

BASE - Basel Agency for Sustainable Energy for the
UNEP Sustainable Energy Finance Initiative (SEFI)

PUBLIC FINANCE MECHANISMS TO INCREASE INVESTMENT IN ENERGY EFFICIENCY

A REPORT FOR POLICYMAKERS AND PUBLIC FINANCE AGENCIES

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With the support of the UK Department
for Environment, Food and Rural Affairs (DEFRA)

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Conception and Technical Editing

Virginia Sonntag-O'Brien, BASE
Eric Usher, UNEP Energy Branch

Author

Sandra Makinson, Consultant, BASE

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An overview of the mechanisms illustrated in the report can be found at the end of the document.

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HOURS**



EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This report was prepared by BASE as part of the UNEP Sustainable Energy Finance Initiative (SEFI) with financial support from the UK Department for Environment, Food and Rural Affairs (DEFRA). Its objective is to demonstrate the importance, value and methods of public sector financing of energy efficiency for its uptake in the market and for increasing private investment in the sector. The report is a sequel to the SEFI report on Public Finance Mechanisms to Catalyze Sustainable Energy Sector Growth (2005), which focussed on renewable energy.

Improving energy efficiency lowers energy consumption and related emissions of greenhouse gases, both of which are priorities of governments. Market barriers, however, hinder cost-effective energy efficiency improvements, and energy efficiency has not been able to attract significant amounts of private capital. The barriers to investment and scale-up of the energy efficiency sector in both developing and developed countries can be lowered through increased cooperation and communication between the public and private sectors, in particular, with publicly backed, market-based mechanisms at the national and especially sub-national level. These mechanisms must be accompanied by improved awareness of the environmental and financial opportunities associated with investing in energy efficiency, as well as by supporting policies and instruments.

The report identifies the market barriers and financing gaps that energy efficiency technologies, companies and projects encounter on the way from conception to commercialisation and highlights existing public sector finance mechanisms that address those gaps. It has been written for policymakers, energy efficiency stakeholders, public financing agencies and other finance practitioners and targets both developed and developing countries.

The report makes a distinction between three main areas of energy efficiency market activity: technology innovation, energy efficiency ventures and energy efficiency projects, and takes into consideration the different local conditions, particularly between developed and developing countries. The financing of technology innovation with venture capital, for instance, is more relevant for mature, developed country markets, whereas in developing countries the focus is on financing energy efficiency projects.

Technology Innovation

Energy efficiency technology innovation involves inventions and technologies that make energy supply and use more efficient. Innovative public financing approaches are required for technology innovation throughout the entire finance continuum, which extends from research and development, demonstration up to commercialisation. The financing gaps typical for technology innovation occur between the demonstration and commercialisation stages. Innovative public sector finance mechanisms can include contingent grants, convertible loans and guarantees. Public sector backed venture capital funds like those found in the UK, US and Australia are one of the most innovative public sector finance mechanisms for energy efficiency technology innovation.

Energy Efficiency Ventures

Energy efficiency ventures are small and medium-size enterprises (SMEs), including Energy Service Companies (ESCOs). These face critical financing gaps at the start-up and expansion stages. Seed financing and other later-stage forms of equity are needed until debt and guarantee mechanisms can be obtained for expansion.

Energy Efficiency Projects

Though energy efficiency projects ideally pay for themselves through the energy they save down the road, the energy audit, assessment of energy use and recommendations for reductions have to be financed directly. Debt instruments, guarantees and third-party financing are finance mechanisms the public sector can make available to cover such costs. Non-financial public mechanisms including marketing, end-user education, capacity building and training are key for energy efficiency sector growth, because they encourage the participation of both end users and the financial institutions.

Enablers

The public sector can significantly affect investment in energy efficiency by creating policy and regulatory frameworks that support energy efficiency, such as standards and labelling on an international scale, as well as integrated legislation at local and regional levels that calls for low emissions / polluting practices.

Raising awareness of the importance of and opportunities provided by energy efficiency is crucial to ensure buy-in from all parties including the general public, industry and financial institutions in order to increase demand and investment.

To contribute to the successful implementation of the public finance mechanisms to increase private investment in energy efficiency, the following recommendations and conclusions are noted:

Approaches must be holistic and market-based

For the scale up of energy efficiency technologies, products and services, holistic approaches are needed that combine regulatory policy and locally appropriate and commercially viable financing mechanisms. They must address the entire finance continuum at all stages of technology, venture or project development and address the needs of all key stakeholders.

Mechanisms must not distort the market and subsidies should remain “smart” and serve to catalyse market growth

Standards and labelling promote consumer and user awareness, which in turn affects economic savings and market growth. Increased international cooperation on standards and labelling is needed to enhance these efforts and continue to create aggregated demand for energy efficiency products and services.

Mechanisms must be adapted to local market conditions

Strategies to close energy efficiency financing gaps must be adapted to local market financing conditions and energy efficiency market development. This applies especially for developing countries. The specific institutional and credit traits of target end-user sectors within the region or country must be considered.

Successful public financing mechanisms to increase investment in energy efficiency need to be replicated

To facilitate the replication of existing public finance mechanisms and the development of new ones, it is suggested that a platform be created that enables financiers and energy efficiency stakeholders to exchange experience and expertise with the aim of improving ways for public sector capital to effectively promote innovation and private investment in the renewable energy and energy efficiency sectors. This could help developed markets optimise their strategies and help emerging markets strengthen their public finance approaches in the energy sector.

Such a platform could serve as a neutral resource centre providing business tools for EE practitioners, including training and assistance for both financiers and project developers.

Impact and innovation increase with public and private sector cooperation

The success of public financing mechanisms in increasing private investment in energy efficiency depends on how market-based they are and how much they involve the private sector. Establishing partnerships with the right private financial entities early on - from the design of the financing programme through to implementation - is crucial. The public sector can fill an important role by facilitating dialogue between local project developers and local lenders.

1. INTRODUCTION

1.1 WHY ENERGY EFFICIENCY?

The International Energy Agency's World Energy Outlook 2005 predicts that "in the absence of new government policies, the world's energy needs will rise inexorably." In designing ways to meet this rising demand, governments have to deal with the challenges of energy security and environmental damage, both of which are linked to the consumption of fossil fuels.

Energy efficiency (EE) has a major role to play in "low-carbon" energy policies. Energy efficiency and EE technologies will be responsible for 58% of CO₂ emissions reductions worldwide between 2002 and 2030.¹ They have also gained significant market share for companies that achieve energy and cost savings for industry, utilities, governments and consumers.² Energy savings and air quality improvement are the fastest, highest impacting and most cost-effective way of reducing greenhouse gas emissions, particularly in densely populated areas.³

The public sector has a crucial stake in improving energy efficiency. Costs due to environmental externalities from inefficient energy use are largely born by the public sector. Government can also benefit from energy efficiency improvements via improved environment, health, energy security, economic development and competitiveness. Government at all levels is a major energy user, and supporting mechanisms for public sector energy efficiency provide for savings for the public purse, as well as important aggregation of EE projects for creating market demand.⁴

In transition and developing countries, where energy intensity is very high,⁵ significant gains in energy efficiency are to be made.⁶ Governments therefore have an interest in promoting and increasing energy efficiency from both an environmental and economic development standpoint.

1.2 MOBILISING PRIVATE SECTOR CAPITAL FOR INVESTMENT IN ENERGY EFFICIENCY: AN INNOVATIVE ROLE FOR GOVERNMENT

Large-scale deployment of energy efficient technologies, products and services requires an increase in overall market activity. In the long term, this can only be achieved through private investment and increased EE market growth. ***Only the private sector can deliver EE technologies and services on the large scale needed to meet emissions reductions commitments and reduce energy demand.*** The barriers to investment and scale-up of the energy efficiency sector in both developing and developed countries can be lowered through increased cooperation and communication between the public and private sectors.

The public sector can play a key role by providing finance mechanisms that mobilise the flow of private capital into the EE industry. This means going beyond traditional interventions such as subsidies and tax advantages for EE measures and *creating and implementing market-based mechanisms that catalyse direct and long-term private sector investment in the industry.*

1 Birol, F., May 2005. OECD countries will contribute 49%, transition economies 63% and developing countries 67% of end-use efficiency gains that are targeted to reduce CO₂ between 2002 and 2030. Increased use of renewables in power generation is targeted to contribute to 20% of CO₂ reductions during the same period. Figures are based on a World Alternative Policy Scenario outlining the impact of new environmental energy security policies under consideration (OECD and non-OECD countries) and on reducing energy intensity via rapid deployment of EE technology, sustainable energy policy in power generation, transport and residential and commercial sectors.

2 Makower, J., R. Pernick and C. Wilder, March 2005

3 European Commission. June 2005.

4 MacLean, John, *Energy Efficiency Finance Program Business Models & Strategies for their Replication*, Presentation at the Energy Efficiency Investment Forum. New York. May 8-9, 2006

5 Measured in terms of the amount of energy required to produce a unit of GDP. For more information see the World Energy Council's *Energy Efficiency: A Worldwide Review - Synopsis* including Energy intensity levels and trends are different between regions.

6 World Energy Council. February 2006

Such publicly driven finance mechanisms should address market barriers and financing gaps, not create dependence. They should be 'removable' in the mid to long-term, reward innovation and demonstrate cost-effectiveness by leveraging private sector capital.⁷ Successful public intervention can demonstrate profitability, reduce perceived and real risks and increase investment opportunities in the EE sector.

The most effective mechanisms support new markets and do not distort them.



BARRIERS TO FINANCING ENERGY EFFICIENCY

2. BARRIERS TO FINANCING ENERGY EFFICIENCY

Energy efficiency projects and ventures face many of the same barriers (and risks) that renewable energy projects and enterprises do (global barriers).

The fundamental market barrier to investment in renewable energy and energy efficiency is the fact that **energy prices do not reflect the real costs** of carbon and other environmental externalities. Policies that create enabling legal and regulatory frameworks that provide stability over the long term give the private sector the needed confidence to scale up investment in energy efficiency and clean energy technologies, businesses and projects.

Energy efficiency must compete with investment opportunities in entrenched industries (conventional energy and other) that loan officers are more familiar with and therefore more comfortable dealing with. In many markets where capital is scarce more traditional investments such as power plants and industrial expansion receive investment priority, even when they do not offer the best business case or the best return. In markets where finance is readily available the problem is the lack of experience with assessing the risks and opportunities of EE investments, which results in a tendency to overrate the underlying project risk.

As with renewable energy, **financial scale** is another challenge to investment in energy efficiency. Energy efficiency projects, as well as EE ventures such as ESCOs, are typically small, resulting in disproportionately high transaction costs. This makes EE finance unattractive to financial institutions, especially international financial institutions, which are a key source of energy sector investment in developing countries.

The **costs of debt and equity are typically very high** for an EE project or venture, which strains the developer's or enterprise's resources. Sustainable energy SMEs, including ESCOs, are often thinly capitalised and rarely have sufficient collateral and track records to secure the capital needed for start-up, operation and expansion.

Small ventures and start-ups often lack the business and management skills and expertise necessary to make a convincing case. Business and technology development assistance is needed to help prepare "bankable" projects and ventures.

In addition to these global barriers, specific financing barriers exist that are unique for the energy efficiency sector.

A typical barrier to the scale up of energy efficiency is the **"split-incentive"** among those who make energy decisions and those who bear the costs. An example is the "renter-owner" split, where tenants pay the energy bills, but landlords control the property. The former pay the costs related to poor insulation and low-efficiency equipment. The latter, including builders, developers and landlords who don't pay the energy bills, save costs upfront by purchasing the least efficient equipment without considering the life-cycle value of efficiency investments (or other factors such as the value of retaining a satisfied tenant). Another typical example of split incentives is metering, as it is not in the utility's financial interest to help its customers monitor energy use effectively.^{8,9}

Financing energy efficiency carries a number of real and perceived risks for the finance sector. The energy efficiency business model of **using energy savings as a revenue stream** guaranteed through performance contracts is a concept completely foreign to banks. Also, since energy efficiency projects are often non-asset based, there is no collateral to serve as security. ESCOs have traditionally used some form of shared savings model, whereby the customer bears no financial risk and pays the ESCO with the money it saves on energy. But that means that if the actual energy savings are lower than projected, the payment to the ESCO is reduced and the ESCO then has trouble servicing its debt to the bank. Another risk factor is the length of the payback term within the performance contract. Financiers need assurance that both the ESCO and the customer will stay in business for the term of the contract. This is particularly the case in countries with new and developing ESCO industries. In reality, a variety of financing models are being increasingly used. The chosen model will depend on local market development,

8 HM Treasury, DEFRA. December 2005

9 In some cases, however, utilities are seeing the advantage of engaging in EE measures where the cost of services is greater than the tariff charged, due to power factor correction, load management etc.

as well as fair payment to both the client and the ESCO based on real energy savings, end-user energy load over time, risk to lender, etc.

In the industry and commercial sectors decision makers are often reluctant to invest in energy efficiency for fear of **hidden costs** associated with energy efficient retrofits and equipment conversion. These include poor performance, transition problems, and internal (company) and external (financier) transaction costs.¹⁰

A further barrier to investment is that the **immediate impacts of energy efficiency measures are often “invisible”** and thus underestimated. If it is not possible to calculate at the outset how an energy efficiency measure adds value to the company’s product or productivity, it is unlikely that an investment will be made.¹¹ The predicted energy savings are regarded as suspect and the benefits small in relation to the overall operating costs.¹²

Due to the barriers described, patently cost-effective energy efficiency investments are not being made in real markets. Publicly backed, market-based mechanisms at the national and especially sub-national level can help overcome some of these barriers and help increase investment. The following sections identify the finance gaps and related financing needed and highlight public sector action that has been taken to fill the gaps and mobilise private capital through active and long-term commitment on the part of leading financial institutions and innovative public-private partnerships.

10 HM Treasury, DEFRA. December 2005

11 *ibid.*

12 World Bank January 2004.



FINANCING ENERGY EFFICIENCY

3. FINANCING ENERGY EFFICIENCY

To attract public and private capital to the energy efficiency market, specific financing strategies and mechanisms are needed for the various sectors and stages of EE market development. Challenges and barriers (elaborated in further detail below) must be overcome in order to bring *affordable* and *accessible* financing to EE initiatives and *deliver viable and profitable projects and ventures to financial institutions*.

There are three main areas of energy efficiency activity that require financing:

Technology Innovation is the process that extends from the R&D stage through to full commercialisation. A finance continuum (see section 4.1) demonstrates the stages of technology innovation, the types of finance required at those stages and the areas where financing gaps exist. Innovative public financing approaches can close the financing gaps for technology innovation throughout the entire continuum.

Energy Efficiency Ventures¹³ are businesses that produce, market, distribute and sell EE products and services. These can include the developers and manufacturers of EE technologies (from energy efficiency light bulbs or heating systems to controls, energy metering, etc.), and the associated vendors, retailers and service companies that sell, install and service the technologies.

A market actor that has received much attention, largely due to its role as a market driver and its high impact on EE sector growth, is the energy service company (ESCO). In most developed markets the ESCO assumes the costs of the equipment, process replacement and building retrofit through an Energy Performance Contract (EPC).¹⁴ Payback is ensured by a percentage of energy savings as stipulated in the EPC. ESCOs require financing both for themselves as ventures and for the projects they undertake.

Energy Efficiency Projects reduce energy consumption and increase energy efficiency for the end user (residential, commercial, institutional and industrial). Each project must be financed directly. Projects usually entail energy efficient building retrofits and standard equipment and process replacement. Costs are recovered from the energy savings. Financing is needed to cover energy audits, energy advisory services, new EE equipment, installation and monitoring.

¹³ Concepts from Financing EE Projects and EE Ventures adapted from IIEC, 1998

¹⁴ Not all ESCO business models include a financing role. This depends on expertise, project and company size and resources or risk considerations.



**FINANCE CONTINUUMS, GAPS IN FINANCING
AND MECHANISMS TO FILL THEM**

4. FINANCE CONTINUUMS, GAPS IN FINANCING AND MECHANISMS TO FILL THEM

This report focuses on the financing gaps that occur in the three main streams of energy efficiency activity that require capital for large-scale deployment: EE technology innovation, EE ventures and EE projects. The gaps in these stages of market development and deployment tend to be common in all economies, but vary in intensity, depending on local market/financial, energy supply and policy conditions.

4.1 TECHNOLOGY INNOVATION

Technology innovation in energy efficiency involves inventions and technologies that render production, conversion, storage and use of energy more efficient. This can involve process technologies (e.g. energy efficient melting process for metal casting), EE controls, EE technologies for transportation or new technologies for EE efficient heating systems or lighting and other cutting-edge, high-tech EE solutions.

In some contexts energy efficiency technologies already exist and energy efficiency needs and strategies can be addressed with proven, low-risk technologies.¹⁵ Here public financing priorities can be given to programmes and mechanisms that assist the full commercialisation and market introduction of existing EE technologies via innovative approaches to financing projects and ventures (addressed in sections 4.2 and 4.3)

Financing energy efficiency technology development covers research and development, demonstration and the entire path to commercialisation. The financing gaps that are unique to technology innovation seen in the finance continuum below occur *between the demonstration and commercialisation stages*.¹⁶ This is due to the long and costly time periods needed for demonstration, testing and early market timing. After R&D activities have been completed, there is little public financing available and private capital is hard to get because of the high business and technology risks. This section will focus on examples of public sector mechanisms (shown in yellow) that can fill the gaps.

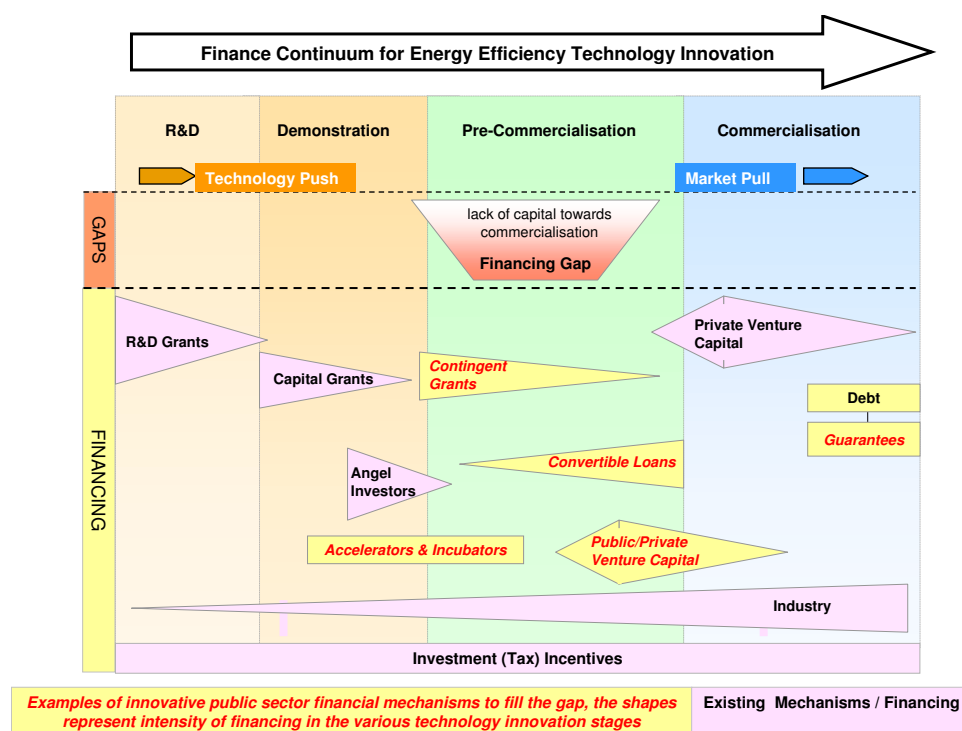


Figure 1

¹⁵ particularly in developing country contexts.

¹⁶ for detailed information on finance continuums for sustainable energy market stages consult "Public Finance Mechanisms to Catalyze Sustainable Energy Sector Growth" UNEP/SEI 2005

4.1.1 Research and Development

Research and development (R&D) is primarily supported by public sector financing, either directly (government agencies or departments) or indirectly (universities or research institutes). Research and development can also be financed by larger corporate and industrial players that perform and finance R&D in-house. It is important to ensure that public sector R&D subsidies remain “smart subsidies” with clear exit strategies based on technology development milestones that lead toward demonstration and pre-commercialisation. Conventional operating and capital grants are most effective when they are part of an overall support strategy that includes technical and business assistance and debt and equity mechanisms as the technology reaches commercialisation (discussed below).

There are many examples of government grants and capital subsidies for energy efficiency R&D. In Austria the Factory of Tomorrow (industry), Energy Systems of Tomorrow and Buildings of Tomorrow¹⁷ offer grants for early research, concept, commercial research, development and demonstration for a total of €75 million for the three programmes. The programme focuses on innovation and provides coordinated support from early R&D phases including demonstration, and covers industry, buildings and efficiency aspects of energy supply and systems. SenterNovem’s EOS programmes in The Netherlands provide a similar complete R&D grant scheme with EOS NEO (small projects), EOS Long-term Research, EOS IS (Innovative Collaboration Projects) and EOS Demonstration.

4.1.2 Demonstration/Pre-Commercialisation

Less money is readily available for the demonstration of energy efficiency technologies than for the research and development stages. Although the intensity of the financing gap for energy EE technologies is not as great as for large-scale renewable energy technologies that have high prototype development and construction costs, the “gap” nevertheless remains a main obstacle to successful commercialisation and deployment. As Figure 1 shows, innovative public sector finance mechanisms can include contingent grants, convertible loans and guarantees. Business and technology support helps developers secure these mechanisms to be able to successfully bring the technology to commercialisation.

4.1.2.1 Business and Technology Development Support

As part of an overall public sector strategy, support should also be directed towards capacity-building via technology incubators and business accelerators. Incubators provide assistance for operating costs during demonstration phases and can provide technical support and synergies that are not necessarily available in a pure “laboratory” environment. Complementary programmes that prepare technology developers for financing and for growth also facilitate access to other financing mechanisms (public and private) and help bridge the pre-commercialisation gap.

The UK Carbon Trust is a special purpose company that provides a comprehensive, early-stage investment vehicle to help sustainable energy technologies develop from conception through to the later stages of market readiness.

Incubators assist developers in covering operating costs, provide advice on business development and raising capital, help to create and mentor management teams, and provide energy-related market research. Governments like them because they contribute to local and regional economic development. The *UK Carbon Trust Incubator Programme* provides an important stepping-stone to commercialisation

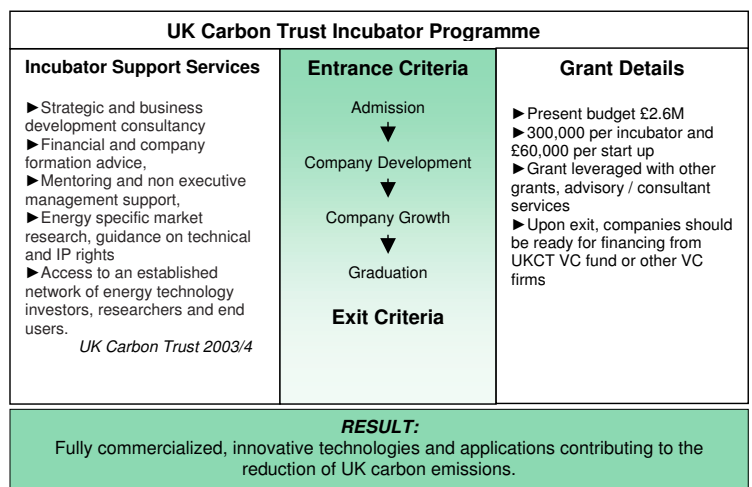


Figure 2

for new sustainable energy and “low carbon” technologies. To date, 34 companies have benefited from the UKCT incubator programme, 13 of which fall within the energy efficiency category. In terms of leverage, 11 companies have raised £14.6 million private sector investment since joining the incubators, two of which are CT venture capital investments (see venture capital in this section below). To date, the CT has spent about £1.6 million on the programme, the average amount per company is approximately £43,000.¹⁸

The UK Carbon Trust also runs technology accelerators that provide field trials and engineering support to key low-carbon sectors. The Low-Carbon Building Accelerator, Advanced Metering and Small Scale CHP accelerators all focus on energy efficiency. Members of the US National Alliance of Clean Energy Business also support the development of EE technologies and start ups with similar activities and support.

4.1.2.2 Grants and Contingent Grants

At the late-demonstration / early-commercialisation stages, grants can ensure the survival of a technology developer or start-up that has a promising energy efficiency product, but is still far away from any revenue stream. Grants are the most common example of subsidy, but these should be very specifically tailored to the stage of the technology and be short term to prevent subsidy dependency. Many governments have grant support programmes for technology development. Those considered most effective are the ones that design the grant support around the entire technology innovation process, from R&D through to commercialisation (see continuum in Figure 1), as well as providing other debt and equity mechanisms.

Contingent grants (also known as forgivable loans) can be particularly effective during high-risk demonstration phases when the EE technology start-up has little or no access to capital. Contingent grants are grants that are ‘loaned’ without interest or repayment requirements until the technology and intellectual property (IP) have been successfully exploited. They can serve to cover some of the costs during the highest-risk development stages, and in some cases they increase investor confidence, which helps to leverage highly needed risk capital. Repayment of contingent grants allows public subsidies to be recommitted to new emerging technologies. The advantage of contingent grants over conventional grants is that they steer the technology developer and entrepreneur towards private and commercial financing. A history of previous financing and successful payback gives start-ups a track record that they need later on to raise debt and equity. Servicing soft and convertible loans also helps build a track record.

The Technology Early Action Measures (TEAM) fund provides financial support through contingent grants, (or repayable or non-repayable contribution agreements) for this stage of technology innovation. TEAM funding has leveraged several hundred millions of Canadian dollars in follow-on financing and achieved a 5:1 leverage ratio of further private financing and other investment.¹⁹

Canadian eco and energy efficiency technology innovation

Canada’s TEAM funds the most promising environmentally sound technologies that have the greatest potential to reduce greenhouse gases including EE technologies, such as the development of integrated, intelligent buildings and the improvement of community-systems management. TEAM and its partners also explore advanced industrial-process technologies and eco-efficient industrial systems that will help to lower GHGs and reduce costs for end users. Many companies that have been involved in TEAM partnerships have subsequently received further private and public financing or have commercially replicated their technology in the marketplace.

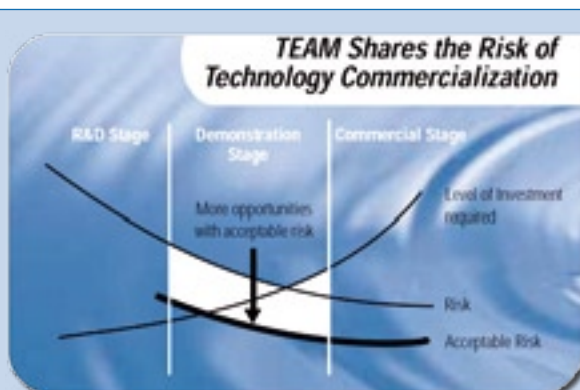


Figure 3

¹⁸ UK Carbon Trust Interview

¹⁹ other impact measurements include GHG emissions reductions, job creation and sector progress in the area of codes and standards (for example in the area of GHG measurement & reporting)

The UK Carbon Trust provides key technology support through its R&D Open Call Scheme for research with contingent grants of up to £250,000 for sustainable energy (low-carbon) technologies, including energy efficiency and demand-side energy management. The grants are repayable in full:

- if the intellectual property attributable to the project is successfully exploited. The grant is to be repaid without interest and at a rate of 5% of revenue per annum. No payment is required if no revenue is generated.
- if the capital equipment purchased as part of the project is used for commercial purposes after the project has ended. If the equipment is sold, a proportion of the sale proceeds must be used to repay the grant.

The financing model created by the US State of Connecticut offers a range of instruments to promote and commercialise clean renewable technologies through the Connecticut Clean Energy Fund (CCEF). An example is a financing scheme that combines grant support for a demonstration project with a soft loan that is repayable if the technology reaches commercialisation. The fund is designed to work with companies at any stage of market development and can often use soft loans, debt and equity - within funding guidelines and at CCEF's discretion - to devise an optimal financing package for early-stage technologies and companies. As a quasi-public state agency with a history of equity investments in technology, CCEF understands the challenges of early-stage and start-up companies and provides capital support not readily available in the private equity markets. Although the *focus is on renewable energies*, an innovative (e.g. synergistic) combination of energy efficiency technologies and renewable technologies (i.e. electric energy efficiency) could be eligible for financing. The CCEF model is a holistic innovative public finance mechanism that could be replicated for energy efficiency at all stages of market development.

4.1.2.3 Debt Financing: Soft and Convertible Loans

The high-risk nature of all new technological ventures makes typical credit instruments such as loans difficult to access, especially when the start-up is weak on investment history, collateral or revenue flows for debt-servicing. Public sector led or supported soft loans and convertible loans can help bring technologies through to revenue generation and commercialisation. Low- or no-interest rates and deferral on loan reimbursement with grace periods help start-ups bridge the financing gap.

The CCEF and the Massachusetts Sustainable Energy Economic Development Fund (SEED)²⁰ are examples of finance mechanisms for pre-commercialisation stage renewable energy technologies that could well be replicated for financing energy efficiency. SEED provides capital at affordable terms for companies undergoing new product development at the critical stage between R&D and the marketplace. Awards range from \$50,000 to \$500,000 and are available as a convertible loan on a competitive basis. SEED loans provide deferred debt service during the first two years. Matching funds are required, but no collateral, which would be an important aspect if the programme were to include energy efficiency technologies. During years three and four, quarterly payments on interest are due, and during year five, remaining interest is amortised quarterly through due dates, at which time the principal is also payable. SEED holds the option for the loan to be converted to equity. The loan then automatically converts at a variable 25% discount during a qualified financing round (minimum \$2 million equity raised with institutional investors).

4.1.2.4 Venture Capital for Technology Innovation²¹

The main source of financing during the technology innovation phase is venture capital from a high-risk investor willing to engage in early stages of a technology company. Venture capital is costly to the technology developer, because the investors receive both equity shares in the start-up, as well as a role in the management and technical developments of the company.²² To attract venture capital, the developer must present a business case with a clear exit strategy. This is another area where

20 <http://www.mtpc.org/seed/index.asp> - Eligible companies must be Massachusetts-based and provide products or services related to energy from biomass, fuel cells, photovoltaic (PV), wave, tides, hydropower, and wind. This also includes those companies that produce power inverters, power controls, power switching equipment, power storage, and instrumentation with a specific renewable energy application.

21 BASE's working definition of Venture Capital is generally understood as being a subset of private equity investment, although the terms are often used interchangeably in different world regions. BASE refers to venture capital as a specific sub segment of private equity investment which entails investing in start-up companies with strong growth potential, and private equity entails investment in the expansion and growth of any company that is not listed on a public stock exchange. In the sustainable energy sector VC is most often used to finance new technology development and private equity is used to finance company growth or energy project development (e.g., ESCOs or energy efficiency product manufacturing).

22 An optimal financing package will have an approximate 4:1 debt-equity ratio. In the sustainable energy sector lenders tend to require the project sponsor to provide more equity (up to 50%) to demonstrate creditworthiness and cover risk to debt servicing. The creditworthiness of both the off-take agreements and the buyer utility can then significantly influence how much debt a project is allowed to take on.

business support such as incubators and similar public-sector programmes can provide a valuable service.

Some of the most innovative public sector financing mechanisms take the form of venture capital. Many models of public sector venture capital investment have been launched in the last decade, although only recently in the sustainable energy sector and only few including energy efficiency investments.²³ They take various approaches: some are capitalised and run exclusively by an arm of the government, in some cases with a mandatory matching private VC investor, and some are partnerships of pooled public and private capital that are usually operated by an external private sector fund manager.

CEGT - Australia

The Centre for Energy & Greenhouse Technologies (CEGT) in Victoria, Australia leverages private venture capital in the clean tech space of up to A\$1 million per investment through immediate co-investment opportunities. The fund provides up to 50% private equity, leaving the returns and other terms to be negotiated between the technology developer and the other equity partners. The CEGT is particularly innovative, because it funds technology developers at different stages across the innovation spectrum. Private/public capital is offered to developers, not only at the early commercialisation stage (where most VC takes place), but also between the development and demonstration stages (i.e. the “pre-seed” phase), where standard commercial capital would not normally venture. One of the fund’s most recent VC investments is a new Australian technology that is designed to increase energy efficiency in the food-processing industry.

UK Carbon Trust VC Fund

The UK Carbon Trust VC Fund has been capitalised by government funds, leverages private sector VC funds and highlights the potential of clean tech investments through the “demonstration effect”. The fund is capitalised at £20 million. Investment volume ranges from minimum £250 000 to a maximum £1.5 million. The spectrum of UK Carbon Trust financing and support mechanisms provides a pipeline for investment in technically sound and bankable projects. All equity investments are negotiated on fully commercial terms and *pari passu*, with the same terms, privileges and payments as with other investors. Partner and co-investing VC companies include Norsk Hydro Technology Ventures, Sustainable Asset Management and 3i.²⁴ By 2005, six companies were in the venture capital investment portfolio, and one successful IPO was achieved (Ceres Power Holdings plc).

The California Clean Energy Fund (CalCEF)

CalCEF is a non-profit public benefit corporation dedicated to making equity investments in clean energy technology and service companies. Its mission is to create a series of private sector investment vehicles that serve as catalysts for advancing California’s clean energy economy. CalCEF partners with three VC firms (Nth Power, Draper Fisher Jurvetson and VantagePoint Venture Partners) to leverage matching. The fund’s initial endowment came from a utility bankruptcy settlement with Pacific Gas & Electric (PG&E, a California utility company); each CalCEF investment is matched by a larger VC capital investment. All profits to CalCEF are reinvested in the US\$30 million fund.

The recently adopted California State Energy Action Plan lists energy efficiency and demand-side management as priority, and CalCEF has also adopted the same priorities for its investment activities. In addition to energy efficiency venture investments, CalCEF also provided grant support for the creation of the University of California Davis Energy Efficiency Centre. The fund’s goal is to accelerate the commercialisation of energy efficiency products via technology development, building design and by advancing investment strategies to demonstrate energy efficiency’s potential. CalCEF is also working to establish the CalCEF Clean Energy Angel Fund with a network of angel investors to fund promising companies that cannot otherwise bridge the pre-commercialisation gap (also known as the “valley of death”) before they can meet criteria for investment from CalCEF.

How CalCEF works:

- VC partners make equity investments in clean energy companies on behalf of CalCEF, using VC partner criteria. For example, Nth Power typically likes to own 10-15% of a company and aims for 5-10 times or even greater return on its investment from a company with a technology proven at the laboratory level and ready to turn into a product or to launch.

²³ Others focus on renewable energy investments only

²⁴ UK Carbon Trust, 2005

- Funds are invested in private companies that create technologies or products that will lead directly or indirectly to decreased reliance on non-renewable fuels.
- Both early and late-stage equity investment opportunities are eligible.

CalCEF is an example of a US trend to use utility settlement of compliance payments to create new funding mechanisms for clean energy.

Although all of the VC public finance mechanisms described are relatively new, they are expected to have a high impact on leveraging private investment and to demonstrate the value of VC and other equity investments in the sector. Fund managers are already reporting positive financial and emission reductions returns.²⁵

4.1.2.5 Guarantees

Debt financing plays only a small role in the technology innovation financing spectrum. Commercial lending institutions are reluctant to take on high risk at this stage. Debt financing might be secured when technologies have reached commercialisation and have proven some extent of revenue generation. Debt guarantee mechanisms can offset some of the bank’s risk. Most existing or emerging public sector guarantee are for energy efficiency ventures or projects. Fall-away guarantees, however, have been proposed for the technology innovation phase,²⁶ in which case the guarantees would be valid until the technology and start-up have reached commercialisation.

4.2 ENERGY EFFICIENCY VENTURES

Businesses that produce, market, distribute and sell energy efficiency products and services face financing gaps, many of which are also typical for SMEs and ventures in the renewable energy sector. Energy efficiency ventures include companies (SMEs) that manufacture, distribute, sell and service energy efficiency products, as well as those that provide energy efficiency consultancy and installation services.

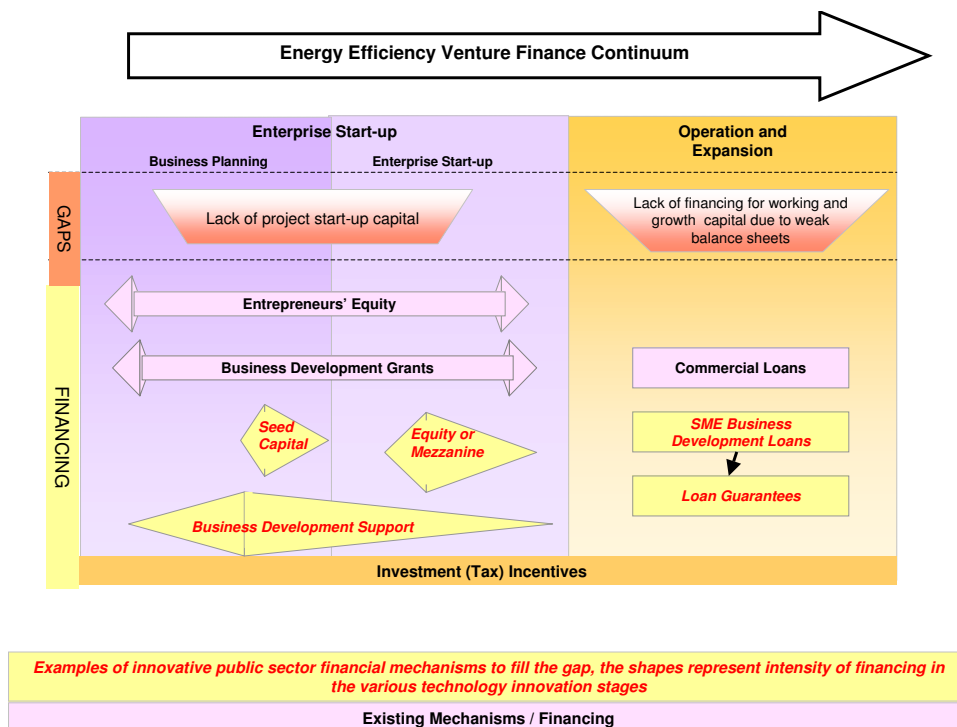


Figure 4

25 Specific details on deal flow and return on investment remain confidential due to early stages of investment and company growth, particularly funds co-capitalised and managed by private VC entities.
 26 Goldman, McKenna and Murphy, 2004.

Energy efficiency venture financing follows a finance continuum starting with business planning and start-up through to operation and growth. The new EE venture lacks start-up capital, particularly when the entrepreneur has no equity from private sources to invest. If the venture manages to survive start-up, it is quickly confronted with the next challenge of raising capital for operation and expansion. Business incubators and accelerators provide business development assistance in preparing strong business and management plans, which are indispensable for raising seed and venture capital. Business development grants can also be crucial at start-up, before there is any revenue flow. Contingent grants that are repaid when revenue success milestones have been achieved can be effective at this stage.

4.2.1 Enterprise Start-Up

4.2.1.1 Equity

Equity-based public sector mechanisms are less common for energy efficiency ventures than for technology innovation. Seed financing and other later-stage forms of equity are needed to launch start-up activities until debt can be obtained for operations and/or expansion. Governments can play a role by creating independent seed and VC investment funds for EE venture start-ups, similar to those that finance technology innovation described above.

Many governments have set up SME investment programmes for investment in policy priority areas such as environment, new technology and geographic region. Within these programmes EE enterprises are eligible for equity investment. One example is the US Small Business Administration (SBA), which provides public funds for matching capital raised from Small Business Investment Companies (SBICs). SBICs are privately owned investment companies that are licensed and regulated by SBA. SBA provides financial assistance to SBICs to stimulate and supplement the flow of private equity and long-term loan funds to small companies. Venture capitalists participate in the SBIC program to supplement their own private capital with funds borrowed at favourable rates through SBA's guarantee of SBIC debentures, which are sold to private investors.²⁷

Equity investment can take the form of an ESCO issuing additional shares in the company's common ownership. The issuance of shares essentially gives the investor a right to any proceeds that may result from a distribution of dividends to the owners or cash proceeds from any sale of the assets of the company after the satisfaction of any outstanding liabilities. The type of shares and investment is dependent on existing regulatory structures.

Public sector financing agencies and IFIs are looking more and more at equity financing for ESCOs.

4.2.1.2 Equity financing for ESCOs

Financing for ESCOs is usually limited to project-related financing activity (off-balance sheet financing) in the form of debt and third-party financing. That is because ESCOs are usually small in size and revenue-generating capacity and do not attract large amounts of risk capital. Another reason for the lack of private equity investment in ESCOs is the fact that ESCO revenue-generation models typically do not have "exit" strategies or large amounts of liquidity (or a liquidity action such as sale of business or an IPO) which allow the venture capitalist to assess an investment and ensure dividends or return on capital invested.²⁸ Equity investment requires flexible "out of the box" financing structures.

As the ESCO industry grows, however, it is becoming clear that equity investment into ESCOs is a crucial piece of the financing puzzle. Equity funds can assist the ESCO in generating sufficient capital to support early development costs such as for salaries, travel, research, temporary metering, and in some cases initial energy audits that can be recovered through costs repaid through contracts receivable and returned to the company's working capital.²⁹ By separating the risk of the project from the risk of the ESCO as a venture, equity provides the ESCO with a "cash" position on its books and greatly improves its balance sheet by improving cash flow after debt payments. Although ESCOs are wary of equity, because it means giving up some control and is therefore seen as an expensive solution, equity investments put the ESCO in a better cash position, which improves its leveraging power vis-à-vis debt lenders.³⁰

²⁷ <http://www.sba.gov/INV/>

²⁸ Howard D.L. November 2005

²⁹ other financing options for EE audits mentioned in section 4.3.1.

³⁰ Howard D.L. November 2005

ESCOs require equity for capital-intensive energy efficiency projects, where costs of large transactions weigh down their balance sheets and negatively affect debt investment options and profitability. To attract equity investors, however, ESCOs need to demonstrate that contracted revenue streams that provide healthy returns (25% p.a.) could provide for a “natural” exit for their investment.³¹ Shares can also be sold for working capital (see box). Equity will play an increasing role as energy efficiency standards increase, the industry grows and financiers become more familiar with the sector. In developing and transitional economies international equity funds and funds backed by international financial institutions (IFI) are those most likely to take the lead in the EE equity market.³²

In some mature ESCO markets the private sector is investing equity into these ventures, however, mostly in established and large ESCOs. There are a few examples in developing countries, where the equity market is still very limited, such as Brazil's

Model for success - Equity Investment in EE and ESCOs

- *100% equity participation* for the first projects developed in the targeted Region. This provides needed boosting of the balance sheet. As debt leveraging and banking sector investment increases with successful projects and revenues, equity participation can be reduced (progressive exit) having had a significant impact on EE and Esco market.
- *Relevant size for project eligibility* (between €1 to 10m): this size enables the fund to place itself on the market of SME and municipalities of average size on which strategic investors as well as development banks are not very present. Moreover, the fork of investment selected contributes to an allocation of the fund resources on a more significant number of projects, thus to a better spread of the risk.
- *A function of decision at the sponsors' level*: the submission of each project to the Fund's investors ensures that the selected projects are economically and financially very reliable.
- *An experienced management team*
- *An adaptation to each country's characteristic*: if the Fund intervenes at Regional level, it has the necessity to tailor its intervention to each country where it plans to invest.
- *Favourable policy and regulatory environment*: public subsidies, fiscal incentives or other kind of public support to renewable energy and energy efficiency projects highly increases the profitability of the projects, thus reducing risks: it brings more certainty to the Fund's revenues projections.
- *Reliable legal framework*: countries where contract enforcement is not reliable are too risky as the Fund has no legal recourse in case of project failure.
- *A favourable business climate*: the more opened the economy of a country is, the more companies seek to reduce the pressure on their internal costs in order to be competitive on national and international level. These companies would more easily accept to develop energy efficiency operations. Moreover, equity funds seek companies in which to invest rather than individual projects: There should be, in the zone of application, a certain number of such companies, even a few, sufficient to give fund managers a choice for investment.
- *A local high experienced staff*: in each country involved, it is important to have a local team, able to undertake the necessary market surveys, to help finding the right companies in which to invest and then to supervise the whole financing operation at local level. This team should be highly skilled on technical and financial issues and have a strong knowledge on the country's market situation.
- *Economic relative stability*: as the investments are realised in local currency, the currency should be stable and energy tariffs must approach real costs

From: Métrau and Lopez Comparison of best practices in developing and managing financial mechanisms that support energy efficiency projects. January 2004

Rio Bravo's equity investment in EcoLuz and China's Tsinghua VC equity investment in the ESCO POWER U. It is important to note that the Tsinghua fund, which provided the equity investment, was partly capitalised by the Asian Development Bank.³³

In 2004, BNDES, the Brazilian Development Bank, also became an equity partner in ECOLUZ through an Emerging Companies Investment Fund.³⁴

The Latin American Clean Energy Services Fund provides equity to small-scale companies seeking to improve energy efficiency,

31 Some funds address this via a subordinated debt approach, which is also suited to investment based on project energy savings revenues.

32 World Bank 2004, IBMEC and USAID 2003

33 For more details consult Econoler International, June 12, 2005

34 Mellos - quote 3CEE presentation

including ESCOs and other related sectors. Initially capitalized in 2001 by the Inter-American Development Bank (MIF \$10 million), the Tokyo Electric Power Company (\$10 million) and Sumitomo Corporation (\$5.5 million), the fund closed at US\$ 31.6 million. Two Mexican Development Banks, NAFIN and Banobras, co-invested in the fund to support equity investments in energy efficiency in Mexico. Managed by the FE Clean Energy Group,³⁵ focus investments are in ESCOs and Special Purpose Companies for energy efficiency (and other sustainable energy) investments in transitional and emerging markets. Investments range from \$500,000 to \$3 million and have a 3 to 5-year exit requirement.

The FE Clean Energy Group also manages the Dexia-FondElec Energy Efficiency and Emissions Reduction Fund, which was initially capitalised by an IFI (European Bank for Reconstruction and Development) and a private bank (Dexia Bank). Additional private investors have also joined the \$71 million fund, which focuses on energy efficient and renewable energy emissions-reducing technologies and projects that improve industrial processes. The fund's larger investments include EETEK, a Hungarian-based ESCO, and two combined heat and power plants in Poland. The Fund's investments in both EETEK and the Polish CHPs have enabled these companies to expand their clean energy development platforms in Central and Eastern Europe. The Fund, through its European investment platforms, has been allocated over 400,000 tons of European Allowance Units (EAU) under the EU Emissions Trading Scheme.

FE Clean Energy Group, Inc. also manages the Global Asia Clean Energy Services Fund, which capitalises on clean energy development needs in Asia. In its third fund the Group will pursue attractive investment opportunities for cost-saving energy efficiency, renewable energy and emission reductions in select emerging Asian markets. A total of US \$35 million of the Fund's subscribed capital has been committed to projects to date, and \$63 million has been subscribed to by various Limited Partners to the Fund since May 2004. FE Clean Energy has made 13 investments in Asian markets, including hydro-electric investments, an investment in an ESCO (Energy Service Company) specializing in municipal lighting efficiency, and several biomass related projects in Thailand and the Philippines .

The Latin American and Dexia Fondelec funds, along with the new Global Asian fund, are excellent examples of the replication of similar funds operated by a fund manager in different world regions and capitalised with IFI participation mixed with private investors. The funds provide examples of direct investment options (via equity participation in companies) or indirect by the acquisition or creation of ESCOs to acquire or fund projects.

Equity is an excellent leveraging mechanism for debt investment and is crucial for industry growth. It is important, however, that equity mechanisms be accompanied by parallel mechanisms for project financing, such as debt financing and guarantees.³⁶ As for all companies that require working capital to grow, equity alone cannot fill both the start up as well as the operation and expansion gaps, because the debt / equity ratio would be too high, which would strain the company's limited resources and put off equity investors. The ESCO's best option is to have sufficient equity to strengthen its balance sheet, while at the same time funds to finance projects that promise to generate solid revenues.

The Super ESCO³⁷

The Super ESCO is a model of an energy service company that buys or "shepherds" projects from an early stage. One proposed example is the establishment of a Super ESCO as a leasing or financial company that provides financing to the ESCO, who in turn structures the payment model/contract with the end-user based on performance. The ESCO could then match the size and timing of its payments from the customer with the payments it owes to the Super ESCO. The Super ESCO would be able to strengthen its balance sheet by raising equity, which would assist in leveraging debt for project implementation. The ultimate benefit of the Super ESCO (like the Special Purpose Vehicle) is that pooling projects brings down transaction costs and creates sufficient volume to attract financing. It is anticipated that the Super ESCO, regardless of how much equity it has, will still require guarantees to be able to get credit. And suitable guarantees are not yet available (see section on guarantees).³⁸

35 formerly known as Fondelec

36 One of the lessons learned from the IFC REEF fund, which was to provide equity investment to ESCOs.

37 In the United States, Super ESCOs refer to energy service companies that provide traditional energy services AND supply gas and/or electricity to customers. See Vine et. al. 1998.

38 IIEC - 2001

The public sector can play a catalytic role in scaling-up the ESCO industry by providing equity financing mechanisms, particularly in partnership with the private sector, which is better poised to manage and operate the fund. Special Purpose Vehicles (SPV) can also play a valuable role as a partner for equity investment in ESCOs (see section 5.2 on SPVs). Such a fund could also provide financing to pooled or bundled projects that individually are too small for equity financing due to the disproportionately high transaction costs.³⁹

4.2.2 Operation and Expansion

4.2.2.1 Debt financing for EE Ventures

Although debt and guarantees are mostly required for energy efficiency projects and used as off-balance sheet project financing, energy efficiency ventures also require debt and guarantee mechanisms for operation and expansion stages.

Energy efficiency ventures in most developed economies can apply for general small business loans and guarantees that are not specific to sustainable energy business activities.

The Sustainable Development Fund (SDF) in Pennsylvania, USA (see box) is an example of a financing instrument at the state level that provides not only royalty financing and equity, but also subordinated debt and commercial loans for renewable energy and energy efficiency ventures (and projects).⁴⁰

Developing Countries

E+Co, a public purpose investment company, provides seed and growth capital to clean energy enterprises in developing country markets. E+Co's approved energy efficiency debt investments in Asia, Africa and Latin America total US\$ 1.325 million, have leveraged over \$1.5 million in third-party investment with a potential amount of growth capital of \$2 million. E+Co invests on an enterprise-to-enterprise basis and focuses largely on energy efficiency ventures producing and selling EE products and equipment. The willingness to take more risk than with conventional financing sources, combined with the provision of enterprise-development services, constitute their seed financing approach. E+Co's experience has led them to replicate and develop activities that demonstrate to investors, from local banks to development banks, that energy efficiency can be financially profitable, provide and improve energy services and positively impact the environment.

Pennsylvania Sustainable Development Fund

Created out of the restructuring proceeding of the state utility, PECO Energy, the SDF is capitalised at around \$32m. The Fund's priorities include energy conservation and energy efficiency among residential, commercial, institutional and industrial customers. Eligible EE ventures include manufacturers, distributors and installers of advanced clean energy or energy conservation technologies who want to finance start-up and expansion operations.

A wide range of funding is available to companies that design, manufacture, sell, install, operate or service SE products, technologies and services including:

- **Commercial loans** are extended to sustainable energy companies and commercial end-users wishing to finance or purchase clean energy equipment or upgrades. This includes start-ups and expansions of SE companies. Loans range from \$25,000 to \$250,000, and carry a 5% to 6.5% fixed interest rate.
- **Subordinated debt** can be granted, occupying a junior position next to an institutional senior lender. Up to \$5 million is available per project for a 12-year term at 5% interest rate.

4.3 ENERGY EFFICIENCY PROJECTS

Off-balance sheet or project financing is required for energy efficiency projects on both the large commercial or industrial and the small residential or business end user scales. Financing can be sought by the large or small-scale consumer who will engage in financing the project directly, or by an ESCO or similar entity that executes the project. As the EE project finance continuum in Figure 5 shows, although energy savings pay for the EE improvements in the long run, financing the first steps – the energy audit, assessment of energy use and recommendations for reductions – may be difficult. Debt instruments, guarantees and third-party financing represent project financing mechanisms that the public sector can make available. These mechanisms, along with marketing, end-user education, credit pre-screening, market aggregation strategies, technical capacity building and training are key for sector growth.

39 Howard, D.L November 2005 and Econoler International, June 2005.

40 <http://www.trfund.com/sdf/>

4.3.1 Energy Audit Assessment and Project Planning Phases ⁴¹

In developed markets (such as Canada, US, and in some European countries) the ESCO or customer pays upfront for the energy audit. If no energy savings are achieved, the ESCO typically absorbs the cost. If the project is successful, the cost of the audit is paid through the ESCO/customer contract revenues. In most cases, however, both the ESCO and the end user initiating the EE measures lack the capital to cover the upfront audit and assessment costs. This results in an initial gap and bottleneck in the energy efficiency project finance continuum.

4.3.1.1 Grants

Full or partial public sector grants can be given to pay for energy audits, however, grants may not be appropriate for all markets.

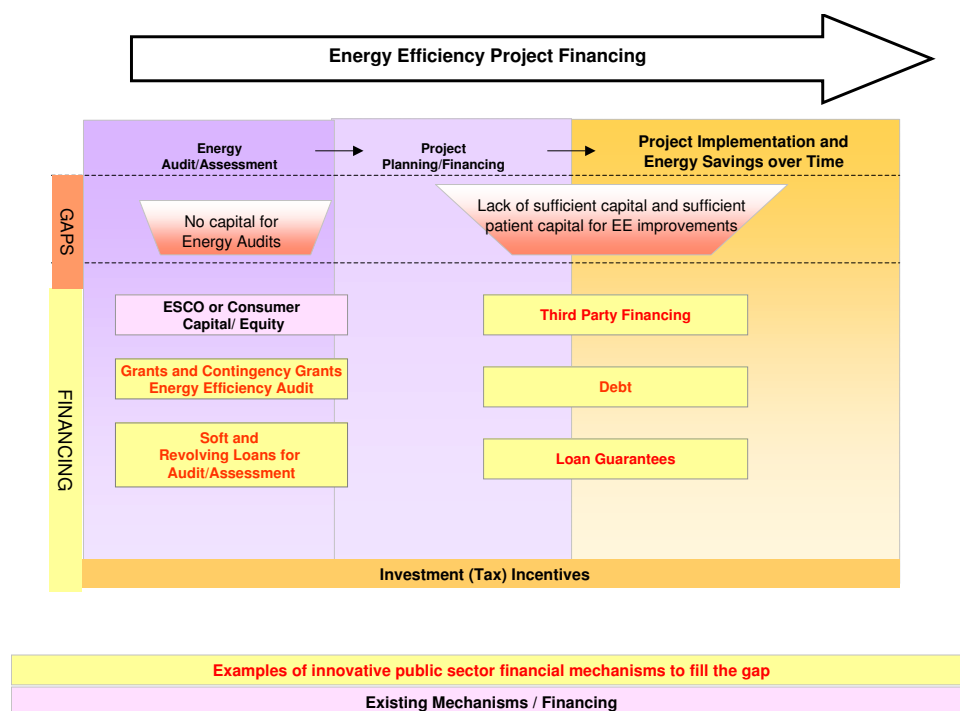


Figure 5

Since public sector intervention should not distort the market, grants should be used only in very young markets and where there is not yet a critical mass or pipeline of projects. In developing markets, where ESCOs are typically small and have more intense financing challenges and pressures, grants may be more appropriate to avoid putting ESCOs or customers at risk until successful examples are achieved to catalyse market development.

The Federation of Canadian Municipalities runs the Green Municipal Enabling Fund (GMEF), which offers grants of up to CDN\$ 350,000 to municipalities and their private sector partners for cost-shared planning initiatives, feasibility studies and field tests for the pre-feasibility and feasibility stages.

Contingent Grants (or forgivable loans) can be loaned to an ESCO or project developer to pay for the energy audit. If the project takes place, loan repayment becomes part of the project financing package or the energy performance contract, or the customer pays it back in instalments once the energy savings are achieved. If no project takes place, the loan is turned into a grant and is "forgiven".

Where possible, audit support should be partial and a portion withheld until the customer agrees to implement the project. With all such options, the appropriate intervention must be determined based on an in-depth analysis of country and market conditions, critical transaction barriers, current ESCO practices and availability of resources.

A revolving energy audit fund could be very helpful in addressing the project development costs impediment for EE projects

World Bank GEF Energy Efficiency Portfolio Review and Practitioners' Handbook

4.3.1.2 Loans

A revolving energy audit fund for either contingent loans or softened loans (depending on local market needs) is another potential financing mechanism to support energy audit and planning costs. Under the operational terms of such a fund, energy audits would be financed on the condition that if the project moved to implementation, the fund would be repaid at financial closure. This could positively impact the development of the EE market. If local lending institutions are unfamiliar with EE project financing, a Special Purpose Vehicle (SPV) may again be the best solution to facilitate the financing of audits and other project needs.

4.3.2 Project implementation ⁴²

As was mentioned in the section on financing EE Ventures, projects initiated and undertaken by ESCOs are largely project-financed (off the balance sheet of the company).⁴³ ESCOs have trouble securing project financing when they have no capital and no equity invested in their venture and when market barriers impede energy efficiency initiatives.⁴⁴ Although there are many different ESCO business and financing models,⁴⁵ the three that lend themselves best to public sector mechanisms are debt, guarantees and direct public sector third-party finance.

ESCO Business and Financing Models are usually variations of performance contracting using the Shared and Guaranteed Savings Models

Guaranteed Savings Model - the ESCO guarantees the savings will cover the debt payments and the customer finances the project.

Shared Savings Model - the ESCO and the customer share the savings and the ESCO (or another third party) provides the financing and thus assumes the credit risk.

Although the standard ESCO financing model has traditionally focussed on guaranteed and shared savings (see box), more flexible models are appealing that can vary from full-service high risk to low-service low risk.⁴⁶ The Energy Performance Contract can be used in various ways to address all partner risk. More flexible business models can ensure fairness and financial protection of the ESCO in the event of uncontrollable developments like energy loan and energy price fluctuations. Financing programmes should be flexible in terms of financing mechanism and financial engineering and should address both local market and sector needs.

As is mentioned in section 4.2.1.2 (EE Ventures - Equity), an ESCO's weak balance sheet and lack of collateral prevent it from obtaining the debt financing needed to execute projects. What little equity the ESCO has can be used for collateral for large loans, however, the equity is not made available to be put back on the "books" until revenue comes in through savings or service payments and loans are repaid in full. That means that in the meantime, ESCOs are often not able to pursue new business development or project expansion, because they do not qualify for financing.⁴⁷ Public sector loan programmes, particularly in partnership with local private sector lending institutions, fill a critical need here.

4.3.2.1 Debt Financing

Soft Loans are loans that are enhanced or "softened" with low interest rates and/or interest-free grace periods until the ESCO or project initiator starts receiving revenues from the energy savings and can make payments. Most public international financing institutions and national governments have begun experimenting with loan programmes to kick-start the market and to fill the debt gap where local and traditional banking sector actors are not active. Creating debt financing mechanisms is key to market growth, particularly for small EE Ventures and ESCOs in underdeveloped markets. Loans and soft loans with a credit enhancement have proven successful for the scale-up of smaller residential and commercial energy efficiency projects. Caution

⁴² Viable options for EE projects led and financed by customers as well as ESCOs.

⁴³ Some experiences show that off-balance sheet financing models are not always appropriate: "Unfortunately, the concept of ESCOs is often misrepresented as one or two models (shared and guaranteed savings), which may not work in many markets... this (is) ideally suited to developing countries, the reality is that the lack of proper legal and financial infrastructure as well as the limited ability of local ESCOs to raise equity capital, secure sufficient project financing as well as their unwillingness and/or inability to take on and properly manage risks can make this "full-service" ESCO model unviable in the near- to medium-term." WBGEF Handbook

⁴⁴ Low energy prices, risk-averse financial institutions etc. See section 4.2.

⁴⁵ also including leasing, outsourcing, equipment supplier/vendor credit, guaranteed and shared financing, etc.

⁴⁶ See World Bank 2004, Text box 1 - page 10 for a well-developed explanation of ESCO Business and Financing models

⁴⁷ World Bank 2004

should be used when introducing debt mechanisms that offer below market rate financing conditions. It is important to determine the market maturity and know the local financial markets well to prevent market distortion. Concessional financing via interest rate subsidies or fees granted to partner banks can be appropriate in markets where there is no banking sector activity in the EE sector and where bank liquidity is an issue.

The Thai Energy Efficiency Revolving Fund

- Leveraged over USD 25 million of EE Investment
- 66 projects approved and under construction – Buildings and Industrial
- Average project size of USD 0.8 mill with an average payback period of 2.4 years
- Wide range of measures – Co-generation, Boiler efficiency, Biogas, Chiller, Control system, Lighting, Fuel Switching, etc.
- Savings more than 18 million KWh per year and 1.2 million liters of fuel oil per year

Each dollar of lending has resulted in more than 10 dollars in lifetime energy cost savings and every dollar lent from the Fund leverages approximately 60 cents in commercial bank lending

Six participating private banks and requests from the others to become involved in the programme due to demonstrated improved banking image and financial profitability, meeting Thai Department of Alternative Energy Development and Energy Efficiency (DEDE) goals of stimulating investment, increasing private financial institutions exposure and confidence in EE investing and weaning off public support in the long term.

Source: Thailand's Energy Efficiency Revolving Fund: A Case Study APEC July 2005

The Canadian Green Municipal Investment Fund (GMIF) provides both soft loans (4-10 years) for sustainable energy projects (including energy efficiency) for capital costs, consultant fees, construction costs, and the renovation of facilities and structures essential to implement SE projects. Loans and loan guarantees cover 15% of all capital costs (more in exceptional cases) to a maximum of CDN\$ 20 million for municipalities and CDN\$ 10 million for private sector partners. Private sector co-financing and leveraging is required. All Canadian Green Municipal Funds (including the enabling funds -above) were capitalized with CDN\$ 250 million in 2000. The success of this model led to another commitment of CDN\$ 300m in 2005 for a total fund endowment of CDN\$ 550 million to the revolving fund.

The Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) offers loans, technical assistance and grant support to Bulgarian industrial energy efficiency and small renewable energy projects. The facility is financed with € 50 million from the EBRD (European Bank for Reconstruction and Development), into which is blended a € 10 million grant facility from the Kozloduy International Decommissioning Support Fund (KIDSF). Private sector banks that participate in the facility on-lend to Bulgarian projects in the range of € 50,000 to € 2 million. As an added incentive, loan recipients also receive grant support towards the principle of the loan, 7.5% for energy efficiency projects. To date (2006), 46 projects have been financed under the BEERECL, receiving loans worth more than € 27 million and worth a total project value of over € 48.4 million. These projects will generate annually more than 286,000 MWh of electricity and more than 400,000 MWh heat energy, over 52,000 MWh electricity savings and more than 1,515,000 GJ of heat energy savings, as well as around 283,500 tonnes of carbon emissions reductions.

KIDSF and the EBRD have also launched credit lines of € 50 million to Bulgarian Banks (United Bulgaria Bank, Postbank and RZB Bulgaria) as part of the Residential Energy Efficiency Credit Line for on-lending to the residential sector for improvements in energy efficiency both in blocks of flats and individual houses.

In both programmes banks are actively participating as partners and administrators of the funds. Although financial incentives for the partners include a margin and/or administration fee, both programmes expect to drive market growth and active long-term participation of the banking sector in the sector by supporting partner banks in developing and managing an energy efficiency loan portfolio. The Model is being replicated for Slovakia for Industrial and Renewable Energy Companies, Housing Associations and Consumers.

FOGIME

Creative public-private partnership has established a loan guarantee that tackles financial risk, project uncertainty and perceived costs

FOGIME provides guarantees of up to 70% of loan amounts granted for implementing energy efficiency and renewable energy business activities for SMEs, to a maximum of € 750,000.

OSEO-BDPME (SME Development Bank) through its subsidiary **OSEO-SOFARIS** finances 40 to 50% of the guarantee from its small business guarantee fund. **ADEME**, French Environment and Energy Management Agency covers the remaining portion of the guarantee.

Other similar successful loan programmes that are implemented by bank, public institutions or Special Purpose Vehicles include the IFC/GEF-supported Hungarian Energy Efficiency Co-Financing Program (HEECP)⁴⁸, the Thai EE Revolving Fund (see box), and Mexico's FIDE, a trust fund for financing electricity savings through low-interest loans (also mentioned below in the section on guarantees).

The 3CEE project focuses on encouraging local commercial banks to provide debt lending for EE projects.⁴⁹ Key results of the project in India include developing EE loan appraisal manuals for bankers, which is an important pilot in establishing standards and protocols for lending for EE projects.

HEECP (Phase 1) operated from 1997-2001 and stimulated the EE market where it was otherwise not possible due to the local financial institution's lack of interest. Success includes the "take-off of projects that were very close to being competitive, but would not have been financed otherwise (30 projects got started), and the building of a competitive lending market for commercial finance for energy efficiency projects in Hungary by introducing energy efficiency as a new potential market (participating FIs represent over 90% of the bank sector)."⁵⁰

Financing mechanisms that are classified between debt and equity include mezzanine and quasi-equity. This type of investment in developing country EE ventures is typically backed by IFI and development bank financing that seeks to achieve social and environmental impacts, while developing the local technical and financial markets for energy efficiency.

E+Co Capital Latin America has recently launched CAREC - The Central American Renewable Energy and Cleaner Production Facility, which provides mezzanine and some debt finance to sustainable energy ventures in Central America. The fund has been capitalised by the MIF-IADB, CABEL, the BIO, Triodos and FinnFund, and is expected to close in summer 2006 at US\$ 17 million. CAREC financing will largely focus on end-user financing for energy efficiency, through preferred shares, subordinated debt and leasing. E+ Co experience to date demonstrates that these forms of investment mechanisms are more suited for companies and their EE upgrades and retrofits and focuses on mezzanine finance for projects rather than the Energy Service Companies themselves.

Loan programmes are also key to motivating and scaling up small scale, end-user driven energy efficiency projects in developed economies.

One example is PreVAIR, which was launched in France by the Banque Populaire d'Alsace in partnership with the French Environment and Energy Management Agency (ADEME). The Banque Populaire has a long-standing sustainability policy, which has been the driving force behind the creation of a PPP-supported investment subsidy and complementary savings instruments. The Banque Populaire markets a savings product, Codevair, which guarantees an annual interest rate of 2% (variable - unlimited savings balance). Codevair carries the 'Finansol' label of the French Social Investment network. Codevair savings offset costs and fund a line of PreVAIR soft-loan products that support sustainable energy improvement and construction projects for SMEs, self-employed entrepreneurs and private customers. Standard PreVAIR loans are presently available at 3% and 'softened' loans offer a reduced interest rate of 1.75%.⁵¹ The interest subsidy is partially covered by ADEME and the Regional Government and partially by the Banque Populaire. The Bank demonstrates its commitment by co-funding the interest rate costs and assuming the full default risk. A multi-sector network of partners reviews the technical feasibility of the projects. The loans are limited to € 25,000 per loan and are used for energy efficiency and small renewable home and building improvements. Many US state loan and EE mortgage programmes offer similar loan mechanisms.⁵² Soft loan schemes for energy efficiency are being studied for implementation in the UK by local authorities in cooperation with housing associations and the Energy Savings Trust.

48 HEECP2 presently in implementation focuses on credit guarantees.

49 <http://3countryee.org> - a partnership between the World Bank, the United Nations Environment Programme (UNEP) through the UNEP Risoe Centre (URC), and institutions in Brazil, China and India

50 Üрге-Vorsatz, Pierre Langlois, Silvia Rezessy. 2004

51 Variable

52 Refer to www.dsireusa.org or www.efanniema.com

4.3.2.2 Guarantees

Guarantee programmes are also crucial to ensure that both end-users and ESCOs are able to access affordable debt financing.

Energy efficiency projects can be structured with various guarantees to assist banks in accepting risk for debt lending. In some project-financing structures the customer can act as a form of guarantor by entering a multi-year contract that specifies monthly or quarterly payments based on the energy savings. The debt lender may be satisfied with the customer's providing backing through a guarantee of payments, as long as the customer has a solid balance sheet and a good credit history. This model, however, has risks. If the energy efficiency measures do not result in energy savings, the customer loses. For this reason, Energy Performance Contracts (EPCs) are becoming the standard agreement between the ESCO and the customer, whereby the ESCO is responsible for project feasibility, design, equipment purchase, installation, maintenance and operation, and most importantly, a guaranteed amount of savings, leaving very little financial risk with the customer. In some contexts this model transfers the risk to the ESCO and requires the ESCO to seek the financing. EPCs are becoming more flexible (particularly in developed markets) to ensure that there is a more equitable risk sharing between the ESCO and the client/end-user. Debt financing for EE projects will then almost always require guarantee mechanisms. In some rare cases the ESCO as a company has a sufficiently strong balance sheet (supported by equity), and strong income statements from other business activities that can be used against the loan, but this is the exception and not the rule.

Reported experiences with public financing mechanisms providing debt instruments almost all cite the need for complementary guarantee mechanisms to fill the financial gaps encountered by early stage EE ventures, particularly ESCOs.

In addition to providing ESCOs and project development access to guarantees, public sector programmes can mobilise the banking sector and encourage its active participation. Guarantees are mechanisms delivered using local currency. Through successful loan repayment supported by public sector-backed guarantees, banks will see that EE can be a competitive and profitable lending product line. Guarantee mechanisms can take many forms and seek to engage financial institutions by supporting and sharing the credit risk of EE project and venture investments. They include:⁵³

- partial parity guarantees (losses shared in agreed proportions),
- subordinated recovery guarantees,
- loss reserves.

Guarantee mechanisms are most urgently needed in developing countries, where the guarantees must cover a very large amount of the loan, sometimes up to 150% (as opposed to most energy efficiency guarantee programmes in Europe that typically provide 50% guarantee, and most programmes worldwide that do not exceed a 90% guarantee level.)⁵⁴ Brazilian experience shows that general SME guarantee funds largely failed, because they only covered 80% of loan amounts.⁵⁵

Public support of both loan and guarantee programmes can have a significant impact on the energy efficiency sector if they mobilise commercial finance over time so that capital becomes affordable, improving ESCO cash flow and cash position. Because the successful uptake of energy efficiency improvement projects depends on reduced risk for the end-user, guarantees and other risk management instruments will be the main catalyst to scale up private investment in energy efficiency.⁵⁶

US AID Guarantee Mechanisms

Loan Guarantee: Financial Institution (F.I.) receives up to 50% coverage on principal amount of loan

Portable Guarantee: A DCA letter of commitment allows borrower to seek best terms from financial markets

Bond Guarantee: Protects investors on a portion of a bond issuance. Used for municipal or private sector financing

Portfolio Guarantee: F.I. Receives up to 50% coverage on the principal amount of a portfolio of loans they provide to their customers

⁵³ MacLean, John. June, 2006

⁵⁴ World Bank IBMEC USAID

⁵⁵ IBMEC 2003.

⁵⁶ for detailed discussions on risk management for sustainable energy see UNEP SEFI Financial Risk Management Instruments for Renewable Energy Projects. 2004

As part of the lessons learned from HEECP's phase 1, HEECP2 utilises US\$ 5.7 million of GEF funds pooled with a \$12 million IFC investment to build the energy efficiency financing capability of Hungarian financial intermediaries. The programme provides partial credit guarantees (and a small amount of technical assistance) to support energy efficiency projects originated and funded by IFC's partners. CEEF (Commercializing Energy Efficiency Finance) is another IFC/GEF mechanism and spin off from the Hungarian experience. CEEF combines \$18 million of GEF funds alongside bilateral donor support totalling \$1.3 million, and an IFC direct investment of \$30-75 million (depending upon market demand) to support the operation of a partial loan guarantee facility for energy efficiency. The programme builds on the HEECP model in expanding IFC's guarantee product offering to the Czech Republic, Slovakia, Estonia, Latvia, and Lithuania. The USAID Development Credit Authority (DCA) also has a range of guarantee facilities for USAID missions that support SMEs, including those undertaking EE projects.

Public Sector (including IFI and Bilateral Donor) debt-based financed mechanisms largely recommending guarantee mechanisms as a key to future success and market scale-up

- Thai EE Revolving Fund
- HEECP (Phase 1)
- FIDE
- Brazil ESCO experience
- Many newly sponsored WB GEF Mechanisms recommend guarantee facilities.

The Canadian GMIF (see 4.3.1.2) also provides guarantees for its loan mechanisms. FOGIME is an example of a guarantee mechanism in France and demonstrates a developed country response to the need for guarantees and risk management mechanisms.

More lessons learned: FIDE

In 1990, the Mexican Government launched FIDE, (Fideicomiso para el Ahorro de Energía Eléctrica), a national Trust for Electric Energy Saving to promote rational electric energy use and energy saving.⁵⁷ FIDE's many activities include providing no- and low-interest loans for both domestic energy efficiency projects, as well as commercial, industrial and municipal projects. One of the main objectives of FIDE's EE financing programmes is to increase the participation of the commercial banking sector in providing debt and other financing to EE projects and ventures. To achieve this, a guarantee fund was launched, which was capitalised by FIDE (MXN\$ 5 million - or approx. US\$ 440,000) and NAFIN, a Mexican development bank (MXN\$ 50 million- or approx US\$4.4 million).

The guarantee programme has been in existence for 1.5 years in cooperation with its commercial banking partner BANORTE. The FIDE/NAFIN guarantee covers 75% of the loan, limited only by the financial limits of the fund itself (approx. US\$ 5 million). The partner bank assumes the financing of the loan and the remaining risk of 25% of the total debt granted. The FIDE debt financing mechanisms have demonstrated significant results vis-à-vis loan servicing and leveraging further financing and energy savings. Despite the successful FIDE loan track record to date (some 15 years of successful loan programme), no commercial loans have been granted under the private bank loan and FIDE/NAFIN guarantee programme. FIDE even covers the technical due diligence and related transaction costs. This demonstrates the ongoing challenges of convincing the commercial and local banks that EE ventures and projects are profitable and that servicing debts through energy savings is a reliable model.

Guarantee Funds are not a stand-alone solution

The FIDE example demonstrates that guarantee funds cannot be used as a stand-alone solution. In Mexico strategies and efforts such as banker awareness and training are presently under consideration to make the commercial finance sector more aware of the opportunities associated with financing energy efficiency (see section 5.3). The 3CEE project in India demonstrated that for ESCOs and EE projects guarantee funds are needed that also address important credit and performance risks. These, however, would not directly contribute to kick starting EE / ESCO lending by the Indian banking sector.⁵⁸

Guarantees are not appropriate for all market situations. In some cases, such as the Bulgarian BEERECL programme that provides debt lending via a credit line with local banks, guarantees are not (or not yet) appropriate, as the main financing challenge is bank liquidity. In other markets where financial institutions have sufficient liquidity, but a low appetite for risk, guarantees should be examined as a mechanism within a public financing programme.

57 <http://www.fide.org.mx> (in Spanish only)

58 India Country Report. Presentation on results of the UNEP/UNF-World Bank Three-Country Energy Efficiency Project. T.Padmanaban, IREDA. May 2006

4.3.2.3 Public sector-led Third-Party Financing

Third-Party Financing (TPF) is another form of off-balance sheet financing that can be used in place of debt financing. ESCOs act as third-party financier by assuming the financing responsibility in most energy-performance contracting models. The public sector can also take on the role of the TPF itself. An example of government-led third party financing is the Spanish IDAE model, which has been financing renewable projects in Spain since the late 1980s. IDAE identifies a project, provides the capital to a developer to construct it (or install the new energy efficient equipment), and recovers its investment plus the cost of its services out of the energy production or savings. In other words, IDAE finances all the costs and assumes the technical responsibility of the investment. At the end of the contract, the project developer and user of the installation owns all the capital assets. In most instances the government agency IDAE functions as an ESCO and has invested € 95m in renewable energy projects and leveraged another € 104m for 144 projects⁵⁹ under the third-party finance mechanism.⁶⁰

59 Biomass, district heating grids, solar thermal, small hydropower, wind, pv solar and energy efficiency projects.

60 In the case of investments where the scale of the project requires additional finance partners IDAE has experimented with other financing approaches, including equity investments. The percentage ownership held by IDAE in the different companies varies between 6.7% and 40% and never exceeds 49%.



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Energy consumption

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kWh per year

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xxx program seven times per week*

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Actual energy use and running costs will depend on how you use the appliance.

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water connection xxx kWh per year*

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THE ENABLERS

5. THE ENABLERS

Public sector interventions can contribute to the overall growth of the energy efficiency sector by facilitating the implementation of finance mechanisms. It is often claimed that government regulations do not significantly impact energy-savings investments in industry.⁶¹ This may be true to some degree, however, regulation does play a role and differences in national standards and regulations can be a barrier to the deployment of energy efficient technologies or facilitate the financing of private energy efficiency projects. Policy and regulatory frameworks that support EE, such as standards and labelling on an international scale, as well as integrated legislation at local and regional levels that call for low emissions / polluting practices, can significantly affect investment in EE, particularly in developing and transition countries. They mandate testing that provides comparative information about the energy performance of appliances, equipment and lighting products under standardised conditions. They set standards against which to measure project benefits. They endorse the most efficient products in the market. They educate end users and sensitise them to more favourably participate in private energy efficiency ventures. Government “enabling” actions help project developers formulate more successful project and satisfy specific needs of their financiers.

Public sector measures that can most significantly foster or deter private investment in energy efficiency include energy conservation and emission standards laws (and their enforcement), mandatory (or voluntary) minimum energy efficiency management measures and minimum energy efficiency standards (minimum required efficiency, stricter efficiency requirements in building codes etc.).⁶² Gradual to entire removal of energy subsidies and rising energy costs may also increase the incentive to manage energy use more efficiently, because the true costs of the energy would then be more apparent to end-users and the realised return to the investor in efficiency would be greater. Privatising public energy utilities and large-scale industry increases pressure to improve efficiency in all operations.

5.1 STANDARDS AND LABELLING

Appropriate regulation can improve the average energy efficiency of energy-consuming products in homes, offices and factories by encouraging the purchase of higher-efficiency products, discouraging the purchase of low-efficiency products and encouraging the development, production and marketing of products that are more efficient than currently available. Standards and labelling can facilitate energy efficiency financing by providing energy efficiency information needed by both financiers and energy-users seeking financing for EE improvements, and by moving EE product markets forward.⁶³ Standards and building codes alone have led to a fourfold reduction in energy consumption in new residences in OECD countries over the past 20 years.⁶⁴ The introduction, streamlining and coordination of standards and labelling on the international scale is an ultimate (if ambitious) goal aimed at facilitating market growth and reducing financing risks by ensuring that new EE technologies have a rapid market impact.

Standards and labelling work hand in hand with public awareness and information campaigns (see below) and with other government and private programs that stimulate energy efficiency.⁶⁵ According to the Collaborative Labelling and Appliance Standards Program (CLASP),⁶⁶ standards and labelling transform markets better than any other energy efficiency policy (and for this report as a policy-based non-financial mechanism), as they:

- *represent top-down* government policy (not bottom-up individual projects)
- *are market-based* (simply changing the market rules)
- *are verifiable* (results directly in measurable savings)
- *affect national markets* (because they are mandatory)
- *affect regional or global product markets* when applied or harmonised collaboratively among nations.

The economic impact of standards and labelling, as well as the cost effectiveness in terms of leveraging savings to end-users and private investment are significant (see box on Energy STAR).

61 http://europa.eu.int/comm/energy_transport/atlas/htmlu/imarfact2.html

62 UNESCAP

63 IEA 2004

64 World Energy Council, 2006

65 S. Wiel 2005 (See Chapter 7: Designing and Implementing Communications Campaigns for Labeling and Standards-Setting Programs and Chapter 10: Energy Programs and Policies that Complement Labels and Standards)

66 Presentation by Christine Egan, Executive Director, CLASP, to the APEC Energy Working Group Workshop on Financing Energy Efficiency Projects, February 2004

5.1.1 Standards

Standards are regulations that prescribe the energy performance of manufactured products and often prohibit the sale of products less energy-efficient than the minimum standard.

Regulatory standards can legally prevent manufacturers from introducing products to the market that do not meet minimum energy efficiency levels. The minimum efficiency standards should be set at levels that provide cost reductions to the consumer without compromising product performance and selling features.⁶⁷ An increase in regulatory standards can also regulate a minimum amount of CO₂ emissions (the current potential is especially high in the transportation sector), resulting in a significant impact on emissions reductions on a global scale.

The standardisation of energy-using industrial and commercial equipment and components⁶⁸ can effectively address the hidden costs company managers perceive when deciding on making EE improvements. They can also have hidden benefits for companies that have corporate social responsibility reporting requirements to management and shareholders.

SMEs rarely seek out non-core business activities such as energy efficiency improvements, as they have limited time, resources and expertise to do so. By requiring removal of poor efficiency products from the market, product standards (and labelling) can be used effectively to push for change and EE improvements in the SME market.⁶⁹ Tax incentives (considered indirect financing mechanisms and not the focus of this report) such as the UK Enhanced Capital Allowance (ECA) Scheme,⁷⁰ and associated Energy Technology List, help by providing a financial incentive to UK companies to improve efficiencies and reduce carbon emissions and also influence what products manufacturers bring to market.

Standards are one of the few responses to the split-incentive barrier. They produce an (almost) invisible trade-off between purchaser (landlord costs for construction/isolation material, heating systems, appliances) and consumer (tenant costs), because neither party pays for the full cost of the energy efficiency product (IEA). The use of labelling can also support consumer decisions by making the running costs and efficiency information available.

5.1.2 Labels

Labels notify and inform consumers of a product's energy performance and use and ultimately the consequences of their purchasing decisions. Labels play a role in channelling technologies to the marketplace by allowing consumers to take energy efficiency into account when they make purchasing decisions. Reliable labelling systems, which are now common practice

The opportunities are rich

"... there are abundant opportunities to save 70% to 90% of the energy and cost for lighting, fan, and pump systems; 50% for electric motors; and 60% in areas such as heating, cooling, office equipment, and appliances. In general, say experts, up to 75% of the electricity used in the U.S. today could be saved with efficiency measures that cost less than the electricity itself."
Clean Energy Trends 2005

Globally as of the end of 2005, 62 countries have enacted at least one energy-efficiency standard or label for appliances and electronic gear. Overall, these countries have enacted 1818 standards and labels covering 82 different energy-consuming products. (S. Wiel 2005, See Table 2-1)

China, the world's fastest-growing energy user, has adopted minimum energy performance standards for 22 household, commercial and industrial products, including aggressive „reach“ standards for air conditioners and refrigerators, has mandated information labels for two products, and has developed voluntary certification labels to endorse 41 different energy efficient products. China's standards are estimated to save over 85 TWh annually by their 10th year of implementation. By 2020, China's standards and labeling program is estimated to save 11% of its residential energy use, reduce CO₂ emissions by 34 million tons of carbon annually, and avoid the need for \$20 billion investment in power plant construction. (CLASP unpublished data)

67 IEA 2000

68 EU website (see former)

69 HM Treasure. DEFRA 2005

70 Essentially a tax incentive whereby firms find that they need to invest in new or upgraded equipment in order to reduce energy consumption. The ECA scheme helps organisations invest in energy saving equipment in a cost-efficient way. Capital allowances on plant and machinery are generally given at 25% a year on a reducing balance basis. However, with ECAs, businesses can write off 100% of the cost of energy saving equipment against their taxable profits within the first year of investment. Businesses claim the allowance on their income tax or corporation tax returns.

in many parts of the world,⁷¹ impact the EE market directly by giving customers accurate and reliable information on the full life-cycle costs of the product (energy use costs) or by endorsing the product as being high efficiency. Labels support other energy efficiency efforts led by utilities or procurement programmes and put pressure on manufacturers to bring more efficient products to market.

There are some limitations to the effectiveness of standards and labels. Labels can help keep low-efficiency products from being purchased, but they are not likely to eliminate them from the market entirely. Standards can address the latter problem, but do not encourage the development of new EE technologies and products,⁷² at least not as a stand-alone policy. These are important reasons why the public sector approach to increasing energy efficiency measures must involve a complementary and holistic package of policy efforts, including finance mechanisms, that supports market uptake.

5.2 THE INTERMEDIARIES - SPECIAL PURPOSE VEHICLES⁷³ AS THE AGENTS FOR PUBLIC FINANCING MECHANISMS

An option for high impact and quick solutions to facilitate and increase financing of energy efficiency is via intermediaries or special purpose vehicles (SPVs). Some of the biggest barriers to financing EE, particularly in developing economies, are the risk adversity of financial institutions, the small investment volume of EE projects and ventures and the lack of expertise in energy efficiency to accompany an investment to success and investment pay-back.

Should ESCOs be in the business of financing?

Although ESCOs should not be considered financiers, but rather a vehicle and facilitator for financing, the answer can be both „Yes and No“. In developed markets ESCOs have grown and made their mark as energy service providers that provide full-package services for EE improvements, including financing. Customers in these contexts (US, Canada, Western Europe) expect this full-service package. Larger ESCOs also finance smaller ESCO projects when they are well-capitalised and have strong technical assessment capacity. Despite this, defining ESCOs as a financing source is still not entirely correct, because ESCOs themselves require both debt and equity financing.

In less or underdeveloped markets until some of the barriers are overcome and EE projects become mainstream, it may be wise to support and develop business models where the financing is secured and managed by an SPV. This is because new and small ESCOs have limited resources and financial and even technical skills. Since the success of an EE project and the ESCO's survival and growth depend on the quality of technical assessments and guaranteed energy savings for the customer, early-stage ESCOs should concentrate on developing their technical expertise to ensure technically successful projects. This will ensure that a qualified and reliable service is delivered and that projects are successful. As successful track records are established and the ESCO grows and develops, it can take on an increased financing role and assume more risk.

SPVs can act as a financing agent either to manage and administer public sector financing mechanisms, or to receive public capital for their own SPV-led funding mechanisms. An SPV can be a private or public entity (government body, private organisation, NGO) and can resolve upfront barriers to financing EE projects and ventures. Examples of SPVs mentioned in this report include E+Co, a non-profit company who invests public, bilateral and IFI funds, and the UK Carbon Trust, a private company capitalized with public funds. E+Co and UK Carbon Trust represent long-term, experienced and holistic vehicles that are well-positioned to understand technical and financial issues surrounding EE investment. SPVs are also created for financing a specific project or pool of projects.

71 S. Wiel 2005, Chapter 2: Energy-Efficiency Labels and Standards: An Overview and Chapter 5: Designing and Implementing a Labeling Program

72 IEA Standards

73 also referred to as SPCs (special purpose companies) or SPEs (special purpose entities)

SPVs:⁷⁴

- can provide business-development support needed to prepare EE project developers and ventures (companies) for financing
- represent and manage all forms of channelled public investment (equity, debt and guarantees and grant)
- can more easily bundle investment in projects that are similar in nature, risk, technology etc. (i.e. ESCO financing) and address costs and barriers such as financial structuring and transaction document design, which is difficult for project developers and ventures to successfully do on their own due lack of expertise
- are well-positioned to mobilise and secure new capital for investment, because they play the role of the local expert. This is particularly important for local debt financing providers and key for growth of local and national markets.
- disseminate and demonstrate the financial viability of EE projects to other lending institutions: successful financing examples will have the greatest impact on the market
- streamline and standardise financing by providing publicly available transaction documents, facilitating financing efforts for projects and ventures
- provide the kind of financing products and appropriate investment criteria needed for the sector and appropriate for ESCOs (i.e. who have weak balance sheets, little incoming equity and no collateral)

SPVs are particularly effective in developing country contexts, where financing is often led by international financial institutions (IFIs). IFIs who have the appropriate mandate for financing EE projects and ventures tend not to provide small amounts of financing. In some cases SPVs can leverage investment financing from institutional lenders and may be more readily accepted among SMEs than profit-oriented ESCOs.⁷⁵ Local intermediaries such as SPVs offer the best chance of sustaining local financier interest and co-investment in the sector and meeting IFI investment criteria and goals. Partnering with NGOs also facilitates understanding of the local cultural and economic circumstances, for instance, the customs of not paying utility and service bills.

5.3 RAISING AWARENESS

Raising awareness of the importance of and opportunities provided by energy efficiency is crucial to ensure buy-in from all parties including the general public, industry and financial institutions. An increase in public and commercial/industrial demand means an increase in the growth of EE projects and ventures to support the demand. The more mainstream energy efficiency becomes as a sector, the more investment will be available.

Raising Banker Awareness

One of the principle barriers to investment in EE is not necessarily the nature of the project or venture itself, but the lack of understanding and experience that exists among commercial lenders in the sector. The extra costs associated with satisfying the higher 'burden of proof' that a bank's loan committee would normally apply to their first few sustainable energy loan requests usually falls on the project developer. This learning curve issue can be remedied somewhat through public sector facilities. Such mechanisms can include institutional strengthening interventions, such as training and technical assistance to banks for putting in place appropriate credit rating and due diligence procedures, or project-specific support facilities that cost-share the elevated transaction process. Raising awareness is crucial within smaller commercial lending institutions and in developing countries, but also in larger lending institutions that have renewable energy units. In these cases, although there are specialized bankers or investment teams, educating management and board members on investing in sustainable energy could assist to raise the profile of SE investing within the entire corporation, as well as improve the general understanding of sector trends and investment opportunities.

Source: Public Finance Mechanisms to Catalyze Sustainable Energy Sector Growth UNEP/SEFI 2005

74 APEC, June 2005 and report from *Public-Private Sustainable Investments and the New Action Plan to Improve Energy Efficiency in the European Community 2006* - Workshop March 2, 2006.

75 Prahba. R. Canara Bank of India. *Energy Efficiency Financing and Mobilizing of Local Capital Markets*. Presentation at the Energy Efficiency Investment Forum. New York. May 8-9, 2006

Nationally consistent approaches are key to supporting broad-reaching sector change in energy consumption behaviour and management and are best suited to affect financing and sector-growth decisions. These can entail:

- General information campaigns describing measures that can be taken to reduce energy consumption in homes and in commercial/industrial settings, including cost-savings;
- Enhanced public disclosure on high emission industries and private sector activities, as well as residential sector via programmes that change market perceptions of value of energy efficiency and risks of inaction;
- Education and training programmes to strengthen the culture of energy efficiency and efficient use by all consumers, including good practices information exchange on successful initiatives at the local, national or international level;
- Initiatives that support and sponsor internal corporate energy efficiency plans for emissions reductions.

ENERGY STAR in the United States is an awareness programme helping businesses and individuals protect the environment through superior energy efficiency. It is part of an overall series of awareness and regulatory standards and labelling efforts that has had impressive impact in the US. The efforts of all of the Energy Star Programmes and efforts have leveraged investments in energy efficient technologies exceeding US\$20 billion. Net of their investment in energy efficiency technologies, consumers and businesses are projected to save US\$115 billion cumulatively over the next 10 years, with US\$10 billion being saved in 2004 alone. For every dollar of investment in ENERGY STAR a reported 15 dollars of private investment has been achieved

<http://www.energystar.gov>

5.4 THE MEANS TO THE END: SOURCES OF FUNDING FOR FINANCING MECHANISMS

Some governments have focussed on taxation measures that seek to ensure that the polluter really pays, easing tax on low-energy consumption products and raising tax on high-energy demand products. Green taxes can be both an efficient instrument for reducing consumption,⁷⁶ as well as a source of revenue to tap innovative public sector financing mechanisms. They also serve to make investments in innovative green technology more attractive than polluting products.⁷⁷

The UK Climate Change Levy

The UK Climate Change Levy (CCL) is the main source of revenue for the many UK Carbon Trust Public Financing Mechanisms (many mentioned in this report), as well as other UK Environment and Industry Ministry programmes for renewables and energy efficiency.

The CCL is charged on all energy supplied to the industrial and commercial users, as well as for agriculture, public administration and other services. That means that the energy supplier and not individual companies registers with and pays levy to Customs and Excise. Individual businesses pay the levy through their utilities bills. Business purchasers of electricity derived from clean energy sources do not pay CCL on the supply of that electricity. Some reductions and exemptions occur for certain sectors and for energy intensive sectors that enter into climate change agreements (CCAs) – agreements with targets to reduce their energy use and/or emissions.

Canton Basel-Stadt Energy Savings Fund

After 10 years of strict regulations governing power plant efficiency and building standards in reaction to the local resistance to nuclear energy, the Canton administration realised that more could be achieved with incentives and positive motivation than with command and control. In 1998, Basel passed a law to put a small systems benefit charge on each consumer's electricity bill. The revenues generated fund the *Energy Savings Fund* and are used to leverage investments in energy efficiency and

⁷⁶ Several examples in Europe (Denmark, Finland, Sweden) have demonstrated energy efficiency improvements and fuel substitution in countries with the highest tax rates. (European Commission, 2005)

⁷⁷ Technopolis, 2004

renewable energy measures. This model is a typical initiative that can provide financing mechanisms at the local level.

The Thai Energy Conservation Promotion Fund

The Thai Energy Conservation Promotion Fund (ENCON Fund) was launched as part of the Thai Energy Conservation Act in 1992. The ENCON Fund receives revenue from a small tax on benzene, diesel, fuel oil, kerosene products sold and used in Thailand. This provides annual inflows of up to US\$ 60 million annually with a total ENCON balance of approximately US\$ 450 million. The allocation of money from the ENCON Fund to activities that support energy efficiency and renewable energy is an important government priority.

The Encon Fund finances the Thai Energy Efficiency Revolving Fund. See box in section 4.3.2.1.

Spot 3

3

Spot 1

10,9

Spot 2

12,3

**CONCLUSION /
RECOMMENDATIONS**

6. CONCLUSIONS/RECOMMENDATIONS

This report has outlined a number of public financing mechanisms that have recently been launched and proven to positively impact energy efficiency market growth. For the successful implementation of the mechanisms by public sector actors, the following recommendations and conclusions are noted:

Approaches must be holistic and market-based

For the scale up of energy efficiency technologies, products and services, holistic approaches are needed that combine regulatory policy and locally appropriate and commercially viable financing mechanisms. This also requires integrated strategies that take into account all stages of sector development, including technology innovation, energy efficiency ventures and products for both project developers and energy consumers. Mechanisms must not distort the market and subsidies should remain “smart”, such as contingent grants and soft loans that have clear exit periods and are used to catalyse growth. When markets have achieved a certain volume and success rate, market-based loan, guarantee and equity mechanisms should be introduced that focus on mitigating risk, lowering transaction costs and building capacity for private sector leadership in investing in energy efficiency. Effective mechanisms address the entire finance continuum at all stages of development. This avoids a quick-fix approach. An integrated approach addresses the needs of all key stakeholders. A strategy aimed at increasing financial institution investment in EE, for example, will also help ESCOs, EE manufacturers, suppliers, or retailers or other EE service providers if it takes into account the technical reliability of projects or products and ensures revenues for growth or debt servicing.

Standards and labelling promote consumer and user awareness, which in turn affects economic savings and market growth. Increased international cooperation on standards and labelling is needed to enhance these efforts and continue to create aggregated demand for energy efficiency products and services.

Mechanisms must be adapted to local market conditions

The types of gaps in financing energy efficiency are very similar in industrialised and developing countries. Particularly in developing markets, however, strategies for EE financing programmes must be adapted to local market financing conditions and energy efficiency market development. They require local management, partnerships with local financial institutions and operation in local currencies.

There are only few successful examples of local and regional commercial investment in energy efficiency in developing markets. The main barrier is not a lack of funds, but rather the mobilisation of funds. The risk perception on the part of financiers and their lack of specific sector knowledge and experience keep EE project developers from accessing funds.

The chosen strategy should include the specific institutional and credit traits of target end-user sectors within the region or country. The credit traits and financial needs of energy users and the specific sector will vary as much as the local market financing conditions. This also helps to ensure market demand via lucrative and attractive EE investment opportunities within companies whose activities can generate demand for financing. Experience demonstrates that creating an EE financing niche is not the best solution for market uptake, rather focussing on specific “booming” sectors where lending is occurring is the best strategy for EE financing programmes that seek to increase private investment.

Recommendation for the replication of successful public financing mechanisms to increase investment in energy efficiency.

This report demonstrates that public-backed mechanisms and institutions are at the cutting edge of a new era in public finance, and that these new efforts need to be supported and coordinated to thrive and be successful. The energy efficiency financing efforts indicate that there is a substantial body of expertise that can be tapped to explore possibilities for adapting and replicating existing finance mechanisms and developing new ones. A vehicle is needed to drive this opportunity forward.

Such a vehicle could be an **active and dynamic platform** that encourages and enables financiers and energy efficiency stakeholders to exchange experience and expertise with the aim of improving ways for public sector capital to effectively promote innovation and private investment in the renewable energy and energy efficiency sectors. Public financing agencies and actors and private financial institutions (local, regional, national and international) and energy efficiency experts in collaboration could make recommendations for adapting and replicating effective public support mechanisms in specific regions.

Such an initiative could help developed markets optimise their strategies and help emerging markets strengthen their public finance approaches in the energy sector.

This report points out that the implementation of any particular financing mechanism and enabling initiative depends largely on local technical, energy and financial market conditions. No one mechanism is 100% replicable in another context. An exchange of approaches to financing energy efficiency can be an effective way to select which strategies could work where and how they could be adapted and successfully implemented. A number of successful financing models have recently been launched in both developed and developing countries. These results could be disseminated through such a platform to demonstrate the financial viability of EE projects with the aim of improving the perception of risk associated with investing in energy efficiency.

Such a platform could serve as a **neutral resource centre** providing business tools for EE financing practitioners. These tools could include training and assistance for both financiers and project developers (with the aim of making the technical aspects of a project financially feasible) and financing standards in the form of banker lending protocols, credit and transaction structures and financial pre-screening for project developers for early establishment of creditworthiness.

Platform focal area: Financial institution training and awareness

Trends observed to date demonstrate that even when banks do not assume the costs for technical evaluations or other due diligence and in some cases receive a margin for administering loans, there is still a relatively small success rate of financing energy efficiency technology innovation, ventures and projects. This is particularly the case in less developed markets. Local financial institutions often do not find the conditions attractive enough to enter into a risk-sharing situation, even with guarantee and other risk-management instruments.⁷⁸

A paradigm shift is needed to “get the banks on board”. Providing banks with successful examples of energy efficiency projects (via replication) is a first step, but this must be supported by a major awareness-raising strategy within all levels of the bank (from the board of directors to the loan officers). Therefore, awareness-raising efforts combined with training activities for financial institutions should be one of the main focal areas of such a platform.⁷⁹ Spin-off activities could include establishing a protocol for financing energy efficiency that is piloted at a regional level with the aim to be applied on a global scale.⁸⁰

Impact and innovation increase with public and private sector cooperation

Investments in energy efficiency products and projects will increasingly take centre stage next to renewables, due to the potential of EE to generate savings, profit and emissions reductions. How successful public financing mechanisms are in increasing private investment is largely dependent on how market-based they are and how much they involve the private sector. Since few public financing agencies have experience of lending in partnership with private fund managers and financial institutions, early establishment of partnerships with the right private financial entities - from the design of the financing programme through to implementation - is crucial. The public sector can fill an important role by facilitating dialogue between local project developers and local lenders.

78 Experience in some markets demonstrates that incentives for banks such as margins and commissions supported by concessional financing are also key to getting them engaged in EE financing.

79 The 3CEE project successfully engaged the participation and exchange of participating country banks including eight from China, demonstrating the importance of helping banks understand energy efficiency via training and technical assistance. Presentation of 3CEE results by Shen Longhai, the Director of EMCo Committee of China Energy Conservation Association. May, 2006, Paris


80 Similar efforts have been launched for the technical development of energy efficiency projects such as the IPMVP (International Performance Measurement and Verification Protocol) by EVO. EVO is a neutral, non-profit organisation with a mandate to develop and promote the use of standardised protocols, methods and tools to quantify and manage the performance risk and benefits associated with end-use energy efficiency, renewable energy and water efficiency business transactions. <http://www.ipmvp.org>



OVERVIEW

7. OVERVIEW

Financing mechanisms presented in report

Organisation	Programme / Mechanism Name	Mechanism Type	Financing Stage/Gap	Geographical Coverage	Website
L'Agence de l'Énergie et de la Maîtrise de l'Énergie (ADEME)	FOGIME	Loan Guarantee	Operation & Expansion	France	www.ademe.fr 
	FOGIME	Loan Guarantee	Project Implementation	France	www.ademe.fr 
	PreVAIR	Debt	Project Implementation	France	www.ademe.fr 
Austrian Federal Ministry of Transport, Innovation and Technology (BMVIT)	Technologies for Sustainable Development (Factory, Energy Systems and Buildings for Tomorrow)	Grants	RD&D	Austria	www.nachhaltigwirtschaften.at 
California Clean Energy Fund (CalCEF)	CalCEF VC Fund	Seed / Venture Capital	Pre-Commercial	California, USA	www.calcef.org
Centre for Energy & Greenhouse Technologies (CEGT)	CEGT Venture Fund	Pre-seed / Seed / Venture Capital	RD&D, Pre-Commercial	Australia	www.cegt.com.au
E+Co	Various Programmes and Funders	Debt	Business Development Support, Seed Capital	Developing Countries	www.energyhouse.com
	E+Co Capita Latin America - CAREC	Mezzanine Finance	Project Planning/Implementation	Central America	www.eandcocapital.com
European Bank for Reconstruction and Development and KIDSF	Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL)	Debt	Project Planning/Implementation	Bulgaria	www.beerecl.com
FE Clean Energy	Latin American Clean Energy Services Fund, Dexia Fond-Elec, Global Asian Fund	Equity	Enterprise Start-up	LA, Eastern Europe, Asia	www.fecleanenergy.com
	Latin American Clean Energy Services Fund, Dexia Fond-Elec, Global Asian Fund	Equity	Project Planning / Implementation	LA, Eastern Europe, Asia	www.fecleanenergy.com
Federation of Canadian Municipalities	Green Municipal Enabling Fund (GMEF)	Grants	Assessments/Project Planning	Canada	www.fcm.ca
	Green Municipal Investment Fund (GMIF)	Soft Loans	Project Planning/Implementation	Canada	www.fcm.ca
	Green Municipal Investment Fund (GMIF)	Loan Guarantee	Construction	Canada	www.fcm.ca
FIDE	Various	Debt & Loan Guarantee	Project Planning/Implementation	Mexico	www.fide.org.mx 
Government of Canada	Technology Early Action Measures (TEAM)	Contingent Grants	Demonstration / Pre-Commercialisation	Canada	www.team.gc.ca/english
Instituto para la Diversificación y Ahorro de la Energía (IDAE)	Varous	Third Party Finance, Equity	All	Spain	www.idae.es 
IFC	HEECP2	Guarantees	Project Planning/Implementation	Hungary	www.ifc.org/ifcext/enviro.nsf/Content/EnergyEfficiency
SenterNovem	EOS	RD&D Grant	RD&D	Netherlands	www.senternovem.nl 

Organisation	Programme / Mechanism Name	Mechanism Type	Financing Stage/Gap	Geographical Coverage	Website
Small Business Administration (SBA)	Small Business Investment Companies (SBICs)	Equity	Enterprise Start-up (all SME)	USA (Typically State-based)	www.sba.gov/INV
Thai Department of Alternative Energy Development and Efficiency	Thai Revolving Loan Fund for Energy Conservation	Debt	Project Planning/Implementation	Thailand	www.dede.go.th/dede
UK Carbon Trust		Business Incubator / Technology Accelerator	Demonstration/Pre-Commercial	UK	www.carbontrust.co.uk
	UK Carbon Trust VC Fund	Seed / Venture Capital	Pre-Commercial	UK	www.carbontrust.co.uk
	R&D Open Call Scheme	Contingent Grant	RD&D	UK	www.carbontrust.co.uk
The Reinvestment Fund (TRF)	Sustainable Development Fund (SDF)	Grants	RD&D	Pennsylvania, USA	www.trfund.com/sdf
	Sustainable Development Fund (SDF)	Seed / Venture Capital	Pre-Commercial	Pennsylvania, USA	www.trfund.com/sdf
	Sustainable Development Fund (SDF)	Commercial Loans, Subordinated Debt	Operation and Expansion	Pennsylvania, USA	www.trfund.com/sdf
	Sustainable Development Fund (SDF)	Commercial Loans, Subordinated Debt	Project Planning/Implementation	Pennsylvania, USA	www.trfund.com/sdf
USAID	Development Credit Authority (DCA)	Guarantees	Project Planning/Implementation	USAID Support Areas	www.usaid.gov/our_work/economic_growth_and_trade/development_credit

Mechanisms mentioned due to the innovation of the mechanism, but that focus on renewable energy only that this time.

Organisation	Programme / Mechanism Name	Mechanism Type	Financing Stage/Gap	Geographical Coverage	Website
Connecticut Clean Energy Fund	n/a	Contingent Grants	R&D / Demonstration	Connecticut, USA	www.ctcleanenergy.com
	n/a	Seed / Venture Capital	Pre-Commercial	Connecticut, USA	www.ctcleanenergy.com
Massachusetts Technology Collaborative (Renewable Energy Trust)	Green Energy Fund	Seed / Venture Capital	Pre-Commercial	Massachusetts, USA	www.masstech.org/renewableenergy
	Sustainable Energy Economic Development (SEED) Initiative	Soft / Convertible Loans	Pre-Commercial	Massachusetts, USA	www.masstech.org/renewableenergy

Key

EE Technology Innovation

EE Ventures

EE Projects

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**SUSTAINABLE
ENERGY
FINANCE
INITIATIVE**

UNEP is working to create the policy and economic framework where sustainable energy can increasingly meet the global energy challenge. Changing attitudes and helping mainstream financiers consider sustainable energy investments are key components of the energy work within UNEP and the starting point for the UNEP Sustainable Energy Initiative.

SEFI provides current and targeted information to financiers and facilitates new economic tools that combine social and environmental factors - both risks and returns - as integral measures of economic performance.

SEFI is modelled as a platform to provide financiers with the tools, support and networks to drive financial innovation that improves the environmental performance of the energy mix. The overall strategy is to use this platform and modest amounts of capital to convene financiers, engage them to do jointly what they may have been reluctant to do individually, and to catalyse public-private alliances that together share the costs and lower the barriers to sustainable energy investment.

SEFI is managed jointly by the UNEP Energy Branch in Paris, the UNEP Finance Initiative in Geneva and BASE, a UNEP Collaborating Centre in Basel.

BASE

Basel Agency for Sustainable Energy

The Canton of Basel-Stadt and the United Nations Environment Programme (UNEP) established BASE as a UNEP Collaborating Centre with the function of supporting UNEP's energy programme, particularly in the area of promoting new approaches to financing sustainable energy. BASE's mission is to promote and facilitate investment in energy efficiency and renewable energy to accelerate worldwide commercialisation of sustainable energy and to contribute to global climate protection, poverty mitigation and conflict prevention. BASE is a non-profit foundation.

For more information see

www.sefi.unep.org
www.energy-base.org

