

# Designing and Implementing Energy-Efficiency Policies and Programs

May 2007 Chisinau, Moldova

## The Alliance Experience and Accomplishments from Various Countries

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ALLIANCE TO  
SAVE ENERGY  
*Creating an Energy-Efficient World*

## What is the Alliance?



- Mission: To advance energy efficiency world-wide through policy, education, research, technology deployment, market transformation and communication initiatives.
- Headquartered in Washington, D.C. with operations in Eastern Europe, South Africa, Mexico, India and several states in the U.S.
- Chaired by Senator Mark Pryor (D-AR) and James Rogers (CEO, Duke Energy) with strong bi-partisan congressional, corporate & public interest leadership.



## Approach proved successful in Central and Eastern Europe and CIS



1. Promoting policy reform
2. Designing and establishing Innovative financing mechanisms
3. Training leaders
4. Raising public awareness
5. Building networks of EE experts and cities
6. Designing energy efficiency (EE) projects

## Policy Reform



1. Comprehensive, market-oriented energy policy
2. Raising tariffs to cost recovery levels
3. Eliminating subsidies and cross subsidies within fuels and between fuels to allow competition,
4. Developing low-income energy efficiency programs to replace traditional subsidies
5. Developing energy efficiency standards and building codes,
6. Designing EE tax and customs incentives,
7. Establishing energy audit procedures, certification, labeling and passportization

## Innovative Policy Design and Reform – *Alliance Experiences*



### **MOLDOVA: Heat strategy and draft heat law**

- Clarify regulations between buyer (housing associations) and seller (DHC)
- Recommend which cities should scrap DH altogether
- Strategy for attracting private investment, commercial lending for DH sector

## Innovative Policy Design and Reform – *Alliance Experiences*



### **ARMENIA: Energy Efficiency Policy Reform**

Design and enforcement of the following legal documents:

- Law on Energy Saving and Renewable Energy
- State Energy Saving and Renewable Energy FUND operational manual
- National Energy Efficiency Program
- Energy Efficiency Standards
- Modern Building Energy Codes

## Innovative Policy Design and Reform – *Alliance Experiences*



### **Promoted and Advised on Legal reform:**

- **Ukraine:** Municipal Budget Code
- **Moldova:** Housing and Condominium legislation, Renewable Energy Law
- **Macedonia:** Energy Efficiency Strategy
- Other efforts included Lithuanian DH Law, Albanian building codes, Bulgarian ESCO sector legislation, etc.

## Innovative financing



- **Grants:** *should only be used to trigger the market forces and gradually phased out to allow for market acceleration*
- **Performance contracting and third party financing – energy service companies (ESCOs)**
- **Housing renovation/modernization loans**
- **Municipal funds (linked to the awareness of municipal officials on benefits of such investments) – Lviv, Ukraine**
- **Energy efficiency revolving funds**  
- *Vanadzor and Gumri (Armenia)*

## Innovative financing - *continued*



- **Leasing, concessions and other Private Sector Participation (PSP)**
- **Vendor credits**
- **Social/subsidy funds for low-income EE financing**
- **State Housing Development, Repair and Maintenance funds**
- **Credits (loans) from commercial banks**
- **Credit guarantees**
- **Carbon finance, etc.**

## Building EE Revolving Funds *Alliance Experience*



- Partner with local public groups/NGOs
- Borrowers' own contribution to the investment (>10%)
- Municipal support for low-income households in capital investment costs (up to 20%)
- Small size of projects (\$500-600) with 6-12 month repayment



Insulation of water pipes



Before project (most windows have no glass)      After Project (all windows are glazed)

- ☑ **20-30% reduction in energy bills**
- ☑ **2-3°C rise in indoor temperature**

## Training for leaders



Building capacity of municipal and national decision-makers on:

- National energy efficiency planning
- Municipal energy and water planning
- Energy management in municipal buildings and enterprises
  - *Create and train municipal energy managers*
- Opening the municipal energy utilities for private sector participation (PSP)
- Municipal project financing



Mayors' Training in Municipal Energy Management and Building EE

## Public Awareness, Networking and Training



- **Public awareness**
- **Consumer brochures, guides, how-to manuals**
- **Success story and case study database**
- **Residential EE Media Campaign**
- **Training children**
- **Green Schools Program**



Training of Condominium Managers



Green Schools Program in Serbia

## Networking



- **Workshops & study tours:** *between countries*

- **Networks:**

- *Regional or sub-regional*
- *National*
- *Local Energy working groups/Councils*

Generate policy dialogue on energy sector problems, identify priorities and suggest actions to address the priority issues (Ukraine, Armenia)



## Designing energy efficiency projects: *Buildings*



- municipal and residential demand-side energy efficiency, with metering, control, weatherization, and with billing for actual consumption – *Chisinau (Moldova), Lviv (Ukraine), Vanadzor (Armenia)*



Common state of windows in CIS countries



## Designing energy efficiency Projects: *Heating systems*



- modernize district heating (DH) systems,
- achieve optimal centralization,
- switch fuels,
- introduce demand-side management (DSM),
- rehabilitate the DH networks and substations,
- increase CHP production



Weatherizing heating pipes



Moldovan children weatherize their boarding school



Heat Cost Allocator

## Designing energy efficiency Projects: *Industrial Enterprises*



- Recommendations include (examples):
  - Energy Management Systems (almost 90% cases)
  - Integration of thermal processes
  - Heating network maintenance
  - Heat recovery
  - Replacement of old equipment by EE equipment
  - Cogeneration plants
  - Compressors
  - Gas-steam Turbines



Waste heat releases

## Early Champions of Ukrainian Industrial Energy Efficiency



In 1998, with the U.S. Department of Energy (DOE) and Pacific Northwest National Laboratory (PNNL) support, six profitable Ukrainian firms improved their energy productivity to be competitive. The plants invested \$1.2 million of their own funds in the recommended energy efficiency measures:

- Installing waste heat recovery boilers, efficient compressors
- Insulating steam pipes
- Upgrading indoor and outdoor lighting with more modern, efficient fixtures
- Recovering heat from condensate
- Hiring ESCOs for energy audits
- Repairing air leaks in exhaust ducts
- Creating an energy management system,
- Modernization of the light and galvanized cable lines

## Current Project: Ukraine Industrial EE Initiative (UIEEI)



- UIEEI began in July 2006
- Purpose:
  - To reduce significantly natural gas consumption by developing 10-15 EE projects at selected large consuming industries
  - Develop, demonstrate and disseminate a sustainable process that can be widely replicated in Ukraine by other industries and large users

Current Project:  
Ukraine Industrial EE Initiative (UIEEI)



**Industrial Gas Saving Project Identification, Preparation, and Implementation:**

- Done by 5 qualified Ukrainian ESCOs:
  - ~ ESCO OptimEnergO ~ UkrESCO ~ RENCO ~ EcoSys ~ ARENA-Eco
- ...at 15 industrial plants large gas users ( $> 10^6 \text{ m}^3 / \text{year}$ ) ...
- ... in two-phase energy audit approach:
  - Preliminary audits and project identification
  - Investment Grade audits and preparation of bankable projects
- ... with potential financing from local and foreign banks:
  - US ExIm Bank
  - EBRD
  - Local banks

Current Project:  
Ukraine Industrial EE Initiative (UIEEI)



Measure description	Gas saving	Annual cost	Implementation	Simple
	Gas	saving	expenses	payback
	million m <sup>3</sup>	million US\$	million US\$	year
<b>Energy management</b>	3-8	2-9	0.3 – 0.8	0.5
<b>Integration of Heat Processes</b>	3 - 11	0.7 - 3	1 - 4	1.5 - 1.7
<b>Construction of Integrated Gasification Combined Cycle (IGCC) plant</b>	1,800	78	270	3.5
<b>Upgrade of heat supply system</b>	3	3.2	0.6	1.0
<b>Installation of economizers</b>	1.6	0.3	0.5	1.7
<b>Introduction of a steam turbine</b>	Specific consumption reduction	0.2	0.35	1.84
<b>Heat Recovery on Furnaces</b>	1.7	0.4	0.3	0.75

*Natural gas use reduction of 1-10 mln m<sup>3</sup> per year per project*

Current Project:  
Ukraine Industrial EE Initiative (UIEEI)



### **Western ESCO Trade Mission**

- Bring western ESCOs to Ukraine and introduce them to prospective Ukrainian counterparts including energy service companies and industrial companies
- Facilitate establishment of partnerships
- Facilitate identification of ideas and initiation of Global Development Alliance (GDA) proposals (USAID grant mechanism)

## Designing energy efficiency (EE) projects – *continued*



- Water supply networks: Watergy
  - Institutional: Set up energy management staff and infrastructure within the City government and/or municipal water company.
  - Technical: Metering, leak detection and repair, piping improvements, motor/drive replacements and other low-cost options

*Fortaleza (Brazil); Veracruz (Mexico); Emfuleni and Soweto (South Africa); Karnataka, Vishakhapatnam and Vizianagaram (India)*



## Watergy



...is a program developed by the Alliance that helps cities manage water and wastewater efficiently, saving energy, water and money.

### WHY IS THIS IMPORTANT?

- ✓ Every liter of water that passes through a system has a significant energy cost, compounded by the money invested to produce it.
- ✓ Water sector efficiency leaves more funds for crucial and often under-funded public services.
- ✓ Water supplied that is lost in developing countries : 1/3 to 1/2

### IT IS COST EFFECTIVE

- ✓ Rapid Payback: generally ranges from immediate to 2 years
- ✓ Huge Savings: at least 20% shaved from energy costs; much higher possible
- ✓ Reduces the need for new infrastructure



## Public-Private Partnerships in Watergy



### Private-sector Partners

- Introduce and demonstrate appropriate technologies.
- Provide training in installation and maintenance of those technologies, and guidance in monitoring results.
- Assist with financing.

### The Alliance to Save Energy

- Raises awareness about “watergy” needs, opportunities, and results.
- Brings public and private sector partners together to address those needs and opportunities.
- Provides ongoing technical assistance to public-sector partners.
- Ensures appropriate public participation.

### *Buy pumps based on efficiency, not purchase price!*

Of a pump's total cost over its **lifetime**:

- ✓ 3% is for purchase
- ✓ 74% is for energy

A more efficient pump also has lower maintenance & downtime costs.

### *Typical ENERGY SAVINGS in a total pumping system:*

- ① **SIZE** – proper matching of pump size to load: **10% – 30%**
- ② **SPEED** – variable speed drives adjust as needed: **5% – 50%**
- ③ Know your **SYSTEM REQUIREMENTS** –  
don't pump more flow and pressure than needed: **5% – 20%**

## EE through LEAK DETECTION: Cetinje, Montenegro



### PROBLEMS:

- ① huge water losses (only 1/3 reached end users)
- ② sporadic service (only a few hours per day)
- ③ poor system management & metering; inadequate skills
- ④ insufficient billing & collection; utility owed ~1€ million

### PROJECT:

- ✓ Detection and repair of water leaks (including training).
- ✓ Hydraulic model developed to analyze network's problems

### RESULTS:

- ➔ Utility's water losses and electricity costs reduced by >30%
- ➔ Service is 24/7 for the first time in 10 years!
- ➔ Payment collection now 46% from 22%



## Performance Contract Financing: Emfuleni, South Africa



### Energy Service Company (ESCO) Model of Shared Savings & Risk Reward Applied to Water

#### PROJECT

- ✓ **Water pressure management firm** acting as ESCO
- ✓ Build-Own-Operate-Transfer to municipality after 5 years
- ✓ Fees: **firm** gets 20% of savings
- ✓ Payback period: **3 months!**

#### ALLIANCE ROLE

- Generated the idea for the project; convinced municipality
- Wrote RFP, putting responsibility on bidders to find funding
- **Served as a trusted third party** to help negotiate contract



## Recovering Water Revenue: Soweto Township Johannesburg, South Africa



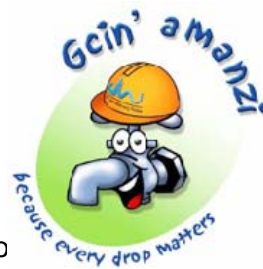
### Water Pre-Payment

#### PROJECT

- ✓ Fix residents' plumbing for free
- ✓ Install water meter
- ✓ Sell them their pre-payment card

#### RESULTS

- ➔ Acceptance of pre-payment at 98%!
- ➔ Water pumped per household went from **70 000** L/month to **11 000** L/month



- Water and energy saved
- Money saved
- Improved quality and reliability of water and wastewater services
- Reduced customer complaints
- Improved payment discipline
- Led to investments in EE technologies
- Replication of projects
- Increased number of customers connected to and receiving reliable water and wastewater service
- Improvements in local economy



## Moldova: Successes

- **Heat Sector Reform**
- Streamlining and supporting HOA legal reform efforts on *Housing Law, Law on Condominiums, Government Decree on Communal Services, etc*
- **Chisinau, Balti, Ungheni:** Partnerships with Municipal Councils for Home Owners Associations (HOA)
- TA to Government on creation of a *Revolving fund for financing energy efficiency and renewable energy projects.*
- Created the *Moldovan HOAs' Coalition*
- *Guidelines for Building Managers* under development
- *Energy Efficiency advice booklets*



## Moldova: Successes – *cont'd*



Low-cost weatherization and demand-side management measures implemented in:

- Telecommunications College
- School No. 95 and No. 83
- Boarding school No. 2
- 14 schools throughout Moldova

***Result: providing warm heating environment (+20°C instead of previous -3°C) for over 2700 students in Chisinau and 6000 in Moldovan regions.***



**New, Efficient window**

## Recommendations: Accelerating the Market for Energy Efficiency



Provide legal enabling environment for energy efficiency

- Developing EE standards, building energy codes, auditing and certification procedures, incentives for EE investments
- Developing financing mechanisms
- Promote government EE and RES programs;
- Increase technical capacity of municipalities for creating energy accounting databases and establishing energy management systems;
- Spur EE retrofit models for municipal and residential end-users, etc.
- Launch a nation-wide energy efficiency education campaigns (for schools, final consumers, universities)

## Recommendations: Promotion of Renewable Energy



- Mapping and assessment of renewable energy (RE) resources
- Development of Portfolio Standards
- Net metering of autonomous renewable energy generation
- Favorable feed-in tariffs for renewable energy
- Fiscal incentives to encourage EE and RES
  - Tax incentives (E.g. low-rate or extended VAT on technologies), customs exemptions on EE equipment, soft lending mechanisms, master planning RE resources, etc.;
- Technology transfer
- Technical assistance for feasibility studies, project development, business planning

## Recommendations: Continued reform in heat sector



- Continue heat sector legal and regulatory reform
- Strengthen local energy planning and enforcement of municipal heat plans
- Transforming ownership of heating assets, opening the heat sector to private participation
- Promoting metering and DSM measures
- Reforming heat pricing system to eliminate price distortions
- Replacing heat subsidies with targeted heat aids and EE assistance
- Promoting energy efficiency services market and ESCOs
- Integrating environmental considerations and promotion of renewable energy sources into heat sector investments and modernization
- Promoting the role HOAs in heat supply and management

For more Information contact:



Alliance to Save Energy

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