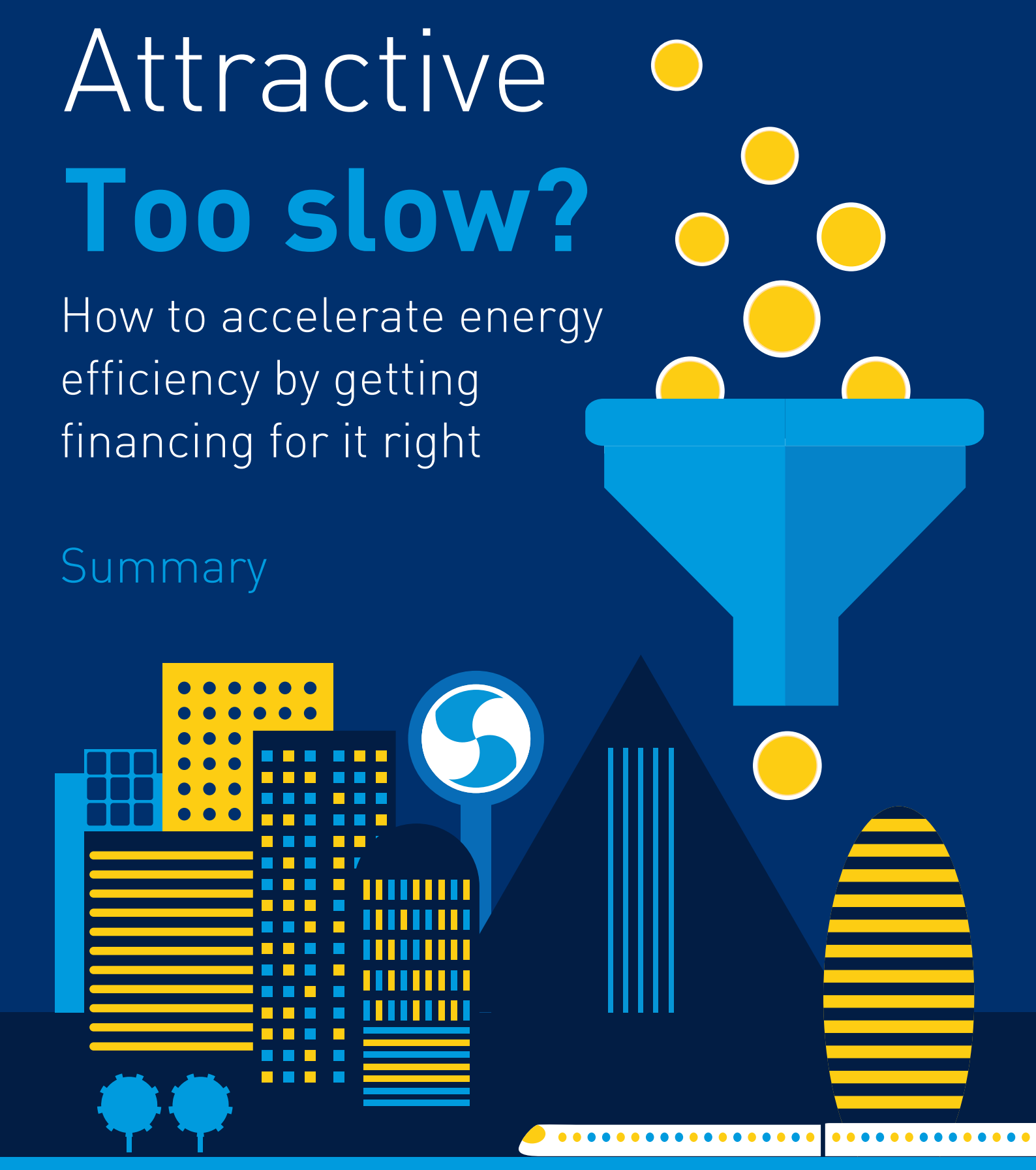
Available
Attractive
Too slow?

How to accelerate energy efficiency by getting financing for it right

Summary



The Carbon Trust's mission is to accelerate the move to a sustainable, low carbon economy. We act as a catalyst for governments, multilateral organisations, businesses, and the public sector in this transition. We are independent, world leading experts on carbon reduction action, resource efficiency strategies, and commercialising clean technologies. As a not-for-dividend group, we reinvest any profits into our mission.

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Contents

Executive summary

Energy efficiency is the lynchpin that can keep the door to 2°C open and save trillions of dollars across the global economy. To unlock it demands a large increase in finance and a re-orientation of investment.

There has been a common struggle across many programmes worldwide to create sustainable private sector markets that are effective in reducing energy demand. Energy efficiency markets continue to face challenges across the supply chain. Smart public programmes are essential to overcome them and to leverage the private finance needed for deployment at scale.

This report outlines best practice for achieving that. It is based on an assessment of 10 case studies, interviews with leading practitioners, evaluations of past programmes, and the Carbon Trust's own 15 years of experience delivering large-scale energy efficiency programmes.

Key findings:

- Six questions should be asked when designing any energy efficiency finance programme – see Figure 1.
- For any programme to be effective, it is critical that: 1) the target market is clearly defined and well-understood; 2) fundamental drivers for action are in place, and if not, efforts are made to strengthen them; 3) the supply chain to deliver energy efficiency is mapped, and if needed, action is taken to build its capacity; 4) barriers across the supply chain are analysed comprehensively and prioritised; 5) programmes are developed which target barriers systematically, with financial and technical solutions implemented in concert; and 6) steps are taken so that once public support ends, the supply of, and demand for finance for energy efficiency continues.
- Too often, programmes have been designed which address only some of the challenges, or on a short term basis only, leaving important barriers deeply entrenched. A narrow focus on finance needs to be replaced with a more holistic approach to ensure a sustainable legacy.
- With this in mind, the report makes three core recommendations:

1. Business cases for investment need to be strengthened by strong policy frameworks with the right economic and regulatory drivers. Influencing these needs to be a key objective.

2. More resources should be devoted to technical assistance than has historically been the case. Activities such as awareness-raising, pipeline generation and de-risking are essential to create sufficient demand and commitment.

3. Upskilling, equipping and accrediting suppliers and technical advisors is also critical to creating a sustainable, scalable and bankable pipeline, as they have the greatest inherent incentive to identify, appraise and deliver viable projects.

Ultimately, to stimulate sustained private sector investment, programmes need to be designed that help create a market of projects with attractive rates of risk and return for financiers, including long-term finance to match the project payback period, structured in an accessible way, so that they invest in energy efficiency of their own accord.

Figure 1: Key questions when designing an energy efficiency finance programme

Introduction

The Paris Agreement's pledge to hold the increase in the global average temperature to well below 2°C above pre-industrial levels, let alone a limit of 1.5°C, represents a monumental challenge. Energy efficiency's role in meeting it is critical.

The Deep Decarbonisation Pathways Project describes energy efficiency as one of three key pillars to delivering an affordable 2°C scenario.[1] The IEA estimates that to achieve a 2°C scenario, energy efficiency must account for 38% of total cumulative emissions reductions to 2050 (compared to 32% projected for renewables).[2]

Crucially, energy efficiency has the potential to decouple economic growth from energy demand. The many benefits of its deployment include boosting industrial productivity, reducing energy poverty, and contributing to economic development.[3] Most notably, energy efficiency measures have the potential to save trillions of dollars across the global economy.[4] It also has clear health benefits: the World Health Organisation (WHO) estimates 2.6m deaths per year from air pollution could be reduced by energy efficiency measures, especially in the developing world.[5]

To unlock these benefits, accelerating the global deployment of energy efficiency demands a huge increase in finance. Limiting temperature rises to 2°C will require increasing global spend on energy efficiency to reach $550 billion a year by the 2030s.[6]

More public finance is being promised. At COP21 and in the run-up to it, national governments and multilateral development banks announced significant increases in funding for climate mitigation, with some pledging to double the amount they provide. Even more recently, the G20 officially affirmed their post-Paris commitment to 'scale up green financing'.[7]

These commitments are important, but it is vital that energy efficiency is a significant recipient and that the resources provided are used as effectively as possible.

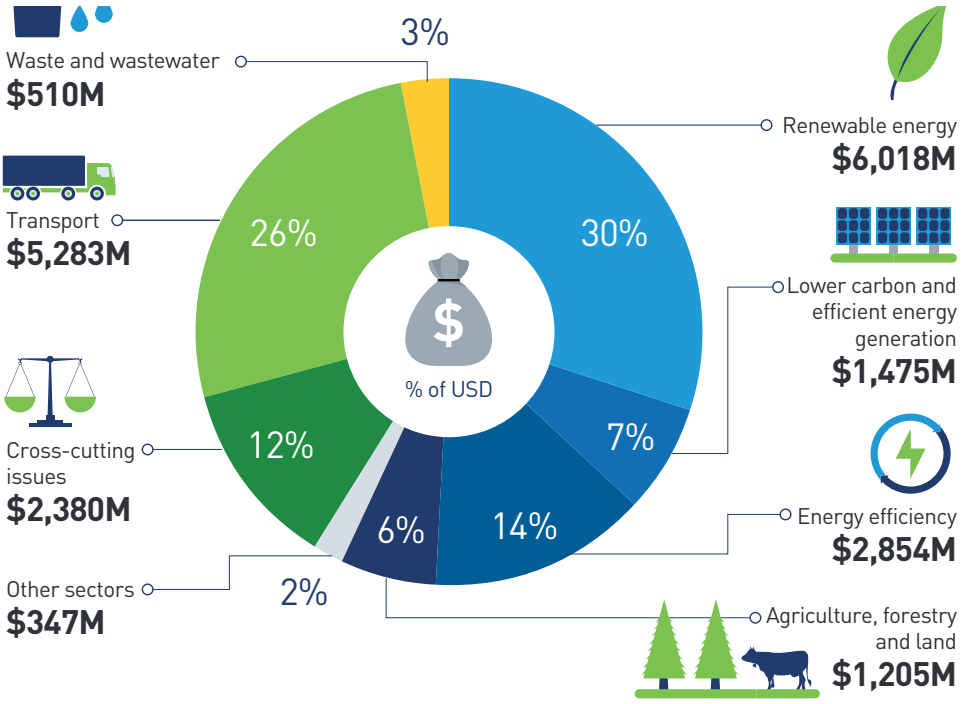
Public finance has a critical role to play. Energy efficiency markets face challenges across the supply chain, from financiers, to end-users, via technology suppliers and consultants:

- Poor awareness of the benefits of energy efficiency and a concurrent lack of commitment to investing in an unfamiliar and/or unconvincing business case;
- An absence of trusted technical solutions; and
- A dearth of resources to fund and implement investments based on prohibitive calculations of risk and return.

These challenges are a complex combination of technical and financial barriers. Further exacerbated by the presence of market distortions (such as energy subsidies), and without externalities (such as carbon) priced to incentivize energy efficiency, the private sector has historically not invested heavily in energy efficiency relative to other opportunities that exist.

Hence, public programmes are essential to overcome both the technical and financial obstacles, stimulate energy efficiency markets to unlock the opportunity, and leverage the far greater sums of private finance needed to scale up to $550 billion per year. A principal source of public funding for programmes are development banks. They help developing economies – where the greatest opportunities lie – move toward a sustainable development path. In 2015, multi-lateral development banks (MDBs) alone committed $2.9 billion to energy efficiency programmes.[8] However, this investment was less than half the amount invested in renewables, at just 14% of their mitigation investments (Figure 2). Given the tremendous potential for further investment in energy efficiency, there is scope for this to increase many times over, while also improving deployment of existing investment.

Figure 2: Multilateral development bank mitigation finance by sector type, 2015



Source: 2015 Joint Report on Multilateral Development Banks' Climate Finance

There is also an urgent need to reassess and re-orient the focus of investment. There has been a common struggle across many programmes worldwide to create sustainable private sector markets that are effective in reducing energy demand, and consequently greenhouse gas (GHG) emissions, with very few undisputed examples of success – as evidenced by the case studies examined for this report.

Too often, programmes have been designed that only address part of the problem, leaving other barriers deeply entrenched. A narrow focus on finance, the provision of credit and enhanced liquidity, needs to be replaced with a more comprehensive approach.

Many MDBs are well aware of the limitations of past efforts and are striving for more effective approaches. Funders and governments see schemes like the Green Deal in the UK failing to attract uptake, or revolving funds in Thailand fading in their impact as soon as public subsidies are withdrawn. This report attempts to help understand why energy efficiency finance programmes have struggled, and to outline best practice for moving forward.

The insights are intended for development banks, other multi-lateral facilities, bilateral donors, and developing country governments, as well as the host of relevant entities supporting them, who want to understand how energy efficiency can be improved.

The following is a summary of analysis grounded in an assessment of 10 case studies from 5 different continents (Table 1) - a longer version including a detailed assessment of all 10 cases studies is available at www.carbontrust.com. It draws on interviews with leading development banks, commercial investors, programme implementers and non-governmental organisations, detailed evaluations of past programmes, in addition to the Carbon Trust's 15 years of experience designing and delivering large-scale energy efficiency programmes. Building a greater common understanding between these different organisations is a priority for nurturing sustainable energy efficiency markets.

10 case studies | **5** continents

Table 1: Summary of case study sample

Property Assessed Clean Energy

Geography	USA (Colorado was the focus of this study)
Primary funder	Colorado Government
Target market	Residential; commercial buildings
Solutions	• Project assessment • Accreditation (suppliers, financiers) • Standardisation (contracts) • Guarantee • On-bill financing • Aggregation (green bonds)
Timeline	2008-2010; revitalised since 2015

Green Deal

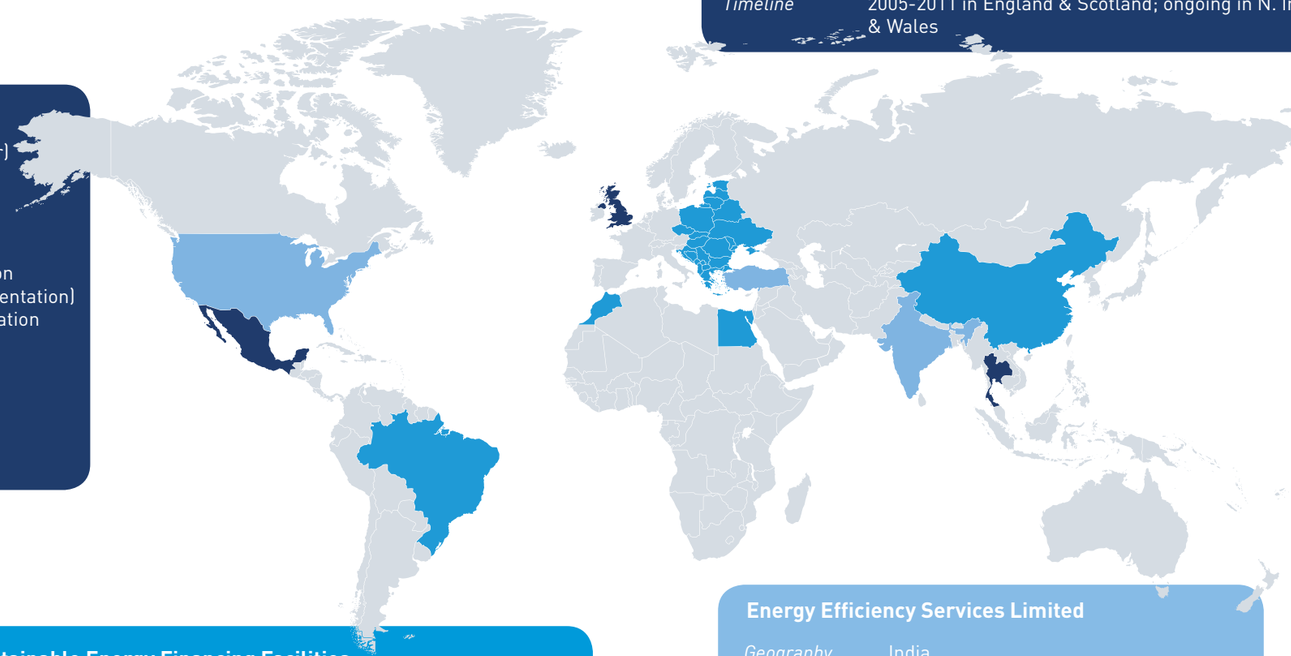
Geography	United Kingdom (UK)
Primary funder	UK Government
Target market	Residential
Solutions	• Project assessment • Accreditation • On-bill financing
Timeline	2013-2014

Carbon Trust SME Energy Efficiency Programme

Geography	United Kingdom (UK)
Primary funder	UK Government
Target market	SMEs
Solutions	• Awareness-raising • Project identification & pipeline generation • Project assessment, monitoring & verification • Standardisation (procedures, contracts, decisions) • Accreditation (technology) • Incentive (concessional interest rates) • Unsecured lending
Timeline	2005-2011 in England & Scotland; ongoing in N. Ireland & Wales

Commercializing Sustainable Energy Finance

Geography	Turkey
Primary funder	IFC
Target market	SMEs
Solutions	• Awareness-raising • Project identification & pipeline generation • Project assessment • Leasing (operational)
Timeline	Ongoing since 2010



Energy Savings Insurance

Geography	Mexico (other pilots in Colombia & El Salvador)
Primary funder	Inter-American Development Bank
Target market	SMEs
Solutions	• Awareness-raising • Project identification & pipeline generation • Incentives (conditional on project implementation) • Project assessment, monitoring & verification • Standardisation (procedures, contracts) • Accreditation (technology, suppliers) • Insurance • Guarantee • Credit line
Timeline	Credit line launched in 2015 in Mexico

China Utility-Based Energy Efficiency

Geography	China
Primary funder	International Finance Corporation (IFC)
Target market	Energy intensive industries; SMEs
Solutions	• Awareness-raising • Project identification & pipeline generation • Guarantee
Timeline	CHUEE I launched in 2006; phase III began in 2013

PROESCO

Geography	Brazil
Primary funder	Brazilian Development Bank (BNDES)
Target market	ESCOs; industrial & commercial businesses
Solutions	• Incentive (concessional interest rates) • Credit line • Guarantee • Unsecured lending
Timeline	2006-2015

Sustainable Energy Financing Facilities

Geography	22 Eastern European countries and North Africa (Morocco and Egypt)
Primary funder	European Bank of Reconstruction & Development
Target market	Industrial & commercial businesses; SMEs; residential
Solutions	• Project identification & pipeline generation • Policy development • Incentive (conditional on performance) • Credit line
Timeline	Ongoing since 2004

Energy Efficiency Services Limited

Geography	India
Primary funder	Municipal street lighting
Target market	Energy intensive industries; SMEs
Solutions	• Project assessment, monitoring & verification • Standardisation (procedures, contracts) • Support for monetising energy savings (ESCO) • Guarantee
Timeline	Ongoing since 2015

Energy Efficiency Revolving Fund

Geography	Thailand
Primary funder	Royal Thai Government
Target market	Energy-intensive industries, SMEs & ESCOs
Solutions	• Awareness-raising • Project assessment • Incentive (concessional interest rates & tenors, and technical assistance) • Credit line
Timeline	Ongoing since 2010

Key questions when designing a programme

The success of an energy efficiency finance programme can be measured according to two criteria:

1. The energy demand reduction, and the subsequent GHG emissions saved, per unit of resources invested; and

2. The sustainability of the market when the programme expires.

Energy efficiency improvements cover a broad set of options with many paying back quickly and being strongly NPV positive. However, programmes designed to unlock savings can be more or less effective and therefore assessing these in terms of energy/GHG savings per unit invested is a key criterion.

Donors also want to change the markets they help start or spur on to create truly lasting change. This is why the sustainability of the market post-expiration of a programme is also a key criterion to assess. Depending on the objectives of any particular programme, achieving progress in one or other of these criteria could be deemed a success, but ideally both should be realised.

The analysis is framed by six key questions (see Figure 3) that should be asked of any energy efficiency finance programme in order to build an effective package of support. They form the lens for this study, through which the case studies are investigated and the efficacy of their solutions analysed.

These systematic questions form a simple guide for how to think about designing an effective and sustainable programme. The questions do not necessarily have to be followed sequentially and earlier questions may be revisited as a programme's design progresses. For example, if the drivers for action are counterproductive, this could necessitate policy development with a host government to address them, whilst complementing the supply of finance in the private sector for energy efficiency investments further downstream.

The following pages delve into the sub-set of issues that follow from these questions. The aim is to structure a way of thinking about why some programmes succeed, and why others might fail, in terms of reducing energy demand and ensuring the long-term sustainability of energy efficiency markets.

Figure 3: Key questions when designing an energy efficiency finance programme

1. What is the target market?

Defining the target market will shape the parameters of every solutions package. This may seem obvious, but across a number of the case studies examined, the market is often not sufficiently understood before the design and implementation of a programme is undertaken. Consequently, programmes fail to have their expected impact because they are not sufficiently attuned with the market.

A rigorous market analysis is a vital starting point for designing any effective and sustainable solution package. Given any programme will have limited resources available, it needs to be selected for maximum impact. Therefore, a prioritisation exercise will decide which target market within a particular country is the most suitable for a programme. Important indicators include:

- **Energy benefits** as measured by demand reduction, cost savings to energy consumers, and the energy system as a whole; and
- **Non-energy benefits** such as avoiding GHG emissions, increasing productivity, reducing energy poverty and other socio-economic benefits e.g. health.

Cost-benefit analysis needs to be carried out where the opportunities for energy savings are related to their payback periods and the returns for end-users, suppliers and financiers. This should show how attractive an opportunity is in the market as it is, and the additional value a programme can achieve.

A detailed understanding of what defines a target market is also necessary in order to understand what is possible:

- What is its size and projected growth, e.g. quantity of organisations or households?
- What are its demographics, e.g. regional or socio-economic distribution?
- What is the size of average energy bills, particularly in relation to other expenditures?
- What is the opportunity for increased energy efficiency, including technology availability, and how accessible and scalable are these opportunities across different customers?
- What is the performance of the target market benchmarked against international best practice?
- What would a well-functioning market look like?
- What choices of suppliers and business models are available?

Case study: Green Deal

Objective: Improve the energy efficiency of buildings in the UK, especially houses, nationwide.

Solutions: Project assessment, accreditation of suppliers and project assessors, on-bill financing.

Lessons: This failed programme had a clear problem understanding its target market, leading to a critical lack of demand. Central to this was a poor understanding of what an attractive payback period would be for homeowners who were unwilling to borrow money for improvement that could take five years to pay back. This was worsened by failing to make the support on offer attractive with relatively high interest rates (7%) and hassle securing loans.

2. Are there drivers for action?

Next, it is imperative to understand whether the business case for energy efficiency in the target market is fundamentally undermined or supported by existing market and policy drivers. To illustrate, these drivers are often economy- or sector-wide and can include concerns such as:

> "Pricing frameworks are distorted against energy efficiency; only when they are corrected will programmes be less necessary"
>
> **Development Bank**

- Do the **economic drivers** such as energy price, carbon price, competitiveness and productivity adequately incentivise the business case for energy efficiency?
- Do **policy drivers** such as standards, regulations and incentives support the business case for energy efficiency?

Case study: Sustainable Energy Financing Facilities (SEFFs)

Objective: Scale-up energy efficiency in Eastern European and North African countries particularly among industrial and commercial businesses.

Solutions: Project identification, pipeline generation, dialogue with policymakers, performance incentives, and a credit line.

Lessons: The SEFFs have worked well because they have lined up with economic and regulatory drivers. Eastern Europe has had a strong focus on upgrading equipment in its industrial sector to become more competitive. This economic driver has been complemented by policy development to work towards standards and regulations that support greater energy efficiency deployment.

If any of these drivers are not favourable to energy efficiency, or not strong enough, the goals of a finance programme will be undermined. Though challenging to address, drivers that weaken the case for action, such as energy subsidies, should prompt concerted efforts to align policy with energy conservation where possible. It is important to recognise that if counterproductive drivers cannot be mitigated, a programme may be better focusing on narrowly targeting emission reductions, as creating a sustainable market will prove problematic. Even with well aligned drivers, impact is not guaranteed. They are necessary but not sufficient for success.

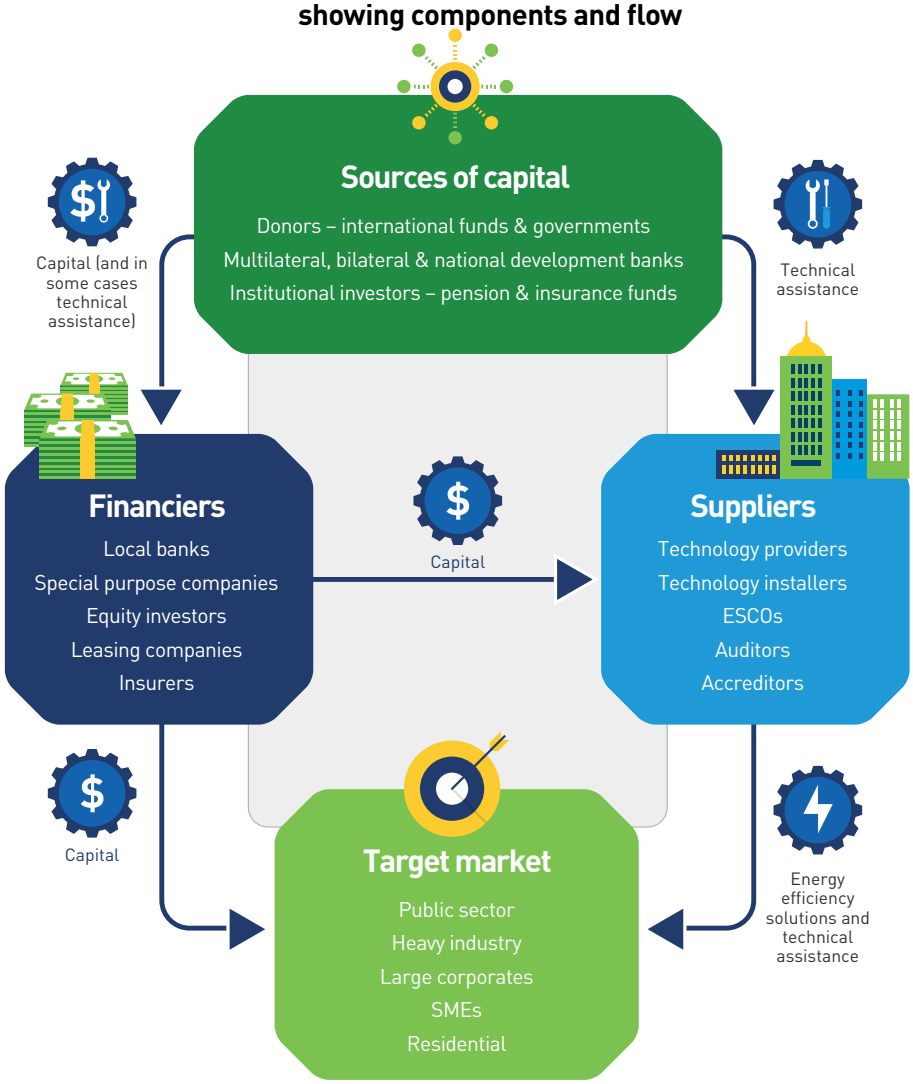
3. Is there a supply chain?

To realise the benefits of energy efficiency in a target market, there needs to be a flow of information to build essential knowledge, skills, and behavioural change. Where capital investment is needed, appropriate flows of technology and funding are essential. These flows are facilitated by institutions and companies with the expertise and connections to deliver them efficiently and reliably.

Figure 4 sets out a stylised supply chain illustrating the major components that must be in place for an energy efficiency programme to succeed. Establishing this supply chain is a pre-condition for then considering how a programme can improve the functioning of individual components of the supply chain or the flows of information, technology and funding.

Understanding the capabilities and limitations of the energy efficiency supply chain, and consequently what capacity-building is needed as part of a programme, is vital. It involves not just examining the capacity of existing entities – comprising financial, technical or human resources – but also their internal strategies and structures. Their ability to underpin sustainable change will rely as much on their desire and organisational set-up, as on their access to the target market. Organisations that prioritise growth in the energy or energy efficiency market, and prove it with dedicated teams, are the most likely to sustain activities beyond the lifetime of a programme.

Figure 4: Indicative supply chain for energy efficiency finance showing components and flow



> "The institutional set-up and strategies are equally important when selecting participants as their capabilities and capacity"
>
> **Programme implementer**

Taking a wider view, supply chains as a whole vary in degrees of maturity, and can therefore require different levels of assistance. Here are some examples:

A. There is an existing local supply chain that can satisfy the needs of information, technology, and capital but requires synchronisation through better integration between the three;

B. There are some local institutions and companies that have the potential to provide the needs for a supply chain, but overall they lack the internal capacity or skills; and

C. There is a gap in the supply chain that cannot be filled by existing local capacity and so either requires inviting foreign entities into the market or stimulating the entry of new local entities.

These three scenarios necessitate responses that range from facilitating connections between appropriate components of the supply chain (A), to training and capability building (B), to creatively bridging gaps between organisations (C). In reality, often more than one scenario is relevant in an immature market, therefore necessitating solutions that utilise a combination of these responses.

The fundamental objective here is connecting finance to credible, bankable projects – uniting the financial and technical elements of energy efficiency. It can be summarised as pipeline generation, and it is a central challenge that very few programmes have sustained. Indeed the lack of attention to pipeline generation is the key reason why finance schemes often fail to have the impact they should. Creating effective pipeline generation to complement financial support is essential.

On the one hand, it is outside of the conventional business model for financiers to actively generate projects. On the other, customers can lack the knowledge, skills or incentives to propose credible projects themselves.

This leaves suppliers and advisors as the most viable avenue because they have an inherent profit incentive to find bankable projects, and a minimum level of technical knowhow to learn how to appraise them. Leveraging them to identify, prepare and present bankable projects, requires investment in developing their skills, tools, credibility, and of course, demand for their services. Therefore, to underpin sustainable private sector markets, attention and resources must be directed toward building a capable and trusted supplier market and providing this market with resources as needed to support the deployment of available finance capital.

Case study: China Utility-Based Energy Efficiency Finance Program (CHUEE)

Objective: Demonstrate that lending to energy efficiency projects in energy intensive industries and SMEs can be low risk.

Solutions: Awareness raising, project identification, pipeline generation, and a credit guarantee to participating banks.

Lessons: Insufficient attention was paid to building a supply chain with motivated participants that can sustain activity after the programme was completed. The first phase of the CHUEE programme in China resulted in a total of $512 million of lending to energy efficiency projects. However, one bank, out of the two selected, accounted for 98% of the loans. This highlights how participants must be carefully selected on the basis of a detailed understanding of both their capabilities and willingness to enter the market for maximum impact.

4. What are the barriers across the supply chain?

Before an effective programme can be designed, it is vital to comprehensively map the barriers faced by key players across the supply chain. This builds on the analysis of what the supply chain currently looks like to understand what factors are preventing it from operating effectively.

> "Too often financial solutions are provided where finance is not the key barrier"
>
> **Programme implementer**

The pervasive problem for energy efficiency is the perceived absence of a convincing business case. A lack of pricing of energy and carbon externalities clearly does not help. Furthermore, energy savings do not create sales or cash directly, but deliver a return by reducing costs relative to a counterfactual situation. This can be a hard sell, and energy savings are often not regarded as a transparent and trusted revenue stream in the eyes of homeowners, boardroom directors, or potential financiers.

The immediate objective of a programme is to confront the unfamiliar and/or unattractive business case that manifests in barriers that prevent the flow of information, technologies and capital across the supply chain. These barriers can be very specific to a particular context, and apply to individual components of the supply chain as well as to the connections between them. In an immature market, the barriers are likely to be numerous and varied, but there are three broad categories that they fall within (Table 2).

Case study: PROESCO

Objective: Scale-up the Brazilian ESCO market.

Solutions: Concessional interest rates, credit line, credit guarantees, and unsecured lending.

Lessons: This programme did not address non-financial barriers inhibiting the scale-up of the Brazilian ESCO market. Some of the most important barriers required an extensive technical element for upskilling businesses in the first place, as well as a simplification of the process for accessing the finance.

Table 2: Overarching barriers to energy efficiency deployment

Awareness & commitment	Lack of knowledge and awareness of energy efficiency; scepticism and misunderstanding of benefits; conflicting priorities; and a lack of motivation across businesses stymie potential demand. Linked to this is the lack of a convincing business case in contexts with cheap energy and absent regulation.
Technical solutions & expertise	Insufficient technical capacity, and a lack of commonality on best practice and standardisation of procedures and technologies, including difficulties in project assessment, monitoring and verification, act as obstacles to delivering energy efficiency solutions that are trustworthy and minimise hassle.
Financial resources	Perceived high investment costs, coupled with prohibitive calculations of risk and return, limit the supply of affordable capital and the demand for such investments.

Effectively identifying the most influential barriers across a supply chain will determine the optimal design of a programme. Of vital importance is also recognising that financial and technical barriers to energy efficiency are interlinked. For instance, whilst an absence of capital in a market can be attributed to the former, technical problems, such as a lack of credible, bankable projects, can be equally significant obstacles to the flow of investment. Understanding how they are interlinked is therefore crucial. Misdiagnosing barriers will invariably lead to misdirected solutions.

5. What solutions can address the barriers?

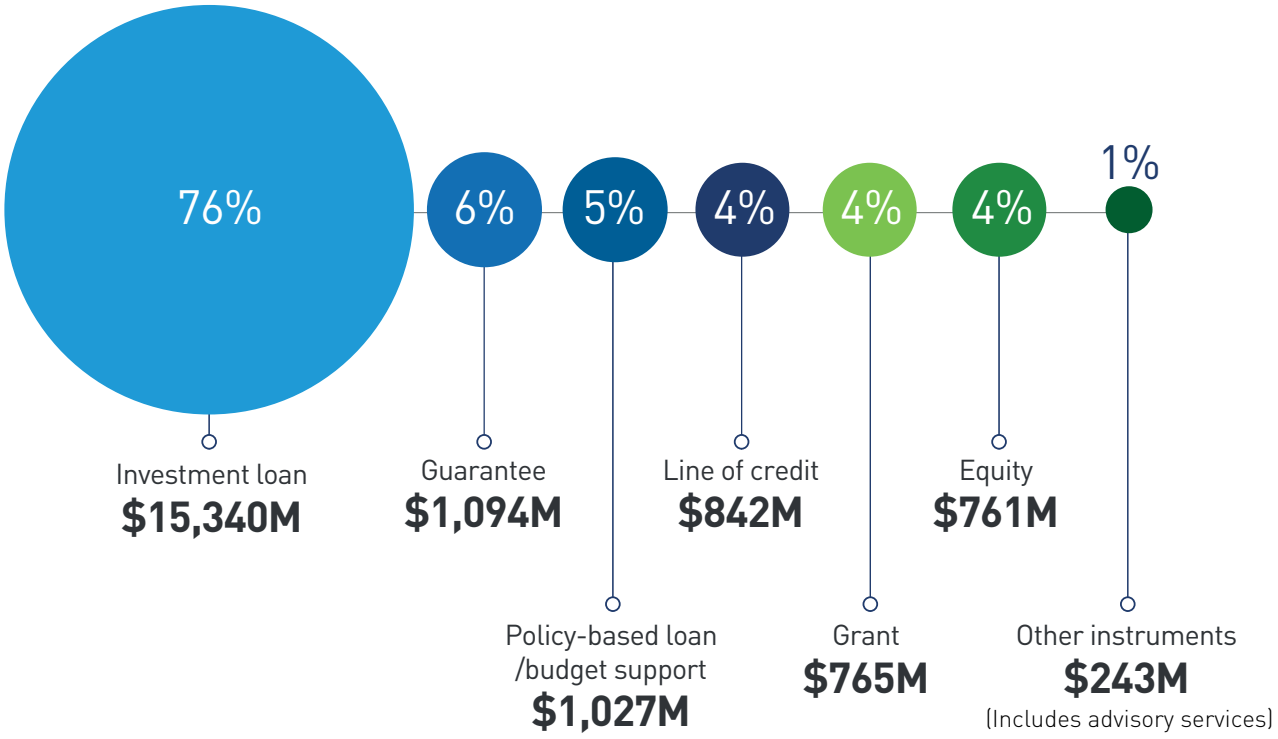
The reality of designing different aspects of programmes rarely, if ever, bears a one-to-one relationship with the barriers that are present. In fact, some design features target multiple barriers; and certain barriers can necessitate more than one solution. Across the sample of case studies, the variety of programme features identified and scrutinized are outlined in Table 3.[10]

They are assessed according to their relative impact to the three challenges outlined above, where darker shading indicates the design feature is more relevant to that challenge.

> "The challenge for designing a programme is effectively synchronising the financial and technical elements to address both sides of the problem in an energy efficiency market"
>
> **Development Bank**

The financial and technical design features of programmes must be planned, coordinated and implemented in concert. Their value as a package relies on their complementarity. It is far too common for solution packages to focus on finance and neglect technical assistance. Figure 5 outlines that in 2015 1% of MDB spend on climate mitigation was dedicated to 'other instruments' – such as advisory services. The rest seems focused on financial instruments. If the energy efficiency opportunity is to be comprehensively taken up, the proportionate spend on technical assistance within programmes needs to be higher. The Carbon Trust's own experience suggests that up to 20% of a programme's resources should be invested in technical assistance in contrast to the 5% that is typical.

Figure 5: MDB mitigating finance split by instrument type, 2015



Source: 2015 Joint Report on Multilateral Development Banks' Climate Finance

Table 3: The relevance of different solutions to addressing the overarching barriers

Very relevant | Relevant | Slightly relevant

Awareness & commitment | Technical solutions | Financial resources

Awareness-raising

Purpose:
build a critical mass of demand by increasing knowledge and understanding in the target market and their financiers.

Method:
advertising, educational events or direct outreach depending on the level of pre-existing awareness and the feasibility of reaching the target audience.

Project identification and pipeline generation

Purpose:
develop and prepare a pipeline of bankable projects to establish sufficient market scale to interest financiers.

Method:
Training suppliers, facilitating interactions across the supply chain, tracking potential customers and demonstration projects can all help create market scale in different ways.

Policy development

Purpose:
tackle fundamental drivers that subvert the business case to create a long-term, sustainable market environment.

Method:
advising on removing pricing distortions of energy and carbon, introducing tax breaks, promoting policy roadmaps, and developing energy efficient codes and standards.

Incentives

Purpose:
temporarily alter the business case to encourage the demand or supply of finance.

Method:
concessional terms of finance, performance subsidies, tax breaks for energy efficient equipment, discounted TA.

Project assessment, monitoring and verification

Purpose:
develop local capacity and a track record for ensuring and measuring the profitability of projects to reduce perceived risks.

Method:
training local suppliers of goods and services, or installing entities capable of transferring skills or outlasting the programme.

Accreditation (technology, suppliers, auditors, financiers)

Purpose:
mitigate perceived risks and consolidate trust in promised energy savings for financiers and end-users alike.

Method:
formal, authoritative qualifications based on historical performance for suppliers and the equipment.

Standardisation (procedures, decisions, contracts)

Purpose:
minimise the extra cost and hassle associated with unfamiliar transactions across the supply chain.

Method:
simple and replicable contracts between parties, user-friendly interfaces, and fast decision-making processes.

Support for monetising energy savings (ESCOs)

Purpose:
grow a market of suppliers that use energy savings within their revenue model, supporting confidence in the promised cash flow.

Method:
support for de-risking investments in ESCOs to encourage growth in their business model.

On-bill financing

Purpose:
overcome the lack of upfront capital and lack of trust in energy savings as revenue for property owners.

Method:
integrating investment costs with pre-existing bills, where energy savings prevent the former exceeding the latter over the payback period.

Unsecured lending

Purpose:
alleviate the need for end-users to provide collateral to secure financing for energy efficiency investments.

Method:
financier will lend against the merits and predicted cash flow of a project and not require assets as a security.

Leasing (operating and capital)

Purpose:
free end-users from capital constraints associated with high upfront costs.

Method:
leasing party will lend equipment as part of a service, possibly including maintenance (operating), or until the end-user pays off the cost and owns it outright (capital).

Insurance

Purpose:
mitigate the risk of the technology not performing as expected.

Method:
premium paid for by the end-user or supplier to cover potential losses reduces the perception of high risk, and possibly the cost of capital if financiers concur.

Guarantee

Purpose:
risk-sharing facility to encourage financiers to expand into new markets perceived as too risky under normal conditions.

Method:
programme will cover a fixed percentage of the losses incurred by financiers if their loans do not perform.

Credit line

Purpose:
address limited liquidity in financial institutions, increasing their willingness to use funds for energy efficiency.

Method:
injection of government, MDB or other donor funds for on-lending, with specified terms for eligible projects attached.

Aggregation (including green bonds)

Purpose:
increase supply of capital into the market by reducing relative transaction costs for investors through scale.

Method:
either 'pooling' capital prior to identifying projects, or 'bundling' pre-identified projects ready for investment.

Considerations of scale and time play pivotal roles here too. If awareness-raising is deployed out of sync, either too early or too late, in relation to the availability of a concessional credit line, or its reach is hampered by a lack of resource, impacts will be neutered. Programmes also require monitoring of their progress and impact, and a degree of flexibility in their design to respond to changing conditions.

The inner mechanics and finer details of each element of a programme will vary according to the market. The parameters, complementarity and shortcomings of design features should all be stress-tested across the supply chain. For instance, a misguided percentage point or two either way on the cost of capital can be irrecoverably off-putting to financiers, suppliers or the target market.

Ultimately, to stimulate sustained private sector investment, there needs to be a market of projects that adhere to attractive rates of risk and return and are structured in an accessible way for investors. The objective of a programme is to positively influence perceived risk and/or actual returns and ensure the opportunity is structured in a way so financiers invest in energy efficiency of their own accord. This demands an understanding of what the risk-return profile is for target investors.

Local banks are often the primary target investors for energy efficiency, due to their financing the public sector, businesses and homeowners alike. Banks seek stable returns on low risk investments. Once target investors are well-understood, there are variables that can be altered by a programme to make energy efficiency investments more attractive.

The disaggregated nature of many energy efficiency markets (outside of large, energy-intensive sectors) puts off investors: high transaction costs can eat away at limited returns. A programme can attempt to counter this – through project assessment, standardisation, incentives or aggregation.

However, it must consider how to influence the target market as a whole, rather than just isolated projects, and investigating whether there is sufficient scale to interest investors.

Case study: Energy Savings Insurance (ESI)

Objective: To address risk-related barriers and to increase the supply of finance to SMEs in three Latin American countries, to enable the realisation of energy efficiency projects that currently struggle to access finance

Solutions: Awareness-raising, project identification, pipeline generation, incentives (conditional on project implementation), project assessment, monitoring & verification, standardisation (procedures, contracts), accreditation (technology, suppliers), insurance, guarantee, and credit line.

Lessons: This case study represents a multi-faceted solution package including standardised energy performance contracts; accreditation of suppliers; verification of projects; and insurance coverage for potential performance failure. Each element is aimed at addressing risk-related barriers and increasing the supply of finance to enable the realisation of projects that currently struggle to access finance. This solution package requires a balancing act to align the benefits that these solutions can provide, and the transaction costs they may represent. Once the market is aware of the real, rather than perceived, risks, familiarity with energy efficiency, and competition within the supply chain, should reduce these transaction costs and amplify the supply and demand of finance in the long-term.

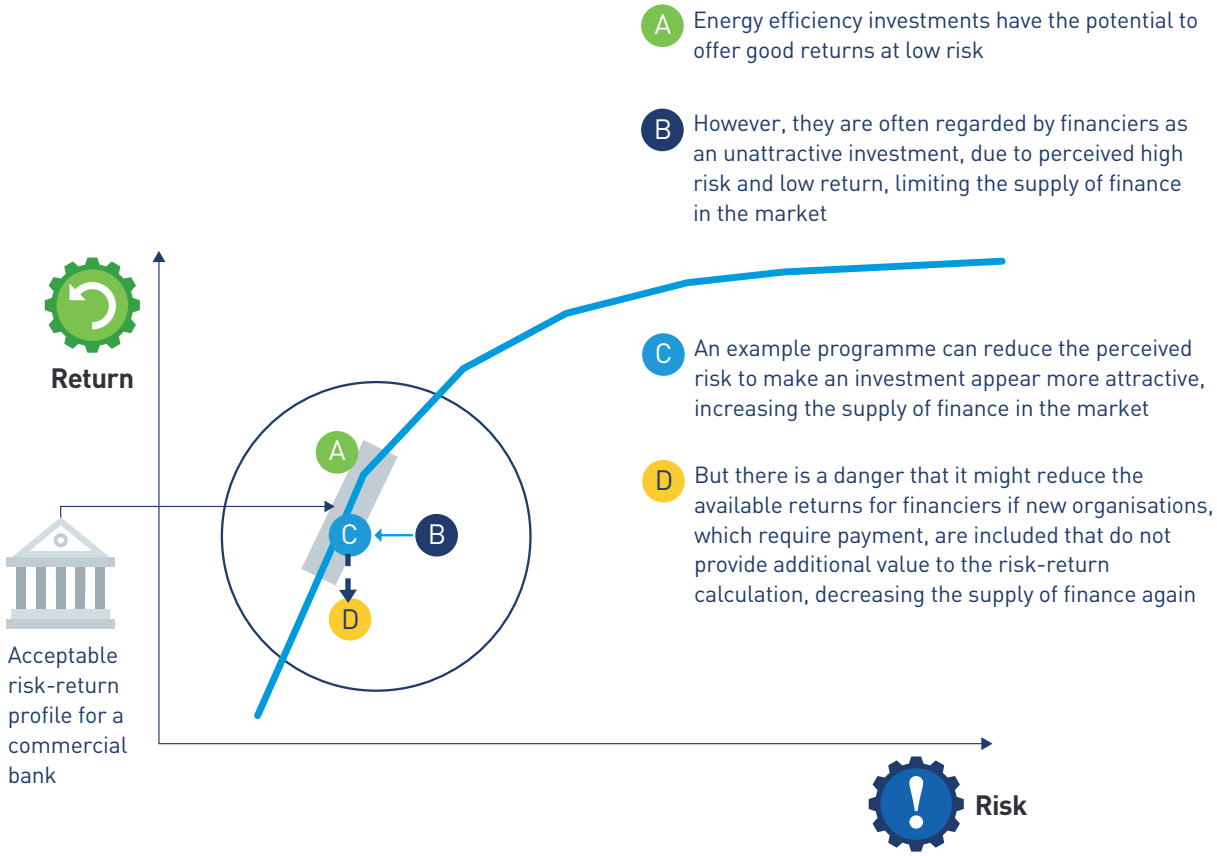
More often perceived risks can be easier to influence. This constitutes dispelling negative perceptions rather than changing material returns. Reducing perceived risks for financiers can have the knock-on effect of decreasing the cost of capital for suppliers and customers – increasing their potential returns. returns.

The perceived risks for financiers can be allayed by introducing new organisations or procedures into the supply chain to assess, monitor, verify, accredit or insure, in order to increase the supply of finance in a market. But these additions must necessarily be paid for, potentially reducing the available returns for the end-user, the financier or both, if there are not consequent cost savings realised by reducing the risk (such as the cost of capital for end-users) or efficient procedures (minimising transaction costs).

Figure 6 illustrates how, although energy efficiency investments have the potential to offer attractive returns at low risk of default (A), they are often perceived to represent lower returns at higher risk (B). As a consequence, the objective of a programme should be to mitigate these prohibitive perceived risks (B to C), thus creating an attractive investment for financiers. However, there is a danger that the de-risking measures can have unintended consequences by reducing the available returns, and therefore the attractiveness, of an investment by introducing new organisations or processes that cut away at the limited pot of returns (C to D).

Therefore, when designing a programme, there must be careful consideration given to balancing the benefits of additional measures, with their effects on risk-return calculations. The objective must be to align the interests of the entire supply chain, so that energy efficiency projects represent attractive investments.

Figure 6: Illustration of how a programme can alter the risk and return calculations of a financier for energy efficiency investments



6. How can change be sustained?

At the beginning of this analysis, two objectives were set out for measuring the success of an energy efficiency finance programme: 1) The energy demand reduction, and the subsequent GHG emissions saved, per unit of resources invested; and 2) The sustainability of activity in the market when the programme expires. While the first can be realised in isolation with targeted programmes, too often they involve one-off or short-term fixes. The danger for any seemingly successful programme is that once its support is no longer available, the supply of, and demand for, finance withers too.

There is an urgent need to drive self-sustained activity. To realise the 2°C target and the long-term benefits of energy efficiency, quick fixes are inadequate. To achieve lasting change, a programme must focus on the energy efficiency problem comprehensively and on the legacy of its solution package.

While each context has unique elements, key commonalities exist for achieving sustainability:

- On the technical side, a programme must ensure sufficient transfer of expertise across the local supply chain for it to continue without needing practical support; and
- On the financial side, solutions must leave behind a sufficient confidence and skills in the market for there to be sustained flows of capital into energy efficiency investments under business-as-usual conditions.

Achieving these goals is no mean feat. They necessitate an approach that demands significant resources and time. If either of these two are lacking, then a programme will struggle to instil a sustainable legacy.

Furthermore, it is vitally important to recognise that a sustainable legacy must involve attracting new entry into the supply chain, growing the private sector market. Convincing new financiers, suppliers and end-users is best-realised through simple solutions. Complex ones may appear convincing at addressing barriers on paper, but these groups will always seek a path of least resistance. Therefore, for growing and sustaining private sector markets, either solutions must be as simple as possible; or if they begin from a complex starting point, they must develop over time to approximate commercial conditions as closely as possible.

These principles can manifest themselves in a number of practical lessons for energy efficiency programmes aiming for sustainable legacies. The conclusion illustrates a number of the most important to emerge from our study.

Case study: Energy Efficiency Revolving Fund (EERF)

Objective: To stimulate lending from banks for energy efficiency projects to energy intensive industries, SMEs, and ESCOs in Thailand.

Solutions: Awareness-raising, project assessment, incentives (concessional interest rates & long loan tenors), technical assistance, and a credit line.

Lessons: Participants in this programme came to rely on its support rather than modifying their own approach to enable them to sustain involvement in the market.

Commercially available interest rates in Thailand were set a minimum of 5.75% for businesses during 2002 to 2005. The EERF provided a concessional interest rate cap of 0.5% to banks and 4% to businesses. This drove uptake with; 294 projects being funded over 9 years. Training was also provided to the banks for assessing projects. However, once these concessions expired, so did lending – by 2015 only one bank was continuing to finance energy efficiency projects.

Conclusion

When designing an energy efficiency finance programme, answering every one of these six questions is essential. Doing so necessitates a comprehensive understanding of a local context, an appreciation of both the possibilities and the limitations of the tools available, and keen attention to detail throughout. Across the preceding sections, the information under each question highlights the most pertinent concerns for realising this.

In addition to these key questions, programme designers can take on board a number of practical lessons for targeting the major barriers of energy efficiency and leveraging sustainable private sector investment. They are the product of analysing the efficacy of a wide range of historical programmes. For each of the three overarching challenges outlined earlier, we have identified five key lessons to address them most effectively, and sustainably.

Awareness and commitment

When combining incentives with awareness-raising and pipeline generation, a comprehensive package should generate significant demand and commitment. But without a favourable and stable policy environment, the business case for energy efficiency will consistently face an uphill struggle for sustained private sector activity and long-term demand.

1. Programmes should not focus solely on the supply of finance, they need to concurrently stimulate and scale-up demand. Investment will not flow unless there are bankable projects. The essential first step is effective demand generation through significant awareness-raising and pipeline generation activities.

2. To link supply and demand, projects must be identified, prepared and delivered to financiers in a commercially viable way. Financiers will not independently search out energy efficiency projects, so leveraging existing networks within target markets and suppliers is crucial. However, third parties need careful quality control to avoid poor project proposals and maximise efficiency.

3. Timing and synchronisation with the other components of a programme is paramount for using awareness-raising and pipeline generation tools effectively. A plan before implementation can fulfil part of this need. But executing it requires regular monitoring of flows of finance, tracking potential customers, and investing in repeated pushes to build awareness and commitment.

4. There should be a mutually reinforcing relationship between policy development and action on the ground. Market distortions (such as energy subsidies) and externalities (such as carbon) need to be priced appropriately to incentivize energy efficiency and lead to transformative and lasting change in the private sector. Convincing policymakers to take potentially difficult decisions can be supported by demonstrating the benefits of energy efficiency.

5. Incentives (such as concessional finance) can temporarily create an attractive business case, but they are more suited to realising short-term energy demand reduction than sustainably transforming markets. To address the latter, an exit strategy needs to aim for commercial, or close to, conditions by the end of their lifetime. For demonstration effects, incentives should be intelligently tied to energy savings.

Technical solutions & expertise

Delivering energy efficiency to a target market requires three indispensable principles: trust, skills and simplicity. When acting in concert, these factors can form the foundation for a credible and integrated supply chain that reduces both costs and hassle.

1. Trust is the essential glue that binds together any supply chain, performing a crucial de-risking function for unfamiliar energy efficiency investments. What it requires is extensive, credible and visible proof of profitable energy efficiency projects.

2. Properly assessing, monitoring and verifying projects provides the raw data for achieving trust; but this requires standardisation of procedures, contracts, decisions and technologies to aid the process of aggregating and scaling credible data.

3. Formal accreditation completes the process. The final step of accreditation for technologies and suppliers can centralise and formalise this process, providing a trusted and credible standard – and an accessible pathway to end-users.

4. To implement all, or even some, of the above requires skills and investment in the local supply chain. For sustainable change, the transfer of skills to local agents is vital. The selection of appropriate organisations, according to their strategies and structures, requires careful consideration. If they are not suitably equipped, without work to address deficiencies in the supply chain, the market will stagnate.

5. As a general rule, simplicity must be maintained wherever possible. Every additional organisation needs to represent a measureable benefit to deserve its inclusion. Financiers, suppliers and end-users will prefer interactions that represent minimal hassle.

Financial resources

The majority of the solutions to this challenge try to unlock the shortage of finance dedicated to energy efficiency. This is often achieved by making energy efficiency capital more attractive to financiers or their recipients depending on the mechanism. But finance is only one dimension of the energy efficiency problem.

1. Financial solutions should not be used to address non-financial barriers. Although a market may display a lack of investment, the major barriers might not be related to the availability and affordability of capital. Thorough investigation is required to assess whether its absence is a symptom of problems downstream that require technical solutions.

2. Financial solutions are often limited to addressing one financial problem at a time, and their shortcomings should be well-understood. For instance, credit lines can inject liquidity but, unless combined with implicit incentives, that is all they can do.

3. Again, simplicity is a fundamental principle. Parcelling up and dividing risks across different entities can be effective, but excessive hassle and transaction costs can be counterintuitive when convincing financiers to invest in new markets.

4. To nurture a self-sufficient private sector market, any financial programme needs to exit the scene with its conditions as close as possible to commercial. This mitigates against over-reliance on its existence, and builds local capacity and confidence in working commercially.

5. Implementing energy efficiency finance demands a close connection between the financial and technical support to sell energy savings to justify investment. The needs, abilities and limits of the supply chain and the target market will define the parameters of any package; and these parameters need to be stress-tested before implementation, and monitored throughout, incorporating a degree of flexibility to changing market conditions. The more effectively financial and technical support are constructed, timed and implemented together, the higher the chances are of creating a robust, trusted and successful supply chain that can inspire confidence in a new market.

Recommendations

There are three indispensable recommendations to re-orient the focus of programmes and thereby drive transformational and sustainable change:

1. Energy efficiency finance schemes will not be enough to change markets. Business cases need to be strengthened by strong policy frameworks with the right economic and regulatory drivers to incentivise and bring about change. Therefore, influencing such frameworks must be a key objective of future programmes.

2. Programmes should devote more resources to technical assistance than has been the case historically. Activities such as awareness-raising, pipeline generation and de-risking are essential to create sufficient demand and commitment to act. Adequate attention and resourcing must also be complemented by carefully synchronising technical and financial elements.

3. Upskilling and equipping suppliers and technical advisors, connecting the financial and technical aspects of energy efficiency, is also critical to creating a sustainable, scalable and bankable pipeline. Across the supply chain, they have the greatest inherent incentive in their business model to identify, appraise and deliver viable projects ready for financing.

These recommendations are essential for unlocking the manifold benefits of energy efficiency and keeping the door to 2°C open.

Endnotes

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About the Carbon Trust

The Carbon Trust is an independent company with a mission to accelerate the move to a sustainable, low carbon economy. The Carbon Trust:

- advises businesses, governments and the public sector on opportunities in a sustainable, low carbon world;
- measures and certifies the environmental footprint of organisations, products and services;
- helps develop and deploy low carbon technologies and solutions, from energy efficiency to renewable power.

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