



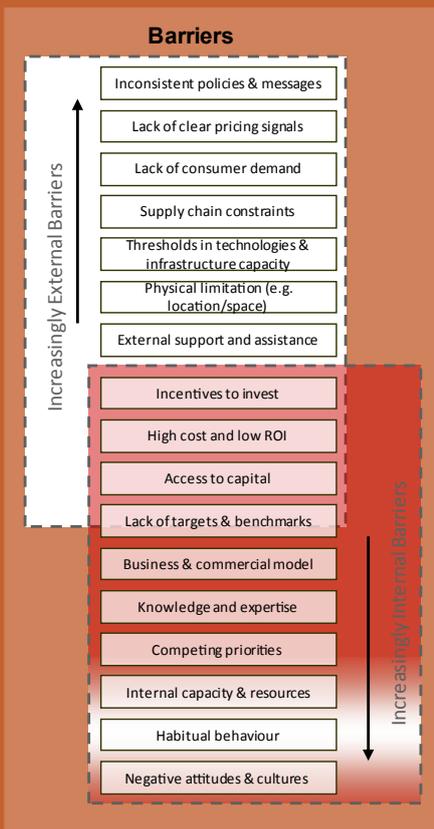
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Economics of Resource Efficiency

Challenges

- There have been a number of studies suggesting that the economic benefits for firms and whole sectors of increasing resource efficiency could be very large.
- There are a number of well attested barriers to achieving these benefits in practice as shown below.

Barriers to business becoming more resource-efficient



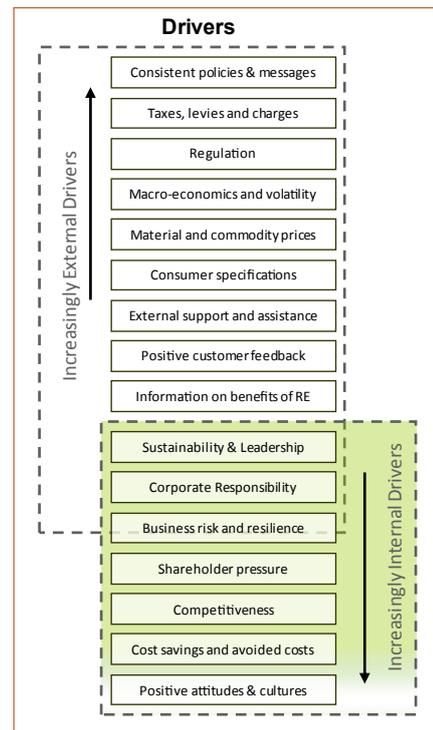
Source: AMEC and BioIS (2013). The opportunities to business of improving resource efficiency. Figure B9, p.83.



Responses

- There is a whole range of possible policies and business approaches that can act as drivers to stimulate the take up of resource efficiency opportunities.

Drivers to stimulate businesses to become more resource-efficient



Source: AMEC and BioIS (2013). The opportunities to business of improving resource efficiency. Figure B9, p.83.

- Despite the difficulties of doing so, practitioners are becoming increasingly able to use modelling techniques to represent the firm and sector level impacts of resource efficiency in a macro-economic framework and therefore estimate the benefits from increasing it for the whole economy.

Examples

Modelling resource efficiency

What?

- A Computable General Equilibrium (CGE) model was used to model the economic outcomes of increased energy efficiency by the International Energy Agency (IEA) in its 2012 World Energy Outlook, and of increased resource efficiency as detailed in the Growth Within publication of the Ellen MacArthur Foundation (EMF) in 2015.

- A system dynamics model was used to model the economic results of investing in natural capital in the United Nations Environment Programme's (UN Environment) 2011 Green Economy Report.
- A macro-econometric model was used to model the economic outcome of an increase in resource productivity in Europe in a 2014 study prepared by Cambridge Econometrics (CE) and BIO Intelligence Service (BioIS) for the European Commission (EC).
- Economic modelling carried out for UN Environment's International Resource Panel in its forthcoming report on Resource Efficiency, adopts an integrated multi-model framework to explore potential future pathways for global resource use, greenhouse emissions, and economic activity to 2050, through ambitious action to improve resource efficiency and address climate change.

Success factors

- Higher growth and employment arising from greater resource efficiency are the result of higher rates and different directions of innovation and technical change than those driven just by markets. They are the outcome of higher investments in resource-efficient infrastructure and products, and intelligent, targeted regulation. Or they arise from environmental tax reform that changes the balance between the costs of labour and materials by shifting the base of taxation away from the former towards the latter and towards pollution, thereby increasing the economic return to resource-efficient and less environmentally damaging products and processes.

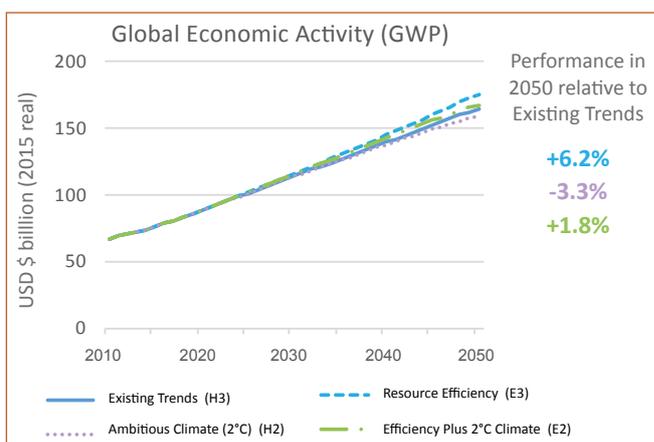
Results

- In the IEA modelling global gross domestic product (GDP) in the Efficient World Scenario increased by 0.4%, compared with the IEA New Policies Scenario, by 2035, with OECD Europe, the US, Japan, Korea, China and India benefitting more than this, but Russia and the Rest of the World having reduced GDP (4.5% lower by 2035 in the case of Russia). In this case, the energy efficiency policies reduce energy demand and energy prices, benefitting energy-importing countries, but making energy exporters worse off.
- The EMF modelling suggested that, in a circular scenario driven by increased consumption due largely to correcting market and regulatory lock-ins that prevent many inherently profitable circular opportunities from materialising, GDP could grow by 7% more by 2030 than the current development path and could increase the difference to 12% by 2050.
- In the UN Environment modelling, the feedback effects from natural resource depletion in the Business-As-Usual

(BAU) scenarios are sufficiently important that the annual rate of world GDP growth gradually falls from about 2.7% per year in the period 2010-2020 to 2.2% in 2020-2030 and further to 1.6% in 2030-2050. In contrast, the green scenarios, by promoting investment in key ecosystem services and low carbon development, show slightly slower economic growth in the short to medium term, but faster and more sustainable growth in the longer term.

- The macro-econometric modelling results in the EC-commissioned study suggest that resource productivity improvements of around 2% to 2.5% per annum can be achieved with net positive impacts on EU28 GDP. This is because the benefits of higher efficiency levels outweigh the costs of making the improvements to efficiency. Beyond an annual rate of 2.5%, however, further improvements in resource productivity are associated with net costs to GDP as the abatement options become more expensive. Both the UN Environment and CE & BioIS macro-econometric modelling also show increased employment from resource efficiency policies.
- The modelling undertaken for the International Resource Panel by the Commonwealth Scientific and Industrial Research Organization (CSIRO) and the International Institute for Applied Systems Analysis (IIASA), projects that effective resource efficiency policies could increase global economic activity by around 6% by 2050 compared to existing trends.

Global projected economic activity under resource efficiency policies, and a 2°C climate pathway



Source: Modelling by CSIRO and IIASA for forthcoming UNEP (2017). Resource efficiency: Potential and economic implications. A report of the International Resource Panel. Ekins, P., Hughes, N., et al.

Thus macroeconomic models of different types with different structures and underlying assumptions do suggest that there is potential for very substantial macroeconomic gains from the implementation of resource efficiency measures.

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