KIGALI COOLING EFFICIENCY PROGRAM

Cooling efficiency finance case studies
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The Kigali Amendment to the Montreal Protocol will deliver substantial greenhouse gas reductions by moving cooling systems to lower global warming potential (GWP) refrigerants. The impact of this transition can be magnified by simultaneously improving their energy efficiency. Left unchecked, cooling could account for nearly 20% of CO2 emissions by 2050, however efficient, clean cooling has the potential to remove the equivalent of 100 Gt CO2e of greenhouse gas emissions cumulatively between now and 2050.

K-CEP aims to make an important contribution towards realizing the huge benefits of cooling efficiency and envisages a world in which efficient, clean cooling is accessible to all.

The IEA estimates that $1.6 trillion will need to be spent on improving heating and cooling energy efficiency in buildings from 2014-2035 to implement new policy commitments announced at the UNFCCC’s COP21. Many industrial, commercial, and residential cooling consumers will be capital constrained when faced with meeting these investments. A substantial proportion (the IEA estimates 40%) of the efficient, clean cooling investment requirement will need to come from external sources.

For consumers needing external funding, climate finance – whether from governments, development banks, philanthropic foundations or in partnership with the private sector - can play a vital role in unlocking and providing the capital for efficient, clean cooling. Which is why K-CEP has a dedicated ‘window’ focused on supporting the deployment of this much needed finance.

There has been a common struggle across many of the more general energy efficiency programs worldwide to create sustainable markets beyond their initial lifespan that are effective in leveraging private finance in their target markets. Although the emphasis in these programs is often on the capital they provide and the financial instruments they use, challenges to success are prevalent across the supply chain – and include awareness and technical issues as well as access to finance itself.

Analysis of the barriers to scaling up finance for more efficient, clean cooling identified six key aspects to consider in the design of any successful efficient, clean cooling finance scheme. These are summarized in Figure 1 below:

2. Ibid

INTRODUCTION
The following case studies included in this briefing paper, examine seven examples of finance schemes either exclusively targeting greater cooling efficiency or including cooling efficiency as part of a broader energy efficiency remit. We set out the key features of each scheme in terms of the design criteria set out in Figure 1. In conclusion we provide some observations on the pros and cons of each category of scheme.

The case studies show that significant finance has been deployed for energy efficiency. These investments have delivered large emissions and energy use reductions, and in some cases levels of financing compare with supply side investments. However financing cooling efficiency is not without challenges including:

- Balancing the objectives of closely matching solutions with barriers and keeping schemes simple and easy to use in the design of financial mechanisms;
- The design of eligibility criteria to ensure take-up;
- The possibility of a rebound effect resulting in increased energy use, which at its extreme could offset savings made through efficiency;
- The importance of awareness raising in generating take-up;
- Driving the right level of competition and scale in bulk procurement-based schemes;
- Ensuring the technical supply chain (e.g. equipment suppliers) is sufficient to support programs;
- Understanding and guaranteeing the leverage of additional finance using public funding;
- Using ESCO models effectively to guarantee energy and cost savings;

The importance of policy frameworks is often cited as key for effective financing of energy efficiency, and for climate mitigation efforts more generally. Whilst there is no doubt that policy can realize significant progress, historical and current evidence of government leadership globally tell us that reliance on policy is not enough. Other influential actors need to play their part in reducing carbon pollution, including the finance community as it directs trillions of dollars in the global economy.

We hope these case studies inform and inspire additional financing of efficient, clean cooling, commensurate with the need to cut carbon pollution from cooling and realize the health, economic productivity and energy access benefits that are both possible and vitally needed.
# Cooling Efficiency Financing Case Studies

**KIGALI - COOLING EFFICIENCY PROGRAM**

## Country / Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Status</th>
<th>Preparatory Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin America (Mexico &amp; Colombia; Brazil, Nicaragua &amp; Peru)</td>
<td>Underway</td>
<td>Argentina and Paraguay</td>
</tr>
</tbody>
</table>

## Goals

Catalyse energy efficiency in Latin America

## Objective

Create Energy Savings Insurance (ESI) Scheme

## Timeframe

2015 to 2020

## Total Size

Not disclosed

## Investment: Size / Range

Average cost of EE projects in the scheme is $250,000 with a range of $30,000-$2m (Clean Energy Forum, 2017).

## Activities

- Create energy savings insurance market
- Partnerships with national development banks to build steady credit lines
- Develop policy framework
- Develop support mechanism
- Develop standardized structures

## Eligibility

SMEs & Technology Service Providers

## Program Manager

Inter-American Development Bank (IDB)

## Program Operator

IDB

## Financial Provider

IDB is the main sponsor, supported by other donors, e.g., Clean Technology Fund, Green Carbon Fund

## Financing

- Standardized Energy Performance Contracts (EPCs) between SMEs & Technology Service Providers (TSPs) reduce cost of transactions, address need for legal expertise & respond to risk of low performance.
- TSPs encouraged to offer ESI from certified insurance providers to SME.
- In case of underperformance, insurance compensates SME.

## Results

If implemented in all relevant developing countries, the ESI aims to attract $10-$100bn in energy efficiency project investments between now and 2030 and provide annual emissions reduction of 20-200MtCO2. Mexico target: $25m in >190 projects with 2-5 year payback. Colombia target: $25m in >125 projects focusing on hotels, clinics & hospitals (Clean Energy Forum, 2017).

## Observations

The ESI program has been recognised by the Global Innovation Lab for Climate Finance as a promising instrument to mobilise private sector investments in EE. It can overcome barriers to investment by enhancing confidence of investors that they will receive ROI. ESI can also raise awareness in local financial institutions of the risk and returns of these projects and increase their willingness to invest. However with several different parties to the transaction, the complexity of the supply chain is higher than standard transactions, potentially discouraging uptake.

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**LATIN AMERICA (UNDERWAY IN MEXICO & COLOMBIA; IN DEVELOPMENT IN BRAZIL, NICARAGUA & PERU) PREPARATORY WORK IN ARGENTINA AND PARAGUAY.**

**GOALS**

Catalyse energy efficiency in Latin America

**OBJECTIVE**

Create Energy Savings Insurance (ESI) Scheme

**TIMEFRAME**

2015 TO 2020

**TOTAL SIZE**

Not disclosed

**INVESTMENT: SIZE / RANGE**

Average cost of EE projects in the scheme is $250,000 with a range of $30,000-$2m (Clean Energy Forum, 2017).

**ACTIVITIES**

- Create energy savings insurance market
- Partnerships with national development banks to build steady credit lines
- Develop policy framework
- Develop support mechanism
- Develop standardized structures

**ELIGIBILITY**

SMEs & Technology Service Providers

**PROGRAM MANAGER**

Inter-American Development Bank (IDB)

**PROGRAM OPERATOR**

IDB

**FINANCIAL PROVIDER**

IDB is the main sponsor, supported by other donors, e.g., Clean Technology Fund, Green Carbon Fund

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**OBSERVATIONS**

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ENERGY SAVINGS INSURANCE (ESI)

**FINANCIAL MECHANISM**

- **CAPITAL**
  - Initially as grants from donors, later from international sources
- **IDB**
  - (ESI manager)
  - Funding: Credit line, partnership
  - Loans (eg. if ESCO)
- **THIRD-PARTY AUDITORS**
  - (Validation)
  - Grants
- **CAPITAL FROM DONORS**
- **NATIONAL DEVELOPMENT BANKS**
  - (Steady credit lines)
- **TIER 1 BANKS**
  - (Open market to advance loans)
  - Loans
- **END USERS**
  - (Target market)
  - Energy performance contracts (if ESCOs)
  - Energy efficiency equipment
- **TECHNOLOGY SERVICE PROVIDER**
  - (TSPs including ESCOs)
- **INSURANCE PROVIDER**
  - (Can target end market or TSPs)
  - Premiums
  - Coverage

**ENERGY SAVINGS INSURANCE (ESI)**
Energy Savings Insurance (ESI) [SEAD, 2015]

1. **Target market**
   - SMEs

2. **Drivers**
   - Policy targets to reduce GHGs and national energy efficiency targets.

3. **Supply chain**
   - Additional actors can absorb the risks but also increase the number of transactions.

4. **Barriers**
   - Lack of trust, lack of knowledge of technologies

5. **Solutions**
   - Comprehensive insurance package including standardised insurance scheme contracts; risk assurance; third party audits within a policy framework

6. **Sustainability**
   - IDB are facilitating initial deployment of insurance for energy efficiency until it gains traction & is de-risked for banks to continue independently
### Cooling efficiency financing case studies

#### KIGALI - COOLING EFFICIENCY PROGRAM

<table>
<thead>
<tr>
<th>COUNTRY / REGION</th>
<th>CHINA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOALS</strong></td>
<td>Reduction of GHG emissions from room air conditioners (RACs) in China’s residential and commercial sectors.</td>
</tr>
<tr>
<td><strong>OBJECTIVE</strong></td>
<td>Improve energy efficiency of locally manufactured RACs by 10% based on 2007 levels from 2010-2014, thereby saving 940m tons of coal, and reducing CO₂ emissions by 35.4 million tons.</td>
</tr>
<tr>
<td><strong>TIMEFRAME</strong></td>
<td>Programme period: 2008 TO 2015</td>
</tr>
<tr>
<td><strong>TOTAL SIZE</strong></td>
<td>$27,613,600</td>
</tr>
<tr>
<td><strong>INVESTMENT: SIZE / RANGE</strong></td>
<td>Undisclosed</td>
</tr>
</tbody>
</table>
| **ACTIVITIES**   | • AC compressor (ACC) efficiency upgrades  
• RAC efficiency upgrades  
• Energy efficient (EE) RAC promotion  
• 20,000 inefficient RACs retired and recycled |
| **ELIGIBILITY**  | Local RAC manufacturers. A variety of technology push and market pull projects were also eligible, e.g. technology training & labelling. |
| **IMPLEMENTING AGENCY** | UNDP |
| **EXECUTING AGENCY** | Ministry of Environmental Protection (China) |

| **FINANCIAL PROVIDER** | • Global Environment Facility (GEF): US$6,263,600  
• Government: $100,000  
• Other: $20,000,000  
• In-kind contributions: $1,250,000 |
| **FINANCING** | Credit line funded by GEF, Chinese government, other funding sources (China’s Great Orient Chemical and Ministry of Agriculture) and in-kind contributions (RAC manufacturers) |
| **RESULTS** | ACC efficiency increased 13% and RAC efficiency increased 23% over project baseline (2.67%), exceeding 2012 target. |
| **OBSERVATIONS** | The project was successful at facilitating efficiency upgrades to older units, and promoting energy efficient RACs in the domestic market. For successful dissemination of energy efficient units and to ensure savings were achieved, this programme required awareness raising and engagement to stimulate demand. This involved consumer education, public relations events, and preliminary work to enhance national energy efficient labelling to ensure information availability and consumer awareness. |
PROMOTING ENERGY EFFICIENT ROOM AIR CONDITIONERS (PEERAC)

**FINANCIAL MECHANISM**

- **FUNDING**
  - GEF: $6.26m
  - Government: $100,000
  - Other: $20,000
  - In-kind: $1.25m

**PEERAC**

- **RAC & ACC TECHNOLOGY TRAINING**
- **IMPROVED RAC EFFICIENCY**
- **RAC REBATE PROGRAMME**
- **RAcers LABELLING PROGRAM**
- **UNIT RECYCLING**
- **WEB INFORMATION DISSEMINATION**
Cooling efficiency financing case studies

Promoting Energy Efficient Room Air Conditioners (PEERAC) (UNDP, n.d.)

**Sustainability**

Improve local capacity in production of energy efficient compressors & ACs, increase energy efficient RACs in the market & enhance demand through consumer engagement & awareness.

**Drivers**

GHG emissions reduction target; target to reduce unit GDP intensity by 20% 2005-10.

**Supply chain**

Increased capacity of technology manufacturers required to make energy efficient RACs available on the market at affordable cost; retailers and end-customers require awareness to ensure take-up.

**Barriers**

Lack of familiarity with energy efficient technology & its benefits, lack of energy efficient standards, low technical capacity of manufacturers low market penetration of energy efficient RACs, high cost of RACs.

**Solutions**

**Technology push:**
ACC & RAC technology training & assistance; improved RAC efficiency & manufacturer incentive programmes.

**Market pull:**
Information dissemination, procurement promotion, energy efficiency RAC policy promotion, RAC labelling, consumer education, RAC rebate programme.

<table>
<thead>
<tr>
<th>COUNTRY / REGION</th>
<th>THAILAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOALS</td>
<td>Stimulate commercial financial sector investment in energy efficiency improvements and reduce oil imports &amp; power demand.</td>
</tr>
<tr>
<td>OBJECTIVE</td>
<td>Involve Thai finance sector in providing access to capital via low interest loans for energy efficiency projects.</td>
</tr>
<tr>
<td>TIMEFRAME</td>
<td>2003 TO 2013</td>
</tr>
<tr>
<td>TOTAL SIZE</td>
<td>Initial fund size in 2003 was THB 2 billion (c. USD 63m) but reached USD 261m by September 2010, including USD 27.5m allocated for renewable energy projects.</td>
</tr>
<tr>
<td>INVESTMENT: SIZE / RANGE</td>
<td>Maximum loan of THB 50m per project (projects may constitute several separate energy efficiency measures). Maximum interest rate 4% p.a.</td>
</tr>
<tr>
<td>ACTIVITIES</td>
<td>Revolving fund with dedicated credit line to commercial banks to fund energy efficiency projects at low interest.</td>
</tr>
<tr>
<td>ELIGIBILITY</td>
<td>Eligible borrowers: buildings, factories, energy service companies (ESCOs) &amp; project developers. Eligible projects: initially energy conservation &amp; saving; later also renewable energy.</td>
</tr>
<tr>
<td>PROGRAMME MANAGER</td>
<td>Ministry of Energy Department of Alternative Energy Development and Efficiency (DEDE)</td>
</tr>
</tbody>
</table>

| PROGRAMME OPERATOR | Department of Alternative Energy Development and Efficiency with 11 major Thai banks. |
| FINANCIAL PROVIDER | Government of Thailand through the Energy Conservation Promotion(ENCON) Fund, funded from capital derived from a petroleum tax. |
| FINANCING          | EERF provide low-interest loans to banks, which finance energy efficiency projects through loans with favourable interest rates. EERF is funded from the government’s ENCON Fund, which derives capital from a petroleum tax. EERF provides up to 50% of on-lent capital, with the remaining coming from the participating bank’s resources. |
| OBSERVATION        | Simple and straightforward fund model can be applied to other countries. Take up of loans initially slow, so criteria were extended to broaden the target market and make loans available for SMEs. Broadening the scope of instruments supported would help capture a higher number of opportunities. |
Cooling efficiency financing case studies

ENERGY EFFICIENCY REVOLVING FUND

ENCON FUND
- DEDE pays banks’ repayments into ENCON Fund within 7-10 years

DEDE
- Repayment within 10 years

ENERGY EFFICIENCY REVOLVING FUND
- Repayments + interest (0.5%) within 7 days of receiving a payment

11 MAJOR BANKS
- Credit lines of USD 2.5-10m per bank (THB 100-R400)
- Fixed-interest loans (max. 4% interest) from EERF & bank’s own funds
- Repayment + interest (max. 4%/year) over 7 years

EE/RE DEVELOPERS
- Additional funding sources, e.g. ESCO Fund

EERF receives revenues from a petroleum tax, $$$ THB 2
- Repayment of energy efficiency projects

FEASIBILITY STUDIES
- Energy efficiency projects

FINANCING MECHANISM
Key Design Features


Target Market

- Industrial & commercial facility owners, ESCOs & energy efficiency / renewable energy project developers

Drivers

- Government of Thailand objective to reduce the energy intensity of Thailand’s economy by 25% 2005-2025

Supply Chain

- Banks provided finance to end-customers for implementation of energy efficiency projects. Banks’ awareness of energy efficiency opportunities, benefits and financial solutions for energy efficiency projects was lacking

Barriers

- Lack of awareness of energy efficiency opportunities & benefits, limited access to capital, lack of interest & experience in energy efficiency financing among banks, excessive bureaucracy & paperwork for energy audits

Sustainability

- Capacity building: Commercial banks now familiar with energy efficiency financing and promote energy efficiency development to industrial and commercial customers. EERF stimulated investment appetite of commercial banks to engage in financing energy efficiency projects.

Solutions

- Low-interest loans to create demand; familiarise banks with opportunities; simplify procedures; and increase awareness
# EESL Super-Efficient Air Conditioning Programme (ESEAP)

<table>
<thead>
<tr>
<th>COUNTRY / REGION</th>
<th>GOALS</th>
<th>OBJECTIVE</th>
<th>TIMEFRAME</th>
<th>TOTAL SIZE</th>
<th>INVESTMENT: SIZE / RANGE</th>
<th>ACTIVITIES</th>
<th>ELIGIBILITY</th>
<th>PROGRAM MANAGER &amp; OPERATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDIA</td>
<td>Increase availability of affordable super-efficient room air conditioners (RACs) in India and Indian export markets (Bangladesh, Nepal, Sri Lanka)</td>
<td>Lower price and increase quality of super-efficient RACs using lower-GWP refrigerants by buying in bulk and streamlining distribution &amp; installation.</td>
<td>RAC tender: February 2017 (delivery expected 30-150 days after awarding)</td>
<td>US$68m purchase to 100,000 super-efficient RACs</td>
<td>Panasonic and Godrej &amp; Boyce (Godrej) submitted final bid of Indian Rupee (INR) 44,320 (US$687.16) each for a total of 100,000 super-efficient RACs</td>
<td>Competitive bulk procurement of super-efficient RACs</td>
<td>Tender allowed use of ozone depleting GHG HCFC-22; ozone safe GHG HFC-410A &amp; HFC-32; HC-290 (propane). RACs had to be 5.28kW (1.5TW) with ISEER of 5.2 or higher &amp; include 3 year warranty.</td>
<td>EESL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FINANCIAL PROVIDER</th>
<th>FINANCING</th>
<th>RESULTS</th>
<th>OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EESL: joint venture company of Government of India Ministry of Power and Public Service Undertakings (PSUs). Supported by TERI, IGSD, TERRE and NRDC.</td>
<td>First tender round in February 2017 for 100,000 RACs with Indian Seasonal Energy Efficiency Ratio (ISEER) of 5.2 or higher including 3-year comprehensive warranty. Indian Government requires at least 3 qualifying bidders. Second tender round where bidders can match the lowest bid to qualify for a portion of the bulk purchase.</td>
<td>Panasonic producing 60,000 super-efficient RACs, Godrej providing 40,000, at ISEER 5.2. EESL plans to purchase 500 more RACs similarly in the future.</td>
<td>Builds on EESL’s highly successful energy efficient street lamp replacement programme. However, procurement outcomes depend on the company response received. The complexity of bidding may discourage companies from participating. Provisions of splitting the purchase with companies who match the winning price may prevent the winning company from achieving economies-of-scale to make a profit.</td>
</tr>
</tbody>
</table>
EESL SUPER-EFFICIENT AIR-CONDITIONING PROGRAMME

FINANCING MECHANISM

- EESL
  - FIRST ROUND TENDER
    - PANASONIC
    - GODREJ
  - Tender for 100,000 RACs of ISEER 5.2 at lowest price

Bidding companies

- DAIKEN
- PANASONIC
- GODREJ

Bidding companies

- PANASONIC
  - SECOND ROUND TENDER
    - GODREJ
    - 60,000 RACs
    - Delivery within 30-150 days of tender award
    - $68m

- 3 bidding companies required

40,000 RACs

100,000 SUPER-EFFICIENT RACs
EESL Super-Efficient Air Conditioning Programme (ESEAP)

### Key Design Features

1. **Target Market**
   - Room air conditioners in India and Indian export markets

2. **Drivers**
   - Government of India energy efficiency targets

3. **Supply Chain**
   - Air conditioning and refrigerant manufacturers develop energy efficient technologies, which are sold to end-customers. There is a gap in the supply of affordable technologies, with current energy efficient solutions sold at high cost to the consumer.

4. **Barriers**
   - Lack of availability of super-efficient RACs, high associated costs, perceived risk, challenges of installation & warranty

5. **Solutions**
   - Bulk procurement tender to lower cost of RACs compliment with ISEER 5.2 & increase market penetration.

6. **Sustainability**
   - EESL builds trust & confidence in RAC manufacturers & incentivises the manufacturing scale necessary for affordable prices
### Commercialising Sustainable Energy Finance

<table>
<thead>
<tr>
<th>COUNTRY / REGION</th>
<th>TURKEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOALS</td>
<td>Scale up energy efficiency (and renewable energy) to reduce expenditure on energy costs, improve competitiveness &amp; move towards a sustainable energy supply.</td>
</tr>
<tr>
<td>OBJECTIVE</td>
<td>Develop energy efficiency leasing model to overcome SME barriers to financing energy efficiency measures.</td>
</tr>
<tr>
<td>TIMEFRAME</td>
<td>4 years duration</td>
</tr>
<tr>
<td>TOTAL SIZE</td>
<td>Concessional finance: $20m capital; $1.7m technical assistance</td>
</tr>
<tr>
<td>INVESTMENT: SIZE / RANGE</td>
<td>Up to $100,000 per investment</td>
</tr>
</tbody>
</table>
| ACTIVITIES       | Energy efficient technology leasing:  
  • **Operational leasing**: regular fee where end-users pay for equipment that is permanently owned by the leasing company.  
  • **Capital leasing**: end-user pays a fee to the leasing company until they own it outright. |
| ELIGIBILITY       | SMEs in commercial, residential & municipal sectors. Requires targeted measures to achieve a minimum 15% energy efficiency improvement. |
| PROGRAM MANAGER  | IFC |
| FINANCIAL PROVIDER | CTF |

### FINANCE
IFC provided credit lines that were ring-fenced for energy efficiency investments to three leasing companies. These credit lines were blended with concessional CIF money to create attractive rates to incentivise utilisation. Leasing companies received technical assistance to help build their awareness, understanding and capacity for marketing and executing energy efficiency investments. Leasing companies would seek opportunities with SME clients before buying the necessary technology with the credit provided by IFC and CIF. Technologies were delivered to SMEs for a subscription fee.

### RESULTS
All funding was utilised and follow-on credit lines, without CIF concessions, have been sought and implemented by the leasing companies. In 2014, one leasing company sought a $96m loan from IFC on fully commercial terms, demonstrating financiers have skills and confidence to invest in energy efficiency. Over 50 energy efficiency projects were financed across the 4 years of the program, saving 0.2MtCO₂/year.

### OBSERVATIONS
CSEF demonstrates that understanding the complexity and nuances of a local market is vital for success. Understanding the Turkish supply chain and barriers that SMEs faced enabled the construction of an effective solution package. This required knowledge of the supply chain circumstances and highlights the value of an in-depth market assessment prior to design. The success of the program demonstrates leasing to be an attractive option for scaling up EE markets, although it must be recognised that the Turkey market already has a developed leasing supply chain. Where this is not developed, leasing may be limited as a solution for EE.
COMMERCIALISING SUSTAINABLE ENERGY FINANCE

FINANCIAL MECHANISM

Consessional finance ($20m loan; $1.7m TA)

Credit lines ($75m) & Training

LEASING COMPANIES (FINANCIERS)

TECHNOLOGY PROVIDERS

SUPPLIERS

Up to $100,000 investments with upfront payment

Leased technology & awareness raising

Consessional finance ($20m loan; $1.7m TA)

Credit lines ($75m) & Training

LEASING COMPANIES (FINANCIERS)

TECHNOLOGY PROVIDERS

SUPPLIERS

Up to $100,000 investments with upfront payment

Leased technology & awareness raising

SMEs (in the commercial, residential & municipal sectors)
Commercialising Sustainable Energy Finance

1. Target market
   SMEs in the commercial, residential & municipal sectors

2. Drivers
   Economic policy to improve competitiveness; reduce dependency on energy imports; reducing exposure to business drivers are increasing energy bills and improving productivity

3. Supply chain
   Leasing provided an off-balance-sheet solution in addition to de-risking the technology

4. Barriers
   Fundamental barrier for SMEs was inability to take extra debt on their limited balance sheets

5. Solutions
   Leasing companies had a strong incentive to expand and were an established avenue for reaching SMEs

6. Sustainability
   Follow-on credit lines with less or no concessions
## Cooling Efficiency Financing Case Studies

### Kigali - Cooling Efficiency Program

<table>
<thead>
<tr>
<th>Country / Region</th>
<th>Surabaya, Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goals</strong></td>
<td>To facilitate development of existing buildings into efficient, sustainable green buildings, to bring about energy savings.</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>To use ESCO financing for energy efficiency measures, to reduce energy costs and bring about financial savings in Adi Husada Hospital.</td>
</tr>
<tr>
<td><strong>Timeframe</strong></td>
<td>Not disclosed</td>
</tr>
<tr>
<td><strong>Total Size</strong></td>
<td>Not disclosed</td>
</tr>
<tr>
<td><strong>Programme Manager</strong></td>
<td>SES</td>
</tr>
<tr>
<td><strong>Investment: Size / Range</strong></td>
<td>Dependent on the client’s energy efficiency requirements</td>
</tr>
</tbody>
</table>
| **Activities**   | • Energy audits  
                           • Energy saving solution recommendation  
                           • Solution implementation |
| **Eligibility**  | Existing buildings (e.g. hotels, hospitals or universities). Scope of work included steam system, domestic hot water, lights, cooling system, power quality, building envelope. |

### Financing

ESCO business model, with compensation through energy savings.  
- The Level 1 energy audit involved no-cost investment.  
- The Level 2 energy audit required financial investment for implementation of solutions, and was financed through SES. SES operates a financing option called Grinvest, whereby SES takes over investments for complex upgrades, and is compensated with monthly cost-savings realised once the energy bill drops. This removes financial risk for clients, allowing risk-averse clients to implement energy efficiency measures. After 5 years, ownership of all the equipment will be handed over to the hospital and they receive 100% of the energy savings ongoing.

### Results

Total project energy savings = 40% (Level 1 energy audit = energy savings of 15% with no investment; Level 2 energy audit = energy savings of 25%, with investment from SES). Hospital bills reduced by 45%.

### Observations

This mechanism had an immediate return on investment for the client as they were not required to invest. In Indonesia ESCOs are rare, and they are also rare in the cooling efficiency market, currently. ESCOs are better suited to clients with large, relatively consistent energy bills – such as hospitals – where the savings delivered are reliable and easy to measure. The ESCO model is more difficult to implement for a diverse customer base with fluctuating energy bills.
## Cooling efficiency financing case studies

### KIGALI - COOLING EFFICIENCY PROGRAM

<table>
<thead>
<tr>
<th>ADI HUSADA HOSPITAL</th>
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<tr>
<td><strong>FINANCIAL MECHANISM</strong></td>
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<tr>
<td>SES (ESCO)</td>
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<tr>
<td>Level 1 Energy Audit recommendations &amp; implementation of solutions</td>
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<tr>
<td>15% energy savings</td>
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<td>No-cost solutions implemented</td>
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Cooling efficiency financing case studies

Adi Husada Hospital (SES, Adi Husada Hospital - Energy Audit/ESCO, n.d.), (SES, 2016)

**KEY DESIGN FEATURES**

**Target market**
Existing energy inefficient buildings (e.g. hotels, hospitals, or universities)

**Drivers**
Cost reduction and energy saving opportunities

**Supply chain**
Energy managers of existing buildings invest in energy efficiency measures, which are recommended and installed by experts/engineers. Current gap as energy managers discoursed by capital investment for solutions

**Barriers**
Lack of drivers or demand for energy efficiency. Operators averse to pursuing solutions that require financial investment. Lack of awareness of ROI benefits.

**Sustainability**
Follow-on credit lines with less or no concessions

**Solutions**
ESCO business model means energy efficient audits, recommendations and solutions are either no cost or paid for by SES through Grinvest. Compensation is through energy bill reductions following retrofit (rather than paid hours of work.)
### Mexico

#### Goals
Boost the economy, reduce poverty, and reduce GHG emissions

#### Objective
Replace 1.7m refrigeration and AC units by 2012 (approximately 10% (170,000) of which will be ACs and 90% (1.53m) will be refrigeration units)

#### Timeframe
2009 TO 2012

#### Total Size
U.S. $600 million for appliance replacements (10% were ACs)

#### Eligibility
Residential ACs & refrigerators (working & ≥10 years old, with cooling capacity ≥0.75 t)

#### Activities
Early replacement program, on-bill financing, refrigerant recycling

#### Program Manager
Mexico Secretaría de Energía (SENER) (Ministry of Energy)

#### Programme Operator
Fideicomiso para el Ahorro de Energía Eléctrica (Electrical Energy Savings Trust)

#### Financial Provider
- Mexican Govt.: US$ 55m (including US$30m to capitalise the guarantee facility)
- World Bank loans: NAFIN: U.S.$127m for consumer loans; IBRD: U.S.$195m; Clean Technology Fund (CTF): U.S.$50m to capitalize consumer loans

#### Financing
- Credit from NAFIN (Mexican development bank) at a lower interest rate
- Repayments through monthly charges on participating customer’s utility bills. Offset by electricity savings achieved.
- A budget of US$30 per unit for collecting and recycling costs.

#### Investment: Size / Range
Between $25 and $70 in appliance rebates available for end consumers; up to US$470 in financing for consumers, depending on monthly energy consumption

#### Results
400GWh energy & 0.24 MtCO2 saved by 2012; 1.5m refrigerators & 167,000 ACs replaced

#### Observations
PNSEE provided more than 150,000 participants with more efficient appliances but a rebound effect actually led to increased energy consumption by 92kWh per year. This was as a result of pent-up demand for cooling - more efficient ACs result in lower energy bills and therefore cost less to use, so participants use them more to increase comfort levels. This can be a positive effect in developing nations for contributing to poverty alleviation although clearly is counter-productive in terms of energy consumption and emissions reduction. Replacement programs such as PNSEE successfully enable proper disposal of units and refrigerants, and so this model is effective in recycling and destroying high GWP HFCs.
Funding:
- IBRD = $195m
- CTF = $50m
- GEF = $5m

Credit lines:
- $55m

Rebates:
- Old Appliances: $25-70
- New applicance and consumer credit (where applicable)

$195m

$55m

$50m

$5m
**KEY DESIGN FEATURES**

**Cooling efficiency financing case studies**


1. **Target market**
   - Residential refrigerators & ACs

2. **Drivers**
   - Policy - reduce GHGs through MEPS; promote social inclusion.

3. **Supply chain**
   - Low income households had challenges to invest in EE equipment. Capacity of retail stores to provide technical solutions and credit to end customers for EE solutions needed building.

4. **Barriers**
   - Lack of awareness & demand for EE equipment; lack of finance (for some customers); potential re-use of old appliances

5. **Solutions**
   - Rebates/vouchers & financing for clients investing in MEPS-compliant equipment. Mandates/budget for recycling old kit

6. **Sustainability**
   - Stimulate domestic demand for EE mandatory replacement & recycling of old units
**CONCLUSION**

The preceding case studies give a flavour of the wide range of energy efficiency finance and support schemes currently operating globally. General reflections regarding each of the financial mechanism design features used in these programs are given in Table 1.

Table 1 - Reflections on common energy efficiency finance mechanisms

<table>
<thead>
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<th>FINANCE MECHANISM</th>
<th>KEY BARRIERS ADDRESSED</th>
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| **Leasing** (operating and capital):** | • The high upfront costs of energy efficient equipment.  
• A lack of awareness/trust from end-users in energy efficient technology.  
• Unwillingness/inability of end-users to secure finance against their limited collateral. | • Highly impactful in sectors where access to finance is difficult (e.g. where target consumers have limited collateral or poor credit history).  
• Particularly successful at targeting the hard-to-reach SME sector. | • Commercialising Sustainable Energy Finance (Turkey) |
| **Operating lease:** Contract for using an asset – ownership responsibilities lie with lessor (rental). |  |  |  |
| **Capital lease:** Contract for using an asset where ownership responsibilities effectively transferred to lessee. |  |  |  |
| **Insurance:** A contractual obligation for SMEs to be reimbursed if the performance of the technology is below set expectations. This could underpin the guarantee of repayments for unfamiliar technologies such as some used to deliver higher energy efficiency. | • Perceived high technology risk discourages lenders from financing particularly longer payback energy efficiency projects.  
• Energy efficiency is not a top business priority for end-users, and they can be sceptical about their savings potential. | • Can mitigate high perceptions of risk on the behalf of financiers (like a guarantee) and end-users (unlike a guarantee).  
• Encourages banks and consumers to invest in upgrades with longer payback periods and/or that could involve high upfront cost. | • Energy Savings Insurance (Mexico, Colombia, El Salvador) |
**Cooling efficiency financing case studies**

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| **Guarantee**: A mechanism that acts as a reserve for losses incurred by financiers lending to relevant projects. This is often provided for a premium that the beneficiary has to pay. | • Poor creditworthiness of clients requiring finance, who often lack the collateral or revenue streams to secure a loan.  
• Financial institutions may be reluctant to finance energy efficiency projects that are unfamiliar to them and especially so if the lending is to a higher credit risk group such as SMEs, which often lack a track-record of successful borrowing and repayment and/or lack collateral. | • Needs careful design to ensure it is effective at de-risking energy efficiency ventures.  
• Concessional terms facilitated by donors often crucial to success.  
• Effective for incentivising lenders in markets where energy efficiency is not familiar.  
• Prior capacity building in energy efficiency will improve effectiveness of guarantee.  
• Requires strong and liquid banking sector to provide its own credit.  
• Must be simple – cost and requirements can be onerous and off-putting for banks. | • Sustainable Energy Finance Program (Philippines)                                                                                                      |
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| **Credit line:** Injection of capital from a donor, multi-lateral development bank (MDB), government or private institution, to a financial intermediary who is able to on-lend to their clients. Provides a ring-fenced source of capital that incentivises lending, particularly when provided at concessional rates or when facilitating unsecured lending. | • Financial institutions lacking liquidity (short and long-term) and/or inclination to invest in energy efficiency projects. | • On-lending often requires a well-established financial sector.  
• Concessional to trigger a market; non-concessional to sustain a market.  
• Needs strong, stable banking sector with relationships with the target market and across the supply chain.  
• Requires technical assistance throughout supply chain – lack of lending is not always due to lack of available capital. | • Sustainable Energy Financing Facilities (multiple countries including most of Eastern Europe, Morocco, and Egypt). |
### Cooling efficiency financing case studies

**On-bill financing:** Integrating investment costs with pre-existing bills, where energy savings prevent the former exceeding the latter over the payback period.

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<tr>
<td>On-bill financing</td>
<td>• The lack of upfront capital and lack of trust in energy savings as value for property owners.</td>
<td>• Hassle-free regular repayment plan that can be subsumed into normal energy bill or tax payments - supporting take-up. • Trust in institutions providing finance is important for ensuring participation.</td>
<td>• Property-Assessed Clean Energy (U.S.)</td>
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<td>Rebates, incentives, or</td>
<td>• Costly and time consuming project development processes.</td>
<td>• Generate demand for investing in energy efficiency and for accompanying finance.</td>
<td>• Scheme for Technology and Quality Upgradation Support to MSMEs (India)</td>
</tr>
<tr>
<td>subsidies: Temporarily</td>
<td>• High transaction costs and small scale (and therefore limited prize) of energy</td>
<td>• Can offset effect of energy subsidies (which dampen interest in energy efficiency).</td>
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<td></td>
<td>efficiency projects and/or the supply of finance for energy efficiency investments.</td>
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<tr>
<td></td>
<td>• High up-front costs of energy efficiency technology</td>
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<td></td>
<td>• Unfavourable prioritisations between energy efficiency and other business priorities.</td>
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<td></td>
<td>• Unappealing payback periods.</td>
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### FINANCE MECHANISM

**Revolving fund:** Any repayable investment vehicle whereby the repayments and/or proceeds of initial investments are reinvested in further eligible projects.

### KEY BARRIERS ADDRESSED

- Lack of capacity or inclination to invest in energy efficiency in the supply chain or local financial sector.

### REFLECTIONS

- Can magnify the amount of capital injected into the market, particularly if combined with criteria limiting the term of individual investments.

- Can lead to the market being dominated by, or reliant on, the revolving fund entity, rather than building broader capacity in the financial sector or technical supply chain.

### EXAMPLE

- Energy Efficiency Revolving Fund (Thailand)
### Energy Service Companies (ESCOs):

Companies that provide customers energy savings solutions that pay for themselves (and provide a return to the ESCO) through the savings on energy bills they generate. The ESCO typically guarantees the performance of energy efficient solutions and may or may not provide customers directly with finance for the investment.

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</table>
| **Energy Service Companies (ESCOs):** | • Lack of familiarity and trust from end-users and investors in energy savings.  
• Difficulties or disinclination to join different elements of the technical and financial supply chain to realise solutions. | • The ESCO model is best suited to sectors with large and consistent energy bills – for example, municipalities or large energy intensive industries.  
• In contrast, for SME markets with their relatively small, less predictable energy bills ESCOs are less suitable.  
• ESCOs often lack their own collateral, preventing them accessing debt financing for growth.  
• The inherent unfamiliarity and complexity of their business model to end-customers can also limit take-up. | • PROESCO (Brazil). |

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BIBLIOGRAPHY


