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POWERING UP

The Investment Potential of Energy Service Companies in India

FOREWORD

With average annual GDP growth at nearly 9 percent over the last five years, India has become an increasingly important global economic player. This rapid economic expansion is matched, however, by a soaring energy requirement. Indeed, the International Energy Agency (IEA) predicts that India's energy demand will more than double by 2030, creating significant challenges for the country.

India has limited reserves of fossil fuels. For example, in 2006, it imported 68 percent of its oil, and imports expected to increase to about 85 percent by 2012. If increasing supply is the only way to meet the rising demand, then energy security will surely become a difficult problem for India.

In regard to greenhouse gas (GHG) emissions, India ranks 140th in the world in per capita emissions. At the same time, though, India ranked fifth in the world in annual, countrywide GHG emissions, emitting 1,853 million metric tons of carbon dioxide equivalents.

The Indian government is keenly aware of these interconnected challenges and has chosen energy conservation as one of its primary strategies to address them. In 2001, the government passed the Energy Conservation Act, establishing a national policy framework to promote the efficient use and conservation of energy. Last year, Prime Minister Manmohan Singh released the National Action Plan on Climate Change, which names "enhanced energy efficiency" as one of India's principal means of mitigating the impacts of climate change. It is commendable that the government has adopted policies supporting energy efficiency. The challenge now is making sure that these policies are implemented.

Various sectors in India, including heavy industry and agriculture, have begun to realize the immense cost-saving potential that can be derived from energy efficiency programs, which has raised the demand for energy-efficient technologies and services.

India still has a relatively small energy service company (ESCO) industry compared with that of other emerging countries such as China and Brazil, partly because of investors' limited awareness and interest. Our report, assembled by members of WRI's New Ventures Program, seeks to stimulate investors' interest by creating a better understanding of the industry's significant investment and growth potential.

Based on a survey of ESCO managers and in-depth interviews with investors and other industry stakeholders, our report proposes recommendations that, if implemented, will increase the attractiveness of India's ESCO industry to investors. As a next step, we are working with a number of commercial banks to develop a financial product tailored to the ESCO industry and its energy efficiency projects.

WRI hopes that these research findings and recommendations will support the expansion of this critical industry in a country with much to gain from conserving energy and a major role to play in mitigating climate change.

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PHOTO CREDITS

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I. Executive Summary

Box 1. What Is an ESCO?

An ESCO is “a company that provides energy-efficiency-related and other value-added services and for which performance contracting is a core part of its energy-efficiency services business.”¹

Notes

1. For this publication, we adopted the definition of an ESCO from two leading authorities and associations on ESCOs in the United States: the Lawrence Berkeley National Laboratory (LBNL) and the National Association of Energy Service Companies (NAESCO).

Box 2. Information and Data Sources

The information and data used for this publication were derived from three sources: (1) a survey that WRI conducted among ESCOs in India; (2) interviews of selected ESCOs, financial institutions, ESCO clients, prospective ESCO clients, and government entities; and (3) secondary sources. WRI’s survey included only those ESCOs that have had at least one client contract in hand and met the aforementioned ESCO definition. Based on these criteria, we identified twenty-six ESCOs, twenty-four of which responded to the survey (see appendix B for more information on WRI’s survey and methodology).

Against a backdrop of national concern about climate change and rising oil imports, interest in implementing energy efficiency initiatives has been increasing in India’s government, business, and investment sectors. Both government policies and efforts by multilateral and bilateral organizations to conserve energy across a wide range of sectors have contributed to new domestic and international energy efficiency companies to serve this market. This expansion over the last half decade has in turn led to investors’ interest in funding the energy efficiency sector. The potential for energy savings is enormous: an estimated 183.5 billion kWh per year, based on reports prepared by the Asian Development Bank and the Indian Bureau of Energy Efficiency (BEE).

One subsector within the energy efficiency industry that can help deliver both energy savings and financial returns in India is the specialized energy service company (ESCO) industry (see box 1).

In other emerging countries, ESCOs have made significant contributions to energy efficiency programs and local economies. In Brazil, such companies produce annual industry revenues of USD 344 million (2008), and in China, USD 121 million (2006). In both countries, the industry is growing at double-digit rates.

The purpose of this study is to provide a better understanding of the potential of India’s ESCO industry in order for financial investors to make better-informed investment decisions. We describe lessons from the ESCO industries in Brazil, China, and the United States and analyze factors that could either contribute to or hinder the growth of the Indian ESCO industry. We also assess the industry’s growth potential and look at three case study examples. Last, we summarize the key issues and opportunities and make recommendations to increase the industry’s attractiveness to investors.

Our ultimate aim in driving greater investment in the ESCO industry is to reduce greenhouse gas emissions and contribute to a more sustainable development in India and across the world.

SUMMARY OF FINDINGS

India’s ESCO industry has grown steadily and significantly over the past five years; we estimate a compounded annual growth rate of 95.6 percent from 2003 to 2007. Our data and analysis indicate that this still young industry has a high investment potential for debt investors (see box 2 for our information and data sources). The majority of ESCOs’ energy efficiency projects have payback periods of less than two years, and ESCOs save clients an average of 20 to 25 percent on baseline energy costs. Currently, opportunities for equity investment in India’s ESCO industry are generally limited to direct investment in the larger

energy service companies, most of which are vendor ESCOs – those ESCOs affiliated with or owned by an equipment or control manufacturer. Larger energy service companies (revenues of USD 0.2 million and above) report no problems with funding projects, although some of their clients may still have some difficulty when clients are providing the financing.

Smaller ESCOs, however, have had difficulty because they lack the collateral to meet bank requirements. Moreover, some prospective clients are unwilling to finance, or cannot obtain financing for ESCO projects owing to a lack of confidence in energy service companies' capabilities and/or reluctance to take risks. A particular concern raised by prospective clients was the industry's domination by "vendor" ESCOs that are technology biased (i.e., offer only one technology and suite of products), rather than providing comprehensive energy management services. Another barrier that we found was Indian banks' lack of engagement. In order for ESCO clients to be able to obtain market-rate financing for energy efficiency projects, banks must recognize the savings potential that an ESCO's involvement can offer.

SUMMARY OF RECOMMENDATIONS

WRI's analysis indicates that the following actions can help the ESCO industry become more attractive to investors and realize its market potential:

For equity investors, banks, and other financial institutions:

- Pilot financial products targeted at ESCOs and energy efficiency projects.
- Include an energy efficiency and an ESCO component in existing credit guarantee funds for small- and medium-sized businesses.
- Invest in ESCOs with good credit ratings (banks) or high revenues/growth rates (equity investors), and explore other financial support mechanisms (banks/other financial institutions).

For government:

- Consider the clean energy sector to be a priority for the banking sector.
- Follow through on the 2001 Energy Conservation Act's mandate to create state energy conservation funds.
- Create energy efficiency mandates related to the 2008 National Action Plan on Climate Change.
- Develop and approve monitoring and verification protocols for energy efficiency, especially for projects undertaken by government agencies, such as water pumping and street lighting.

For energy service companies:

- Establish a strong, inclusive national association to increase the industry's credibility, to lobby for its needs, and to coordinate other organizations' efforts to support its growth.
- Focus on developing technical skills in a few industries or technology streams in order to build expertise and increase value to customers.
- Develop cogeneration and captive power generation capabilities to expand opportunities for projects in these untapped sectors.
- Utilize enterprise development and investment facilitation programs that can provide business advisory services and access to investors.

For enterprise development programs:

- Provide business advisory and investment facilitation services to ESCOs and work with banks to develop pilot products to finance them.

II. Introduction: India's Energy Conservation Potential

The aggregate investment potential for energy savings amounts to USD 9.8 billion.

Between 2003 and 2016, India's energy demand is expected to climb by 60 percent because of rising incomes, accelerated industrialization, urbanization, and population growth.¹ Meeting this greater demand only by increasing supply will lead to adverse environmental, economic, and security impacts. To curb this demand, the Indian government recognizes conservation as an essential part of its national energy strategy. Significant opportunities and value for energy efficiency projects abound in India. Indeed, in May 2008, the Ministry of Power stated that the energy conservation potential with today's technologies would be 20,000 MW.²

The energy saved between 2002 and 2007, the period of the Tenth Five-Year Plan set by the Indian Planning Commission, was 877 MW, but the target for the Eleventh Five-Year Plan (2007–2012) is 10,000 MW, more than a tenfold increase. Table 1 and figure 1 show that the aggregate investment potential in these sectors for energy savings amounts to USD 9.8 billion, with a total savings of 183.5 billion kWh and 148.6 million tons of CO₂ equivalent emissions.³

TABLE 1. Energy Savings Investment Potential in India by Sector

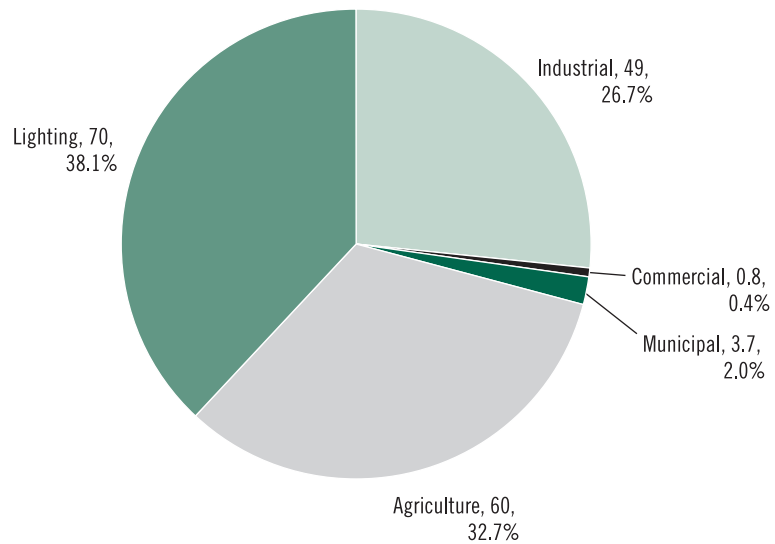
Market Type	Investment Potential INR Billions (\$ mill) ^a	Energy Savings (Billion kWh)	Energy Savings (MW)
Industrial: generic EE measures	42.0 (\$1,050)	23.8	3,400
Industrial: process EE measures	79.0 (\$1,975)	25.2	3,600
Commercial	6.6 (\$1,647)	0.8	290
Municipal	13.0 (\$325)	3.7	1,688
Agriculture	150.0 (\$3,750)	60	
Lighting	40.0 (\$1,000)	70	
Total	\$9.77 billion	183.5	

Notes:

The ministry bases the total potential energy savings on reports completed by the Asian Development Bank (ADB) on the industrial, commercial, and municipal potential energy savings and by the Bureau of Energy Efficiency (BEE) on the agriculture and lighting savings.

^a Represents total capital expenses.

Source: Bhaskar Natarajan, "EE Finance in India—Some Progress and What Next?" report presented at the Asia Clean Energy Forum, 2008, Asian Development Bank Headquarters, Manila, Philippines, June 3–5, 2008. Available at <http://www.adb.org/Documents/events/2008/ACEF/Session17-Natarajan.pdf> (accessed on September 20, 2008).

FIGURE 1. POTENTIAL ENERGY SAVINGS IN INDIA BY SECTOR (BILLION kWh)

Source: Bhaskar Natarajan, "EE Finance in India—Some Progress and What Next?" report presented at the Asia Clean Energy Forum, 2008, Asian Development Bank Headquarters, Manila, Philippines, June 3–5, 2008. Available at <http://www.adb.org/Documents/events/2008/ACEF/Session17-Natarajan.pdf> (accessed on September 20, 2008).

The industrial sector offers a good opportunity to save 49 billion kWh of energy per year, with an investment potential of USD 3 billion.

While the potential for energy conservation exists everywhere, the greatest aggregate savings can be achieved in the lighting, industrial, and agricultural sectors. Based on our survey of ESCOs, the lighting sector offers one of the most cost-effective opportunities to reduce energy usage, with also one of the quickest payback periods. The investment potential for implementing lighting efficiency projects is estimated by the Ministry of Power to be USD 1 billion.

Between 2004 and 2005, the industrial sector accounted for 42 percent of India's commercial energy use and has had an annual growth rate of more than 8 percent since 2005.⁴ The industrial sector, which includes small, medium, and large industrial enterprises, offers a good opportunity to save 49 billion kWh of energy per year, with an investment potential of USD 3 billion.⁵ Success in conserving energy has been demonstrated through an annual award scheme for conserving energy, organized by the Ministry of Power. In 2005, 311 industrial units participated in the scheme. These units' total one-time investment was INR 1,316 crores (USD 292 million), leading to an annual savings of INR 989 crores (USD 219 million) and an annual energy savings of 1,316 million kWh, 2.3 million kiloliters of oil, 75.8 million metric tons of coal, and 1.3 billion cubic meters of gas.⁶

The agriculture sector also provides fertile ground for conservation, with potential savings of up to 60 billion kWh. However, because of the subsidized electricity rates for the agricultural sector, there is little demand for energy efficiency. One of the current projects for the sector is upgrading water pumps to minimize the energy consumed in pumping. This sector's investment potential is USD 3.75 billion.

Although municipalities provide only a small amount of the total conservation potential, they have helped the ESCO industry achieve solid growth through government mandates combined with policymakers' desire for successful energy efficiency initiatives. Most of the current projects have been upgrading street lighting and water pumping. But other prospective areas, such as government buildings, offer opportunities to save energy as well. Audits completed for a number of government buildings under the direction of the BEE show potential energy savings of between 20 and 46 percent.

III. India's ESCO Industry

India's ESCO industry is relatively young. The first three ESCOs in India were established in the early 1990s, initiated in large part by funding from the U.S. Agency for International Development (USAID).⁷ These initiatives included training workshops held by energy specialists from the United States and an ESCO feasibility study.⁸

In 2001, the Indian government passed the Energy Conservation Act, which set the institutional and legal framework for energy conservation measures and programs. This law mandated the formation of the Bureau of Energy Efficiency (BEE), an agency under the Ministry of Power charged with the nationwide development and promotion of the energy efficiency industry.

International agencies have also helped develop India's energy service companies. From 2003 to 2007, the World Bank and UN Environmental Programme (UNEP) launched the Three Country Energy Efficiency (3CEE) project, which sought to increase energy efficiency investments in Brazil, China, and India through local financial institutions sharing best practices and lessons among the three countries.⁹ At the end of the program, five banks in India had started energy efficiency schemes to help fund energy efficiency projects (see appendix G for the details). By 2005, the number of ESCOs had grown to twenty companies,¹⁰ many of them former energy auditors or engineering consultants that started with a small asset base.¹¹

LOCATION OF ESCOS

The ESCO industry has grown mainly in three regions, clustered around the cities of Delhi, Hyderabad, Bangalore, Mumbai, Pune, and Chennai. The reasons that the industries are found here are as follows: The western region, which includes Maharashtra, Gujarat, and Goa, is a heavily industrialized zone in which most of the Indian pharmaceutical industry, a key client sector for ESCOs, is located. In this part of India, there also are a large number of paper and pulp, power, steel, automobile, engineering, chemical, and fertilizer factories, providing the ESCOs with a wide variety of potential clients. The national capital region around Delhi also has emerged as a site for significant industrial growth over the past few years, with several companies in the construction, power, steel, automobile, and fertilizer industries building plants. In the southern region, encompassing Hyderabad and Bangalore, the information technology, pharmaceuticals, paper and pulp, engineering, and automobile industries present business opportunities for ESCOs.¹²

ESCO INDUSTRY STATISTICS

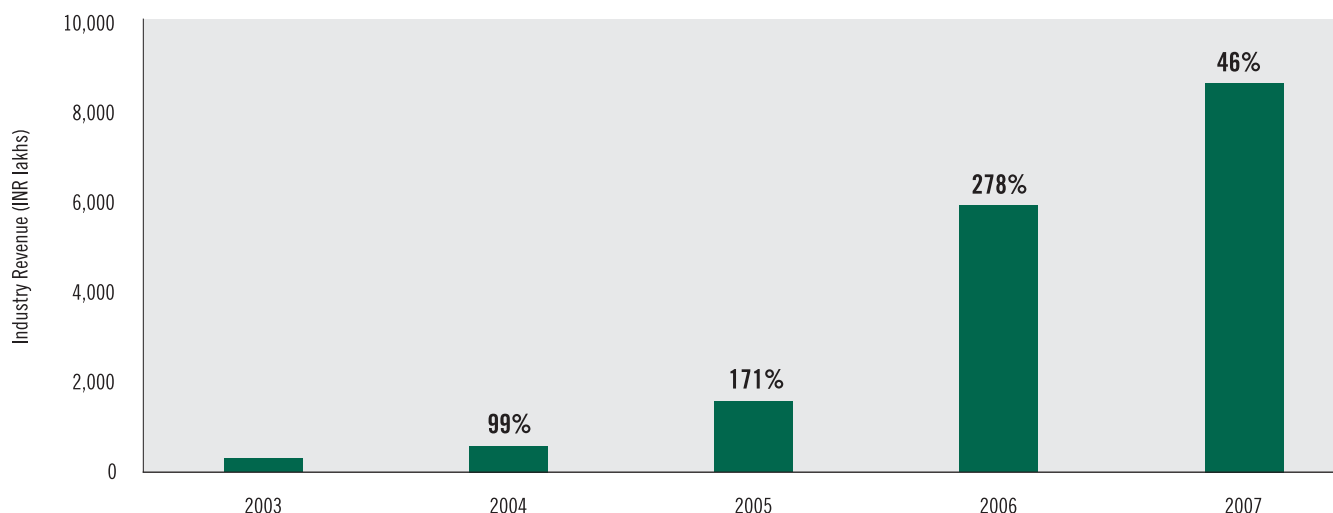
WRI conducted a survey of ESCOs in India between August and November 2008, seeking information about their revenues, business models, and project types (see appendix B for more information on the survey and survey methodology). Only those companies that had at

Based on a revenue-weighted average of the companies' projected growth for 2008, we estimate that the ESCO industry grew by at least 62 percent from 2007 to 2008.

least one client contract in hand and that met the aforementioned ESCO definition were included in the survey. Based on these criteria, we identified twenty-six ESCOs, twenty-four of which responded to the survey (see appendices E and F for more information).

Our survey determined that in 2007, the revenues for these twenty-four companies' ESCO services were more than INR 8,640 lakhs (USD 17.7 million)¹³ (see figure 2). The six largest companies earned INR 7,258 lakhs (USD 14.8 million), which accounted for 84 percent of the industry's revenues. From 2003 to 2007, revenues grew at a compounded annual growth rate of 95.6 percent, from a low base of less than 500 lakhs (USD 1.02 million). Nonetheless, the industry is expected to continue growing at a high rate in the coming years. Based on a revenue-weighted average of the companies' projected growth for 2008, we estimate that the industry grew by at least 62 percent from 2007 to 2008.¹⁴ In addition to this projected growth, new entrants in the market such as Dalkia, a multinational ESCO, will increase the overall industry growth rate as well.

FIGURE 2. ESCO INDUSTRY REVENUES (INR LAKHS) & YEAR OVER YEAR GROWTH (%)



Source: WRI Indian ESCO Survey, 2008.

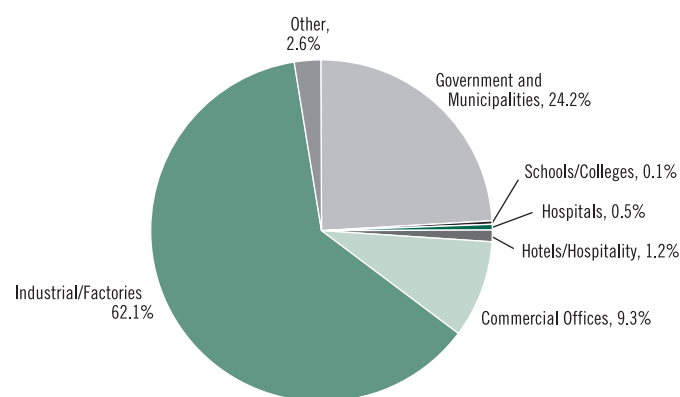
The ESCOs were asked to classify themselves as a general ESCO, a vendor-driven ESCO, or a consultant, based on the definitions in table 2. Eight ESCOs identified themselves as vendor-driven ESCOs, while sixteen identified themselves as general ESCOs. No ESCOs classified themselves solely as consultants. The vendor-driven ESCOs earned 53 percent of the 2007 revenues. Ten of the surveyed ESCOs indicated that they operated only through a guaranteed savings model; five operated only through a shared savings model; and the remainder used both. Companies using the shared savings model assume both financing and performance risks, whereas those using the guaranteed savings model only assume performance risk.

TABLE 2. ESCO Classifications and Business Models

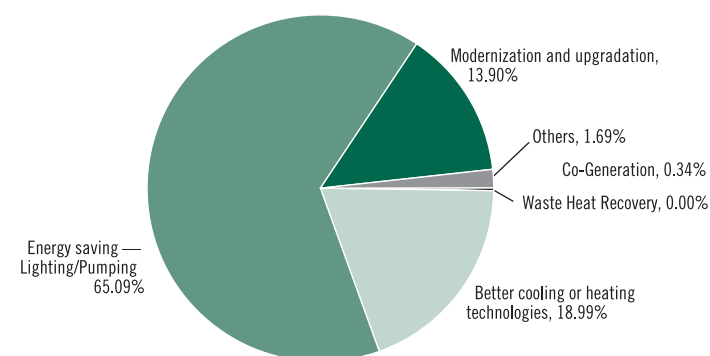
Terminology	Definition
<i>ESCO classification</i>	
General ESCO	An ESCO not owned or operated by an equipment manufacturer or an energy supplier.
Vendor-driven ESCO	An ESCO affiliated with or owned by an equipment or control manufacturer.
Consultant ESCO	An ESCO offering recommendations to a client based on knowledge or specialization in a particular aspect of energy efficiency.
<i>Business model</i>	
Shared savings model	The ESCO provides financing through its own funds or a loan. The client and ESCO share the energy savings based on a predetermined ratio.
Guaranteed savings model	The customer provides financing and the ESCO guarantees performance. The ESCO is paid a fixed fee if the guaranteed savings is achieved through the upgrade.

The companies assigned their revenues and number of projects into one of six customer categories (see figure 3), led by industrial facilities (62%) and government projects, including municipal and street light projects (24%). Figure 4 shows the breakdown of the sector's technology streams, weighted by revenues.

According to WRI's survey, the average energy savings per implemented ESCO project was between 21 and 25 percent.¹⁵

FIGURE 3. PERCENTAGE OF INDUSTRY REVENUES BY CUSTOMER SEGMENTS (%)

Source: WRI Indian ESCO Survey, 2008.

FIGURE 4. PERCENTAGE OF INDUSTRY REVENUES BY TECHNOLOGY STREAMS (%)

Source: WRI Indian ESCO Survey, 2008.

IV. ESCOs in the United States, Brazil, and China: Lessons for India

To better understand the growth of the Indian ESCO industry, we compared its trajectory with the larger ESCO industries in China, Brazil, and the United States (see table 3). Brazil, China, and India were participants in the World Bank and UNEP—backed Three Country Energy Efficiency Project, whose purpose was to substantially increase investments in the energy efficiency sector. These countries' ESCO industries were begun around the same time, enabling us to compare what has both aided and prohibited growth. We chose the U.S. ESCO industry for comparison with a mature ESCO industry, to determine how the Indian industry is performing for its stage of development and what challenges it could expect in the future.

TABLE 3. ESCO Country Statistics

Country	United States	China	Brazil	India
Revenue	USD 3.6 billion (2006)	USD 121 million (2006)	USD 280 million (2007)	USD 17.7 million (2007)
Annual growth rate	22% (2004 to 2007)	53.1% (2003 to 2006)	27% (2007 to 2008)	95.6% (2003 to 2007)
Total energy consumption units: thousand tons of oil equivalent (ktoe) ^a	2,320,696 (2006)	1,878,744 (2006)	224,129 (2006)	565,820 (2006)
Per capita energy consumption (ktoe) ^b	0.0076	0.0014	0.0012	0.0005
Number of companies	46	212	58	26
Largest customer sectors	Government	Commercial/industrial	Commercial/industrial	Industrial

Notes
a International Energy Agency.
b. U.S. Census Bureau International Database.

While the Indian ESCO industry is growing at a fast rate, our cross-country comparative analysis underscores that it remains far from realizing its full potential.

While the Indian industry is growing at a fast rate, our cross-country comparative analysis underscores that it remains far from realizing its full potential. For instance, Brazil's energy consumption is only around 40 percent of India's energy consumption, at 224,129 thousand tons of oil equivalent, and its per capita energy consumption is 2.4 times larger than that of India's, yet the aggregate revenue of Brazil's ESCO industry is sixteen times greater than its Indian counterpart. China's energy consumption is 3.3 times greater than India's, and its per capita energy consumption is 2.8 times larger, yet the aggregate revenue of its ESCO industry is 6.8 times greater than India's.

The following analysis highlights some lessons that can be learned from how these countries encouraged the growth of their ESCO industries.

TABLE 4. Comparison of ESCO Industries in the United States and India

Country	United States (2006)	India (2007)
<i>Percentage of Total Revenues by ESCO Classification (%)*</i>		
Vendor ESCO	59	53
General ESCO	21	47

Sources: For the United States: C. Goldman et al., “Market Trends in the U.S. ESCO Industry: Results from the NAESCO Database” (Berkeley: Energy Analysis Department, Ernest Orlando Lawrence Berkeley National Laboratory, University of California, May 2002). Available at <http://eetd.lbl.gov/ea/ems/reports/49601.pdf> (accessed on November 10, 2008).

For India: WRI Indian ESCO Survey, 2008.

* For US ESCOs, 9% are utility-owned and 10% are of other types.

LESSONS FROM THE UNITED STATES

The U.S. ESCO industry has undergone significant changes in customer acceptability and composition.

While the shared savings structure has been identified as an important introductory model in the US ESCO industry, the guaranteed savings model is now used for roughly 90% of performance contracts (see table 4).¹⁶ In comparison to the structure of the US industry in its initial growth stages, India does not have as many ESCOs that primarily use the shared savings business model. Forty-two percent of surveyed ESCOs solely use the guaranteed savings model.¹⁷ Providing the shared savings model increases the customers’ perceived reliability of the ESCO industry by having the ESCO take both performance and financing risks.¹⁸ It is important to note the difference between the acceptability of the guaranteed savings model in the proven ESCO market than in the nascent markets of Brazil, China and India. The success of the guaranteed model has been based on clients’ ability to obtain market-rate financing for energy efficiency projects.¹⁹ This decreases the need for the ESCO to use its capital to work on a particular project, thus expanding the potential reach of its resources. In order for clients to obtain market-rate financing for energy efficiency projects, banks need to be aware of the savings potential which can be achieved through an experienced ESCO. In the US, banks finance almost all energy performance contract projects. Typically, clients finance projects directly with a financial institution rather than the ESCO because of the better interest rates they can obtain and the availability of the capital.²⁰

LESSONS FROM CHINA

The Chinese ESCO industry has grown faster than its India counterpart owing to the existence of a national loan guarantee program and the presence of a national ESCO association focused on market development. In 1998, the World Bank and the Global Environment Facility (GEF) promoted the Chinese ESCO industry by funding three ESCOs.²¹ This initiative set the stage for the nascent industry to adopt the shared savings business model. In contrast to the popular guaranteed savings model in India, this kind of ESCO assumes both the financing and the performance risks of a project. This model was able to work effectively because of donors’ funding.

To build on the success of the first three ESCOs, in 2003 the World Bank and GEF approved USD 26 million in grant financing for the China ESCO (or EMC) Commercial Loan Guarantee Program. This introduced local financing institutions to the shared savings model by providing partial loan guarantees for energy performance contracting.²² Over time, the guarantee program has allowed ESCOs to secure their own financing. As a result, between 2005 and 2006, the ESCO loan guarantees provided by the China National Investment and Guaranty Company (I&G) accounted for only 9 percent of the total ESCO financing.²³

The existence and efforts of the national EMC Association of China (EMCA) is a second factor that has enabled the industry’s continuing high level of growth. The EMCA provides technical assistance to new market entrants and represents the industry to the government and potential customers in order to facilitate market development.²⁴

LESSONS FROM BRAZIL

The stark difference in the sizes of the Indian and Brazilian ESCO industries can be attributed to the Brazilian industry's superior capitalization resulting from two government initiatives. First, in 1998, ANEEL (the Brazilian Electricity Regulatory Agency) mandated utilities to invest 0.9 percent of its revenues in energy efficiency projects, including demand-side projects and R&D efforts. In 2007, Brazil's national congress then modified the mandate to require all utilities to invest 0.5 percent of their revenues in strictly demand-side energy efficiency projects.²⁵ This investment amounts to around 350 million reais a year (USD 150.5 million). Projects are approved by ANEEL, the regulatory body for Brazil's power sector, and most of these projects are implemented by ESCOs.²⁶ Second, in 2006, the Banco Nacional de Desenvolvimento Econômico e Social (National Bank for Social and Economic Development), a Brazilian government bank associated with the Ministry for Development, Industry, and Foreign Trade, approved a 100-million-reais line of credit for energy efficiency projects, called PROESCO.²⁷ Three major private banks and a second government bank (Banco do Brasil S.A.) have agreed to act as intermediaries and administrators for this line of credit. To date, 60 million to 80 million reais (USD 25.8 million to USD 34.4 million) has already been approved. The investment funds for both these financing mechanisms generally go to the ESCO, although technically they may also be channeled directly to the ESCO's client.²⁸

Another difference between the Indian and Brazilian industries is that in Brazil, the Associação Brasileiro das Empresas de Serviços de Conservação de Energia (ABESCO), the Brazilian energy service company association, has always been a strong lobbyist and promoter of the ESCO industry, which no organization has been able to do in India. For instance, ABESCO was instrumental in persuading the three major private banks to be intermediaries for the PROESCO line of credit. The organization is currently lobbying the government to revise its procurement law so that ESCOs can start accepting government projects.²⁹

V. An Assessment of the Indian Industry's Growth Potential

To understand the potential for growth and key barriers in the Indian ESCO industry, we analyzed the following factors:

- Demand conditions
- Industry dynamics
- Financing
- Government policies
- Supply chains
- Supporting institutions

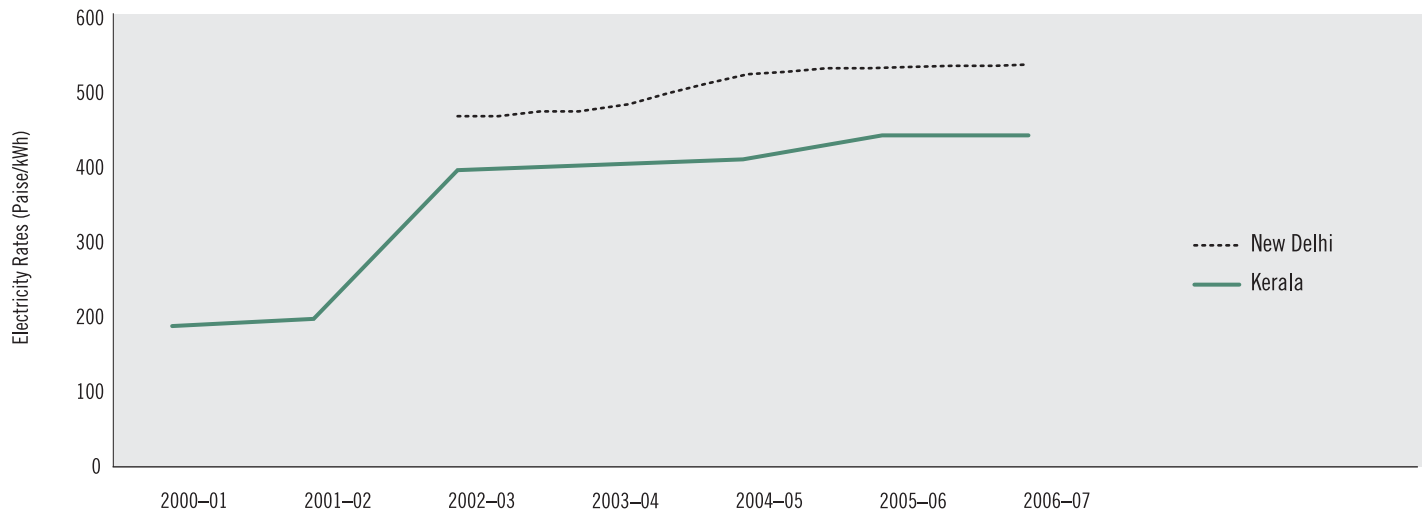
DEMAND CONDITIONS

Based on our survey results, the ESCO industry has grown significantly since 2003, with a compounded annual revenue growth rate of 95.6 percent between 2003 and 2007. In 2003, only five of the surveyed companies existed, which carried out a total of sixty-three ESCO projects. As demand grew, new companies entered the industry, and from 2006 to 2007, the industry's revenue growth was 46 percent. In 2008, it is expected to exceed 62 percent, based on the existing companies' projected growth and the expected entrance of new companies into the Indian ESCO market. This growth can be attributed to several factors, including rising energy prices and the procurement of energy services by government agencies.

Growth in the ESCO industry can be attributed to rising energy costs, the desire of enterprises to increase cost-competitiveness, and greater procurement of energy services by government agencies.

Rising energy costs (see figure 5), in particular, has led energy-intensive enterprises to consider conservation efforts. With energy costs representing more than 10 percent of production costs in many industries, rising prices make implementing energy efficiency initiatives even more imperative. But some energy markets, especially for oil,³⁰ are highly variable, with uncertainty as to how future fluctuations in energy prices will affect the demand for energy efficiency projects. Despite the high fluctuations in oil prices, however, the prices of other fossil fuels, such as coal and lignite, have remained stable, and so electricity rates are not expected to fall, save for minor fluctuations, which will benefit the ESCO industry. Conversely, as a result of the recent downturn in predicted oil prices, clients that rely on oil-fired equipment could be faced with longer payback periods which, in turn, would have a negative effect on financing prospects. Nonetheless, energy efficiency projects have the advantage of reducing an organization's exposure to volatile energy prices, by lowering the electricity cost of each delivered outcome.

A second trend, toward lowering costs in order to increase competitiveness, also has contributed to a greater demand for energy efficiency projects. According to commercial banks, their corporate clients have been bundling technological upgrades with other energy effi-

FIGURE 5. ELECTRICITY RATES FOR SMALL TO MEDIUM-SIZED INDUSTRIAL CUSTOMERS (PAISE/kWh), FROM 2000 TO 2007

Source: Based on tariffs derived from the Delhi Electricity Regulatory Commission and Keral State Electricity Board. Information available at <http://derc.gov.in/ordersPetitions/orders/Tariff/Tariff%20Order/TariffOrder.html> and <http://expert-eyes.org/tariffs.html>.

ciency initiatives to become more competitive in the industry. With the global economic crisis showing no signs of abating, this trend will likely continue.

Third, government and municipal projects contributed 24.2% of the 2007 industry revenues. These clients have helped fuel the growth of the industry because they value outsourcing the financial and operational risks of energy reduction technologies. The ESCOs' energy savings performance contracts provide a way for government offices to reduce their annual expenditures and energy usage while not placing constraints on their budgets and incurring financial obligations for investments in energy efficiency projects.

Looking forward, installing cogeneration and captive power plants could spur demand in the industry. For industries, these projects improve the poor quality and reliability of power from the grid as well as save money owing to the higher electricity rates that industries are forced to pay. Such projects currently account for about 14 percent and 16 percent of projects in the respective portfolios of the Chinese and American ESCO industries, and the WRI survey revealed that they constituted only 5 percent of Indian ESCO projects.³¹ In addition, the industry could explore collaborating with utility companies in upgrading transmission and distribution through the ESCO model.

Constraints on Demand: Our interviews with actual and potential ESCO clients found a perceived lack of technical capacity to be a key factor in constraining demand for the services of the Indian ESCO industry. The majority of prospective clients were not confident about the ESCOs' technical capabilities, pointing to the sector's dominance by vendor ESCOs that are technology biased (i.e., offer only one technology and suite of products) and thus cannot provide comprehensive energy management services. Instead, clients seek expertise and an understanding of industrial and business operations rather than technology-specific informa-

tion.³² To make them more acceptable to prospective clients, therefore, vendor ESCOs may need to offer more services or consider partnering with general energy service companies.

INDUSTRY DYNAMICS

Of our twenty-four survey respondents, three ESCO companies had revenues exceeding INR 2,000 lakhs (USD 4 million).³³ Eleven companies had revenues of between INR 100 lakhs and INR 2,000 lakhs (USD 0.2 million to USD 4 million), with the remaining ten limited to revenues under INR 100 lakhs (USD 0.2 million).

Competition in the ESCO industry remains low because of the high growth trajectory coupled with the small number of firms. None of the ESCOs we interviewed believed that the market environment was very competitive. ESCOs derive most of their new business by demonstrating to potential customers the tangible cash savings from energy conservation. As a result, the companies have focused more on enlarging the size of their individual companies than on their competitive advantages. Competition will increase, however, when the market begins to mature, and then the ESCOs will have to differentiate and focus on particular customer or industry segments.

One customer segment in which ESCOs are competing more intensely is the government sector. For municipal projects, ESCOs are being short-listed as capable entities for implementing energy efficiency projects. The government agency then selects the services based on the lowest cost or the highest guaranteed energy savings, which leads to greater competitiveness among the bidding ESCOs.

A comparison of the Herfindahl–Hirschman Index (HHI), a measure of market concentration,³⁴ revealed an HHI at 3,238 in 2003, versus 1,971 in 2007. This reflects the decrease in market concentration owing to new companies entering the industry during the five-year period, as well as a lower disparity in the companies' revenues. While the 1,971 HHI level for 2007 is considered high, the decrease in concentration will most likely persist with the continuing stream of new market entrants and smaller competitors posting high growth rates.

Barriers to Market Entry: Knowledge and experience in efficiency technologies and their implementation pose the biggest barriers because of the technical risks that ESCOs assume. Because competition is tied to technological specialties, new ESCOs can enter the Indian ESCO industry if they can offer both technological and industrial expertise.

Of the twenty-six confirmed ESCOs in operation, four entered the market within the last eighteen months. But the larger, established companies earning more than INR 100 lakhs (USD 0.2 million) have an advantage in that they can leverage their resources for higher-valued projects. In 2007, five companies comprised 70 percent of the industry's total revenues. The top two revenue-generating companies had an average revenue per project of INR 431 lakhs (USD 0.8 million) versus the industry average of INR 31 lakhs (USD 63,000). The larger ESCOs have the additional advantage of greater credibility and the ability to assume greater technical and financial risks. The larger vendor ESCOs also can provide broader financing solutions and have more bargaining power because of their manufacturing-based business units.

Substitutes to ESCO Services: Substitutes are important when analyzing the Indian ESCO industry. The BEE's efforts to certify energy managers, combined with rising energy prices, have encouraged industrial and commercial enterprises to create internal positions for energy managers. As a result, some large potential customers that we interviewed regarded ESCOs as providing little additional value to their own energy efficiency initiatives and resources. Process consultants, too, have emerged in industries, including cement and textiles, that may support the use of internal engineers to implement energy efficiency upgrades, technologies, and best practices. Even though such substitutes are growing, ESCOs are well poised to take advantage of the high growth in energy efficiency services because they offer fewer performance risks and guarantee savings to their clients. If ESCOs can supply proof of their superior technology and applied efficiency upgrades, their services will continue to be in great demand.

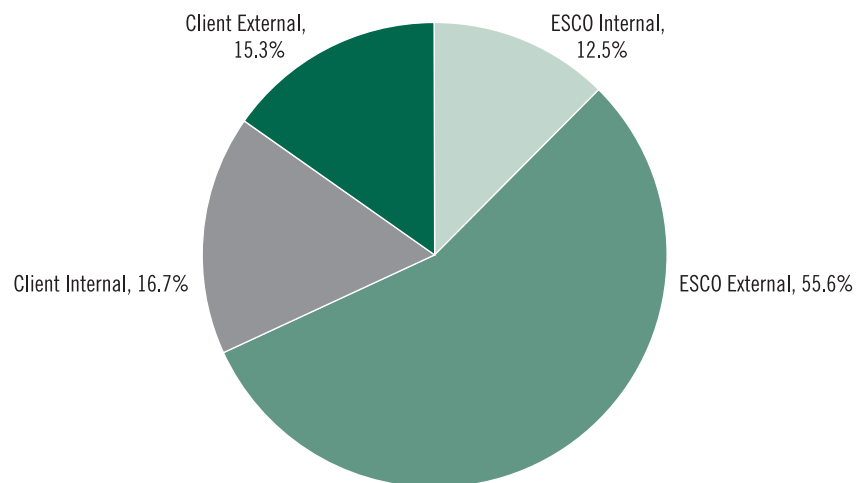
Despite the lack of competition in the industry, the smaller ESCOs face a credibility issue with their clients, which they can overcome by improving their technical and financial capabilities. To do so, they could concentrate on a particular industry and/or specialize in certain technologies.

The industry can lower the demand for substitutes with proper marketing and demonstration of the superior savings that clients could obtain through an ESCO's services. ESCOs also must prove to potential customers that they can provide more value for invested capital than merely investment in internal resources and staff.

FINANCING ESCOS AND THEIR PROJECTS

Four in ten ESCOs surveyed by WRI (42%) viewed the lack of access to financing as a major barrier to their growth. Figure 6 shows the current sources of ESCO project financing,

FIGURE 6. SOURCES OF FINANCING BY NUMBER OF PROJECTS (%)



Source: WRI Indian ESCO Survey, 2008.

The fact that more than half of these ESCO projects are financed through external funders indicates that some investors recognize the creditworthiness of ESCO projects as well as the investment potential of ESCOs as enterprises.

obtained through our survey. More than half of ESCO projects (55.6%) are financed through external means, mostly loans from commercial banks; 15 percent are financed by the clients through external means; 16.7 percent are self-funded by clients; and 12.5 percent of projects are financed by the ESCO through their own funds.³⁵

The fact that more than half of these ESCO projects are financed through external funders indicates that some investors recognize the creditworthiness of ESCO projects as well as the investment potential of ESCOs as enterprises. All the projects financed by banks were implemented by the larger ESCOs (earning more than INR 100 lakhs, or USD 0.2 million). This supports the argument that an ESCO must reach a certain size and show a certain strength on its balance sheet to be viewed as worthy of investment. This strength is tied to the collateral level required by banks before they can lend money. Several ESCOs even had lines of credit with banks. The banks that financed these projects by lending money to ESCOs included IDBI, ICICI, AXIS Bank, and IREDA.³⁶

Most of the projects implemented by smaller ESCOs (earning less than INR 100 lakhs, or USD 0.2 million) are financed by the clients that contract them. But this kind of financing limits the ability of many small ESCOs to grow, since some prospective clients are not willing to finance or apply for financing. In the United States and Brazil, by contrast, providing funding is one of the ESCOs' added values, demonstrating that a key aspect of expanding the ESCO market is also expanding ESCOs' access to credit. The reasons why some banks are apprehensive about funding ESCOs are

- Lack of financial capacity and collateral.
- Perception by banks' clients that cost-saving projects are not as financially attractive as revenue-generating projects.
- Perception by banks that clients usually finance desirable energy efficiency projects on their own and let the banks finance less desirable projects.
- Lack of confidence in the technical analysis and recommendations of the investment grade audit (IGA) or detailed project report, the report prepared by the energy auditor.

Several of India's vendor ESCOs are public companies and are capitalized through the public markets. Two ESCOs have received equity funding through their parent companies. No external equity funder, like a venture capitalist firm or angel investor, has yet invested in an ESCO. In WRI's interviews, equity funders such as Yes Bank gave the following reasons for not funding ESCOs:

- The industry is relatively new and unfamiliar.
- ESCOs do not have enough revenues.
- ESCOs cannot show consistent cash flows as a company.

In this report we hope to address the first reason. The latter two perceptions do not hold true for the whole industry, since a few of the larger Indian ESCOs generate enough revenue to qualify for equity funding and show consistent cash flows. Most of them are vendor ESCOs.

Another way to attract prospective clients to energy efficiency projects is for more banks to develop, provide, and promote financial products specifically for energy efficiency projects.

Another way to attract prospective clients to energy efficiency projects is for more banks to develop, provide, and promote financial products specifically for energy efficiency projects. So far, five banks have developed such products as a result of the 3CEE project: SBI, Canara Bank, Union Bank of India, Bank of India, and Bank of Baroda (see appendix G for more details).³⁷ The impact of such financial products remains unclear, however, since most banks do not track separately the loans disbursed as a result of these new products.³⁸ SBI has facilitated sixty energy audits with their clients and sanctioned twenty loans.³⁹ An analysis of the specific schemes reveals that they fail to address the main barrier to ESCO projects when looking for funding — the prohibitive collateral requirement. This may explain why SBI has not yet sanctioned many loans. Canara Bank also reported that some SME clients have found the energy audit costs to be too high.⁴⁰

Another possible solution is for ESCOs to explore partnering with organizations that have strong financial resources. For example, PTC India Limited (formerly Power Trading Corporation), a creditworthy institution with a strong balance sheet, expects to provide the financial resources necessary for ESCO projects requiring an investment of INR 2.5 billion (USD 51 million) in the immediate future.

GOVERNMENT POLICIES RELATED TO THE ESCO INDUSTRY

The Government of India has implemented several policies to promote energy efficiency. The Energy Conservation Act (ECA) of 2001, mentioned earlier, was a landmark policy enabling the establishment of the Bureau of Energy Efficiency (BEE) in 2002. The BEE is a national-level government agency in charge of energy efficiency measures across the country and provides the national policy framework and direction for energy efficiency initiatives. The act specifically authorizes the BEE to strengthen consultancy services in the field of energy efficiency and conservation and to promote innovative financing of energy efficiency projects. The BEE regards the promotion of delivery mechanisms for energy efficiency services as one of ten “thrust areas” in its action plan, which also recognizes the strong potential of the ESCO performance contracting model in delivering energy savings.⁴¹

Under the ECA’s mandate, the BEE has begun enforcing mandatory energy audits and establishing consumption norms for nine energy-intensive industries and sectors specified in the act. An initial set of norms were created for the cement, and paper and pulp sectors in collaboration with representative industry stakeholders. Thus far, these norms have not had an effect on the performance of the ESCO industry. However, as the norms are implemented further, they could encourage companies in the nine sectors falling under the ECA’s category of designated consumers to undertake energy efficiency projects with ESCOs, leading to the growth of the industry.⁴² Next, the BEE will also focus on 1,200 commercial buildings, requiring regular energy audits and encouraging efficiency upgrades, which could also lead to more projects for Indian ESCOs.

Even though the BEE has furnished the policy framework for energy efficiency initiatives, several policies have had negative effects. For example, the energy-pricing policies of most Indian states ensure that industries are charged relatively high tariffs in order to cross-subsidize the agricultural sector. These higher costs, combined with frequent power shortages,

have persuaded several industries to construct their own small, decentralized, captive power plants, which often rely on older technology and are less efficient than centralized power plants.⁴³ Other sectors, such as the extremely energy-intensive fertilizer industry, are eligible for high levels of subsidies and thereby have little incentive to introduce energy efficiency programs. This outcome points to the need for a more cohesive and consistent national policy framework to ensure that financial incentives are aligned with energy efficiency goals.

Several of the ESCOs that we surveyed pointed out that many of the Energy Conservation Act's policy measures had never been carried out. Specifically, they cited the lack of help with financing solutions—one of the BEE's tasks—as a major barrier to their growth. The ECA also mandated the use of state energy conservation funds, but they also have not been available in many states, even seven years after the act was passed.⁴⁴ Although the act requires state designated agencies to produce twenty-two deliverables with limited technical and financial assistance, it does not have the capacity to implement these measures. To resolve this problem, state agencies may need to look for public–private partnerships for quicker assistance, as well as better implementation and accountability.

The Indian National Action Plan on Climate Change (NAPCC), released in 2008, charts the likely future direction of energy efficiency policies. The plan names “enhanced energy efficiency” as one of eight national missions to address the impact of climate change in India. It proposes initiatives to accelerate the shift to energy efficient appliances through tax incentives (such as an accelerated depreciation of up to 80 percent in the first year and a lower VAT on EE equipment), mechanisms to help finance demand side management (DSM) programs in industrial sectors, and innovative financial instruments to enhance energy efficiency. The plan addresses some of the inconsistencies in national policy, for example, recommending the elimination of fertilizer subsidies. It also discusses technology improvements for small and medium enterprises (SMEs), which would offer incentives to such companies to use ESCOs in their energy efficiency projects. Most important, the plan recommends mandating lower energy consumption in large, energy-consuming industries and facilities and the establishment of a market-based mechanism to make energy efficiency programs more cost-effective. This would be done by certifying energy savings above those mandated and enabling the companies to trade their excess savings.⁴⁵

These cross-industry ESCO initiatives indicate that the government considers a robust ESCO industry an important part of its future climate change and energy security strategies. By monitoring the progress of the energy efficiency industry, India's government may help reduce the implementation time of projects geared toward achieving the “enhanced energy efficiency” mission's goals of the NAPCC.

SUPPLY CHAIN

ESCOs depend heavily on inputs from the energy auditors, energy efficiency equipment manufacturers, and energy managers that they hire as employees. Usually, before an ESCO is hired, auditors perform an energy audit to assess opportunities for savings. Energy efficiency equipment manufacturers provide the technology, software, and hardware that ESCOs use to carry out their projects.

The number of companies manufacturing energy efficiency equipment that ESCOs use for their projects is rising.

The number of accredited energy auditors in India is growing. According to the BEE, which certifies auditors, this number will reach 3,100 by 2010.⁴⁶ Despite the accreditation process, a number of stakeholders we interviewed claimed that the energy auditors were producing inaccurate or substandard reports. Some of them overestimated energy savings, which misled those companies that wanted to launch energy efficiency projects, as well as the investors who wanted to fund them.

The number of companies manufacturing energy efficiency equipment that ESCOs use for their projects also is rising. Since 2003, for example, three foreign-based manufacturers of variable-frequency drive manufacturers, which control the speed of motors by controlling the frequency of the supplied electricity, began operating in India: Grundfos, Rockwell Automation, and Control Techniques. Before 2003, only Siemens and ABB were major players in this field.⁴⁷

The existing energy efficiency equipment manufacturers also are expanding their production capacities in response to both local and global demand. For example, in the area of energy-efficient lighting, OSRAM invested between INR 83 and 111 crores (USD 17 million to 22 million) to construct a second plant in India in 2007,⁴⁸ and INDO Asian Fusegear invested INR 55 crores (USD 11 million) to establish a manufacturing unit in 2005.⁴⁹

More and more local small- and medium-sized businesses as well are providing energy-efficient solutions for buildings, governments, and industries in India. From 2006 to 2008, New Ventures India, a WRI program that promotes high-growth SMEs with strong environmental and social benefits, selected thirty-one companies to support and showcase. Nine of these thirty-one companies manufacture hardware and software products that could be used by ESCOs. Examples are HMX Sumaya, which makes energy-efficient HVAC systems, and Neutech, which manufactures solar water heaters.⁵⁰

Because ESCOs are mainly service businesses, the quality of their energy managers is critical to their success. Some of the ESCO executives we interviewed pointed to the availability of qualified talent as important to the industry's growth. Our interviews with the BEE suggested that most ESCO employees are trained on the job and only later are certified as energy auditors and energy managers.⁵¹ Even though most engineering schools offers courses on electrical measuring devices, control systems, and production management, few are directly relevant to the ESCO industry, and many schools know nothing about the energy efficiency industry. Brazil's ESCO association is aware of the industry's lack of technical expertise and recently entered into an agreement with a major university in São Paulo to offer an MBA degree for energy managers concentrating in energy efficiency.⁵² This is an offering that Indian universities should consider.

SUPPORTING INSTITUTIONS

Many governmental agencies and industry associations in India have programs supporting the ESCO industry, both directly and indirectly.

A majority of the ESCOs we surveyed cited the BEE as an institution with which they were affiliated, mostly by being included on an ESCO short list provided to state governments and state development agencies as a reference for their energy efficiency projects. Two ESCOs also recognized the BEE's efforts in setting energy efficiency standards and guidelines for certain industries. Many ESCOs, though, did not comment on whether the BEE was helpful to their business development.⁵³ Perhaps this was because the BEE is limited in what it can do, since it has to wait for the central government to determine its activities.⁵⁴

Another government agency that has helped the development of the ESCO industry is the Petroleum Conservation Research Association (PCRA), an agency under the Ministry of Petroleum and Natural Gas certified by the Energy Conservation Act of 2001 to conduct energy audits. After the PCRA conducts general energy audits for agricultural and industrial sectors, it then carries out demonstrative energy efficiency projects to encourage individual enterprises in these sectors to adopt energy-efficient technologies. The PCRA also initiates and sponsors research and development projects to create new technologies. For example, through the PCRA's efforts, an energy-efficient control system was developed for humidification plants in textile mills, leading to energy savings of 20 percent.⁵⁵

A third government agency, the Indian Renewable Energy Development Agency (IREDA), under the Ministry of New and Renewable Energy, finances ESCO projects. The IREDA also tries to persuade commercial banks to finance ESCOs and/or energy efficiency projects by providing subsidies⁵⁶ for energy audits performed on the premises of potential loan customers.⁵⁷

Aside from governmental agencies, a number of industry associations and international initiatives have provided support. The Confederation of Indian Industries-Green Business Centre and other engineering associations such as the Institution of Engineers, provides a platform from which ESCOs can interact with potential clients and technology/equipment suppliers through exhibitions and seminars. The World Bank and the UNEP's 3CEE project, mentioned earlier in this report, also helped spur the creation of financial products for energy efficiency projects and the sharing of best practices from other countries for the ESCO industry. In addition, the Clinton Climate Initiative has helped connect ESCOs with potential clients and facilitate financing for projects.

Based on our surveys and interviews of ESCOs, it is unclear whether this range of support has contributed significantly to the industry's growth. What is clear, though, is that these agencies, associations, and initiatives need to coordinate their efforts to generate more concrete results for the industry. For example, at the governmental level, the roles of the PCRA and BEE need to be clarified with regard to energy auditing. The Indian Council for Promotion of Energy Efficiency Business (ICPEEB) was formed in 2005 by the Indian ESCO industry to serve this coordinating purpose and also to lead promotion efforts for the industry, but so far it has not succeeded.

VI. Analysis of Energy Efficiency Projects

In this section we describe three successful energy efficiency projects carried out in India. Two of them are companies that collaborated with an ESCO to save energy through performance contracting. The third is an energy efficiency project implemented by a company without an ESCO. We selected these examples to highlight common trends in the Indian ESCO industry. Then, in the following section, we discuss the lessons learned from these case studies.

LILAVATI HOSPITAL PROJECT IMPLEMENTED BY SUDNYA INDUSTRIAL SERVICES

Company Details: Lilavati Hospital is one of the largest multispecialty hospitals in India, with state-of-the-art medical and research facilities. The building houses several energy-intensive activities, like laundry and sterilization. The central air-conditioning system was the biggest consumer of electricity, accounting for more than 60 percent of the hospital's energy usage.

Project Details: The impetus for the project came from the hospital's senior managers, who were eager to implement energy-efficient measures to reduce energy costs and optimize their central air-conditioning and building services. The vice president of operations, Mr. Prakash Mhatre, introduced the ESCO, Sudnya Industrial Services, to the management. The hospital conducted a survey of its utilities and an energy audit of its facilities and then asked Sudnya to help provide turnkey solutions for energy savings through a pilot project, linking the remuneration to Sudnya to the savings achieved.

Box 3. Cost-Benefit Analysis, Lilavati Hospital Project

- Investment: INR 6 lakhs (USD 12,000)
- Annual Savings: INR 8.5 lakhs (USD 17,000)
- Payback: Nine months

Sudnya analyzed the data from the past three years, including energy consumption, oil temperature, water pressure, and condensation. It determined that the air-conditioning system could be upgraded quickly and effectively and provided demonstrable results, thereby making it suitable for a pilot project. Sudnya held a seminar for the plant operators and engineers at the hospital, at which they discussed available options and the advantages of the proposed solution. The ESCO then developed an energy-saving program and solicited and evaluated proposals for the equipment, remaining involved throughout the implementation process. The ESCO was able to ease the hospital management's initial concerns and to guarantee the savings. Lilavati Hospital financed the entire project, which cost approximately INR 6 lakhs (USD 12,000) and used this figure to determine the amount of the guarantee (see box 3).

Action Taken: Because the hospital requires air-conditioning twenty-four hours a day, two variable-frequency drives were installed on the pumps to ensure continuous operation. The staff was trained in operating the equipment, and the hospital reports that the pumps are now more efficient, quieter, and less prone to breakdowns.

Measurement and Verification: Sudnya worked with the staff at Lilavati to establish a baseline and developed robust measurement and verification (M&V) protocols to avoid any disputes. The company monitored the pumps every hour for more than three months, establishing baselines and fine-tuning the operating parameters. After the pumps were installed, the ESCO rigorously monitored their performance, which met the client's requirements.

Results: Lilavati Hospital has realized energy savings of 20 to 40 percent and cost savings of approximately INR 8.5 lakhs (USD 17,000) annually, and over a three-year period, this resulted in energy savings of 618,210 kWh and cost savings of more than INR 26 lakhs (USD 49,000).⁵⁸ Table 5 is a cash flow analysis of the project, showing the payback during the first year and a net cash flow of 1.7 lakhs (USD 3,400) at the end of the first year.

TABLE 5. Cash Flow Analysis (INR million), Lilavati Hospital Project

Year	0	1	2	3	4	5	6	7	8	9	10
Inflow											
Energy cost savings		0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Outflow											
Initial cost	0.6										
Less depreciation		0.60									
Net income		0.25	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Tax (30.5%)		0.08	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Cash inflow after tax	-0.6	0.17	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Cumulative cash flow		0.17	0.76	1.36	1.95	2.54	3.13	3.72	4.31	4.90	5.49

Those factors regarded as crucial to the project's success were the commitment of the hospital's senior management and the strong M&V protocol, which helped avoid disputes. Lilavati Hospital is extremely satisfied with the ESCO's performance and is currently in the second phase of implementing more energy-efficient activities.

NEW DELHI MUNICIPAL COUNCIL IMPLEMENTED BY DSCL ENERGY SERVICES (DSCLES)

Company Details: The New Delhi Municipal Council (NDMC) manages all municipal services, including electricity, water, and sanitation for the core regions of New Delhi.

Project Details: The NDMC solicited bids for a proposed efficiency study and upgrade and chose DSCLES to carry it out. PRI Canada, along with DSCLES, conducted a demand-side management strategy study supported by the Commonwealth Development Council. The study identified several energy-saving options in the areas of lighting, cooling and air-conditioning, water pumping, and electrical distribution. DSCLES was selected through competitive bidding to implement the project under an ESCO performance contract. DSCLES was

responsible for the design, financing, installation, and maintenance of the lighting system for a four-year period.

Action Taken: The energy-saving project was to replace magnetic ballast T-12 tubes with electronic ballast T-8 tubes, redesign the installation in some areas, and also improve the wiring and end connections. The project resulted in total savings of 126kW in lighting power consumption, a 48 percent energy saving over the baseline (see box 4).

Measurement and Verification: The close coordination between the NDMC and DSCLES helped avoid measurement and verification problems. The two organizations were able to do this by first deciding on a benchmarking methodology and then having DSCLES work with the NDMC to provide detailed measurements and evaluations after retrofitting the lights.

Results: DSCLES was paid a share of the energy savings in forty-eight installments. DSCLES received 80 percent of the savings in the first year, 75 percent in the second, 70 percent in the third, and 60 percent in the fourth. The total investment was approximately INR 300 lakhs (USD 61,000), which was financed internally by DSCLES. The total energy savings was 126 kW in lighting power consumption, an annual savings of INR 200 lakhs (USD 40,000). This savings led to a payback period of eighteen months.⁵⁹

The NDMC considers the overall project to have been a success, as it reduced energy usage and expenditures.

Box 4. Cost-Benefit Analysis, NDMC project

- Investment: INR 30 lakhs (USD 75,000)
- Annual savings: INR 20 lakhs (USD 50,000)
- Payback: Eighteen months

ITC HOTEL PROJECTS IMPLEMENTED INTERNALLY BY ITC

Company Details: ITC Hotels is one of India's largest hotel groups, with more than 90 properties. The hospitality industry offers numerous opportunities to implement energy efficiency projects with strong financial returns on investments.

Energy Efficiency: ITC has undertaken several energy efficiency projects on its own and is continually optimizing its energy usage through projects such as HVAC and water heating. The majority of these projects have had a payback period of less than two years. All efficiency investments were made by ITC without bank financing.

Reasons for not Working with an ESCO: The company cited three main reasons for not working with an ESCO. ITC did not accept the shared savings model because it has no significant debt and does not have the necessary internal funds to carry out efficiency projects. The company also claims that Indian ESCOs offer little technical value and lack experience with cutting-edge technologies. Instead, ITC believes that it can match the ESCOs' technical expertise for the energy efficiency projects that ITC has implemented. In order to recognize an ESCO's value, ITC feels that it must have a record of success demonstrating its knowledge and experience in implementing complex efficiency projects.

The ESCO's Potential: ITC may consider profit sharing for complex energy efficiency projects requiring strong technical and management skills with longer payback periods, although it does not envision any such projects in the immediate future. In order for an ESCO to prove

its value to ITC, it must present innovative solutions that build on the ESCO's technologically advanced skills.⁶⁰ ITC suggests that Indian ESCOs partner with international ESCOs in order to bring higher levels of technological expertise to the industry.

LESSONS LEARNED FROM CASE STUDIES AND CLIENT INTERVIEWS

Prospective Clients: The ITC Hotel case highlights one of the major obstacles facing Indian ESCOs. Throughout our interviews with prospective clients, a recurring comment was that the ESCOs did not seem to offer any technical skills that the prospective clients did not already have. All the people we interviewed expressed a desire for innovative solutions beyond the usual energy savings. The key to providing these innovative solutions is understanding each industry's energy and technology needs, which leads to a second barrier that ESCOs face: their ability to understand and take into account the operational requirements of the clients' businesses.

M&V Protocols: Even though 52 percent of the companies we surveyed cited "baseline measurement and other monitoring and verification issues" as barriers, the two successful projects just described avoided these problems. In each case, the ESCO and the client together established the baseline and carried out the measurements and verification. Lilavati Hospital staff monitored the upgraded pumps every hour for three months to establish the baselines, rigorous but necessary procedures. The clients consistently mentioned M&V protocols as a factor in considering ESCOs.

Current and prospective government clients expressed the most concern about M&V issues with ESCOs. These clients sought more complex M&V protocols, especially in public lighting. One successful interviewed ESCO has been able to get around these issues by joining the municipalities in its extensive measurement and verification process. That is, the ESCO sampled the energy usage in a street-lighting project over a three-month period in order to establish a baseline on which to measure savings.

Success Factors with ESCOs: In these successful cases, several factors also appeared as trends in our interviews with ESCO clients. First, many of the projects had the commitment of the top management before the project was started. Second, the measurement and verification were transparent. Third, clients expressed their appreciation for the ESCO's expertise in specific energy savings. In other words, the ESCO was able to prove its value and perform technically and financially sound projects by making changes of which the client was not capable or aware of doing.

VII. Next Steps: Opportunities and Recommendations

Based on our analysis of factors affecting the growth of energy service companies in India and elsewhere, we offer the following recommendations to support the Indian industry's growth, help realize India's tremendous energy conservation opportunities, and capture the financial returns that can be derived from these opportunities.

FINANCING

Both debt and equity investors have attractive investment opportunities to fund ESCOs and their projects. Moreover, the industry promises to continue growing at a high rate owing to the great demand for energy-efficient solutions from the industrial, commercial, and government sectors; the pressures to cut operational costs; and the increasing importance placed by India's government on energy efficiency.

Both debt and equity investors have funded ESCOs and ESCO projects in the past. Debt providers have based their decision to fund an ESCO project primarily on the collateral that the investee is willing to offer. But this has limited the ability of ESCOs and their clients to obtain financing, since many ESCOs, especially the smaller ones, do not have enough collateral to meet banks' requirements. Forty-two percent of the ESCOs we surveyed still claim that lack of access to financing is one of the major barriers to their growth. Clients, especially those that do not have existing lines of bank credit or have not previously undertaken an energy efficiency project, often are unwilling to apply for financing or put up their own assets as collateral.

Equity investors usually look for companies that have large revenues, are growing, and offer a unique competitive advantage. Currently, several energy services companies meet these criteria, are good candidates for equity funding, and are willing to receive equity funding.

Recommendations

Banks/other financial institutions	<ul style="list-style-type: none"> • Pilot financial products targeted for ESCO and energy efficiency projects. Guidelines for developing such products could include (1) making the cash flows of energy efficiency projects the primary consideration for lending rather than the collateral and/or (2) lowering the collateral requirements for energy efficiency projects undertaken by ESCOs. For government projects, a model for escrowing collections would enable ESCOs to speed up the implementation of these projects by creating greater access to financing. As a next step, WRI will educate banks on the investment potential of ESCO projects and work with interested banks to develop products that can be piloted in their organizations. • Incorporate energy efficiency and ESCO elements in the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE), thereby using this existing SME guarantee fund to increase the financing of energy efficiency projects. • Consider funding ESCOs with good credit ratings. Credit Rating Information Services of India Limited, India's premier credit-rating agency, and the BEE, have rated individual ESCOs. • Give ESCOs a platform for reaching out to existing bank clients that may benefit from energy efficiency upgrades. • Explore the securitization of ESCO clients' payments in order to finance ESCO projects.
Equity investors	<ul style="list-style-type: none"> • Consider investing in ESCOs that generate relatively large revenues and have exhibited steady growth as well as consistent cash flows.
All investors	<ul style="list-style-type: none"> • Work with the green business enterprise development programs, which can connect interested investors to potential ESCO targets.
ESCOs	<ul style="list-style-type: none"> • Approach enterprise development and investment facilitation programs that can provide business advisory services and access to investors.
Green business incubators and enterprise development programs	<ul style="list-style-type: none"> • Approach investor-worthy ESCOs and offer them business advisory and investment facilitation services. Educate banks on the investment potential of ESCOs and work with interested banks to develop products for piloting in their organizations.
Central government, Reserve Bank of India	<ul style="list-style-type: none"> • Consider the clean energy sector (energy efficiency and renewable energy) as a priority sector for banks to lend to.

GOVERNMENT POLICIES AND ENFORCEMENT

On a policy level, the Government of India has done much to encourage energy conservation. But the ESCO industry has not yet fully benefited from these policies, owing to the length of time that it takes for the mandates to move through the government bureaucracy to implementing agencies like the BEE, as well as these implementing agencies' lack of accountability. Moreover, the central government has not yet developed any specific mandates following the passage of the National Action Plan on Climate Change in 2008.

Recommendation

Central and state governments	<ul style="list-style-type: none"> • Execute the mandates made through the Energy Conservation Act of 2001 so that they may be enforced by the Bureau of Energy Efficiency. For example, the act mandates that the government supply funds in each state to be called the State Energy Conservation Funds, to promote energy efficiency. But no State Energy Conservation Fund has yet been established. • Create mandates related to the National Action Plan on Climate Change.
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PROSPECTIVE CLIENTS' LACK OF CONFIDENCE IN ESCOS

Our interviews with organizations that have undertaken projects with ESCOs and with prospective ESCO clients revealed that their lack of confidence in the ESCO industry prevented them from taking on energy efficiency projects with ESCOs. The low confidence is due to the perceived deficiency of the ESCOs' technical and specific industry expertise. If an ESCO could demonstrate its technological capabilities and understanding of the client's industry operations and processes, then many prospective clients say that they would be willing to work with it. The same perceived lack of technical capability also was cited for energy auditors that often overestimated potential energy savings.

Recommendations	
Central government, BEE or PCRA	<ul style="list-style-type: none"> Identify those industries or customer groups that would benefit the most from working with ESCOs and connect ESCOs to organizations representing these industries and groups. Use targeted road shows to promote the value that ESCOs can deliver.
ESCOs	<ul style="list-style-type: none"> Focus on developing technical expertise in a limited number of industries or technology streams in order to increase their value to customers. Develop cogeneration and captive power generation capabilities to expand opportunities for projects in these untapped sectors.
Central government, Ministry of Education	<ul style="list-style-type: none"> Work with the energy efficiency industry to create university courses on energy efficiency.

MONITORING AND VERIFICATION

"Baseline measurement and other monitoring and verification issues" were cited by 52 percent of the surveyed companies as a barrier to the growth of the ESCO industry. Nonetheless, our interviews with industrial and commercial-building clients that have carried out ESCO projects showed that they generally had good experiences in establishing the baseline measurement, agreeing on the measurement and verification protocol, and then following it. Both actual and prospective government clients expressed the greatest concern over M&V issues with ESCOs because of the more complex protocols that they demand and the scale of government projects.

Recommendation	
Central government, BEE	<ul style="list-style-type: none"> Develop and approve monitoring and verification protocols, especially for projects usually undertaken by government entities, such as water pumping and street lighting.

ABSENCE OF A STRONG INDUSTRY ASSOCIATION

ne common positive factor mentioned in China, Brazil, and the United States was the existence of a national association dedicated to the growth of the ESCO industry. India, too, needs to establish such an organization in order to increase awareness, build the credibility of the local industry, facilitate financing for ESCO projects, and advocate policies to the government. Such an organization also could coordinate the efforts of various government and nongovernment agencies to help the ESCO industry. Efforts to establish the ICPEEB (Indian Council for Promotion of Energy Efficiency Business) in 2005 has not resulted in the promotion of the ESCO industry in India.

Recommendation

ESCOs

- Form a new industry association or revive the ICPEEB. Ensure that the new or revived group has equal representation among all companies in the industry and is independently managed.

Appendices

APPENDIX A: LIST OF ACRONYMS

3CEE	Three Country Energy Efficiency	IDBI	Industrial Development Bank of India
ABESCO	Associação Brasileira das Empresas de Serviços de Conservação de Energia (Brazilian ESCO Association)	IEA	International Energy Agency
ADB	Asian Development Bank	INR	Indian rupees
ANEEL	Brazilian Electricity Regulatory Agency	IREDA	Indian Renewable Energy Development Agency
BEE	Bureau of Energy Efficiency	kWh	Kilowatt hours
BoB	Bank of Baroda	M&V	Measurement and verification
Bol	Bank of India	MNRE	Ministry of New and Renewable Energy
CII-GBC	Confederation of Indian Industry-Green Business Centre	NAPCC	National Action Plan on Climate Change
CO ₂	Carbon dioxide	NDMC	New Delhi Municipal Council
EC Act	Energy Conservation Act (2001)	NREL	National Renewable Energy Laboratory
EE	Energy efficiency	PCRA	Petroleum Conservation Research Association
EMC	Chinese ESCOs	RFP	Request for proposal
EMCA	National EMC Association of China	SBI	State Bank of India
ESCO	Energy service company	SME	Small-to-Medium Enterprise
GEF	Global environmental facility	TA	Technical assistance
GHG	Greenhouse gas	UBI	Union Bank of India
HHI	Herfindahl–Hirschman Index	UNEP	United Nations Environment Programme
HVAC	Heating, ventilating, and air-conditioning	USAID	United States Agency for International Development
ICC E2i	Indian Chamber of Commerce Energy Efficiency Initiative	USD	U.S. dollars
ICPEEB	Indian Council for Promotion of Energy Efficiency Business	WB	World Bank
		WRI	World Resources Institute

APPENDIX B: ESCO SURVEY METHODOLOGY

WRI conducted a comprehensive survey of the ESCO industry in India to determine its market size and investment potential. To establish the universe of ESCOs in India, we used lists from the Bureau of Energy Efficiency (BEE), the Indian Chamber of Commerce Energy Efficiency Initiative (ICC E2i), and the Indian Council for Promotion of Energy Efficient Business (ICPEEB). We consolidated the information from these sources to compile a list of ESCOs to survey.

We e-mailed the surveys to all the ESCOs on the list and followed up with phone calls and interviews to determine whether all the companies listed were in fact ESCOs. We defined an ESCO as an entity that delivers energy savings and/or energy efficiency improvement measures in a user's facility or premises and that accepts some financial and/or technical risks in doing so. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficient improvements and on the meeting of the other agreed-on performance criteria (cost savings).

Based on our definition, several companies on the initial list did not qualify as ESCOs for our study, and so we reduced the final list to twenty-six companies. We eventually received information from twenty-four companies, through surveys, telephone, and personal interviews. We supplemented our survey data with information from interviews with experts in the field from the BEE, banks that have implemented energy efficiency schemes, and other organizations. We then aggregated this survey information to determine the market size of the ESCO industry.

In addition to the ESCOs, we interviewed eight ESCO clients and eight potential ESCO clients.

APPENDIX C: WRI INDIAN ESCO SURVEY

Appendix C shows the ESCO survey instrument that we used to collect our data.

Please see the following website link for the survey:
<http://www.wri.org/publication/powering-up>

APPENDIX D: SELECTED STATISTICS AND A SUMMARY OF RESPONSES TO THE WORLD RESOURCES INSTITUTE INDIAN ESCO INDUSTRY SURVEY

TABLE 1. Distribution of ESCO Client Categories (in descending order by revenue)

Clients	Average Share of Projects (%)	Average Share of Revenues (%)
Industrial/factories	57.63	64.26
Government buildings	23.74	19.57
Commercial offices	13.17	10.96
Other clients	0.23	3.06
Hotels/hospitality	1.70	1.40
Hospitals	2.40	0.65
Schools/colleges	0.21	0.17

Source: World Resources Institute Indian ESCO Survey, 2008.

TABLE 2. Distribution Technology Streams Used by ESCOs (in descending order by revenue)

Clients	Average Share of Projects (%)	Average Share of Revenues (%)
Energy saving: lighting/pumping	53.28	67.25
Modernization and upgrading	22.77	15.88
Better cooling or heating technologies	23.29	14.55
Other	0.18	1.93
Cogeneration	0.18	0.39
Waste heat recovery	0.29	0.00

Source: World Resources Institute Indian ESCO Survey, 2008.

TABLE 3. ESCOs' Responses to the Reasons for Difficulty Raising Equity and Debt Finance

Reason	ESCOs' Responses (%)
ESCO's limited financial capacity	36.8
Small size of operations	31.6
Uncertain cash flows	31.6
Poor visibility of the ESCO industry	31.6
Reluctance to fund new business models	26.3
Inadequate database of ESCO projects	26.3
Nonconformity with financing norms and criteria	21.1
Other reasons	5.3

Source: World Resources Institute Indian ESCO Survey, 2008.

TABLE 4. ESCOs' Responses to the Major Barriers They Have Faced in the Industry

Barrier	ESCOs' Responses (%)
Customer acceptability of the ESCO model	52.6
Baseline measurement; other monitoring and verification issues	52.6
Delays in decision making by customers and financiers	47.4
Lack of finance for projects	42.1
Contracting issues	36.8
Lack of financing for ESCO operations	31.6
Disputes over sharing of savings	21.1
Small scale of operations and inexperience	21.1
Poor information about industry and competition	21.1
Other barriers	5.3

Source: World Resources Institute Indian ESCO Survey, 2008.

APPENDIX E: IDENTIFIED ESCOS

1. Asian Electronics Ltd.
2. Blue Star Ltd.
3. Dalkia
4. DSCL Energy Services Company Ltd.
5. EL PRO Energy Dimensions
6. Encon Energy Management Services P Ltd.
7. Energetic Consulting Pvt. Ltd.
8. Energy Economy and Environment Consultants
9. Epic Energy Ltd.
10. Dynaspede
11. Five-M Energy Pvt. Ltd.
12. Honeywell Automation India Ltd.
13. Intesco Asia Ltd.
14. M.K. Raju Consultants P Ltd.
15. Optimumair Solutions Pvt. Ltd.
16. REALESCO
17. MITCON Consultancy Services Ltd.
18. Pranat Engineers Pvt. Ltd.
19. Rayon Applied Engineers
20. Win-Win
21. Saket Projects Ltd.
22. Salzer Electronics Ltd.
23. SEE-Tech Solutions Pvt. Ltd.,
24. Sudnya
25. U V Krishna Mohan Rao Associates (UVKA)
26. Transparent Energy Systems

APPENDIX F: SURVEYED ESCOS

1. Asian Electronics Ltd.
2. Blue Star Ltd.
3. Dalkia
4. DSCL Energy Services Company Ltd.
5. EL PRO Energy Dimensions
6. Encon Energy Management Services P Ltd.
7. Energetic Consulting Pvt. Ltd.
8. Energy Economy and Environment Consultants
9. Epic Energy Ltd.
10. Dynaspede
11. Five-M Energy Pvt. Ltd.
12. Honeywell Automation India Ltd.
13. Intesco Asia Ltd.
14. M.K. Raju Consultants P Ltd.
15. Optimumair Solutions Pvt. Ltd.
16. MITCON Consultancy Services Ltd.
17. Pranat Engineers Pvt. Ltd.
18. Rayon Applied Engineers
19. Win-Win
20. Salzer Electronics Ltd.
21. SEE-Tech Solutions Pvt. Ltd.
22. Sudnya
23. U V Krishna Mohan Rao Associates (UVKA)
24. Transparent Energy Systems

APPENDIX G: SUMMARY OF INDIAN BANKS' ENERGY EFFICIENCY (EE) SCHEMES

Please see the following website link for the summary: <http://www.wri.org/publication/powering-up>

Notes

1. Rajiv Garg, "Implementation of Energy Conservation Act and BEE Action Plan," report presented at Adoption of Energy Efficient Process Technologies & Practices and Implementation of Energy Conservation Act 2001 in Pulp and Paper Sector conference, Saharanpur, India, Bureau of Energy Efficiency, September 3, 2008. Available at http://www.energymanagertraining.com/Presentations2008/3L_2008Sep3_PulpandPaper/list.htm (accessed on October 22, 2008).
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Potential Energy Savings	Billion kWh	kWh	MWh	Emission Factor	Potentially Reduced Emissions
183.5	1,000,000,000	183,500,000,000	183,500,000	0.81	148,635,000

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9. Koshy Cherail, *Report on Indian Participation in ESCO Mini Exchange in China and Local Dissemination Activities in India* (New Delhi: UNEP, World Bank, March 2004). Available at <http://www.3countryee.org/publications.htm> (accessed on September 18, 2008).
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11. World Bank Three Country Energy Efficiency Project, *Developing Financial Intermediation Mechanisms*.
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14. The growth rate was calculated by taking a weighted average of the surveyed companies' projected growth for 2008.
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19. SME clients, who may form the largest customer segment in India, have the least access to bank financing, and as a result, many are unable to implement energy efficiency projects.
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26. Interview with Maria Cecilia Amaral, executive director, ABESCO, November, 10, 2008.
27. Ninety percent of the capital for every energy efficiency project comes from the PROESCO line of credit, and the remaining 10 percent comes from the ESCO, ESCO client, or another financial institution.
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29. Ibid.
30. Crude oil prices have fluctuated significantly in the last five years. In April 2004, the Indian Oil Corporation had a spot price as low as USD 32.36, which then rose to above USD 132.47 in July 2008, more than a 300 percent increase. From July 2008 to January 2009, the price fell to as low as USD 43.99, more than a 66 percent decline. Information available at <http://www.iocl.com/Products/CrudeOilPrices.aspx>.
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33. The section uses components of Michael Porter's Five Forces to analyze the industry. Competition is determined by industry growth, industry concentration, and product/service differences. Barriers to entry are determined by capital requirements, brand identity, cost advantages, and proprietary technologies. Substitutes are analyzed by looking at customers' inclination to substitute the services from the ESCO industry and the related cost and performance differences in doing so.
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36. Ibid.
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45. Prime Minister's Office, *National Action Plan on Climate Change* (New Delhi: Government of India, 2008).
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ABOUT THE FUNDERS OF THIS REPORT



Asia Pacific Partnership – United States Department of State

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The Asia-Pacific Partnership on Clean Development and Climate (APP) brings together the governments and private sectors of Australia, Canada, China, India, Japan, the Republic of Korea, and the United States to facilitate investment in clean technologies, goods, and services; accelerates the sharing of energy-efficient best practices; and identifies policy barriers to the diffusion of clean energy technologies. This innovative public-private partnership is achieving real results through project-based public-private sector task forces covering eight energy-intensive sectors - aluminum, buildings and appliances, cement, fossil energy, coal mining, power generation and transmission, renewable energy and distributed generation, and steel. Partnership countries account for more than half of the world's population, economy, and energy use.

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British High Commission New Delhi

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The Environmentally Sustainable Finance (ESF) team is focused on research and action to inform environmental policymaking, integrate environmental sustainability into development initiatives, and support scalable commercial and non-profit interventions to make India's economy more environmentally sustainable from the bottom up. We focus in particular on the environmental issues that affect everyday living standards, as these are the areas in which mitigating environmental impact and alleviating poverty go hand in hand. Our approach combines academic research and strategic consulting, with careful attention to political economy and market incentives as the drivers of any sustainable solutions. Please see www.ifmr.ac.in/cdf/esf.htm for an overview of current projects.



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WRI organizes its work around four key programmatic goals:

- **People & Ecosystems:** Reverse rapid degradation of ecosystems and assure their capacity to provide humans with needed goods and services.
- **Governance:** Empower people and support institutions to foster environmentally sound and socially equitable decision-making.
- **Climate Protection:** Protect the global climate system from further harm due to emissions of greenhouse gases and help humanity and the natural world adapt to unavoidable climate change.
- **Markets & Enterprise:** Harness markets and enterprise to expand economic opportunity and protect the environment.