



DIRECTIONS IN DEVELOPMENT
Energy and Mining

Public Procurement of Energy Efficiency Services

Lessons from International Experiences

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Why the public sector?

- Public sector energy use ~2-5% of total energy use in many countries
- ~9% (33 TWh) of electricity consumption in Brazil was in public sector in 2006
- Large, homogenous, common-owner market
- Can “lead by example” and influence markets
 - Public sector typically represents 10-20% of GDP
 - Public procurement alone in EU is €200B or 3% of GDP
 - U.S. federal sales (2-3%) helped achieve high penetration rates for ENERGY STAR equipment (many at 90% or more)
- Reducing energy costs creates fiscal space for socioeconomic investments
- Suitable target for fiscal stimulus and “greening” infrastructure efforts

EE in Cities

- Cities are engines for socioeconomic development
- Escalating energy demand puts pressures on costs, service quality, access and the environment across all sectors:
 - *Power/heating*
 - *Water/wastewater*
 - *Transport*
 - *Public lighting*
 - *Buildings/public housing*
 - *Solid waste*
- Constrained city budgets and technical/institutional capabilities
- Priority on delivering key services and expanding access
- Growing interest in sustainable energy/“eco-cities,” but on-the-ground results have been limited

Why have results been so low?

Policy / Regulatory

- Low energy pricing and collections
- Rigid procurement and budgeting policies
- Limitations on public financing
- Ad hoc planning
- Limited and poor data

Public End Users

- Limited incentives to save energy/try new approaches
- No discretionary budgets for special projects/upgrades
- Unclear ownership of cost/energy savings
- Limited availability of financing
- Lack of awareness and technical expertise
- Behavioral biases

Equipment/ Service Providers

- Higher transaction costs for public sector projects
- Perceived risk of late/non-payment of public sector
- High project development costs
- Limited technical, business and risk management skills
- Limited access to equity and financing

Financiers

- High perceived public credit risks
- New technologies and contractual mechanisms
- Small sizes/high transaction costs
- Behavioral biases

What have other countries done?

- Policy measures
 - Energy pricing (time-of-use/feed-in tariffs, demand charges)
 - EE product procurement (public sector MEPS/labeling, life-cycle costing, bulk purchase)
 - Setting and monitoring of EE targets in public facilities
 - Allowance for use of energy savings performance contracts (ESPCs)
 - Building codes and certification
- Procedural changes
 - Changes in budgeting to allow retention of energy savings
 - Designation of energy managers, periodic energy audits to identify EE measures
 - O&M changes, such as automatic shut-off during evening/weekend hours
- Informational programs
 - Standard bidding documents and templates, analytical tools
 - Establishment of benchmarks, guidelines and good practices for buildings/systems
 - Public sector EE case studies and newsletters
 - Training of public sector staff, facility managers, procurement officers
- Incentive mechanisms
 - Funding for energy audits
 - Public financing for EE retrofits/upgrades
 - Awards for high performing public facility managers, agencies, cities
 - Publishing agency performance, ranking and rating of agencies

Where Should a City Start?

- Retrofit existing public facilities
 - ❑ *Energy system retrofits in public buildings and services*
 - ❑ *Promote distributed generation and load reduction options*
- Implement policies and programs in non-public facilities
 - ❑ *“Green” buildings*
 - ❑ *Electrical equipment and appliances*
 - ❑ *Industrial process improvements*
 - ❑ *Promote “green” transport*
- Integrate energy considerations in land use planning and development
 - ❑ *Spatial densification*
 - ❑ *Integrated urban planning, city design*
 - ❑ *Coordinated utility planning*



Illustrative Economics of Municipal EE

Sector	Short-Term Payback (under 5 years)	Medium-Term Payback (5-10 years)	Long-Term Payback (10+ years)
Public Buildings	<ul style="list-style-type: none"> Equipment retrofits Labeling building energy use ESCO contracting Solar water heating 	<ul style="list-style-type: none"> Building envelop measures Green roofs Training in good building O&M practices 	<ul style="list-style-type: none"> Building codes Certification of building materials Building integrated PV Equipment standards
Public Lighting	<ul style="list-style-type: none"> Lighting retrofits (HPSV) Control systems & sensors 	<ul style="list-style-type: none"> Retrofits using LEDs Lighting system redesign 	<ul style="list-style-type: none"> Street & traffic lighting standards
Water/Wastewater	<ul style="list-style-type: none"> Pumping retrofits, incl. VSDs Leak reduction Load management ESCO contracting 	<ul style="list-style-type: none"> System redesign & optimization Wastewater methane recovery for power generation Water DSM (low-flow outlets) 	
Transport	<ul style="list-style-type: none"> Improve traffic circulation planning Differential fuel taxation/pricing Congestion/Parking fees Promote non-motorized transport 	<ul style="list-style-type: none"> Alternative fuels for buses/ taxis BRT systems Fuel efficiency vehicle standards Promote fuel-efficient vehicles through fiscal incentives 	<ul style="list-style-type: none"> Modal shifts Vehicle I&M programs Changes in land-use patterns to promote urban densification

What is an ESPC?

- Contracting mechanism for implementing EE projects on **turn-key basis** – i.e., design, equipment procurement, installation, and savings verification
- Optional services include financing, O&M, training, etc.
- Compensation is generally based on actual demonstrated energy cost savings from the client or ‘host facility’
- Allows host facilities with limited capital to **pay for EE upgrades from future energy savings**, while mobilizing private capital and sharing of project performance risks
- ESPCs are generally carried out by energy service companies, or ESCOs

Project Example

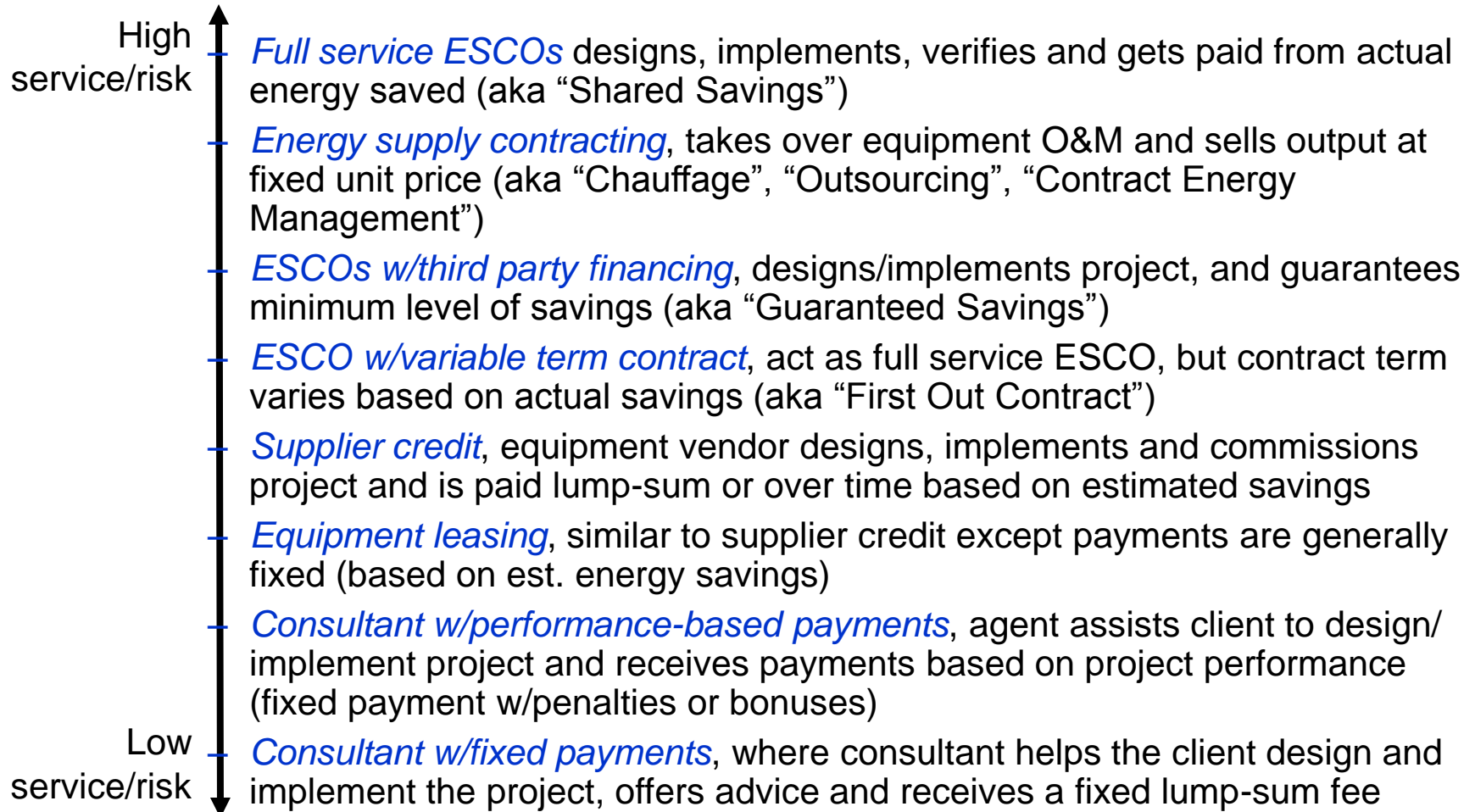
India Akola Street Lighting Replacement

- *State of Maharashtra plagued by power shortages, high electricity costs (~5% of Akola municipal budget)*
- *Akola issued tender for financing/replacement of 11.5k lamps using an ESPC*
- *AEL won tender in April 2007, invested ~\$120k replacing all lamps with T-5 FTLs, and took 95% of verified energy savings (metering 10% of lamps), 6 year term w/ maintenance/replacement obligation*
- *Project savings were 2.13 million kWh (\$133k cost savings, or 11 month payback)*

How ESPCs Can Help

Public Sector Barriers	ESPCs Can...
High perceived risks	better define the benefits/ costs upfront, assign some project risks away from the public agency and financier.
Inflexible procurement procedures	allow high IRR projects by evaluating the best value to the agency, bypassing multiple procurements.
Limited annual budgets for capital upgrades	facilitate project financing, usually with repayments derived from project savings.
Small projects with high project development/ transaction costs	allow smaller projects to be bundled, streamline audits/M&V for similar types of facilities, reduces hassle factor for public agencies.
Inadequate information and technical know-how	solicit technically competent private sector firms to compete based on their qualifications, experience and best project ideas.

ESCO Models



Source: World Bank 2005

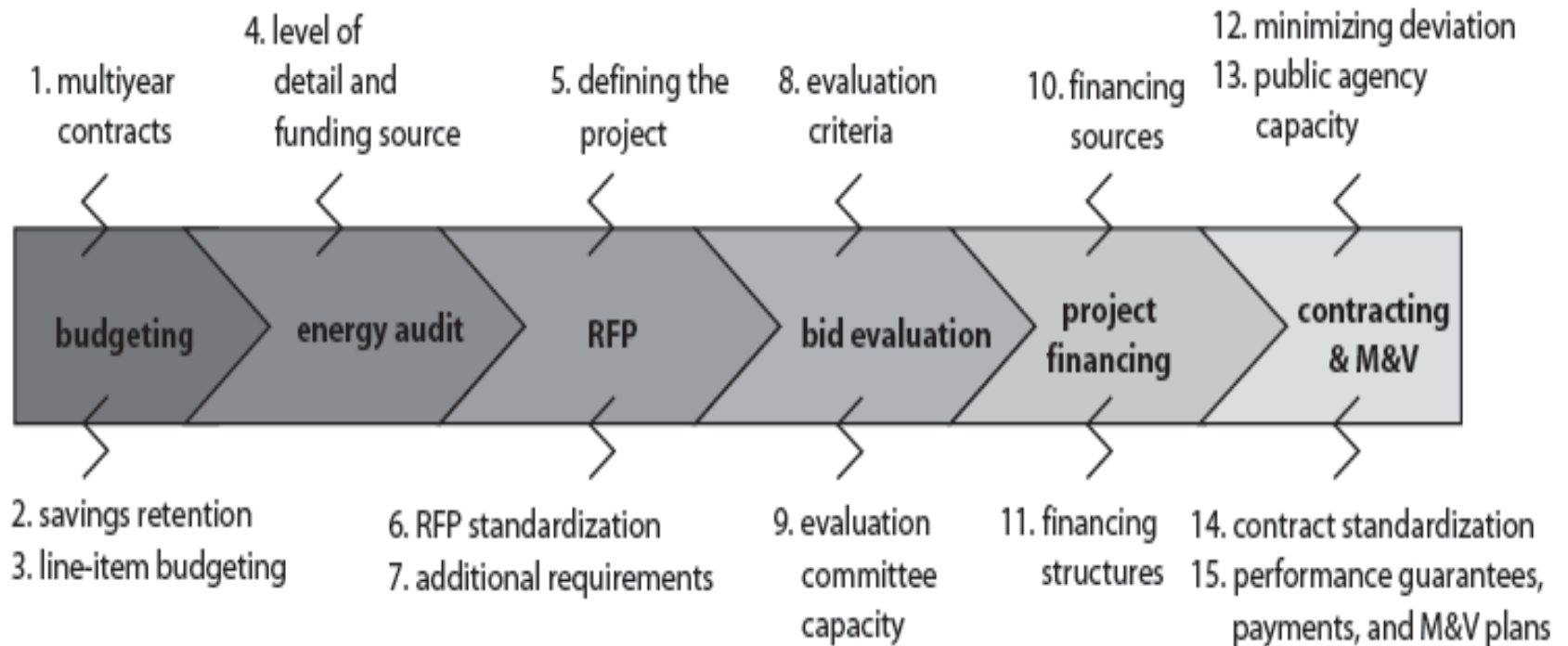
Results from select countries

Country	Market Size	Results	Projects
United States (FEMP)	US\$3.8 billion	<ul style="list-style-type: none"> - 18 trillion BTU/yr (2006) - US\$7.1 billion energy cost savings 	460 ESPC projects
Canada (FBI)	Can\$320 million	<ul style="list-style-type: none"> - 20% energy intensity reduction - Can\$40 million energy cost savings - 285 kt CO₂ reduction 	85 EPC projects (7,500+ buildings)
Germany	~€200 million	<ul style="list-style-type: none"> - 20-30% energy cost reduction - €30-45 million energy cost savings/yr 	2,000 properties
Japan	~10 billion yen	<ul style="list-style-type: none"> - 12% reduction energy intensity - 265kt of CO₂ reduction 	50 ESPC projects in FY06
South Korea	US\$185 million	n/a	~1,400 public ESCO projects

Projects Can also be Bundled

- State of Tamil Nadu (**India**) urban development fund (PPP) to bundle SL and water pumping in 7 municipalities under single tender (30% energy savings requirement, ESPC signed in 2008)
- State of Gujarat (**India**) recently issued tender for up to 159 local urban bodies (2 phases)
- MOE in **Hungary** issued tender in 2006 for ESOC to renovate all schools in country; OTP Bank and local ESCO (Caminus) signed 20-yr agreement with \$250m IFC guarantee; about \$22m implemented as of Aug '08
- City of Johannesburg (**South Africa**) bundled 50 municipal buildings for retrofits in 2008
- **Austria, Belgium, Czech Republic, Germany, South Korea, United States** – all have successful bundling of EE projects using ESPCs

Steps and Issues



Emerging Public ESPC Models

Model	Examples
Indefinite Quantity Contract (IQC)	U.S. (FEMP), Hungary (MOE)
Public ESP	Ukraine (Rivne City)
Super ESP	U.S. (NYPA), Belgium (Fedesco), Philippines (EC ²)
Utility ESP	U.S. (FEMP – UESC), Croatia (HEP ESCO)
Utility DSM ESP	Brazil
Internal ESP (PICO)	Germany (Stuttgart)
Energy Supply Contracting	Germany, Austria, France
Procurement Agent	Germany (BEA, DENA), Austria, U.S., Czech Republic, Slovakia
Project Bundling	Austria, Germany, India, S. Africa, U.S.
Nodal Agencies	U.S. (USDOE), S. Korea (KEMCO), India (BEE), Japan (ECCJ)
Ad Hoc	Brazil, China, Egypt, Mexico, Poland, S. Africa

Designing the Right Process

Budget	Audit	Financing	Model	Contract
<p>Progressive</p> <ul style="list-style-type: none"> agency's full retention of EE benefits after reform certain autonomy or fixed budget provisions of agency noncash refund to agency from ESPs with retention of EE benefits partial EE benefits assigned to agency by Ministry of Finance (MOF) no agency retention, MOF upfront subsidy/grant/special financing no retention but other incentives (e.g., awards, competitions) no retention; MOF mandate on agency EE implementation no retention; ESP procurement by MOF/parent agency <p>Restrictive</p>	<p>Prescriptive</p> <ul style="list-style-type: none"> detailed energy audit and resulting predefined project mandate audit detailed audit from similar, representative facility walk-through audits/evaluation institution-led low- or no-cost audit completed audit template equipment inventory/bill summary audit by preselected ESPs under Indefinite quantity contract (IQC) approach no upfront audit; detailed audit by bidders prior to bid submission <p>Flexible</p>	<p>Commercial</p> <ul style="list-style-type: none"> bank lending and project financing to ESPCs vendor financing or leasing credit or risk guarantee carbon financing to boost IRR or extend ESPC duration financing and packaging by Public-private partnership (PPPs) financing and packaging by public entities (e.g., super-ESPs) public revolving fund public financing through public bonds, etc. government budget for EE projects <p>Public</p>	<p>High ESP risk</p> <ul style="list-style-type: none"> full service—shared savings energy supply contracting—chauffage, outsourcing, contract energy management ESPs with third-party financing—guaranteed savings ESPs with variable-term contract—first out contract supplier credit equipment leasing consultant with performance-based payments consultant with fixed payments <p>Low ESP risk</p>	<p>Performance based</p> <ul style="list-style-type: none"> multiyear contract and periodic payments based on M&V assessment multiyear, flexible term contract until ESP's agreed return met partial payment upon commissioning and balance paid 3–6 months multiyear contract and fixed payments with periodic M&V, equipment warranty, and bonus provisions full payment upon commissioning with some recourse for outer years full payment upon commissioning <p>Traditional</p>

Barriers to ESPCs in Brazil

Substantial barriers for ESPCs in public sector due to federal public procurement rules (Law 8666 of 1993, budget Law 4320 of 1964, fiscal responsibility Law 101 of 2000), including:

- Project description. RFP must define basic project (*projeto básico*), which requires the project to be predefined upfront, limiting bidders to offer innovative solutions.
- Budget line items. Restrictions on moving budgets between line items (using operating costs - e.g., electricity - for capital upgrades – e.g., equipment upgrades) which is a key element of ESPCs.
- Contract terms. Contract terms should not exceed budgetary cycles, which are passed annually, creating problems for multi-year ESPCs.
- Evaluation. Selection based on (i) lowest price, or (ii) lowest price with best technical proposal, does not allow for preferences for bidders offering the best value (i.e., highest NPV) to the public agency.

A Glimmer of Hope?

Despite these challenges, two ESCPs have been successfully completed in public sector to date:

- (i) INFRAERO, the Federal airport management company (RFP issued 1999, awarded 2000), and
- (ii) SABESP, Sao Paulo's water and sanitation utility (RFP issued 2005, awarded 2006).

Some other options exist:

- Working with utility-based ESCOs that use ANEEL “public benefit” wire-charge for EE investments (by mid-2006, ~R\$1.8 billion used for EE investments, about half in public sector)
- Public-private partnership (PPP) law of 2004 may create alternate procurement options where private sector brings commercial financing and risk sharing for benefit of public sector (but minimum size is large, ~R\$20 million)

Conclusions and Recommendations

For countries interested in developing a process:

- Conduct an upfront market survey of potential service providers
- Hold stakeholder consultations to analyze barriers and identify potential solutions
- Define multiple solutions for each barrier and options for each issue
- Develop and test small procurements
- Expand and replicate
- Institutionalize systems

Thank you!

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