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Towards a Green Energy Economy?

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The late 2000's global financial crisis provided an opportunity for countries to reduce their dependence on fossil fuels. Green energy technologies were heavily promoted as a way to reinvigorate economies, create jobs and reduce CO₂ emissions. However, despite some policy efforts, data show that global emissions continue to rise. While some progress has been made in certain regions of the world, it has been insufficient to offset the negative effects of economic growth, increased consumption and fossil-based energy use. The world is not yet on a green path.

The global financial crisis and green energy

There is growing consensus that our traditional economic system has led to significant loss of natural capital, disturbed our climate system, and triggered social inequalities. The recent global financial crisis, opened up for the concepts of 'Green Economic Growth', the 'Low-Carbon Economy', and a 'New Green Economy', which received increasing policy and media attention. The global financial crisis led to numerous economic policy commitments based on policies that were to be much less damaging to the economic system itself, as well as to the environment and the society. It was argued that the financial crisis provided a significant opportunity to decrease fossil fuel dependency. As a result, the role of green energy technologies was heavily emphasized.

Green energy technology stimulus spending

In response to the financial crisis, economic recovery packages were implemented in numerous countries to stimulate green growth and support low-carbon economies, among other policy objectives. These stimulus packages were quickly portrayed as a golden opportunity, and the entry point into the 'New Green Economy', in which the green energy sector would play a vital role. Green energy was the target of recovery packages in many countries, and China and South Korea soon became the world leaders in green spending. By 2010, South Korea had allocated nearly 95% of its US\$38 billion fiscal stimulus program to green investments. Of this, more than 30% was

dedicated to energy-efficient buildings, renewable energy and low-carbon vehicles. China allocated more than 30% of its US\$ 647 billion stimulus package to green measures. Of this, 13% targeted energy-efficiency measures related to buildings and low-carbon vehicles. In the United States, financial support for low-carbon technologies accounted for more than 65% of the US\$ 94 billion devoted to green spending through the American Recovery and Reinvestment Act.

CO₂ emissions on the rise

However, despite the huge stimulus spending, our research¹ shows that most regions do not appear to have seized the 'Green Energy Economy' opportunity – at least in climate mitigation terms. There was an unparalleled surge in CO₂ emissions (so-called 'CO₂ emission rebound') immediately after the worst global financial crisis years, which was caused by economic growth and/or increased energy use. Our research is consistent with the findings of the 5th IPCC Assessment Report on Climate Change: it is assessed that there has been relative rather than absolute improvement. For instance, energy intensity (the ratio of energy use to GDP) has decreased in Asia, and the carbon intensity of energy supply (the ratio of CO₂ to total primary energy) has been reduced in OECD Europe. Nevertheless, the relative progress being made remains insufficient to offset the negative effects of economic growth, increased consumption and fossil energy use in the world. Asia did not experience a significant rebound effect in 2010, but its CO₂

¹ Mundaca, L., Markandya, A. & Nørgaard, J. (2013). Walking away from a low-carbon economy? Recent and historical trends using a regional decomposition analysis. *Energy Policy* 61: 1471-1480.

emissions grew much faster than its historical annual average.

If we are to prevent dangerous interference with the climate system, CO₂ emissions must be reduced and cannot continue to rise forever. More ambitious energy efficiency and renewable energy policies are required. Absolute reductions in fossil fuel-based energy use in general, and CO₂ emissions in particular, are urgently needed. Not only economic and technical issues, but also ethical and distributional considerations are rather important for how this common global challenge can be met in developed and developing countries and in time. The “common but differentiated responsibility” and respective capacities is a cornerstone principle in the international climate negotiations, i.e. the developed countries should take the lead when it comes to action. This is critical for economic growth in less-developed regions of the world.

The implementation of green energy technologies

To realize absolute reductions in CO₂ emissions, the implementation of low-carbon technologies needs to be increased and strategies for this needs to be developed. However, most strategic actions and policy initiatives to date are not evaluated and their effects on technology change are rarely understood. Our research provides modest, but important, contribution on the knowledge of the dynamics of energy systems and the effect of various policy instruments. We show that the barriers to technology change are many and

the transaction costs of implementing low-carbon technologies can be many times higher than the investment costs. On the other hand, our research also shows that the cost of new technologies will reduce over time as a result of learning processes, which indicates a need for initial support of new innovative technologies. For example, thanks to subsidies, the cost of solar cells has been reduced by more than 90 % since 1990. Moreover, the implementation of clean technologies will not only rely on cost reductions of the technologies but also on costs related to implementation. Such costs can be even higher than the investment cost of the technologies. In order to support the implementation of low carbon technologies, policy instruments need to be designed to support learning that reduce all costs. Improved knowledge in the dynamics of energy systems will provide insights that can realize larger reductions in CO₂ emissions.

The global CO₂ emissions are still on the rise, which is a trend that needs to be reversed urgently if we are to halt global warming. Policy actions undertaken today will inevitably shape the well-being of future generations. There are policy developments which point in the right direction, but they need to be scaled up and more broadly implemented in the long run. To realize absolute reductions in CO₂ emissions we need to develop strong policies and strategies for the implementation of green energy technologies that are based on experience and research.



WHAT IS THE QUESTION?**What is Green Energy Economics?**

Green energy economics (GEE) is an applied sub-discipline of economics that focuses on low-carbon energy production, distribution and consumption. Like the concepts of the 'New Green Economy', 'Green Economic Growth' and the 'Low Carbon Economy', GEE examines the links between resource efficiency, job creation, greenhouse gas (GHG) emission reduction and the conservation of natural capital, which are the potential results of more widespread low-carbon energy systems. For instance, in a green energy economy, job creation and income growth are motivated by (public or private) investments that not only reduce GHG emissions, but also maintain biodiversity and improve resource efficiency.

ABOUT THE AUTHORS

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