

**"FOR A CLEAN ENVIRONMENT"**  
**FIFTH MEETING OF THE KITAKYUSHU INITIATIVE NETWORK**  
 10-11 February, 2010, Kitakyushu, Japan

**Environment and Energy Efficiency  
 in Public Buildings of Dushanbe City**


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### REPUBLIC OF TAJIKISTAN


**General Information**

Area	143 100 km <sup>2</sup>
Climate	Continental, dry hot summers and cold winters
Topography	93% mountainous
Border	Afghanistan, Uzbekistan, Kyrgyzstan and China
Population	7,5 million
Capital	Dushanbe



**Economic Indicators**

National currency - Somoni, TJS  
 GDP per capita - 772 USD  
 GDP nom. - 5,05 billion USD  
 Average GDP growth rate – 6.8%




### ENERGY RESOURCES OF THE REPUBLIC OF TAJIKISTAN

Most of the electricity is produced by Hydropower Stations

The total installed hydropower capacity is 4 070 MW

Electricity production: up to 17.1 billion kWh


Technical potential for hydro-electricity: 317.82 billion kWh



**Fossil energy resources:**

Potential:  
 4452 million tons of coal  
 8517 billion m<sup>3</sup> of gas  
 117.6 million tons of oil


Present annual exploitation:  
 97.0 thousand tons of coal  
 30.0 million m<sup>3</sup> of Gas  
 21 thousand tons of oil



### ENERGY RESOURCES OF THE REPUBLIC OF TAJIKISTAN

**Renewable energy resources (in toe)**

Resources	Gross capacity	Technical potential	Economic potential
Hydro	179.2	107.4	107.4
Including Small	62.7	20.3	20.3
Solar	4790.6	3.92	1.49
Biomass Energy	4.25	4.25	1.12
Wind Energy	163.0	10.12	5.06
Geothermal	0.045	0.045	0.045
<b>Total (without large hydro)</b>	<b>5020.595</b>	<b>38.635</b>	<b>27.955</b>



### DUSHANBE CITY - THE CAPITAL

Located in the south of the republic and occupies an area of 112 km<sup>2</sup>

Geographically located in a pit (Zerafshan plain)

There are 4 412 apartment houses, 29 453 houses the private sector, 192 educational establishments, 41 healthcare facilities in Dushanbe


State administrative offices include ministries, agencies and others

More than 230 industrial enterprises

Population of the city: >720 000 people

Average annual population growth rate: 2.5%


Electricity consumption of buildings in Dushanbe: 1.2 billion kWh




### HOUSING SECTOR of DUSHANBE CITY

**Characteristics of housing on 01.10.2009.**

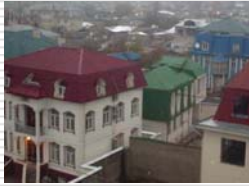
The territory of Dushanbe	km <sup>2</sup>	112
Population	people	722 594
Housing stock (total)	Thousand m <sup>2</sup>	7 515
State	Thousand m <sup>2</sup>	556,7
Individual	Thousand m <sup>2</sup>	6 358,5
The total number of houses	100%	38 581
- private houses	90%	35 167
- multi-storey apartments	10%	3384



Dushanbe – 1960 - 1980



### HOUSING SECTOR OF DUSHANBE CITY



### ENERGY CHARACTERISTICS OF DUSHANBE CITY

The present energy use in buildings is characterized by extremely low efficiency, the use of outdated technologies and equipment, dependence on imported fossil fuels, as well as negative impacts on the environment.

The main source of heat and light is electricity

Electricity consumption -1.2 billion kWh

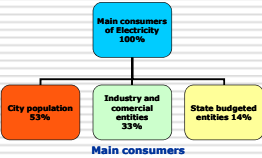
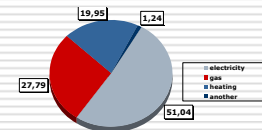
Loss of electricity up to 24%

About 2/3<sup>rd</sup> of the centralized heating system is out of order

Continuous rise in electricity consumption

The use of other natural sources of heat and energy (coal, wood, etc.)

Energy consumption of houses represents more than 53% of the total consumption of the city



### KEY FACTORS for THE NEED TO IMPLEMENT ENERGY EFFICIENCY MEASURES AND ENERGY CONSERVATION IMPROVEMENTS

Energy Efficiency:

- Mechanism of Efficient use of energy

- Ensure energy Security of the city

- Reduce energy consumption, the loss of heat and power in Existing residential buildings

- Improve Ecology and Environment of the city

- Raise public awareness of the importance of energy conservation and Environment

Emissions of harmful pollutants  
Dushanbe city

№№№	Years	Dushanbe city (x1000tons)
1	1998	1.4
2	1999	1.5
3	2000	1.2
4	2001	1.4
5	2002	1.2
6	2003	1.4
7	2004	4.7
8	2005	2.0
9	2006	2.5
10	2007	3.2
11	2008	1.2

### THE POTENTIAL OF ENERGY SAVING IN HOUSING SECTOR

The existing potential for energy savings in housing and communal services in the city of Dushanbe is estimated at about 30-35% of current energy consumption

#### WAYS TO IMPROVE ENERGY EFFICIENCY

- Design and implement measures to upgrade the thermal protection in residential buildings.
- Use of alternative and renewable sources of energy.
- Inform and educate/train people to conserve energy.



### EXAMPLE OF CALCULATIONS WITH A HOUSE BUILDING

Proposed improvement measures in the existing building:

1. Thermal insulation of external walls (using Polystyrene)
2. Replacement of poor quality single-glazed wooden windows by double-glazed plastic windows
3. Installation of automatic system for controlling the heating system according to the need



### EXAMPLE OF CALCULATIONS WITH A HOUSE BUILDING

Results of simulation carried out on the existing building:

1. Electricity saving through the proposed improvement measures: Around 50% savings (*mainly from walls insulation and temperature control system*)
2. Saving in energy bill (for the tenants): Also 50%
3. Payback period of the investment on retrofits: Around 2 years



### FINANCIAL MECHANISMS

1. Encourage organizations to manage cost-effective resource-saving measures in the housing sector (tax breaks, exemption from VAT, etc.)
2. Encourage the implementation of investment-based (capital-intensive) energy conservation projects at the government level
3. Facilitate interest-free long-term loans through banks for construction and rehabilitation of energy efficient residential buildings
4. Lower the rate of payment of energy for consumers with low energy consumption
5. Exempt imported energy-efficient equipment of custom duty

### SUMMARY RECOMMENDATIONS

1. Create a Center to promote Energy Efficiency among public organizations and private entrepreneurs, as well as individuals for the implementation of energy saving projects.
2. Conduct energy audits, draft and approve local energy conservation programs and introduce specific energy efficiency measures in order to enhance the action of administrations of cities and districts, ministries, departments and organizations
3. Construct exemplary energy efficient houses in the city and throughout the country to demonstrate to the population the economic attractiveness of energy saving measures and renewable energy sources.
4. Reduce energy loss of existing residential buildings through rehabilitation and introduction of alternative energy sources.
5. Introduce energy certification of existing and planned residential buildings
6. Promote the use of alternative sources of clean energy (renewable energy).
7. Improve legislation in conjunction with specific economic mechanisms to stimulate the introduction of energy saving technologies.

A group of scientists, economists and specialists has been established by the Association of Alumni TTU-TPI to deal with energy efficiency and environmental protection in all areas of the republic.



ECONOMICAL AND SOCIAL  
COMMISSION FOR ASIA AND THE  
PACIFIC  
EDDEDPSKINS



LOCAL STATE EXECUTIVE  
OF DUSHANBE CITY



ASSOCIATIONS OF ALUMNI  
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(TTU - TPI)

### THANK YOU FOR YOUR ATTENTION

In the presentation published materials and report materials of the Association of Alumni TTU-TPI, the materials of UNESCAP and individual scientists and professionals working in the field of research of energy efficiency and environmental protection have been used.

