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Financing Energy Efficiency: A Strategy for Reducing Lending Risk

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SUMMARY POINTS

- A huge increase in investment in energy efficiency is required if global energy systems are to be transformed to a more sustainable basis. Energy efficiency has significant and well-documented economic and environmental benefits, especially in regions with a history of cheap energy and high energy intensity. Companies' energy costs can often be similar to or even higher than their profits. This indicates the significant financial benefits that can accrue from reducing energy costs through improved efficiency.
- To date, less attention has been paid to how these benefits can flow through to financial institutions as a result of reducing the default risk of borrowers. Reducing energy consumption lowers the exposure of companies to volatile energy prices, making their profits more secure and lowering the risk of their defaulting on loans.
- For the selection of companies studied, such a risk reduction could be worth as much as one percentage point (100 basis points) on the cost of debt, making energy efficiency lending a more attractive proposition for banks and reducing the cost of capital for borrowers.
- Over-cautious bank lending for energy efficiency may fail to take this risk reduction effect into account. This creates a role for international financial institutions to offer risk-sharing facilities, such as partial credit guarantees, to help companies and banks realize the benefits of energy efficiency and to help scale up the level of financing in this sector.
- In countries with a supportive environment for energy efficiency, well-designed risk management products can accelerate investment rates and trigger long-term improvements in the pricing of energy efficiency risk by the market.

Introduction

Energy efficiency is vital to attempts to achieve a more sustainable use of energy resources, accounting for around half of the changes to energy systems that are required to achieve energy and climate security goals.[1] In the case of industrial energy efficiency, the additional investment implied by these goals amounts to over $50 billion per year globally over the next 25 years.[2] Experience has been built up in many countries since the oil shocks of the 1970s, indicating a high volume of potential investments with short payback periods and high internal rates of return. Indeed, interest from the finance sector in clean energy has ballooned in recent years.[3] Nevertheless, an order of magnitude increase in investment will be required to achieve the full potential.

Much has been written about both the benefits of energy efficiency and the barriers to uptake of such measures. This summary paper and the associated report[4] address an area to which less attention has been paid – namely the link between energy efficiency investment and risk management.

The attractiveness of energy efficiency as an investment proposition depends on the environment in which the projects arise. This can be influenced by a variety of factors, including the policy environment, energy market structure and the existence of suitable supply chains for energy efficiency projects.[5] Perhaps most fundamentally, the investment case depends on energy prices. As prices rise, the payback on energy efficiency investment becomes more attractive. However, project finances depend not only on the absolute level of energy prices but also on their volatility. Price volatility creates systemic risks to companies and the wider economy. Energy efficiency can help to offset some of these risks, giving companies that invest in energy efficiency a different risk profile from their competitors.

Because energy markets exhibit a high degree of volatility and uncertainty going forward, companies with significant energy costs will be exposed to significant financial risk. Energy efficiency can help reduce this exposure. A

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[1] See, for instance, *World Energy Outlook 2010* (WEO), International Energy Agency, Paris.
[2] WEO 2010, additional investment required to meet 450ppm scenario relative to 'current policies' scenario.
[3] Bloomberg New Energy Finance estimates that over $6.5bn of venture capital and private equity capital has been invested in energy efficiency since 2007.
[4] This research was financed by the EBRD Shareholder Special Fund. A copy of the full report, 'Scaling-up Financing of Energy Efficiency through Provision of Targeted Risk Management Products', is available at www.oxfordenergyassociates.com/projects.html.
[5] For a review of barriers to energy efficiency, see *Mind the Gap*, International Energy Agency, 2007.

company that can bring energy costs down below those of its competitors may find that its returns have a reverse correlation with energy price movements: if the market price of goods rises in response to energy price rises, energy-efficient companies stand to gain more than their competitors, and profits may in fact go up in line with energy prices. Banks and other investors seeking to hedge themselves against energy price risk should therefore see energy efficiency as an attractive investment class.

This paper focuses on the risk-reduction feature of energy efficiency, explaining why it arises, and quantifying the potential scale of the effect. The longer report also looks at the implications for international financial institutions (IFIs), and how they might stimulate greater levels of investment by sharing investment risk. The report focuses on Eastern Europe and Central Asia, the regions of interest for the European Bank for Reconstruction and Development (EBRD). The potential for energy efficiency in these regions is particularly strong because of their history of cheap energy and the legacy of a stock of inefficient industrial equipment. Energy prices are now adjusting to international levels because many of the countries can ill afford to maintain costly energy subsidies, leaving companies exposed to significant energy price fluctuations. The conclusions of the report are, however, likely to apply in many other parts of the world which experience similar conditions of low levels of energy efficiency.

The findings of the research suggest that expanding energy efficiency financing beyond current (overly cautious) horizons to a wider range of companies will not be as risky as is currently perceived. Companies' reduced exposure to volatile energy costs will make their profit margins more stable and reduce their risk of defaulting on the loan. The scale of this effect has been modelled for a sample of companies, and is estimated to lead to an average reduction of about one percentage point (100 basis points) on the credit spread.[6] This ought to reduce borrowers' cost of credit, and stimulate greater demand for energy efficiency loans than for loans for other types of investment.

However, anecdotal evidence from the EBRD and other IFIs suggests that lenders tend not to differentiate between energy efficiency and other investments when making loan decisions. This lack of differentiation contributes to a sub-optimal level of investment in energy efficiency. IFIs have an opportunity to address this financial barrier by providing partial credit guarantees to local banks to encourage an expansion of the range of companies to which they are prepared to extend credit. Pilot-scale trials of risk management products could be an appropriate next step to help reveal information about the credit risk profile of this broader base of companies.

A review of international experience shows that successful scaling-up of energy efficiency investment requires a strong enabling environment, whatever type of financing instrument is used. Risk-management products need careful design in order to ensure that they are attractive to the market while avoiding market distortions, and that there is a clear exit strategy to ensure the sustainability of lending practices once products are withdrawn. Technical assistance programmes have typically been a strong feature in the success of IFI programmes on energy efficiency, and are also likely to be needed alongside these risk management products in order to help build local banks' capacity on deal origination and technical assessment of energy efficiency opportunities.

How energy efficiency can reduce credit risk

The research addresses the conundrum that while individual energy efficiency projects may be financially attractive, banks generally make loan decisions not on the basis of project cash-flow but rather on the strength of the host company's balance sheet because of the need for collateral. Companies with tight margins are exposed to significant financial risk from rising and volatile prices for energy and other commodities. Improving the efficiency with which energy and other resources are used can alleviate this risk by reducing companies' exposure to fluctuating costs, making their cost structure more stable and their profit levels more secure, and in turn reducing the risk of loan default.

The steps used in the report to model the scale of the credit risk reduction associated with energy efficiency investment are:

- **Reduction in energy consumption.** Data on the initial energy-consumption and energy-saving potentials of companies are taken from the technical assessments of energy efficiency investment opportunities carried out by consultants on behalf of the EBRD Sustainable Energy Finance Facility (SEFF). On average for the companies studied in the report, energy savings amounted to 31% of total energy consumption.

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[6] The credit spread measures the premium that a bank would need to charge on a loan to cover the risk of default. This is an average figure, and there is considerable variation in the size of the

- **Reduction in volatility of company profits and asset value.** Reducing energy consumption decreases exposure to energy cost fluctuations, making company profits more stable. Since the asset value of a company is the net present value of its future profits, the impact of energy efficiency investment in reducing the volatility of asset values follows the reduction in the volatility of profits.
- **Reduction in risk of default.** A company technically becomes bankrupt if its total asset value falls below the total value of its liabilities. The likelihood of this happening will depend on the stability of its asset value as well as the level of liabilities. Reducing volatility in the asset value therefore reduces a company's risk of default, and should also reduce the company's cost of capital.

These three steps were applied to a sample group of eight companies for which relevant data were available. Some details of the eight companies, all located in Bulgaria, are shown in Table 1. Company names have been withheld for confidentiality reasons. Although this is a small sample of companies, the evidence suggests that it is fairly representative.

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risk reduction effect between different companies, as shown below.

Table 1: The eight case-study companies in Eastern Europe

	Products	Turnover (€m)	Profit (€m)	Energy costs (€m)	Energy-saving project	Energy cost savings (%)[a]
1	Medical dressings and hygiene products	7.1	0.6	0.6	Replacement of existing heavy fuel oil boilers with new LPG boilers	16
2	Cosmetics	13.4	0.7	0.5	Replacement of centralized boilers with more efficient decentralized steam system and heat pumps	30
3	Medical and veterinary products	55.3	1.2	6.3	Replacement of existing gas boilers with CHP system to generate own electricity and heat	39
4	Woollen goods and carpets	10.2	0.2	0.6	Replacement of existing gas boilers with CHP system to generate own electricity and heat, and export surplus electricity	78
5	Chemicals, paints and varnishes	61.2	1.1	1.4	Utilization of waste heat for drying	7
6	Construction, buildings and engineering	42.2	5.2	0.1	Replacement of old machine tools with more efficient equipment	52[b]
7	Engineering equipment and household appliances	9.5	0.3	0.3	Replacement of old steam system with new decentralized gas-fired heating system	6
8	Brewery	3.3	0.4	0.5	Improvement of the steam system, boiler efficiency, heating, lighting and energy control system	23

Note: Figures for turnover, profit and energy costs in this table represent averages over the past three years.

a These are the cost savings for the specific energy efficiency projects identified in the technical reports carried out for these companies under the EBRD's SEFF programme.

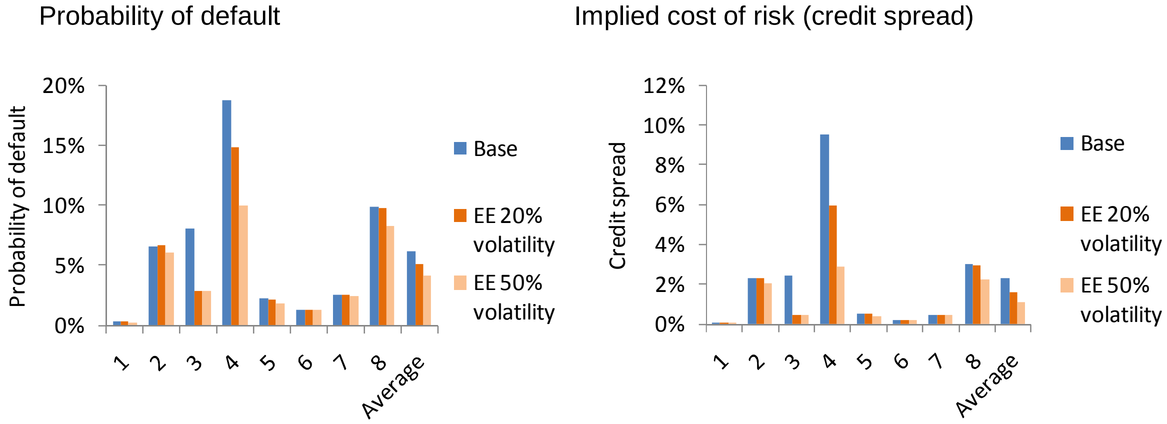
b The energy consumption and savings figures are for electricity use only – fuel use data was not provided in the reports.

CHP = combined heat and power; LPG = liquefied petroleum gas.

Energy price volatility is important in this analysis because energy efficiency will have a greater risk reduction effect when prices are more volatile. Historically, prices in West European gas markets were relatively stable during the early 2000s, with an annual volatility of 20%. However, since then prices have become significantly more volatile, especially in EBRD regions which are experiencing significant price adjustments, and where price rises greater than 50% in a year are not unusual. In Bulgaria, gas prices rose by 50% for the past three consecutive years.

Figure 1 compares the calculated effects of energy efficiency investment under assumptions of 20% and 50% energy price volatility. The left-hand chart shows the probability of a company defaulting on its corporate loans, while the right-hand chart shows the implied credit spreads (risk premiums) associated with this default probability.

Figure 1: Impact of energy efficiency (EE) on the probability of default and implied credit spread compared with the base case



The average credit spread in the base case using this methodology is calculated to be 2.3%. Under an assumption of 50% volatility in energy price volatility, the energy efficiency projects would reduce the average credit spread of these eight companies to 1.1%, a reduction of 120 basis points compared with the base case. Under an assumption of 20% volatility in energy price, the average credit spread would be reduced to 1.6%, a reduction of 70 basis points compared with the base case.

The scale of the effect will clearly be very dependent on the assumptions used. The key drivers of the energy efficiency risk reduction effect are:

1. **Degree of energy cost uncertainty**. In order for energy efficiency to reduce a company's credit risk, its energy costs must be both risky and substantial in relation to its profit.
2. **Energy-saving potential of the project**. The higher the energy-saving potential, the greater the risk reduction.
3. **Degree of cost pass-through to customers**. If companies can pass through variations in energy costs to their customers by varying their product prices, then energy efficiency projects will not reduce credit default risk. On the other hand, if none of the variations in energy costs can be passed through to customers, then energy efficiency investment

will have a stronger effect. The results shown here assume that two-thirds of any cost variation could be passed through to customers. In markets where less pass-through is possible, the effects would be stronger than indicated here.

Portfolio effects

Portfolios of projects are attractive because they can potentially reduce the transaction costs of financing, relative to the costs of having to deal with individual projects, and because of their increased scale, portfolios could in principle attract finance from a wider range of sources. The default behaviour of a portfolio as a whole is different from the default behaviour of an average loan within it. Even if there is a low probability of default on each individual loan, the probability of some level of default in the portfolio can be quite high because there are many loans over which the risk of default accumulates. Exposure to this default risk can be tailored to match the risk appetite of different types of investor. Senior debt provides capital that is paid back first from the portfolio returns, and is therefore least exposed to default, whereas junior debt is paid back last, and is most exposed if portfolio returns have been reduced as a result of default. These junior portions or 'tranches' of debt which are most exposed can therefore be thought of as the first tranches that would incur losses as a result of default.

Figure 2 shows the default characteristics for a hypothetical portfolio made up of loans from the eight companies identified previously. The base case represents the portfolio risk that would apply if all the companies were to borrow money for projects that maintained the status quo in terms of their individual default risk. The 'with EE projects' case shows the reduction in risk that occurs if the lending is targeted towards energy efficiency projects.

Figure 2: Portfolio risk for different tranches of debt: (a) probability of default, (b) expected loss in each tranche as % of overall portfolio debt

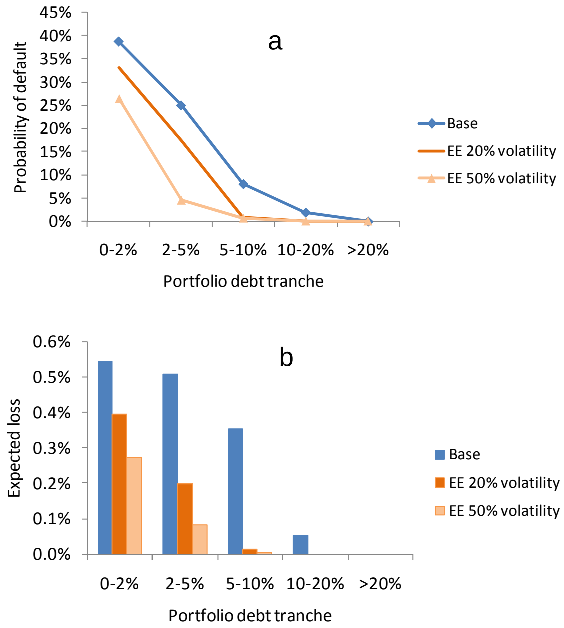


Figure 2(a) shows the annual probability that some portion of the portfolio would default on repayments of either interest or capital. This risk of default is divided into different debt tranches in order to illustrate that first losses (e.g. below 2%) are far more likely than losses greater than 10%. The effect of targeting the portfolio towards energy efficiency investment is to reduce these first losses considerably relative to the base case, especially when energy price volatility is high, as shown in the 50% volatility case. Not only is the probability of default reduced as a result of energy efficiency investment, but also the expected amount lost in each tranche is significantly reduced, as shown in Figure 2(b).

The rate at which the probability of default drops down for more senior debt tranches has important consequences for the way in which a portfolio guarantee is structured, in particular the relative risk of first-loss tranches with respect to the risk-sharing for the rest of the portfolio. Guarantees covering such first losses from portfolios are therefore particularly attractive to banks because of the higher risk that is being covered. However, this also reinforces the need for first-loss guarantees to be priced appropriately in order to cover these risks.

The role of risk management products in scaling up energy efficiency finance

Attention among IFIs is now focusing on the possible role that risk products could play in supporting the scaling-up of energy efficiency lending where liquidity is not the primary lending constraint. The design of these risk products depends on the types of risk they aim to manage. Key types include political risk guarantees covering specifically defined sovereign or political risks, mezzanine finance allowing the conversion of debt to equity on non-performing loans, securitization of loans to help scale up financing, and energy service companies (ESCOs) as a vehicle for risk aggregation in relation to energy efficiency.[7]

The research focuses mainly on partial credit guarantees (PCGs) because preliminary discussions with the EBRD and its partner banks indicated that the bulk of lending decisions in the region are driven by considerations of the collateral provided by borrowers' balance sheets, rather than specific risks associated with the energy efficiency projects themselves. The consensus is that PCGs will be an appropriate tool where project credit risk is perceived to be the key barrier for third-party lending. A World Bank report identified guarantees as being most effective where there is a gap between the real risks and those perceived by banks.[8]

If banks are ignoring the potential of energy efficiency investment to reduce credit risk when pricing their loans, this provides some justification for IFIs to intervene through the provision of risk guarantees priced against the 'real' as opposed to the 'perceived' risk profile of such investments. Such guarantees could help catalyse a scaling up of energy efficiency financing. Initially, guarantees would encourage banks to explore default risk beyond their current conservative horizons with respect to energy efficiency lending. The banks would then gain from the reduced risks, and in the long run this should lead to a greater willingness to lend to energy efficiency and more favourable lending terms, stimulating greater demand for loans without the need for guarantees.

The opportunity for energy efficiency financing to be scaled up through such mechanisms depends on a number of factors:

- The population of companies with suitable energy efficiency investment opportunities;

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7 World Energy Council, 'An Assessment of on Energy Service Companies (ESCOs) Worldwide', 2007, http://www.worldenergy.org/documents/esco_synthesis.pdf.
8 World Bank GEF, 'Energy Efficiency Portfolio Review and Practitioners' Handbook', World Bank GEF Thematic Discussion Paper, 21 January 2004.

- The extent to which these investments lead to reduction in credit risk;
- The willingness of partner banks to broaden lending with a guarantee in place;
- The demand for loans, and the attractiveness of loan pricing to end-borrowers.

The evidence for the first of these factors rests primarily with the experience of the EBRD, built up through its technical assistance programmes, that there are plenty of technical opportunities for cost-effective energy efficiency investments in client countries. However, the risk profile of these companies is less well understood. Current lending practice by partner banks under the SEFF appears to be over-cautious, as evidenced by the extremely low default rates of loans in that programme compared with other EBRD programmes and the market more generally. This suggests that the potential exists to expand lending by encouraging a broadening out of lending practice, and that lending to companies investing in energy efficiency projects will be less risky than partner banks perceive it to be.

The international experience to date suggests that guarantees can be successfully deployed in situations where there is the potential to help banks learn about risks in a class of investments with which they are not familiar. In the current context, banks are already familiar with financing industrial energy efficiency projects through the SEFF and other programmes. The argument made here is that banks nevertheless need to become comfortable with extending lending to a wider range of such opportunities. First-loss facilities sometimes attract donor funds from interested parties seeking to mobilize activity in a given sector. In all cases, a clear understanding of the exit strategy should be established, with indicators as to when this process should be undertaken. Otherwise there is a risk of market distortion.[9]

Conclusions

Scaling up energy efficiency will require a number of factors to be in place to provide a strong enabling environment for investment. These include full cost-recovery pricing of energy, pricing of environmental and other externalities, a stable and supportive regulatory framework, measures in place to help improve information on energy efficiency opportunities, and a well-functioning supply chain for the skills, services and technologies needed to implement these opportunities. The availability of finance appropriately priced to reflect the level of risk of these investments will be a necessary component. Lending is currently being constrained by cautious policies among partner banks. While this is partly due to lack of familiarity with energy efficiency as a credit class, it also stems from basic concerns about the corporate creditworthiness of sub-borrowers associated with transition markets. This has been compounded by the global macro-economic instability since 2008.

Risk management products could play an important role in helping to scale up energy efficiency financing by closing the gap between real and perceived investment risks. This gap may arise because energy efficiency projects can reduce a company's credit default risk by reducing exposure to volatile energy prices, leading to more stable profit levels. The risk reduction potential of energy efficiency investment is substantial. For the limited sample covered in this analysis, the implied reduction in credit spread was in the order of 100 basis points.

Partial credit guarantees are the most suitable instrument to address risk perceptions among lenders, in particular in markets where liquidity is no longer an issue. They have traditionally been used to introduce lenders to new asset classes. Given the link between energy efficiency investment and corporate default risk reduction demonstrated in the research, there is now a case to use credit guarantees to influence credit decisions on sub-borrowers may who may have a lower credit risk as a result of energy efficiency investments than is currently perceived by lenders.

There are a number of examples of the successful use of PCGs for extending energy efficiency lending. Their deployment has not been universally successful, however, and alignment of programmes with partner banks' strategic objectives has proved important. Like more traditional programmes of providing credit lines, offering guarantees is not sufficient on its own to create a successful scale-up of investment. Both require technical assistance programmes to support deal origination and to develop the capacity for technical project evaluation.

For portfolios of projects, risk reductions as a result of energy efficiency investment also occur, especially in the first-loss tranches of portfolio debt where the risk of default is highest. Deciding how to share this first-loss risk is important to the success of a guarantee scheme. Project originators need at least some exposure to this risk in order to align their incentives with the success of the portfolio, and there should be a strategy to reduce the first-loss coverage over time to avoid market distortion.

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9 Independent Evaluation Group, The World Bank Group Guarantee Instruments 1990–2007: An Independent Evaluation', World Bank Group, 2009.

The credit risk reduction effects of energy efficiency investment demonstrated by the research, together with the review of international experience, provide encouraging signs for IFIs to continue developing risk management products. IFIs should play a catalytic role by providing guarantees as a transitional tool, and sharing the resulting investment experiences as widely as possible. This should help markets move towards correct pricing of risk for energy efficiency loans, and an associated scale-up in supply and demand for energy efficiency loans with benefits for lenders and borrowers alike.

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