Energy Efficiency in Municipal Social Facilities

Renewable Resources and Energy Efficiency Fund
Armenia
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"ESMAP Knowledge Exchange Forum, March 17, 2011"
R2E2 Fund

Facilitate Investments in Renewable Energy and Energy Efficiency Fields in Armenia

• Established in 2005 by Government following the Law on Energy Efficiency and Renewable Energy
• Objective – create financing mechanism for EE&RE
• Legal status – independent legal entity acting under Civil Code
• Portfolio of implemented projects >$40mln. financed by WB
• Establishing non-bank financing organization (Universal Credit Organization)
R2E2 Fund - organizational structure

- Board of Trustees
- Director
  - Administration
  - Financial
  - Procurement
  - Legal
  - Engineering
- Projects
Public Buildings in Armenia

- Public Agencies – financed from the state or community budgets (hospitals, schools, kindergartens, administrative buildings, street lighting, etc)
- Budget constraints coupled with rising energy costs
  - gas prices increased ~58% from 2008 to 2010; electricity also increased 20% (daytime), 33% (nighttime)
- Buildings are under-occupied, financing is per person (student, patient, etc.)
- Survey results show average comfort levels in social buildings ~40%
- Energy costs are generally second-highest cost (5-20% of total costs) for public buildings
- State of public buildings is poor and many need rehabilitation without prospects for cost recovery
- Typical consumption – heating, cooking, hot water, electricity
Urban Heating Project in Schools

- 106 urban schools efficient heating system
  - New boiler house, Internal heating network, External heating pipeline. Gas pipeline, Water, electricity infrastructure

- Lessons learned
  - Annual savings are 10-70% dependent on envelope
  - Gas tariff increase causes comfort level decline (area, days, t)
  - The school financing per student does not reflect tariff changes
  - Output based contracts assures better performance
  - Single responsibility for design and construction (turn-key) gives higher performance and quality
  - Procurement of turn-key contract saves at least 3-4 months and 30% money
Under the UHP $7 mln allocated to improve heating conditions for over 60,000 students and teachers.

Typical boiler house constructed under the UHP by R2E2 Fund.
Orphanage in Gavar

11.19.2009
Need for Energy Efficiency Project

- ORPHANAGE
Medical centre
Problems and Solutions

• Problems
  - High energy cost less comfort
  - Buildings construction destroyed
  - Health problems
  - Accidents
  - Low quality of services

• Gov. & Municipalities are aware of the situation and allocate funds from limited sources of State and Municipal budgets to fix situation

• IFIs, donors, Diaspora, individuals help to improve comfort

• However
  - Grants are limited and not sustainable
  - Loans are not provided to this type of organizations

Solution INNOVATIVE MECHANISM
“ESCO” Concept

• A firm that provides integrated solutions for achieving energy cost reductions, and whose payments are linked to the performance of implemented solutions
• It is the financing of projects from energy savings
• It permits the realization of projects for which $$$ may not otherwise be available
• It can mobilize outside capital
• It guarantees that savings will be realized in a certain time frame
• It sells results not equipment or services
• ESCO – Clearly stated procedures
• ESCO – Mechanism for risk sharing and functional guarantees
• ESCO – Financial resources, creditworthiness
• ESCO – Investments financed from energy cost savings
• ESCO – long term service agreement
“ESCO” Concept

Barriers for ESCO mechanism in Armenia

- Low awareness on benefits
- Lack of capacity for assessment of EE potential
- Lack of working capital in private construction companies
- Lack of long term loans within financial market
- Lack of mutual trust between contractor and client
- Risks related to the changes of behavior after improvement
- Energy tariff non predictable, weather is changed from year to year
- The obligation in public organizations to go through a conventional tender process is a major barrier
ESMAP Supports to Overcome Barriers

- Modification of “ESCO” into “Super ESCO” concept to be applicable in Armenia and other developing countries
- ESMAP and World Bank assisted in preparation of financing mechanism for social buildings EE improvement
- ESMAP assisted with idea of “Super ESCo”
- ESMAP assisted in risk sharing and segregation of responsibilities
- ESMAP helped with procurement scheme design
- ESMAP supported to develop performance guarantees, M&V protocol
Financing Scheme – Super ESCO

World Bank

- loan
- repayment

Ministry of Finance

- on-lending
- repayment

R2E2 Fund (Super ESCO)

- Fund hires ESCO under ESPC
- Takes over energy bills for 5-7 yrs

Municipalities

- energy efficiency services

Takes over project after contract term

ESCOs
MECHANISM “SUPER ESCO” – Win-Win-Win

- Balanced risks between financier, Energy Service Company and beneficiary
- Reduced risk due to clearly stated procedures for overall cycle of EE project
  - Energy Audit; Identification of Baseline for energy consumption; Procurement; O&M; M&V Protocol; Payment based on output; Repayment schedule; Adjustment of savings (baseline), etc
- The highest NPV and adequate annual savings level for each project
- Technical feasibility of proposed EE measures
- Quality of construction works and installed equipment
- Proper O&M for sustainable performance
- Guarantees savings
- Guaranteed payments to the contractors if they meet adequate performance criteria
- Long-term “soft” financing (investment funding from the IBRD loan)
- Assures repayment from savings
- No need for upfront budget allocation, no performance risk, maintain positive cash flow, improved comfort, free up budget for other critical expenditures
Criteria for Public Facilities

**Facility type** – public administration buildings, schools, kindergartens, hospitals, public lighting

**Requirements** - sound building structures, no plans for facility closing/privatization

**Additional selection criteria**

- Comfort level over 50%
- Technical energy savings potential over 30%
- Payback period less than 10 years
Procurement Scheme – new & consistent

- Combined design & output-based CW contract with performance-based payments
- Use of NCB template for small Works (updated Nov 2010)
- Project is defined by minimum level of energy savings based on preliminary energy audit
- Bidder must bid on design and construction
- Bids are submitted in single envelop (technical & financial)
- Evaluation is based on (i) technical feasibility to meet promised energy savings, and (ii) highest net present value
- Bidding documents to include process for commissioning and 1-year M&V
Payment Schedule

20% - Advance payment against bank guarantee
60% - After completion of works and commissioning
10% - After 14-day M&V during the heating season and proved performance
10% - After 12 defect liability period, completed O&M and verification
# Risks and mitigation measures

<table>
<thead>
<tr>
<th>Risks</th>
<th>Mitigation</th>
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<tbody>
<tr>
<td>Low interest from bidders</td>
<td>Training, Pre-bid conference, Site visit</td>
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<tr>
<td>Higher working capital needs</td>
<td>Advance payment</td>
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<tr>
<td>Non-performance risk</td>
<td>Turn-key contract. Approval of design</td>
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<tr>
<td>Non-payment risk</td>
<td>Energy bills &amp; payment to the Fund bundled</td>
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<tr>
<td>Risk of persistence of savings</td>
<td>Training on O&amp;M, capacity building in PA</td>
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### Pilot projects – Orphan boarding school in Gavar

<table>
<thead>
<tr>
<th>Before /2009-2010/</th>
<th>After /2010-2011/</th>
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<tbody>
<tr>
<td>Gas, boiler house</td>
<td>Gas, boiler house, replaced windows, insulated walls, attic</td>
</tr>
<tr>
<td>102 days heating</td>
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</tr>
<tr>
<td>3854 sqm</td>
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<tr>
<td>2,173,100 AMD</td>
<td>1,069,860 AMD</td>
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<tr>
<td>annual average 2007-2010</td>
<td>actual annual</td>
</tr>
<tr>
<td>3,215,760 AMD</td>
<td>Cash saving – 2,145,900 AMD</td>
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<tr>
<td>gas price in 2010-2011</td>
<td>Annual savings – 67%</td>
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Project Development Steps

- Request
- Eligibility screening
- Due Diligence
- Walk-through audit
- Procurement
- Design
- Construction
- Commissioning
- O&M
- Contractor
- Fund
- Fund
- Fund
- Client
- Client
- Client

Project Life
Thank you for attention

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