2025 Research report summary

SNS

How Can Entrepreneurship Help Reduce Carbon Emissions?

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Summary

Entrepreneurs have historically played a key role in structural transformations of the business sector through breakthrough innovations. This report examines whether entrepreneurs can also drive the ongoing transition towards a sustainable and cleantech-based economy, and how policy can be designed to stimulate this effectively.

There are strong reasons to support research and development (R&D) of technologies that reduce environmental impact, so-called cleantech. In the environmental field -- and particularly regarding climate issues -- not only do the classic technology spillover effects from R&D investments occur, where the results of a company's innovations often benefit other actors without the company itself being able to capture the full value. In addition, there is a positive consumption externality. When a company's cleantech innovation leads to reduced consumption of carbon-intensive products and services, it is difficult for the company to fully appropriate the value of the increased social benefit that the innovation generates. This means that R&D in cleantech is associated with a particularly severe underinvestment problem.

These dual positive externalities make policy measures especially important in the cleantech area. Sweden and the EU, as well as several other OECD countries, have introduced various policy instruments to stimulate cleantech investments with the aim of reducing climate emissions. These initiatives have grown both in number and scope. A current example is the European Commission's launch of the Clean Industrial Deal on 26 February 2025. The initiative contains a number of proposed policy measures aimed at promoting the green transition

within the EU, while at the same time strengthening the competitiveness of industry.

For these policy initiatives to achieve the desired effect, a well-elaborated design is required that takes into account the specific conditions and driving forces of the cleantech sector. The purpose of this report is to contribute to new knowledge in this area.

Our review of the stylized facts regarding carbon dioxide emissions shows that Sweden has made significant progress in reducing its CO_2 emissions over the past decades, although emissions are still far from zero. We also note that Sweden is very advanced in terms of carbon pricing, with both broad coverage and high emission prices.

Our review of the innovation and commercialization process also shows that the Swedish business sector performs well in an international perspective and that Sweden is developing strongly within cleantech. Private investments and the access to venture capital in cleantech have increased markedly in recent years, placing Sweden at the very top internationally. Furthermore, we find that patenting in cleantech is to a large extent dominated by larger, established actors – a pattern that differs from many other technological fields, where entrepreneurial firms often play a more prominent role.

To understand innovation and commercialization patterns, as well as the role of entrepreneurship in the cleantech market, we develop a theoretical analytical framework. It is based on economic mechanisms – identified in the economics research literature – concerning how institutions, market conditions, and policy measures influence the dynamics of the cleantech sector. The analytical framework is also used to identify potential market and regulatory failures, with particular emphasis on the importance of entrepreneurship.

Based on our empirical overview, the policy-oriented research literature on cleantech, and the results from our theoretical analytical framework, we identify a number of policy areas where various measures are deemed capable of promoting a socially efficient, cleantech-driven structural transformation of the business sector, with particular focus on the role of entrepreneurship.

We highlight seven areas where reforms are considered particularly important for strengthening the contribution of entrepreneurship to a socially efficient cleantech transition.

1. PROMOTE AND PROTECT INNOVATION IN CLEANTECH, WITH A PARTICULAR FOCUS ON ENTREPRENEURIAL FIRMS.

A well-functioning intellectual property rights system, with strong but balanced patent rights and trademark protection, is crucial for companies to be able to obtain returns on their cleantech investments, while still allowing for knowledge spillovers over time. At the same time, there is a risk that dominant global companies exploit their market position in the patent system in ways that inhibit innovation among entrepreneurial firms. Support measures and tax incentives for R&D investments in cleantech can help stimulate innovation – but entrepreneurial firms in cleantech face a particularly high risk of being disadvantaged, not least due to a regulatory structure that often favors established actors. We therefore propose that Sweden introduce general tax incentives for R&D and cleantech investments that effectively reach entrepreneurial firms, and that Sweden actively works to ensure that Swedish companies – especially entrepreneurial firms – are not disadvantaged within the EU's patent system.

2. R&D AND COMMERCIALIZATION SUPPORT IN CLEANTECH SHOULD BE GENERAL, NEUTRAL, COMPETITIVE, AND ACCESSIBLE TO ENTREPRENEURIAL FIRMS.

Companies that are first to develop breakthrough innovations in cleantech often lack profitability in their investments, even though their activities may generate considerable social value. An active industrial policy can counteract this market failure, for example by subsidizing early technology adopters or supporting coordination around technical standards. At the same time, there is a risk that established firms use their greater resources to gain advantages in the subsidy process, and that public authorities favor more grandiose projects out of self-interest. We therefore propose that Sweden, with caution, make use of R&D and commercialization support in cleantech, and continuously work to ensure that such support – both nationally and within the EU – is designed to be as competitive and neutral as possible, and made easily accessible to entrepreneurial firms, in order to minimize the risk of regulatory failures.

3. A MORE SOCIALLY EFFICIENT REGULATION IN CLEANTECH CAN BE ACHIEVED BY IMPLEMENTING A REGULATORY SANDBOX FOR ENTREPRENEURIAL FIRMS.

Regulatory costs and regulatory uncertainty are disproportionately burdensome for entrepreneurial firms. A regulatory sandbox provides an institutional framework that allows supervisory authorities to grant companies permission to test innovative products and business models in a controlled environment. Regulatory sandboxes can help address market failures in the form of information asymmetries, as well as regulatory failures such as coordination problems between companies, public authorities, and investors. In this way, regulatory sandboxes can increase incentives to commercialize innovations in cleantech. We therefore propose that Sweden introduce a regulatory sandbox specifically aimed at the cleantech sector, with a focus on entrepreneurial firms.

4. LEARNING CENTERS FOR THE USE OF AI IN CLEANTECH INNOVATIONS FOR ENTREPRENEURIAL FIRMS ARE WELL-JUSTIFIED INITIATIVES.

Corporate investments in AI infrastructure and AI expertise within cleantech risk being too low due to market failures, where the direct economic return is difficult to secure for individual actors. This is particularly true for entrepreneurial firms, as they have less access to self-generated data compared to more established companies, and typically possess more limited in-house capacity or access to computing power. We therefore propose the establishment of AI learning centers in cleantech for entrepreneurial firms, where access to AI infrastructure – in the form of computing capacity and data – is ensured, and AI knowledge is made readily accessible.

5. SAFEGUARD COMPETITION IN THE CLEANTECH-DRIVEN STRUCTURAL TRANSFORMATION TO PROMOTE ENTREPRENEURSHIP.

In an increasingly technology-driven economy with strong network effects, well-functioning competition in product markets becomes ever more important, and it is crucial that entrepreneurial firms in cleantech do not face anti-competitive measures from established companies. We also observe a troubling increase in criminal activities that dis-

proportionately affect entrepreneurial firms, as well as the infiltration of organized crime into parts of the environmental sector. We therefore propose that the Swedish Competition Authority be allocated additional resources to safeguard effective competition – but also to counter unfair competition from companies with criminal ties in the environmental sector. We further propose that other public authorities cooperate with the Competition Authority in this work.

6. A MORE EXTENSIVE EQUITY AND VENTURE CAPITAL MARKET IN SWEDEN CAN PROMOTE THE DIFFUSION OF CLEANTECH IN THE BUSINESS SECTOR.

An increasing share of investments in the Swedish economy is directed toward intangible assets. This development means that venture capital and equity markets play an increasingly important role in financing cleantech entrepreneurial firms, since these forms of financing are better suited than traditional bank loans to handle asymmetric information between investors and companies. This is particularly true for entrepreneurial firms. A more extensive equity and venture capital market can also help level the playing field in cleantech, where many established firms are financially strong. We therefore propose that Sweden work toward a more extensive and well-functioning equity and venture capital market, not least geographically and across different ownership structures. Measures should also be introduced to achieve greater neutrality between debt and equity financing in the tax system. We further propose that Sweden promote integration, regulatory harmonization, and efficiency of EU capital markets.

7. INCREASED SUPPORT FOR BREAKTHROUGH INNOVATIONS IS IMPORTANT IN CLEANTECH, PARTICULARLY FOR ENTREPRENEURIAL FIRMS.

Entrepreneurial firms often have stronger incentives than established companies to engage in high-risk projects, since the potential net gains are significantly larger than for firms that already possess established solutions. Policy measures aimed at lowering entry barriers can certainly stimulate entrepreneurship, but they may also result in entrepreneurial firms increasingly opting for less risky projects. Such projects have a higher likelihood of success but -- even if successful -- the gains are limited, for example through modest reductions in carbon emis-

sions. We therefore propose that Sweden implement policy measures that more strongly encourage entrepreneurs to engage in high-risk, groundbreaking cleantech projects.

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