Konrad Adenauer Stiftung

SOUTH CAUCASUS ENERGY FORUM

ENERGY EFFICIENCY IN THE SOUTH CAUCASUS

REGIONAL FORUM

18-19 May 2013

Sheraton Batumi Hotel, Batumi, Georgia

Konrad
Adenauer
Stiftung

Konrad-Adenauer-Stiftung (KAS) is a political foundation of the Federal Republic of Germany. Democracy, peace and justice are the basic principles underlying the activities of KAS at home as well as abroad. The Foundation's Regional Program South Caucasus conducts projects aiming at: Strengthening democratization processes, Promoting political participation of the people, Supporting social justice and sustainable economic development, Promoting peaceful conflict resolution, Supporting the region's rapprochement with European structures.

The Regional Environmental Centre for the Caucasus (REC Caucasus) is an independent, non-for-profit organisation, established to assist in solving environmental problems as well as development of the civic society in the countries of the South Caucasus.

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CONTENT

THE SOUTH CAUCASUS REGIONAL ENERGY FORUM

The pubication on hand is the compilation of presentations, working papers and reccomendations adopted during the second regional forum on 18-19 May, 2013 in Batumi, Georgia.

In 2012 Konrad-Adenauer-Stiftung in cooperation with the Regional Environmental centre for the South Caucasus established the South Caucasus Energy Forum. Representatives of government, Think Tanks, international organisations and NGOs from Armenia, Azerbaijan and Georgia are engaged in the forum.

South Caucasus Regional Energy Forum concentrates its efforts on promoting sustainable energy development and contributes towards the convergence of countries of the South Caucasus region, hence lead to implementation of sustainable development goals, set out in the document "The Future We Want", adopted by governments during Rio+20, United Nations Conference on Sustainable Development, held on June 20-22, 2012 in Rio de Janeiro.

The South Caucasus Regional Energy Forum itends to:

1. Serve as an instrument for South Caucasus region to launch national and regional initiatives/projects, including the preparation of international meetings in the region to review energy priorities;

2. Strengthen information and observation capacity, in order to provide reliable and relevant information on the state of the sustainable energy development as a basis for improved policymaking and public awareness, and use indicators to assess progress as appropriate;

3. Consider the need for and develop, as appropriate, recommendations, methodologies and guidelines for promotion development of sustainable energy;

4. Develop and support international activities which promote development of sustainable energy in the region;

5. Promote implementation of policy and economic instruments and tools for strengthening the capabilities of countries through technical assistance, advisory missions and capacity-building;

6. Assist South Caucasus countries, as necessary to integrate sustainable energy considerations into other policies and to use indicators to assess progress as appropriate;

7. Contribute to South Caucasus region's implementation of the energy pillar of sustainable development;

8. Regularly review its programme of work to ensure the coherence of its activities with the overall objectives of Konrad Adenauer Foundation and REC Caucasus, herein Secretariat;

9. Facilitate coordination between energy-related programmes initiated by Governments and the European Union; cooperate with other international organizations and with other relevant bodies, including financing institutions, to avoid duplication of work and enhance synergies.

ARMENIA

FINANCING OF ENERGY EFFICIENCY IN THE PUBLIC FACILITIES

Ms. Tamara Babayan
Executive Director
Renewable Resources and Energy Efficiency Fund

R2E2 Fund
Facilitate investments in Renewable Energy and Energy Efficiency sphere in Armenia

- Established in 2005 by GOA following the Law on Energy Efficiency and Renewable Energy
- Mission – facilitate investments in EE&RE area
- Objective – create financing mechanism for EE&RE
- Portfolio of implemented projects >$40mln.

R2E2 Fund - organizational structure

- Board of Trustees
- Director
- Administration
- Financial
- Procurement
- Legal

Our activities

- Policy development support
- Legal regulatory improvement proposals aimed to market development
- Support to new production and services busting EE&RE sector

- Training and capacity building activities for ESCOs and financial institutions
- Public awareness activities
- Project Management Services in Energy Sector - From initiation to post project monitoring
- Revolving funding mechanism (through banks)
- Direct lending activities for pilot projects
- Trainings

Surveys and studies to facilitate investments in RE and EE fields (SHPP scheme; PV production, Bio-ethanol production; Wind power, etc)

Energy Efficiency Project

- Objective – Reduce energy consumption in public buildings
- WB/GEF Grant - $1,8mln.
- GOA - $8mln.
- Beneficiaries – public and municipal agencies
- Typical ESMs – Insulation of walls and roofs, replacement of windows, replacement of street lighting system

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
- Annual savings are 10-70% dependent on envelope
- Gas tariff increase causes comfort level decline (area, days, temperature)
- The school financing per student does not reflect tariff changes
- Energy savings are left to the public agency
- Grants are limited and not sustainable
- Loans are not provided to this type of organizations

Financing Mechanism for Energy Efficiency Project

- R2E2 Fund
- Loan
- PA project assessment, EA, accurate baseline identification, M&V protocol, O&M contract with the same contractor
- Energy services
- Tariff increase,
- Tariff structure,
- Budget constrains,
- Comfort increase
- Project assessment, EA, baseline, M&V
- O&M contract with ESCO
- Escrow account for payments to R2E2, gas, electricity suppliers

Some activities under the recommended mechanism

Loan:

- Applications from PA and municipalities
- Screening for Eligibility
- Walk-through energy audit
- Due diligence
- ESM Project Agreement (intention & mechanism)
- Procurement of EE measures– WB rules

- Loan agreement with repayment schedule
- M&V
- Annual adjustment of savings

Energy services:

- Application from PA and/or municipalities
- Screening for Eligibility
- Walk-through energy audit
- Due diligence
- ESM Project Agreement (intention & mechanism)
- Procurement of EE measures– WB rules
- Single source contracting with R2E2 Fund for energy services with extended payment period
- M&V
- Energy payments to escrow account for payments to R2E2 fund, gas, electricity suppliers

Other Risk Reduction Measures

- The loan shall be reflected in the municipal budget which is obligatory for implementation
- Procurement based on outputs
- Payment based on performance

Procurement Scheme

- Combined design & output-based CW contract with performance-based payments)
- Project is defined by minimum level of energy savings based on preliminary energy audit
- Bidder must bid on design, construction and O&M
- 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

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

Pilot projects – Orphan boarding school in Gavar

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

Next Steps

- Testing the Energy Service Agreements
- Testing the procurement mechanism and possibility to adapt to the municipalities procedures
- Building capacity of the construction and ESCO contractors
- Information campaign
- NEEAP preparation
- Legal regulatory improvements

LEGAL AND TECHNICAL FRAMEWORK OF URBAN PLANNING IN TERMS OF ENERGY EFFICIENCY IN ARMENIA

Mr. Arsen Karapetyan
National Expert on Building Regulations and Standards.
"Development Solutions Institute" Foundation

Energy efficiency potential in the Republic of Armenia;

40% potential of energy efficiency in buildings, 402,000 tons of oil equivalent per year or reduction of greenhouse gas emissions by 944.000 tons of CO2 emissions annually.

Regulatory, technical and legal framework of urban development (1)

Legislation:

- On Legal Acts
- On Construction
- On Standardization
- On Conformity Assessment

The system of normative and technical documents:

- Building codes and regulations, and SNIP (Building Rules and Regulations) guidelines
- Localized interstate building standards of the CIS
- National Standards
- Localized international and European standards

Regulatory, technical and legal terrain of urban development (2)
Intergovernmental Agreements of the CIS:

- "Intergovernmental Agreement on Cooperation in Construction Activity "(9 September, 1994).
- Intergovernmental Agreement "On Introduction of Coherent Policy on Standardization, Metrology and Certification "(13 March, 1992).

Agreement on Partnership and Cooperation Between the Republic of Armenia and European communities and their member-states

RA Government Enactments in Urban Development Sphere, Related to Energy Efficiency

- A concept of system of legal and technical documents on urban development (06.05.2010.)
- 2011- 2013 Priority program of compliance of the existing urban development norms with European standards (30.01.2011.)
- Renewable Energy and Energy Efficiency National Program (2007)
- Action Plan of the Government of Armenia for implementation of Renewable Energy and Energy Efficiency National Program (04.11.2010)

Ongoing work on improvement of urban sector

- Draft technical regulation - "Security of buildings, facilities, building materials and products (UNDP-GEF) has been developed.
- A bill on amendments to the Law On Renewable Energy and Energy Efficiency and the Law On Urban Development (UNDP- GEF) has been elaborated.
- European and international standards are being harmonized.
- Statute of the Ministry of Urban Development has been amended with draft's assistance, setting functions in the sphere of energy-efficient urban development.
- A uniform comprehensive list of legal acts of the energy sector, subject to harmonization under the draft EU-Armenia Association Agreement, has been adopted.

- Directive 2010/31/EU of the European Parliament and of the Council of 19 May, 2010, on the energy performance of buildings.

Conclusions and recommendations

Lack of clear and direct energy efficiency requirements in legal acts (laws, regulations on development of urban planning documents, etc.)

Inflexibility of SNIP (Building Rules and Regulations) and standards (e.g. SNIP for building envelope thermal physics) to modern requirements of building energy consumption planning and new thermal insulation materials and technologies.

Defective fulfillment of SNIP requirements for building envelope thermal physics by developers, designers and project auditors.

Public agencies' poor control over fulfillment of building code requirements. To periodically analyze the performance of regulatory technical documents and statutory instruments and to develop corresponding improvement guidelines.

To adopt new legal acts and normative technical documents (such as laws, technical regulations, standards) on setting specific requirements for energy efficiency of buildings, as well as on increasing fulfillment of those requirements.

To strengthen the structures of the Ministry of Urban Development for elaboration of regulatory and technical documents and legal acts, as well as for monitoring of fulfillment of their requirements (technical assistance, trainings, etc.).

To raise the awareness and skills of the parties concerned.

ENERGY AUDIT OF PILOT BUILDING AS A TOOL FOR PROMOTING CONSTRUCTION OF ENERGY EFFICIEN BUILDINGS

Mr. Artur Tsugunyan
UNDP
Expert on energy audit and evaluation potential for energy efficiency

PROJECT COMPONENTS

Development and implementation of new building codes and standards for energy-efficient construction.

- QA / QC testing and certification of materials and energy efficiency equipment. Technical assistance to project partner laboratories.
- Awareness-raising and educational programs on EE design and integrated building design approach (IBDA).
- Demonstration of the benefits of IBDA and energy-efficient building design. Monitoring and assessment.

PILOT PROJECTS

- Purpose: To demonstrate the benefits of energy-efficient building design, energy efficiency potential and cost-effectiveness.
- New apartment building with funding from the budget, selected at the design stage as a valid model of the building
- UNDP covers the expenses for extra measures to improve energy efficiency of pilot
- buildings.

PILOT BUILDING
In Goris, Syunik region

The main technical parameters of the building

- Year of construction - 2012
- Number of floors - 3

- Number of entrances - 2
- Building volume - 2437 m3
- Height - 9 m
- Total area of buildings - 812 m2
- Residential area - 557 m2
- Number of apartments - 20
- Building envelope total area - 1438 m2
- Central heating and hot water at home is powered by two gas boilers installed in the house attic.

EE measures in Goris Apartment building

- Cladding exterior walls from the inside with 60mm polyurethane heat-insulation layer, followed by light-aggregate 100mm blocks and inner plaster;
- Insulation of flooring of the ground floor and the upper floor ceiling with 40mm polyurethane layer, followed by 40mm thick cement mortar;
- Replacing windows provided in reference design and exterior doors with energy efficient windows and doors.
- Insulation of exterior reinforced concrete balcony slabs with 20 mm polyurethane layer, with cement mortar fixing;
- Replacing incandescent lamps with energy-efficient compact fluorescent lamps. Installation of motion detectors.
- Installation of window air inlets and heat allocators.

OBJECTIVE AND METHODOLOGY

The goal of conducted energy audit:
Confirmation of reduction of GHG emissions and thermal energy costs as a result of measures aimed at improving energy efficiency in design and construction of new buildings.

Following measures have been taken:

- Data collection;
- Drafting of building technical certificate;
- Instrumental measurement of parameters;
- Analysis of energy performance of the building;
- Filling out building energy performance certificate
- Building energy efficiency rating
- Drawing conclusions, generalization of the results
- Drafting of energy audit report

Lab testing of heat-insulation materials

- During the construction of the building, heat-insulation layer samples of walls and floors of the building were taken for lab and thermal performance testing.
- Thermal performance of these samples was also tested at RF NIISF (SRIBP- Scientific-Research Institute of Building Physics).

Sample Name	Density kg/m3	Heat transfer coefficient W/m2 ° C
Polyurethane (samplew taken from the wall)	36	0.0306
Polyurethane (sample taken from the floor of the ground floor)	30	0.0280

Average temperature data

Premise	Volume, m3	The average temperature, ° C	
		Actual	Standard
Apartments	2095.6	+19.8	+20
Stairwells	422.4	+16.1	+16
Event Hall	221.3	+17.1	-
Cellars	433.4	+10.9	+12
Tambour	24.5	+10.5	-
Outdoor air		+6.1	+2.4

RESULTS AND CONCLUSIONS

Audit-based building energy performance certificate has been drafted.

- Application of energy efficient technologies in design and construction of buildings has 2.8 times improved thermal energy estimated specific flow characteristics for heating and ventilation of the building, at the expense of which the building comfort level (compared to standard) has made 95.5%.
- Building energy efficiency class
  - Rose from "E" to "C" (MCH 24-01-2011 "Building Heat-Insulation ")
  - Rose from the "G" to "C" (in EN 15217:2007 "Energy efficiency in buildings. Methods of expressing energy performance of buildings ")
- Coefficients of building envelope reduced total thermal resistance meet the existing standards of the RA.
- Energy saving of primary fuel for heating the buildings is about 62%, or about 109,000 kWh per year.
- Reduction of GHG emissions is 25 tons per year.

For more objective and reliable information, it is necessary to continue monitoring of the building during the heating period 2013-2014, because:

- For more than 25 years, the apartment building residents used to live in temporary housing, heated mostly using electric heaters and wood stoves.
- Residents do not have any experience of operating energy-efficient apartment buildings (adjustment of heating system and window air inlets; optimal heating of common areas; use of tambours etc.)
- Monitoring was conducted during the first year of operation of the building.
- Building window and balcony door gaps of were adjusted after conducting the monitoring.
- During the heating season 2012-2013, the average outdoor air temperature in Goris was significantly higher than the calculated values.
- It is necessary to rationalize the events hall heating (heat the area

only when necessary.) Thus it will be possible to cut energy consumption in the building by 18%.
- Separate hot&cold water and electricity meters shall be installed in common areas (stairwells, laundry rooms, boiler rooms).

EXPERIENCE OF PARTNERSHIP WITH PRIVATE SECTOR AND SPECIALIZED TRAINING AND DESIGN ENGINEERING ORGANIZATIONS IN PROMOTING ENERGY-EFFICIENT DESIGN PRINCIPLES

Mr.Vahram Jalayan
Project Manager, UNDP

PROJECT COMPONENTS

- Development and implementation of new building codes and standards for energy-efficient construction.
- QA / QC testing and certification of energy-efficiency materials and equipment. Technical assistance to the project partner laboratories.
- Awareness-raising and educational programs on energy-efficient design and integrated building design approach (IBDA).
- Demonstration of the benefits of IBDA and energy-efficient building design. Monitoring and assessment.

TESTING AND CERTIFICATION OF EE MATERIALS AND EQUIPMENT. TECHNICAL ASSISTANCE TO THE PROJECT PARTNER LABORATORIES

- Sampling testing and certification of local insulation materials and products
- Support to local laboratories and certification bodies in personnel retraining, provision of technical equipment and measurement devices.

TESTING AND CERTIFICATION OF HEAT- INSULATION PRODUCTS

- The project has organized testing of 6 types of locally produced heat-insulation materials at Moscow-based NIISF Building Physics Laboratory (SRIBP- Scientific-Research Institute of Building Physics).
- Conformity certificates have been prepared by StroyCertificate (Building Certificate) Company and granted to 3 local producers of heat-insulation materials based on test results, as part of co-operation with "Improving Energy Efficiency in Buildings " project;
- Specifications and standards for further certification for 3 more producers are currently being developed as part of the project in cooperation with the National Standards Institute.

Density and thermal conductivity

Materials	**Characteristics of the materials in dry state**			
	density kg/m3		**Thermal conductivity, W / m × K**	
	According to test results	*According to the GOST*	*According to test results*	*According to the GOST*
Mineral wool GOST 4640-93	78,5	Not more than 80 for „A"-type SC	0,037	0,045
Polystyrene slabs GOST 15588-86	35,3	From 35.1 to 50.0 for the highest quality category grade „50"	0,040	0,040
Expanded perlite GOST 10832-91	126,3	More than 100 + 150 inclusive	0,056	0,058

Materials	Characteristics of the materials in dry state			
	density kg/m3		Thermal conductivity, W / m × K	
	According to test results	*According to the GOST*	*According to test results*	*According to the GOST*
Slabs of expanded perlite on silicate binder ArmSt 197 – 2000	228,2	Not more than 250	0,072	0,065
perlite concrete GOST 25820-2000	689,3	700 for grade D700	0,134	0.14 (SP 23 - 101-2004)
Foam plastic slabs GOST 20916-87	12,4	Not more than 50 for (first) quality category grade „50"	0,049	0,041
Two-component polyurethane „Elastopor" 1612/20	41,4	not less than 40	0,029	0,029 (СП 23 101 2004)

Water absorption

Materials	Density kg/m3	Water absorption,%		
according to the results of test		according to GOST		
(volume)	*(by weight)*			
Polystyrene slabs GOST 15588-86	35,4	0,6	18,2	Not more than 2.0 in volume (GOST 15588-86)
Slabs of expanded perlite on silicate binder ArmSt 197 - 2000	226,8	47,2	211,3	
perlite concrete GOST 25820-2000	664 8	34 0	51 1	

WHAT HAS BEEN DONE WITHIN THE FRAMEWORK OF THE RPOJECT

Assessment of existing test laboratories and choosing 3 partner laboratories

- Organization of advanced training for partner lab staff at NIISF (SRIBP- Scientific-Research Institute of Building Physics) Laboratory, Moscow
- Procurement and provision of modern equipment to the local laboratory
- Testing and certification of locally produced heat-insulation materials
- Development of specifications for producers

Procured devices:
PIT- 2,1
ITP-MG4 "100"

Advanced training for lab specialists at NIISF

AWARENESS-RAISING AND EDUCATIONAL PROGRAMS

- Industry Professionals
  - Designers
  - Engineers
  - Analysts
- Specialized higher education institution teachers/instructors
- Students, postgraduate students
- Producers

EDUCATION / TRAINING

- Certification of Building Materials
- Testing of materials and structures
- Building heat insulation
- Sound insulation
- Passive buildings
- IBDA principle

Several trainings and workshops have been conducted, including:

- Seminar on certification of materials
- Training workshop on testing building materials
- SNIP (Building Rules and Regulations)
  Seminar on building heat-insulation
- Lab staff training at NIISF Laboratory (Moscow)

PROJECT TARGET AUDIENCE

- General public
- Authorities pursuing public policy in this sector

- Architectural / Design Engineering Organizations
- Real Estate Agents
- Relevant Higher Education Institutions
- Field Experts

DOCUMENTARIES AND PUBLIC SERVICE ADS

- Two documentaries about energy efficiency, in general, and a pilot building, in particular, have been shot
- Series of three public service ad clips on energy efficiency in buildings have been prepared and broadcasted.

AZERBAIJAN

ANALYSIS OF LEGAL BASIS IN AZERBAIJAN

Mr. Fagan Abdurahmanov
Investments and Project Management Department, State Agency on Alternative and Renewable Energy Sources of the Republic of Azerbaijan

Energy conservation in electric power industry can be achieved through decommissioning of obsolete equipment and its replacement by new, high-performance equipment; construction and commissioning of high and low-capacity power plants; construction of new substations and power transmission lines, as well as raising efficiency of the sector. Rough calculations show, that the volume of energy consumption can be reduced by 20 - 25%. Funds amounting to EUR250 million have been allocated to improve power distribution network in Baku. Following steps have been taken for solving these problems:

- Since 2010, only natural gas has been used instead of fuel oil for electric power generation;
- Volume of fuel consumption by traditional generation plants dropped from 411 gr. / kWh
  in 2000 to 314 gr. / kWh in 2011; the aim is to further reduce it to 260gr./kWh by 2015;
- development of power transmission line network:
  - Mingechaur - Absheron 220 kV transmission line construction project; funding provided by the Asian Development Bank (US$ 160 million) ;
  - AzGRES - Imishly 330 kV transmission line project; funded by the KfW (EUR30 million);
- Power transmission and distribution losses make approximately 20 -25%; further drop to 10 % will be achieved through modernization of the power supply system;
- Successful implementation of smart-card project in all regions throughout the country.

It is necessary to conduct a mandatory energy expertise of construction and reconstruction of facilities in accordance with Article 3 of the "Law of the Republic of Azerbaijan on Utilization of Energy Resources ".

Implementation of the "Energy-efficient buildings in Azerbaijan, technical assistance and development of institutional infrastructure" project has been launched by the Azerbaijani State Agency for Alternative and Renewable Energy Sources (SAARES) jointly with Norsk Energi (Norway). Project implementation period – May 2011 - April 2014 . This project of technical assistance and development of institutional infrastructure covers the following issue: energy audit; certification and building management; use of renewable energy in buildings; contribution to the development of new regulations and standards in the sphere of energy efficiency and renewable energy in buildings.

In July - December 2011, one of the NGOs implemented the project "Initiative to Improve Energy Efficiency in Settlements" in the framework of the Civil Action for Security and Environment (CASE) program. Project management was carried out by the OSCE Office in Baku; funding was provided by Statoil Co., as well as the governments of Austria, Canada and the United States. Energy audit of 19 commercial enterprises, 12 public buildings and 136 individual farms in 4 settlements was conducted and training was organized as part of the project. The final audit revealed that energy costs for those facilities dropped by 15%.

Each of us can, at the most basic level, take measures to reduce energy consumption at home. Introduction of energy saving technologies at the household level does not require much efforts: just use energy-saving lamps; do not cover batteries with black-out curtains; turn off equipment from the network; put to good use your washing machine; in electric cookers, use exactly the dishes that are specified in the manuals; put a fridge away from battery, etc. These activities are not labor-intensive and easily become a habit, thereby helping to save energy.

MEASURES TO IMPROVE ENERGY EFFICIENCY

Mr. Shamil Movsumov
"Centre for Energy, Ecology and Economy"

The basis for development of each state is its energy security: improvement of energy efficiency, implementation of energy-conservation measures, which is one of the guarantees of this security and a major resource to accelerate economic growth.

Under the Directive 2009/28/EC, known as <20-20-20>, the EU undertakes to reduce, by 2020, the overall greenhouse gas emissions by at least 20% below 1999 levels, to increase up to 20% the share of energy from renewable sources in the total energy consumption and improve energy efficiency of the economy by 20%.

The essence of energy efficiency lies in reduction of energy consumption per unit of produced goods: this implies more efficient use of technological and power engineering equipment in production of various goods.

An individual approach to each consumer shall be applied when determining energy efficiency in the chain - "manufacturer-power network-consumer": that is, knowledge of priorities for reduction of energy consumption; financial cost of energy resources, which is a pre-condition for improving energy efficiency.

The Law on Utilization of Energy Resources of 1996 is the main statutory act in Azerbaijan. The related statutory acts and by-laws do not provide for implementation of this law, which does not allow talking about the existence of effective public policies in the sphere of energy efficiency and energy conservation. It is necessary to elaborate the Law On Energy Saving and Improvement of Energy Efficiency", which should provide legal, economic and organizational basis for promoting energy conservation and improving energy efficiency.

Key Energy Consumers of the Republic (in% s):

Name of consumer	2010	2011
Housing	30.75	29.14
Commerce and public services	18.79	20.10
Energy sector	11.53	11.07
Industry and construction	9.39	9.74

In order to obtain reliable information on energy efficiency and energy conservation indicators, the energy audit of an enterprise is required: analysis of energy consumption measuring and recording tools; energy sources, energy costs and energy balance calculations. Following measures need to be taken for the enterprise: - raising enterprise administration's awareness of the opportunities of modern energy-saving technologies and the impact on their underuse; use of technical measures and investment projects to increase energy efficiency and improve the results of energy saving.

The Republic has no legal framework for banning incandescent lamps and elaborating measures for the implementation of this process. It is necessary to organize awareness-raising work with consumers, especially with general public, on cost efficiency of energy-saving lamps and the rules for handling this product.

Amidst the lack of a streamlined lamp collection and recycling system, mass use of energy-saving lamps, including fluorescent tube lamps, may cause serious damage to human health and environment. Small disadvantages of fluorescent lamps: requires about 2-minute warm-up; not designed for low temperature of 15-20 degrees below zero; frequent switching on and off and voltage fluctuation significantly reduce

its lifespan; cannot be switched on at less than 10% of normal input power.

Bigger disadvantages of fluorescent lamps: each lamp contains 3-5 mg of mercury, in aggregation state, in the form of vapor. If broken or damaged, the fluorescent lamp releases mercury vapor, that can cause serious intoxication: its penetration into the human organism may affect nervous system, kidney and liver.

It is necessary to shift to more advanced technology - production and use of more efficient LED lamps. LEDs consume eight times less energy than incandescent lamps and serve 80 times longer, but they are more expensive (about 100 times) than incandescent lamps.

2012-2020 national strategy on use of alternative and renewable sources has been elaborated in the Republic. It is planned to create 15-50 MW hybrid plants. Studies have been conducted and tariff system proposals have been drafted as part of elaboration of renewable energy development strategy.

It is noteworthy that the problem, the development of renewable energy (including wind power) is facing, has not been settled in the Republic yet. There is a lack of enactments and regulatory documents, as well as alternative and renewable energy laws.

Despite the fact that almost 70% of the overall number of consumers in the housing sector are individual consumers, low-capacity (5-30 kW) wind installations are practically not used to ensure power supply to the consumers in the Republic.

Therefore, the following actions need to be taken:

- Assessment of wind potential at an altitude of 14-18 m and development of country's electronic wind map , which should be available for the public;
- Production of low-capacity wind installations; provision of consulting

and services;
- Activities taken as part of implementation of loan and lease agreements for utilization of these installations.

FRAMEWORK CONDITIONS IN AZERBAIJAN FOR ENERGY CONSERVATION AND ENERGY EFFICIENCY IN BUILDINGS

Pr. Nurmammad Mammadov
International Eco Energy Academy

DYNAMICS OF MACROECONOMIC INDICATORS IN AZERBAIJAN (1995 - 2009)

index	measure-ment	1995	2000	2005	2006	2007	2008	2009
GDP (Gross Domestic Product)	billion U.S.	**2,42**	**5,27**	**13,24**	**20,98**	**33,05**	**46,26**	**50,6**
GDP / per capita	thousands USD	**0,019**	**0,665**	**1,60**	**2,56**	**3,91**	**5,40**	**5,61**
Energy intencity	kWh / USD	n / a	**5,43**	**2,814**	**2,32**	**1,91**	**1,37**	**1,28**
Electric capacitance	kWh / USD	**7,0**	**3,53**	**1,69**	**1,13**	**0,65**	**0,46**	**0,35**
Losses. el.en. / per capita.	kWh / persons	**2,255**	**2,563**	**2,790**	**2,892**	**2,454**	**2,357**	**2,0**

Development of Energy Intensity of GDP in Azerbaijan

Azerbaijan's energy intensity of GDP in PPP (purchasing power parity) in 2010 amounted to 0,130 toe / thousand dollars. The government set target to improve energy efficiency by 20% by 2020. During 2000 - 2009, the energy efficiency ratio increased from 30% to 37.5%, and the loss in power grid - from 15 to 8.5%.

Fuel& Energy Balance of Azerbaijan for 2010, Mln.toe

Index	Extraction (generation)	Import	Export	Change at the expense of stocks	Consumption
Oil	51,14	-	44,73	0,18	6,6
Gas	13,95	-	5,19	0,94	7,82
Nuclear energy	-	-	-	-	-
Water power	0,3	-	-	-	0,3
RES (excluding water power)	-	-	-	-	-
Intern. trade in electric power	-	0,01	0,04	-	0,03
Power - Total	65,39	0,01	49,96	1,12	14,75

According to the IMF, in 2011, Azerbaijan's GDP in PPP made US$ 93.1 billion, that is by 2.2% more as compared to the same period of 2010. In 2011, real GDP growth rate made 0.1% as compared to 2010.

According to the World Bank, in Azerbaijan's GDP structure of 2011, 67% were accounted for industry, 27% - service sector, 6% - agriculture. Mining industry (76%) played an important role in the industrial production sphere. In 2010, revenues from crude oil export sales made 86.5%, oil products - 6%. According to the IEA, primary energy consumption in Azerbaijan in 2010 amounted to 11.8 mln. toe., production - 65.4 mln.toe. Production of energy resources is represented almost exclusively by oil (78.2%) and natural gas (21.3%). Primary energy source consumption also includes natural gas (66.1%) and oil products (31.4%); HPPs have smaller share.

Key Economic and Energy Indicators of Azerbaijan (economics)

Index	Measure Unit	2000	2005	2010	2011
GDP in PPP	US$billion	19,3	38,4	91,0	93,1
GDP per capita in PPP	US$	2372	4456	10059	10202
Real GDP Growth	% against previous year	6,2	26,4	5,0	0,1
Aggregate Investment	% of GDP	20,7	41,5	19,0	21,6

Key economic and energy indicators of Azerbaijan(Oil)

Index	Measure Unit	2000	2005	2010	2011
Stock	billion. ton	0,16	0,96	0,96	0,96
Extraction	million ton	14,0	22,2	50,9	45,1
Consumption	million ton	6,1	5,4	3,6	
Export	million ton	5,6	14,3	44,5	n.d
Import	million ton	-	-	-	n.d
Processing	million ton	8,2	7,9	6,1	n.d

Key economic and energy indicators of Azerbaijan (Gas)

Index	Measure unit	2000	2005	2010	2011
Stock	trillion cub. m.	1,2	1,2	1,3	1,3
Extraction	billion cub. m.	5,9	5,7	16,6	16,4
Consumption	billion cub. m.	6,2	10,0	9,3	9,5
Export	billion cub. m.	-	-	6,2	6,8
Import	billion cub. m.	0,3	4,7	-	-

Key economic and energy indicators of Azerbaijan (Electric power)

Index	Measure unit	2000	2005	2010	2011
Installed capacity	GW	4,9	5,2	6,4	n.d
Generation	billion kWh	18,7	21,2	18,7	n.d
Consumption	billion kWh	19,2	22,4	18,3	n.d
Export	billion kWh	0,4	0,9	0,5	n.d
Import	billion kWh	0,9	2,1	0,1	n.d

The image of the capital is swiftly changing; rundown residential houses are replaced with new cutting-edge buildings. However, unfortunately, it cannot be said that the actions, taken in the country, meet the energy-efficient construction, reconstruction and housing modernization standards.

In March 2013, the volume of commissioned housing in Azerbaijan increased by 9% as against February. According to the data of Fineko / abc.az at Azerbaijan State Statistics Committee, 124.7 thousand m^2 of housing were commissioned in March 2013, as against 114.4 thousand m^2 - in February, 131.2

thousand m^2 - in January 2013, 198.3 thousand m^2 - in December and 250.8 thousand m^2 - in June 2012 (the best index of the last year). In March 2012, the volume of commissioned housing made 83.9 thousand m^2 and the best ever index - 342.5 thousand $m,^2$ was recorded in December 2011.

"370.7 thousand m^2 of housing were commissioned in January-March, 2013, which turned out to be 12% higher than the index of the same period of 2012 (331 thousand m^2), "- reads the report. In 2012, the volume of commissioned housing amounted to 1,757.4 thousand m^2, that is by 8.6% less than in 2011, when 1,922.5 m^2 (+6.8%) were commissioned (an all-time record level). In 2010, housing commissioning made 1.8 million m^2 as against 1,363.3 thousand m^2. in 2009 and 1,556.9 thousand m^2 in 2008. In 2007, 1,425.7 thousand m^2 of housing were commissioned; in 2006 - 1,218.2 thousand m^2. In 2005, the commissioned housing totaled 1,583.5 thousand m^2. Today, the housing deficiency in Baku, taken alone, makes 15 million m^2 and, with the current pace of construction, it will take approximately ten years to settle the housing problem in the country.

However, despite the ongoing construction works, the issue of elaboration of a comprehensive program for development of building energy efficiency is not on agenda. It's high time to actively introduce modern innovations in housing construction, since energy-efficient buildings are fundamental for the formation of country's sustainable energy development. Otherwise, Azerbaijani hydrocarbon riches will be further irrationally used to heat our homes.

EU INTEGRATION

Mr.Kenan Kerimli
Senior Advisor of the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan

Under the relevant state programs, sustainable development measures have been taken in order to settle the environmental problems in accordance with the Millennium Development Goals.

It is a common knowledge, that in recent years, the focus has been made on development of cooperation between the Republic of Azerbaijan and the European Union. EU-Azerbaijan 2007-2012 Action Plan, adopted as part of the European Neighborhood Policy, is a good example of the aforesaid.

In particular, it should be noted that, since 2008, on the European Commission's proposal, the environmental issues have been included in the list of key issues within the EU-Azerbaijan Energy and Transport Subcommission framework.

The work has been carried out to introduce amendments to other regulations, as well as to ensure sustainable development of the energy sector and to mitigate the climate change effect in order to increase the use of alternative energy sources.

In this regard, the State Agency for Alternative and Renewable Energy Sources under the Ministry of Industry and Energy was established under the presidential decree to accelerate consistent and effective implementation of the issues arising from the "State Program on Utilization of Alternative and Renewable Energy Sources in Azerbaijan"

17 project proposals in energy sphere have been registered by the competent designated national authority for Clean Development Mechanisms (CDM).

Yashma 40 MW-capacity wind park project, Sumgait Power Station project, optimization of AzDRES and Balakhany Landfill "waste-to-energy" project (Project 4) have been registered under CDM projects by the Executive Committee of the United Nations Framework Convention on Climate Change (UNFCCC). 4 energy projects are on validation stage. Maps, showing the alternative energy potential, have been developed by the State Agency for Alternative and Renewable Energy Sources in cooperation with the State Land and Cartography Committee.

Projects are being implemented in the country for the development of wind, solar and small hydro power.

Harmonization of the current legislation with international, as well as EU legislation is of great importance for the Republic.

Technical Committee has been established on joint order of the Ministry of Ecology and Natural Resources and the State Committee on Standardization, Metrology and Patents. The Technical Committee comprises officials of the Ministry of Ecology and Natural Resources, Ministry of Health, as well as representatives of non-governmental organizations. Sub-committees on environment, air, water and soil issues have been set up to ensure efficient and effective execution of work. Standards, developed by the sub-committees for 2010-2012, were submitted for approval to the State Committee on Standardization, Metrology and Patents.

From this point, we believe that, the EU-Azerbaijan Association Agreement will further improve the legislation and give opportunities for the European integration.

The environmental issues are widely covered in the mentioned agreement.

However, even after completion of the aforementioned work, it will take much time to implement it, in other words, to adapt country's existing infrastructure, population's lifestyle, activity of plants and enterprise to the requirements of a new legislation.

We, therefore, hope that, the European Union will help the Republic of Azerbaijan and share its relevant experience.

GEORGIA

THE ROLE OF ENERGY EFFICIENCY IMPROVEMENTS IN GLOBAL CLIMATE CHANGE MITIGATION STRATEGIES

Mr. Grigol Lazrievi
Head of the Climate Change Division
Ministry of Environment and Natural Resources Protection of Georgia

Background

Climate change is a critical challenge that our planet is facing. Global climate change is happening and human-caused greenhouse gas (GHG) emissions are a crucial factor. Georgia is highly vulnerable to the climate change – Climate Change-related problems in Georgia are of greatest concern. The collapse of centrally planned economy in the 90s resulted in substantial decrease in GHG emissions in Georgia: GHG emissions in 2006 made only 13 mil tCO2-eq (about 25% of 1990 levels). Economic growth will be definitely accompanied by increase in GHG emissions level. Therefore, it is important to undertake efforts to substantially limit this increase by boosting investments in low-carbon technologies throughout the country.

Energy efficiency and global warming

Enhancing energy efficiency may be one of the most promising and most immediate ways of cutting greenhouse gas emissions. Wasted energy contributes to global warming and higher energy costs. Squeezing the most out of energy resources can save money and have a major impact on the efforts against climate change. Efficient energy use, sometimes simply called energy efficiency, is the goal to reduce the amount of energy required to provide products and services. Energy efficiency is "using less energy to provide the same service".

UNFCCC mechanisms

Energy efficiency improvement leads to less fuel consumption and less GHG emissions. Consequently, energy efficiency related projects are considered as climate change mitigation (GHG emission reduction) projects. The United Nations Framework Convention on Climate Change (UNFCCC) has introduced financial mechanisms to assist developing countries in implementation of Climate Change mitigation projects, including energy efficiency improvement projects.

Clean Development Mechanism

A clean development mechanism (CDM) is defined by the Kyoto Protocol The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation. Under the clean development mechanism:

(a) Parties not included in Annex I will benefit from project activities resulting in certified emission reductions; and

(b) Parties included in Annex I may use the certified emission reductions accruing from such project activities to contribute to compliance with part of their quantified emission limitation and reduction commitments.

Nationally Appropriate Mitigation Actions (NAMA)

Parties to the UNFCCC agreed to "take nationally appropriate mitigation actions in the context of sustainable development, supported and enabled by technology, financing and capacity-building, aimed at achieving a deviation in emissions relative to 'business as usual' emissions in 2020. Two types of NAMAs are considered:

- (1) **Supported** NAMAs are those actions funded by Annex I (developed) nations. These NAMAs will be listed on a UNFCCC regis-

try and are "subject to international measurement, reporting and verification" (MRV) guidelines to be developed under the Convention.

- (2) **Unilateral / Voluntary** – For these NAMAs, a country takes unilateral commitment to take a mitigation action without asking for funding from developed nations. These domestically supported mitigation actions will be subject to domestic MRV in accordance with guidelines to be developed under the UNFCCC.

Principal difference between the CDM and NAMA is that emission reductions generated by the CDM project is transferred (sold) to the developed country (annex 1 Country) while emission reductions achieved by the NAMA is attributed to the developing country (non-annex 1 country).

CDM case study: Natural gas leakage reduction

The project "Leak Reduction in Above Ground Gas Distribution Equipment in the Kaz-Transgaz-Tbilisi Gas Distribution System- Tbilisi, Georgia" is registered as the CDM project (95% of NG is methane - the potent greenhouse gas). 420,000 CERs are already issued and about 1,400,000 CERs will be issued. In addition to the carbon revenues, Kaz-Transgaz has significant benefit avoiding NG losses – during 2.5 years about 29 million m^3 NG losses (costs about 7 million US$) and about 120 million m^3 NG (29 million US$) during the project's total lifetime (10 years).

Another CDM project "Leak Reduction in Above Ground Gas Distribution Equipment in 'Socar Georgia Gas' distribution system, Georgia" is registered in 2013. Expected emission reductions during the project lifetime about 1,000,000 tCO_2eq, avoided NG losses about 58 million m^3 with costs about 14 million US$.

Waste Heat Recovery

Waste Heat Recovery generally refers to capturing waste heat that an industrial site or combustion process is already emitting, and using it to provide useful thermal energy elsewhere in the facility or turning it into clean

electricity or mechanical power. This is an important resource for vastly increasing industrial energy efficiency, improving the competitiveness of the industrial sector, and providing a source of pollution-free energy. Georgia's industrial sector accounts for approximately 16% of all energy used in Georgia, consuming approximately 18.7 TJ (5.2 billion kWh) of energy annually and emitting about 1,680 million tons of carbon dioxide associated with this energy use.

Large consumers of energy are:

Zestaponi Ferroalloy Plant. Annual production 230,000 tones of Sillicomanganese. 1.1 TWh Electricity is consumed. At least 50 GWh heat from combustion exhaust gases can be recovered. Annual GHG emission reductions about 20,000 tCO2

Rustavi metallurgical plant. Annual steel production about 170,000 tones. It is planned to expand production up to 250,000 tones. About 40 GWh heat from combustion exhaust gases can be recovered. Annual GHG emission reductions about 16,000 tCO2.

Waste Heat Recovery. Cement production

"HeidelbergCement Georgia" is the biggest producer of cement in Georgia. The company operates two cement factories, located in Rustavi and Kaspi towns (total production capacity up to 1.6 million ton per year).

GHG abatement measures:

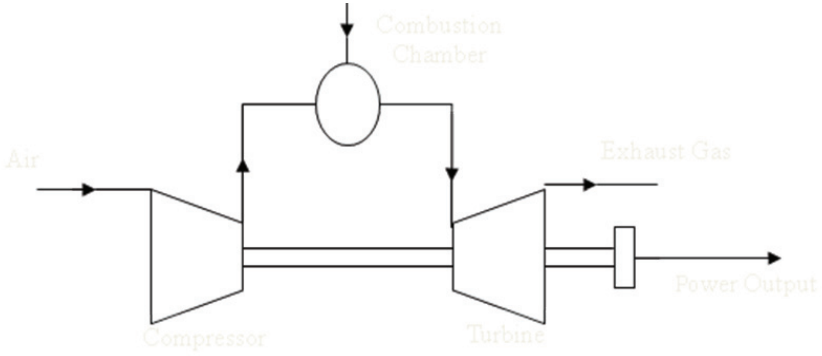
1. Recovery of waste heat contained in the exhaust gases vented (about 3-5% of total heat consumed by kilns).
   Capacity 6-10MW; Generation: 40 - 70 GWh;
   Annual CO2 emission reduction: 15,000-25,000 tCO2
   Investment: about EUR6 – 10 million

2. Using dry process in cement production

In the cement factories today clinker is produced by using quite outdated "wet" method technology. This method uses huge amount of energy, in order to evaporate the water in the prepared blend and achieve calcinations. It is necessary to install new kilns operating on the "dry" method. The new method reduces energy and especially fuel consumption. As a result, significant reduction of CO2 emissions shall be achieved.
Annual CO2 emission reduction: about 180,000 tCO2 Installation of the new kiln requires EUR30-35 million.

Gas turbine

In recent years gas turbines have gained a significant portion of the power generation market, with the vast majority of units running on natural gas.



Air is compressed to a high pressure in the compressor, fuel is added in the combustion chamber, resulting in a high temperature at the turbine inlet; the hot gases are then expanded in the turbine back to atmospheric pressure. The expansion process provides significantly more power than is required by the compressor resulting in a net power which is available to the generator. After leaving the last stage of the turbine, the exhaust gases are either released to the atmosphere or directed through an exhaust system to heat recovery equipment.

Gas turbine

A Simple Cycle Combustion Turbine (SCCT) is a type of gas turbine most frequently used in the power industry. It differs from a combined cycle machine in that it has no provision for waste heat recovery. The most efficient turbines have reached 40% efficiency. The main advantage of an SCCT is the ability to be turned on and off within minutes. In a Combined Cycle Gas Turbine (CCGT), the hot exhaust gases of a gas turbine, or turbines, are used to provide all, or a portion of, the heat source for a heat exchanger to supply a steam turbine. Both the gas and steam turbines drive electrical generators, achieving a greater thermal efficiency than is possible independently. Efficiencies of around 55% are achievable.

Gardabani Simple Cycle Combustion Turbine (SCCT) power plant

Plant capacity is 110MW. In 2006 plant generated 290 GWh. Maximal monthly generation (51 GWh) was reached in October 2006. At least 500 GWh per year is achievable.

Converting a simple cycle thermal generation facility into a combined cycle facility will add about 240 GWh electricity to Georgia's electricity grid avoiding about 135,000 tCO2 emissions (in case of additional 240 GWh is generated by the existing thermal power plants of Georgia).

	Simple cycle Turbine	Combined cycle turbine	Addition
NG Consumption, mil m^3	158	158	–
NCV, MJ/m^3	33.7	33.7	–
Heat content, TJ	5,321	5,321	–
Electricity generation, GWh	500	739.2	239.2
Electricity generation, TJ	1800	2,661	861
Plant efficiency, %	33.8	50.0	16.2

Replacement of incandescent bulbs by Compact Fluorescent Light Bulbs (CFLs)

CFLs can save money, use less energy, reduce GHG emissions.

N°	Parameter	Unit	Value
1	Number of CFLs per household (on average)	pcs	3
2	Number of households	hsh	400,000
3	Total number of CFLs	pcs	1,200,000
4	CFL power	W	12
5	Incandescent lamp power	W	60
6	Power saving per lamp	W	48
7	Power saving in total	MW	57.6
8	CFLs technical lifetime	hr	15,000
9	Lifetime in years	year	7.0
10	Daily utilization hours of CFL	hr	5.87
11	Annual saving of electricity	GWh/year	123
12	Annual saving of electricity per bulb	kWh/year	103
13	Emission factor of the electricity system	kg CO_2eq/ kWh	0.4
14	Emission reduction per year	t CO_2eq	49,371

ENERGY EFFICIENCY IN ENERGY STRATEGY

Ms. Natalia Shatirishvili
Researcher, Energy Studies, World Experience for Georgia (WEG)

Introduction

Absence of state energy strategy

- Lack of staff qualification and capacity of institutions responsible for sector development
- Absence of long term planning
- Uncertainty that slows down inflow of credible investments
- Growing external energy dependence
- Risk to association with Energy Community and EU

Structure of Energy Efficiency Part in Energy Strategy

Common EE indicator: Energy intensity of GDP

- Targets
  - Reduction of energy intensity
  - % reduction of final or primary energy consumption
  - % reduction of energy consumption per sectors
  - Targeted investments per EE measures
- Measures to achieve targets
- Financing (estimated investments and sources of financing)

Energy Efficiency Measures

The most accepted measures:

- Liberalization of energy market (often electricity only) and/or elimination of cross subsidies (UA, BY, RU, US, HR)
- Increase energy efficiency in buildings (BY, UA, DE, TR, AM, MK, CS, EU)
- Development of energy efficient legislative base (RU, HR, MK, BY)
- Standards and labeling (RU, UA, AM, HR, MK, EU)

- Increase population's energy efficiency awareness (UA, RU, DE, TR, HR, EU)

Important Energy Efficiency Measures from Georgian perspective

- Importance of human factor. To bring together the best minds to advance critical energy research and development (US).
- National energy efficiency action plan to provide comprehensive benchmarking on energy efficiency (EU)
- Municipalities and Public sector are important actors in moving towards energy efficiency. (EU, 2020 strategy)

Croatia, Belarus admit their low level of energy efficiency, stating reasons for that helping them to set more realistic targets that correspond to their EE potential

Examples of Financial Schemes

- US: HOMESTAR and GOLDSTAR program to rebate up 50% for buildings upgrade with efficient technologies, tax reduction for commercial buildings upgrade, technical and financial assistance to small and medium size manufacturers.
- Germany: direct grants to small and medium size manufacturers for upgrade of their businesses with energy efficient technologies
- Russia/Ukraine: fines for irrational energy use and some benefits to those manufacturers, who have overachieved energy efficiency standards

Conclusion

- Energy Efficiency should be included in the future energy strategy of Georgia
- Proper estimation of energy efficiency potential should be done.
- Experience of developed and developing countries can serve as a guideline to prepare sound energy strategy for Georgia

- Main reasons for low energy efficiency stated by majority of countries are applicable for Georgia (low level of awareness, inefficient buildings, lack of legislative basis, etc)

EEC ROLE AND ACTIVITIES IN RE AND EE AWARENESS RAISING

Ms. M. Dadiani , L. Garibashvili
Director, Energy Efficiency Center Georgia

Dissemination of EE and RE technologies among population

Energy Bus

- More than 400 villages throughout Georgia;
- 63000 visitors;
- Trainings for 16154 schoolchildren and 1213 teachers;
- 1200 individual consultations;
- 39 TV spots, 6 radio programs, 37 newspaper articles

SHP Development Manual Covering all aspects of developing SHPPs in Georgia

I. Introduction and Assessing Potential SHPP:
Collect data: technical, financial and legal.
Create a pre-proposals using initial pre-approval with Ministry of Energy.

II. Planning and designing
Planning Stage and Designing phase.
Preparing analysis, materials and permits within the four main factors

III. Package SHPP Proposals for Financing
1. Packaging your SHPP Proposals for Financing .Collect all permits and licenses add copies to the business plan as attachments.

2. Complete a SHPP business Plan include all documents as copies and also an EIA, if required.

3. FIND INVESTORS

IV. Final Approvals Before Buildings

1. Guarantee letter from bank/investor
2. Energy Ministry's approval, obtained using guarantee letter.
3. FINAL APPROVALS TO BUILD YOUR SHPP check list:
   a. EIA report and license
   b. SHPP design documents
   c. Obtain construction license
   d. Contract with ESCO
   e. Secure property and waterways

V. Negotiation and Contracting

A successful power plant building demands contracted procedures.
Technical Standards and Tests (FAI)
Contracted Standards

VI. Contracting SHPP

Important parts for projects Implementation and Management.
Time and Budget Control
Construction Monitoring

COMMISSIONNING

Now that your SHPP is built, the final part is to ensure to follow up on the requirements from the Supplier and develop an Operations and Maintenance plan. As well as to work out trouble shooting for full capacity operation.

Project Development Manual
Covering all aspects of developing SHPPs in Georgia

1. SHP basics and initial assessments
2. Pre-feasibility, financial assessments
3. Business planning
4. Agreements and permits
5. Contracting
6. Construction phase
7. Commissioning, operation

http://smallhydrogeorgia.org

Sustainable Energy Action Plans
Energy Saving Initiative in the Building Sector – ESIB

ESIB is a project funded by the European Union within the framework of the INOGATE programme. The INOGATE Programme supports energy policy cooperation between the European Union and the INOGATE Partner Countries. ESIB will be implemented in INOGATE Partner Countries until January 2014. EU-INOGATE funded project ESIB launches cooperation with Energy Efficiency Centre (EEC) Georgia In the framework of the partnership agreement the Energy Efficiency Centre will reinforce and highlight the presence of the ESIB project in Georgia, and, subsequently, in the whole Caucasus region. ESIB will assess the EE in buildings potential in partner countries and provide tools to improve the situation:

High level policy advice;
Operational ad hoc technical assistance;
Capacity building;
Support to demonstration projects;
ESIB expert community platform and knowledge base (on the present site).

SEAPs activities

- Support to Gori municipality to develop SEAP;
- Provision of municipalities with relevant methodologies/software tools and guidelines adapted to Georgian conditions for calculating their baseline CO2emission for SEAP development phase and monitoring during SEAP implementation;
- Training of consultants in Covenant of Mayors related issues;
- Training of municipality employees in energy audit for public buildings

Intelligent Energy Days in Georgia
IEDs for Young Georgian Artists

- Seminars on ESIB project and energy saving initiatives/measures in buildings for young Georgian artists
- Exhibition and awarding of young Georgian artists

Barriers to Energy Savings in Buildings

- Energy Audit Training in Rustavi, Georgia, April 10, 11, 12, 2012.
- Training was implemented in agreement with Rustavi town, where ESIB is going to implement an integrated pilot project; The objective of this training was to let the participant perform the energy audit themselves. Sixteen trainees mainly represented the Energy Efficiency Center, the Municipalities of Rustavi and Tbilisi, and 2 private companies.
- Technical Solutions catalogue, aimed to help specialists carry out Energy Audit, has been also developed by Mrs. Karine Melkadze as part of the ESIB project.

Workshop for journalists in Georgia

A training workshop for journalists on the topic 'Specifics of Highlighting Energy Policy and Energy Efficiency in Buildings in Mass Media' was held for Georgian journalists.
The event was organized by the European Union's project 'Energy Sav-

ing Initiative in the Building Sector in Eastern Europe and Central Asia' (ESIB) within the framework of the INOGATE program and the Delegation of the European Union to Georgia.

The workshop was attended by 16 representatives of Georgian mass media, Tbilisi municipality and Economy Ministry officials, as well as by representatives of public organizations.

Organization of various events

In 2010, EEC Georgia initiated joining the **EU Sustainable Energy Week campaign** and since then, our organization, with the assistance of BP and its partners, has been supporting the events organized as part of the Georgian Sustainable Energy Week.

The following events were organized during the Georgian SEW- 2012: **16-17 June, 2012** –Exhibition of Renewable Energy and Energy Efficient Technologies.

RE and EE Technological exhibitions

Finally, the hypermarket "Goodwill" administration agreed to provide necessary space for exhibition at its branch, located in Kavtaradze St. in Saburatalo". The Exhibition was opened for visitors from 11 a.m. till 5 p.m.. Official opening of the exhibition was held on June 16, 2012,at 11a.m..

Invitees to the exhibition opening were: representatives of BP, the EU Delegation, Ministry of Economy and Sustainable Development, Municipality, NGOs, Mass Media.

17 local suppliers/distributors of RE & EE technologies and 4 schoolchildren - winners of the competition among schoolchildren for the best project idea, who presented working models of their projects, participated in the exhibition. The exhibition hosted about 1540 visitors.

18-22 June, 2012
Exhibition "Sustainable Development in Paintings" and award ceremony of students of faculty of Graphics of Tbilisi State Academy of Arts

Seventeen students from Tbilisi State Academy of Arts, Faculty of Graphics, exhibited 20 thematic posters for competition organized within "Provision of Implementation of Renewable Energy and Energy Efficient Projects", initiated and funded by BP, and co-ventures' in oil and gas business.

22 June, 2012
Exhibition of architecture students' works and award ceremony of the winners of the best project competition

The exhibition of 21 architecture students' works, submitted for participation in the competition "Sustainable Development in Architecture", organized as part of the project "Provision of Implementation of Renewable Energy and Energy Efficient Projects" , initiated and funded by BP and its partner companies in Baku-Tbilisi-Ceyhan, was held at the Georgian Architects' Union, on June 22,2012, at 1 p.m..

Implementation of small-scale demonstration projects
Introduction of Solar Thermal System in SOS Tbilisi Children's Village

On January-June, 2012, "Energy Efficiency Center Georgia", with partnership and financial support of BP Georgia, installed 16 (sixteen) individual (each 300 L capacity) pressurized split solar thermal systems at SOS Tbilisi Village, which decreased the consumption of natural gas used for hot water supply for showers and kitchens, improving living conditions of about 90 persons.

Introduction of Solar Thermal System in Tbilisi Public School #203 for Deaf and Hearing-Impaired Children

A solar thermal system with the total capacity of 2000 L, comprising 10 units of 200 l capacity pressurized integrated system, made of 70 mm diameter super vacuum tubes, 200 l tank and electric heating element, electronic controller to meter thermal energy output, was installed.

Energy Efficient Measures in Tsereteli Kindergarten (Marneuli district, Qvemo Qartli)

The project envisaged the introduction of such energy efficiency measures as replacement of 5 inefficient wood stoves with energy efficient wood stoves; replacement of 50 incandescent light bulbs with CFLs. Implemented energy efficient measures will enable the kindergarten to save about 5 m3 of fire wood and 400 kWh electricity annually and to decrease 5955 kg.CO2 emission.

Energy Efficient Measures in Bebnisi Kindergarten (Qareli district, Shida Qartli)

The following energy efficiency measures were implemented: In two rooms six single glazed windows were replaced with double glazed windows in PVC frames;

- Two entrance doors were replaced with PVC ones;
- Three big window gaps (with the area 16.5m2) were insulated using Knauf insulation materials;
- Three existing inefficient wood stoves were replaced with locally manufactured energy efficient wood stoves;
- In two common areas the floor was insulated with felt supported linoleum.

Implemented energy efficiency measures will significantly improve indoor environment for the children and enable the kindergarten to cut

energy costs – save annually about 4 m3 of fire wood and reduce by 4390 kg the CO2 emissions.

Solar Energy for Qedeli Community

The following energy efficiency measures were implemented in Therapeutic Union for Adults with Mental and Physical Disabilities-Community Qedeli, Sighnaghi, Kakheti: The solar thermal vacuum tube active pressurized system with 400 liter water tank connected with existing hot water supply and heating system, working on natural gas, was constructed in one of the buildings. To ensure outdoor lighting of the community territory by two LED projectors, 50 W capacity micro-solar PV plant was constructed.

Energy Efficiency Measures in Tsalka Kindergarten (Tsalka, Qvemo Qartli)

The implemented project in Tsalka kindergarten envisaged the introduction of such energy efficient measures as replacement of 30 incandescent light bulbs with CFLs , replacement of 4 inefficient wood stoves with efficient ones, weatherization of 18 double pane wooden windows and 5 interior doors and replacement of 3 exterior old wooden doors with PVC ones. The project was completed in January 2013.

Renewable Energy & Energy Efficiency Measures in Gurgeniani Rangers' House (Lagodekhi Protected areas)

The implemented project in Lagodekhi Protected Areas Gurgeniani Rangers' House envisaged provision of the off- grid rangers' house and adjacent territory with clean electricity from the 240 W capacity autonomous micro PV solar plant, weatherization of the windows of rangers' house with additional glazing to reduce heat losses and introduction of energy efficient wood stove. Implemented measures will result in provision of Gurgeniani rangers' house and adjacent territory with electricity for lighting, significant improvement of indoor environment, reduction of energy expenditures – annual saving of about 4 m3

of fire wood and 750 lt. of diesel fuel as well as reduce by 6400 kg. the CO2 emissions.

Energy Efficiency Measures in Zinobioani Kindergarten (Kvareli district, Kakheti)

The implemented project in Zinobiani kindergarten envisaged the implementation of such energy efficient measures as:

- Replacement of thirteen exterior single glazed windows with double glazed windows in PVC frames;
- Replacement of 4 existing inefficient wood stoves with energy efficient wood stoves;
- Replacement if incandescent light bulbs with energy saving compact fluorescent ones

Energy Efficiency Measures in Akhaltskhe kindergarten #6 (Akhaltskhe, Samtskhe-Javakheti)

The implemented project envisaged implementation of such energy efficient measures as:

- Replacement of 5 existing inefficient wood stoves with energy efficient wood stoves;
- Replacement of old single glazed wooden windows (40.5 m2) and 2 external doors (9 m2) in the common rooms;
- Replacement of 20 incandescent light bulbs with CFLs.

WORKING GROUPS AND RECOMMENDATIONS

Recommendations Challenges and future recommendations to accelerate the process of approximation of Energy Policy with EU

- Improvement of existing legal framework, and creation of new legislative acts regulating the EE area (Laws, technical regulations, standards, etc). It includes different sectors, i.e. construction, energy, transport, water, industry, etc);
- Institutional improvement (assignment of responsibilities to existing agencies or establishment of new structures);
- Demand Side Management (energy tariff policy and methodology);
- Improvement of energy statistics (energy balance preparation; short, medium and long-term energy planning);
- Education of EE experts, training and capacity building of engineers;
- Economic incentives for facilitation of investments;
- Development of financing mechanism and instruments;
- Public awareness activities;
- MONITORING (methodology, indicators, responsible agency
- Recommend financing or technical support to implement the items in the action plan;
- Coordination of activities of donor projects to maximize the results;
- Coordination of regional projects.

Recommendations to improve the legal framework:

- to establish a framework for the development of business incubators;
- to create legislative and regulatory framework for business ideas, envisage use of energy efficient technologies;
- to improve the regulatory framework to strengthen public-private partnerships and attract private investment for projects in the energy conservation and energy efficiency sphere;
- to develop a coherent and effective power management and energy efficiency system based on integrated development of infrastructure, education and improvement of energy conservation and energy efficiency; to promote and implement energy management systems;
- to reduce greenhouse gas emissions and strengthen public health

based on emission reduction;
- to significantly reduce the share of energy costs, diminishing the load on payment of electricity supply on the budget system and ensuring competitiveness and financial stability of the economy; to provide high-quality energy services at affordable prices;
- to organize energy conservation and energy efficiency trainings;
- to maintain and expand export potential of energy sources and the revenue side of the federal budget by reducing inefficiencies in energy consumption on the domestic market;
- to apply energy conservation and energy efficiency promotion mechanisms, ensuring revitalization of both, population and business; to realize the potential of energy saving and energy efficiency.

Recommendations for strengthening economic instruments representation of energy-efficient technologies:

- Studying the experience of use of the latest energy efficient technologies in the western European countries (Norway, Sweden, Germany, etc.);
- Exchange of experience (trainings);
- Development of new energy efficiency technologies in relation to the climatic conditions in the South Caucasus;
- Mandatory supervision during construction design (thermal engineering);
- Efficient use of financial mechanisms of the Framework Convention on Climate Change for the development and implementation of projects and implementation of national and regional programs and projects in the field of energy efficiency;
- Incentives for financial institutions providing loans on mutually beneficial terms for EE Projects;
- Development of a mechanism for promoting consumer energy efficiency;
- Organization of regular exhibitions on the latest global energy efficiency technologies in the region;
- Strict enforcement of EE by designing and building;
- Establishment of specialized laboratories for mandatory certification of building and insulation materials for the presence of harmful gases and thermal performance;
- Establishment of regional information network for the South Caucasus.

Photo Gallery


MALAK
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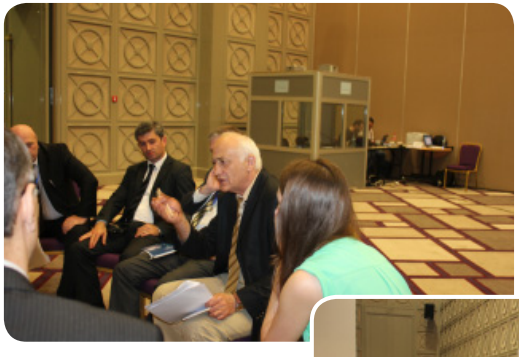
SOUTH CAUCASUS ENERGY FORUM


VUGAR
BAYRAMOV

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