

Investments in Resource Efficiency

Understanding the benefits and overcoming investment barriers

High and volatile resource prices, uncertain supply, rising demand and environmental impacts – various factors are putting increasing pressure on policy makers, researchers, firms and investors to explore pathways towards sustainable and efficient resource management.

Resource efficiency is thought to be an answer to these challenges, yielding substantial benefits – both environmentally and economically.

Against this background, our recent report analyses the economic rationale for resource efficiency investments. It provides the blueprint of an analytical framework for assessing the prospects and viability of such investments in practice; and proposes interventions for overcoming investment barriers and boosting resource efficiency investments.

The potential of resource efficiency investments

Economic theory would suggest that price signals, such as high and volatile prices, incentivise resource efficiency improvements. However, data on resource productivity in developing and emerging economies shows substantial gaps relative to developed economies. While not exact, these productivity gaps are indicative of the significant potential for resource efficiency improvements.

Costs & benefits of resource efficiency investments

Using a comprehensive cost-benefit framework, we evaluate environmental, economic and political aspects of resource efficiency investments. This analysis aims to complement purely commercial investment appraisals and facilitate the identification, monitoring and evaluation of specific resource efficiency investments.

We identify three main costs associated with resource efficiency investments:

1. *Investment costs* can be substantial (e.g. new machinery) and generate uncertain payoffs, especially given fluctuating resource prices. This can impose costs on firms once the actual revenue streams deviate from projections.
2. *Opportunity costs* arise when investments bind financial capital, which consequently cannot be invested in possibly more profitable alternatives (e.g. investments in labour productivity).

Understanding benefits - overcoming barriers

Resource efficiency investments tend to yield both economic and environmental benefits. Yet many economies lag behind in terms of resource productivity.

Market failures and distortions create barriers, which mean that firms may be unable or unwilling to invest in efficiency. Such barriers cause and perpetuate resource inefficiency.

Comprehensive strategies are needed to address resource inefficiency. Investment barriers are interlinked, and cannot be treated as isolated issues.



3. *Rebound Effect*: We find evidence of a potential rebound effect, particularly for energy efficiency measures. As resource efficiency is increased absolute consumption may rise, which potentially increases overall environmental impacts.

We also identify four main benefits from investing in resource efficiency:

1. *Cost reduction*: Increasing resource efficiency reduces firms' input costs, therefore increasing their competitiveness. Consumers may also benefit once firms pass on lower costs. These benefits can also improve economic performance at the sector or country level (incl. employment, fiscal stance).
2. *Environmental benefits* from resource efficiency can materialise at different levels, e.g.: (i) Global climate: More efficient production can significantly reduce energy and material demand, thus abating carbon emissions and mitigating climate change; (ii) Local level: Cleaner production and reduced wastage can reduce water, air and land pollution.
3. *Risk mitigation*: Increased resource efficiency can help hedging against volatile resource prices by reducing exposure. Additionally, decreasing import dependency can reduce supply risks. Moreover, improving resource efficiency can mitigate negative externalities and associated risks (e.g. lowering pollution, therefore mitigating health impacts).

4. *Value creation* can occur by fostering innovation capacity, which is an important driver for further technological advances through spill-over effects. Eco-innovation can trigger such effects while reducing negative environmental impacts and potentially expanding or creating markets (e.g. through industrial symbiosis).

Are there net benefits from resource efficiency investments?

Overall, our review suggests that resource efficiency investments tend to yield positive net-benefits financially and environmentally. However, case-by-case evaluations are necessary, which take case specific circumstances and the wider investment environment into account. Whether a resource efficiency investment provides net-benefits also depends on expectations about resource prices.

Investment barriers and the causes of resource inefficiency

However, we find that even if resource efficiency investments are estimated to be commercially viable, firms may be unable or unwilling to take action.

We identify various market failures, which create investment barriers for firms, thus causing inefficient resource use and under-investment in resource efficiency:

1. *Information constraints* include:

(i) Limited information on the scale and type of resource inefficiency, i.e. due to lacking monitoring and disclosure, decision makers may struggle to take targeted actions.

(ii) Limited information on the solutions, i.e. efficient technologies and processes are unknown to decision makers.

2. *Capacity constraints* can limit the ability to act upon available information. Lacking technical and managerial capacity (i.e. skills) restricts the identification, installation, operation and maintenance of efficient technology. Limited institutional capacity (at the state level) creates an adverse environment for resource efficiency investments.

3. *Financial constraints*, such as:

(i) Firms may have limited access to credit, especially if local banks consider resource efficiency investments non-essential or risky.

(ii) Uncertain investment payoffs (e.g. due to unknown maintenance costs) can make credit expensive.

(iii) Non-monetary (e.g. environmental) benefits of resource efficiency investments may be overlooked, thus lowering perceived benefits.

(iv) Unstable financial markets may impair the ability to undertake longer-term investments.

4. *Market structures* may limit competitive pressures, which drive efficiency gains and innovation. This includes:

(i) insufficient competition policy and enforcement,

(ii) (state-run) monopolies,

(iii) 'entrenched' incumbents, and

(iv) protectionist trade policies, which limit international competition and access to modern technologies.

5. *Fiscal mismanagement* distorts incentives and causes negative externalities. Energy or industry subsidies for instance reduce incentives to invest in innovation and efficiency gains; waste taxes incentivise recycling, re-usage and investments in resource efficient machinery and processes.

Systemic risks and uncertainty may exacerbate investment barriers, as planning horizons are reduced. For instance, volatile commodity prices make the expected benefits from resource efficiency investments highly uncertain.

Payback periods will be difficult to estimate, thus aggravating existing financial and information constraints.

Policy measures and interventions

We argue that actions must be taken to address the causes of inefficient resource use and investment barriers – otherwise the accumulation of new productive capital will also be characterised by inefficiency.

We propose two types of interventions, when designing effective resource efficiency strategies:

(i) Addressing 'symptoms': i.e. help firms to overcome existing barriers; and address excessive waste and its externalities, which result from existing inefficiencies.

(ii) Addressing causes: i.e. address structural causes of investment barriers, and mitigate pre-existing inefficiencies.

According to this typology, we propose specific intervention measures for addressing investment barriers, including technical assistance, financial support and regulatory reforms. These measures must

be part of a comprehensive intervention approach, recognising that barriers are interlinked and cannot be addressed in isolation.

Conclusions

Our report provides evidence for the notion that resource efficiency investments are not only financially profitable, but can also address major externalities, such as environmental impacts from excessive waste.

However, we show that resource efficiency investments can be difficult to implement in practice as firms face multiple investment barriers due to market distortions and failures.

Therefore, we propose a comprehensive intervention typology, using which policy makers can enable resource efficiency gains and unlock the economic and environmental potential of resource efficiency.

This document provides a summary of **Flachenecker, F., & Rentschler, J. (2015). Investments in Resource Efficiency - Costs and Benefits, Investment Barriers and Intervention Measures. A report prepared for the European Bank for Reconstruction and Development (EBRD). London: University College London.** Full copies of the report are available on request or online.



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