a self-assessment tool allowing SMEs to measure their progress towards this economic model and 3) annual awareness campaigns (out of 3 years) aimed at promoting the benefits of a transition to the circular economy and draw attention to the relevance of the self-assessment tool. Federal government will thus encourage SMEs to improve their circularity.[138]

In 2018, the **EIB** provided funding of EUR 100 million for small and medium-sized enterprises (SMEs) through the Life Cycle Asset Management programme operated by DLL, a Dutch asset finance partner. The EIB credit facility enabled some 200 Dutch and Belgian SMEs and companies with a medium-sized market capitalization – 'mid-caps' – employing less than 3,000 workers, to transition to the circular economy, providing them with financing at favourable rates of interest. Based on information on the incoming financing requests from SMEs, the total was split in a 2:1 ratio between Dutch companies (which submitted funding requests of EUR 66 million) and their Belgian counterparts (EUR 34 million). The programme defined specific criteria with which a circular transaction must comply, with a focus on the financing of remanufactured second-life assets and on delivering solutions for the complete asset life cycle.[139]

Digitally enabled circular plastics economy models. In such models, SMEs and start-ups make use of digital innovations to improve collection rates for waste plastics, set up digital payment systems and offer 3D printing with recycled plastics. An example is **Mr Green Africa**, a tech-enabled plastics recycling company aiming to disrupt the current informal and exploitative plastic recycling sector in Kenya. Supported by the Global Innovation Fund, the company offers an in-house end-to-end process for recycling, purchasing directly from about 2,000 waste collectors, many of whom are informal 'waste pickers' and are some of society's most marginalized people. Investments are needed to open plastics trading points, on board additional sourcing agents, invest in IT upgrades, and upgrade processing machinery to increase the scale of collection and the quality of recycled plastics materials and product.

[136] https://www.greenindustryplatform.org/blog/smes-must-embrace-circularity-businesses-and-planet-survive

[137] http://ec.europa.eu/environment/sme/circular_economy_boost_en.htm

[138] https://dermine.belgium.be/sites/default/files/articles/FR%20-%20Plan%20national%20pour%20la%20reprise%20et%20la%20re%CC%81silience.pdf

[139] https://www.chathamhouse.org/2021/07/financing-inclusive-circular-economy/acknowledgments?utm_source=Chatham%20House&utm_medium=email&utm_campaign=12530482_EER%20-%20Circular%20Economy%20-%20Finance%20publication%20-%20July%202021&utm_content=Asia-CTA&dm_i=1S3M,7GKKY,W7I94P,UBKHS,1

COVID-19 recovery packages

Economic incentive measures for greening are getting a strong boost through the recovery packages launched by many OECD countries in response to COVID-19. This section discusses how these recovery packages support the greening of SMEs.

Recovery packages include a focus on greening, but the emphasis on SMEs is modest…

An important policy question is how the policy response to COVID-19 helps support green entrepreneurship and the greening of SMEs, which were heavily affected by the pandemic. Policy makers across OECD countries stepped in rapidly to avoid an SME liquidity crisis (OECD, 2021[136]) (OECD, 2021[137]). Whereas the first response to the pandemic focused on rescue support, since Summer 2020 COVID-19 recovery packages are being rolled out that include sustainable objectives. Box 4.20 shows that the SME orientation of greening measures in recovery packages is relatively modest.

Box 4.20. Green recovery packages and SMEs

Support for greening is an important part of recovery packages, although estimates of the exact share differ depending on definitions and country coverage. According to the Global Recovery Observatory, 21% of the USD 2.25 trillion total spending for recovery (USD 0.46 trillion) is focused on greening.[140] The Green Recovery tracker from the German Wuppertal Institute[141], which focuses on recovery packages in Europe, estimates EUR 204 billion out of EUR 685 billion will be spend on greening (30%). The OECD Greening database finds that out of a total of USD 1950 billion of fiscal support measures, USD 336 billion has a positive impact on greening (17%).[142] The OECD database shows that the bulk of the green measures in recovery packages are grants or loans (making up around 37% of the 680 measures), tax reductions or other subsidies (17% of the total), and regulatory changes at around 11%. According to the Brussels-based think tank Bruegel, the share of greening in the recovery packages of 20 EU countries is above the 37% requirement set by the European Commission.[143] In Luxembourg, Denmark, Belgium and France the share of green ranks highest, whereas in absolute terms Italy, Spain, France and Poland spend most on greening.

On the basis of the various trackers of recovery packages available an analysis was made of the SME orientation of the greening measures they include (see Annex A for the methodology used). Policies are seen as 'SME-related' when they explicitly target SMEs or reference them as one of the key target groups. Policies that are open for all businesses, and do not mention a specific focus on SMEs, are thus not included, even though SMEs can of course make use of such more generic policies. Table 5 shows the results from the three databases used. The share of SME related policies in greening policies in the recovery packages is between 4-5%.

[140] https://recovery.smithschool.ox.ac.uk/tracking/. This tracker monitors COVID-19 related fiscal policy spending across 50 major economies and include almost 5,500 policy measures and budgets dating since the start of the pandemic.

[141] https://www.greenrecoverytracker.org/. This tracker monitors the contributions of 16 EU member states recovery plans to the green transition, and contains 996 policies on greening.

[142] https://www.oecd.org/coronavirus/en/themes/green-recovery. This tracker contains around 860 national-level measures with environmental relevance, spread over 43 countries and the European Union, and covers a range of environmental impacts beyond just energy and climate, and includes pollution (air, plastics), water, biodiversity, and waste management.

[143] https://www.bruegel.org/publications/datasets/european-union-countries-recovery-and-resilience-plans/

Table 4. SME related greening policies in recovery packages (number of policies)

Tracker	Focus	SME related	Total	Share of SME related
Global Recovery Observatory	Total	39	806	4.84%
	Rescue	20	147	13.61%
	Recovery	19	659	2.88%
Wuppertal Institute Green Recovery Tracker*	Recovery	16	327	4.89%
OECD Green Recovery Database	Recovery	36	857	4.20%

Note: From the Wuppertal Institute Green Recovery tracker, policies expected to have a positive or very positive impact on environmental outcomes have been included
Source: https://recovery.smithschool.ox.ac.uk/tracking/; https://www.greenrecoverytracker.org; https://www.oecd.org/coronavirus/en/themes/green-recovery

This can be considered low for at least two reasons. First, it is considerably lower than the share of SME related policies in the rescue packages to the pandemic. OECD analysis on financial support to businesses in response to COVID-19 shows that SME related policies account for 40-56% of policy measures. Also with broader definitions of fiscal support, McKinsey estimated in July 2020 that of a total of USD 12 trillion in fiscal support, 10% was aimed for SMEs. Using the total database of the Global Recovery Observatory, 17% of rescue policies and 4% of recovery policies were SME related. Second, the share of SME related policies in greening is also significantly below the share of SME related policies in other policy areas, for instance in digitalisation (9.4%). At the same time, this modest orientation towards SMEs in greening is less surprising from the perspective of general environmental and climate policies, which have a limited orientation towards SMEs. For instance, a database launched by the IEA[144] in June 2021 with 6250 policies with regard to energy and climate, shows that only 3.9% of these measures focus on SMEs, start-ups or entrepreneurs.

Finally, The Global Recovery Observatory also includes data on the values of policies. The total value of SME related green policies is USD 38.2 billion, which is 0.13% of the total value of greening policies in the database. The share in value in recovery packages alone is 2.44%. According to the Wuppertal Institute Green Recovery Tracker, the share in value of green SME-related policies in 17 European countries is higher, amounting to 5% of total greening policies. Both estimates suggest the action is still limited, at least against the background of the estimated investment gap to reach net zero discussed in section 3.[145]

…although the packages include various policies of relevance to SMEs

However, the various recovery packages do include examples of SME related policies. **Belgium** and **Poland** include measures regarding SMEs and the circular economy. **Finland** and **Spain** reference SMEs in the context of hydrogen. **Lithuania** and **Italy** put emphasis on eco-innovation and start-ups. The **Danish** Recovery plan includes EUR 80 million in SME support measures for energy renovation, supporting SMEs to grow and create local employment with projects such as energy renovation of buildings or boosting energy efficiency for industry.[146]

Slovenia includes a variety of measures on greening related to SMEs. The Slovenian recovery plan includes various reference to SMEs with regard to greening, such as the fostering of cooperation between

[144] https://www.iea.org/policies

[145] OECD (2022) Financing SMEs and Entrepreneurs: an OECD Scoreboard (forthcoming)

[146] https://ec.europa.eu/info/system/files/denmark-recovery-resilience-factsheet_en.pdf

energy-intensive industries and innovative SMEs to strengthen energy efficiency, promoting energy management systems in SMEs, raising awareness among SMEs of energy efficiency, demonstration projects with SMEs, retrofitting of buildings with specific SME reference, and supporting innovation in SMEs and start-ups. The plan also includes a 'support for SMEs in the circular economy' initiative.

The **French** ecological transition and energy renovation of MSMEs[147] includes various measures targeted at MSMEs to support them in the ecological transition including a refundable tax credit for the energy renovation of VSE-SME buildings, support to companies engaged in ecological transition (EETE), support for MSMEs, in the form of a lump sum to initiate or accelerate an ecodesign process, the acceleration of the ecological transition of 45,000 artisans, traders and self-employed by CMA and CCI, by funding diagnostics and support and the provision of flat-rate aid for eco-design actions for products and services developed by SMEs; more specifically, the implementation of actions to support sustainable tourism in benefit of SMEs (waste management, reduction of the carbon footprint, etc.).[148]

In **Germany**, in 2020 the KfW and the Federal Ministry for Economic Affairs and Energy launched the programme Climate action campaign for SMEs. Through low-interest loans and grants it incentives investments in the manufacture and use of sustainable systems and products, helping SMEs in their efforts to transition to climate change mitigation, environmental protection and resource efficiency. The programme will provide up to EUR 100 million per year, over a period of three years.[149]

The **United Kingdom** deployed in February 2021 GBP 11 million specifically to fund energy entrepreneurs.[150] The governmental investment will stock the latest round of the Energy Entrepreneurs Fund (EEF)[151], which exists since 2012 and seeks to drive innovations from SMEs in new clean technologies and reduction of carbon emissions with the aim to support UK zero emissions target. The investment aim to fund between 15 and 20 projects.

As part of its Green New Deal, **Korea** will invest 73.4 trillion won by 2025 with the aim to strengthen climate action and realize a green economy. The investment will focus on green infrastructures, renewable energy, and fostering green industry. Amongst other, it aims to provide technology development support for environment and energy SMEs, build a green industrial cluster to help with technology development, testing, production and marketing, and create about 215 billion won worth of public-private joint funds to grow green businesses, as well as make 1.9 trillion won worth of loans available for businesses investing in environment protection tools and facilities (Government of Korea, 2020[138]).

Looking ahead

Towards and integrated approaches to SME greening and green entrepreneurship

Evidence shows that an integrated approach is important for effective policies to support environmental and climate performance by SMEs

Several studies have underlined the importance of an integrated policy approach. (UNEP, 2017[77]) emphasizes a policy approach for eco-innovation by SMEs that includes sustainable production and consumption, environmental protection, industrial development as well as science, technology and innovation policy frameworks to create a holistic system response (mainstreaming). Likewise, (Parker, Redmond and Simpson, 2009[139]) conclude that given the large differences between SMEs, 'a holistic mixture of interventions is necessary to achieve maximum engagement and environmental improvement by all SMEs'. (Federation of Small Businesses, 2012[113]) looks into the impact of energy and environmental regulation on SMEs in the UK, and argues for a more coordinated and staged approach for policies.

147 https://www.economie.gouv.fr/files/files/directions_services/plan-de-relance/PNRR%20Francais.pdf

148 https://www.economie.gouv.fr/files/files/directions_services/plan-de-relance/annexe-fiche-mesures.pdf

149 https://www.kfw.de/KfW-Group/Newsroom/LatestNews/Pressemitteilungen-Details_573120.html.

150 https://www.gov.uk/government/news/11-million-boost-for-energy-entrepreneurs-to-turn-green-dreams-into-reality

151 https://www.gov.uk/government/collections/energy-entrepeneurs-fund

(Blundel, Monaghan and Thomas, 2013[16]) emphasise the need for better-integrated approaches in environmental policymaking towards SMEs to address today's complex sustainability challenges and potential interactions and trade-offs. (McDaniels and Robins, 2017[58]) argue that discussions and agenda on finance for sustainability and SME finance have remained largely separate, and need to be brought together and should be better aligned across levels of government. (Labonne, 2006[114]) suggests that for SMEs even more than for larger firms the choice of environmental policy instruments mix makes a major difference.

Further work that not only focuses on the impact of individual policy instruments, but also which sheds light on the optimal integrated policy mix for the SME-environment nexus in different countries will be important to calibrate governmental policies and actions. Such work could include an analysis of the appropriate mix between generic and more SME specific policies and instruments to foster SME greening, but may also focus on potential complementarities and trade-offs among such policies with other policy objectives, including competitiveness.

Twin transition

…including on the twin transition of greening and digitalisation

Various countries approach SMEs and environmental issues in combination with digitalisation. Not only can digital solutions in some cases support environmental practice, but also may in other cases be a source of high-energy use. For example, among the smart solutions suitable for SMEs are micro-grids that incorporate renewable sources of energy into conventional electricity grids with the help of information and communication technologies (ICT) for management and control purposes and enable small-scale energy production and management (OECD, 2021[137]). Studies increasingly document digitalisation and greening in conjunction (see for instance (EIB, 2021[41]) (Kesidou and Ri, 2021[140]).

An interesting example of an approach on the twin transition is the roadmap on digital and environmental issues launched by **France** in 2021, which includes reference to SMEs.[152] The roadmap aims to "develop knowledge of the digital environmental footprint", "support a more sober digital environment" and "make digital technology a lever for the ecological and solidarity transition", and aims to improve the knowledge base on the twin transition.

The diversity of SMEs and entrepreneurs

Policies need to take the diversity of SMEs and entrepreneurs into account

SMEs and entrepreneurs differ significantly in their aspirations and capacities with respect to greening. Some entrepreneurs are frontrunners in developing the technologies needed to realise climate ambitions. Others are more gradually adopting working methods and applied technologies for instance to reduce energy use. These differences among SMEs and entrepreneurs are important for policy makers to take into account (Box 4.21).

Box 4.21. SME heterogeneity as a barrier for effective SME greening policies

The heterogeneity of SMEs and entrepreneurs was mentioned at several occasions in this paper, for instance:

- With respect to their attitudes and actions towards greening;
- With respect to the type of environmental abatement steps involved (for instance energy saving, waste, circularity);
- With respect to the drivers and barriers they encounter.

[152] https://www.economie.gouv.fr/environnement-numerique-feuille-de-route-gouvernement

Several studies point to a lack of consideration of the heterogeneity of SMEs and entrepreneurs and their environmental actions and needs as a core challenge for more effective policies at the SME and environment nexus (Raes, 2021[141]). (Rizos et al., 2015[142]), in a literature review, analyse barriers and opportunities for SMEs to embrace circular economy business models, point at the large heterogeneity in SME managers as to their environmental awareness. Similarly, (Gibb and O'Neill, 2014[56]) show that the category of green entrepreneurs is very heterogeneous and that entrepreneurs move over time between green and conventional business practice. (Aragón-Correa et al., 2008[11]) show that environmental strategies of SMEs vary widely from reactive regulatory compliance to pro-active pollution prevention and environmental leadership. (Blundel, Monaghan and Thomas, 2013[16]) suggest that the existence of trade-offs between financial and environmental objectives depends on geographical, sectoral and firm-level specificities.

Various studies have developed typologies to better understand these differences, in particular regarding green entrepreneurs and their motivations. (Walley and Taylor, 2002[57]) distinguish different profile of entrepreneurs:

- Ad hoc (or accidental) green entrepreneurs, who are driven purely by financial gain and whose contribution to sustainability is entirely unintended
- Innovative opportunists, who are financially oriented, having spotted a green niche in existing markets and setting out to exploit that niche
- Ethical mavericks, whose sustainability orientation tends to be influenced by the values of their friends, networks and past experiences; these tend to set up small, niche businesses that rarely grow beyond a small scale due to a lack of financial interest on the part of the founder
- Visionary champions, who embrace a transformative, sustainability orientation and tend to be driven by a combination of their values and financial return.

Taking the heterogeneity of SMEs and their environmental challenges and opportunities better into account may contribute to more effective environmental policy making and the realisation of more win-wins between environmental and business objectives.

Source: (Raes, 2021[141])

Transition policies

Complementary and transition policies can support greening

Finally, supporting SMEs in the environment and climate transition they face may require complementary policy to ensure that such transition is just and inclusive, in line with the SDGs to leave no one behind. In a recent OECD Green Growth paper, (Botta, 2019[143]) this 'just transition' is analysed. Although overall employment costs related to the transition are expected to be limited, some communities are expected to be more affected than others, requiring an inclusive policy framework to strengthen their resilience. The progress report on OECD's Green Growth Strategy (OECD, 2015[2]) concludes that potential distributional costs of the transition merit greater policy focus. Although these reports do not focus on SMEs explicitly, SMEs in some areas or sectors may be more affected than others by the transition, and – as in adaptation – might help support resilience (Dougherty-Choux, 2014[54]). This message on better place-based policies, also follows from recent OECD work on environmental challenges in cities and regions (see for instance (OECD, 2019[144])). A relevant question is if and how possible place-based transition policies for groups of SMEs could contribute to such 'just transition' in the environmental domain.

(OECD, 2021[145]) finds evidence for the hypothesis that an output reallocation between firms induced by changes in the energy price leads to a reallocation of workers between firms, especially from large energy-intensive firms to energy-efficient SMEs.

5 Conclusions

For quite some time, SMEs were not a central focus of the policy debate about climate change and environmental degradation. The focus was on larger entities, and when SMEs were included, it was primarily the more innovative entrepreneurs. Discussions on SMEs and environmental regulation were more about how to minimise costs for SMEs, for instance through exemptions, and less on how they could be enabled to drive the transition.

That perspective is now changing. With the growing urgency and ambition in climate policy, it is increasingly clear that SMEs must play a central role in the transition, given their significant aggregate footprint and potential to contribute to mitigation, including through the development of innovative technologies. The importance of SMEs and entrepreneurs is also acknowledged in SME and entrepreneurship strategies in various countries, which include sustainability measures. COVID-19 has further shown the importance and vulnerability of SMEs, with recovery packages to build back better offering opportunities to help SMEs to become more resilient and greener.

Although available data on the SME environmental footprint is limited, studies show that on aggregate, the share of SMEs in energy use, emissions and other indicators of pollution is considerable. At the same time, innovative small businesses and entrepreneurs are increasingly taking steps to reduce their footprint – although less than larger entities – and, through their innovations, contribute to technological solutions for climate mitigation and adaptation. Similarly, SMEs are increasingly greening their goods, services and business models to cater to the needs and standards of consumers.

What primarily drives SMEs to undertake steps to reduce their footprint is the prospect of cost reduction, along with changing consumer demand. However, pressure from societal actors within the SME eco-system also plays a significant role, including consumers, employees, and investors, as well as supply chain relations and policies. Although studies show that through well-designed environmental and climate policies need not come at the expense of financial and business success, given the wide variety of entrepreneurs and SMEs, in some cases the business case for greening is not straight-forward.

At the same time, SMEs and entrepreneurs also face a number of barriers in their greening efforts. These include a lack of awareness, information and knowledge on changing environmental requirements and needs, as well as support to address these. They also have more limited access than larger firms to resources for greening, such as skills and finance, and have to deal with uncertainties in markets and policies as well as externalities that make greening investment challenging.

Countries have put in place an increasing number of SME focused policies to reach net zero. Such policies focus on the provision of information and advice, regulation as well as economic incentives such as grants and loans. However, the share in SME-oriented environmental and climate policies is limited, which can be problematic, given the specific circumstances and barriers they face.

Furthermore, there is significant variety in how countries address SMEs in environmental and climate policies. There is important scope for mutual learning between countries and sharing of experiences on what works and what works less well, in particular in light of the many recent initiatives in this area. In addition, there is room to explore further the optimal mix between SME oriented and more generic policies in relation to the various environmental challenges and opportunities SMEs encounter (eco-innovation, new green markets, energy and resource efficiency, waste management and the circular economy).

Furthermore, given the large heterogeneity of SMEs and entrepreneurs, and the different environmental challenges they face, it is clear that one-size fits all policies are not the solution.

The COVID-19 pandemic has shown the vulnerabilities of SMEs, and is having a deep and continuing impact on their performance. While rescue policies focused on liquidity support had a strong SME orientation, this is less the case for the recovery packages that have been launched in many OECD countries, in particular with regard to greening. Taking an SME perspective into account in greening measures in recovery packages, as well as complementary measures, is of the essence to enable progress on reaching climate mitigation objectives.

Finally, an integrated approach to SME and greening policies is important. Such an approach would be well embedded in both wider SME and entrepreneurship policy frameworks and in climate and environmental policy; it would also require an appropriate mix and governance of policies across levels of government. Such integrated approach can help mitigate the potential trade-offs between improving environmental and business performance.

The OECD will continue its work on these issues to contribute to better understanding of the various issues and the identification of good practice policies, In this regard, the OECD Platform on Financing SMEs for Sustainability has an important role to play in creating the conditions for SMEs to finance their green investments and innovations by tackling demand- and supply-side obstacles, Other ongoing analytical work focuses on better understanding the drivers and barriers to green entrepreneurship and the greening of SMEs, and the implications for policy. The OECD SME and Entrepreneurship Strategy will deliver Guiding Principles for SME and entrepreneurship policies, including on greening. Strengthening the evidence base on the greening of SMEs and entrepreneurship will be a key challenge in the years to come.

Realising the ambitions of climate policies to reach net zero by 2050 can only succeed if SMEs and entrepreneurs are included in policies efforts, and when support measures take their added value, needs and challenges well into account. Moving forward, the following issues will be of key importance:

- Improving the evidence base on the greening of SMEs and entrepreneurs through improved data availability and analysis, focusing both on green innovative entrepreneurship and on the greening of SMEs.
- Better insight at more granular level on the business case, and possible need for government support, for different types of greening activities, taking the differences among SMEs and entrepreneurs into account.
- Further analysis of how regulatory frameworks can be best designed to support and provide the right incentives for the participation of SMEs and entrepreneurs in the green transition.
- Better insight into the types of policies best suited to support green entrepreneurship and the greening of SMEs, and in particular the identification of cases that warrant targeted measures for SMEs and entrepreneurs, and how to ensure a coherent and integrated policy approach.
- Better understanding the financing needs of SMEs and entrepreneurs to invest in greening, and identifying the relevant financial policies and products, including through the exchange of good practices on this issue.
- The inclusion of SMEs and entrepreneurs in policy design on climate and the environment, including through SME tests in regulatory impact assessments and consultations.

Annex A. Identifying SME-related policies in recovery packages

To assess the SME-orientation of recovery packages in greening, three trackers and databases were analysed:

- The Global Recovery Observatory of the Oxford University Economics Recovery Project (OUERP), which includes 7,584 rescue and recovery policies of 90 countries, accessed in September 2021 (https://recovery.smithschool.ox.ac.uk/tracking/).
- The OECD Green Recovery Database, which includes 857 greening policies in recovery packages in 44 countries, accessed in September 2021 (https://www.oecd.org/coronavirus/en/themes/green-recovery).
- The Green Recovery Tacker developed by the Wuppertal Institute and E3G, which includes 996 recovery policies in 17 EU countries, and assesses these according to their green impact, accessed in September 2021 (https://www.greenrecoverytracker.org/).

The aim of the tracker analysis is to assess if and how policies in the trackers were 'SME-related'. SME-related is interpreted as policies that explicitly target SMEs or reference them as one of the target groups. Where possible, (the share of) SME-related policies was assessed by number and value of policies in both rescue and recovery packages at large, as well as in specific policy domains (digitalisation, greening, skills and innovation) and aspects of SME finance (liquidity, insolvency, alternative finance). Where possible, SME-related policies were differentiated between focused on firm age (e.g. start-ups), self-employed, type of entrepreneurs and firm size per se.

The identification of SME-related policies took place along three steps:

- First, relevant existing classifications within the databases were used, for instance archetype C (liquidity for SMEs) and the clean archetype in the Oxford database, or classifications regarding policy domains.
- Second, a word search was done on the descriptions of policies in the databases (where available), using targeted search terms to identify policies.

  Third, a manual check was done on all the policies identified, to ascertain if indeed they ended up in the right category. Moreover, financial outliers by value were omitted to avoid bias in the analysis.

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