Public Procurement of Energy Efficiency Services

Lessons from International Experiences

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Financial and Technical Solutions for Sustainable Cities
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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?

<table>
<thead>
<tr>
<th>Policy / Regulatory</th>
<th>Public End Users</th>
<th>Equipment/Service Providers</th>
<th>Financiers</th>
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<tbody>
<tr>
<td>Low energy pricing and collections</td>
<td>Limited incentives to save energy/try new approaches</td>
<td>Higher transaction costs for public sector projects</td>
<td>High perceived public credit risks</td>
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<tr>
<td>Rigid procurement and budgeting policies</td>
<td>No discretionary budgets for special projects/upgrades</td>
<td>Perceived risk of late/non-payment of public sector</td>
<td>New technologies and contractual mechanisms</td>
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<tr>
<td>Limitations on public financing</td>
<td>Unclear ownership of cost/energy savings</td>
<td>High project development costs</td>
<td>Small sizes/high transaction costs</td>
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<td>Ad hoc planning</td>
<td>Limited availability of financing</td>
<td>Limited technical, business and risk management skills</td>
<td>Behavioral biases</td>
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<tr>
<td>Limited and poor data</td>
<td>Lack of awareness and technical expertise</td>
<td>Limited access to equity and financing</td>
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<tr>
<td>Behavioral biases</td>
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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

<table>
<thead>
<tr>
<th>Sector</th>
<th>Short-Term Payback (under 5 years)</th>
<th>Medium-Term Payback (5-10 years)</th>
<th>Long-Term Payback (10+ years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Buildings</td>
<td>- Equipment retrofits&lt;br&gt;- Labeling building energy use&lt;br&gt;- ESCO contracting&lt;br&gt;- Solar water heating</td>
<td>- Building envelop measures&lt;br&gt;- Green roofs&lt;br&gt;- Training in good building O&amp;M practices</td>
<td>- Building codes&lt;br&gt;- Certification of building materials&lt;br&gt;- Building integrated PV&lt;br&gt;- Equipment standards</td>
</tr>
<tr>
<td>Public Lighting</td>
<td>- Lighting retrofits (HPSV)&lt;br&gt;- Control systems &amp; sensors</td>
<td>- Retrofits using LEDs&lt;br&gt;- Lighting system redesign</td>
<td>- Street &amp; traffic lighting standards</td>
</tr>
<tr>
<td>Water/Wastewater</td>
<td>- Pumping retrofits, incl. VSDs&lt;br&gt;- Leak reduction&lt;br&gt;- Load management&lt;br&gt;- ESCO contracting</td>
<td>- System redesign &amp; optimization&lt;br&gt;- Wastewater methane recovery for power generation&lt;br&gt;- Water DSM (low-flow outlets)</td>
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<tr>
<td>Transport</td>
<td>- Improve traffic circulation planning&lt;br&gt;- Differential fuel taxation/pricing&lt;br&gt;- Congestion/Parking fees&lt;br&gt;- Promote non-motorized transport</td>
<td>- Alternative fuels for buses/ taxis&lt;br&gt;- BRT systems&lt;br&gt;- Fuel efficiency vehicle standards&lt;br&gt;- Promote fuel-efficient vehicles through fiscal incentives</td>
<td>- Modal shifts&lt;br&gt;- Vehicle I&amp;M programs&lt;br&gt;- Changes in land-use patterns to promote urban densification</td>
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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

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

High service/risk

- **Full service ESCOs** designs, implements, verifies and gets paid from actual energy saved (aka “Shared Savings”)

- **Energy supply contracting**, takes over equipment O&M and sells output at fixed unit price (aka “Chauffage”, “Outsourcing”, “Contract Energy Management”)

- **ESCOs w/third party financing**, designs/implements project, and guarantees minimum level of savings (aka “Guaranteed Savings”)

- **ESCO w/variable term contract**, act as full service ESCO, but contract term varies based on actual savings (aka “First Out Contract”)

- **Supplier credit**, equipment vendor designs, implements and commissions project and is paid lump-sum or over time based on estimated savings

- **Equipment leasing**, similar to supplier credit except payments are generally fixed (based on est. energy savings)

- **Consultant w/performance-based payments**, agent assists client to design/implement project and receives payments based on project performance (fixed payment w/penalties or bonuses)

Low service/risk

- **Consultant w/fixed payments**, where consultant helps the client design and implement the project, offers advice and receives a fixed lump-sum fee

*Source: World Bank 2005*
## Results from select countries

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<th>Country</th>
<th>Market Size</th>
<th>Results</th>
<th>Projects</th>
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<tr>
<td>United States (FEMP)</td>
<td>US$3.8 billion</td>
<td>- 18 trillion BTU/yr (2006)</td>
<td>460 ESPC projects</td>
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<td></td>
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<td>- US$7.1 billion energy cost savings</td>
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<tr>
<td>Canada (FBI)</td>
<td>Can$320 million</td>
<td>- 20% energy intensity reduction</td>
<td>85 EPC projects (7,500+ buildings)</td>
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<td>- Can$40 million energy cost savings</td>
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<td></td>
<td></td>
<td>- 285 kt CO₂ reduction</td>
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<tr>
<td>Germany</td>
<td>~€200 million</td>
<td>- 20-30% energy cost reduction</td>
<td>2,000 properties</td>
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<td>- €30-45 million energy cost savings</td>
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<tr>
<td></td>
<td></td>
<td>- CO₂ reduction</td>
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<tr>
<td>Japan</td>
<td>~10 billion yen</td>
<td>- 12% reduction energy intensity</td>
<td>50 ESPC projects in FY06</td>
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<td>- 265kt of CO₂ reduction</td>
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<tr>
<td>South Korea</td>
<td>US$185 million</td>
<td>n/a</td>
<td>~1,400 public ESCO projects</td>
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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

1. Multiyear contracts
2. Savings retention
3. Line-item budgeting
4. Level of detail and funding source
5. Defining the project
6. RFP standardization
7. Additional requirements
8. Evaluation criteria
9. Evaluation committee capacity
10. Financing sources
11. Financing structures
12. Minimizing deviation
13. Public agency capacity
14. Contract standardization
15. Performance guarantees, payments, and M&V plans
# Emerging Public ESPC Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Indefinite Quantity Contract (IQC)</td>
<td>U.S. (FEMP), Hungary (MOE)</td>
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<td>Public ESP</td>
<td>Ukraine (Rivne City)</td>
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<td>Super ESP</td>
<td>U.S. (NYPA), Belgium (Fedesco), Philippines (EC²)</td>
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<tr>
<td>Utility ESP</td>
<td>U.S. (FEMP – UESC), Croatia (HEP ESCO)</td>
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<td>Utility DSM ESP</td>
<td>Brazil</td>
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<td>Internal ESP (PICO)</td>
<td>Germany (Stuttgart)</td>
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<tr>
<td>Energy Supply Contracting</td>
<td>Germany, Austria, France</td>
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<tr>
<td>Procurement Agent</td>
<td>Germany (BEA, DENA), Austria, U.S., Czech Republic, Slovakia</td>
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<tr>
<td>Project Bundling</td>
<td>Austria, Germany, India, S. Africa, U.S.</td>
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<tr>
<td>Nodal Agencies</td>
<td>U.S. (USDOE), S. Korea (KEMCO), India (BEE), Japan (ECCJ)</td>
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<tr>
<td>Ad Hoc</td>
<td>Brazil, China, Egypt, Mexico, Poland, S. Africa</td>
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# Designing the Right Process

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<tr>
<th>Budget</th>
<th>Audit</th>
<th>Financing</th>
<th>Model</th>
<th>Contract</th>
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<tr>
<td>Progressive&lt;br&gt;agency’s full retention of EE benefits after reform&lt;br&gt;certain autonomy or fixed budget provisions of agency&lt;br&gt;noncash refund to agency from ESPs with retention of EE benefits&lt;br&gt;partial EE benefits assigned to agency by Ministry of Finance (MOF)&lt;br&gt;no agency retention, MOF upfront subsidy/grant/special financing&lt;br&gt;no retention but other incentives (e.g., awards, competitions)&lt;br&gt;no retention; MOF mandate on agency EE implementation&lt;br&gt;no retention; ESP procurement by MOF/parent agency</td>
<td>Prescriptive&lt;br&gt;detailed energy audit and resulting predefined project&lt;br&gt;mandate audit&lt;br&gt;detailed audit from similar, representative facility&lt;br&gt;walk-through audits/evaluation&lt;br&gt;institution-led low- or no-cost audit&lt;br&gt;completed audit template&lt;br&gt;equipment inventory/bill summary&lt;br&gt;audit by preselected ESPs under Indefinite quantity contract (IQC) approach&lt;br&gt;no upfront audit; detailed audit by bidders prior to bid submission</td>
<td>Commercial&lt;br&gt;bank lending and project financing to ESPCs&lt;br&gt;vendor financing or leasing&lt;br&gt;credit or risk guarantee&lt;br&gt;carbon financing to boost IRR or extend ESPC duration&lt;br&gt;financing and packaging by Public-private partnership (PPPs)&lt;br&gt;financing and packaging by public entities (e.g., super-ESPs)&lt;br&gt;public revolving fund&lt;br&gt;public financing through public bonds, etc.&lt;br&gt;government budget for EE projects</td>
<td>High ESP risk&lt;br&gt;full service—shared savings&lt;br&gt;energy supply contracting—chauffage, outsourcing, contract energy management&lt;br&gt;ESPs with third-party financing—guaranteed savings&lt;br&gt;ESPs with variable-term contract—first out contract&lt;br&gt;supplier credit&lt;br&gt;equipment leasing&lt;br&gt;consultant with performance-based payments&lt;br&gt;consultant with fixed payments</td>
<td>Performance based&lt;br&gt;multiyear contract and periodic payments based on M&amp;V assessment&lt;br&gt;multiyear, flexible term contract until ESP’s agreed return met&lt;br&gt;partial payment upon commissioning and balance paid 3–6 months&lt;br&gt;multiyear contract and fixed payments with periodic M&amp;V, equipment warranty, and bonus provisions&lt;br&gt;full payment upon commissioning with some recourse for outer years&lt;br&gt;full payment upon commissioning&lt;br&gt;Traditional</td>
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<tr>
<td>Flexible</td>
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ESMAP<br>The Energy Sector Management Assistance Program
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 ESPCs 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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