

Financing the green transformation

The role of finance is key to an efficient green transformation, needing a large-scale reallocation of capital and labour, argues Christian Keuschnigg, Professor at the University of St. Gallen

Global warming could irreversibly damage the well-being of future generations. Accumulation of greenhouse gases causes rising temperature with potentially catastrophic consequences. More frequent heat waves, floods and hurricanes will result in large economic damages. Many species will become extinct, and parts of the planet might get uninhabitable. Since part of carbon emissions in the atmosphere never disappear again, the greenhouse effect is largely irreversible. It is thus imperative to reduce carbon emissions to net zero within a few decades. Burning fossil fuels such as coal, oil and gas is the main source of carbon emissions. Fossil fuels must thus be fully replaced by solar, wind and hydropower and other alternative energies within a few decades. [What's the role of finance](#) to support and speed up the green transformation?

Carbon pricing

To limit global warming, the world must coordinate on a path of emissions reductions to net zero by 2050 or even earlier. The core policy is to attach a steep price on carbon emissions using a carbon tax. A largely equivalent solution is emissions trading. The EU directly imposes a quota on carbon emissions and requires industry to buy emission permits at a possibly high market price. In both ways, firms must pay for climate damages due to carbon emissions and charge higher prices. Rising prices restrict demand for fossil energy and carbon-intensive goods, reduce emissions and thereby slow down global warming. In addition, the high cost of carbon emissions makes investments in alternative energy more profitable.

The green transformation

Stopping climate change requires massive structural change. Carbon-intensive sectors will have to shrink. Extraction of fossil fuels and power generation with coal, oil and gas must come to an end. Other sectors with green technologies and using alternative energy must expand rapidly to cope with exploding demand. Firms must overhaul product lines and production processes to offer energy efficient and carbon free solutions. Consumption, including cars and housing, must adjust to comply with zero emissions. The green transformation is a prime example of a large-scale reallocation of capital and labour.

Creating shortages and imposing extra costs reduces growth. Structural change causes painful disruptions. The prospects of labour and the returns to capital in carbon-intensive sectors are much diminished. Past investments will have to be written off, causing

financial difficulties for firms and risks to the banking sector. Labour might temporarily end up unemployed as previously acquired skills are no longer needed. Green jobs require different skills which are not available in short order and create bottlenecks in the growth of green sectors.

The chances of a smooth transformation without stagnation rests on the answers to three questions. How fast are emissions to be reduced? Tighter emission quotas drive up carbon prices in the short-run, lead to higher energy prices, and thereby slow down growth. Are substitute solutions available? Directed technological progress is key to reconcile the green transformation with new growth opportunities. How fast can existing resources be reallocated? A smooth reallocation can partly remove the bottlenecks in the expansion of green sectors.

Innovation in the green transformation

Directed technological change can reconcile the green transformation with new growth. Green innovation can be emissions-reducing. It can facilitate the substitution of fossil fuel by alternative, renewable energy. Substitution applies to electricity generation, heating and cooling, and to many other applications. Radical innovation also holds the potential for 'negative emissions' that extract carbon from the atmosphere.

High carbon prices are a precondition for directed innovation. High carbon prices lead firms to focus R&D effort on energy substituting and emissions-reducing solutions. They can gain market shares by designing fuel efficient and less carbon-intensive products. Alternative energy sources become more profitable. Firms generating negative emissions could earn more from selling permit rights for each unit of carbon extracted from the atmosphere.

Governments could support private R&D by stepping up public investment in basic research on climate solutions. To speed up the knowledge spillovers to the private sector, such investments should be combined with incentives for the commercialisation of basic research.

The role of finance

Directed innovation holds the potential to reconcile the green transformation with new growth. A smooth reallocation of resources can speed up the process and remove some bottlenecks in the expansion of green industries. The financial sector plays a key role to steer scarce finance to the most productive uses. This role applies to 'both ends of innovation by creative destruction'.

Innovative start-ups are a vital source of new technology. Financing them is especially difficult since these firms are highly risky, have limited own resources, and often lack a proven management record. Access to bank credit is limited or even impossible. The market solution is venture capital and private equity, if available. Given high risk, financiers must intensively screen and restrict financing only to the most promising ventures. They inject a large junk of equity capital. They carefully monitor projects to

prevent unnecessary business failure. And they provide value increasing advice. For these reasons, venture capital backed firms typically grow larger and create more value than other comparable firms. Possibly even more important, young innovative firms might not get started if venture capital is not available. The economy might not be able to invest in the potentially most promising climate solutions.

The other end of creative destruction is the liquidation of unprofitable investments. Labour and capital must not get locked up in unproductive uses but should flow to more profitable firms with better prospects. Banks play a key role in this process. When a firm is insolvent, banks must liquidate assets and sell them at a discount to rival firms which can use them more profitably. By extracting liquidation revenue, banks limit their credit losses and lend part of the resources to new firms with better prospects. By this process, banks are instrumental in reallocating scarce capital to new and more profitable uses.

A strong financial sector can substantially facilitate and speed up the green transformation by reallocating capital and providing innovation financing for new climate solutions.

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