Public Procurement of Energy Efficiency Services
Lessons from International Experiences

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Preparing, Financing and Implementing Municipal EE Programs
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Why the public sector?

- Public sector energy use ~2-5% of total energy use in many countries
- Public organizations in Russia can save 42% or about 15.2 mtoe
- 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
Municipal EE

- 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>
</tr>
</thead>
<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>
</tr>
<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>
</tr>
<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>
</tr>
<tr>
<td>Ad hoc planning</td>
<td>Limited availability of financing</td>
<td>Limited technical, business and risk management skills</td>
<td>Behavioral biases</td>
</tr>
<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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<td></td>
<td>Behavioral biases</td>
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</table>
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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</table>
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

<table>
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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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<tr>
<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/implment 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
<table>
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<tr>
<th>Country</th>
<th>Market Size</th>
<th>Results</th>
<th>Projects</th>
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<tbody>
<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>- US$7.1 billion energy cost savings</td>
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<td>- 20% energy intensity reduction</td>
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<td>- Can$40 million energy cost savings</td>
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<td>- 285 kt CO₂ reduction</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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<tr>
<td></td>
<td></td>
<td>- Can$40 million energy cost savings</td>
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<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>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

ESMAP
The Energy Sector Management Assistance Program
# 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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<tr>
<td>Public ESP</td>
<td>Ukraine (Rivne City)</td>
</tr>
<tr>
<td>Super ESP</td>
<td>U.S. (NYPA), Belgium (Fedesco), Philippines (EC²)</td>
</tr>
<tr>
<td>Utility ESP</td>
<td>U.S. (FEMP – UESC), Croatia (HEP ESCO)</td>
</tr>
<tr>
<td>Utility DSM ESP</td>
<td>Brazil</td>
</tr>
<tr>
<td>Internal ESP (PICO)</td>
<td>Germany (Stuttgart)</td>
</tr>
<tr>
<td>Energy Supply Contracting</td>
<td>Germany, Austria, France</td>
</tr>
<tr>
<td>Procurement Agent</td>
<td>Germany (BEA, DENA), Austria, U.S., Czech Republic, Slovakia</td>
</tr>
<tr>
<td>Project Bundling</td>
<td>Austria, Germany, India, S. Africa, U.S.</td>
</tr>
<tr>
<td>Nodal Agencies</td>
<td>U.S. (USDOE), S. Korea (KEMCO), India (BEE), Japan (ECCJ)</td>
</tr>
<tr>
<td>Ad Hoc</td>
<td>Brazil, China, Egypt, Mexico, Poland, S. Africa</td>
</tr>
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# Designing the Right Process

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

World Bank (2008) report identified key barriers to ESPC in public sector to include:

- **Multi-year contracting.** Public agencies cannot enter into multi-year contracts, financing agreements, or contracts that recover investment from future revenues (i.e., energy savings)

- **Retention of energy savings.** Public organizations are not able to retain energy savings, which are needed to pay the ESP and create an incentive for the agency to pursue EE

- **Limited upfront technical information.** Little statistical information, benchmarking, energy audits, etc. exist to provide bidders with enough information to estimate savings and for agencies to assess credibility of ESP proposals

- **Financial evaluation.** Typical public procurement relies on lowest cost bid rather than life-cycle cost, NPV or alternate method to determine the “best value” to the agency
**Multi-year contracts**

- **Medium Term Expenditure Framework (MTEF)** is an approach promoted by WB to help reconcile multi-year obligations with annual budget envelopes.
- MTEF helps ensure that public commitments are consistent with its medium-term fiscal outlook.
- Many WB clients have adopted MTEF, so do not face multi-year contracting barriers.
- Many other countries have precedents for multi-year contracting (utility services, financing, employment contracts, recurring services), which can be explored.
- But, if this is a key issue, consider **one-year ESPCs** (e.g., Mexico).
Retention of energy savings

Full ownership of savings
- MOF/parent agency assigns full project benefits to agency for discretionary spending – may require regulatory changes
- Focus on autonomous agencies or ones with fixed budget provisions
- ESP retains all energy savings but then provides a non-cash refund to the agency at the end of the project period
- MOF assigns partial project benefits (e.g., duration of ESPC) to agency to allow ESP payments to be made
- MOF provides upfront subsidy/grant for investment or special financing but retains benefits
- Gov’t does not allow energy savings but offers institutional awards, interagency competitions, employee recognition for proactive energy efficiency measures
- MOF issues mandate to implement cost-effective EE measures

No ownership of savings
- MOF/parent agency procures ESP directly for public facility retrofits and retains all energy savings
Audit: Level of Detail/Cost

Prescriptive
- Detailed energy audit resulting in predefined project/evaluate based on lowest cost for services/equipment
- Gov’t mandates energy audits for public facilities
- Detailed energy audit from similar, representative facility
- Walk-through audit/evaluation based on representative project with allowance for bidders to suggest project enhancements
- Institution-led low-/no- cost audits (e.g., gov’t agency, utility, university)
- Host facility completes audit template
- Host facility provides equipment inventory/bill summary
- Use of IQC approach, where ESPs are competitively preselected and then undertake audits and contracts directly with public agencies

Flexible
- No upfront audit; RFP requires bidders to perform detailed audit during bid phase, possible remuneration for unsuccessful bidders
Audit (continued)

Minimum information (buildings) required:
- Age of building
- Inventory of equipment
- Square footage by function (e.g., office space, cafeteria, training centers, etc.)
- Operating conditions (operating times, functions)
- 1+ year of energy billing data, including tariff information
- Past EE measures implemented to date
- If bundle of projects, only need data on representative sample

Conclusion: Technical information can be prepared at a very low cost!
Bid evaluation

- Most countries use two-stage evaluation process (technical and financial)
- Technical evaluation similar to typical services: firm experience, technical approach, personnel, etc.
- Financial evaluation more complex due to multiple cost-related parameters (e.g., energy savings, IRR, total project cost)
  - Some countries use weighted average of financial criteria (Japan, Czech Republic, Canada, U.S. – NYSERDA, India)
  - Others use single calculation or value to determine best value (i.e., NPV) (Austria, Germany)
  - Still others rely on direct negotiations (U.S. – FEMP/NYPA, France)
- Evaluation procedures must fit local regulations and agency needs, yet also be clear, transparent and simple
Conclusions and recommendations

For cities 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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