Overseas Development Institute

Opinion

December 2009

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Financing energy efficiency – good for the environment and good for development

Nicola Cantore

'Investing in energy efficiency in developing countries provides for a global public good, and promotes innovation, productivity and growth'

The promotion of environmental global public goods is one of the most pressing global challenges, with a profound impact on development. A look at the literature reveals that global public goods tend to be underprovided. And when it comes to climate change, polluting countries do not pay enough, while some actors 'free ride' when they enjoy the benefits of clean environment without bearing the costs. Investment in energy efficiency represents one of the most promising avenues to address climate change – such measures represent a win-win situation, reducing emissions while safeguarding productivity and incomes in poor countries. However, market failures prevent investment in energy efficiency from happening sufficiently and efficiently.

Demand for energy worldwide is rising very fast, as it supports growing production and consumption patterns. The International Energy Agency's World Energy Outlook reference scenario estimates that world primary energy demand will grow by 1.6% per year on average from 2006 to 2030, amounting to an overall increase of 45% (IEA, 2008). The IEA also points out that most of this growth will be in developing countries, with 87% of the projected increase in demand likely to take place in non-OECD countries, and 50% of total demand coming from China and India alone.

But energy efficiency also spurs national development. Industrial efficiency improvements to produce more economic output with less energy input are essential for reasons of energy supply security, economic competitiveness through improved industry profitability, improvement in livelihoods, and environmental sustainability. The McKinsey Global Institute also suggests that 65% of all available positive-return opportunities for investment in energy efficiency are located in developing regions. An estimated annual investment of $90 billion in the next twelve years could make it possible for developing countries to achieve $600 bn a year in energy savings by 2020, just by using existing technologies. Such an investment is projected to be half of the required investment to keep up with energy demand growth without improved efficiency measures.

However, action to promote energy efficiency in developing countries needs large upfront financial transfers from rich regions. The 2010 *World Development Report* (WDR) stresses that many of the savings from the lower operating costs associated with renewable energy and energy efficiency gains only materialise over time. The report outlines a McKinsey estimate that, in a scenario constraining greenhouse gases at 450 ppm CO_2e, while the annual incremental cost for mitigation by 2030 would be $175 bn, the investments required would amount to $563 bn over and above the business-as-usual needs. It also points out, however, that many contributions to environmental global public goods can be achieved most cost-effectively in developing countries.

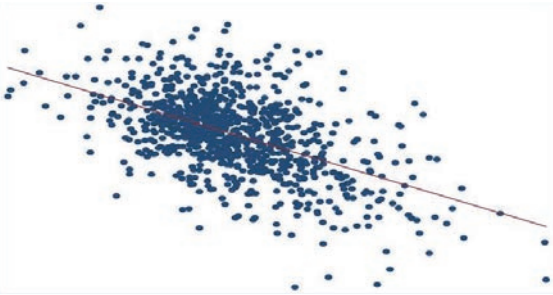
Evidence suggests that growth and the decrease of energy intensity levels are strongly related. At the macro level, greater energy efficiency (lower energy intensity) is correlated with higher GDP per capita, especially over time, although this relationship does not apply for all countries and is characterised by heterogeneous trends across regions.

Our recent work (te Velde, 2008; Cantore and te Velde, 2009) examines the factors affecting energy intensity levels in developing countries and the factors representing barriers to the adoption of energy savings over time at micro level. We find a negative and significant correlation between energy efficiency and Total Factor Productivity (TFP variable) for almost all of the 24 developing countries contained in a sample using World Bank enterprise survey data. This important finding can be further highlighted in Figure 1, which shows the correlation between energy efficiency and TFP in Pakistan in 2002. Similar results apply using semi-parametric regressions holding other explanatory variables constant.

The evidence suggests that normal development policies to improve productivity could go hand in hand with improvements in energy intensity.

Our work also reviews the existence of many factors affecting investments in energy efficiency in developing regions ranging from barriers to knowledge flow, lack of access to credit, access to technology, the uncertainty in the future projection of oil prices and wrong national policy choices. Other factors could

Figure 1: Correlation between energy intensity and total factor productivity for Pakistan (2002)



Notes: Correlation between energy intensity (vertical axis) and total factor productivity (horizontal axis). Data in natural logarithms. Source: Own elaboration using World Bank enterprise data.

relate to internal firm conditions such as their 'age', governance designs, the size of their economic activity, previous investment decisions and sector specific features. However the significance of each of these variables can vary across countries.

Many economists agree that market failures impede the effective adoption of energy efficiency technological innovation. Those barriers affecting the efficient use of inputs and their correct combination are particularly difficult to tackle, and are linked to the following:

- Technological development: positive externalities of investments in hitherto unknown energy efficient technologies are often not internalised, which leads to sub-optimal investment levels.
- Skills formation related to environmental management: There are instances of market failures in the education and training system for environmental management.
- Capital market imperfections: Perfect capital markets will lend surpluses of savings to those with skills, talents and ideas for profitable projects, including those that address climate change. However, the market is associated with credit constraints caused by transaction costs, risk sharing, the characteristics of firms, and social and institutional factors.
- Coordination failures: Coordination failures go beyond the static market failures and form crucial impediments to transforming economies into high-growth, low-carbon performers.

There is a role for the public sector in addressing these market failures by building on private sector efforts, providing finance, raising taxes and setting standards. Finance is needed for two reasons. Development finance is needed because the improvement of energy efficiency is good for technical change and innovation in general, while climate finance is needed because of its environmental benefits. Many studies show that a solid financing scheme based on additional transfers from rich to poor regions as compensation for mititgation costs could facilitate widespread participation in emissions stabilising policies and strengthen the effectiveness of international environmental agreements. The recent European Commission blueprint points out that in a scenario constraining the global temperature increase to 2˚C (over pre-industrial levels) the climate finance need for developing countries in the energy and industry sectors to promote mitigation, which cannot be covered by the carbon market, is around €33 bn per year by 2020. However, it also points out that: 'this predominantly represents long-term low cost efficiency measures, most of which should be financed domestically, mainly from private sources in developing countries'. Only 10-20% would need to be funded by international public support by 2020 with a focus on the poorer developing countries (€3 to 6 bn).

The EC also maintains that emerging economies should not receive financial transfers as: 'many developing countries, especially the economically more advanced ones, have sufficient own financial resources at their disposal to stimulate the necessary domestic investment'.

The EC blueprint assumes that annual international public finance to cover overall costs of mitigation (including those related to energy efficiency measures) should amount to €10-20 bn at 2005 prices. The WDR (2010) points out that many authoritative studies estimate a climate finance annual need of a much higher range – between $264 to $563 bn by 2030 (€212 to €454 bn at 2005 prices, assuming an exchange rate of €0.8 per dollar). If we assume that the international public finance should cover 20- 40% of the climate finance need (as suggested by the EC), the annual amount of transfers through international public finance for mitigation should be in the range of €42-181 bn – far above the estimates of the EC blueprint.

The Copenhagen Summit in December 2009 will be one focus for the continued interest in climate negotiations. Climate finance for mitigation, and increases in energy efficiency in particular, will need to be part of any deal. Development finance should also be made more 'climate change proof', as it should promote growth without compromising global sustainability, and a greater share should go to stimulate productivity, innovation and the adoption of environmental technology. Together, aid and climate finance need to result in more resources to help developing countries promote development and environmental global public goods in the most efficient way.

Written by Nicola Cantore, ODI Research Fellow (n.cantore@odi.org.uk).

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Overseas Development Institute

111 Westminster Bridge Road, London SE1 7JD

Tel +44 (0)20 7922 0300

Fax +44 (0)20 7922 0399

Email publications@odi.org.uk

ISSN 1756-7629