FINAL REPORT

Developing Financial Intermediation Mechanisms For Energy Efficiency Projects – Focus On Commercial Banking Windows For Energy Efficiency

WORKSHOP SUMMARY

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Held at Fort Aguada Beach Resort, Goa, India
January 16 – 18, 2002

Abbreviations & Acronyms

ADB	Asian Development Bank
BNDES	Brazilian National Bank of Economic and Social Development
EE	Energy efficiency
EMC	Energy management company (Chinese term for ESCO)
ESCO	Energy service company
GEF	Global Environment Facility
GDP	Gross domestic product
GHG	Greenhouse gases
GoI	Government of India
IFCI	Industrial Finance Corporation of India
M&V	Measurement and verification
RMB	Renminbi (Chinese currency)
SBI	State Bank of India
SPV	Special purpose vehicle
US AID	U.S. Agency for International Development

Preface

This report summarizes the issues and discussions of the first of a series of cross exchange workshops included in the newly launched UNF/UNEP/World Bank project "Developing Financial Intermediation Mechanisms for Energy Efficiency Projects in Brazil, China and India." This first workshop was held at the Taj Fort Aguada Resort in Goa, India January 16-18, 2002.

The basic objective of the full joint project is to expand investments in energy efficiency projects in developing countries, specifically by increasing investment from local financial institutions. The primary focus will be on three of the largest developing countries—China, India and Brazil—where needs for increased investment in energy efficiency to reduce GHG emissions are particularly great, significant potential has already been identified, substantial experience exists, operating environments are relatively sophisticated, and utility, government, and international energy efficiency assistance programs are already in place providing both an existing knowledge base and a framework for large-scale follow-up investment.

The purpose of this workshop was to initiate discussion of issues and options for development of specialized energy efficiency loan "windows" in commercial banks, a major component of the UNF/UNEP/WB Project. The main participants were representatives from each Core Country Group, formed to implement the joint program. The workshop allowed these efficiency practitioners and representatives from each countries' financial sector to gather in an informal setting to discuss the current climate for investment in EE in each country, present options for overcoming the barriers to investment, and to define the scope of work and outlines for implementation of each countries' strategy for developing commercial banking windows for energy efficiency.

The format of the workshop was designed to be cumulative, that is, each day built on the discussion from the prior day. During the first day, each team provided an overview of the macroeconomic conditions in each country, particularly the financial sector, and the current status of the energy efficiency industry. The second day focused more specifically on the major barriers inhibiting investment in energy efficiency and examples of specific projects that overcame those barriers (or did not). On the third day, each team presented their action plans to be financed by the joint UNF/UNEP/World Bank project for further developing the markets for commercial financing of energy efficiency projects within their own countries.

This workshop was sponsored by the World Bank and is the final component of the ESMAP Operational Exchange Program.

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Introduction

To improve energy efficiency means reducing the amount of energy input for any particular application without adversely affecting the quality of the output. Whether the application is an industrial process, a commercial building, or a power plant, energy is a key and often costly input. Thus, improving energy efficiency can improve economies of operation while also helping to reduce emissions of greenhouse gases where the energy efficiency project serves to reduce the consumption of fossil fuels. Moreover, energy efficiency projects can offer an extremely attractive return on investment (when structured and implemented properly) relative to competing uses for capital for a given energy consuming enterprise.

One of the principle barriers to the implementation of energy efficiency projects, especially in the developing world, is the availability of financing from domestic sources, especially commercial banks. There are several reasons for this, including:

- Unfamiliarity with the many aspects of EE projects, especially the notion of basing a financing on the realization of savings (or "negative cost") stream.
- Weak credit strength of prospective borrowers, especially nascent ESCOs, relative to the amount of investment capital that is required.
- Country-specific issues that cause the commercial bank sector to lend only to the borrowers with the strongest credit or those who can provide collateral and/or guarantees to substantially eliminate repayment risk. In these countries, the availability of structured loans, i.e., limited recourse debt, is virtually non-existent.
- EE projects require multi-disciplinary resources to be properly appraised and monitored and, thus, are judged as too costly and time consuming relative to the amount of profit to be earned.

This workshop brought together EE teams from Brazil, China and India for a focused, interactive yet informal discussion on the issue of developing domestic commercial banking windows for EE projects. Each team included representatives from domestic banks and other financing institutions as well as EE associations and a few ESCOs. Also attending were representatives from The World Bank and the UN Collaborating Centre on Energy & Environment. The workshop was facilitated by Mr. Sanford Selman, a World Bank consultant with significant investment banking experience in the energy field worldwide. Mr. Selman's firm had previously conducted appraisal missions on the availability of domestic financing for EE in each of the three countries.

The three-day workshop was conducted in accordance with the following format:

Day 1 Presentations by each country team concerning the macroeconomic conditions in each country, particularly the finance sector, and the status of the EE industry. Each team was also asked to present what it saw as the primary barriers to increased penetration of EE within their country.

Day 2 In-depth discussion of key barriers, including a "chalkboard" session on financial structures. Each team prepared and gave a short presentation in the afternoon on what it saw as some opportunities for overcoming these key barriers.

Day 3 Team presentations of action plans for realizing the workshop objective of increased domestic financing of EE projects and session wrap-up.

Section 1 provides a summary of the country presentations delivered by each country with respect to the current state of the financial sector, particularly as relevant to EE.

Section 2 provides a summary of the country presentations delivered by each country with respect to the current state of the EE sector.

Section 3 provides a summary of the country presentations and ensuing discussions concerning the main institutional and market barriers affecting the implementation of energy efficiency projects as well as EE lending activity by domestic financial institutions.

Section 4 is a synthesis of the information and opinions exchanged during the discussions regarding methods for overcoming the barriers discussed in Section 3.

Section 5 summarizes the action plans presented by each country, including feedback provided by the group.

Section 6 offers some commentary on successful EE financing schemes in the U.S.

Section 7 includes some final observations and comments.

Annex A provides an attendance list including contact information.

Annex B provides the workshop agenda.

SECTION 1

COUNTRY SUMMARIES – FINANCIAL SECTOR

This section summarizes the country presentations delivered by each country team on the overall domestic finance sector and potential sources of financing for energy efficiency.

Brazil

Brazil is a highly industrialized country that has experienced tremendous economic instabilityl, especially during the past two decades. One of the more significant macroeconomic issues that has plagued Brazil has been high inflation with bouts of hyperinflation (see Figure 1) that reached a peak of over 2000% p.a. in 1990. During this period, the Brazilian currency experienced severe devaluation, effectively precluding commercial banks from providing long-term debt. This instability in the Brazilian currency has persisted into 2001 (see Figure 2) even as inflation has been brought into a more normal range.

Figure 1. History of Brazil's Inflation Rate

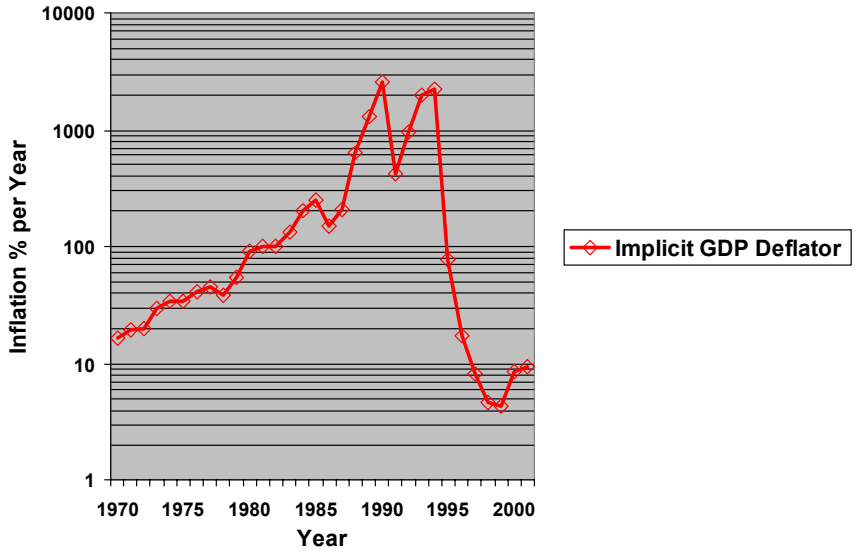


Figure 2. **Exchange Rate Instability Continues Despite Subdued Inflation**

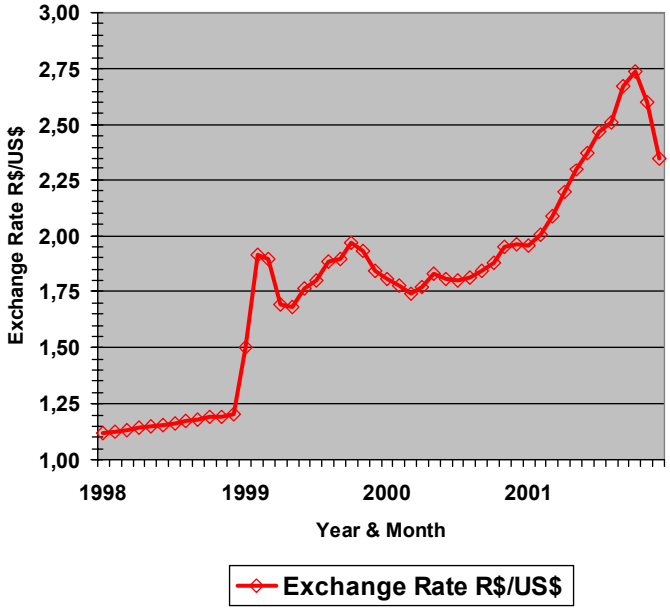


Figure 3 presents the organization of Brazil's financial sector.

Figure 4 illustrates the relative size of each component of the Brazilian finance sector in terms of total assets, liabilities, deposits and net equity.

Figure 5 provides an overview of the major commercial banks in Brazil.

Figure 3. **Organization of Brazilian Finance Sector**

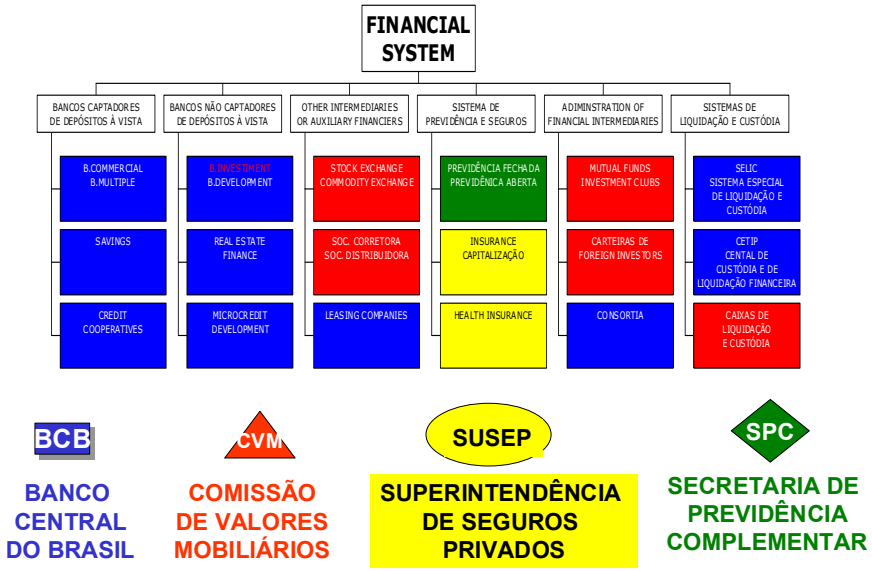


Figure 4. **Components of Brazilian Finance Sector**

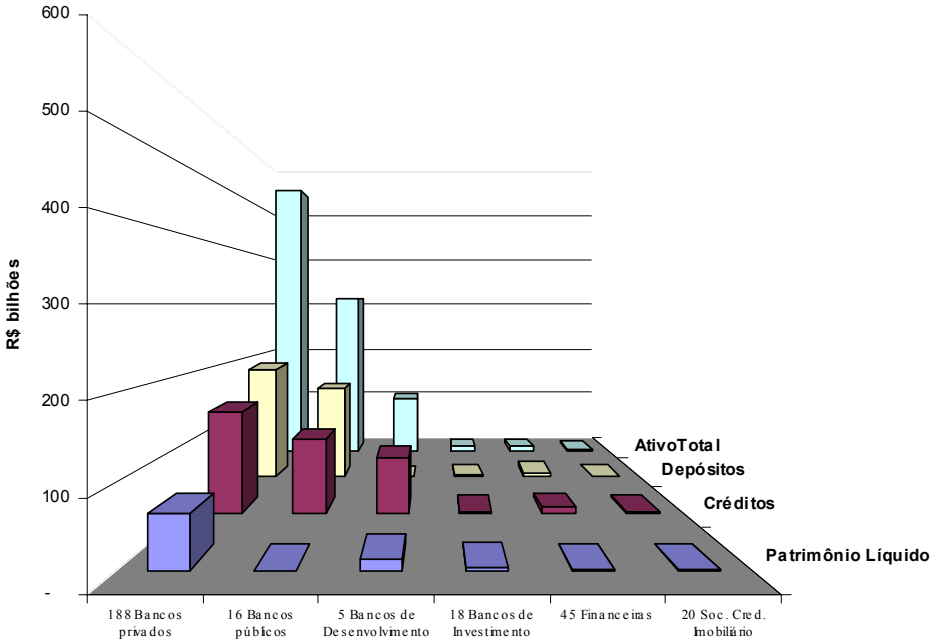
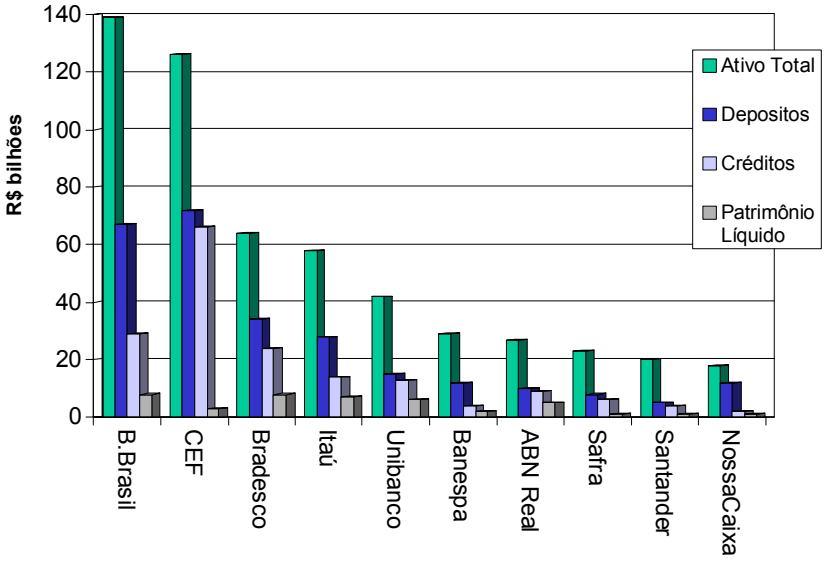


Figure 5. **Overview of Brazilian Commercial Banks**



Interest rates on local currency financing are significantly higher than for USD financing and average 12 – 15% p.a. for good corporate credits and up to 50% p.a. for smaller companies with weaker balance sheets. Long-term loans are supplied only through the national development bank, BNDES, and Caixa Econômica Federal (CEF), another government-owned bank who manages the housing credit (mortgage) system. Loans from BNDES and CEF are made primarily through various commercial banks. As the corporate debt market is dominated by shorter maturities (e.g. 90 days to 1 year) where interest rates are in the mid-teen's, there is precious little long-term capital being made available except for the strongest corporate credits and for special government initiatives. Even so, the average tenor of public sector debt is just 3 years. Because interest rates are so high and tenors so short for comparatively "safe" transactions, commercial banks have little incentive to assume incrementally more risk, either by extending maturities or by lending to weaker or more complicated credits (e.g. structured financings).

BNDES has two credit lines in place dedicated to energy efficiency – a small loan program and a large loan (over R$7 million) program. BNDES extends credit to borrowers using domestic banks as intermediaries, however in the case of large loans, the borrower has the option of going directly to BNDES. Loan tenor can be a maximum of 10 years. The interest rate has 3 components: a long-term base rate (e.g., 10% p.a.), a BNDES interest rate spread of 1.5% to 3% p.a., and a commercial bank spread of 1.5% to 4% p.a. In describing these lines, the Brazilian team noted that they have been

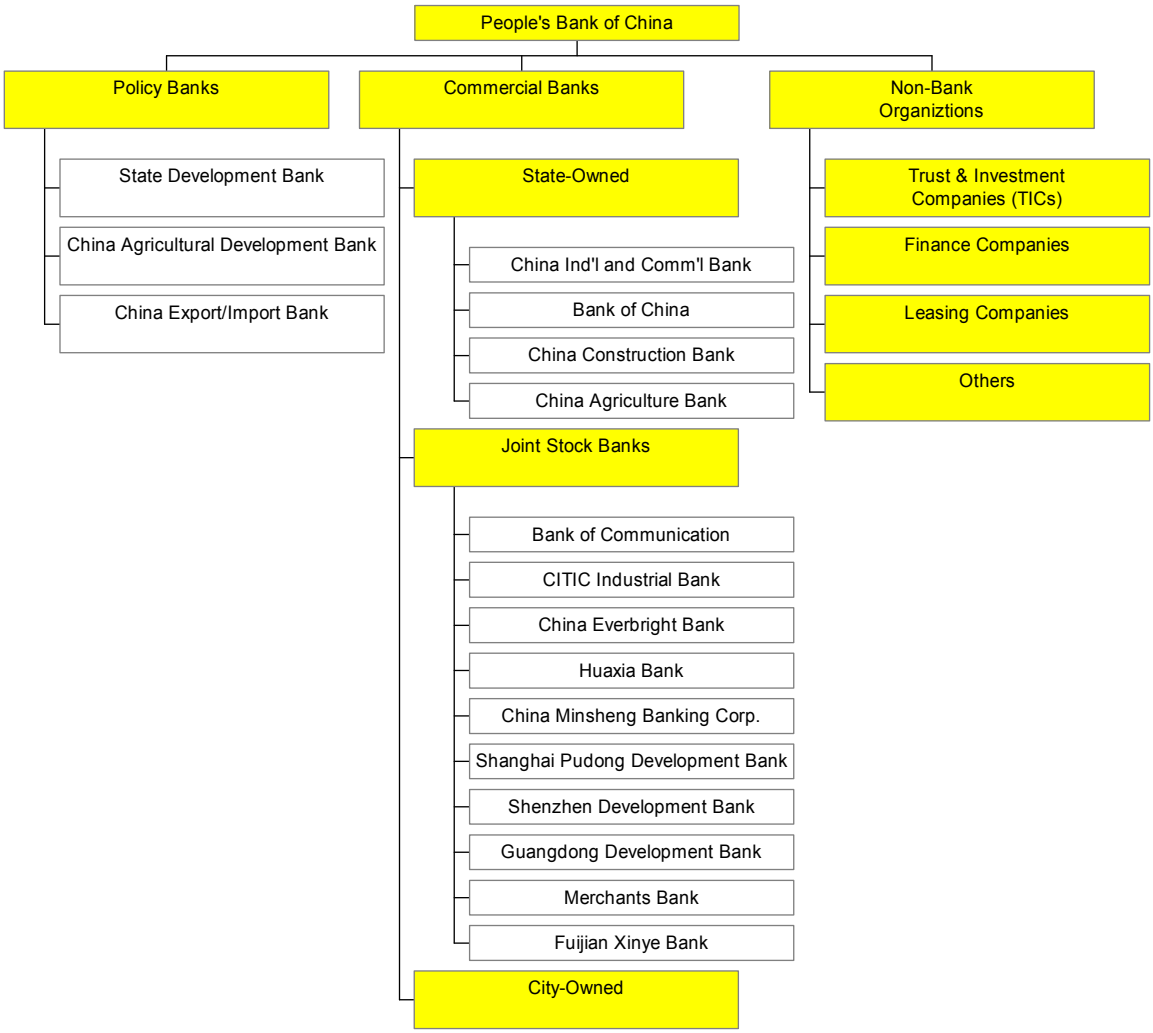
largely unutilized. There were two reasons given for this – the requirement for the borrower to post guarantees and the nascent stage of development of the EE industry.

China

The vast majority of banking business is undertaken by a plethora of banks with public sector shareholders. The overall organization of the Chinese banking sector is illustrated in Figure 6.

In addition to the banks shown here, there are a number of non-bank financial institutions, however, it is the banks that are of primary interest to the EE sector.

Figure 6. Structure of Chinese Banking Sector



At the top of the Chinese banking system is China's central bank, the People's Bank of China ("PBOC"), which is charged with managing money supply and credit. The PBOC

was established in 1948 and was designated as China's central bank in 1983. The PBOC supervises the banking sector's payment, clearing and settlement systems, and audits the operations and balance sheets of all financial institutions in China. It also implements regulations regarding the operation of commercial banks. The PBOC dictates the interest rate banks can charge on renminbi (RMB) loans (the "Base Rate") as well as the fees banks can charge for making loans. The State Council maintains oversight of PBOC policies.

China has three "policy" banks that are responsible for long-term lending to priority projects such as infrastructure, agriculture and other projects that will promote the development of China. These banks were established in 1994 to free the "commercial" banks from the obligation of making policy loans.

- Agricultural Development Bank of China – provides funds for agricultural development projects in rural areas such as projects related to grain, cotton and oil
- China Development Bank – specializes in infrastructure financing (formerly the State Development Bank) and is the only one of the three policy banks concerned with energy efficiency financing
- Export-Import Bank of China – specializes in export financing for mechanical and electrical products

In 1995, the government introduced the Commercial Bank Law to commercialize the operations of the four state-owned banks:

- Bank of China – Founded in 1912 and specializes in foreign exchange transactions and trade finance.
- China Construction Bank – Its predecessor, the Peoples Construction Bank of China, was formerly a department of the Ministry of Finance, and was renamed in 1996 to specialize in infrastructure financing and urban housing development.
- China Agriculture Bank – Absorbed the rural branch network of the PBOC in 1979. The Bank specializes in providing financing to the agricultural sector and provides services to farmers, township and village enterprises and other rural institutions.
- China Industrial and Commercial Bank – The largest bank in China and was formed in 1983 when it assumed control of 25,000 urban branches of the PBOC. It is the major supplier of funds to China's urban areas and manufacturing sector.

In addition to the "big four" commercial banks, there are a ten joint stock banks ("JSBs") operating at the national, regional and provincial levels who are generally healthier in terms of asset quality and profitability. These banks generally have much lower non-performing loan ratios than the "big four."

In addition to the JSBs, there are more than 90 city commercial banks, 3,000 urban credit cooperatives and 36,000 rural credit cooperatives.

The relative size of Chinese banks (1998 data) is provided below in Table 1.

Table 1. Relative Size of Chinese Banks

Rank	Bank	Total Assets (RMB 100,000,000)
1	Industry and Commercial Bank of China	32,387
2	Bank of China	24,754
3	Agriculture Bank	20,224
4	China Construction Bank	19,236
5	China Development Bank	5,255
6	China Communication Bank	4,839
7	Merchant Bank	1,381
8	CITIC Bank	1,336
9	Guangdong Development Bank	1,069
10	Pudong Bank	873
11	Everbright Bank	747
12	Huaxia Bank	499
13	Shenzhen Development Bank	394
14	Fujian Bank	356
15	Mingsheng Bank	252

Of significant impact on the EE industry is the fact that PBOC regulates all aspects of the banking sector, including the level of interest rates on loans and deposits and fees banks are allowed to charge on RMB loans. The current interest rate allowed by PBOC on one-year loans is 5.58% p.a. As a result, an important incentive is not available to Chinese banks, as they are not allowed to price their loans in accordance with the risk profile of the transaction. The result is that (i) capital is provided only to the most creditworthy borrowers or (ii) the lender is provided with a satisfactory financial guarantee of some or all of the loan principal. Historically, much of the domestic (RMB) loan market is conducted on the basis of guarantees.

However, the Chinese bank sector is in the midst of significant changes now that China has entered the World Trade Organization ("WTO"). Among the most significant changes is an anticipated loosening of interest rate regulation so that the banking sector can begin to structure and price risk on a loan-by-loan basis. One drawback is that, at the present time, the banking sector does not have personnel with such experience, as the practice has not been allowed by PBOC.

During the old system (1980's and before), banks were directed by the State to provide credit to state-owned enterprises ("SOEs") and, consequently, built up large non-performing loans to non-creditworthy SOEs. When the reform process got underway in the 1990's, most banks were in a weakened financial condition, hence, bank managers had little tolerance for risk and restricted credit to only the most creditworthy borrowers and/or required financial guarantees. JSBs, all of whom have only come into existence in the 1990's, are an important bridge to the future of commercial banking in China. The

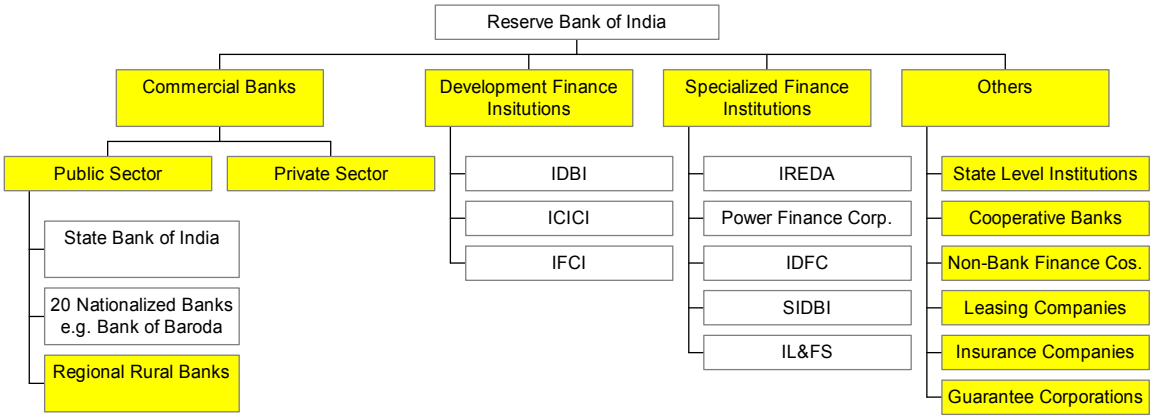
reform process is only partially completed but yet there is still significant innovation occurring within the JSBs. It is believed they will be the first to offer structured financing solutions for energy efficiency as the reform process continues to mature.

India

India is a vast country with per capita GDP of US$442, a GDP growth averaging greater than 5% p.a. and inflation averaging about 3% p.a. The country is dominated by the service and agriculture sectors, however, energy demand is increasing due to rapid industrialization and urbanization.

India has an advantage in that there are a wide variety of financial institutions that presently finance EE projects and many more that could. The participants in the financial sector relevant to EE are shown below in Figure 7.

Figure 7. Structure of Indian Financial Sector



A brief review of the financial institutions relevant to EE financing follows.

Industrial Development Bank of India (IDBI)

IDBI was established in 1964 to promote the development of technology, originally in the textile sector. IDBI manages three credit lines:

- USAID (EMCAT, $27 million)
- USAID (GEP I, $10 million)
- ADB (IEEP, $150 million)

IDBI uses these funds to leverage its own funds. IDBI would use its own funds for EE but has not any EE financing to date. Its minimum project size is Rs.100 million (US$2 million) and it is open to a structure where various smaller EE projects are aggregated in an industrial cluster (using some financial intermediary) to create larger transactions.

Industrial Credit and Investment Corporation of India (ICICI)
ICICI was established in 1955 and is listed on the New York Stock Exchange. ICICI manages various funds including:

- USAID ($25 million)
- World Bank ($350 million)
- JBIC ($40 million)
- Others (PACT, PACER, SPREAD, ACE, TI, ESP, etc.)

Its minimum project size is Rs.100 million (US$2 million) for a new client but can be somewhat less for an existing client.

ICICI is the only DFI with a dedicated EE fund, the $5 million ECO loan fund with capital provided by USAID. In order to qualify, borrowers must have been profitable for the past 2 years, have positive cash flow from operations during the past year and earnings before tax, depreciation and amortization must greater than 150% of debt service. Under this facility, ICICI will lend up to 50% of total project cost at a concessional interest rate of 9% p.a. plus a credit spread. Repayment is based upon the projected cash flows of the project but cannot be greater than 8 years. The fund was launched in 2001 and its first transaction is expected shortly.

Infrastructure Development Finance Corporation (IDFC)
IDFC was established in 1997 with a unique focus of providing credit enhancements for infrastructure project financings. IDFC can provide direct funding as well as guarantees and also provides advisory services. To date, IDFC has provided funding for cogeneration projects with a capacity of 7 MW or greater. Although IDFC does not have concessional line for EE financing, it is open to such projects.

Small Industries Development Bank of India (SIDBI)
SIDBI was established in 1990 by GoI to focus on small scale industries. SIDBI provides direct assistance to its customer base through 38 offices and indirect assistance through rural banks, commercial banks, etc. The Technology Bureau for Small Enterprises (TBSE) was established in 1995 in cooperation with the UN Asia Pacific Center for Transfer of Technology (UN APCTT) as an activity within SIDBI to provide specific kinds of support (e.g. technology information, partner search, syndication, etc.) to industrial clusters. For example, TBSE is targeting clusters with high energy consumption and attendant pollution levels, such as:

- Brick kilns (there are 55,000 spread throughout the country)
- Utensil manufacturers (Haryana)
- Foundries (West Bengal)
- Dyeing units (Tamil Nadu)

Infrastructure Leasing & Finance Services (IL&FS)

IL&FS is a leasing company founded in 1987 and is a joint venture among the Central Bank of India, Unit Trust of India, Housing Development Finance Corporation, Orix Corporation (Japan) and the International Finance Corporation. Although IL&FS has no dedicated EE program, they financed a capacitor project that was quite similar to the IREDA transaction described in Figure 9 (shown below) – the primary difference being that IL&FS provided a lease to the equipment supplier (Saha Sprague). In so doing, IL&FS was able to claim the tax benefits of depreciation and (presumably) pass a portion on to the equipment supplier in the form of lower lease payments. In the IL&FS transaction, however, the utility placed customer payments for electricity into an escrow account from which the equipment supplier could withdraw funds to make its lease payment.

Indian Renewable Energy Development Agency (IREDA)

Of India's non-bank financial institutions, IREDA is the most directly involved in financing EE projects. IREDA was incorporated in 1987 as a government-owned company with a mission of promoting and financing renewable energy and energy efficiency technologies and projects. IREDA has been consistently profitable and has even paid dividends back to GoI. IREDA received its first line of credit in renewable energy ever provided by the World Bank with a capacity of US$195 million. The ADB also provided a renewable energy line of credit for US$100 million. IREDA has also gotten soft loan assistance from KfW (Germany) for DM120 million. Additional assistance from JBIC and US Eximbank is in the planning stages. In sum, IREDA has financed over 1,500 projects with an aggregate loan value of approximately US$1 billion.

With respect to the EE sector, IREDA manages a revolving fund provided by the World Bank for US$50 million. Under this program, IREDA will lend up to 75% of project cost and the terms are somewhat below market with tenors based upon the savings generated by the project but not greater than 10 years and interest rates of 12.5% - 13.5% p.a. However, IREDA attempts to adopt a cash flow-based approach to lending – distinctly different from the straightforward balance sheet lending practiced by most of the remainder of the finance sector. Launched in 1999, 18 projects have been funded with an aggregate loan value of some US$35 million. These projects include:

- Energy efficient drives and production equipment for a sugar mill
- Lighting, drives and production equipment for a textile company
- Energy efficient evaporator for a paper mill
- Energy efficient production equipment and drives for a cement manufacturer
- Waste heat recovery project for a sponge iron kiln
- Waste heat recovery for a mini blast furnace
- Capacitor panels to improve load factor for a private and a public utility
- Drives and production equipment for a sugar mill financed on the basis of a performance contract through an ESCO
- Financing for a financial intermediary selling energy efficient products to retail customers

Commercial Banks

In general, Indian banks make loans on the basis of the creditworthiness of the borrower. Traditionally, Indian commercial banks made only working capital loans. Since 1992, GoI has allowed the banks to make term loans and their services include financing for infrastructure and industrial project finance. There are some 21 public sector banks with the largest being State Bank of India, Bank of Baroda, Canara Bank, Syndicate Bank and Punjab National Bank. There are also a number of private and foreign banks including Citibank, ANZ and ABN Amro.

Bank of Baroda and Syndicate Bank (both represented at the workshop) have shown interest in the EE sector. Each bank has project finance experience in the infrastructure sector and thus are capable of adopting a sophisticated approach to EE lending. In general, the international banks are seeking projects that are far greater in size than is typical for an EE project.

State Bank of India (SBI)

SBI is the largest public sector bank with over 6000 branches throughout the country, including:

- 99 branches in industrial estates
- 55 specialized branches to serve small scale industries
- 400+ branches with a small industry business division

The largest public sector bank, SBI, launched a program in the 1980's called Project Uptech. This project is aimed at SMEs and its objectives are to:

- Enhance technology awareness
- Increase market competitiveness
- Disseminate information
- Enhance the awareness of SBI credit managers as to the technological issues of specific industries, thus improving credit analysis within the bank

The project adopts an industry cluster where possible to leverage resources so that they reach a larger number of targeted customers.

As part of this project, energy audits were conducted in various foundries that resulted in SBI financing several high impact, low cost improvements involving cupolas, pit furnaces, centrifugal pumpsets, and induction furnaces. Project Uptech also identified significant potential for energy savings in press shops and machine shops using belt-linked lathes and in the re-rolling industry particularly where there are oil-fired furnaces. The project also examined the glass industry and identified several high potential areas including improvements to tank furnaces, insulation, and fire pots.

Bank of Baroda

Bank of Baroda has over 2600 branches, with a concentration in the western part of the country. Twenty-five of these branches deal exclusively with small scale industries. The

Bank has experience with industrial project finance (e.g. renovation, modernization, expansion) and infrastructure project finance (e.g., IPPs, CPPs, roads, bridges). Although the Bank has not financed EE projects specifically, it is open to such activity as it sees EE as a new product area that can enhance its relationship with its existing customers and it views itself as being able to innovate in new product areas. As EE projects tend to be small and Bank branches have local approval authority up to Rs.10 million (US$200,000), there is a good match in terms of EE project size and the size of loans that can be approved at the branch level.

Canara Bank

Canara was established in 1906 and nationalized in 1969. Today, the Bank has over 2400 branches in 22 states and 4 Union Territories. Canara has an Industrial Advisory Division specializing in appraising industrial projects that is well suited to EE. CanBank Financial Services, a subsidiary, focuses on providing leasing, merchant banking, registrar and transfer services and stock brokerage. Another subsidiary, CanBank Venture Capital Fund invests in greenfield projects, growth-oriented companies and small/medium scale ventures where risks are relatively high.

Syndicate Bank

Established in 1925 and nationalized in 1969, Syndicate Bank has over 1700 branches and 200 extension counters. Syndicate Bank is active in project financing and has expressed interest in the EE sector.

Corporation Bank

Established in 1905, Corporation Bank has been continuously profitable throughout its existence. Corporation Bank is active in project financing and has expressed interest in the EE sector.

One final note: The Energy Efficiency Act of 2001 proposes the established of an Energy Conservation Fund which would be funded by GoI and State governments. At the present, the fund is only under discussion and has not been designed but initial thinking is to establish a target funding level of US$30 million.

SECTION 2

COUNTRY SUMMARIES – ENERGY EFFICIENCY SECTOR

This section summarizes the country presentations delivered by each country team with respect to the energy sector overall, and the energy efficiency sector, in particular.

Brazil

Energy Sector Overview

Brazil is quite unique among large, industrialized countries in that its electric supply is dominated by large hydroelectric stations. Hydropower supplies some 93% of Brazil's 74 GW power demand. Although Brazilian industry, especially sugar and steel, uses a considerable amount of biomass, and natural gas use is increasing rapidly, Brazil is extremely dependent upon its large hydroelectric stations for power. Of considerable concern is the steady and alarming decline in Brazil's hydroelectric reservoir levels (see Figure 8). This situation became so severe in the past year that the government instituted an electricity rationing scheme from June 2001 to early March 2002.

The goal of the rationing program was to reduce average consumption by 20% in most of the country. The program was successful in averting major damage to the economy and got the country into the next rainy season thus forestalling the problem until the next dry season. Much like the California power crisis of 2001, the rationing program illustrated that there was considerable room for energy conservation and that consumers can take advantage of conservation opportunities if given clear signals.

On the demand side, the overall energy intensity of Brazil's economy has increased steadily. The electrical intensity of both the residential and commercial sector has doubled since 1980, outpacing population growth, while energy (electricity and fossil fuels) intensity of the industrial sector has remained fairly stable. (See Figures 9 and 10). Overall, Brazil is consuming more energy per unit of GDP which places an added strain on the country as it seeks new sources of energy supply.

Figure 8. **Steady Decline in Brazil's Hydroelectric Reservoirs**

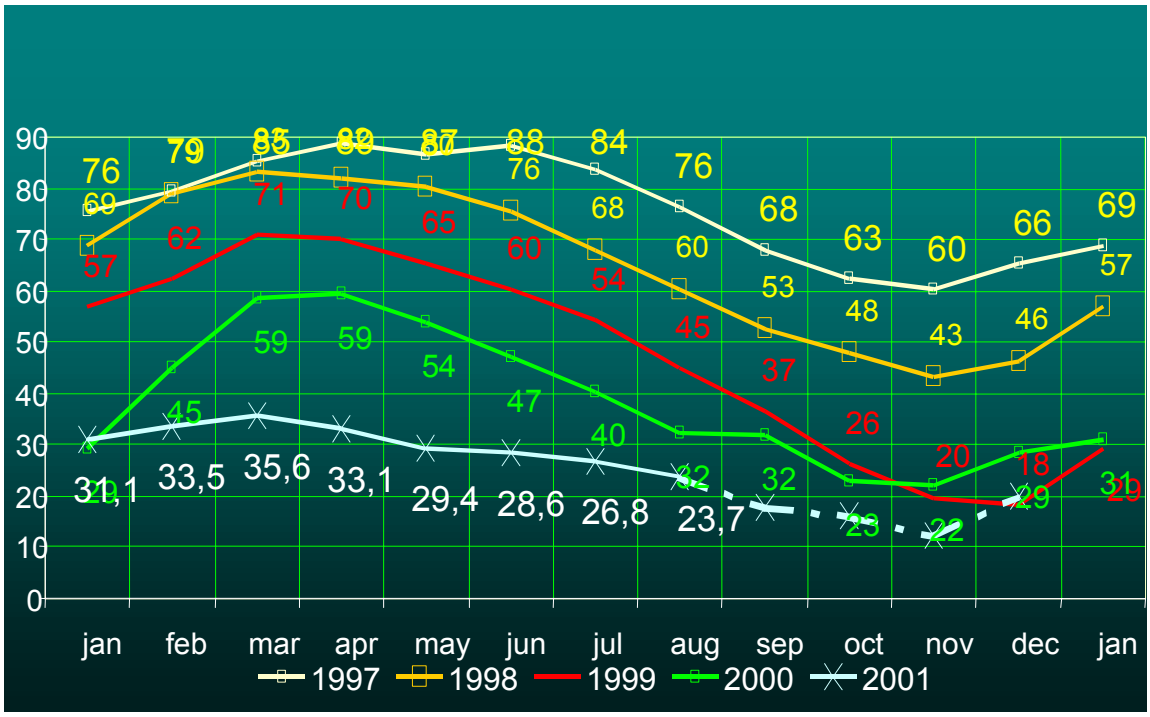


Figure 9. **Electricity Consumption vs. GDP**

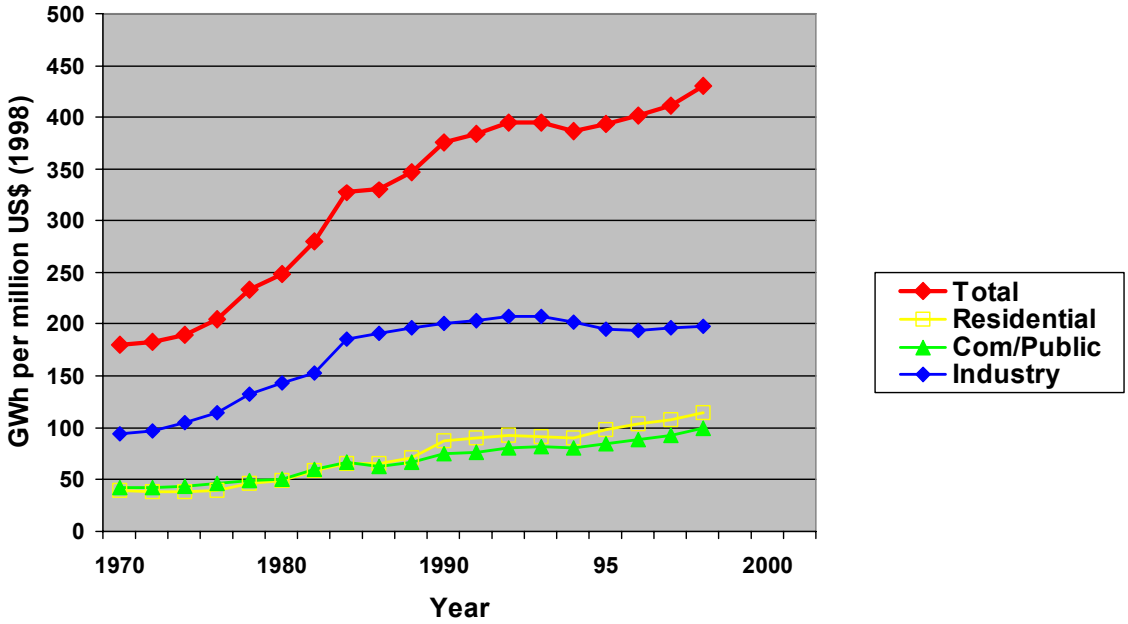
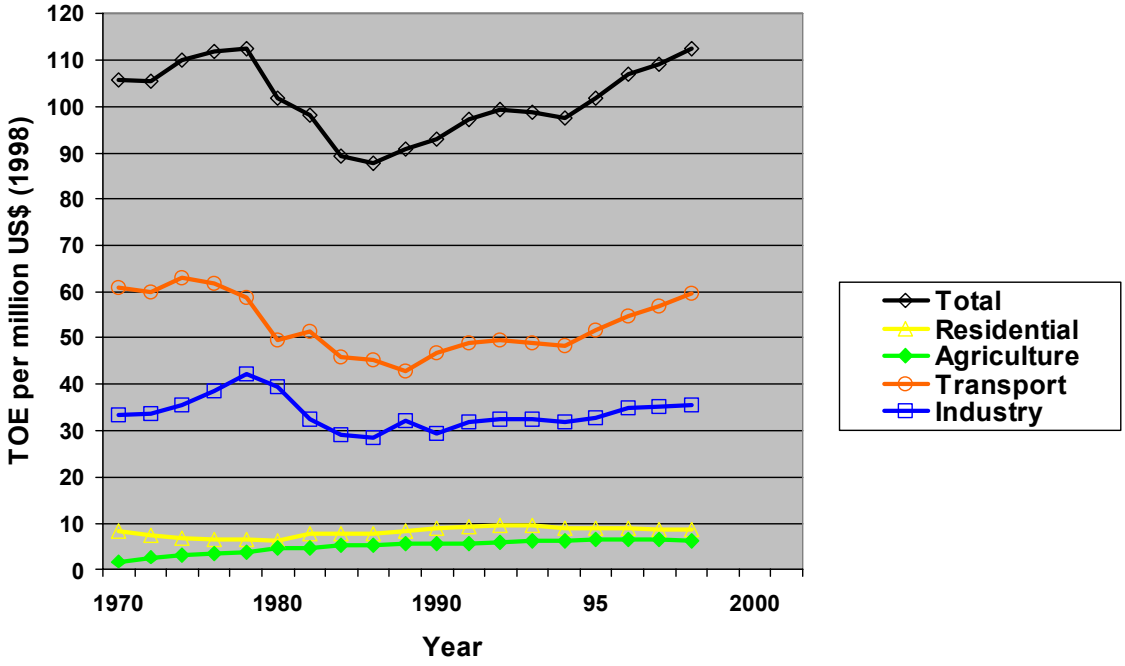


Figure 10. Fossil Fuel Consumption vs. GDP



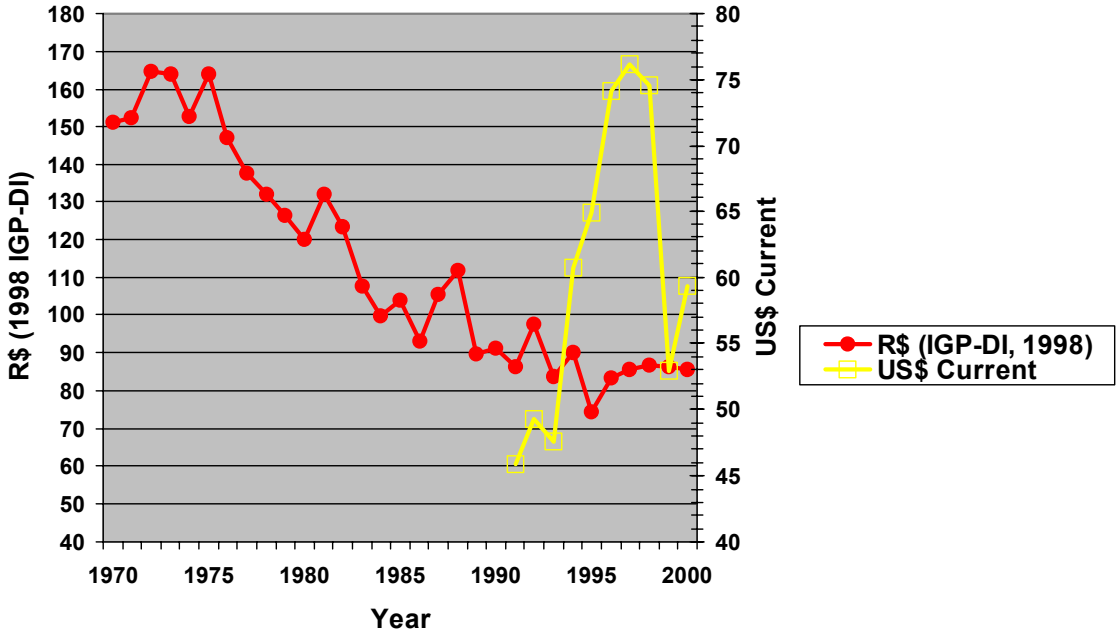
Average electricity prices have oscillated in USD terms falling from over US$ 75/MWh in 1997 to just under US$55 per MWh due to exchange rate changes and have risen in terms of deflated Reals since 1995 to their current level of approximately R$110 per MWh (see Figure 11). It is anticipated that prices now rise at a rate greater than inflation due to the comparatively higher costs of incremental generation capacity and associated construction costs of transmission. As industrial customers pay relatively low prices at the present time, industry is expected to be hardest hit by these price increases.

All of these factors:

- Low reservoir levels and government recognition of the need to add generation capacity;
- Increasing energy intensity of the economy; and
- Rapidly increasing electricity prices, especially in the industrial sector.

bode well for the future of the Brazilian EE industry.

Figure 11. **Average Annual Electricity Price**



Energy Efficiency Industry Overview

Figures 12 and 13 summarize energy price levels in Brazil for various types of energy sources and end use categories. A breakdown of electricity consumption by market segment is illustrated in Figure 14.

Figure 12. **Brazilian Electricity Prices**

CATEGORY	US$/MM BTU Without tax	US$/MM BTU With tax
RESIDENTIAL	-	30,57
COMMERCIAL BUIDING	22,15	27,02
INDUSTRIAL MEDIUM SIZE	19,48	23,75
SHOPPING CENTER	18,85	23,04
HOTEL	17,37	21,19
HOSPITAL	15,09	18,11
INDUSTRIAL LARGE SIZE	12,25	14,93

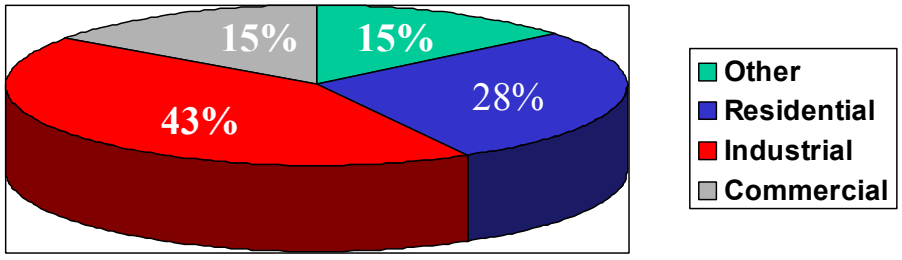
TAXA DÓLAR = 2,13

Figure 13. **Brazilian Fossil Fuel Prices**

ENERGY SOURCE	US$/MM BTU Without tax	US$/MM BTU With tax
NATURAL GAS FOR RESIDENTIAL	13,91	15,95
L.P.G. RESIDENTIAL	12,71	15,00
L.P.G. - Granary	8,70	10,18
NATURAL GAS (5.000 a 50.000 m3/month)	7,78	8,92
DIESEL OIL - Granary	7,70	9,40
NATURAL GAS (50.001 a 300.000 m3/mth)	5,83	6,68
NATURAL GAS (300.001 a 500.000 m3/mth)	5,00	5,84
ÓLEO COMBUSTÍVEL 1A	4,51	5,57

DOLLAR = R$ 2,13

Figure 14. **Electrical Energy Use Segmentation**



The Association of Brazilian Energy Service Companies (ABESCO) was founded in 1997 by 15 members to represent and promote the ESCO industry in Brazil. Today, ABESCO has 64 member ESCOs. ABESCO's mission includes:

- Helping the country reach its national goals vis-à-vis energy rationalization by promoting the EE industry;
- Implementing technically and financially sound EE projects to ensure energy reductions are permanent;
- Improving the competitiveness of the Brazilian industrial sector by helping it to reduce energy costs;

- Increasing the capacity for energy conservation technology within the engineering sector; and
- Creating jobs in the ESCO sector.

The typical energy conservation project in Brazil today has a value of R$250,000 (US$105,000) and a simple payback of under one year and can thus be financed, even in a high interest rate environment, with a performance contract of 5 years or less while providing a positive cash flow to the client.

ABESCO estimates that the volume of energy conservation projects undertaken annually is only about US$25 million. There are very few performance contracts and most projects are financed internally by the client or by the ESCO. Many projects are not being implemented even though the energy audits have been completed. The reasons for this are discussed in the following section in the discussion concerning barriers.

China

Energy Sector Overview

Only the U.S. consumes more energy than China on a gross basis, however, China has demonstrated increased efficiency of use over the past two decades. Since 1981, GDP increased by an average of 9.7% annually while energy consumption increased at an annual average rate of 4.6%. The industrial sector uses almost 70% of the total energy consumed nationally. The 8 most energy consuming sectors consume 80% of the industrial total. These sectors and the proportion of their production cost that is energy are represented in Table 2.

Table 2. Summary of Largest Industrial Energy Consuming Sub-Sectors

Industrial Sub-Sector	% of Production Cost That is Energy
Mining	n.a.
Power and District Heating	n.a.
Iron and Steel	25%
Non-Ferrous Metallurgy	50% (aluminum)
Building Materials	40 – 50%
Chemicals	40% (petrochemicals
Oil Refining	n.a.
Petroleum Coke	n.a.

In addition, energy constitutes some 70 – 75% of production cost in the fertilizer industry.

Table 3 provides a breakdown of final energy consumption within China. As much of the electricity is fueled by coal, it is evident that China is heavily dependent upon coal, oil and coke to meet its energy needs.

Table 3. Summary of Final Energy Use

Type of Energy	% of Final Energy Use
Coal	35.6
Oil	28.8
Electricity	15.0
Coke	10.0
Heat (District Heat/Cogenerated Heat)	4.8
Other	3.1
Natural Gas	2.7

Energy Efficiency Sector

China's transition from a centrally planned to market based economy is having a profound affect on Chinese energy efficiency activities. Energy efficiency under the centrally planned economy was a major government program based upon policy directions, regulations, technical assistance and project financing. This program extended from the national government through the provisional governments to country/prefect governments. The State Economic and Trade Commission ("SETC") oversaw a network of provisional and local energy conservation units, which implemented the national energy conservation program. Under this program, Chinese enterprises were told what energy efficiency measures to take, were provided technical assistance to develop the measures and financed implementation of the measures with funding ultimately from the central government. Considerable technical expertise was developed in China's numerous energy conservation units.

The Government is significantly reducing its energy conservation programs during the transition to a market economy. Government grants for investments in energy efficiency projects are ending. Instead the Government is attempting to transform its energy conservation program to operate in a market-based economy.

A major player from the past, the China Energy Conservation Investment Corporation ("CECIC"), was the implementing agency under the central government's special EE fund. CECIC has registered capital of RMB 2 billion, however, the future of CECIC is uncertain, as its role in a market-based EE program is unclear. CECIC is now in a transition phase where it is attempting to map its future course under the new market system.

An example of efforts to develop mechanisms that can prosper under the market economy are the energy management companies (EMCs) developed through The World Bank/Global Environment Fund China Energy Conservation Project. These three EMCs, established in 1997, are summarized in Table 3. In addition to the initial share capital, which was used primarily to fund company overhead, the European Commission gave each EMC a grant of US$1 million in 1998 to fund pilot projects. In mid-1999, the GEF (through World Bank) provided US$5 million in grant funding to each company for pilot projects and a US$21 million loan to fund commercial projects. As Table 4 illustrates, these companies have ramped up their business very rapidly and have all reported average returns of 20% p.a., thus amply illustrating the potential for financially viable EE financing in China.

Table 4. Overview of Chinese EMCs

EMC	Registered Capital (RMB)	Shareholders	%	No. Projects (est.)	Aggregate Value (RMB, est.)
Liaoning EMC	20 million	Liaoning Provincial Electric Pwr. Dev. Co.	50%	104	192 million
		Fushun Aluminum Factory	25%		
		Liaoning Xinda Industry Dev. Co.	10%		
		3 Others	15%		
Shandong EMC	34.4 million	Shandong Energy Conservation and Service Company	58%	64	161 million
		Shandong Energy Savings and Technical Service Center	24%		
		Shandong Shengli Stock Corporation	15%		
		Sanlian Group Corp.	3%		
Beijing EMC	20 million	Beijing Energy Investment Co (affiliate of N. China Power Group)	75%	79	122 million
		Beijing Energy Savings Monitoring Center	15%		
		Beijing Energy Savings Technical Center	10%		

Typical projects recently implemented by the three EMCs included:

- Alternative speed drive system renovation
- Renovation of boilers and industrial furnaces
- Renovation of heating systems
- Renovation of electric distribution systems
- Building energy conservation measures
- Condensate recovery, heat recovery, fuel gas recovery
- Replacement of steam/air hammers with electric hydraulic hammers
- Automatic control systems

As a result of the success of these EMCs, there are approximately a dozen more EMCs in formation and many more parties who are interested in moving into the business. In view of the aforementioned inability of banks to finance performance contracts without guarantees, the EMCs that will successfully launch are more likely to be those sponsored by industrial groups who can provide sufficient equity capitalization to organize and staff the company. In addition, the World Bank is organizing an EE guarantee fund with some US$22 million in GEF funding. The market shall determine the degree of leveraging of guarantee funding to loan volume. This guarantee fund is expected to be operational during 2002 and will surely serve to remove a significant barrier to the implementation of EE projects on a more widespread basis.

India

Energy Sector Overview

Perhaps the largest issues facing India's power sector are transmission losses and the weak credit standing of the State Electricity Boards (SEBs). From the generation plant to the end use, it is estimated that some 60% of the energy is lost:

- 10% - Losses at the generation plant
- 10% - Transmission line losses
- 20% - Non-technical losses (i.e., theft, meter reading errors)
- 20% - Inefficient end use

India is experiencing a capacity shortage of 11% - 18% and an energy shortage of 7% - 11%. Capacity additions are badly needed although the immense size of the needed investment far outstrips that which has been made over the past decade.

Regarding thermal energy, India is highly dependent upon imported oil and gas. Imports account for 60% of total consumption. India's coal resources have extremely high ash content (>40%) and there are transportation bottlenecks.

Thus, the potential for EE to address the supply problem is obvious. Accordingly, GoI promulgated the Energy Conservation Act of 2001 which seeks to improve EE in various sectors, specifically, industry, transport and buildings. The basic instruments of the Act include:

- Standards and labeling
- Specifying energy consumption norms
- Mandatory energy audits
- Enhancing awareness levels

Energy Efficiency Sector

There has been a significant amount of analysis completed concerning the potential for energy (and demand) savings. Various statistics were presented including the potential for reducing electric demand in India's 22 largest industrial sectors by some 15 GW.

However, the ESCO sector is still very immature with some 9 ESCOs (loosely defined) operating in the market. The most active include DSCL Energy Service Company (represented at the workshop) and Thermax EPS. Only DSCL has experience with implementing a project on the basis of a performance contract.

In addition to the ESCOs, there are a few important industry associations.

The Council of Energy Efficiency Companies in India (CCECI) was established in 1998 to expand the markets for energy efficiency products and services. Its members consist of suppliers of EE products and services and its role is to:

- Promote rational energy pricing and fiscal policies
- Influence energy legislation
- Develop energy standards for buildings and equipment
- Identify EE financing resources
- Provide technical support to utilities and other stakeholders
- Conduct joint marketing of EE products and services
- Identify project opportunities

The Energy Management Cell within the Confederation of Indian Industry was formed in 1989 and offers a range of services covering energy audits, training/workshops, and information dissemination.

The Federation of Indian Chambers of Commerce and Industry (FICCI) is the apex body of a nationwide network of 540 chambers and industry associations. FICCI has established a website dedicated to EE (www.energysaversindia.com). The energy audit cell of FICCI provides energy audit services to both large and small energy users and has assisted over 180 small scale non-residential end users.

SECTION 3

BARRIERS TO IMPLEMENTATION OF ENERGY EFFICIENCY PROJECTS AND LENDING

Brazil

Presently, there is little possibility to obtain loans for EE projects in Brazil unless there is a financial guarantee or the borrower is deemed by the bank to be very creditworthy. Consequently, the Brazilian team has been focused on the development of various guarantee fund structures to mobilize domestic bank financing. Given the paucity of risk capital, this approach makes sense since capital placed in a guarantee fund can be leveraged (e.g., 10 times) to produce a much larger volume of loans as only a portion the loans in any given portfolio should experience difficulty.

In spite of the energy sector conditions that favor EE cited in Section 2, many barriers to EE project implementation remain. From a financing perspective, the biggest barrier is that the opportunity cost to Brazilian banks (i.e., the risk adjusted return those banks could earn on more traditional financial products) is viewed as being greater than the risk adjusted return offered by EE projects. A guarantee fund would be a logical mechanism to induce banks to provide capital for EE projects, at least initially.

Other main barriers cited by the Brazilian team included the following:

Lack of knowledge in the market about EE and performance contracting, in general. The notion of a performance contract is almost unheard of in Brazil. Consequently, a significant amount of education and awareness raising is necessary with potential customers, vendors and financiers about this type of contracting, the risk allocation and the method by which payments are computed.

Few successful (non-bank) EE financing lines. In addition to the existing World Bank energy efficiency program with Eletrobras/Procel, BNDES manages two credit lines dedicated to energy efficiency – a small loan program and a large loan (over R$7 million) program. For reasons discussed in Section 1, these credit lines are not presently utilized.

Capital controlled by Eletrobras specifically for EE can only be provided to utilities who themselves are not all that interested in EE. Incumbent electric utilities have little direct incentive to help their customers reduce the amount of electricity they purchase. Moreover, it is the ESCOs and the energy end users that require direct financial assistance to implement EE projects, yet these entities must go through a utility to gain access to capital.

China

The major barriers cited by the Chinese team include the following:

1. Information dissemination, raising awareness of the financial potential of EE projects to all stakeholders. The information dissemination barrier relates to the need to raise awareness both in the banking community, among prospective end users (especially in targeted industrial sectors) and the government as to the economic merits of EE projects, the potential for savings, technologies that can be employed, how the projects are typically implemented with performance contracts, and so on.

2. Lack of suitable loan appraisal methodologies for EE loans. The lack of an appraisal methodology is seen as a problem as bank loan officers do not have a process by which they can evaluate a prospective loan application. Existing credit review processes are not entirely suitable for evaluating EE loans. There is a need for a comprehensive assessment system so bank loan officers with little or no prior EE experience, can quickly and accurately appraise EE loan applications.

3. Need for demonstration projects by sector (or information on completed projects) to increase the understanding among banks of the technical options available in different industries for financially attractive EE loans. Similarly, banks do not have experience financing the kind of equipment often found in EE projects and are generally unfamiliar with the kinds of economics that can be created with different types of EE hardware.

4. Lack of experience on how to secure the cash stream associated with EE project savings and how to then use this "negative cost" stream as the basis for a structured financing. There was considerable discussion on the second day of the workshop concerning how to "securitize the negative cost stream", or in other words, how to use the savings stream as the basis for a structured financing. All participants agreed that finding creative ways to accomplish this would be instrumental in moving towards more non-recourse kinds of loan structures.

5. Aside from the issue just above, the need for adequate loan security and/or collateral. (Author Note: The Chinese group cited the poor credit quality of EMCs in that they tend to be small companies relative to the amount of money they need to raise for projects. However, this is a nearly universal issue and the focus here should be on how to finance projects as opposed to balance sheets of EMCs.) The financing barrier stems from the present practice of providing loans only to the most creditworthy borrowers or, instead, requiring strong financial guarantees if the borrower is not deemed to be sufficiently creditworthy. The World Bank/GEF guarantee fund will no doubt be instrumental in filling the financing gap during this transition period in China's banking system.

6. How to achieve economies of scale in EE projects for financing purposes as most projects tend to be of a small size and entail significant transaction costs; a need to bundle projects to make it efficient from a banking perspective. There was considerable discussion concerning ways to reduce the transaction costs associated with typically small EE projects so as to make those transactions more attractive to banks.

India

Barriers to increased EE activity cited by the India team include the following:

- Energy (electrical) tariffs that send imperfect price signals to consumers (e.g., flow rates, zero tariffs, no time-of-use tariffs, etc.)
- Insufficient efforts made by utilities to check and stop non-technical losses in the electric distribution system
- EE not a focus within industry
- Weak credit profile of ESCOs and, oftentimes, the end user
- Inadequate awareness of EE opportunities among stakeholder groups
- Obsolete energy consumption standards (e.g. appliances, motors, etc.)
- No indigenous R&D for energy efficient technologies
- High prices for EE equipment (i.e., energy efficient equipment costs more up front than less energy efficient equipment that performs the same function)
- Supply chain inefficiencies
- Early negative perceptions of EE equipment (e.g. too expensive, inadequate performance)
- Government procurement policies which favor lowest initial cost over life cycle costing
- Lack of dedicated EE funds
- Small ESCO industry
- Insufficient financial sector capability to appraise and finance EE projects

However, the environment is viewed as turning more favorable as:

- Macroeconomic environment evolves to rationalize electric tariffs and import tariffs are reduced
- Standards are established for various EE technologies, e.g., EE motors
- Increased awareness brings more ESCOs and projects to the table

SECTION 4

OVERCOMING BARRIERS TO EE FINANCING

As one can see from Section 3, there are a number of common themes that emanated from the workshop in terms of the barriers to increased domestic financing of EE projects. The most prevalent themes were the following:

- How to secure the savings ("negative cash") stream associated with EE projects and have that secured stream of savings provide meaningful credit support to the EE loan. A closely related topic was how, through financial structuring or specific credit enhancements, to create more "bankable" EE projects.
- How to overcome the transactional cost burden of EE projects that tend to require rather small amounts of capital per project.
- How to prove the financial viability of EE projects to a generally unaware domestic finance sector. This theme has two parts: information dissemination/project appraisal and project demonstrations.

Theme 1: How to "securitize" the savings stream, developing other financial structures and credit enhancements to support EE project loans.

There was considerable discussion on the second day of the workshop concerning the means by which the credit structure of EE project loans could be improved through financial structuring and credit enhancements (e.g. guarantees) to overcome the common problem that lenders are reluctant to lend to borrowers they perceive as being not sufficiently creditworthy to support loan repayment based upon their financial statements alone. Furthermore, the collateral value of an EE project is often only a fraction of the loan amount if the lender had to enter a defaulting borrower's premises, remove the equipment and sell it.

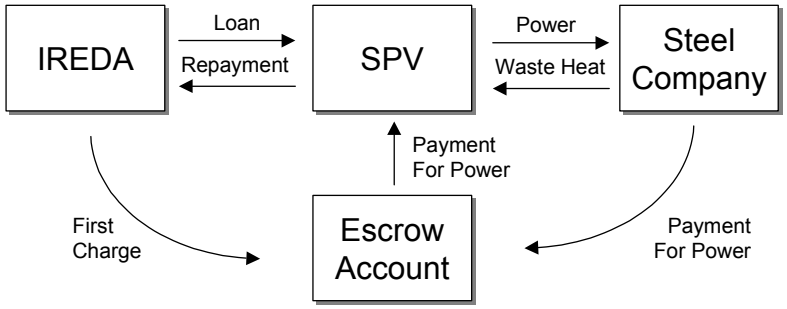
In response to this issue, the IREDA representatives proceeded to explain two transactions they have successfully financed.

In a particularly novel transaction (Figure 15), IREDA provided financing on a structured, limited recourse basis for a heat recovery/cogeneration project involving a steel mill. As project finance is not practiced to any extent in India, this transaction illustrates the creativity and flexibility IREDA has in doing well-structured deals and should serve as a beacon to commercial banks eyeing similar opportunities.

In this transaction, IREDA created a SPV who serves as the borrower of the loan and the owner of the financed assets. The SPV is capitalized both with IREDA's loan as well as equity contributed by the project sponsors. Although there is no corporate balance sheet or financial guarantee backing the loan, IREDA takes comfort in the fact that the steel company must have power to operate which he cannot do without the equipment

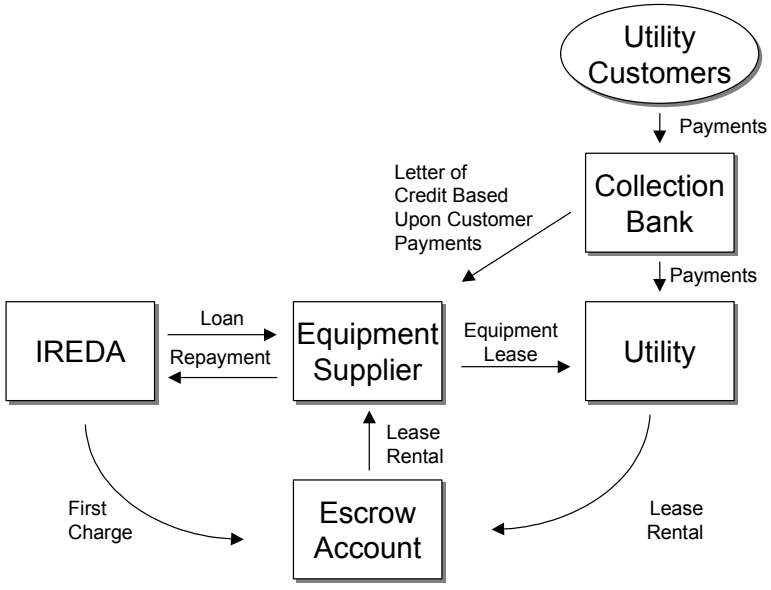
owned and operated by the SPV. An escrow account was created to shield IREDA from the payment risk of the SPV. This structure is common in limited recourse financings elsewhere and provides an early example of what banks will hopefully finance in the coming years.

Figure 15. SPV Financing Structure



Another novel structure financed by IREDA is illustrated in Figure 16 which involved the sale of capacitor banks to improve load factor at industrial facilities, a very common problem in India. The IREDA loan was for 75% of the US$2 million project cost and is repaid over 5 years (including one year grace) at 13.5% p.a. Of particular note is that the lease payment from the utility is only due if the project achieves a minimum 95% load factor. Although Indian utilities are notoriously weak financially speaking, this structure allowed the equipment supplier to finance and install this equipment which otherwise would have been beyond the ability of the equipment suppliers balance sheet to finance. Furthermore, IREDA took the performance risk of the equipment supplier without being exposed to its credit risk.

Figure 16. Vendor Finance Structure



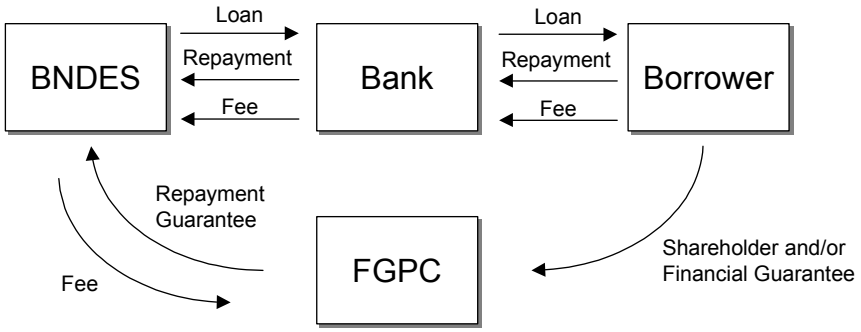
These structures illustrate how IREDA was able to structure the transaction to substantially mitigate the repayment risk of the ultimate end user of the EE equipment. Considerable discussion followed, particularly by the Indian commercial banks, as these structures were analyzed and debated. It was obvious from the discussion that "light bulbs" were going off all around the table that there are indeed novel ways of addressing common credit concerns of EE projects, such as demonstrated by these two case studies.

Another case study, proposed by DSCL Energy Services, involved a project that has not been able to attract financing. In this case, a paper mill with a weak balance sheet and a $3.4 million annual utility bill wants to undertake an EE project with an installed cost of $1 million. The projected savings on the utility bill is $1.2 million. These savings are the difference between the mill operating at a loss or a profit. The question posed to the group by DSCL was how to structure this project so that it would be bankable. Even though the project has an obviously high return on investment, the weak credit of the mill is the main impediment to completing the financing. It was suggested to DSCL that they work with the mill's existing lead bank to finance the project since they (the bank) stood to lose much more than $1 million if the mill ceases operation. The project should be pitched to the bank as a means to keep their existing loans performing. In addition, the bank could perhaps be offered some form of "sweetener" (e.g., equity kicker) to extend additional credit for the EE project.

There was a brief discussion concerning leasing which, in most countries, is a tax-driven financial product. Specifically, when leasing companies can take advantage of depreciation benefits and/or tax credits immediately when lessees cannot (usually due to a lack of taxable income), then there may be a financial benefit from leasing to both the lessor and lessee. This situation is common in the US and might also exist in India as indicated by the lease approach taken in the capacitor transaction described above in Figure 16.

The Brazilian team then discussed the concept of a guarantee fund as the credit enhancement on which they are focusing as a means to mobilize domestic capital for EE projects. BNDES presently manages a guarantee fund, FGPC, the structure of which is illustrated in Figure 17. The guarantee fee payable by the borrower is 0.15% per month (1.8% p.a.) and the FGPC guarantee covers 70% - 80% of the loan principal. Mr. Walsey Magalhaes noted this fund has been unsuccessful, presumably due to the stiff requirement of the borrowing company to provide a financial counter-guarantee back to FGPC. From the banks' perspective, the program was also less than optimum since borrowers were only providing a partial guarantee and judicial action was necessary to call the guarantee if needed. The counter-guarantee is not required for loans under R$500,000.

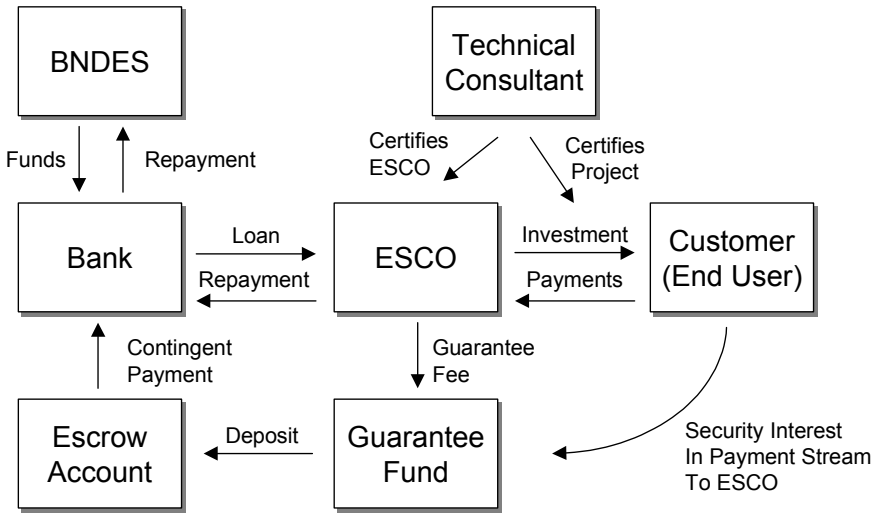
Figure 17. FGPC Guarantee Fund



Another structure under consideration for financing EE is shown in Figure 18. Under this structure, financing is made available to the ESCO on a project-by-project basis. The bank would make financing available to the ESCO to implement the project. In this example, it can be assumed that financing for 100% of the project cost is available, however, it may be prudent to have either/both the ESCO and customer to have a financial stake in the project as well. As a prerequisite to the financing, the ESCO would enter into a performance contract with the customer requiring the customer to make payments to the ESCO assuming the savings from the project materialize. An independent technical consultant would evaluate both the project and the technical capabilities of the ESCO to implement the project to mitigate the risk that the savings won't materialize assuming the project is implemented properly. This is intended to reduce the risk to the guarantee fund that the project will fail technically thus excusing the customer from making payments to the ESCO and exposing the guarantee fund to the credit risk of the ESCO. The guarantee fund would maintain an escrow account from which the bank could make draws in the event the ESCO fails to make timely payments. The guarantee fund is intended to be self-sustaining in that guarantee fees paid in by ESCOs would cover any loss experience.

The merits of this scheme are that there is a financial benefit to every participant in the structure. It is also anticipated that the capital in the guarantee fund can be leveraged some ten times (i.e., $1 of guarantee enables $10 in loans). The obvious downside is that it is a complicated structure which will entail both time and expense. Some 70% of Brazilian EE projects are less than US$200,000 which does not seem large enough to support the cost of this structure. Furthermore, it is not at all obvious who is going to provide the initial capitalization of the guarantee fund, what the initial leveraging multiple should be, and what happens should the banks view the fund as having insufficient capitalization to cover their loss exposure.

Figure 18. Contemplated EE Guarantee Scheme



Notwithstanding the drawbacks of the above the structure, the positive aspect of the guarantee approach is that it serves to leverage very scarce long-term risk capital and can be a way for banks to familiarize themselves with EE projects. The negative aspects are that the guarantee fund does nothing to reduce the already high domestic interest rates and, in fact, adds additional complexity and cost to any given transaction. Furthermore, there are at least three key uncertainties, including:

- Who will provide the initial capitalization of the fund;
- What amount of leveraging of the fund the bank(s) will allow; and
- How the fund would be replenished in the event it runs dry.

Other than the initial capitalization, the guarantee fund anticipated for China and sponsored by The World Bank faces similar issues.

The notion of a guarantee fund is important in all three countries as, perhaps, a transitional mechanism to facilitate EE project financing until the commercial banks start doing more structured financings in the EE sector.

The Brazilian team also raised the subject of having equipment vendors provide financing for their own equipment as is common practice in the agricultural sector in Brazil (e.g., tractor manufacturers provide financing to farmers to purchase their tractors). This led into a discussion of manufacturers who have started ESCO businesses (e.g., Honeywell, Siemens, other building controls manufacturers) as a means of selling their equipment. The Brazilians noted their experience with vendor finance in the EE sector has not been so good as you need multiple suppliers covering all the relevant equipment categories (e.g., lighting, motors, pumps, etc.) to have both competitive offerings and financing for the breadth of equipment required. Bob Taylor pointed out that vendor finance may be an opportunity in China as there are a number of manufacturers who are interested in providing financing and vendor finance is one

approach, among many, that could be called upon to increase EE project activity. DSCL pointed out there are no barriers to vendors entering into this business right now.

The concept of energy savings insurance was briefly discussed as this is a product that is available in the US but is not available in China, India or Brazil.

Finally, it was agreed among the workshop participants that it would be helpful to have additional information concerning how US lenders approach the problem of securitizing the savings stream. Accordingly, Section 6 of this report provides a summary of how EE projects financed with performance contracts are structured in the US.

Theme 2: How to overcome the transactional cost burden of relatively small EE projects.

There are numerous transactions costs associated with EE projects including:

- Engineering (upfront)
- Legal (upfront)
- Measurement and verification (ongoing)
- Maintenance (ongoing)

The IREDA representatives noted that they require prospective borrowers to bear all transaction-related costs, even if the financing is not approved. This is accomplished by charging borrowers a 1.2% application fee, a registration fee of Rs.35,000 and a additional reimbursement for transaction costs (i.e., legal, energy audit, travel) in the amount of Rs.1 million.

Another approach was explained by the State Bank of India. As part of their Uptech Program (discussed in Section 1), they are working with a glass research institute on a furnace design improvement that has widespread application throughout the glass industry. The Bank has provided some seed capital to the research institute to develop a proprietary design which it then provides to industry. The Bank then provides loans to the glass manufacturers to implement the improvement. To date, about 25 units have been installed of which the Bank has financed 15 with an average cost of about US$12,000 each.

This “cluster” approach can be effectively used to reduce transaction costs in any number of ways:

- Identify a technology application (“technology cluster”) that has widespread application in one or more industries;
- Identify an industry (“industry cluster”) that has a need for a variety of technology applications; or as described above,
- Focus on the intersection of a technology cluster and an industry cluster.

Technology clusters being pursued by IREDA include:

- Waste heat cogeneration in industrial applications
- Power generation using bagasse in the sugar industry
- Improvements to existing power generation stations

Theme 3: Proving the financial viability of EE projects – information dissemination/project appraisal and project demonstrations

The third theme dealing with information dissemination overall was aptly characterized by the SIDBI representative as a "gap of conceptual clarity."

The Chinese led a discussion on the communication gaps that presently exist within the banking sector on EE projects, in general, not to mention the financial appraisal and structuring issues. They stressed the need for bank loan officers to receive specialized EE-related training so they would better understand how to assess the risks associated with such projects.

The Chinese also stressed the need for a special, comprehensive assessment system for EE projects as they tend to be multi-faceted – both technical as well as financial in nature. Standardized appraisal methodologies may also reduce transaction costs (Theme 2).

The ABESCO representative discussed how his trade association plans to assist by managing a certification program for ESCOs so that banks and prospective customers can readily identify whether an ESCO possesses certain pre-established qualifications. ABESCO also plans a certification program for projects in conjunction with Procel to help overcome the technology assessment barrier. Finally, ABESCO plans an outreach program to banks, law firms, ESCOs and customers on performance contracting and M&V protocols.

Other outreach activities planned by ABESCO include coordination with other business trade associations and federations in the industrialized states of Brazil, selected universities and research centers, key government agencies at the federal, state and municipal level. ABESCO's activities would be closely coordinated with those of Procel/Eletrobras, INEE (National Institute for Energy Efficiency), Brazil Clean and Efficient Program (a USAID-funded program managed by Winrock International), and the International Institute of Energy Conservation.

A component of the India action plan is to establish an outreach effort to executive management of selected banks and to encourage those banks, through their internal communication channels to disseminate information throughout the organization and branch network.

All workshop participants generally agreed on the merits of implementing demonstration projects as a means to "push the envelope" on what is considered common business practices currently. Successfully implemented demonstration projects, coupled with an

effective information dissemination program, can serve to break down an important barrier to EE financing.

SECTION 5

COUNTRY ACTION PLANS

This section summarizes the action plans prepared by each country team that were presented on the third day of the workshop to directly address the barriers discussed the prior day.

Brazil

A key objective of the project is to catalyze investment in energy efficiency by local banks. Given the current status of the financial sector in Brazil, the Brazil team feels that one of the most important factors inhibiting this investment is the lack of a guarantee facility to aid the securitizing energy efficiency loans developed by or for ESCOs, based on the future project cash flow of energy efficiency projects. Therefore, the Brazil delegation placed strong emphasis on the development of a guarantee fund for ESCOs. In this work, the Brazil team will concentrate much of its activities on:

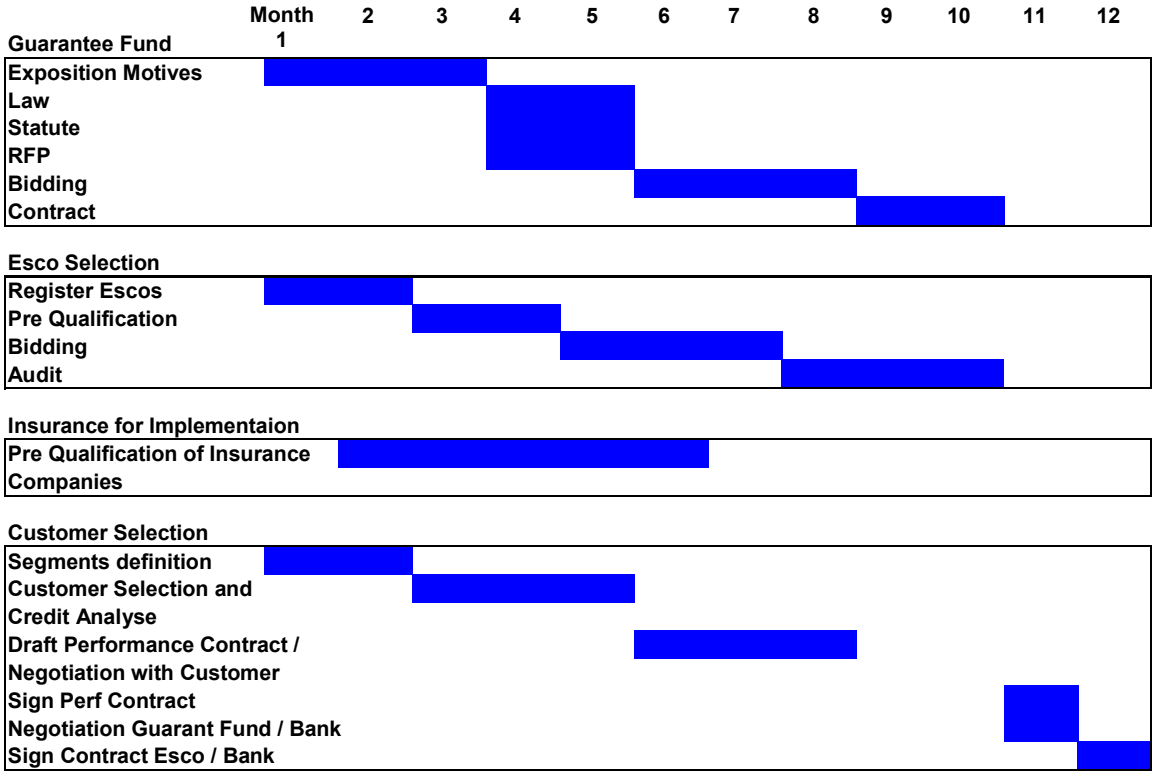
- Providing preliminary support for the formulation of an ESCO guarantee facility , which could be further supported through the World Bank's Brazil Energy Efficiency Project; and

- Preparation of a number of potential investment projects jointly with selected ESCOs in specific representative industrial, commercial, and public sector facilities, suitable for submission to local banks for financing, especially with the proposed guarantee fund in place. The Brazil team could help facilitate mutual understanding between the project developers and the local banks.

In addition, the Brazil team noted that there may be opportunities for stimulating local bank financing for other types of energy efficiency investments, such as development of cogeneration possibly also with support from an existing BNDES energy efficiency line-of-credit.

Figure 19 presents an overview of a possible plan for development of the proposed guarantee fund and associated activities, which could be the basis for further discussion with other Brazil group members, especially PROCEL, on a mutually supportive arrangement between activities sponsored in this project and the World Bank Energy Efficiency Project.

Figure 19. Overview of Brazil Action Plan



China

There is a considerable amount of EE financing already underway in China at the present time but, other than the GEF/World Bank financing being made available specifically for the three EMCs discussed previously, domestically financed EE projects tend to be for large projects with large, creditworthy borrowers or where there is a financial guarantee. Since there is an enormous untapped market among small and medium sized enterprises, there is a deep gap between the banks who have money but face a shortage in bankable projects, and the markets who have lots of projects but no money. The goal, then, of the Chinese program is to demonstrate innovative structured financing approaches using domestic banks on smaller, pilot projects through the formation of specialized “windows” for EE loans at selected banks.

The Core Team will maintain flexibility in bank selection and approach selected banks at a high management level since key management support will be required for the introduction of such a new approach. They will work to encourage selected banks to establish a dedicated EE financing department or unit (aka “window”). Within that specialized unit, the UNF program (in parallel with the ongoing WB project) could help provide support for training, project analysis, and coordination with SETC.

To achieve this, the Chinese Core Team will undertake the following activities:

EE Appraisal Tools and Financial Products

- Design credit appraisal standards for SME borrowers
- Design/refine project appraisal methods
- Design EE loan contracting procedures to securitize repayments against energy savings
- Design standardized energy audit/savings calculation methodologies

Investment Projects by EE Finance Window of Local Banks

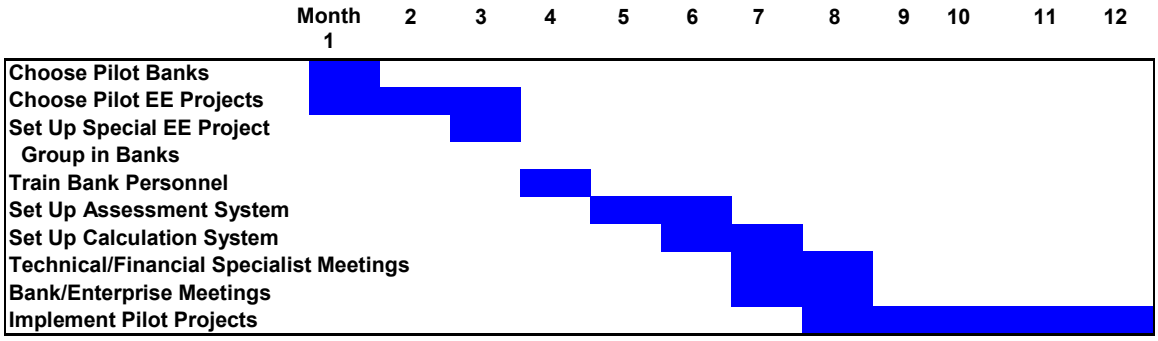
- Outreach/selection of banks to participate in EE finance window
- Identification of potential project type/target borrowers
- Support for EE project group within participating banks
- Support for development of project proposals and contracting arrangements for selected projects in representative sectors

Information Dissemination

- Disseminate information on tools and financial products developed to non-participating banks
- Disseminate results of initial investments made by commercial windows for EE

An overview of the action plan is provided in Figure 20.

Figure 20. Overview of China Action Plan



India

The key activities planned by the India Core team are described below:

Information Compilation – This activity consists of compiling data on EE technologies, EE projects and industry participants. The aim of the report is to increase awareness of the EE industry among all stakeholders, especially financial institutions.

Institutional Delivery Plan – This activity is focused on establishing a protocol within specific banks, starting with the Core Team banks, for the processing and appraisal of EE projects. Its components include:

- Preparation of a letter from IREDA to the Core Team banks and SIDBI officially notifying them of the project and the concurrence of the Ministry of Finance
- Preparation of a draft concept note for dissemination with the Boards of the Core Team banks as well as the remainder of the Core Team. Bank of Baroda will take the lead on the concept note.
- Discussion of the concept note with top bank/SIDBI management
- Develop an outline of the overall scheme (e.g., definition of eligible borrowers, project appraisal approach, pricing strategy, procedures for routing proposals, maintenance and verification procedures, etc.)

Appraisal System – This activity is intended to make the Scheme Outline from the prior activity operational. A consultant will be hired to transform the outline into actual procedures that may be used as a guide by participating financial institutions (core banks on their behalf), industry (FICCI on their behalf) and ESCOs (DSCL on their behalf).

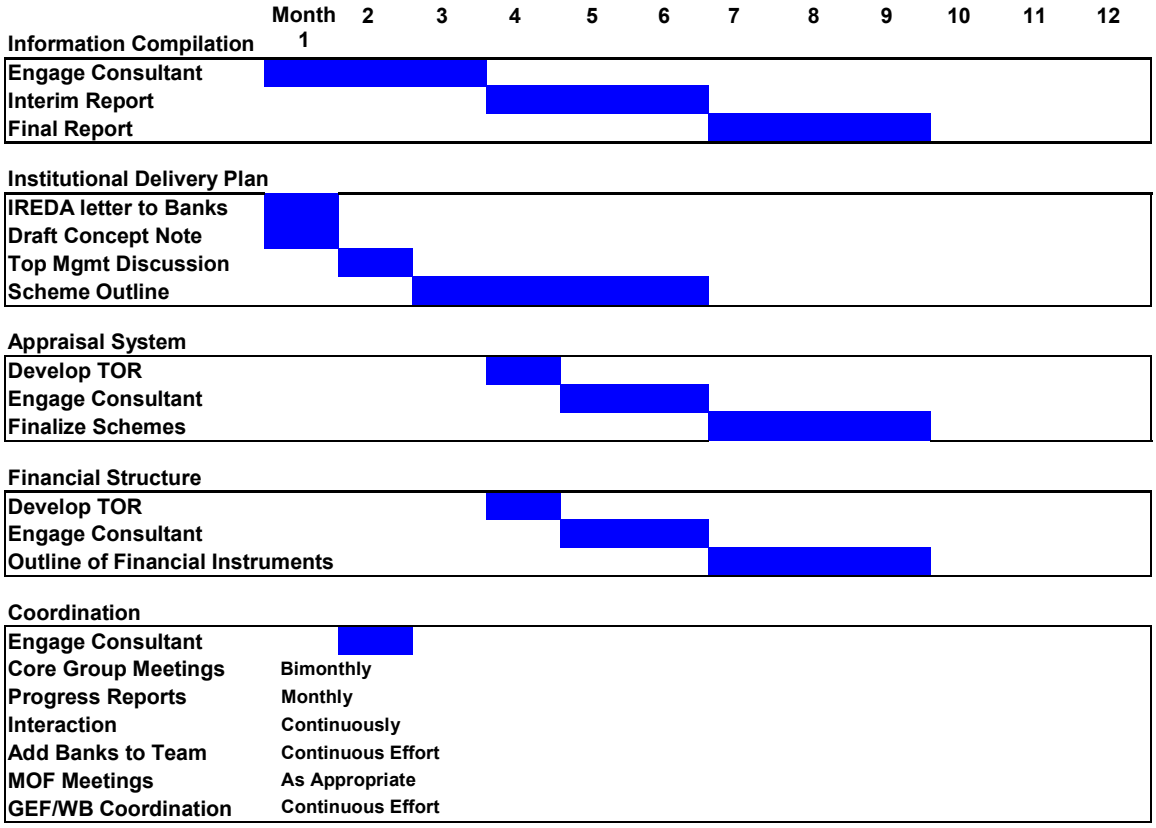
Financial Structure – The purpose of this activity is to design workable financial instruments, including the possibility of a guarantee fund, that may be used to finance EE projects. These instruments, at a minimum, will be used as a training tool for loan officers. It was also discussed that it would be useful to have, as a reference, information concerning financial structures that have been successfully deployed in other EE markets, notably the U.S. (see SECTION 3).

Coordination – Finally, all of the activities of the Core Team need to be coordinated and thus, the following steps would be undertaken:

- IREDA will engage a consultant dedicated to managing the Secretariat function
- The Core Team will meet every two months
- The Secretariat will coordinate the preparation and dissemination of a monthly progress report
- Continuous interaction among the Core Team will be encouraged
- There will be a parallel effort to include more commercial banks in the Core Team, taking advantage of existing banking relationships held by the Core Team banks
- There will be periodic meetings with the Ministry of Finance and other stakeholders, as appropriate
- There will be programmatic coordination with the GEF/World Bank money provided to IREDA to leverage the value of that funding

An overview of the India action plan is provided in Figure 21.

Figure 21. Overview of India Action Plan



SECTION 6

NOTES ON EE FINANCING IN THE U.S.

Author Note: At the request of the meeting participants, this section is being included in the report to highlight how US lenders, where EE financing is common, deal with many of the barriers discussed at the workshop.

It is estimated that there is some US$100 million in EE financing being completed annually in the U.S. along based upon the structured financing techniques discussed at the workshop. Lenders who are active in this market include:

- ABB Energy Capital (sub. of ABB), Westborough, Massachusetts
- GE Capital (sub. of General Electric Company), Stamford, Connecticut

In addition, there are numerous leasing and equipment finance companies (e.g. CitiCapital, sub. of Citigroup) that finance EE equipment on a lease basis as opposed to the project financing of performance contracts that the lenders cited above will undertake. Since U.S. tax laws that favor leasing are unique to the U.S. and are not generally applicable to Brazil, China or India, the remainder of this section will focus on the project financing of performance contracts.

Securitizing the "Negative Cost" (Savings) Stream

These lenders securitize the savings stream in any number of ways. Perhaps the most straightforward approach is where the borrower (end user or ESCO) enters into a number of simultaneous contracts with the lender including:

- An Energy Services Agreement (or performance contract) where a number of important transaction characteristics are spelled out, including:
  - Project scope, schedule and budget
  - Undertakings by the borrower as to performance
  - Methodology for calculating savings
  - Maintenance and verification (M&V) protocol for maintaining the equipment and verifying the savings on an ongoing basis

  (Most end users and ESCOs have their own form of ESA that they must ultimately negotiate with the lender.)
- Consent and Recognition Agreement (where the borrower is an ESCO) from the host company recognizing the existence of the Energy Services Agreement (ESA) and their obligations to make payments under the ESA (if there is no ESCO involved) or the ESCO contract, as the case may be.
- Loan Agreement where the lender takes a security interest in the payment stream created by the ESA and the Consent and Recognition Agreement

- Various other certificates, estoppels, and UCC filings to fully perfect the lender's security interest in the equipment and the "negative cost" payment stream.

It was noted that the two key items here from a lender's perspective are:

1. The credit of the borrower determines the overall quality of the deal. If there is no ESCO involved, this is a straightforward question: does the borrower have the financial ability to make payments under the ESA, taking into consideration the savings likely to be achieved? If there is an ESCO involved whose balance sheet cannot support the size of the project, then a special purpose company can be established where a "fence" is drawn around the project for the benefit of the lender thus removing the payment risk of the ESCO from the picture. In this instance, the lender would "look through" the ESCO to the end user as the lender would have a security interest in the underlying contract between the special purpose company and the end user should the ESCO go away.
2. The M&V protocol needs to be very simple and easy to follow so there is no confusion or disagreement after the deal is completed concerning how to calculate the required payment by the ESCO and end user. There are many M&V protocols available in the public domain.

Another key aspect of the lenders assessment of a prospective project is the involvement of a bank engineer to assess the technical merit of the project and the likelihood that the expected savings will materialize.

The calculation of the savings has two components: the ***quantity*** of energy saved and the ***unit price*** of energy. Typically, the quantity is a calculated amount and the unit price is either fixed or tied to a utility tariff that is not expected to vary significantly over the term of the financing. If price is expected to vary widely, the risk of the financing goes up which is reflected in the terms of the financing.

Loan Structure and Pricing

It was reported that the percent of project cost that could be financed varies widely, e.g., 65% - 100%, depending upon the credit of the borrower and the degree of difficulty of the transaction. Tenors are often 5 – 7 years but can be as short as 3 years or as long as 10 years. Debt coverage ratios (the ratio of expected savings over the required loan payment) also vary widely, e.g., 1.05 up to 2.0, depending upon the credit of the borrower, the degree of difficulty of the transaction and the amount of leverage being sought. A coverage ratio of 1.50 is not uncommon. Pricing was reported to be in the range of 375 to 450 basis points over LIBOR reflecting a non-investment grade credit risk owing to the structured finance nature of the transaction. However, a lighting retrofit with an investment grade end user may command lower pricing due to the strong credit of the borrower coupled with the simplicity of the project.

Deal Size and Transaction Costs

The challenge of financing smaller transactions utilizing a structured finance approach is difficult for everyone, including lenders who do these transactions on a routine basis. However, it was noted that documenting a performance contract-based financing can take as little as $25,000 (for a U.S. transaction using U.S. lawyers and engineers). ABB's average transaction size was $8 million in 2001, up from $4.5 million in 2000, whereas ABB would finance $600,000 projects just a few years ago. The minimum size project ABB will now look at is $3 million for a new customer but lower for an existing customer. So what can an ESCO with smaller projects do in this situation? Answer: the ESCO must self-finance the first few projects and then sell the portfolio to the lender to get his capital investment out. Over time, it may be possible for the ESCO to negotiate a line of credit with the lender to add to the lender's portfolio in smaller, project-by-project, increments.

SECTION 7

FINAL COMMENTS

This workshop provided clear evidence, not surprisingly, that the barriers to increased development of EE projects are similar among each country, even though the underlying causes may be quite different. And the action plans that emerged from the discussion demonstrated that the suite of solutions appropriate for each country is somewhat unique, reflecting the unique macroeconomic and energy sector conditions in each country.

Notwithstanding the uniqueness of these solutions, there are significant common elements among the action plans. The workshop engendered a spirit of cooperation and mutual encouragement.

As required under the UNF/World Bank funded activities, the secretariats of each country team (i.e., ABESCO, SECIDC, IREDA) will be sending out bi-monthly progress reports that will be shared with the entire group. In addition, a recommended list of websites, including a brief description of each, will be compiled by World Bank with suggestions submitted by the entire group.

The World Bank, UNEP and the author would like to thank all of the workshop participants for their time, energy and ideas to make this event such a success.

ANNEX A

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ANNEX B

UNF/UNEP/World Bank Program on
Developing Financial Intermediation Mechanisms for Energy Efficiency Projects

ESMAP Brazil-China-India Workshop on Energy Efficiency Financing by Local Banks

16-18 January 2002, Goa, India

Final Agenda

Tuesday, 15 January 2002: **Welcome Dinner**

1930 Dinner the Taj Fort Aguada Beach Resort hosted by The World Bank

Wednesday, 16 January 2002: Opening Remarks and Country Team Presentations

0845 Welcoming Address *IREDA representative*

0855 Opening Statements: Objectives of Workshop and Full Program *Mr. R. Taylor, World Bank, Mr. J. Painuly, UNEP*

0915 Structure and Format for Workshop *Mr. S. Selman, Workshop Chairman*
Workshop Logistics *Ms. H. Bhavani, World Bank*

0930 Introductions

1000 First Country Team Presentation *China Country Team*

1100 Q & A

1200 Lunch

1330 Second Country Team Presentation *Brazil Country Team*

1430 Q&A

1530 Break

1545 Third Country Team Presentation *India Country Team*

1645 Q&A

1745 Closing Summary and Discussion of Day 2 Agenda *Mr. S. Selman*

Thursday, 17 January 2002: Barriers to Local Bank Finance for Energy Efficiency and Tools to Overcome Them

0900 Interactive mini-sessions concerning key barriers to energy efficiency lending faced by local finance facilities *Chairman: S. Selman*

1. Summary of the barriers
2. Understanding the root causes

3. Discussion of shared experiences, perspectives and lessons learned
4. Discussion of solutions that have emerged

0900 Barrier #1

0945 Barrier #2

1030 Coffee Break

1100 Barrier #3

1145 Barrier #4

Possible topics for discussion (subject to modification based upon Day 1 country presentations):

- High Transaction Costs. The transaction costs of preparing and implementing financing for energy efficiency projects can be disproportionately large relative to the size of the transaction, especially as compared to corporate finance, thus imposing an added financial burden on both prospective lenders as well as borrowers.

- Mismatch of Domestic Loan Products to EE Market Needs. Energy efficiency projects are best financed in local currency to match the currency of the energy savings (i.e., the source of financial return). However, the domestic market for loan products does not often match the needs of the energy efficiency marketplace in terms of the willingness/ability of lenders to offer loans with higher pricing to reflect higher risk, provide sufficiently long loan tenors, etc.

- Unfamiliar Credit Support. EE projects are typically implemented by ESCOs/EMCs or directly by the end user. When an intermediary such as an ESCO is involved, their balance sheet is usually insufficient to support multiple EE projects, particularly those of any size. Likewise, end users implementing EE projects directly are often either unwilling or unable to offer a strong balance sheet, financial guarantee or fixed asset collateral. In these cases, more creative (i.e., structured) ways must be found to create a "bankable" credit package.

- Low Receptivity By Banks To EE Projects. Because EE financing is not commonplace, lenders typically are not aware of the loan potential of the EE market, how to attract good projects and screen out weak ones, how to make performance contracts bankable, and how to make money from an EE loan portfolio. Accordingly, few banks are set up to finance such projects on a repetitive, economic and value-added basis.

1230 Lunch

1315 Separate Country Team meetings to discuss country-specific opportunities to overcome barriers

1445 Presentation and Discussion on Opportunities for Overcoming Barriers in India
India Country Team

1515 Coffee Break

1530 Presentation and Discussion on Opportunities for Overcoming Barriers in Brazil
Brazil Country Team

1600 Presentation and Discussion on Opportunities for Overcoming Barriers in China

China Country Team

1630 Synthesis discussion and wrap-up of major themes from the day *Mr. S Selman*

1700 Issues to be discussed amongst Country Team Members *Mr. R. Taylor*

Friday, 18 January 2002: Definition of Future Project Work Program On Local Bank Lending for Energy Efficiency

0900 Separate Country Team Meetings

1000 Presentation of Activities to be undertaken to Overcome Barriers
Brazil Country Team

1045 Presentation of Activities to be undertaken to Overcome Barriers
India Country Team

1130 Presentation of Activities to be undertaken to Overcome Barriers
China Country Team

1215 Lunch

1400 Synthesis and Summary of Future Project Activities *World Bank Team*

- Definition of further project activities in the three countries
- Scheduling of second cross exchange workshop

1700 Closing Statements *R. Taylor/J. Painuly/S. Selman/IREDA representative*

Presentations by the three country teams may use the following outline as a guide.

(Note: Each team is <u>strongly</u> encouraged to have at least a copy of its presentation in English. Delivery of the presentation in English is desirable but <u>not</u> required. Each team will have approximately 2 hours to make its presentation.)

1. Overview of domestic baseline conditions including:
    a. Macroeconomic conditions (e.g., GDP growth rate, inflation, etc.)
    b. Currency convertibility
    c. Energy prices
        i. Electricity (commercial, industrial)
        ii. Fuels used for space heating, process heat (natural gas, oil, coal, other)
    d. Significant laws or regulations impacting on energy efficiency sector
    e. Typical sources of debt financing, especially long-term corporate debt and, if available, structured debt (e.g., project finance, cash flow-based loans, etc.)
    f. Long-term debt market environment (local currency and USD)
        i. Interest rates
        ii. Tenors
        iii. Fees charged
    g. The types of risks long-term lenders are/are not willing to undertake
    h. The market for other financial products as applicable to energy efficiency, including:
        i. Guarantees (for bank loans)
        ii. Leasing
        iii. Other specialized sources of finance specifically for energy efficiency (e.g. credit lines from World Bank or other sources)
    i. Commentary on the experience to date with energy efficiency projects, from the perspective of the <u>financier or lender</u>

2. Overview of energy efficiency sector, including:
    a. Existence of energy service companies (ESCOs) or energy management companies (EMCs)
        i. How many?
        ii. How large are they?
        iii. Any information regarding their project volume and/or financial condition
    b. General comments concerning the amount of energy efficiency work being undertaken directly by end users in various sectors
        i. Commercial
        ii. Institutional
        iii. Government
        iv. Industrial
    c. Existence of specialized energy efficiency organizations or associations
        i. Description
        ii. What do they do?
        iii. How helpful are they?

3. Each team shall describe what it sees as the primary <u>barriers</u> to increased energy efficiency activity within its own country
    a. Country-specific barriers (e.g., lack of structured finance lending, high interest rates, etc.)
    b. Barriers that are generic to energy efficiency projects (e.g., high transaction costs relative to size of typical projects, energy efficiency loans require both technical and financial expertise, generally weak credit stature of ESCOs/EMCs, etc.)

Each team shall describe what it sees as the primary <u>opportunities</u> for increased energy efficiency activity within its own country.