

# Energy Efficiency in Municipal Social Facilities

Renewable Resources and Energy Efficiency Fund  
Armenia

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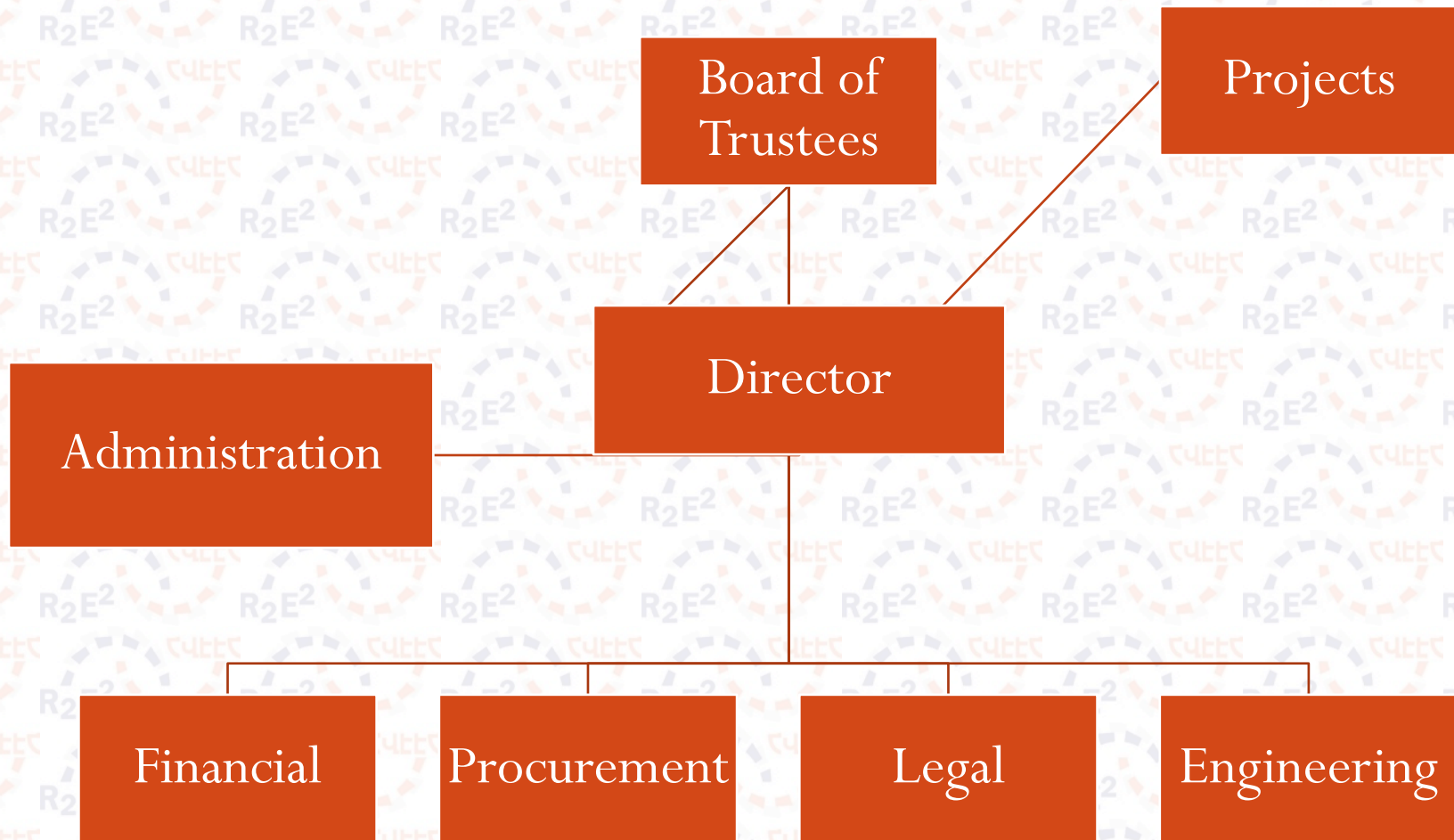
"ESMAP Knowledge Exchange Forum, March 17, 2011"

# 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



# 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





# 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

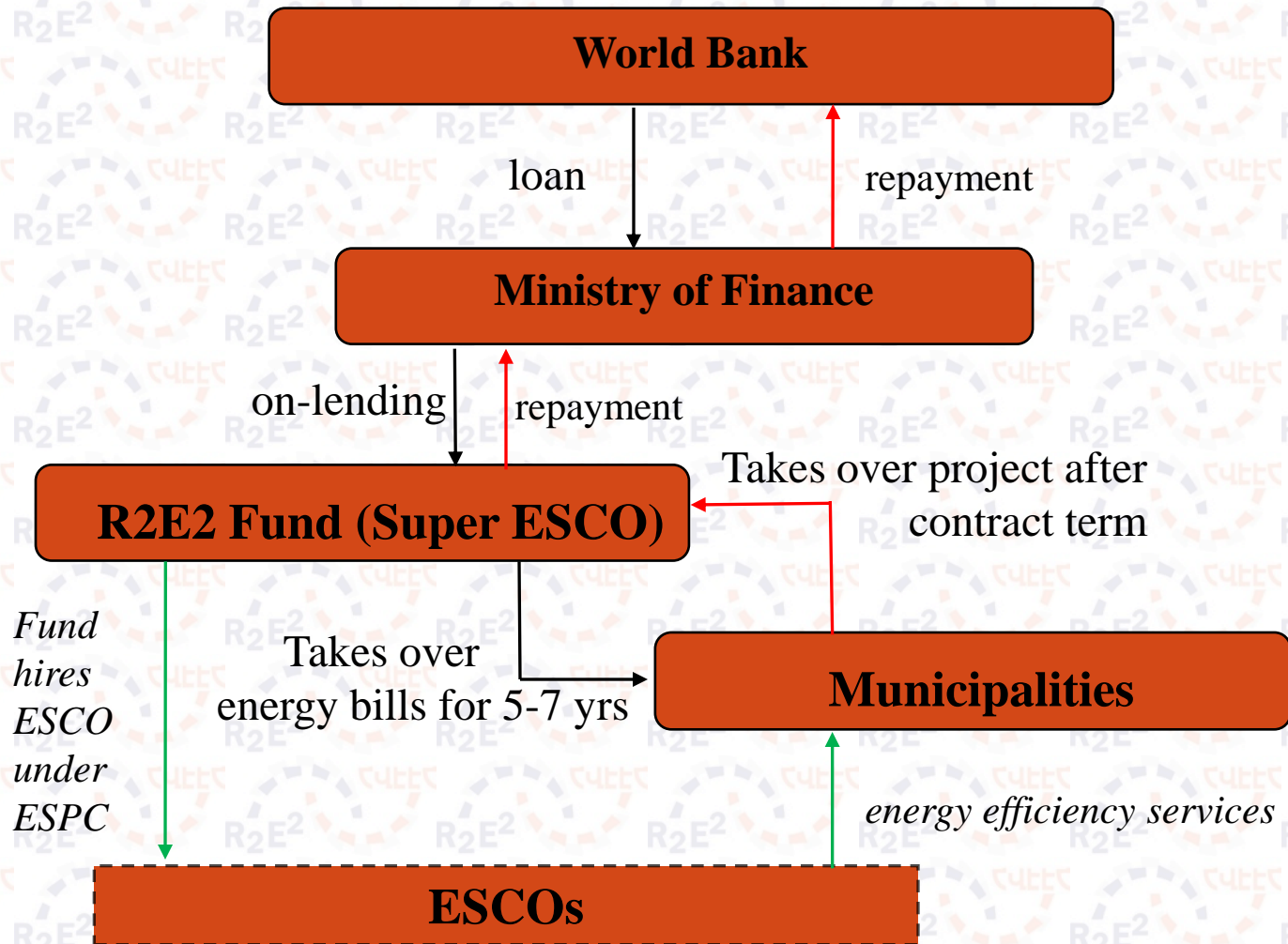
## Barriers for ESCO mechanism in Armenia

- 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





## 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

## Risks

Low interest from bidders

Higher working capital needs

Non-performance risk

Non-payment risk

Risk of persistence of savings

## Mitigation

Training , Pre-bid conference, Site visit

Advance payment

Turn-key contract. Approval of design

Energy bills & payment to the Fund bundled

Training on O&M, capacity building in PA

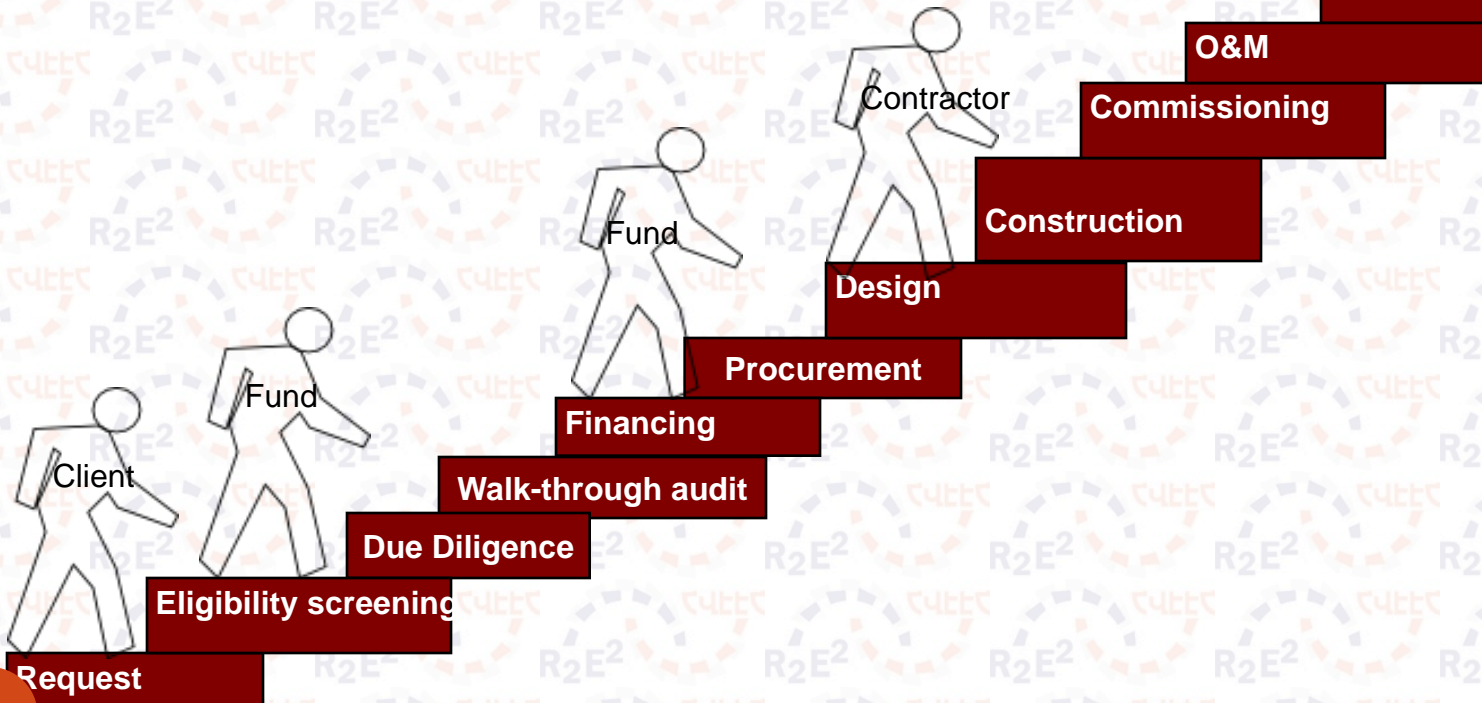
# Pilot projects – Orphan boarding school in Gavar

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

# Project Development Steps



**Project Life**



# Thank you for attention

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