

Promoting Energy Efficiency

International Development Finance Club

Energy Efficiency Working Group

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PREFACE

The International Development Finance Club (IDFC) has brought together 20 national, bilateral and regional development banks from Africa, Asia, Europe, and Central and South America to pool their global expertise, best practices and in-depth local know-how on strategic topics of mutual interest. Members finance a wide range of projects, from poverty alleviation and habitat protection to education, health, and public transportation. The primary objective of the club is to address the major obstacles facing development finance today by joining forces on the issues currently defining the global agenda.

This paper was developed by the IDFC Energy Efficiency Working Group. The project was initiated by the IDFC in 2012, as part of a multi-year plan to share experiences, explore new financing tools, and identify concrete measures to strengthen interbank financial cooperation in the club's four main strategic areas: renewable energy, energy efficiency, sustainable infrastructure, and social and economic inclusion.

Energy efficiency is an imperative mission of today's leaders in order to achieve our ambitious goal of realizing sustainable development for the decades to come. However, the financial gap remains extremely high and the financing needs to be scaled-up from 177 billion USD in 2020 to 290 billion in 2035.

This paper summarizes some of the key trend in the world's efforts in energy efficiency promotion and the IDFC members' experience in supporting them. Various sources and instruments for financing energy efficiency investment are also examined, with an emphasis on innovative mechanisms for leveraging public and private sector funds. In particular, this paper highlights the lessons learned and best practices from some of the IDFC's members.

We hope this publication will provide valuable insight and catalyze further dialogue among governments, investors, and other stakeholders regarding the role of development banks in energy efficiency promotion. It is our wish to contribute to the discussion on the Post-2015 Development Agenda and contribute to our efforts to shape sustainable future.

EXECUTIVE SUMMARY

By reviewing the world's efforts in energy efficiency promotion and the IDFC members' experience in supporting them, this report aims to provide the members' best practices and lessons learnt for energy efficiency promotion and thereby to contribute to encourage wide exchange of information and knowledge on the issue.

Energy efficiency is an imperative mission of today's leaders in order to achieve our ambitious goal of realizing sustainable development for the decades to come. As IEA points out, energy efficiency would greatly contribute to moderate the future energy demand, foster sustainable economic growth, and provide the most cost-efficient mitigation measures against climate change. Despite the world's efforts in the past decades, the recent years have seen a slowdown in the pace of energy efficiency activities. To alter this trend, the leaders of countries are setting the ambitious targets and striving to take a wide range of countermeasures.

However, barriers to energy efficiency are multifold, stretching over issues concerning institutional and legal frameworks, financial and economic incentives, and information, knowledge and technology gaps. Therefore, efforts to promote energy efficiency require cross-sectoral, holistic and sequencing approaches, addressing the major barriers to energy efficiency. Setting right policy, regulatory and incentive framework is indispensable to create proper-functioning market. Introducing effective funding mechanism as well as capacity development of relevant actors is all critical. And measures required are contextual and vary significantly from country to country, from time to time.

Investment gap for energy efficiency remains substantial. Under IEA's scenario pursuing CO₂ emission reduction by 4.6 gigatonnes (Gt) by 2035, energy efficiency financing needs to be scaled-up from 177 billion USD in 2020 to 290 billion in 2035. Engineering effective financing mechanism, as part of comprehensive policy package mentioned above, is essential to scale up energy efficiency programs. It is also important to bear in mind that energy efficiency programs are often endowed with specific characteristics, which give rise to perceived high risk and higher transactions, preventing financial institutions from engaging in the investment. Effective measures to overcome these barriers have to be put in place and this is where governments and public institutions including DFIs can play significant roles.

A review on the IDFC members' experiences in promoting energy efficiency highlighted the complexity of the issue and the richness of the members' measures address them. The IDFC's contributions to the area reached 23 billion USD in 2012, and have proven effective in creating the market and enhance its functions and sustainability. Their common business model of lending through local private financial institutions is useful for delivering energy efficiency financing. This makes it possible to mobilize local financial resources, to tap large segments of the market, and can ensure the sustainability of the investment. It also helps to develop capacity of the local private financial institutions for energy efficiency investments, contributing to enhancement of the country's financial infrastructure. Other areas of competence include their abilities to provide risk-sharing mechanisms, to set up mechanisms to bundle smaller projects in order to decrease the transaction costs and create robust demands. They are also strong in creating enabling environment such policy reforms through policy dialogues, budget support and technical assistances.

As we look into the future, our efforts for energy efficiency must be significantly accelerated. To this end, mechanisms to scale up energy efficiency financing, better support to up-stream energy development planning, and establishing models to strengthen the functioning of the market through minimum public support are the all areas that require further analysis and collaboration among stakeholders such as government, DFIs, IFIs and the private sector. The IDFC is well-positioned itself in the international society as the candid forum for advancing such dialogue, and is expected to play a leading role.

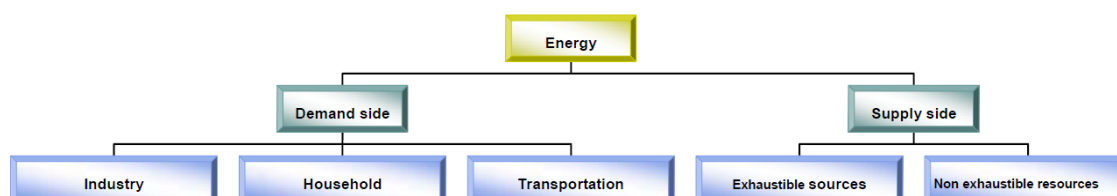
CHAPTER 1. INTRODUCTION

1.1 Purpose of the Study

As a part of the world's efforts to achieve sustainable use of energy, this report intends to provide the best practices and lesson learnt from the experiences of IDFC members in promoting energy efficiency. It will be released in two parts from 2013 to 2014. This 2013 report focuses on demand-side cases of energy efficiency, with supply-side cases being the focus of the 2014 report.

Figure 1 illustrates the classification of the demand and supply side of energy efficiency. The demand side contains three main categories: the industrial sector, the household sector and the transportation sector. On the demand side, buildings are one of the most important targets for energy efficiency policies because they consume about 40% of the world's final energy. The category includes non-renewable and renewable sources of energy.

Figure 1 Classification of “Demand Side” and “Supply Side” of Energy



1.2 Why Energy Efficiency?

The most important rational for advancing energy efficiency is that it has the greatest potential for moderating future energy demand. The International Energy Association (IEA) estimates that the global demand for energy will increase by 35% by the year 2035 (IEA, 2012). However, a quick literature review reveals that we are not fully exploiting the potential of energy efficiency activities to save energy for the future generation¹.

As we look at the recent past, increased energy efficiency has played an important role in slowing the growth in energy demand. According to the IEA's World Energy Outlook 2012, energy intensity² improved at an average of 1% per year from 1980 to 2010. Without those improvements in energy efficiency, global demand for energy would have been 35% higher in 2010.

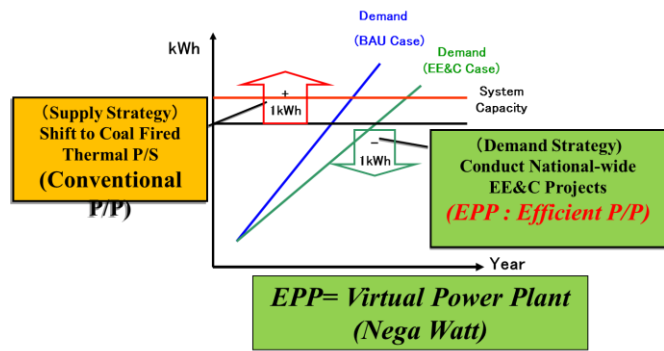
Looking towards the future, energy efficiency could be the overwhelming factor contributing towards reduced energy demand. The IEA estimates that energy efficiency could account for as much as 70% of the reduction in global energy demand, assuming nations pursue recent commitments to energy efficiency policies (IEA 2012). In fact, improving energy efficiency can bring the benefit equivalent to creating a new energy source and there are on-going efforts to shed the light to energy saved and encourage behavioral change toward energy efficiency. The concept of Negawatt power, a theoretical unit of power representing an amount of saved energy, is increasingly used to promote energy efficiency. When considering effective countermeasures

¹ In the case of Uzbekistan, one of the world's most energy intensive countries, a World Bank survey revealed that more than 60% of the primary energy for energy services are lost in processing and delivery system (<http://www.worldbank.org/en/results/2013/04/30/uzbekistan-the-economics-of-efficiency>)

² The amount of energy consumed to produce one unit of gross domestic product or GDP

against the increasing power demand, it is important to compare the economic efficiency of supply side (through conventional power plant construction) and demand side (Negawatt achieved by investing in energy efficiency). According to the World Bank and Inter-American Development Bank, 16 billion USD investment in energy efficient technology and equipment in the Latin American and Caribbean countries, would reduce 143,000GWh of power consumption. This would results in saving up to 53 billion USD investment in the construction of conventional thermal power plants (World Bank and IDFC, 2009). Furthermore, avoiding the construction of conventional thermal power plants would also produce fiscal gains through the reduction of energy subsidies as well as consumer’s benefits through power price reduction. All of these factors have to be taken into account when exploring options to meet increasing energy demand.

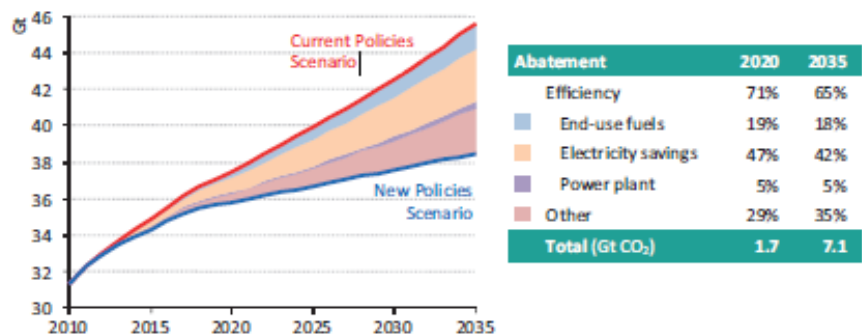
Figure 2 Meeting growing electricity demand through energy efficiency and conservation



Source: J-Power “Promotion of Energy Efficiency and Conservation”

In the long run, energy efficiency is strategically important in achieving sustainable development. On the macroeconomic point of view, it is estimated that investments in energy efficiency would further boost global economic growth by an additional \$18 trillion by 2035. Global investments in energy efficiency do not only ease the pressure for new oil discoveries and development, but also can be offset by reductions in fuel expenditures. In this way, it helps to reduce a country’s reliance on imported energy and thereby improve its energy security (IEA, 2012). Looking from environmental points of view, energy efficiency is considered to be one of the most cost-efficient among climate change mitigation measures, thus instrumental in realizing sustainable development (IEA 2009). IEA estimates that energy efficiency measures in a scenario under feasible policy and economic options would reduce CO₂ emissions by 4.6 gigatonnes (Gt) in 2035, compared to a business-as-usual scenario. This saving accounts for 65% of total CO₂ reduction in 2035 (IEA, 2012).

Figure 3 Contribution of change in CO2 emissions by policies in the New Policies Scenario compared with the Current Policies Scenario

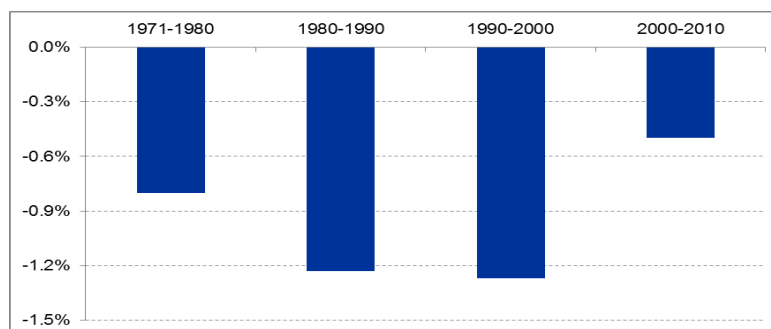


Source: IEA, World Economic Outlook 2012

1.3 General Status of Energy Efficiency

Global energy intensity has significantly decreased since 1980, but many of the gains were produced in the first 20 years from 1980 to 2000 when annual declines averaged about 1.2%. In recent years, as global economic activity has shifted to Asia, the decline in energy intensity has slowed to an average of only 0.5% per year. Many of the Asian economies have been more reliant on energy-intensive industries and coal-fired power generation. In the long run, economic growth in Africa will have similar impacts in the decline in energy intensity.

Figure 4 Global energy intensity average annual growth rates, 1971-2020



Source: IEA, World Energy Outlook 2012

Responding to this slowing trend, several countries have made further steps to adopt new energy efficiency legislation and in the recent years, the world's large energy consumers have set more stringent targets as energy-efficient technology, policies and managements techniques are being widely dispersed. China plans to reduce its energy intensity by 16%; the US has adopted a fuel target of 54 mpg (miles per gallon) by 2025 and 24 states are pursuing individual energy efficiency targets. The European Union and Japan also strive to make further progress. The European Union looks to cut energy demand by 20% by 2020, while Japan has targeted a 10% reduction in electricity consumption by 2030 (IEA 2012).

In addition to these large energy-consumers, others are pursuing energy efficiency policies, making it as an integral part of their energy policies. Brazil, India, and Russia have all adopted cross-sectoral legislation in recent years. Brazil aims to reduce projected power consumption by 10% by 2030; India aims to improve energy efficiency, with a previous 5 year goal of 20% from 2007 to 2012; and Russia has set a goal of reducing energy intensity by 40% by 2020 (IEA 2012).

1.4 Challenges in Energy Efficiency

Despite the prospective gains from energy efficiency, there exists a wide array of barriers that has to be overcome, since energy efficiency is about changing the behaviors of a milliard of energy consumers from individual households to large utilities. A review of major literatures reveals that these barriers can be categorized into three dimensions; (i) institutional and organizational, (ii) financial and economic, (iii) knowledge, information and technology, whose overviews are given below;

- (i) Institutional and Organizational Barriers
 - ✓ Lack of policies, legal and regulatory frameworks and enforcement
 - ✓ Limited institutional capacity (both in public and private)
 - ✓ Fragmentation in energy consumption (split among a diverse range of end-users and users), business models (focusing on either supply or demand side), and supply chains

- (ii) Financial and Economic Barriers
 - ✓ Energy prices
 - ✓ Unfavorable or mal-functioning market structures
 - ✓ Insufficient finance available
 - ✓ Lack of financial Incentives/ Split incentives³
- (iii) Knowledge and Information Barriers
 - ✓ Low awareness of the value of energy efficiency
 - ✓ Lack of information, education and training
 - ✓ Lack of energy efficiency technologies available
 - ✓ Lack of infrastructure

In emerging and developing economies, these barriers can often be compounded by additional challenges. The most visible is weak governing structure for energy efficiency, lack of enabling frameworks such as laws and decrees and its enforcement, lack of effective institutional arrangements and co-ordination mechanisms among stakeholders. Limited capacity of public institutions in charge of energy efficiency is often cited as another significant bottleneck. Emerging and developing economies are also faced by a challenge of reconciling energy efficiency and other important political missions such as providing energy necessary for economic growth. Other impeding factors include; lack of data that enables right decision-making, and limited market attractiveness to investors due to smaller transaction scales, high transaction costs⁴, and uncertain investment risks and returns.⁵

1.5 Measures to Overcome Barriers

Measures to promote energy efficiency vary significantly depending on the country's economic, social and political situation, and preferences. However, what is needed in common is that energy efficiency, must be tackled through cross-sectoral, holistic and sequencing approaches that encompass measures to address the three main barriers: (i) institutional and organizational, (ii) financial and economic, (iii) knowledge, information and technology.

The first category of measures is to overcome institutional and organizational barriers. It is about policy regulatory, and institutional arrangements that intend to induce the appropriate market conditions, and to drive user/ consumer choice towards the most cost effective solutions. They could include regulation that sets energy efficiency requirements for consumers and utilities and/ or for equipment and buildings. Mainly targeting large enterprises, some countries impose energy efficiency targets on energy consumers and ensure their enforcement through energy-auditing and reporting.

The second category concerns removing financial and economic barriers and promoting market instruments. Especially at the earlier stage of the market development, this can be facilitated by financial support and incentive mechanisms such as deployment of specific financing schemes to energy efficiency equipment and activities. At the later stage, measures such as Demand Responses, and Energy Service Company (ESCO) are also instrumental.

The last category of measures involves information and education for end-users. By raising consumers' awareness and encouraging their engagement in energy efficiency activities, they serve to create demands and set conditions for the market to be developed and functioning in a sustainable manner. R&D and dissemination of technology and expertise are also important elements.

³ "the potential difficulties in motivating one party to act in the best interests of another when they may have different goals and/or different levels of information". (IEA 2012)

⁴ Energy efficiency project often involves high transaction costs that are estimated between 9% and 40%, with smaller projects usually accompanied by the largest increase, . (IEA 2012)

⁵ International Energy Forum (IEF), Background Paper for the IEF Symposium on Energy Efficiency in Developing Countries, 2011

Table 1 Measures to Promote Energy Efficiency

1. Policy and Regulatory Measures	
Regulation on energy efficiency requirements for consumers and utilities	✓ Compulsory activities, such as energy audits and energy management and activities either/ both by internal or external human resources (often energy managers) on utilities and enterprises with certain energy consumption (e.g. Italy, Japan, India, Thailand, Vietnam, China) ✓ Compulsory investments on private companies ✓ Energy consumption reduction targets
Regulation on equipment and buildings	✓ Minimum energy performance standards (MEPS) (specification on performance requirements for equipment and devices that limits the maximum amount of energy that may be consumed by the product) ✓ EE Labeling system (indicating energy performance of equipment and devices)(mandatory; China, India, Singapore, Vietnam and Indonesia, optional; Japan and Thailand)
2. Financial Support and Incentive Mechanisms	
Pricing Mechanisms including Demand-side Management (DSM)	✓ Variable tariffs in which higher energy consumption results in higher unit prices ✓ DM: Incentivizing changes in electric use by end-users by setting varying electricity prices over time or by providing incentive payments designed to induce lower electricity use at times of high market prices⁶
Financing mechanism and incentives	✓ Grants, subsidies and tax incentives for energy efficiency investments ✓ Direct procurement of EE goods and services ✓ Subsidies or soft loans or revolving funds for energy efficiency investment and equipment ✓ Subsidies for audits ✓ Project preparation facilities
Energy Service Company (ESCO)	✓ A business that provides EE and other services (including development, implementation, financing of projects) and for which performance contracting is a core part of its services⁷ (definitions varies significantly from country to country) ✓ Leasing scheme as simplified ESCO scheme
3. Information and Education	
Information and Education	✓ Public information campaigns and promotions ✓ School education ✓ Technology development, demonstration and dissemination

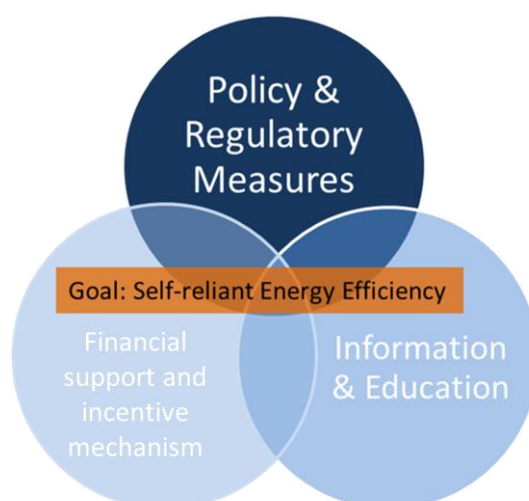
Source: Made by the author using reports; Energy Efficiency Governance (OECD/IEA, 2010) and JICA 2013

A comprehensive policy package covering the three categories of measures has proven critical for successful promotion of energy efficiency in many countries. In a number of developing countries, for example, their governments have introduced legal and regulatory frameworks but failed to enforce them as they lack information and education system and/ or financial support or incentive mechanisms. Addressing these measures in an integrated, balanced and well-sequenced manner is a key to achieving energy efficiency and ensuring its sustainability.

⁶ The US Federal Energy Regulatory Commission, HP
<http://energy.gov/oe/services/electricity-policy-coordination-and-implementation/state-and-regional-policy-assistance>

⁷ UNESCAP, Low carbon Green Growth Roadmap for Asia and the Pacific: Fact Sheet
http://www.unescap.org/esd/environment/kgg/documents/roadmap/case_study_fact_sheets/Fact%20Sheets/FS-Energy-Service-Companies.pdf

Figure 5 Comprehensive policy package to promote energy efficiency



1.6 Financing Energy Efficiency

The investment gap for energy efficiency remains substantial. Under IEA's scenario which aims at CO₂ emission reduction by 4.6 gigatonnes (Gt) by 2035, energy efficiency financing needs to be scaled-up from 177 billion USD in 2020 to 290 billion in 2035 (IEA, 2012). Engineering effective financing mechanism, as part of comprehensive policy package mentioned in the previous section, is essential for successfully implementing energy efficiency projects. This session briefly discusses challenges and possible countermeasures in this area.

Energy efficiency programs are often endowed with specific characteristics that prevent commercial financial institutions from engaging in the investment. The following factors are often heard as persisting barriers to energy efficiency investments (EU 2010, WB 2008).

- (i) Information gap
 - ✓ On customer side: lack of awareness on benefits or misunderstanding of technical and financial risk of energy efficient projects (usually perceived as high)
 - ✓ On financier side: lack of knowledge in general and in experience in financing energy efficient projects
- (ii) Banks' perception on energy efficiency projects
 - ✓ Most of energy efficiency projects are smaller-sized and they are categorized as niche business for financial institutions, with higher transaction costs compared to conventional larger energy projects
- (iii) Structural impediments
 - ✓ Smaller energy efficiency equipment/ facilities have low collateral asset value, making it difficult to set up appropriate financing structure
 - ✓ Treating cash flows from energy saving as revenues is less common in asset-based markets, measuring and verifying the flows is not easy. This discourages financial institutions from entering the market

Addressing some of the above challenges, different financial instruments are introduced to finance energy efficiency programs, mostly in combination or with certain modifications. They include debt-financing, guarantees, bonds, equity finance and subordinated debt financing (mezzanine finance). Among them, debt-financing is the most commonly used instrument. In many cases, loans are provided in project financing (off balance sheet financing) structure, and/ or with guarantees to mitigate risks associated with the project. The table below summarizes financial instruments and delivery mechanisms which are commonly provided by public and private financial institutions.

Table 2 Financing Options for Energy Efficiency Projects

1. Financial Instruments	
Loans	✓ Most common instrument available for energy efficiency projects. ✓ Mostly given in a form of project finance, particularly in ESCO financing mechanisms. In case of direct lending to the energy end-users, the end-user credit risks are assumed by the financier and technical and performance risks by ESCO and/ or the end-users depending on the contract. When an ESCO company is the direct borrower, the financier has to examine financial and technical performances of the project as well as of the ESCO, and the project contracts, in addition to the end-user credit risk. ✓ The fact that (i) cash flows from energy savings do not often constitute conventional revenues, and (ii) energy efficiency equipment represent low asset value, debt financing for energy efficiency project is often based on the debtor's creditworthiness or additional collateral is required. In such circumstances, risk-sharing mechanisms such as guarantee, is often deployed.
Guarantees	✓ Useful to "de-risk" and increase access to financial products such as loans. It is especially helpful in the context where international risk management oblige banks and leasing companies to demand assets as collaterals, which is often difficult in energy efficiency projects. ✓ However, when domestic financial systems face liquidity constraints, effectiveness of guarantee is limited. ✓ Although experiences are still limited, there are emerging experiences with insurance products such as Energy Savings Insurance where the insurer agrees to pay any shortfall in energy savings compared to the pre-agreed baseline, in exchange for a premium.
Bonds	✓ Issuing bonds can be effective for procuring finance for energy efficiency projects and sometime done by, for example, municipal governments ✓ However, the process requires substantial resources and sometimes can cause cash-flow constraints to the bond issuers.
Equity Financing	✓ A useful measure to promote energy efficiency, particularly to encourage ESCO mechanism development through providing them with capital and improving their balance sheet by improving cash flow (although experiences are still limited)
Subordinated Debt Financing	✓ Functioning as a complementary or alternative solution to portfolio guarantees. Useful to raise capital by "cheaper" finance than through the equity market, without compromising any control of the company. ✓ Can be most useful in the economies with well-developed capital markets, and in addressing companies with stable cash flows and higher growth prospects.
2. Project Financing	
Project Financing	✓ Off-balance sheet financing to a project, through project debt and equity, sourced by a set of different actors. It is attractive in terms of risk management and financing flexibility. ✓ However, it often involves higher transaction costs therefore end up imposing higher investment threshold.
Leasing	✓ Often introduced to lower the initial cost by equipment manufactures/ vendors, as part of an energy efficiency project finance package. Especially useful in projects in which physical assets represent the large part of the expenditure.

In reality, however, these financial instruments are not easily accessible or do not function well to achieve expected outcomes especially where the perceived risks are high, the above-mentioned barriers persist, and markets are at their infancy or incompleteness. This is where governments can effectively intervene in order to improve market functions through demand creation, reduction of transaction costs, risk sharing and enhancement of financial intermediation mechanism by public and private financial institutions. A wide range of financial instruments and mechanisms are used, of which the most common schemes include: grant programs, soft loans, and tax incentives (through capital gain tax, property tax and VAT reduction).

In many countries and sectors, development finance institutions (DFIs)' interventions constitute a significant part of the governments' measures to implement their economic and social policies. They provide supplementary assistance to market-based private financial mechanism by catalyzing required resources. In the case of energy efficiency programs, too, DFIs play important roles in removing barriers associated with energy efficiency investments and creating functioning markets through interventions such as

- (i) credit lines for on-lending to projects,
- (ii) guarantees and risk sharing facilities,
- (iii) subordinated debt financing,
- (iv) grant schemes,
- (v) technical assistance to enhance the awareness and capacities of main stakeholders such as industrial clusters and local financial institutions, and
- (vi) facilitation of policy dialogues and reforms to ensure enabling environment for energy efficiency investments.

DFI support programs are often provided through local private financial institutions. Practically, this is because the size of energy efficiency investments tends to be smaller, making it difficult to provide direct financing to end-users. This approach is also effective to strengthen the capacity of local private financial institutions as financial intermediary and to mobilize domestic resources to energy efficiency programs. Where capacities of local financial institutions are limited, DFIs provide technical assistances to enhance their project appraisal and screening capacities and contracting procedures to minimize transaction costs. Furthermore, DFI supports are sometimes extended to create robust demands for energy efficiency financing. Working together, DFIs and local financial institutions strive to come up with effective financial instruments suitable to specific needs, and mechanisms to bundle small projects. Where circumstances require, they initiate activities to reach out end-users to increase demands through awareness campaigns or promoting energy audits.

In next Chapter, experiences by the IDFC members will be discussed in more detail.

CHAPTER 2. IDFC EFFORTS IN PROMOTING ENERGY EFFICIENCY

As mentioned earlier, promotion of energy efficiency requires cross-sectoral, holistic and sequencing approaches addressing a wide range of issues from policy, law and regulations, financial support and incentive mechanisms, and information and education. Governments play a significant role in this process and most of the times utilize public financing to support the creation or proper function of the energy efficiency market through its institutions including DFIs. The aim of this Chapter is to provide an overview of IDFC members' experiences in promoting energy efficiency in developing countries and analysis on their good practices and lessons learnt.

2.1 Overview

The IDFC, a network of 20 leading national, bilateral and regional development banks, is renowned for its strong commitment to inclusive and sustainable development. Green investment is one of their priority areas and their commitment exceeded 95 USD in 2012, of which the largest share went to green energy and greenhouse gas mitigation. The Club members have also strong track record in providing a variety of expertise to their clients from policy to technical advices and support. Naturally, the IDFC members' engagement in energy efficiency promotion is substantial in terms of volume and impact. A mapping of their activities highlights that their finance reached 23 billion.

2.2 IDFC Members' Good Practices and Lessons Learnt

This section provides IDFC members' experiences and lessons learnt in energy efficiency programs. They are selected to give readers insights into how they take strategic approaches to remove the three major barriers to energy efficiency and successfully achieve tangible outcomes.

Table 3 Measures to Promote Energy Efficiency

1. Policy and Regulatory Measures
Regulation on energy efficiency requirements for consumers and utilities
Regulation on equipment and buildings
2. Financial Support and Incentive Mechanisms
Pricing Mechanisms including Demand Response (DM)
Financing mechanism and incentive
Energy Service Company (ESCO)
3. Information, Education and Technology
Information and Education, technology

(1) Policy and Regulatory Measures

JICA's Holistic Approach to Energy Efficiency: Case study from Vietnam

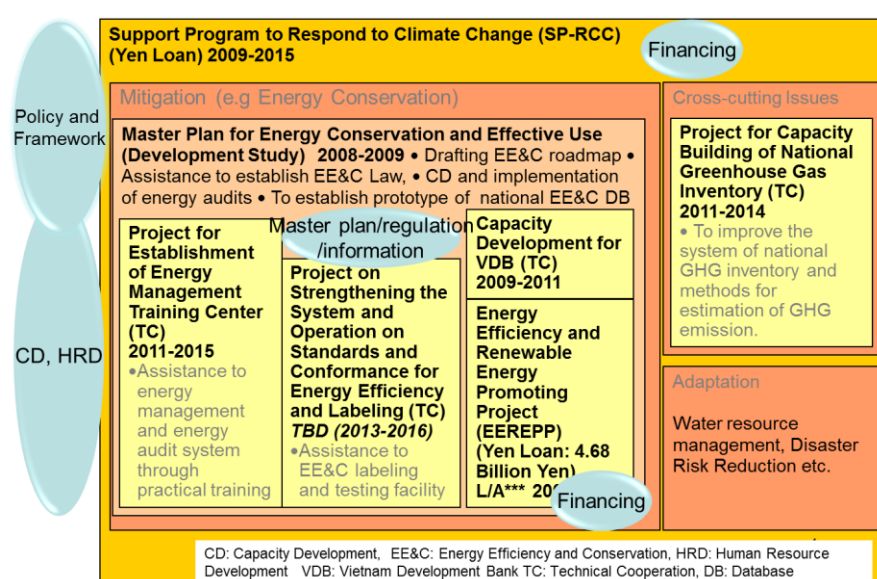
JICA provides a holistic approach to promote energy efficiency and conservation in Vietnam (figure 6). From 2008 to 2009, "Master Plan Study on Energy Conservation and Efficiency Promotion" has been implemented to develop a roadmap in promoting energy efficiency, leading to the enactment of the "Law on Energy Efficiency and Conservation" in 2011. The roadmap and the law set an important foundation for the Vietnamese Government to pursue energy efficiency policies through the best mix of obligations and

incentives.

This was followed by assistance in the mode of low interest loans under “Energy Efficiency and Renewable Energy Promoting Project”. The Project provides financial incentives to end-users’ energy efficiency and renewable energy investments through Vietnam Development Bank (VDB). The credit line reached 40 million USD.

Furthermore, JICA is implementing technical cooperation projects to facilitate technology transfer to the two main pillars of the energy efficiency law. The first one, “Project for Establishment of Energy Management Training Center (2011-2015)”, is to support the energy management and energy audit system through institutional and capacity development of stakeholders. The second one is “Project on Strengthening the System and Operation on Standards and Conformance for Energy Efficiency and Labeling” which intends to support the energy labeling program to promote energy efficiency equipment.

Figure 6 JICA's Holistic Approach to Promote Energy Efficiency in Vietnam



While implementing these projects, the possibility of collaboration with Japanese industrial groups such as the Japanese Business Alliance for Smart Energy Worldwide (JASE-W) has been sought in order to facilitate cooperation between public and private sectors in both countries. Through policy dialogue among related stakeholders, key milestones of these projects are selected as policy actions, and their implementations are facilitated by a program loan (budget support to the government), namely “Support Program to Respond to Climate Change (SPRCC)”, which was co-financed among AFD, CIDA, AusAID, Korea-Exim Bank, and the World Bank since 2009.

The following holistic and sequencing approaches taken in the program, in combination with capacity development of relevant stakeholders, are a good example in addressing three barriers to energy efficiency that were explained in 1.5.

- policy and regulatory arrangements through the support to drafting energy conservation law and roadmap), and additional support to policy implementation through additional technical assistance (e.g. Project for Establishment of Energy Management Training Center) and financial assistance (e.g. SPRCC).
- financial support and incentive mechanism through the soft loans provided to energy efficiency investment by energy consumers through the VDB, and

- (iii) setting basis for demand creation through development of prototype on energy database, promotion of energy auditing, and awareness raising activities.

(2) Financial Support and Incentive Mechanisms

Bancóldex' Efforts to Promote Energy Efficiency through ESCO Mechanism

As a development bank, Bancóldex works to boost productivity and competitiveness of Colombia's business sector. Ensuring compliance with the Ministry's of Commerce, Industry and Tourism Action Plan and the Colombian National Development Plan, Bancóldex has been carrying out a number of activities under an environmental strategy framework, considering five blocks of action: a.) eco-efficiency, b.) management of environmental and social risks, c.) signing to protocols and sustainability initiatives; d.) sustainable development training programs for financial intermediaries and companies, and e.) design of new green financial products⁸.

Based on these blocks of actions, Bancóldex, aware of the great potential in Colombia to reduce emissions of greenhouse gases through energy efficiency measures, is designing an innovative model of financial instrument in order to encourage energy efficiency investments through building trust between the client and the Energy Service Company - ESCO and providing financial resources for implementation by means of a contract in which performance indicators are established, an insurance policy to support any breach to the contract. There is also a neutral entity which evaluates the ESCO's technical capacity, its performance indicators according to the contract and settles any differences between the ESCO and its client.

Energy savings percentages will be established in the contract as performance indicators that the ESCO will work to reach as a compromise to its client. Also, the contract will stipulate a figure of the whole value of the project that the client will provide in order to periodically pay the ESCO according to its achievements in energy savings.

If the ESCO fails to achieve the established indicators for any reason, the client will keep the amount correspondent to the unsuccessful savings from the figure stipulated in the contract. In case the figure is not enough to pay the client, the insurance policy will assume the difference.

This financial instrument will be made available in the first quarter of 2014

CABEI's Assistance to Green Micro, Small and Medium Enterprises

In 2008 CABEI approved its "Strategy to Support the Energy Sector in Central America", with the aim to "Provide financial solutions to promote energy efficiency, promoting the development of renewable energy sources and reducing dependence of renewable energy sources in Central America" in line with its Institutional Strategy 2010-2014: "Integrating Competitiveness and Social Development". This Strategy recognizes the need to promote energy efficiency in Central America in order to reduce dependence on hydrocarbons through the reduction of the demand, which is much more efficient and economical to increase the offer. CABEI has planted as first guideline, within the Strategy, to promote the implementation of energy efficiency in all energy

⁸ a) Eco-efficiency answers to all actions within the bank, aiming to reduce Bancóldex's environmental impact/ b) The managing environmental and social risks strategy focuses on raising awareness of both, financial intermediaries and companies, on the importance of preventing and mitigating the negative effects of business activities on the environment/ c) Signing to protocols and sustainability initiatives allows Bancóldex to strengthen its sustainable development strategy and acquired clear commitments to adopt sustainability principles in a national and international level/ d) The sustainable development training programs for financial intermediaries and companies seeks to provide the necessary tools for decision-making to the business and financial sectors that contributes to sustainable development/ e) As part of the new green financial products design block, Bancóldex offers a specific loan called "Sustainable Development and Renewable Energy", which funds projects to prevent and mitigate the negative effects of business activity on the environment and support the use or generation of renewable energy. Bancóldex is also structuring two new instruments to encourage sustainable transport and energy efficiency investments in the service sector.

sources. Consequently, in June 2009, it approved the CABEI Energy Efficiency Program, which aims to boost energy efficiency in order to reduce dependence on fossil fuels in the region and the emission of harmful gases to atmosphere. This program allows CABEI to frame energy efficiency projects serving the Bank's Energy focus area within three related sectors: Electricity, Fossil Fuels and Construction although the participation of CABEI on energy efficiency projects to date remains limited mainly due to the need for the Central America governments to increase its generation offer to meet the growing demand

CABEI has established an Initiative named Green Micro, Small and Medium Enterprises (MV) with the financial support of the Government of Germany, through KfW, and the European Union as part of its Latin American Investment Facility (LAIF). The Initiative has reimbursable and non-reimbursable resources that are used to boost the development of small projects for energy efficiency and renewable energy, and allocate funding through Central America financial institutions. Through this initiative, CABEI has elaborated a good number of Energy Audits on several companies, which are expected to finance future projects. The following provides an outline of the initiative.

- (i) Participants of this Initiative: All intermediary financial institutions (IFIs) that have a "Global Credit Line" with CABEI.
- (ii) Beneficiaries: All persons or institutions wishing to undertake environmentally friendly projects, focused on Energy Efficiency and Renewable Energy.
- (iii) Coverage: regional, serving all applications that are located in the countries of Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica.
- (iv) General conditions of the initiative
 - Maximum Amount to finance: Up to US\$5,000 thousand per project.
 - Beneficiaries: All Micro, Small and Medium Enterprise customers and potential customers of the financial institution with up to 100 employees.
 - Eligible Investments in Energy Efficiency Financing:
 - Equipment or investments for the improvement and efficient use systems: Lighting, Refrigeration, Air-conditioning, boilers and steam networks, stoves and ovens.
 - Equipment or investments to correct problems of distortion and power factor.
 - Investments to energy recovery
 - Industrial Cogeneration Projects
 - Investments to use alternative fuel or equipment that replace fossil fuels (gasoline, diesel, coal)
 - Technical cooperation component: Technical Assistance to Financial Institutions up to US\$120 thousand; Energy Audits up to US\$7 thousand. Finance studies to identify potential energy saving projects and investments in renewable energy production, such as: Energy Audits, Feasibility Studies, Environmental Impact Studies, Research Updates, among others.

CAF's Financial and Technical Assistance for demand side energy efficiency

While CAF's main focus has historically been on providing funds and technical assistance to supply side players, it is now developing expanded regional programs and working with multilateral, regional and local institutions, to boost its financial and technical assistance for demand side projects as well.

In partnership with KfW, the Government of Germany, and the European Union's Latin American Investment Facility (LAIF), CAF has begun structuring an Energy Efficiency Regional Program that seeks to mobilize support for energy efficiency measures in Latin America, both on the supply and demand side. The program has two main tools: a credit line and a technical assistance fund. The technical assistance fund aims to help mitigate the complexity of the proposed projects. It will provide assistance for the identification, structuring and pre-feasibility studies of energy efficiency projects. The fund will allocate non reimbursable resources provided by the Government of Germany, the Latin American Investment Facility (LAIF) of the European Union and CAF. Once the projects have been identified as feasible, they will be financed through a credit lines made available by local banks. These two new tools are expected to launch in 2014. At the same time, CAF has already begun working with potential high energy-demand clients, looking to identify energy efficiency

projects in the early stage of feasibility analysis that may be eligible to receive technical assistance support from the fund. CAF has already identified opportunities in the metallurgical, steel, mining, chemical, and cement sectors.

On the other hand, CAF, in partnership with AFD, is developing a preliminary evaluation of the feasibility of using deep seawater air conditioning systems (SWAC) in four Caribbean islands. The energy demand for air conditioning in the Caribbean is quite extensive due to the hot climate. Among the reasons for the high electricity consumption in the region is the large volume of hotels and other air conditioned buildings. Presently, the conditioning (cooling) of air in the Caribbean islands is provided by conventional cooling systems (CCSs) that use electric power to chill water that is distributed throughout buildings to pick up heat and transfer it outside. The conventional A/C system consumes around 40% of the total electrical power used in such buildings. Deep seawater is a valuable natural resource; it can be used for energy production, cooling, desalination, aquaculture and agriculture. One of the most economically viable uses for deep seawater is to air-condition buildings using SWAC systems that could potentially help reduce electricity consumption in the Caribbean islands.

CDB's Support to Dry Quenched Coke Energy Management Contract Project

In April, 2012, Shanghai Tellhow Energy Conservation Technology Co., Ltd and Shanxi Yatai Coke Magnesium Co., Ltd executed an Energy Management Contract (EMC) regarding the installation of dry quenched coke facility to use the dry quenched coke and residual heat in flue gas of coke oven in the production process to generate steam. The total investment of the Project is RMB 300million and China Development Bank undertakes to grant a mid and long term loan of RMB 210million. The repayment source is free cash flow from the Project, which means the sales revenue of steam shared by the Borrower. The dry quenched coke technology used by this Project is an advanced technology of clean production in coking industry, which uses recycling inert gas to substitute cooling water to cool coke. This leads to water conservation by coking enterprise, reduction of air pollutant emissions. Recovery and reuse of the heat of red-hot coke effectively enhances energy efficiency and generates certain economic benefits. Upon completion of the facility, the project owner will be responsible for operation and the Borrower will be responsible for the maintenance service of the equipment. Both parties will share the benefits incurred by energy conservation during the operation period, namely the sales revenue from the produced steam. Upon expiration of operation period, the equipment will be transferred to Yatai Coke Magnesium free of charge.

In this case, China Development Bank supports professional energy conservation service provider with mid and long term loan and the recovery of investment matches the repayment progress. This has directly and effectively solved the problem of large amount of advance required for the prophase investment and difficulties in capital turnover, removed the bottleneck of financing for EMC project, and thus exerted the major advantage of EMC model in motivating the industrial enterprises to conduct technical transformation for energy conservation and reduced the capital pressure on energy conservation service provider so as to promote the swift and healthy development of energy conservation service industry under a win-win condition.

EMC is one of the top 10 key projects in the “twelfth five-year” energy conservation and emission control plan and is an effective measure to use the market mechanism to promote energy conservation and emission control and mitigate greenhouse gas emissions. CDB has supported EMC as a development focus of strategic emerging industry. The implementation of the Project has realized emission control by coking enterprises, promoted energy conservation and consumption reduction in production process, and formed an industry chain for recycling economy by producing steam for downstream and relevant enterprises through recovery of residual heat generated in production by upstream enterprises. This has realized clean production, obtained substantial economic and social benefits and explored the financing business of the Bank in strategic and emerging energy conservation field and therefore has good promotion and demonstration significance.

HBOR'S Energy Efficiency Finance Facility – EEFF2006

In relation to a Finance Contract for SMEs and Mid-Cap Loans between European Investment Bank (EIB) and HBOR, the Commission of the European Union (Commission) established an Energy Efficiency Finance Facility (EEFF2006) to finance energy efficiency investments in the buildings sector and in the industry sector.

Under the EEFF2006, the Commission is granting, inter alia, funding of investment incentives and consultants fee.

For each eligible investment, the Commission via HBOR will pay an investment incentive, which shall be limited to 15% of the Credit disbursed to the respective EEFF 2006 Sub-Project approved by the EIB and shall not exceed aggregate amount of 1.8 million EUR. Any investment incentives shall only become payable upon fulfillment of the following conditions:

Industry sector:

- Sub-projects shall relate to investments on the energy demand side of the industry sector generating at least 20% energy savings and/or CO2 reduction.
- For example, energy efficiency investments in new machinery, systems, drives, use of compressed air, ventilation, air conditioning, cooling, process heat, hot water, drying technology and electricity.

Building sector:

- Investment on the energy demand side of the building sector generating at least 30% savings and/or CO2 reduction.
- For example, energy efficiency investments in residential, industrial, office, schools and public buildings on thermal insulation, heating and cooling systems, lighting systems as well as on the promotion of the concept of passive housing i.e. taking advantage of natural ventilation, passive lighting, geothermal and biomass energy and heating from the sun.

In this framework, consultants are providing technical assistance in making assessment of the investment (energy audit) and verification of the investment. Only verified energy efficiency investment can get an incentive. Consultant's fee is calculated as a percentage of the amounts on-lent to the EEFF2006 Final Beneficiaries and shall be limited to 5% of the on-lent amount and shall not exceed aggregate amount of 600.000 EUR

HBOR's Energy Efficiency Project and the Bank Guarantee Program in accordance with the GEF Grant Agreement No TF052141

The Republic of Croatia was approved a Grant for the development of the Energy Efficiency Project (EEP) by the Global Environment Facility (GEF) with an objective of eliminating obstacles to applying cost-effective technologies and procedures for the enhancement of energy efficiency and the development of the market for goods and services relating to energy efficiency. The International Bank for Reconstruction and Development (IBRD) and the United Nations Development Program (UNDP) participate as the Grant implementing agencies.

On 10th November 2003, the Republic of Croatia represented by Ministry of Finance (hereinafter: the Ministry) and the IBRD entered into the Grant Agreement No TF 052141 in an amount of USD 7.0 million for the purpose of implementing EEP.

On the same day, the IBRD and Hrvatska banka za obnovu i razvitak (HBOR) entered into the Project Agreement related to the Grant Agreement, under which HBOR is obliged to protect the objectives of the Project and to implement the part C of the Project – Bank Guarantee Issuance Programme (hereinafter: Programme) – in accordance with the technical, financial and environmental practices as well as to provide the funds, premises, services and other assets needed for the Programme. Within this framework, the Grant Implementation Agreement was effectuated by the Ministry and HBOR on 31st March 2004 and the Grant funds are made available to HBOR up to the equivalent value of USD 2.0 million with an obligation to

implement the Programme.

In accordance with the Program, HBOR issues a bank guarantee to the commercial banks over their loans granted to customers' energy efficiency projects, either from their own funds or from funds HBOR. The guarantee covers 50% of the bank's loan amount.

In accordance with the Program, HBOR has concluded agreements on business cooperation by the program issuing bank guarantees with 3 banks, creating a precondition for the start of the Program:

- Raiffeisen Bank Austria dd (18 January 2008.)
- OTP Bank Croatia dd, (January 21st 2008.)
- PBZ dd (22 December 2008.).

So far a total withdrawn amount of the guarantee account (GFA) is \$ 900,000.00. Following the available funds, HBOR will proceed with issuance of bank guarantees for energy efficiency projects.

Energy Efficiency Project Finance Program : A Joint Program by Indonesia Eximbank (IEB) and Asian Development Bank (ADB)

Indonesia Eximbank (IEB) as national export agencies provides financing, guarantee, insurance, and consultation for non-bankable clients in order to leverage client's export capacity. It also commits to support government policy in climate changing issue, such as providing financing to companies that promote investment in reducing greenhouse gases and promote energy efficiency.

One of IEB's experience in promoting energy efficiency financing is its involvement in Energy Efficiency (EE) Project Finance Program from ADB. ADB provided Non Sovereign Loan Facility with total facility amount USD 200 million USD of which 30 million USD must be dedicated for Energy Efficiency financing. All of the USD 30 million fund has been drawn by IEB since 31 March 2012. As the commitment, IEB must distribute the funds to clients that can perform energy efficiency projects.

The objective of the program is to reduce existing barriers for energy-consuming export-import industrial facility owners in Indonesia to obtain local debt financing for properly implemented EEPs on commercially attractive terms. In order to achieve the objective, the program is developed based on three main pillars i.e. technical assistance to develop internal infrastructure of the product/activities (manuals, standard operating procedures), capacity building for IEB's human resources, and the funds itself.

The structure of financing under this program also covers activities called Project Concept Development and Investment Grade Audit. These two activities are conducted by international experts for free of charge if it is concluded that there is opportunity of implementing the program on the project and the clients agree to proceed with investment. These two activities will ensure the conformity of the project with the program.

Other characters of the financing program include: the financing under the program will not impact the core credit capacity of the client, savings generated from energy efficiency program will be treated as primary collateral and, the financing will generate positive cash-flow. Eventually, the benefits for clients who implemented this financing program will include, among others, cost savings, increasing competitiveness, and green footprint. Through the program, clients can reduce energy usage and produce efficiency in their production activities. The program also brings in benefits to IEB as handling institution. It allows creation of new loan products and provide more potentials for attracting multilateral agencies for additional grant or loan provisions.

So far IEB has promoted EE Project Finance programs in textile, food manufacturing industries, cement industries, crum rubber industries, and steel manufacturing industries. IEB is currently finalizing its first project and expecting other two projects to be implemented in the near future. Constraints to the

implementation IEB has encountered include : the character of lending in Indonesia banking industry that only provides “asset-based” lending limited to 70% asset with requirement of 100% collateral or guarantees, banks does not acknowledge (yet) that savings from EEP equals to increased credit capacity for industry hosts/clients, Industries and Service Providers have limited knowledge and experience in EE and Industries and Service Providers gets low interest in small transaction sizes and high costs investment.

KfW’s support to the Government of India in bringing in energy efficient in the residential housing sector

With KfW’s decade long experience in financing energy efficient residential buildings in Germany and the current construction boom in India which leads to increasing energy consumption and green house gas emissions, this cooperation between Germany and India has come natural and just at the right time. KfW Entwicklungsbank of Germany has extended a line of credit up to 50 million EUR to the National Housing Bank (NHB) of India and technical assistance for promotion of energy efficiency in residential buildings under the “Promotional Programme for New Residential Housing”.

The Programme provides financing for new apartments through the refinance window of NHB. Up to date, 14 million EUR have been disbursed to NHB for on lending to Housing Finance Corporations and Banks for energy efficient buildings. Under KfW’s guidance, TERI and Fraunhofer Institute for Building Physics have jointly adapted an Assessment Tool (software) for calculating, optimizing and certifying the energy efficiency of residential buildings. The tool is used to determine the eligibility of buildings for receiving financing under the Programme. On an average, the buildings refinanced under the Programme need 30% less electricity than the standard Indian apartment building.

The Programme aims at improving the electricity intensity of housing by providing soft loans for energy efficient apartments. It rewards efforts such as the use of improved design and orientation in building architecture, use of innovative and energy efficient building materials and of energy efficient building technology (cooling, water heating, lighting). The reduced electricity consumption in the residential sector will lead to significant CO₂ emission reductions. Close cooperation with the supply (builders and developers including Government housing boards and development authorities) and demand side (providers of housing finance at the individual level) will develop the sector and contribute to the policy development for the promotion of energy efficiency.

KoFC’s support for Korea’s energy efficiency in the Car Industry

The Korean government enacted the Framework Act on Low Carbon Green Growth in 2010, laying the foundation for a balanced development between the economy and the environment while using environmental technologies and industries as the new driver of growth. In line with this framework, during the Eighth Meeting of the Presidential Committee on Green Growth in July same year, Korea Finance Corporation (KoFC) was designated by the government as a leading institute in green finance. Since then, KoFC has implemented various measures to support Korea’s green growth effort including projects to enhance energy efficiency via direct and indirect loans, investments, funds, etc.

Of the many tools KoFC has at its disposal, on-lending is an advanced and market-friendly financing scheme where KoFC leverages its intermediary financial institutions network to extend funds to end-users. The intermediaries, which cover the entire commercial banking institutions in Korea, can benefit from cheap and stable funds KoFC raises based on its strong credit. In November 2010, KoFC extended a KRW50 billion on-lending loan to Hyundai Commercial, an affiliate of the Hyundai Motor Group whose business consists of industrial, corporate, and investment financing. The loan was then used for Hyundai Commercial to provide facility capital to transit bus operators to replace their old diesel-run buses with environmental-friendly vehicles that run on CNG, electricity, LPG, bio-fuels, etc. KoFC’s competitive financial resources combined with

Hyundai Commercial's capacity as a leader in Korea's commercial vehicle (e.g. buses, trucks) finance market has proved effective in promoting the purchase and distribution of environmental-friendly vehicles among public transit operators, contributing to enhancing energy efficiency of the industry on the whole.

SIDBI's Loans to Energy Programs by Micro, Small and Medium Enterprises

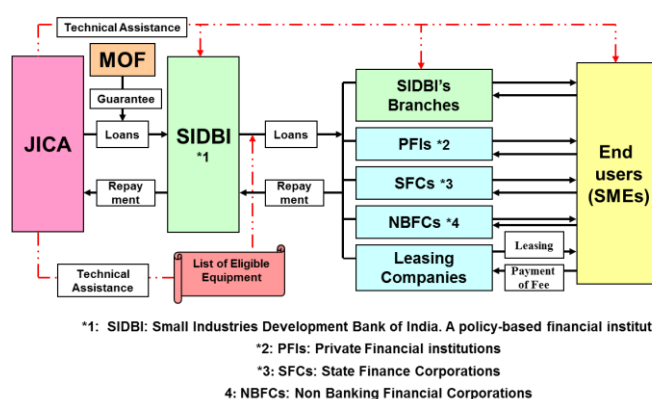
From 2008 to 2010, "Micro, Small and Medium Enterprises Energy Saving Project" was implemented in India and provided low interest loans to energy saving investments with a credit line of 3,000 million USD through Small Industries Development Bank of India (SIDBI), in cooperation with JICA. The project successfully promoted a wide range of energy efficient applications from high efficient industrial facilities to CNG⁹ taxis. The project indeed consisted of 3,539 sub-projects with an energy efficiency impact of more than 10% per application, resulting in an estimated annual electrical saving of around 500 GWh and an estimated annual thermal saving of around 450 TCal. As a result of the positive impacts from the first phase, JICA has extended a second credit line of 3,000 million USD to SIDBI from 2011. The activities are also supported by other international donors such as AFD.

The structure of the Project where loans are provided through local intermediaries to end-users has proven effective in reach out to a large number of potential users.

Another reason behind the success is the development and introduction of Energy Saving Equipment List that lists up the equipment eligible for the low interest loans provided by SIDBI. The List was developed, taking the full account of the local situation, needs of micro, small and medium enterprises and suppliers, and is regularly and systematically updated. By giving the transparent, clear-cut and up-to-date criteria for the eligible projects, the List facilitated the technical screening and appraisal of the project to the great extent. The development and updating of the Energy Saving Equipment List as well as enhancement of the banks' appraisal capacities were done in a close cooperation among the stakeholders and this facilitated the sustainable operation.

Furthermore, awareness campaign launched by the Project also contributed greatly to accelerate the demand for the energy efficiency investment. The campaign targeted industrial clusters that are pre-identified based on the volume of energy consumption and energy saving potentials. It provided them with a variety of information from energy efficiency activities in their industries and their potential benefits, together with information regarding the SIDBI's loans. The action resulted in the increase of end-users applying for the SIDBI's loans.

Figure 7 Comprehensive policy package to promote energy efficiency



Source: J-Power and JICA

⁹ CNG: Compressed Natural Gas

TSKB'S Support to Energy Efficiency Projects

With an energy intensity figure at 50% higher than that of the OECD average, Turkey's energy efficiency potential is high. A recent study by the World Bank puts Turkey's energy savings potential in the industry and buildings at 15,152,000 toe/year¹⁰. Industrial Development Bank of Turkey (TSKB) has been actively financing energy efficiency projects since 2009. Lines of credit specifically targeting to finance energy efficiency projects have been secured from international finance institutions including the World Bank, European Investment Bank, KfW, AFD, IFC and the Islamic Development Bank. The share of energy efficiency projects in the Bank's total outstanding loan portfolio has increased rapidly and currently stands at 7%. Energy efficiency projects in various sectors of the industry including iron and steel, automotive, plastics, petrochemicals and cement have been financed.

The cement industry is an ideal target for energy efficiency investments. Cement production is one of the highest energy intensive sectors in the Turkish manufacturing industry and energy costs account for 55-65% of total production costs. TSKB has initiated the financing of energy efficiency investments in cement plants which mainly incorporate "waste heat recovery power generation systems". These investments are mainly based on utilization of the energy of waste gases resulting from the production process to produce electricity. Once the investment is completed plants can produce 20-30% of the electricity consumed. TSKB, so far, has 5 projects within this scope. The share of electricity produced in total consumption varies between 23-29%, the total installed capacity is 48 MW and annual CO2 reduction is in the region of 150.000 tons per annum.

(3) Information, Education and Technology

AFD's Energy Efficiency Programs in existing buildings in Hubei Province, China

A joint research program on energy efficiency retrofit of existing public buildings in Wuhan was launched in 2007 by AFD, Ademe (French Environment and Energy Management Agency) and the Commission of Housing, Urban and Rural Development of Hubei Province, China.

The program focused on technico-economic criteria and suitable financing mechanisms to implement a large-scale program on rehabilitation of existing buildings in Wuhan. Ultimately, it is expected to facilitate the development of a market for energy efficiency retrofit in existing public buildings of Hubei Province.

AFD's contribution consisted in a sovereign loan of €20 million to the Ministry of Finance that is retroceded to Wuhan Municipality. This financing serves the implementation works, but also the studies, engineering, monitoring of the project preparation and bidding process. In parallel, an international technical assistance co-financed by AFD and Ademe supports Wuhan municipality in energy performance management.

The project finances the rehabilitation of 30 existing administrative buildings in the municipality of Wuhan, including offices, Wuhan municipal library and Wuhan hospital. Rehabilitation works are implemented in four phases, on the basis of two different retrofit scenarios: the "light" scenario includes replacement and upgrading of equipment; the "middle" scenario adds improvement on the building envelope. This demonstrative project is an opportunity to engage financial, technical and organizational aspects. Specifically, the feasibility of energy performance contracts (EPCs) is tested for the energy efficiency retrofit on these 30 buildings.

Overall, the project helps to reduce Wuhan's carbon footprint. Energy savings of about 17 million kWh annually lowers the pressure on electricity bills. Furthermore, it mobilizes local and national authorities on thermal rehabilitation programs for existing buildings.

¹⁰ Source: Turkey-Tapping the Potential for Energy Savings, IBRD 2010

2.3 Main Findings and Lessons Learnt

The IDFC members' cases demonstrate the complexity of the energy efficiency issues and the richness of the members' assistance menus prescribed to solve them. The quick review over their experiences provides us some important perspectives in energy efficiency promotion and their strengths in addressing them. This section briefly summarizes the findings and lessons learnt.

(i) Strengths

The IDFC members' cases presented in the previous sections have shown that their contributions to energy efficiency promotion are significantly effective, constituting an important pillar of the respective governments' energy efficiency policies. Their most distinct feature can be identified in their ability to provide a comprehensive package, which is composed of financial, technical and other assistance programs to remove the major impediments to energy efficiency; (i) institutional and organizational barriers, (ii) financial and economic barriers, (iii) knowledge, information and technology gap. Their assistance programs can include all or some of the following interventions, whose contents are tailored to suit the market situation and needs of each program.

- (a) a variety of financial instruments, ranging from debt-financing to guarantee schemes, which are tailored to the specific needs, and which can mobilize private finance at the international and domestic levels,
- (b) facilitation of policy dialogues and reforms to set out enabling environment for energy efficiency investments, including policy and regulatory frameworks, and
- (c) other actions required for energy efficiency promotion such as capacity building of stakeholders, awareness raising that are critical for demand creation.

Sustainability of energy efficiency programs depends on how to create the market and enhance its functions and sustainability. And this is where the IDFC members can create added-values to each energy efficiency program. First, their common business model of lending through local private financial institutions has proven to be an effective delivery mechanism of energy efficiency financing. Avoiding market distortions, this makes it possible to mobilize local financial resources, enables the financial products to tap large segments of the market, and can ensure the sustainability. Combined with technical assistance, this also helps to develop capacity of the local private financial institutions for energy efficiency investments, which would, in the long run, contribute to enhance the country's financial infrastructure. For example, the equipment list used in the SIDBI's program which was introduced based on the established system in Japan, served as clear, transparent and up-to-date criteria for lending. It thus facilitated appraisal procedures by banks. The success is so significant that equipment lists are currently used by a wide range of financial institutions including international organizations such as EBRD.

Second, the IDFC members' ability to provide risk-sharing mechanisms is instrumental in enlarging access to energy efficiency investments. Guarantee schemes are used by some members and successfully bridging financial gap.

Last but not least, their engagements in setting out enabling environment for energy efficiency investment are also important. IDFC members are successfully assisting the governments to undertake necessary policy reforms required to advance energy efficiency. It is often done through policy dialogues, budget support and technical assistances and brings tangible results such as setting up a road map for energy efficiency promotion and policy and regulatory frameworks. Their active involvement in measures such as awareness raising and outreach also contributed to creation of a broad-based end-user demand. For example, the KfW programme with the National Housing Bank (NHB) in India combines funding with know-how transfer and "voluntary regulation": Only such buildings are eligible for financing which need on average 30 per cent less electricity than the market standard, where the measurement and labeling methodology is a co-production of German and Indian scientific institutes.

(ii) Challenges to overcome:

As discussed in the first Chapter of this report, the world has to significantly scale up its efforts to improve energy efficiency in order to meet accelerating demands for energy and pressure on environment including climate. And there are numerous challenges to overcome. Concluding this Chapter, the following issues are put forward for consideration by the IDFC members so as to boost their contributions to energy efficiency programs.

- (a) How to scale-up the financing for energy efficiency: Mobilizing private finance through increasing DFI's instruments. Their intermediary function has to be further strengthened. Scaling up scarce resource through co-financing among DFIs, IFIs and with private actors should be effective. It is also important to ensure better coordination and complementary joint works. Mechanisms to facilitate this should be established. The IDFC serves as a candid platform for such collaboration. Building on this report, the IDFC members are invited to discuss the next steps.
- (b) How to better support energy development plan: As discussed in section 1.2., the concept of Negawatt has a great potential to boost efforts on energy efficiency. It is necessary to incorporate the concept into up-stream planning on energy development at the national and regional level. This requires concerted action among stakeholders such as energy ministries, energy supply companies as well as finance ministries. The IDFC members could usefully consider setting up a joint operation to support such actions in some pilot countries.
- (c) How to increase sustainability of publicly and/ or DFI-supported programs: The ultimate goal is to establish self-sufficient market mechanism for energy efficiency programs. Assistance has to be given so as to encourage self-reliant functioning of the market. In this regard, guarantee mechanisms are useful and can be explore for better modeling and scale up. How to exploit the potential of ESCO has to be also analyzed for wider application. Interventions by public institutions including DFIs have to be diminished as the market grows and functions properly. Exit models have not been well established so far, and further analysis is needed.

CHAPTER 3. CONCLUSIONS AND WAY FORWARD

Energy efficiency is indispensable in achieving our ambitious goal of sustainable development for the next generation. It would greatly contribute to moderate the future energy demand, foster sustainable economic growth, and provide the most cost-efficient mitigation measures against climate change.

However, the recent years have seen a slowdown in the pace of energy efficiency activities. Barriers are multifold, stretching over issues related to institution and organization, financial and economic incentives, information, knowledge and technology gaps. Achieving energy efficiency requires cross-sectoral, holistic and sequencing approaches, addressing the major barriers to energy efficiency. Setting right policy, regulatory and incentive framework is indispensable to create proper-functioning market. Introducing effective funding mechanism as well as capacity development of relevant institutions and actors is critical.

The review on the IDFC members' experiences in promoting energy efficiency highlights the complexity of the issue and the richness of the members' measures to address them. The IDFC's contributions to the area reached 23 billion USD in 2012, and have proven effective in creating the market and enhance its functions and sustainability. Their common business model of lending through local private financial institutions is useful for delivering energy efficiency financing. This makes it possible to mobilize local financial resources, to tap into large segments of the market, and can ensure the sustainability. It also helps to develop capacity of the local private financial institutions for energy efficiency investments, contributing to enhancement of the country's financial infrastructure. Other areas of competence include their abilities to provide risk-sharing mechanisms. Their engagements in setting enabling environment such policy reforms through policy dialogues, budget support and technical assistances, contribute greatly toward scaling up energy efficiency investment.

As we look into the future, our efforts to promote energy efficiency and to attain inclusive and sustainable development have to be significantly accelerated. To this end, mechanisms to scale up energy efficiency financing, better support up-stream energy development planning, and establishing models to strengthen the functioning of the market through minimum public support are all the areas that require further analysis and collaboration among stakeholders such as government, DFIs, IFIs and the private sector. The IDFC, a network of 20 leading national, bilateral and regional DFIs, serves as an ideal forum to facilitate such collaboration and should play an important role in leading this process.

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