

## Innovative green-technology SMEs as an opportunity to promote financial de-risking

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### Abstract

The authors recommend that the G20 target innovative green-technology SMEs as an opportunity to promote financial de-risking while addressing Paris Agreement commitments and UN Sustainable Development Goals. This should be achieved by creating signals for private investors through: (1) a reporting system that can help monitor the scale-up of green-technology SMEs; (2) the use of public funds to signal innovative green-technology SMEs to investors; and (3) the inclusion of SMEs in the design of green finance platforms. By implementing these recommendations, the G20 will ensure that innovative, low-carbon SMEs become attractive, low(er)-risk investment opportunities for the private sector.

(Published as [Global Solutions Paper](#))

**JEL** O31 Q55 Q58 E60

**Keywords** Innovation; green technology; eco-efficiency; SMEs; financial de-risking

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**Citation** Elena Verdolini, Céline Bak, Joël Ruet, and Anbumozhi Venkatachalam (2018). Innovative green-technology SMEs as an opportunity to promote financial de-risking. *Economics: The Open-Access, Open-Assessment E-Journal*, 12 (2018-14): 1–12. <http://dx.doi.org/10.5018/economics-ejournal.ja.2018-14>

## **Introduction**

As the G20/OECD High-Level Principles of SMEs Financing state, Small and Medium-sized Enterprises (SMEs), including micro-enterprises, are core engines of innovation, growth, job creation and social cohesion in high-income/emerging economies, as well as low-income developing countries. In the former, SMEs undertake the majority of private economic activity, and account for more than 60 percent of employment and 50 percent of GDP. In the latter, SMEs contribute on average to more than 50 percent of employment and 40 percent of GDP; furthermore, they contribute significantly to broadening employment opportunities, social inclusion and poverty reduction (G20/OECD 2015).<sup>1</sup>

In this article, we argue that G20 countries need to recognize and engage SMEs, and especially low-carbon technology SMEs, as key economic actors in the effort toward climate mitigation and sustainable development. Failing to bring them on board, or designing strategies that do not take into account the challenges and barriers they face, significantly reduces the chances of successfully attaining UN Sustainable Development Goals and the commitments made at the Paris Agreement.

## **Green technology and eco-efficient SMEs**

Small, medium and micro-sized enterprises are non-subsidary, independent firms which employ fewer than a given number of employees. This number varies across countries, but the most frequent upper limit designating a medium size enterprise is 250 employees, as in the European Union.<sup>2</sup> Small firms are generally those with fewer than 50 employees, while micro-enterprises have at most 10, or in some cases 5, workers. SMEs are also often defined by relying also on financial assets. For instance, in the European Union, the turnover of medium-sized enterprises (50–249 employees) should not exceed EUR 50 million; that of small enterprises (10–49 employees) should not exceed EUR 10 million while that of micro firms (less than 10 employees) should not exceed EUR 2 million. Alternatively, balance sheets for medium, small and micro enterprises should not exceed EUR 43 million, EUR 10 million and EUR 2 million, respectively (OECD 2005: 17).

Within this type of firms, green-technology (or low-carbon technology) SMEs can be defined as those SMEs whose business model includes: (1) “any product, process or service designed with the primary purpose of contributing to remediating or preventing any type of environmental damage”; and (2) any “product, process or service that is less polluting or more

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<sup>1</sup> To put this in perspective, in the EU27 the overwhelming majority (some 20.9 million, or 99.8 percent) of enterprises active within non-financial business economy in 2008 were SMEs. These accounted for two out of every three jobs (66.7 percent) and for 58.6 percent of value added within the non-financial business economy (EUROSTAT 2011).

<sup>2</sup> However, some countries set the limit at 200 employees, while the United States considers SMEs to include firms with fewer than 500 employees.

resource-efficient than equivalent normal products that furnish a similar utility.” Conversely, an eco-efficient SME is an SME that has reduced its environmental footprint and has made its operations climate resilient. Eco-efficiency entails delivering competitively-priced goods and services which satisfy human needs and bring quality of life, while reducing ecological impacts and resource intensity (Lehni et al. 2000). Low carbon SMEs thus entails using less energy and improving the efficiency with which resources are used (ADBI 2013). This is particularly important from the perspective of emerging economies, where implementing policies and incentives that discourage carbon intensive practices is seen as a unique opportunity for SMEs to invest in competitiveness.

Arguably, these definitions are somewhat vague, and hard to operationalize to identify which SMEs can be characterized as low-carbon and/or eco-efficient. This reflects the general difficulty in drawing the boundaries of low carbon and environmental manufacturing and activities, as also pointed out in (Shapira et al. 2014). Indeed, several definitions have been proposed in the literature. For instance, the OECD and Eurostat define low carbon and environmental sectors are those “contributing to prevent, measure, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems” (OECD/Eurostat 1999). These include services and products which reduce environmental risk, cleaner production technologies, and all those technologies and processes that lower pollution and resource use. Along similar lines, a study commissioned by BIS to Innovas Solutions Ltd considers three broad categories as “low carbon and environmental goods and services”. These relate to the environment (e.g. recycling, pollution control, environmental consultancy); renewable and carbon free energy (such as wind, solar, hydro, geothermal, wave energy and nuclear); and, more generally, low carbon products, processes and technologies (e.g. those goods and services which reduce emissions in several polluting sectors, such as transport, construction, metals. Interestingly, this study also includes carbon finance within the set of low carbon and environmental goods (BIS 2010).

Clearly, a first issue that needs to be resolved is the creation of an appropriate and clear cut definition of low-carbon and environmental SMEs. This would be instrumental in helping identify and support these firms, as discussed later in this paper, but is far from being an easy task due to significant differences in the size of SMEs and projects around the world. For instance, this is of special relevance for a continent such as Africa where, since the German presidency, the G20 worked to develop a partnership. There, as the International Finance Corporation (IFC) of the Africa50 initiative from the African Development Bank argues, size is a critical challenge for energy projects: compared to other projects in similar geography (Mexico, Africa, Arabia, India) the kWh cost ratio is 1:2 to 1:3 on recent projects. This arguably depends on scale—150 GW for the whole of Africa, which results in lower average size and higher interest rates, both of which add to governance issues.

## **Challenge**

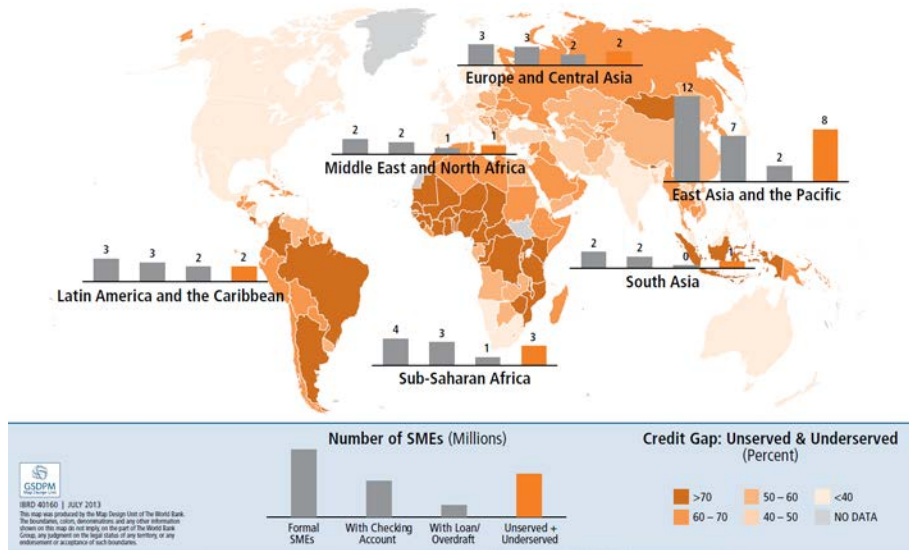
One major long-standing hurdle for SMEs has been the lack of appropriate forms of finance, with the severity of financing constraints varying across countries and sectors. A recent World Bank report estimates that the percentage of SMEs unserved or underserved by the formal financial sector is between 19 and 23 percent in developed economies, and rises to 26–32 percent in developing countries (Stein et al. 2013). This amounts to a credit gap of around 1 trillion USD, which rises to over 2 trillion USD if informal SMEs and micro-enterprises are taken into account (Figure 1).

As most green or low-carbon technologies have relatively high ratio of up-front to operating costs, their viability is particularly sensitive to SMEs. These financing constraints and barriers to private capital have an even more decisive impact on innovative low-carbon SMEs who have developed solutions to mitigate GHG emissions (i.e. green-technology SMEs) as well as SMEs looking to deploy solutions to reduce their operations' carbon intensity (i.e. eco-efficient SMEs), as illustrated in Figure 2. Green-technology SMEs face issues similar to those of sustainable infrastructure projects: their returns may accrue over a long-term horizon. Similarly, eco-efficient SMEs need to have access to finance with long horizons (Lane 2017). In fact, if we were to imagine emerging firms delivering solutions to climate change in a sports league, they would be a newly established and very talented team of young people playing on a field not yet served by lighting, a stadium or a transportation system for spectators. Their older opponents (incumbent, larger and/or more fossil-intensive firms), on the other hand, are playing on a covered and level field, well-lit and well-served by public transportation and infrastructure, such as well-established financial markets and engagement mechanism during environmental regulation processes, including for carbon pricing (Bak 2017).

Indeed, many firms now engaged in commercializing solutions to climate change must seek out markets where they can both improve environmental performance and do so at a cost lower than current business baselines. This is because today inefficient fossil fuel subsidies, combined with very low carbon prices, create disincentives to quickly adopt green innovation. G20 countries now provide roughly \$444 billion a year in subsidies for the production of fossil fuels (Bast et al. 2015). In addition to the recommendations put forward in Bak et al. (2017), which include, for instance, dismantling fossil fuel subsidies and the establishment of a tax on carbon emissions, we focus here on the key challenges for, and role of, innovative, low-carbon SMEs. Note also that SMEs wanting to reduce GHG emissions from their own operations must simultaneously open both the innovation and financing windows. Access to finance is as important as access to technology when it comes to improving eco-efficiency. In this article, we focus specifically on access to finance to commercialize innovation, but it should be noted that accessing finance to adopt innovation should not be forgotten.

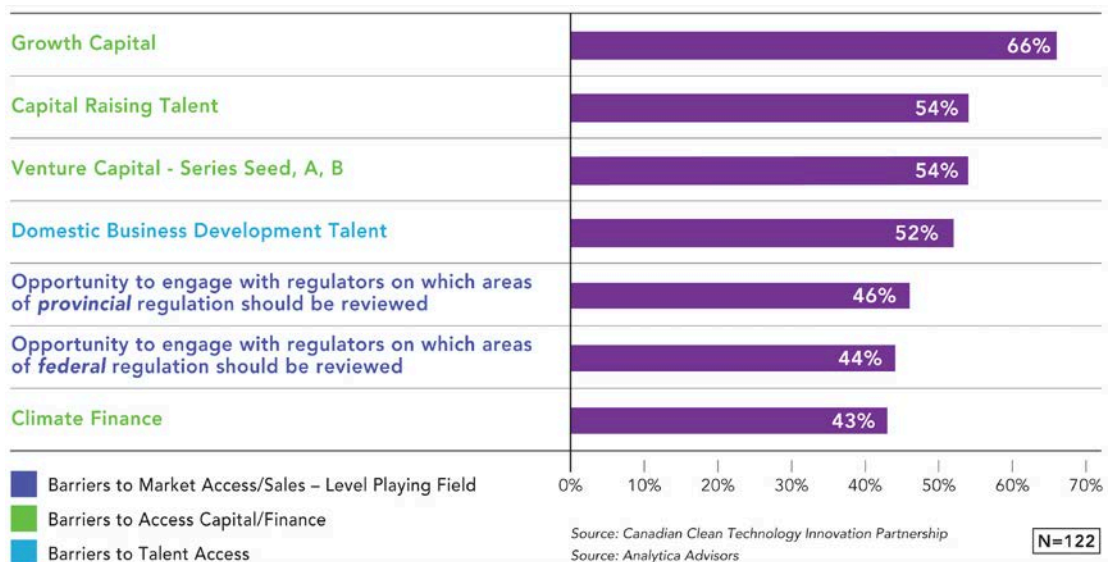
In this respect, two other key aspects merit consideration. First, G20 countries must unlock the finance needed to enable the attainment of both Sustainable Development Goals and Paris Agreement commitments. This will require the scale-up of new low-carbon technologies, including promising zero-emission options (i.e., green and blue hydrogen, which offer lower

Figure 1: Total credit gap for SMEs



Source: Stein et al. (2013) based on data from IFS Enterprise Financing Gap Database 2011. Please note that this graph does not include data for USA and Canada, although they are part of the G20.”

Figure 2: Barriers to growth for SMEs commercializing climate mitigation and adaptation innovations in Canada



Source: Figure provided by Céline Bak.

costs and higher performance for sustainable infrastructure projects) as well as carbon capture sequestration and use (CCUS). Indeed, there is currently significant heterogeneity across sectors and countries, and the pace at which low-carbon technologies are developed and deployed. An integrated approach to industrial policy across G20 countries would provide a bridge to accelerate the dissemination of innovation (Ruet 2016).

While carbon pricing and sustainable infrastructure are key to fostering the innovation process, accessing green finance will be a significant challenge for firms developing and commercializing innovative solutions to climate change as well as SMEs who must adapt to climate change. In many cases, the “technologies of tomorrow” may very well be developed and commercialized through firms that will start as SMEs.

On the other hand, lack of disclosure and transparency makes it impossible for financial markets to identify investment opportunities to move capital into green investments. As climate-related financial disclosure increases, investors will identify three kinds of risk: (1) Physical risks (i.e., risks of economic and financial losses due to climate-related hazards); (2) Transition risks (i.e., risks of financial losses related to regulatory and economic adjustments in a transition to a lower-carbon economy; and (3) Liability risks (i.e., risks that liability insurance providers have to cover claims for losses arising from physical or transition risk from climate change) (Tanaka et al. 2016). If information asymmetries are addressed, the solutions that green-technology SMEs can offer for physical risks will attract investment. Their innovations can form the basis of new business models that address transition risks. With access to green finance, SMEs may have a positive impact on liability risks. Indeed, this article identifies financing low-carbon innovative SMEs as one the strategies to kill many birds with one stone. Specifically, we suggest including SMEs in the effort to support sustainable, low-carbon growth as a way to (1) successfully achieve climate targets in G20 countries and beyond; (2) promote sustainable growth for G20 economies; and (3) de-risk private financial investments by ensuring that innovative, low-carbon SMEs are identified as high-return, low(er)-risk investments than firms investing in carbon-intensive infrastructure, processes and production.

We put forward three recommendations that will ensure that the G20 can promote the financing of the transition towards sustainability and resilience by leveraging low-carbon innovation.

## **Recommendations**

### **1. Promote a reporting system to help monitor the scale-up of green-technology SMEs**

*There is currently no means for firms to signal innovative projects that lead to reduced GHG emissions, and their commitment to market or adopt low-carbon technologies, processes or business models. However, such signals will increasingly play an important role in a global economy where investments, partnerships and markets extend beyond geographical borders.*

G20 countries have the unique opportunity to engage in promoting and designing a monitoring system that can lower financial asymmetries and signal green, innovative SMEs (and firms more generally) to domestic and international investors through low-carbon-related financial disclosure.

**To this end, the G20 countries should:**

1. *Track the health of emerging green-technology firms as well as the resilience of financial institutions to climate stress-test scenarios.* The G20 should invite the OECD and the World Bank to report on the emergence of green innovation firms and the capital they are attracting for demonstration of innovation at scale and for broad-based adoption, as well as their aggregate firm-level financial strength. These indicators should be included as part of monitoring the transition to the low-carbon economy for G20 countries. This measure ought to be paired with informative, non-normative, climate scenarios stress-testing for banks and financial institutions, based on long-term scenarios as an indirect incentive to better capital allocation.<sup>3</sup>
2. *Promote systematic sharing of IP databases seen not as “protection” but “signaling” of (green and sustainable) innovation.* Indeed, beyond granting the owner a monopoly of use, patents can and do play other important roles. Of relevance for firms, and for SMEs in particular, is the fact that patents signal an innovative player in the market. Further, patents can be classified into specific technology classes, and specifically in green technologies (Hascic and Mingotto 2014). Promoting the sharing of information on the firm’s patent portfolios—for instance, by publicizing what percentage of the firm’s innovation is “green,” is an important market signal to separate low-carbon innovative SMEs from other economic actors. Note that in this respect, SMEs often lack the human resources or training to access such databases, hence designing implementation focus groups and support strategies would be a crucial aspect of our recommendation.

**2. Include green-technology firms in green finance platforms**

*The Taskforce on Financial Risk Disclosure has made recommendations on reporting climate risk for corporations, including banks and pension funds. Given that SMEs represent the backbone of the worldwide economic system, it is crucial that they are included from the start in green finance platforms and in the design of carbon risk disclosure.*

SMEs should be included from the start in the design of any system meant to assess climate-related financial risk by addressing information asymmetries and increasing transparency. This is warranted for at least three reasons. First, unless SMEs are put in a position to successfully develop and implement green-technology solutions and sustainable business models by accessing financing, economic growth in the G20 will not be inclusive. Second, financial institutions and private investors are seeking sustainable investment opportunities. Innovative

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<sup>3</sup> This recommendation is in line with recommendation number 5 of Terra Nova’s brief: *Le capital patient—un horizon pour la France et pour l’Europe* (Bouzidi et al. 2016).

green-technology SMEs can fulfil this role and hence, contribute to decreasing risk by providing an alternative to carbon intensive investments. Third, many SMEs developing green technologies have emerged from publically funded Research & Development (R&D) as well as programs to fund scaled-up demonstration projects. Ensuring that these investments are included in green finance disclosure platforms will address parallel information asymmetries and will make it more likely that spillover benefits are garnered from public investments in innovation

Including SMEs in green finance platforms, and ensuring that they report on climate impact, will provide a powerful investment signal because it will ensure that investors are able to identify innovative green-technology firms. This in turn will (1) ensure finance information asymmetries are addressed for opportunities presented by green-technology firms; (2) accelerate the formation of capital markets around green technologies to mitigate and adapt to climate change; (3) ensure publically funded R&D returns to society through spillover benefits; and (4) enable green-technology SMEs to become engines of sustainable growth.

**To this end, the G20 countries should:**

*Invite the Financial Stability Board (FSB) to establish a platform to exchange experiences and develop approaches to disclosure on climate-related financial risks (transition, physical and litigation). This platform should be chaired by finance ministries/central banks and involve all relevant stakeholders, including regulators, academia, finance, industry (including SMEs) and relevant international financial institutions. The proposed platform should develop recommendations for climate-related financial risk disclosure as well as its corollary, climate risk reduction from investment in green-technology projects and sustainable infrastructure.*

**3. Leverage public funds and public support to signal innovative green-technology SMEs to private investors**

*Governments and intergovernmental bodies can play a crucial role in mobilizing private capital by leveraging public funds and support to signal innovative, low-carbon SMEs to private investors.*

The role of government support of R&D to foster innovative technologies is undisputed, both in green technologies and overall. Further, given the challenges associated with the diffusion of sustainable technologies, an active role and engagement by government and intergovernmental bodies is a necessary component of a successful transition towards sustainability. However, public investment cannot come close to filling the financing gap for the energy transition, and a significant amount of private money must be mobilized to this end. Indeed, access to public funding for SMEs should be designed in such a way as to provide private investors with a clear signal that the SME receiving public support has been selected as one of the most innovative in green technologies.



**To this end, the G20 countries should:**

*Use public funding to de-risk the scale-up of low-carbon innovation by SMEs.* There are several examples of how public money and intervention which is meant to support innovative, low-carbon SMEs can be turned into a signal to mobilize private capital to support low-carbon innovation by SMEs. These include:

- Public investment in demonstration projects and proof of concept at commercial scale. Public investment financing should indeed be targeted at low-carbon technologies and away from high-carbon ones. This would ensure that public funding is indeed channeled towards the improvement of energy efficiency, the provision of a healthy, unpolluted environment for the work force, the mitigation of climate change, and more generally the scale-up and diffusion of low-carbon innovation (Anbumozhi et al. 2016: 495pp). SMEs supported by public financing would then be able to use this as a signal when applying for private credit.
- Public procurement budgets for innovative, low-carbon SMEs and requirements for major government suppliers to develop relationships with them. SMEs participating in public procurement should be able to use such signals as a guarantee of their innovativeness and potential when accessing private funding.
- Dedicated credit lines. These can be established by a public entity such as government agencies and national development banks in cooperation with international financial institutions such as the World Bank, the Asian Development Bank, or the African Development Bank, to guarantee the performance risk of low-carbon innovative SME projects for project developers and their bankers.
- Risk-Sharing Facilities. Partial risk or partial credit guarantee schemes established by public entities to reduce the risk of SME financing from the private sector, enabling increased private sector lending to SME, low-carbon energy projects.
- Climate Mitigation and Environmental Performance Contracts. Public-sector initiatives, in the form of legislation or regulation, by one or more government agency to facilitate the absorption of required technologies by Energy Service Companies (ESCOs) of performance-based contracts using private-sector financing.

Indeed, many of these instruments are already widely used within G20 countries to target specific groups of entrepreneurs or sectors. For instance, within the EU, entrepreneurs from ethnic minorities and migrant groups benefit from such actions as the “Think Small First” principle, which aims to reduce administrative burdens and make them more competitive, or by the SBA (Small Business Act for Europe), which includes improved access to financing through strengthened loan guarantee schemes (EC 2008). Another example is JEREMIE (Joint European Resources for Small and Medium-sized Enterprises), a joint initiative by the European Commission and the European Investment Fund that promotes the use of financial engineering instruments to improve access to finance for SMEs with EU Structural Fund interventions (OECD/European Commission 2014). In Asia, the strategic Action Plan for ASEAN SME

Development (SAPASD) has been devised as a part of ASEAN Economic Community (AEC) Blue print to engage the small and micro enterprises on issues of access to finance, technology development and human resource development, among others in order to enhance the resilience and competitiveness of SMEs (ERIA SME Research Working Group 2014)

Designing similar mechanisms specifically targeting innovative, low-carbon SMEs, while addressing existing challenges and leveraging existing institutions, would contribute significantly to fostering low-carbon development within the G20. By following the recommendations presented in this article, G20 countries would strengthen policy signals in support of low-carbon innovation, provide a de-risking strategy for private investors, promote transversality and provide ecosystemic support to safeguard the investments in climate mitigation undertaken by clusters of emerging firms. Indeed, the measures outlined above would go far beyond the universe of innovative, low-carbon SMEs.

Of course, the application of these instruments will very much depend on a number of specific characteristics, including country context, legislative and regulatory frameworks, existing low-carbon energy innovation systems and service-delivery infrastructure, as well as the maturity of commercial financial markets. Indeed, to the success of the recommendations will depend on the harmonization of such policies across G20 countries. Such much needed harmonization will not only be beneficial for the G20, but will also promote scale-up and technology diffusion to Asia, Africa and Latin America – not as policy but as a result of investment. To this end, the G20 will need to promote regional, cross-country regulatory packages for investment (Medhora 2016), as well as realign trade and FDI policies towards supporting low-carbon products and processes.

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