



The Energy Sector Management Assistance Program

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# Financing Energy Efficiency and Implementation Models in Developing Countries

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# Why is EE important?

- Global energy demand will grow 45% by 2030, requiring ~US\$26 trillion investment
- 87% of this growth will occur in developing countries
- Increased volatility in oil and gas prices and supply
- By 2030, greenhouse gas (GHG) emissions will also grow 45% to 41 Gt
- EE can:
  - Reduce new infrastructure investments while easing bottlenecks
  - Lessen country's dependence on imported/fossil fuels
  - Enhance industrial/commercial competitiveness
  - Ease public expenditures for energy creating fiscal space for other socioeconomic priorities
  - Reduce environmental footprint, both locally and globally

# Barriers to Energy Efficiency Investments

## Policy/ Regulatory

- Energy pricing and collections
- Procurement policies favor lowest cost
- Import duties on EE equipment
- Unclear or underdeveloped institutional framework for EE
- Lack of appliance standards and building EE codes, lack of testing, poor enforcement

## Equipment/ Service Providers

- High project development costs
- Limited demand for EE goods/svcs
- Diffuse/diverse markets
- New contractual mechanisms (ESCOs)
- Limited technical, business, risk mgmt skills
- Limited financing/equity

## End User

- Lack of awareness of EE and high disc rates
- Higher project dev and upfront costs
- Ability/willingness to pay incremental cost
- Low EE benefits relative to other costs
- Perceived risks of new tech/systems
- Concept of energy savings is "virtual" – can not "see"
- Mixed incentives
- Behavioral biases
- Lack of credible data

## Financiers

- New technologies and contractual mechanisms
- Small sizes/dispersed widely → high transaction costs
- High perceived risks as these are not traditional, asset-based proj
- Other higher return, low risk projects are more attractive
- Behavioral biases

# Why has progress been so slow?

- Numerous informational, technical, financial and behavioral barriers across a diverse range of stakeholders
- Institutional challenge – need for appropriate deliver mechanisms to identify, package, finance and implement EE projects across sectors and end users in an effective and efficient manner
- Other challenges include:
  - Lack of international consensus on approaches (e.g., regulation vs. incentives vs. information) – i.e., appropriate role of government
  - Overreliance on Western models - local markets require local solutions
  - EE is invisible, hard to measure – need for consistent, credible data
  - Poor incentives - mixed institutional incentives, low prices, behavioral inertia

# EE scale-up challenges

- EE Retrofits vs. New Systems
  - *How to accelerate retrofits?*
  - *How to better influence new systems (factories, buildings, urban development, new infrastructure)?*
- Regulation vs. Incentives
  - *How to foster improved regulatory, enforcement regimes?*
  - *How to best complement regulatory measures with voluntary programs with incentives?*
- Global Trade
  - *How can international community help address developing country disincentives?*
  - *What approaches should be used for equipment importers vs. exporters?*
  - *How can the private sector help address these issues?*

# Int'l experiences – delivery models

- Utility demand-side management (DSM)
- Energy service companies (ESCOs)
- Financing programs
- Market transformation
- Incentives, subsidies and grants

# Utility DSM

- Utilities have many advantages for pursuing DSM but also mixed incentives
- Load management vs. energy conservation
- Recent proliferation of utility CFL programs
- Post DSM models – DSM bidding, standard offer, EE power plant

- Examples

Argentina

Mexico

Sri Lanka

Bangladesh

Pakistan

Thailand

Brazil

Philippines

Uruguay

India

South Africa

Vietnam

# Utility DSM

## ■ Results

- **Thailand** (1993-2000) invested **US\$60 million** and saved **566 MW; 3,140 GWh/yr**
- **Brazil** (2000-04) invested **\$200 million** which saved **500 MW; 1,500 GWh/yr**
- **Uganda** (2006-08) distributed **800,000 CFLs** at a cost of **\$1.3 million** and saved **30 MW**.

## ■ Key success factors

- Proper regulatory and financial incentives
- Adequate and dedicated funding source
- Utility management commitment
- Strong program planning, implementation and evaluation functions
- Strong customer outreach



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# ESCOs

- ESCOs can bundle projects, mobilize financing, offer turn-key services, assume performance risks
- But ESCOs are complex, requiring strong legal, financial, accounting, business infrastructure

- Examples

Brazil

Bulgaria

China

Croatia

India

Poland

Thailand

Tunisia

Turkey

Uruguay

Vietnam

# ESCOs

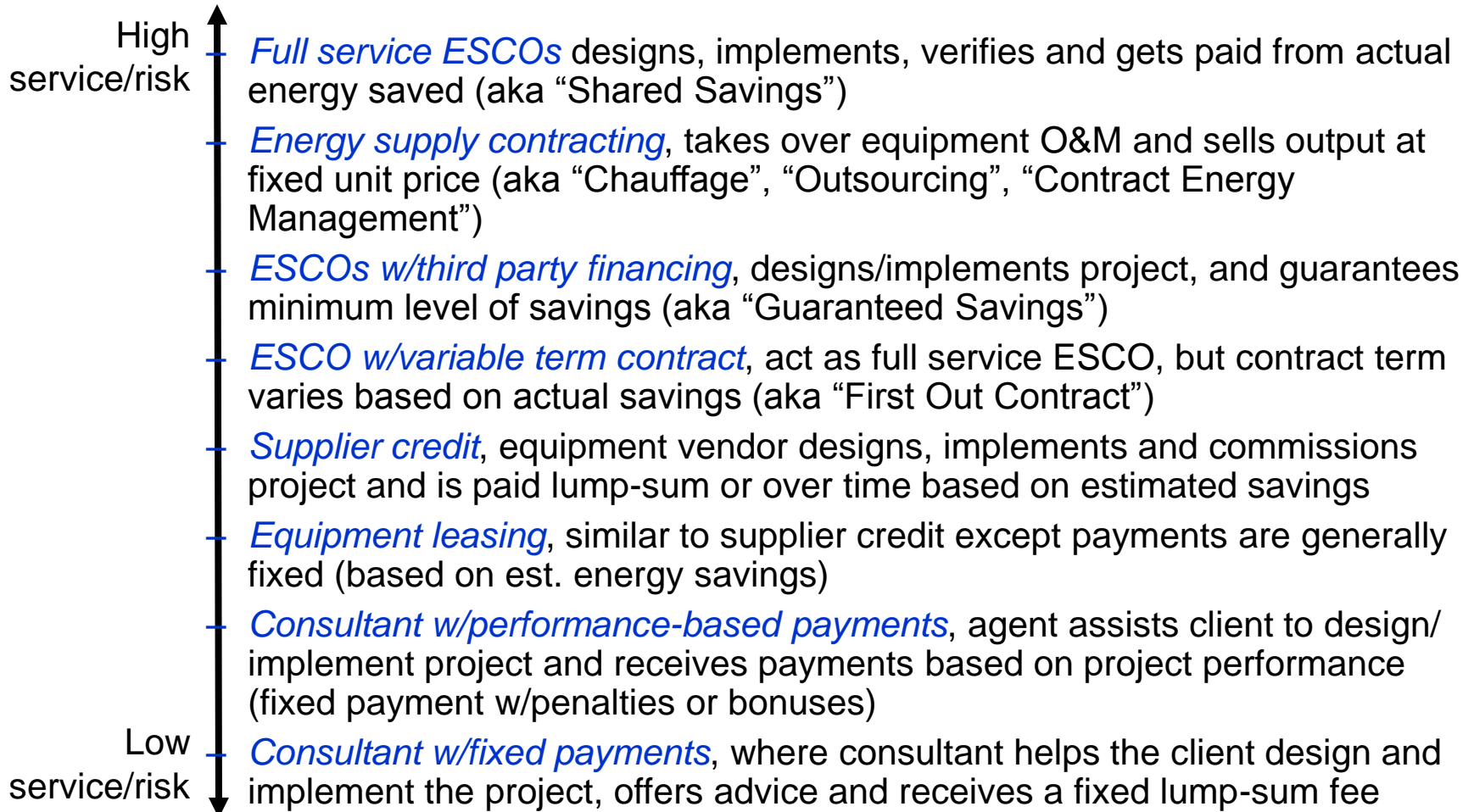
## ■ Results

- **Germany** (1992-2005) initiated about **\$5 billion** in ESPC contracts with some **40+ active ESCOs**
- **Japan** (1998-2007) invested **\$406 million** in ESPC projects and has some **130 registered ESCOs**
- **China** established 3 pilot EMCs in 1997 and now has **400 EMCs** which transacted **\$2.8 billion** in projects in 2009

## ■ Key success factors

- Supportive policies and enabling environment
- Introduction of simpler business models first
- Appropriate financing schemes
- Early market development through public sector projects
- Development of PPP models (e.g., public ESCO, super ESCO, ESCO agents, ESCO financing windows) to kick-start market

# ESCO business models



World Bank, 2005

# EE financing programs

- Need to bring commercial banks into market and demonstrate the high returns
- Many tools – credit lines, revolving funds, special purpose funds, credit guarantees, special purpose vehicles
- Still need to develop delivery mechanisms
- Examples

Bulgaria

India

Russia

Turkey

China

Lithuania

South Korea

Uruguay

Egypt

Philippines

Thailand

Hungary

Romania

Tunisia

# EE financing programs

## ■ Results

- **Bulgaria** (2006-09) created an EE Fund which has financed **75+ projects** valued at **\$22 million**
- **Hungary** (1997-2007) established a loan guarantee program which initiated **\$93 million** in EE projects
- **India** (1999-08) credit line (IREDA) completed **\$36 million** in EE projects saving **90 MW**, **249 GWh/year**, **9.4 million tonnes CO<sub>2</sub>**

## ■ Key success factors

- Holistic upfront market assessment
- Proper design of financing schemes and products
- Careful selection of financing partners
- Standardization to lower transaction costs
- Appropriate and intensive marketing to ensure strong pipeline
- Flexible schemes that can evolve with markets

# Market transformation

- Targeting of products rather than end users
- Many tools – utility DSM, standards & labeling, market aggregation, marketing, technology transfer, financing, rebates, manufacturer negotiations, or a combination
- Main issues are overcoming higher costs and changing purchasing behaviors

- Examples

Bangladesh	Cuba	Mexico	Sri Lanka
Bolivia	Ethiopia	Philippines	Thailand
Brazil	Ghana	Rwanda	Uganda
China	India	South Africa	Vietnam

# Market transformation

## ■ Results

- **CFL Programs** around the world have been able to significantly shift market and now bring <\$1 for large purchases
- **European Union** (1993-2007) achieved a **45% reduction** in energy use of refrigerators through S&L efforts

## ■ Key success factors

- Strong upfront market research
- Effective public campaigns
- Incentive schemes preceding mandatory ones have worked better
- Careful selection of financing partners
- Judicious use of subsidies can help
- Effective and efficient enforcement

# Market transformation

## Examples of Cost Reduction from Bulk Procurement for CFLs

Country	Year	Procurement Size	Bulk Price
Vietnam – Phase I	2004	300,000	\$1.07
Phase II	2005	700,000	\$0.98
Uganda	2006	800,000	\$1.10
Rwanda	2008	200,000	\$1.00
Ethiopia	2009	4,500,000	\$0.87
Bangladesh	2009	3,300,000 (13-14 W) 2,200,000 (20-23 W)	\$0.94 \$1.04
Philippines	2009	5,000,000	\$0.87

World Bank, 2009



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# Incentives, subsidies and grants

- Use of public funds to demonstrate new technologies or models, overcome initial high costs, lower perceived risks, jumpstart nascent market
- Can be used where credit barriers is too high, banks are unwilling to lend, help address low priority of EE among consumers
- Can be used with other schemes as long as subsidies do not undermine market-based approaches
- Example: **Vietnam** (2005-09) supported **111 ESCO projects** with total investment of **\$5+ million** with **<\$1 million in small grants**
- Success factors: effective administration, targeted use, sunset provisions, intensive dissemination

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# What have we learned?

- EE requires a *long-term* and *dedicated focus*
- Western models can serve as reference points, but need to *carefully adapt to local situations*
- Holistic *market assessments* are critical
- Programs should be *commercially-oriented*, *demand-driven* and *flexible*
- *Balance* policy frameworks, institutional arrangements, training, and implementation
- Show *results* within 1-2 year to create credibility
- Create *strong incentives* for all actors to actively participate
- Launch *marketing campaigns* to ensure high participation
- Follow-up *technical support* to address implementation hurdles and program/market evolution

# Accelerating EE

- Enact EE legislation and supporting regulations
  - *Signals government commitment*
  - *Provides institutional mandates and funding mechanisms*
- Develop EE programs and set targets
  - *Creates lines of accountability*
  - *Brings stakeholders together for common purpose*
- Build local capability
  - *Often most effective when “learning-by-doing”*
  - *Includes successful marketing and education campaigns*
- Replicate and scale up
  - *Builds upon successful pilots, demos, models on a large, commercial scale*
  - *Gov’t shifts from implementer to market organizer, advocate*

# New emerging models

- Foster voluntary agreements through global **EE PPPs** – e.g., incandescent/T-12 phase out, greening supply chains, discounts, commercial bank EE financing targets
- Issuance of country-wide or regional **standard offers**
- Global or regional **certification agencies**
- **Bundle public facilities** for large-scale ESCO projects
- Improved **urban planning and design**

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# ***Thank you!***

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