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THE BOTTOM LINE

Energy service companies can aid energy efficiency efforts by providing technical skills, assuming performance risks, facilitating access to finance from commercial lenders, and enabling energy users to repay initial costs through future savings. Although many attempts to encourage the development of ESCO markets in developing countries have failed, some recent experiences demonstrate how governments can help by promoting simple business models; facilitating ESCO financing; making legislative, regulatory, and policy changes; and creating demand.

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Fostering the Development of ESCO Markets for Energy Efficiency

Why is this issue important?

Energy service companies can help scale up energy efficiency by offering specialized technical and financial services for project design and implementation

Energy service companies (ESCOs) offer services for implementing and financing energy efficiency projects, including energy auditing, design and engineering, equipment procurement, construction, installation, commissioning, measurement and verification (M&V) of energy and cost savings, operations and maintenance (O&M), facility management, and energy services.

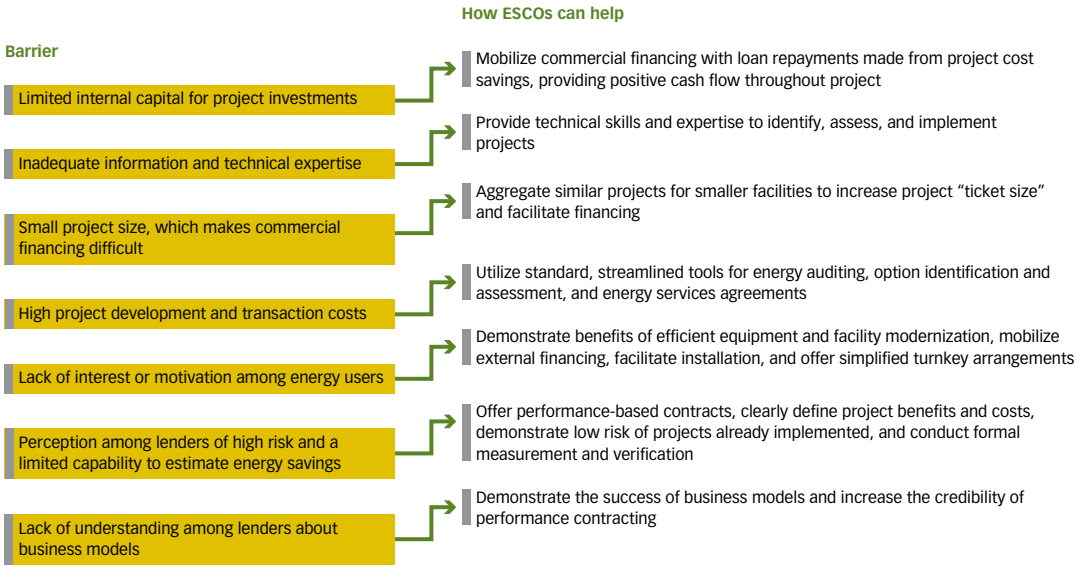
The energy user, or host facility, pays for the ESCO's services from the resulting cost savings. ESCOs typically use performance-based contracting models, under which payments are contingent on customer satisfaction and the ESCO assumes most of the technical, financial, and performance risks.

In several countries, ESCOs have demonstrated that they can help scale up energy efficiency by addressing prevailing market barriers (figure 1).

In the United States, Canada, Japan, Korea, China, and Thailand, the most commonly used business models are *shared savings* and *guaranteed savings*. A third model, known as outsourced energy *management*, is widely used in the European Union.

Shared savings. Typically, under this model, an ESCO provides or arranges for most or all of the financing needed to implement an energy efficiency project. The agreement between the ESCO and host facility specifies how cost savings are shared, measured, and

Figure 1. How ESCOs can address barriers to scaling up energy efficiency



Source: Singh, Limaye, and Hofer 2014.

"Donors and consultants systematically oversold ESCOs, creating extremely high—and often false—expectations with regard to what ESCOs were capable of and how quickly they could develop."

Figure 2. Shared savings model

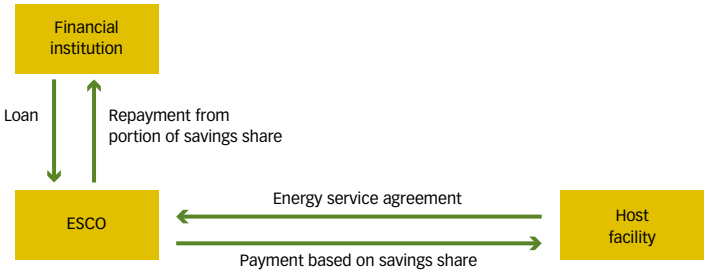
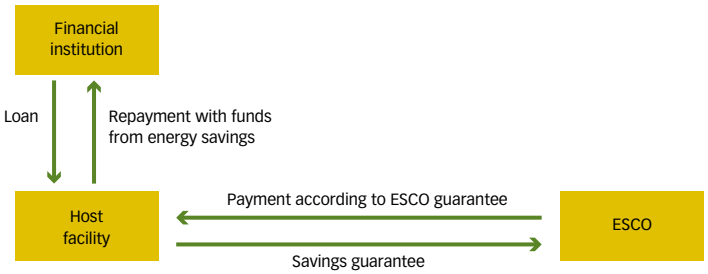


Figure 3. Guaranteed savings model

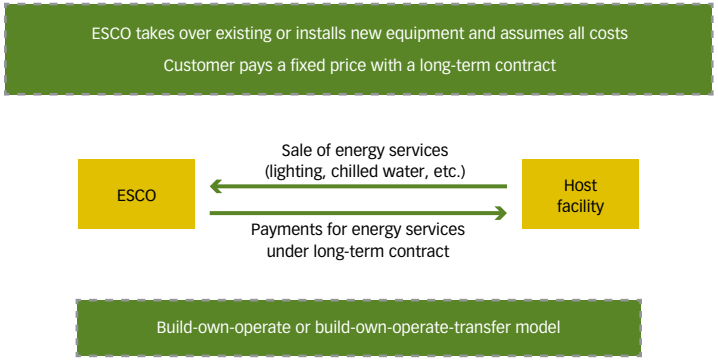


verified. The host facility does not invest in the project but receives a share of the energy cost savings during the contract period and 100 percent of the savings after it, allowing for a positive cash flow for the duration of the project (figure 2).

Guaranteed savings. Under this model, the host facility borrows the funds needed to finance the project and puts the project loan on its balance sheet. The ESCO guarantees performance standards and specifies M&V methods. Payments are made by the host facility to the ESCO once performance guarantees are satisfied (figure 3). The loan is repaid by the host facility out of the energy cost savings.

Outsourced energy management. This model, most commonly used in the European Union, is also referred to as *energy performance management contracting* or energy supply contracting. The ESCO pays for equipment upgrades, repairs, and related expenses and sells the energy output, such as steam, heating, cooling, and lighting, to the host facility under a long-term contract

Figure 4. Energy suppy contracting model



at an agreed price (figure 4). The ownership of equipment ultimately remains with the ESCO (build-own-operate model) or is transferred to the customer (build-own-operate-transfer model).

Have ESCOs worked in the developing world?

So far, replication of western models has not worked well

Attempts to foster ESCO markets in developing countries by replicating Western-style ESCO models have been disappointing. Donors and consultants systematically oversold ESCOs, creating extremely high—and often false—expectations with regard to what ESCOs were capable of and how quickly they could develop. Several countries focused on financing programs such as credit lines, expecting they would eliminate the financing barriers to ESCO development, but they then encountered ESCO regulatory gaps or a lack of stable demand. Other countries encouraged smaller engineering firms to pursue ESCO business lines, but then found that the firms lacked the experience needed to implement energy efficiency projects and the financial credibility required to guarantee larger projects. A number of countries approached international ESCOs and joint ventures for financing, but the international ESCOs were seeking local financing and legally enforceable performance contracts, which the countries could not provide.

"The challenges are real. ESCO models *are* complex and require strong legal, financial, accounting, and business infrastructure—which is often lacking in developing countries."

As a result of these failures, some governments concluded that ESCOs could not work in their countries, further hindering their promotion.

The challenges are real. ESCO models *are* complex and require strong legal, financial, accounting, and business infrastructure—which is often lacking in developing countries. Commercial lenders in the developing world are unfamiliar with the models and lack developed procedures for technical due diligence and project appraisal, which leads to their perception that ESCO projects carry high risk.

New ESCOs lack credibility with industrial and commercial energy users owing to their limited track record and (perceived) limited technical capabilities. Misperceptions about ESCOs often lead customers to expect them to assume all of the technical, operational, and financial risks. Their limited assets and weak balance sheets make it difficult for them to credibly back up customer financing with performance guarantees.

As a result of these challenges, replicating the shared savings model, which requires that ESCOs have strong balance sheets, or the guaranteed savings model, which requires credible guarantees, has proven to be challenging in many developing countries. The outsourced energy management model requires long-term contracts (over 10 years) that may be difficult to implement in developing markets with weaker legal and contract frameworks and less creditworthy customers.

What can developing-country governments do to foster ESCO markets?

They can apply simpler models, offer targeted financing mechanisms, build an enabling environment, and stimulate demand

In response to the slow uptake of ESCOs in many developing countries, simpler business models are needed, as well as and targeted mechanisms for financing energy efficiency. Governments should strive to foster an enabling operational environment and to catalyze the ESCO market by increasing demand for services in the public sector.

Start with simple models. Simple business models adjusted to local market conditions should be used to introduce ESCO markets in developing countries. Aspects of those models include standardized products, equipment leasing, one-year contracts with partial performance payments, variable-term contracts, and simplified energy service agreements. Simple models make it possible to build on existing energy service providers (e.g., leasing firms, equipment suppliers, and construction companies) and bring them into the market. Table 1 highlights how simple ESCO business models can help address traditional market barriers for ESCOs.

More complex ESCO models can be introduced as local ESCO markets and regulatory infrastructures evolve. The selection and design of the models depends on factors such as: (i) the current state of the local energy services market, including the experience with energy performance contracts and the provision of combined services (e.g., audits, design and build contracts, and financing); (ii) the maturity of financial markets, the financial capabilities of ESCOs, and access to funds for ESCO projects through dedicated financing mechanisms; (iii) the familiarity and comfort of target markets with ESCOs and energy performance contracts; and (iv) the legislative and regulatory framework.

Facilitate ESCO project financing. An important challenge for nascent ESCO markets is the limited financial strength of existing and new ESCOs or other energy service providers, which restricts their ability to obtain commercial financing that may then be extended to customers. Barriers include: (i) limited assets and weak balance sheets; (ii) perception among commercial lenders that ESCO projects involve high risk; and (iii) unfamiliarity with and lack of technical capacity among lenders to properly appraise ESCO projects. For this reason, as previously noted, most ESCO models in developed countries have evolved away from shared savings to guaranteed savings.

As countries develop and implement scalable mechanisms for financing energy efficiency, design features can be integrated to facilitate financing for ESCO projects and encourage a transition toward commercial financing. Examples of targeted financing include standard products with deemed savings, leasing, performance incentives, forfaiting (purchasing receivables from an ESCO project),

Table 1. Simplified models to address common barriers to ESCO development

Model and description	How model addresses barriers	Examples
Standard product model with "deemed savings" Applies to standard products or equipment where the energy savings are well-known and agreed to in advance. Customer pays the ESCO predetermined amount after installation.	• Equipment supplier or the ESCO can provide and install standard products or equipment • Does not require energy audits or measurement and verification	South Africa
Equipment leasing with verified savings The ESCO or equipment supplier identifies and installs energy efficient equipment. The ESCO retains ownership of the equipment until all lease payments are made. Payments are contingent on energy cost savings, which are usually verified by measurements taken during commissioning.	• ESCO does not need strong balance sheet • Facilitates bank financing • Particularly well suited for small- and medium-sized enterprises	Turkey, China, Vietnam, and India
One-year contract with partial performance payment The ESCO receives 60–70 percent of the payment based on deliverables and measurements taken at commissioning; the remainder is paid 6–12 months later, ensuring continued performance and savings.	• Takes into account contracting limitations for public institutions and short-term loans • Introduces simplified or partial performance	Mexico, Armenia, and Turkey
Variable-term contract Similar to common ESCO models except contract term varies based on actual savings. If actual savings are less than expected, contract can be extended to allow the ESCO to recover its agreed payment. The "first out" model is a variation in which the ESCO receives all energy savings benefits until its costs have been recovered and it has made a profit.	• Reduces perceived risk for ESCO companies • Provides greater flexibility during transition to complete ESCO models • Offers possibility of success when project host lacks capacity to implement project • May be implemented by public (or "super") ESCO using private ESCO companies as subcontractors for implementation services	Canada
Energy service agreements The ESCO finances, designs, and implements the project, and the customer pays a fixed amount per year (e.g., baseline energy costs with agreed adjustment factors) until the ESCO recovers its investment.		Armenia and Mexico

Source: Authors.

"To facilitate ESCO contracts with the public, industrial, and commercial sectors, the legal framework should have clear accounting and taxation rules, procedures for arbitration, and third-party verification."

and energy service agreements through public or super ESCOs that subcontract to smaller ESCOs (table 2).

Strengthen the enabling environment for ESCOs. The ESCO industry in North America, Western Europe, and other countries developed over many years. Strong commitments from and promotions by the governments were crucial to the strengthening of the enabling framework. Governments in developing countries can improve the overall environment and reduce real and perceived risks associated with ESCO projects.

Appropriate legislation is usually needed to promote growth of an energy services market. To facilitate ESCO contracts with the public, industrial, and commercial sectors, the legal framework should have clear accounting and taxation rules, procedures for arbitration, and third-party verification. Recent legislation in Ukraine provides a legal and economic basis for public procurement of ESCO services for state and municipal facilities. It also provides for long-term budgetary repayment obligations for energy service contracts. In the Czech Republic, the government reformed public procurement procedures to facilitate ESCO contracts in the public sector, such as multi-year contracts and retention of savings. It used multiple criteria for the evaluation of bids and certified "energy experts" in several categories.

An accreditation or certification scheme can boost ESCOs' standing with energy users in the public, industrial, commercial, and financial sectors. India, Singapore, Thailand, Turkey, and Dubai are among the countries that have developed ESCO accreditation schemes. However, accreditation schemes can create a barrier to market entry, especially in the early stages of market development.

Table 2. Pros and cons of mechanisms to facilitate financing for ESCO projects

Description	Pros (+) and cons (–)	Examples	Selected results
Revolving energy efficiency funds • Provides financial and technical support for project preparation and implementation. Repayments are based on realized energy savings and can finance additional projects. • Targeted ESCO instruments offered by energy efficiency funds include debt financing for ESCOs, energy service agreements, and forfaiting.	+ Provides flexible platform for testing simplified ESCO models and targeted ESCO financing + Builds local market capacity for ESCOs and other energy service providers – Requires effective fund management and instrument design that matches specific market needs – Necessitates sound and enforceable repayment mechanisms	Bulgaria, Armenia, Thailand	Bulgaria Energy Efficiency and Renewable Sources Fund (2006–13) • 31 ESCO projects valued at US$6 million • Portfolio guarantee for 29 ESCO projects valued at US$9.8 million
Dedicated energy efficiency credit lines • Dedicated credit lines on-lend concessional funds to commercial banks to provide debt financing for energy efficiency projects. • Credit lines can offer loans specifically targeting ESCOs. Forfaiting is useful when an ESCO is supplying its own equity for project financing.	+ Builds a commercial lending market for ESCOs – Requires robust bank participation with incentives and capacity to proactively develop multi-year pipeline – Unsuitable for addressing barriers associated with ESCOs' weak balance sheets (when commercial banks reluctant to provide loans)	China, Western Balkans, Turkey	China Energy Efficiency Financing (2008–15) • ESCO projects valued at US$90 million
Risk-sharing facility • Can be designed to facilitate commercial financing of ESCO projects by providing risk-sharing instruments (e.g., partial risk guarantees and first loss reserves) to financial intermediaries for ESCO projects.	+ Builds commercial lending market by mitigating the perception of high risk and over-collateralization of ESCO projects – Requires mature financing markets and strong bank partners – ESCOs must be creditworthy	China, India, Central and Eastern Europe	China Second Energy Conservation Project (2004–10) • 148 ESCO projects valued at US$142 million
Public or super ESCO • A public ESCO is usually a government-owned company that provides financing and technical assistance for energy efficiency projects in the public sector, with repayments based on energy cost savings. The super ESCO is a special case of a public ESCO, one that aims to develop the capacity of existing private ESCOs by engaging them as subcontractors. • Public and super ESCOs can provide instruments similar to revolving funds or act as a leasing/financing company, providing ESCOs and their customers with energy efficiency equipment on lease or with benefit-sharing terms.	+ Facilitates project bundling and overcoming procurement and contracting challenges in the public sector + Uses variety of instruments and approaches to implement public sector projects and build nascent ESCO market – Access to long-term financing needed – Risks potential monopolistic market role – Public sector bureaucracy can be rigid	Poland, Croatia, Ukraine, Belgium, India, and China	Armenia R2E2 Super ESCO (2012–15) • 58 energy service agreements valued at US$8.4 million • 38 simplified ESCO contracts concluded with private companies
Standard offer programs • A utility or government agency purchases energy savings or demand reductions from ESCOs or energy consumers using a predetermined and prepublished rate based on verified savings. Payments are based on the verified value of electricity savings (in kWh or KW) to the power system through the implementation of energy saving products, technologies, and/or equipment in facilities.	+ Facilitates ESCO project financing by guaranteeing payments from utility or government soon after implementation – Requires formal framework for utility or government to realize energy savings and requires strong capabilities for measurement and verification, which are difficult to establish in a new ESCO market	South Africa and India	ESKOM Standard Offer Program (2006–13) • 206 projects with peak savings of about 105 MW and energy savings of 727 GWh

Source: Authors, based on Eskom 2014; Singh and others 2009; Singh, Limaye, and Hofer 2014; Wang and others 2013.

"ESCO markets in the United States, Canada, and the European Union developed largely as a result of government initiatives to promote energy efficiency projects in the public sector."

The capacity of existing ESCOs can be increased through formal training activities. Such programs have been implemented in India, China, and Vietnam. In Vietnam, for example, a formal capacity-building program was implemented as part of a World Bank/GEF project, with more than 40 project agents, and training and financial assistance was provided to implement more than 100 energy services projects.

Information on various ESCO business models, options for collateralizing cash flows from ESCO projects, guidelines for appraisal of ESCO projects, and simplified procedures for M&V of energy savings are logical components of training and capacity building programs for bank loan officers and risk managers. India's Bureau of Energy Efficiency is conducting a nationwide program for bank loan officers and risk managers on financing energy efficiency projects. A similar program has been implemented in China. Guidelines, tools, benchmarks, case studies, and audit/contract templates to facilitate ESCO contracting can also be developed.

Formal M&V schemes, including the International Performance Measurement and Verification Protocol (IPMVP), are now widely used but require substantial time and effort to build capacity, making projects more complex and costly. Using simpler M&V approaches such as deemed savings until the ESCO market matures is advisable. A super ESCO in India, Energy Efficiency Services Limited, successfully adopted the deemed savings approach for its street and residential lighting projects.

Increase public sector demand for ESCO services. Governments can further develop the ESCO market by promoting energy-saving performance contracting in public buildings and facilities. The public sector in developing countries is often a sizeable and inefficient energy user without the capacity to identify, finance, and implement energy efficiency projects—or incentives to do so. ESCOs can offer useful and valuable services in such cases, but a large and stable demand for services is crucial. ESCO markets in the United States, Canada, and the European Union developed largely as a result of government initiatives to promote energy efficiency projects in the public sector. Germany, for example, established the Berlin Energy Agency (BEA)—a procurement agent, to facilitate energy service contracts in the public sector. On a fee-for-service basis, the BEA helps public agencies identify energy efficiency opportunities and provides standard templates for audits, RFPs, bid evaluations, and contracts as well as guidance throughout the energy services procurement process. In 2012, the BEA posted sales of almost €13 million.

Some government actions that can stimulate demand for ESCO services in the public sector are described below.

- Establish mandates and targets for public agencies to reduce energy usage, including compulsory energy audits and energy efficiency plans and reporting on energy use. Educate public sector facility engineers and managers on the benefits of improved energy efficiency, the potential role of ESCOs, and performance contracting for projects.
- Facilitate implementation of ESCO contracts with public agencies by providing assistance in identifying, evaluating, and procuring ESCO services, and by revising public procurement and budgeting provisions to allow public agencies to retain energy cost savings, engage in multi-year contracts with ESCOs, and select the service provider that offers the best value, not the lowest bid.
- Develop and promote simplified models and standardized tools or templates for the public sector, benefit-cost assessment tools and procedures, request-for-proposal and bidding documents, simplified design and construction contracts, and energy services contracts and agreements. India's Energy Efficiency Services Limited has applied standard offers, using templates for RFPs and for contracts between public agencies and ESCOs. Such standard offers, combined with deemed savings, have been used in contracts for street lighting and residential LED lighting services.
- Benchmark energy consumption in public buildings and facilitate data collection and dissemination to help identify energy efficiency opportunities.
- Assist public agencies in aggregating similar buildings and facilities to create larger projects, reducing project development and transaction costs. Hungary's Ministry of Education, for example, issued a single procurement for its schools and competitively selected an ESCO consortium to provide energy efficiency services to all schools under one master contract.
- As previously mentioned, encourage the use of simple M&V tools and protocols, such as deemed savings for energy efficiency in public buildings.

What have we learned?

A combination of approaches adapted to country circumstances can overcome past failures

"A combination of simple ESCO models, dedicated financing, enabling policy, regulatory initiatives, and increased public sector demand has resulted in the development of sizeable ESCO markets in some countries."

Recent efforts demonstrate that alternative approaches combined with decisive action and sustained commitment by government can succeed. Building an ESCO market incrementally involves: (i) developing and promoting simple ESCO business models; (ii) facilitating ESCO financing; (iii) implementing supportive legislative, regulatory, and policy initiatives; and (iv) creating a stable demand for ESCOs in the public sector.

A strategy that includes all four aspects is strongly recommended. Impressive results are emerging from countries that included all four approaches or even three of them. A combination or package of simple ESCO models, dedicated financing, enabling policy, regulatory initiatives, and increased public sector demand has resulted in the development of sizeable ESCO markets in some countries (table 3). The use of simpler models combined with dedicated financing and legislative support boosted markets in China (equipment leasing, public pilot ESCOs, and aggressive energy efficiency policy), India (super ESCO, deemed savings, and accreditation scheme), Armenia (super ESCO providing energy service agreements), and South Africa (utility-based standard offer program).

Table 3. Successful energy services markets in selected developing countries

Country	Initiation	Market size (2012/13)	Characteristics and success factors
China	1998	• 2,339 registered companies • 1,472 ESCOs with EPCs • Size: US$8.25 billion • Potential: US$14.5 billion	• World Bank support to demonstrate or pilot ESCO models • Focus on industry and single energy efficiency technologies • Primarily guaranteed savings • ESCO accreditation scheme and aggressive energy efficiency policy
India	1995	• 114 ESCOs accredited • Size: US$140 million • Potential: US$2.8 billion	• Strong ESCO accreditation scheme • Focus on public sector and industry • Creation of super ESCO • Market dominated by a few large ESCOs
Thailand	1999	• 45 ESCOs registered • 10 ESCOs with EPCs • Size: US$100–200 million • Potential: US$500 million	• Government funding support (dedicated ESCO fund) • Focus on industry, hospitals, and government buildings • Guaranteed and shared savings
South Africa	2004	• 500 ESCOs registered (only 50 active) • Potential: US$1 billion	• Growth driven by Eskom Standard Offer Program • Focus on industry and buildings • ESCO accreditation scheme (ESKOM)
Czech Republic	1994	• 20 ESCOs with EPC-type contracts • 150–200 EPC projects implemented (US$120 million since the 1990s) • Size: US$11–23 million • Potential: US$110– 560 million	• Active ESCO companies, facilitators, and procurement advisors • Availability of standard documents • Commercial banks started investing in ESCO projects • Focus on public sector • Common use of guaranteed savings

Source: Prepared by authors based on Bertoldi and others (2014) and Panev and others (2014).

EPC = energy performance contract.

MAKE FURTHER CONNECTIONS

Live Wire 2014/11. "Designing Credit Lines for Energy Efficiency," by Ashok Sarkar, Jonathan Sinton, and Joeri de Wit.

Live Wire 2014/18. "Exploiting Market-Based Mechanisms to Meet Utilities' Energy Efficiency Obligations," by Jonathan Sinton and Joeri de Wit.

Live Wire 2014/25. "Doubling the Rate of Improvement of Energy Efficiency," by Jonathan Sinton, Ivan Jacques, Ashok Sarkar, and Irina Bushueva.

Live Wire 2015/53. "Why Energy Efficiency Matters and How to Scale It Up," by Jas Singh.

Live Wire 2015/55. "Designing Effective National Industrial Energy Efficiency Programs," by Feng Liu and Robert Tromop.

Intervention designs must also consider local markets, precedents (e.g., how other public-private partnerships fared), financing and credit practices, customer needs, and prospective ESCO capabilities. Organizing disparate market actors, building enabling environments, and disseminating experiences—successes and failures—are functions that can only be accomplished by governments, whose leadership and sustained commitment will be critical in achieving energy savings in the decades to come.

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