

## SUMMARY

---

*Energy is central for Tajikistan. It is the main element and the core of country's industry and agriculture and is an integral part of the life support system of the whole society; it is absolutely essential for education, transport and telecommunications. Tajikistan's energy sector is a platform for civilized life of its citizens.*

Tajikistan has one of the world's largest hydropower potential. It is the first country globally in terms of hydropower reserves per territorial unit. At present, hydropower provides more than 90% of the country's energy demand.

However, energy production from hydropower has a seasonal fluctuation in the country. The lowest trend in energy production is evident in autumn and winter period, when the country faces acute energy deficit and has to **dramatically limit electricity supply** that adversely affect economic development, especially in rural areas. In winter electricity is available only for up to 3 hours a day for rural population. Meanwhile, 70% of population living in rural areas uses only 9% (!) out of total energy use. Reliable energy supply is very critical to **ensure the food security and economic development of the country**. Limited access to electricity in rural areas causes **30% damage to agricultural production** and forces the closure of around 850 small and medium enterprises annually.

Energy plays a key role in economic development of Tajikistan. **The share of energy costs in the total volume of the GDP amounts to 60%**. At the same time, due to the lack of its own resources in winter time, Tajikistan has to import expensive fuel from other countries in order to cover 70% of its energy demand. **Every year, the Government of the Republic of Tajikistan allocates more than 300 million USD or 15% of its state budget for the development of the fuel-energy complex.**

**In Tajikistan, by 2030 the following objectives should be attained within the frameworks of the "Sustainable Energy for All":**

1. **Access to energy:** ensure access to regular and reliable electricity to 5.6 million people, living in rural areas of Tajikistan
2. **Energy efficiency:** reduce energy losses up to 10% in power grids and up to 20% in thermal grids, as well as increase the efficiency of energy use in all economic sectors, irrigation systems and final users up to 20% against the baseline
3. **Renewable energy sources:** increase energy production from renewable energy sources up to 20% against the baseline.

In order to achieve them Tajikistan prioritizes the following tasks:

1. Improvement of the policy and regulatory framework and institutional reform of the energy sector, including the establishment of independent regulatory body in the energy sector;
2. Amendment of the tariff policy, ensuring the transparency of the policy-making process and involvement of civil society, vulnerable groups and other users' groups in decision-making;
3. Mobilization of private investments, in particular for the deployment of renewable energy, and development of market relations in the energy sector;
4. Establishment of the National Trust Fund on renewable energy and energy efficiency;
5. Development of the long-term Programme and targeted energy efficient policy in all economic sectors;
6. Development of the domestic technological base and capacities, including manufacturing, operation and maintenance, supplies and equipment for energy sector, technology transfer and know-how;
7. Regional cooperation and partnership in energy sector.

**This report is developed by the interdepartmental working group, which was established by the Ministry of economic development and trade of the Republic of Tajikistan and chaired by Kh. Fakirov, the First Deputy Minister.**

**The interdepartmental working group comprised the following ministers and departments:**

- Ministry of economic development and trade
- Ministry of energy and industry
- Ministry of land reclamation and water resources
- Agency on standardization, metrology, certification and trade inspection under the Government of the Republic of Tajikistan
- OJSC “Barki Tojik”

**The report has been based on the materials of the interdepartmental working group and members of the Association of energy specialists of Tajikistan, including:**

- R. Musaeva, Team-Leader
- A. Abdurakhmanov
- T. Valamat-Zade
- R. Gulov
- Sh. Shabdolov
- J. Juraeva

**The following experts were represented from the Ministry of economic development and trade:**

- S. Khisainov
- A. Latifov

**The consultations with the representatives of the private sector were also held and included:**

- Public Corporation “Systemavtomatika”
- Public Corporation “Pamir Energy”
- LLC “Long Island”, the owner of the sHPP “Panjrud”
- Close Corporation “Energoremont”
- Close Corporation “T-Rank”

**The following public organizations were actively involved in the assessment:**

- Association of Renewable Energy Sources
- National Association of dekhans farms
- National Association of small and medium enterprises
- Subsidiary Branch of the Tajik-Norwegian Centre on sHPP

**Table of content:**

<b>Section 1: Introduction</b> .....	<b>6</b>
1.1. Country overview .....	6
1.2. Situation in the energy sector .....	6
1. Basic socio-economic data .....	6
2. Primary sources of energy .....	6
3. Electricity power sector .....	7
4. Energy demand .....	8
5. Importance of energy sector for the national economy .....	9
6. The Energy strategy .....	9
<b>Chapter 2: The current situation</b> .....	<b>11</b>
2.1 Access to energy .....	11
7. Review and assessment .....	11
8. Sources of thermal energy .....	12
9. Availability of energy resources .....	12
10. Environmental sustainability .....	13
11. Centralized heat supply .....	13
12. Access to energy .....	15
13. Modern sources of energy for industrial consumers .....	15
2.2 Energy efficiency.....	15
14. Review and assessment .....	15
2.3 Renewable energy in SEFA Initiative .....	16
15. Review and assessment .....	16
16. Renewable energy generated for grid .....	16
17. The use of RES for thermal energy .....	17
18. The use of RES for industry .....	17
2.3 Objectives of the SEFA Initiative.....	18
19. Objectives .....	18
<b>Chapter 3: Challenges and opportunities</b> .....	<b>19</b>
3.1 Institutional and policy frameworks .....	19
20. Organizational structure .....	19
21. Strategic goals, programmes and plans .....	20
22. Monitoring system of the national goals .....	21
3.2 Programme and financing .....	22
23. Financing of the energy sector .....	23
3.3 Private investments .....	24
24. Institutional and policy frameworks .....	24
25. Private investments into heat supply .....	25
26. Private investments into hydropower and RES .....	26
3.4 Key gaps and barriers .....	27

## Section I: Introduction

### 1.1 COUNTRY OVERVIEW

#### 1. Basic socio-economic data

Tajikistan is a mountainous and landlocked country. It borders with Afghanistan, China, Kyrgyzstan and Uzbekistan. The population is 7.8 million; in the last ten years, the natural growth rate has been 25%. Since 2000, GDP has grown over 2.5 times, and its average annual increase has been more than 8%. GDP per capita has grown 5.4 times, and in 2011 it amounted to UDS850.

A rather dynamic economic growth in the last 12 years contributed to reducing poverty by nearly half – from 81% in 2000 to 42% in 2011 (Table 1). Despite the progress achieved in recent years, the level of poverty in Tajikistan is still high, and the country remains among the poorest countries of the world.

Table 1: Basic socio-economic indicators

Population in Tajikistan	7.500.000
Residents of rural areas	70%
Population below the poverty line	42,7%
Average number of persons per household	10
Number of vulnerable people	3.500.000
Number of vulnerable households	350.000

Source: Statistics Agency and the Association of Power Engineers, Republic of Tajikistan

The level of inflation during that period also decreased: from 36,5% in 2001 to 6,5% in 2010. However, in 2011, inflation grew again to reach 9.3%. The main factor for the growth of inflation is the global increase in the price of food and imported hydrocarbon fuel. On average, the price of imported oil products has doubled in the last five years and, in many respects, this factor determines the prices in the domestic consumer market which in turn affects the living standards in the country.

The country possesses huge hydropower resources. The perspectives of inexpensive electricity had oriented Tajikistan to the production of aluminum. The prolific, mild climate and lengthy agricultural season along with abundant water resources for irrigation create favorable conditions for cotton farming. Together these factors define the main economic structure of the country.

In 2011 shares of GDP per sector were as follows: agriculture – 23,8%, industry – 12,3%, civil construction – 7,4%, trade – 16,7%, transport – 14,3%, education – 4,5%, healthcare – 2,2%, taxes – 11,8%, and other sectors – 7% (banking services, public administration, communal services).

The national economy essentially depends on external factors. Global fluctuations in the prices of raw materials affect Tajikistan's paying capacity and its budget revenues. In 2011 oil products comprised 14.2% of the total volume of imports. The volumes of export and import of electricity have been insignificant in recent years. The share of electric power in Tajikistan's foreign trade turnover in 2011 was 0.1%, and in the export of goods and services it comprised 0.3%.

*Tajikistan's energy sector plays a very specific role, being the main element and the core of industry and agriculture. It is an integral part of the life support system of society (lighting, cooking, water supply, heating and healthcare), as well as education, transport and telecommunications. Given that the centralized electric power supply covers almost 99% of the country population, Tajikistan's energy sector has become a platform for civilized life.*

## 1.2 SITUATION IN THE ENERGY SECTOR

### 2. Primary sources of energy

The Republic of Tajikistan does not possess any significant explored reserves of oil and natural gas – the main modern sources of energy. The country has large reserves of coal; the main mines are located in remote mountainous areas. Extraction of coal and transportation by road, along with high manufacturing costs, significantly increase the final cost for the population. The fuel and energy balance is presented in the Table below.

Table 2: Fuel and energy balance for Tajikistan (in thousands of tons of the oil equivalent)

	Coal and lignum fossil	Crude oil	Oil products	Natural gas	Nuclear materials	Hydropower	Geothermal, solar, etc.	Combustible renewable sources of energy and wastes	Electricity	Heat	Total *
Production	86	14	0	24	0	1363	0	0	0	0	1487
Import	5	0	524	419	0	0	0	0	456	0	1404
Export	-1	-2	-11	0	0	0	0	0	-380	0	-394
Consumption	90	12	510	443	0	1363	0	0	75	0	2493

As indicated in the Table, **Tajikistan presently imports about 40% of the total volume of energy to cover its needs.** This share will keep growing – mainly due to the increasing demand of oil products for transport. This dependence on energy import adversely impacts the economy and energy security of Tajikistan, as well as the life of its poorest citizens. The constantly rising price of imported fuel and systematic interruptions in supply make them (prices) unaffordable for most citizens, entrepreneurs, enterprises and public institutions.

Table 3: The structure of annual energy reserves in Tajikistan, gross potential

Hydropower	Coal	Oil	Natural gas
179,2	13,35	1,85	0,75

Moreover, Tajikistan is one of the regional and global leaders in hydropower potential. In terms of per capita potential, it is 87.8 thousand kilowatt/hours of electricity per annum, which rates Tajikistan as the second in the world. In terms of per territorial unit potential, it is 3.62 million kilowatt/hour per square kilometer, i.e. the first in the world.

The structure of energy resources shows that Tajikistan has no other alternative than hydropower resources. However, at present, the country uses only 3.5-4% of its total potential.

In the common structure of Tajikistan's electric power resources, the share of hydropower is 90.8%. The energy generated by hydropower plants (HPP) is the most inexpensive among other existing energy sources in Tajikistan.

The country has a significant potential in the use of solar energy, and considerable opportunities in the area of other renewable sources of energy.

Within the framework of the UN Initiative "Sustainable energy for all", Tajikistan's huge hydropower potential could ensure access to inexpensive, renewable and ecologically clean energy for a majority of the population of Tajikistan, as well as for neighboring countries of the region (Afghanistan, Pakistan, India).

- Total potential resources – 527 billion k/w/h (8-th position in the world)
- Technical hydro potential - 317,82 billion k/w/h per annum
- Total potential of small hydropower industry – 184,46 billion k/w/h per annum
- Tajikistan has 4% of the global hydropower potential

### 3. Electric power sector

The total estimated capacity of Tajikistan's energy system is 5190 megawatt, of which 93.9% is generated by hydropower plants. Thermal plants generate 318 megawatt, i.e. only 6.1% of the total volume. The average multiyear energy production in the Tajik energy system, which mainly consists of hydropower plants, is 16.5 billion k/w/h. It should be noted that more than 98% of the electric power generated in Tajikistan is produced by hydropower plants, including 97% by large and medium hydropower plants.

The production of hydro electricity has a seasonal character and depends on the level of water in rivers. The lowest level of energy production occurs during the autumn-winter period (from October to April/May), when the demand is at its highest. The power supply is most reliable during the summer period, as the surplus of energy is between 3 and 7 billion k/w/h. The surplus of water leads to idle discharge, which is seen as a huge potential loss of energy. Depending on annual hydrological conditions, the economic loss averages between \$90 million and \$225 million per annum.

Table 5 shows the dynamic indicators of Tajikistan's electric power sector.

*Table 5: Main indicators of the electric power sector in the Republic of Tajikistan, 2000 -2010*

Years		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Production of electric power (billion k/w/h)</b>		14,2	14,4	15,3	16,5	16,5	17,1	16,9	17,5	16,1	14,2	<b>16,2</b>
<b>Including:</b>	Thermal power plants	0,2	0,2	0,1	0,2	0,2	0,2	0,2	0,4	0,3	0,17	<b>0,033</b>
	Hydro power plants	14,0	14,2	15,2	16,3	16,3	16,9	16,7	17,1	15,9	14,03	<b>16,2</b>
<b>Consumption of electric power (billion k/w/h)</b>		15,6	15,7	16,1	16,5	16,9	17,3	17,5	17,6	17,0	15,35	<b>16,5</b>
<b>Export (billion k/w/h)</b>		3,9	4,0	3,9	4,6	4,5	4,3	4,2	4,5	4,421	4,25	<b>0,178</b>
<b>Import (billion k/w/h)</b>		5,2	5,4	4,7	4,6	4,8	4,5	4,8	4,6	5,3	6,0	<b>0,338</b>
<b>Installed capacity (megawatt)</b>		4424	4424	4422	4420	4396	4355	4355	4235	4235	4354	<b>5024</b>
<b>Including:</b>	Thermal power plants	355	355	354	353	329	318	318	198	198	198	<b>318</b>
	Hydro power plants	4069	4069	4068	4067	4067	4037	4067	4037	4037	41157	<b>4706</b>
<b>Production cost of electric power (US cent per k/w/h)</b>		0,29	0,27	0,20	0,19	0,24	0,28	0,39	0,55	0,87	0,98	<b>1,0</b>
<b>Normal tariff (US cent per k/w/h)</b>		<b>0,34</b>	<b>0,31</b>	<b>0,34</b>	<b>0,48</b>	<b>0,50</b>	<b>0,52</b>	<b>0,51</b>	<b>0,65</b>	<b>1,17</b>	<b>1,38</b>	<b>1,57</b>

Source: "The energy systems of the Commonwealth of Independent States. 20 years of development – 1992-2012", Moscow. The CIS Electric Power Executive Committee

The main challenges in the electric power sector:

- Considerable deterioration of equipment and the lack of generating capacity along with limited investments in the sector during the civil war and the post-war economic redevelopment;
- Absence of access to the regional energy grid and, as a consequence, lack of technical opportunities for import of electricity in the winter period and export of electricity in the summer time;
- Breaching of previously existing barter agreements (Tajikistan could sell its surplus of energy in summer periods and in the winter, when the level of water is low, offset its deficit with inexpensive import from neighboring countries);

As a result, in winter periods, the country experiences significant deficits in electricity (2.2 – 2.5 billion k/w/h). For this reason, Tajikistan had to introduce limitations, *which affect primarily rural residents comprising not less than 70% of the total population.*

#### 4. Energy demand

According to the latest data from different sectors of Tajikistan's economy, as in previous periods, the industrial enterprises remain the largest consumers of electricity with more than 48.38% of the total volume of electricity produced (Table 6). The second largest consumer is the population – with almost 29% (not taking into account winter limitations). Irrigation systems occupy the third position and consume 19% of the total volume.

Table 6: Distribution of electricity among consumers in the Republic of Tajikistan in 2011 (data from the Barki Tojik energy holding)

#	Consumer	k/w/h per annum	%
1	Industrial enterprises, including:	6 582 865 551	48,38
2	State-financed organizations, communal enterprises and electric transport	426 242 743	3,1
3	Pumping stations (irrigation systems)	2 669 688 911	19,6
4	Population, including:	3 937 870 275	28,92
4.1	Towns and cities	2 502 824 098	
4.2	Rural areas (villages)	1 378 030 875	
<b>Total</b>		<b>13 616 667 480</b>	<b>100%</b>

This important share of irrigation systems in the structure of electric energy consumption in the country demonstrates the importance of reliable and efficient power supply in this sector to ensure national food security. Out of 1.5 million hectares of land in Tajikistan where irrigation is potentially applicable, only 748 thousand hectares of irrigated land are being used. This is due to the fact that 50% of undeveloped land is located in mountainous areas and piedmonts. Additional pumping stations and energy supply systems should be built in order to irrigate these lands. 47% or 383.1 thousand hectares of the total area of reclaimed lands are serviced by 481 pumping stations. In most facilities, the equipment is outworn by 90% and everywhere the consumption of electricity is excessive. Water delivery in irrigation systems depends on the stabilization of the level of water in the rivers and the removal of energy supply limitations in March and April during the vegetation period for cereal crops and vegetables. **The average annual loss of agricultural products caused by energy supply limitations revolves around 30%.** On the other hand, low electricity tariffs for pumping stations during the vegetation period (0.3 US cents per k/w/h) are not conducive to energy saving and more efficient use of electricity. Thus, reliable energy supply and efficiency of irrigation systems constitute important factors for sustainable and guaranteed water supply and food security in Tajikistan.

#### 5. Importance of the energy sector for the national economy

Since 2000, Tajikistan's GDP (which was \$980 million) has increased 7.5 times, and reached \$7300 million in 2012. **The share of energy expenditures, about 60% of GDP, is quite high** given the low economic effectiveness in the country. Furthermore, prices of liquid fuel on the world market are liable to variations, and this has a significant impact on overall energy expenditures. Economic growth is the main cause of increasing energy consumption. During the 2003-2007 period, which saw the most extensive increase in energy consumption the average GDP growth was 7.2%. This indicates a close relation between economic growth and increased energy consumption which is a common feature among developing countries.

In 2012, allocations from Tajikistan's national budget (10,160,600 thousand Somoni) for the **development of the fuel and energy sector** were in the amount of **1 549.4 million Somoni, i.e. 15.2% of the total budget.** It should be noted that after the introduction of the energy supply limits, the shares of export and import of electricity in the national balance of payment decreased substantially, while the share of import of energy products (oil products and natural gas) has risen constantly due to the price increase.

#### 6. The energy strategy

The energy strategy in the Republic of Tajikistan is focused on achieving the national energy independence. This is reflected in many country programs and strategic documents, including the National Development

Strategy for 2010-2015, and the Poverty Reduction Strategy for 2010-2012. **One of the main goals in the energy sector is to ensure reliable access to energy for the whole population as well as industrial facilities and services, and to achieve efficient use of energy with the purpose of alleviating poverty in the country.**

## Section 2: The current situation in the area of the initiative “Sustainable energy for all”

### 2.1 ACCESS TO ENERGY

#### 7. Review and assessment

Tajikistan inherited from the Soviet time a rather ramified system of centralized energy supply covering more than 90% of the country territory. In 2011, a unified energy grid was created within the country connecting the southern energy system with the northern one, thus significantly improving the population’s physical access to generated electricity.

However, unequal access to reliable energy for a majority of the population in the autumn-winter period remains one of the critical impediments for development. Every winter, the country faces an energy crisis. In winter seasons (November – April/May), most rural residents have access to electricity only 3-7 hours a day, with a poor quality of energy supply (frequent outages, reduced voltage, etc.). **What is more, 5.6 million people living in rural areas consume merely 9% of the total volume of energy delivered to customers.** In winter, electricity deficiencies amount to 2.2 – 2.5 billion k/w/h, which leads to the introduction of official limitations in power supply.

The modern state and level of development of the fuel industry in Tajikistan does not meet the increasing demands in fuel resources. Out of total volume of fuel, **only 30-35% is covered by internal resources.** On the other hand, there are challenges in supplying the consumers with natural gas.

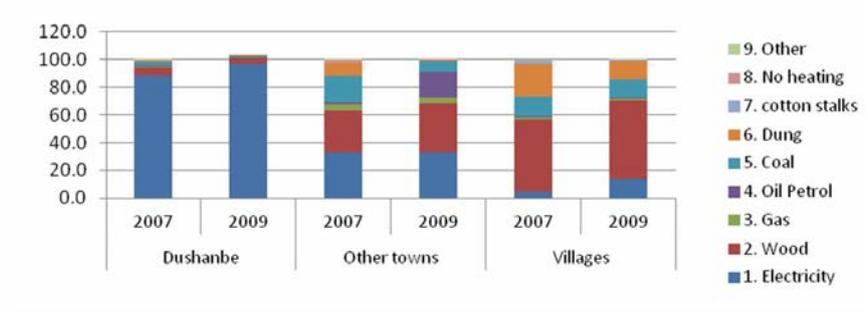
In Tajikistan, access to reliable power supply has become a critical issue for economic development, poverty alleviation and the achievement of the MDGs. This situation seriously affects industrial enterprises and the services sector, and negatively impacts the productivity and performance of enterprises. Small and medium business ventures are especially affected by the limited power supply. The use of imported natural gas, given the growing price on this type of fuel, also increases production costs.

#### 8. Sources of thermal energy

After the collapse of the Soviet Union, issues of supplying fuel and power resources to the national economy and the population have become very complex. Tajikistan has very little deposits of natural gas and oil, but it possesses a huge hydropower potential, in addition to coal. Prospective resources of coal are estimated at 4.5 billion tons; and only a small part is currently being extracted. The explored deposits of oil, gas and condensates constitute less than 1% of the total resources (Table 2).

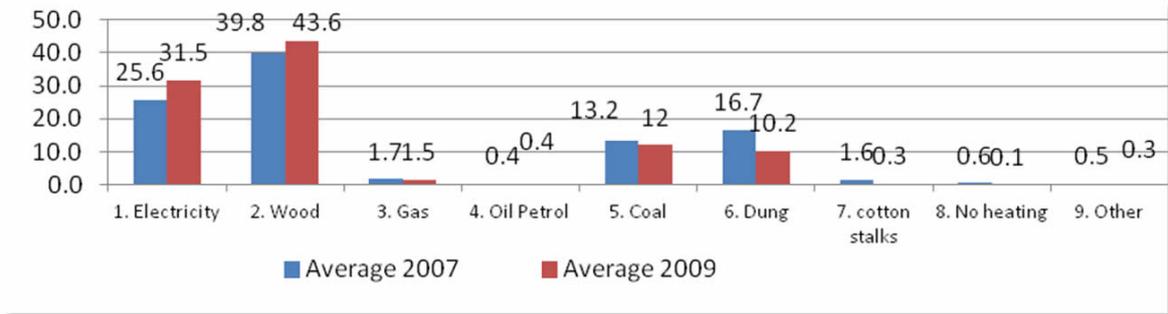
Because of the lack of fuel for household needs (heating and cooking), residents mainly use coal extracted in Tajikistan, as well as imported fossils – liquid (oil products), gas (liquid gas), and solid (coal, wood and coal bricks). In rural areas, people also use manure, cotton stems and other wastes. Everywhere, people prefer the use of electric energy instead of fossil fuel – since the former is less expensive. In rural households, the share of electric energy used for heating is between 2 to 16%; the use of wood is from 35 to 85%; and the rest is the share of manure, coal, liquid and fluid fossils. In urban households, the share of electric energy is 35-40%, wood - 30-35%, coal - 15%, and the rest – liquid and fluid fossils (see charts below).

Sources of heating: by location, %



UNDP calculations, based on LSS 2007 and 2009 databases of World Bank.

### Household heating sources (%)

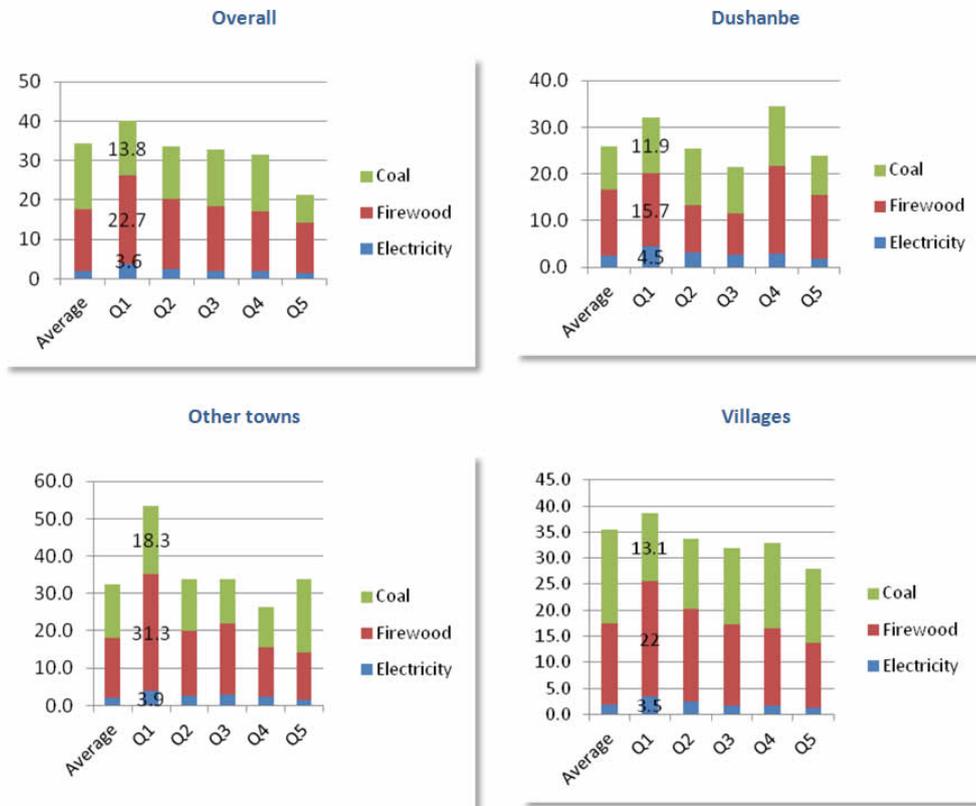


UNDP calculations based on LSS 2007 and 2009 databases of World Bank.

## 9. Availability of energy resources

One of the key challenges in providing people with reliable heating supply is poverty: households spend up around 50% of their total income on fuel in winter months. Specifically, every month, an average family spends 30 Somoni on wood, 40 Somoni on coal, 25 Somoni on electricity (only lighting and household appliances), and 40 Somoni on other types of fuel (including liquid natural gas) (see charters below).

Average energy affordability for households using simultaneously electricity, wood and coal (share of household expenditures, 2009, %)



UNDP calculations, based on LSS 2009 database of World Bank.

## 10. Environmental sustainability

Unreliable power supply and the lack of modern and affordable heating supply facilities have an adverse environmental impact. The cutting of very valuable mountain forests has contributed to the loss of the woodland belt; it has affected biodiversity and conducted to greenhouse emissions. According to studies conducted in a number of rural areas, from 70 to 80% of the woodland has been lost in the last twenty years due to a high demand on energy. Deforestation and degradation of forests have increased soil erosion, which have resulted in lower soil productivity and increased the level of vulnerability of rural communities to natural disasters, such as landslides caused by torrential rains.

The situation is aggravated by the use of primitive and inefficient cooking stoves with an estimated efficiency of 10-30%. In addition, the use of wood, pressed manure and anthracite (if available) in lower-efficiency stoves has contributed to the poor quality of air in dwelling premises causing additional health risks. The absence of heating in public institutions, such as schools and hospitals, has created additional risks for other vulnerable groups, particularly in the winter period.

The harsh winter of 2008-2009 and the last winter's (2012) lengthy cold temperatures have forced households to use energy efficient stoves and *otashdons* for cooking, which allow halving the volume of fuel consumed. An average rural house is heated by one stove, a single source with no special heat distribution system. Other needs, such as heating water, cooking, drying food and clothes, etc. are satisfied by the same heating device. The use of biological fuel in households has a fragmentary character (very few examples with low capacity).

It should be noted that due their cost and insufficient availability in the market, access to efficient stoves among households remains limited. For one, Tajikistan does not produce such stoves, and there is no systematic sale of these stoves in stores. This is why the overall share of use of efficient stoves and renewable is relatively low, especially in rural areas.

## 11. Centralized heat supply

In Soviet times, heating systems in the major cities of Tajikistan were based on a centralized heat supply. In large cities and towns, thermal energy is generated in boiler houses by natural gas and residual oil. Because of the deficiency and high cost of natural gas and residual oil, all boiling facilities have gradually gone out of date, and the centralized heating systems in many settlements have been dismantled. Only one centralized heating system remains in the capital city of Tajikistan, Dushanbe. Dushanbe combined heat power plant (CHPP) and the eastern and western boiling facilities with the total capacity of 190 megawatt can cover only 60% of the overall need in heating in the city. Because of the lack of gas and furnace fuel, the Dushanbe CHPP uses only 20-25% of its designed capacity and its equipment is obsolete and outmoded. Private sector enterprises in Dushanbe, as well as in other cities of Tajikistan, do not have access to the centralized heat supply system either. Heating and hot water supply in dwelling areas are ensured mainly through the combustion of liquid, fluid and solid fuels in various stoves. At present, the western boiling facility in Dushanbe is under reconstruction; the boiling house will be using composite fossil (coal-water slurry). A decision has been made to construct a new facility, the Dushanbe CHPP-2 using coal, with a capacity of 270 megawatt.

In industry, thermal energy for technological manufacturing processes is generated autonomously in electric boilers and in heating systems, they apply various electric devices. Additionally, there are 1911 functioning retail stores selling all types of fuel, and it should be noted that these stores have sufficient quantities of various types of fuel. The quality of this fuel is mainly in compliance with existing standards. However, the quality of coal extracted from local mines and used by households does not meet the standards.

## 12. Access to energy

### a. Electric power supply

By 2011, a unified energy grid was created within the country connecting the southern energy system with the northern one, thereby significantly improving the population's physical access to generated electricity. However, **in the last 18 years, the country has faced energy crisis almost every winter.** The mode of

limited power supply is introduced in such periods during which most of the country's rural areas – although connected to power supply lines – have access to electricity only from 3 to 7 hours a day (Table 7). Moreover, because of excessive use of electricity for heating and cooking, compared to the early 1990s, the consumption of electricity has grown more than fourfold – from 1 billion k/w/h to 4.5 billion k/w/h. However, rural residents (73% of the country's population) consume only 8.9% of the total volume of electricity in Tajikistan. In 2011, the average consumption of electricity per capita was: 1000 k/w/h for one urban resident per annum, and 250 k/w/h for one rural resident per annum (hundreds of times less than the average consumption of electricity per capita in developed countries).

Table 7: Balance of electric power consumption among rural residents in autumn-winter period in 2011-2012

	October 2011	November 2011	December 2011	January 2012	February 2012	March 2012
Factual demand on electric energy (mln k/w/h)	448,8	518,2	595,8	592,5	555,2	463,1
Factual consumption of electric energy (mln k/w/h)	121,8	135,2	137,8	126,5	115,2	87,1
Short-delivered volumes of electricity (mln k/w/h)	327,0	383,0	458,0	446,0	440,0	376,0
Time of outages (hours/day)	17 hours	18 hours	19 hours	20 hours	19 hours	22 hours

Furthermore, a number of remote and inaccessible rural communities are not connected to the national energy grid and have no electricity year round (GBAO – 3240 households, and villages in Gorno-Matcha district of Sughd province).

**In order to cover electricity deficiency in the critical period (autumn-winter), it is necessary to create additional guaranteed capacities in the volume of 1200 megawatt capable of producing 2.2-2.5 billion k/w/h of electricity during the autumn-winter periods.** The total generating capacity of Tajikistan's energy system is 5190 megawatt. Table 8 shows that the available capacity of existing electric plants has decreased by 1102 megawatt compared to their initial design capacity. This situation is caused by deteriorated hydroelectric generating sets at the Nurek and Kairakkum hydropower plants, the cascade of Vakhsh and Varzob HPPs, which were launched in the 1960s and 1970s, and which technical resources have exhausted. Rapid reconstruction and technical modernization of existing hydropower facilities are needed.

Table 8: Operating electric plants in Tajikistan, as of 1 January 2012

No	Name	Technical capacity, megawatt		
		Designed	Available	Operating
1.	Nurek HPP	3000	2385	1625,3
2.	Baipaza HPP	600	450	273,5
3.	Dushanbe thermal electric plant	198	100	4,9
4.	Yavan thermal electric plant	120	-	-
5.	Kairakkum HPP	126	104	83,8
6.	The Vakhsh cascade of HPPs	285	211	139,61
7.	The Varzob cascade of HPPs	25,36	8,0	7,1
8.	Pamir Energy	42	39	37
9.	МГЭС	13	11	10
10.	Sangtuda HPP-1	670	670	440
11.	Sangtuda HPP-2	110	110	40
<b>TOTAL</b>		<b>5190</b>	<b>4088</b>	<b>2661,21</b>

## b. Affordability and social support

Electricity tariffs for citizens in Tajikistan are “socially oriented”. As of 1 April 2012, the Government adopted a 2.32 US Cents tariff per k/w/h. The Social tariff is established based on the average household income for a certain period, with partial subsidies for the population and increased tariffs for other categories of consumers. Tariffs for industrial enterprises and other eligible consumers (commercial structures) are

established at the rate of 5.61 and 13,87 US Cents per k/w/h, which exceed by 2,4 and 6 times the tariffs charged to the population (2,32 US Cents per k/w/h). Likewise, every year the Government provides subsidies to lower-income families for electricity; these funds are allocated from the national budget. In 2011, the electricity subsidies covered 133,360 lower-income families in total amount of 4.2 million Somoni.

It should be also noted that in spring-summer season, when the system can generate more electricity, the Government subsidizes export-oriented enterprises (aluminum, cotton, etc.) introducing seasonal tariffs for industrial enterprises. The seasonal tariff is valid from 1 April to 30 September.

On the other hand, the low tariffs seriously limit the development and modernization of the energy sector, which in turn has a negative impact on the sector's investment attractiveness. In 2012, the expected average tariff within the energy system was only 1.69 US Cents per k/w/h, which is much lower than the level of self-repayment of the Barki Tojik energy holding, especially for thermal plants. In the autumn-winter period of 2011-2012, the production cost at the Dushanbe thermal electric plant was 21.05 US Cents per k/w/h, whereas the average selling price of electricity is 1.89 US Cents per k/w/h. In that period, the plant generated 46.9 million k/w/h of electricity, out of which 37.0 million k/w/h was transmitted through the system to consumers; the loss comprised 33,7 million Somoni (about \$7,09 million). In defiance of significant losses, in cold months, the company has to use the Dushanbe thermal electric plant to cover the electric power and heating deficiency.

### **13. Modern sources of energy for industrial consumers**

Domestic industrial enterprises consume only 50% of the electricity generated in the country. Limitations are not imposed on the majority of other industrial enterprises located in big cities; the same applies to cotton ginneries in rural areas.

This is because cotton ginneries and a number of other strategic enterprises are "export-oriented ventures" that bring much-needed hard currency to the national budget for the development of national infrastructure and social welfare. These enterprises create additional employment opportunities and pay taxes, thus contributing to poverty alleviation.

However, in 2010, about 850 medium and small enterprises had limited access to power supply or did not function at all. Tajikistan has a rather weak common economic structure. Therefore, interruptions in production seriously affect the national economy and wellbeing of workers employed by them. Most of these enterprises send their workers on vocations without pay during the period of power supply cut-offs.

According to the data available as of January 1, 2012, the number of enterprises that use electricity in their manufacturing cycles has decreased by 30 units. These enterprises have turned to coal, since they suffered high losses from electricity cut-offs in autumn-winter periods.

## **2.2 ENERGY EFFICIENCY**

---

### **14. Review and assessment**

Along with the construction of new power generating facilities, Tajikistan's energy development strategy pays due attention to the issue of energy efficiency. The Law of the Republic of Tajikistan "On the use of renewable sources of energy" has been adopted and the President of Tajikistan has signed the Decree "On additional measures on rational use of energy". The "Program of standardization in the area of energy conservation and energy efficiency for the period of 2010-2012" has also been adopted with the purpose of implementation of the Energy Law and relevant policy. Based of existing norms and guidelines in EU, Russia, Ukraine and Kazakhstan, 8 additional standards in the area of energy efficiency and renewable sources of electric energy have been developed.

**Industry:** The industrial sector prevails in the structure of consumption as it consumes almost a half of the electric power generated. According to the evaluation, **the potential growth of technological efficiency and energy conservation in this sector is about 25-30 percent.**

**Fuel Energy Complex:** Existing hydropower plants have been operating for more than 30 years and their technical capabilities are exhausted. More than 50% of the equipment, distribution grids and substations need systematic maintenance and capital rehabilitation. The losses within the grid are 14.1%, whereas the normal rate should not exceed 8-10%. Hence it is necessary (or imperative) to improve the conditions of transmission lines and distribution grids. Accordingly, **the potential for the reduction of losses in transmission and distribution can be estimated at 4-6%**. Moreover, existing heat supply networks are obsolete due to poor technical maintenance and, along with thermal plants, should be modernized.

**Agriculture:** The equipment at most pumping stations deteriorated by 90%, resulting in overspending on electricity. For an efficient use of electricity in irrigation systems, new power-saving engines and meters for accurate measurement must be installed at pumping stations. Technical arrangements ensuring higher efficiency and the introduction of progressive and modern irrigation systems (drip irrigation and renewable sources of energy) also hold a significant potential in reducing energy losses in the sector.

**Household consumers:** To support efficient use of electric power, the Government has adopted a Decree prohibiting traditional filament lamps and promoting the use of energy-saving luminescent bulbs. Two laboratories have been set up – in Dushanbe and in Khujand – to test the quality and safety of luminescent bulbs. Taking into consideration the growing demand for electric household appliances, and for efficient use of electric devices, a special standard was developed. The increased energy efficiency and thermal modernization of buildings also possesses good capacity for reducing common energy losses. For instance, the practical thermal insulation in one four-storey dwelling house in Dushanbe reduces energy consumption by 28%.

## **2.3 RENEWABLE ENERGY IN UN INITIATIVE “SUSTAINABLE ENERGY FOR ALL” (SE4ALL)**

### **15. Review and assessment**

Tajikistan possesses essential deposits of renewable energy. The basic renewable source of energy in Tajikistan is hydropower, and the electric power generated by hydropower plants (HPP) is the most affordable energy source existing in Tajikistan. The deposits of renewable hydropower resources that could potentially be developed and used exceed 3.5 times against the present level of consumption in Central Asia.

At present, Tajikistan uses less than 4% of the available potential of technical and cost-efficient hydropower resources and less than 1% of other renewable sources of energy. About 10% of the population lives in remote mountainous areas of Tajikistan, far from centralized power supply systems. The most accessible sources for them are non-traditional sources of renewable energy: small rivers, solar, geothermal water, wind and bio energy. Given their huge potential, the even distribution of rivers throughout Tajikistan's territory is of especially significant. At present, priority is given to the construction of small HPPs located in close proximity to consumers in order to avoid the construction of expensive power transmission lines.

Preliminary studies show that it is technically possible and economically feasible to construct more than 900 small HPPs with a capacity ranging from 100 to 3000 kilowatt. According to expert estimates, the energy generated by small rivers could cover about 50-70% of the needs of 500-600 thousand residents in remote rural areas and in certain cases, up to 100%. Nowadays, residents of remote areas are actively involved in the construction of micro and mini HPPs using both their own money and funds provided by donors.

Tajikistan has a potential to use agricultural wastes as a means for energy, including biogas from the cattle and poultry dumps. There are some examples of biogas devices operational in Tajikistan. On the other hand, there is a capacity to produce energy, using the thermo chemical method, which allows inverting the biomass from the industrial wastes.

The climate of Tajikistan is very favorable for the use of solar energy. Tajikistan accounts for 280-330 of solar days per year; the radioactive intensity varies between 280 and 925 MJ/m<sup>2</sup> in piedmont areas per year, while in mountainous areas this figure can reach up to 360 and 1120 MJ/m<sup>2</sup>. The use of the existing potential of solar energy may satisfy up to 10-20% of energy demand in Tajikistan. The assessments show that the

potential of the solar energy in Tajikistan amounts to 25 milliard kWt/hour/year. Yet, this potential is not used for a maximum extend.

Geothermal resources are poorly studied in Tajikistan. The data about the use of the geothermal water are usually not available, even though some potential is used in some areas of Tajikistan (for example, in Khoja-Obi-Garm). Apart from other RES in the mountains, thermoelectric devices can be very effective to generate the electric power.

There is a huge capacity in the use of wind energy in Tajikistan. However, for now it is used as the additional source for the existing hydropower facility (especially in some mountain areas). The strongest winds are observed in the regions, like Fedchenko and Anzob pass, where the landscape of the country finds the maximum wind speed and flows (e.g. in Khujand and Fayzabad). Annual mean wind speed throughout of these regions varies between 5 and 6 m/sec. Mean wind speed with 3-4 m/sec one can found in open valleys and plains.

The potential of Tajikistan’s energy resources is described in Table 9. Even the partial use of this potential could significantly improve the access of rural residents to energy resources, stabilize the energy balance and enhance the ecological situation in the country and in the region of Central Asia.

Table 9: Renewable sources of energy (RES) in Tajikistan, million tons a year

Resources	Gross potential
Hydropower, total	179.2 (60167)
Hydropower, including small HPP	62.7 (21057)
Solar energy	4790.6 (1 822 894)
Biomass energy	4.25 (1614.14)
Wind energy	163 (62257.3)
Geothermal energy	0.045
Total (without big HPPs)	5020.595 (1 907 823)

## 16. Renewable energy generated for the grid and autonomous sources of renewable energy

At present, the total capacity of the 269 micro and small hydropower plants functioning in Tajikistan is 132 megawatt. In principle, the whole energy system in GBAO and Varzob river HPP cascade are considered as small hydropower plants. The small private HPP Panjrud is connected to the energy grid of the Barki Tojik energy holding; this facility has the capacity of 500 kilowatt, and belongs to the company Long Island Ltd. Most of the small HPPs functioning in Tajikistan belong to the private sector or to jamoats (local self-governance bodies). The construction of these facilities was funded by UNDP, ADB and other organizations.

In 2009, the country adopted a revised program for the construction of small hydropower plants. This program envisages the construction of 189 small HPPs with an aggregate capacity of 103.6 megawatt. More than 60 mini and small HPPs with a total capacity of 47 megawatt were built in 2010-2011.

In addition, there is no widespread application of other renewable sources of energy. For example, solar photo converters and solar collectors are rarely used and in small numbers (about 2000 sets with low capacity), and serve mainly for household needs. Wind power generators are used in few regions, but there are only several dozens of them.

Small energy sector is a key factor capable of releasing the development capacity of highland (93% of the country territory) rural areas in Tajikistan, contributing therefore, to poverty alleviation and MDGs achievement.

### Text Box1: Japan Government helps to install solar panels in Tajik hospitals

Dushanbe, June 2, 2012. The solar energy is used for the improvement of health conditions in Tajikistan. In the national medical centre of Dushanbe and one of the maternity hospital, the solar panels and collectors are installed. This is the gift from the Japan Government. The capacity of the accumulating modules is 120 kWatt.

“The hospitals are equipped with expensive power device, which is very sensitive to power cut-offs and blackouts. Therefore, these solar panels will help to avoid such problems”, the Japanese specialist of the solar energy says.

The regular power supply will be ensured for those medical premises, which are among priority. For example, children surgery rooms and resuscitation department are in need of reliable power supply.

The doctors agree that the solar panels are cost-effective. There will be no longer a need to pay for the electricity. The saved money will go for purchasing the additional equipment and organize capacity building initiatives for the medical staff.

For the time being, the Ministry of Health negotiates with the Japan Government to provide solar panels for some more medical centers.

## 17. Use of renewable energy sources (RES) for thermal power

Tajikistan has unique opportunities in using solar energy and other RES for thermal power generation. However, for the time being, there are no data on the household use of RES for heating and cooking.

There are technological developments in the country for solar water heaters with a production capacity varying from 0,1 to 1 ton of hot water (50-70°C) per daylight period. The open joint-stock company Systemavtomatika and the RES Association have launched the manufacturing of single-circuit solar collectors. There are many good examples for the practical application of these devices. The industrial assembling of solar collectors is organized in Sughd province. The unitary industrial enterprise Tajiktextilmash, the state unitary enterprise Vostokredmet and the closed joint-stock company Tajikenergoremont who manufacture certain turbines for small HPPs also have sufficient capacities to organize the technological manufacturing of solar collectors. However, suitable investments are needed for such production.

There are also technological developments of various simple solar ovens (up to 130°C). Studies have shown that rural residents widely use Chinese kitchen appliances, mainly for heating water and brewing tea. Solar energy is ecologically clean and there are many opportunities for the domestic manufacturing of solar converters in Tajikistan, but investments are still needed.

The use of thermal water is not yet substantially exploited in Tajikistan by now. However, some examples still exist. For instance, thermal pumps are installed and functioning in Republican Tuberculosis Hospital in Machiton district for heat supply. Sanatorium Obi Garm and other also use the thermal water for heating the premises.

## 18. Use of RES for industry

The use of renewable sources of energy for industry and manufacturing activities can be illustrated by the use of small HPPs. For example, small HPP with a capacity of 2x750 kilowatt in the village of Takob works autonomously, supplying electricity to the Takob mining and processing facility. Micro HPPs are used in roadside cafes in Ayni district. Some solar collectors are used in sports facilities, educational and financial institutions.

The Ministry of reclamation and water resources has the capacity to build mini and small HPPs, especially for efficient functioning of pump stations. In the late 1980s, the aggregate potential of these canals was estimated at 152 million kilowatt/hours per annum, which constitutes about 10% of the current energy consumption in domestic irrigation systems. Thus, to increase the current use of renewable energy, it is necessary to conduct studies and properly estimate the number of sites along irrigation canals suitable for the construction of mini HPPs.

## **2.4 OBJECTIVES OF THE “SUSTAINABLE ENERGY FOR ALL” (SE4ALL)**

---

### 19. Objectives

**In Tajikistan, by 2030 the following objectives should be attained in the frameworks of the “Sustainable Energy for All”:**

**Access to energy:** ensure to supply regular and reliable energy to 5.6 million people, living in rural areas of Tajikistan

**Energy efficiency:** reduce the energy losses up to 10% in power grids and up to 20% in thermal grids, as well as increase the efficiency from the energy use in all economic sectors, irrigation systems and final users up to 20% against the baseline

**Renewable energy sources:** increase of energy production with the use of renewable energy sources up to 20% against the baseline.



## Chapter 3: Challenges and opportunities to achieve the objectives of the “Sustainable Energy for All” initiative

### 3.1 INSTITUTIONAL AND POLICY FRAMEWORK

---

#### 20. Organizational structure

Within the energy sector, decision-making at the political level cannot be separated from the overall process. The key decisions taken at this policy level are those by the lower house of Parliament of the Republic of Tajikistan - Majlisi Namoyandagon Majlisi Oli (MN MO RT). For the enactment of the law the process has to be followed by approval of the bill by Majlisi Milli (the upper house) and signed by the President of the Republic of Tajikistan. In general, the decision-making process at the political level is formalized and clearly defined. The profile committee of the Majlisi Namoyandagon, the Committee on Energy, Industry and Communications, prepares draft legislation on energy and provides appropriate conclusions on the draft laws introduced to the parliament by other entities eligible for legal initiative.

The implementation of the state energy policy, as well as the planning and forecasting of the dynamics of supply and demand for all types of energy resources are vested in the authorized state body of the Republic of Tajikistan, the Ministry of Energy and Industry of the Republic of Tajikistan.

The State Joint Stock Holding Company “Barqi Tajik” has monopoly in the energy sector and deals with the operation of power plants and grid within the country, as well the generation, transmission, distribution and sale of electric and thermal energy. “Barqi Tojik” is responsible for the practical implementation of state-funded projects and programs in the energy sector, including projects aimed at promoting renewable energy.

Other important governmental partners for the development of electric power sector:

- The Committee on Environmental Protection, which is responsible for leadership in environmental policies;
- The Anti-Monopoly Committee under the Government of the Republic of Tajikistan (issues on tariffs);
- The Ministry of Economic Development and Trade and the Ministry of Labor and Social Security (both agencies are responsible for poverty reduction);
- The State Committee on investments and state property of the Republic of Tajikistan;
- The State Agency for Metrology, Standardization and Certification under the Government of the Republic of Tajikistan (issues of standardization and certification)
- The Ministry of Finance and the State Committee on Investments and Management of State Property (public financing of large energy projects, as well as attracting additional investments)

**Private sector:** There is currently no real market for electricity in Tajikistan. Its generation, transmission and distribution are concentrated in the hands of the state, represented by "Barqi Tojik", the only company with a monopoly on energy resources. On the other hand, as of today, private HPP Sangtuda-1" (670 MW) and more than 30 corporate and private sHPP with an overall capacity of 55 MW are connected to the state-operated grid. In 2012, the "Sangtuda-2" HPP (220 MW) was launched for full operation, and will remain the property of the Iranian company "Sangob" until 2025. In GBAO, power supply is provided by a privately held company, "Pamir Energy," since the Government of the Republic of Tajikistan, under the Concession Agreement, has handed over the grid and generation capacity owned by "Barqi Tojik" for 25 years. The agenda cover more acute problems in regards of commercialization of industry, which is defined as a main task of the first phase of the forthcoming restructuring of energy sector.

**Heat Supply Policy** in the Republic of Tajikistan is under the responsibility of the Ministry of Energy and Industry, and the main service providers are “Barqi Tojik” and the State Unitary Enterprise "Hojagii manziliyu Kommunalni." In addition, within urban areas there are wholesale consumers - reseller of heat energy such as "Thermal grid", which is in charge of providing thermal energy to the population. In all cities except Dushanbe, Khujand, Rogun and Nurek, and within regional centers, jurisdictional utilities of SUE "Hojagii manziliyu Kommunalni" provide services for garbage collection and disposal, as well as heat supply and landscaping. However, in recent years due to a lack of heating systems, the organization has dealt with water supply problems, waste disposal, and fuel import. In rural areas, local authorities “Jamoats”, should

effectively utilize local energy resources and ensure that the population receives thermal energy or the necessary amount of energy resources.

In order to ensure **international cooperation** on national development issues and the implementation of the Poverty Reduction Strategy under the President of the Republic of Tajikistan, the National Development Council has been established. The Joint Action Plan of Government and development partners, adopted by the National Development Council, includes a separate section on the implementation of reforms and energy sector development, which provides specific measures to ensure the effectiveness and improve the energy capacity of the country. In particular, this plan foresees the construction, reconstruction and rehabilitation of the energy sector, the completion of ongoing projects and development of new investment projects, the construction of transmission lines, and the use of alternative sources for electricity generation. The organizational structure of the energy sector is presented in Table 10.

**The Role of NGOs:** The participation of civil society in matters of energy management is expanding. The Energy Association of Tajikistan (EAT), established in 2005, has initiated the development and adoption of several laws of RT, including the law on the "Use of Renewable Energy Sources," the "Charcoal Law" (currently, at the Parliament level), and pending laws such as the "Energy saving and energy efficiency Law", and the new edition of "Energy Law" and "Oil and Gas Law". Members of EAT are experts on water and energy, RES and other aspects of the fuel and energy complex. The Renewable Energy Association (REA), established three years ago, contributes to the implementation of specific projects on renewable energy resources, and advocates and promotes the use of RES. The Public Foundation "Tajik-Norwegian Centre for the development of small hydropower" which prepared the "Action Plan to improve the commercial attractiveness of small hydropower in Tajikistan", has monitored a number of small hydropower plants. There are other NGOs active in environmental area.

Table 10: Structure of Energy Sector

<b>National Development Council under the President of the Republic of Tajikistan</b> Coordination with donors and international financial organizations on development issues, including energy sector			
<b>Political institutions:</b> Majlisi Oli of the Republic of Tajikistan, President of the Republic of Tajikistan, Government of the Republic of Tajikistan, Ministry of Energy and Industry, Ministry of Economical Development and Trade		<b>Regulatory Bodies:</b> Government of the Republic of Tajikistan Ministry of Energy and Industry Antimonopoly Service under Government of the Republic of Tajikistan Gosstandart	
<b>Enterprises for electricity generation</b> <ul style="list-style-type: none"> <li>• JSHC "Barqi Tojik"</li> <li>• EC "Pamir Energy"</li> <li>• JSC "Sangtuda-1"</li> <li>• JSC "Sangtuda-2"</li> <li>• Private and public owners of micro, mini and small hydropower plants</li> </ul>	<b>Enterprises for electricity distribution</b> <ul style="list-style-type: none"> <li>• JSHC "Barqi Tojik"</li> <li>• EC "Pamir Energy"</li> </ul> The distribution network of wholesale customers/consumers	<b>Enterprises for electricity transmission</b> <ul style="list-style-type: none"> <li>• JSHC "Barqi Tojik"</li> <li>• EC "Pamir Energy"</li> <li>• Departmental distribution networks</li> </ul>	<b>Enterprises for fuel and heat generation and supply</b> <ul style="list-style-type: none"> <li>• JSHC "Barqi Tojik"</li> <li>• "Khojagii Manziliyu Kommunalii"</li> <li>• Heat networks</li> <li>• Jamoats</li> </ul>
NGOs and Civic Organizations: "Energy Association of Tajikistan", "Renewable Energy Association" Public Foundation "Tajik-Norwegian Centre for Development of Small Hydropower in Tajikistan" Coordinating Council of Business Associations and civic organizations, The National Association of farmer households, etc.			

## 21. Strategic goals, programs and plans

Reforms affect the financial rehabilitation of the industry by introducing payment discipline, and improving and increasing energy tariffs. In particular, the Government of the Republic of Tajikistan had adopted (as of August 30, 2011 № 431) an Individual Plan **"on Restructuring of the Open Joint Stock Company "Barqi Tojik"** for the period 2011-2018. The most important aspects of this phase include the necessity to

change/amend the existing legislation to create an independent regulator in the electricity sector and to reform the tariff policy to allow the private sector to participate in subsequent phases of the restructuring.

The Government of the Republic of Tajikistan approved the "**Action Plan for the implementation of priority projects in the energy industry in the Republic of Tajikistan for 2010-2015**", which envisages the construction of 12 new generating facilities and 13 high-voltage transmission lines. The implementation of this Plan will resolve the basic problems of energy supply in the future and will provide an opportunity to export surplus electricity. Some of the projects have already been successfully implemented or are currently being implemented, while for others the search for investors is ongoing.

In 2012, construction works at the Sangtuda-2 (220 MW) are expected to be completed, as well as the rehabilitation works at Rogun HPP. With the financial support of international organizations (ADB, WB, EBRD, etc.) several projects are being implemented to modernize and rehabilitate existing facilities within the main power grid. These projects, foresee an increase in hydroelectric power of up to 10-15%, providing an increase of 500-600 MW in installed hydropower capacity. In addition, a double circuit transmission line – 220 kV, “Tajikistan – Afghanistan” has been built and commissioned. A draft of the “CASA – 1000” project is ready while commissioning is scheduled for 2016. This transmission line will increase the export of surplus electricity produced in the summer from Tajikistan to Afghanistan and Pakistan.

**Text Box 2: Afghanistan and Pakistan count on Tajik power**

Meeting of the intergovernmental council of four countries participating in CASA-1000 project (Tajikistan, Kyrgyzstan, Pakistan and Afghanistan) held in Dubai on May 17, 2012, concluded in signing of the protocol.

Along with the ministers of the four participating countries, meeting was also attended by several international financial institutions and Arab funds.

“At the moment, CASA-1000 project is supported primarily by the World Bank, Islamic Development Bank and the U.S. Agency for International Development (USAID)”, - said the press service of the Ministry of Energy and Industry.

At the level of ministry it was also noted that project may be joined by other stakeholders. Tajikistan, Afghanistan, Pakistan and Kyrgyzstan have joined forces to link their national electrical grid through a project called CASA-1000. It is expected that after implementation of this project surplus electricity produced in Tajikistan and Kyrgyzstan, will be exported to the markets of Pakistan and Afghanistan, where shortage of electricity is observed.  
18.05.2012 12:14

The Government of the Republic of Tajikistan (as of November 2, 2011; № 551) has adopted the ‘**Program for the efficient use of hydropower resources and energy saving for 2012-2016**’. This program covers the main areas of efficient use of hydropower resources, the implementation of plans and activities in the area of energy efficiency and energy saving, the rational use of electricity and reduction of electricity losses; and determines state policy for achieving energy independence/security.

Market reforms undertaken by the Government aimed primarily at improving the investment attractiveness of the industry through the introduction of payment discipline and increase of energy tariffs to a level that ensures reimbursement of costs associated with the generation and sale of energy, as well as profitable investments in the industry. Certain principles for establishing tariffs are included in the Memorandum of Understanding on the implementation of energy reforms signed with the Asian Development Bank and World Bank.

As part of these reforms, the Government also pays greater attention to the use of renewable energy sources (RES), notably small hydropower plants. The use of renewable energy for electricity generation in the Republic of Tajikistan is announced as a national interest and will be an opportunity to achieve poverty reduction and economic development goals by providing reliable access to electricity to all citizens. This is also confirmed by various legislative and strategic documents adopted by the Government of the Republic of Tajikistan:

- ⇒ *"A comprehensive target program for the widespread use of renewable energy sources, such as energy of small rivers, sun, wind, biomass and thermal underground waters "* (adopted by Government of the Republic of Tajikistan, № 41 as of February 2, 2007);
- ⇒ *Long-term program for building small hydropower plants for the period 2009 - 2020* (adopted by Government of the Republic of Tajikistan, № 73 as of February 2, 2009);
- ⇒ *" National Environmental Program of the Republic of Tajikistan for the period 2009 - 2010"* (approved by Government of the Republic of Tajikistan, № 602, as of October 31, 2009);

⇒ *Law of the Republic of Tajikistan on the "Use of renewable energy sources (RES)" as of 2010.*

It is important to note that the small energy sector is a key factor that can unlock the capacity/potential of high altitude mountainous (93% of the country) rural areas of Tajikistan, and has a great potential for reducing poverty and achieving the MDGs. The aim of the Strategy for the development of small hydropower in Tajikistan is to provide reliable and sustainable electricity to populations living in isolated and remote areas of the country, as well as to small and medium enterprises. Overall, the **Long-term program for building small hydropower plants for the period 2009 - 2020**, adopted by the Government of the Republic of Tajikistan envisages the construction of 189 small hydropower plants with a total capacity of 103.6 MW.

It should be noted that in 2010, the Government of RT adopted the **Law on the " Use of renewable energy sources"**, and afterwards adopted a series of legal acts on the use of renewable energy sources according to which owners of electric and thermal power plants that generate energy through the use of renewable energy sources will receive the following **benefits**:

- The provision of technical conditions to connect to public grid/networks for free before the completion of the construction and commissioning of the facility.
- Mandatory connection to the common power grid, subject to compliance with technical specifications for connection.
- Electrical losses while transmitting electricity from renewable energy facilities to the joining point to be covered by power supply organizations.
- Electrical and thermal meters for electricity and heat energy to be installed by power supply organizations.
- Electricity tariff is set in accordance with the project's cost of electricity and heat, approved by the Antimonopoly Service under Government of the Republic of Tajikistan.
- In case of delay of payment for supplied electricity, a daily fine will be imposed to power supply organizations.
- Independent power producers of small energy up to 30 MW are exempted from the water tax (water royalty tax).

## 22. The monitoring system of national goals within the "Sustainable Energy For All" initiative

*Table 11: Goals and Indicators within "Sustainable Energy for All" initiative*

National goals within global initiative "Sustainable Energy For All"	Proposed indicators to measure and monitor national goals	Basic level (2010)	Target (2030)	Data sources
<b>Goal 1: To ensure uninterrupted access to electricity for people in rural areas</b>	Indicator 1: Number of households without access to national / local grid	5340 households	0	MEI State Committee on Statistics MEDT
	Indicator 2: Number of days in a year when power supply to households and enterprises is limited by more than 3 hours	150 days	0	MEI
	Indicator 3: Population with uninterrupted access to electricity throughout the year (millions)	2.3 mln people	All population	MEI State Committee on Statistics
<b>Goal 2: Improve energy efficiency</b>	Indicator 1: The share of technical losses within the grid	14.5%	10%	MEI
	Indicator 2: Percentage of households using energy-efficient lighting devices	No information	20%	Gosstandart MEI Customs Service
	Indicator 3: Specific consumption of electricity by water pumping stations	No information	Reduce by 20%	Barqi Tojik
<b>Goal 3: Provide energy</b>	Indicator 1: The ratio of RES in total electricity balance (%)	0.8%	10%	MEI

independence/security and use of renewable energy sources	Indicator 2: The ratio of indigenous energy sources in energy sector	59.3%	80%	MEI MEDT
---	--	-------	-----	-------------

### 3.2 PROGRAMS AND FINANCING

#### 23. Financing of the Energy Sector

On an annual basis, the Government of the Republic of Tajikistan allocates about 15% of the total national budget for the development of fuel-energy complex. In particular, the state budget envisages the construction in 2014 of over 355 sites totaling 2400.0 million Somoni, including 1142.7 million Somoni for the energy sector, equivalent to 47.62%. Among other things, the public investment program, grants and capital construction for 2012-2014 provides financing for energy projects worth 1.4 billion U.S. dollars, accounting for 37% of the total funding within the program (see Table 13).

Table 13: The distribution of investments under State program, grants and capital construction for 2012-2014; breakdown by sector (in thousands USD)

Sector	2012	2013	2014	Total for 2012 - 2014
Energy	55 735,00	665 270,00	708 400,00	1 429 405,00
<b>Total</b>	407 974,00	1 669 666,00	1 801 432,00	3 879 072,00

The Government of the Republic of Tajikistan has successfully cooperated with the World Bank, the Asian Development Bank, UNDP, Islamic Development Bank, Kuwait Fund and other international financial institutions in area of attracting investments for the rehabilitation and development of the energy sector, and efficient operation and long-term sustainable development of hydropower., In total, the share of donor assistance in the energy sector accounts for 25% (the second largest, right after the transport sector).

Table 14: The program of grant distribution and technical assistance to the PSI (sector breakdown)

Project/Sector	Number of Projects	Cost		Financing sources	
		(in thousands USD)	%	Internal/Domestic	External/Foreign
Economic Management	9	40 428,90	3,05	1 330,00	39 098,90
Agriculture	30	134 382,62	10,12	4 054,00	130 328,62
Rural irrigation and water supply	30	74 870,93	5,64	1 180,00	73 690,93
Water supply and sewerage	27	129 866,03	9,78	5 900,00	123 966,03
Energy	33	334 007,10	25,16	14 800,00	319 207,10
Transport	18	377 268,20	28,42	5 100,00	372 168,20
Education	24	77 659,80	5,85	4 771,00	72 888,80
Healthcare	19	87 439,50	6,59	0,00	87 439,50
Multi-sector and other sectors	27	71 728,40	5,40	0,00	71 728,40
<b>Total within grant program and technical assistance</b>	217	1 327 651,48	100,00	37 135,00	1 290 516,48

A list of the main projects and their sources of financing is provided in Table 15

Table 15: Main investment projects in the energy sector and their sources of financing

Name	Year	Financing	Cost (in million USD)
<b>Completed Projects</b>			
1. Transmission line -220 kV «Lolazor-Khatlon»	2008	Loan of People Republic of China	58,13
2. Transmission line -500 kV «South-North»	2009	- «» -	281,3

3. Additional works within construction project of Transmission line -220 kV «Lolazor-Khatlon»	2010	- «» -	51,0
4. Construction of transmission line for 110 kV	2010	- «» -	3,0
5. Transmission line -220 kV “Khudjand - Ayni”	2011	- «» -	36,9
6. Establishment of united energy grid at northern part of the country	2011	- «» -	27,8
7. Sangtuda - 1 HPP (670 MW)	2009-2010	Joint investments of Russian Federation and RT	798,0
8. Sangtuda - 2 HPP (220 MW, 1 aggregate only)	2011-2012	Joint investments of IRI and RT	318,9
9. sHPP (total installed capacity – 8 MW)	2009-2011	IDB Loan	9,2
On-going project			
1. Modernization of Varzob HPP (1 MW)	2011-2012	Grant of Indian Government	17,0
2. Modernization of 4 <sup>th</sup> aggregate of Leading Thermal PP	2011-2012	IDB Loan	13,5
3. Construction of CDET – 220 kV, Nurek HPP	2012-2012	Loan and grant of German Government	39,2
4. Construction of CDET – 500 kV, Nurek HPP	2011-2014	ADB grant	54,7
Construction of intraregional transmission lines	2011-2014	ADB grant	122
Reduce of energy losses in Dushanbe city	2009-2014	WB loan	17,0
Reduce of energy losses in Soghd oblast	2012-2014	Loan and grant of ERDB	26,5
Rehabilitation of transmission line for 500 KV. Construction of Dushanbe Thermal PP - 2	2012-2014	Resource method	127,0
Feasibility study to modernize Kairakkum HPP (126 MW)	2012	ERDB grant	1,0
Feasibility study for Sarband HPP (240 MW)	2011-2012	Компания «Синохайдро»	0,9
Planned Projects			
Construction of first line. Roghun HPP (1200 MW)	2016	State Budget (Central Level)	560
Modernization of Kairakkum HPP	2013-2015	ERDB	75
Modernization of Nurek HPP	2013-2017	Source of Financing is not defined	380
Modernization of Sarband HPP	2013-2016	Source of Financing is not defined	137,0
Construction of Transmission lines for 500 kV, within the framework of CASA-1000 project	2013-2016	WB and IDB Loan	270
Completion of construction of Roghun HPP (3600 MW)	2018	Source of Financing is not defined	2000
Long-term program on construction of sHPP	2012-2020	External/Foreign and Local Investments	200
Shurab HPP (300 MW)	2013-2016	External/Foreign Investments	320
Zarafshon HPP (160 MW)	2018	- «» -	320
Dupulin HPP (90 MW)	2018	- «» -	180
Nurobod-2 HPP (160 MW)	2017	- «» -	400
Sangor HPP (160 MW)	2017	- «» -	320
Shurab HPP (850 MW)	2019	- «» -	1500
Fondarya HPP (160 MW)	2020	- «» -	321
Oburdon HPP (120 MW)	2020	- «» -	240
Sangiston HPP (140 MW)	2020	- «» -	280
Ayni HPP (160 MW)	2019	- «» -	220
Sanobod HPP (125 MW)	2019	External/Foreign Investments	228
Urfatin HPP (160 MW)	2022	- «» -	320
Shtiyon HPP (160 MW)	2022	- «» -	320
Nurobod-1 HPP (150 MW)	2021	- «» -	440
Fon-Yagnob HPP (500 MW)	2018	- «» -	356

In 2009, the Government of the Republic of Tajikistan adopted a program for the construction of small hydropower plants for domestic and foreign investors for the period 2009 - 2020. This program includes the construction of 189 small hydropower plants with a total capacity of 103.6 MW and generating 800 mln. kWh of electricity per year.

Table 16: Program for construction of sHPP

Type/ Information	Short-term program for 2009-2011	Medium-term program for 2012-2015	Long-term program for 2016-2020
Up to 100 kW, ea.	20	21	21
From 100 kW to 1000 kW, ea.	34	37	25
Above 1000 kW, ea.	12	12	7
<b>Total:</b>	<b>66</b>	<b>70</b>	<b>53</b>
Total installed capacity, kW	43350	32850	26801
Commissioned, ea.	26	10	5
Under construction, ea.	8	12	-
Projects, not implements, ea.	32	48	48
Sources of financing	IDB, ADB, OJSC "Barqi Tojik", Local investors		

### 3.3 PRIVATE INVESTMENTS AND BUSINESS ENABLING ENVIRONMENT

#### 24. Institutional and policy framework

The legal basis for investment activities in Tajikistan comprises the Constitution of the Republic of Tajikistan, the Law of RT "On Investment," the Law of RT "On free economic zones in the Republic of Tajikistan", the Tax and Customs Codes of the Republic of Tajikistan, and other normative legal acts of the Republic of Tajikistan aimed at protecting the rights and interests of foreign and domestic investors. International legal tools pertaining to investment and adopted by Tajikistan also constitute the legal basis for investment activities in the Republic of Tajikistan. In addition, an interagency working group has developed a draft of the Law of the Republic of Tajikistan "**On Public-Private Partnership**" in order to attract large companies and private entrepreneurs to partake in public - private partnerships, and financially support the implementation of infrastructure projects., The draft law defines the legal, economic and organizational basis of public-private partnerships (PPP), and aimed at promoting and facilitating the implementation of public-private partnerships for infrastructure projects and project services in the social sector.

In order to attract investments, an Advisory Council was established by Decree of the President of the Republic of Tajikistan (as of December 19, 2007, № 356), to improve the investment climate in the country. The Council aims to strengthen the work of government agencies to improve business environment to attract investment, carry out a coherent and coordinated state policy in the area of investment activity, and establish a constructive dialogue between government and business.

#### Text Box 3: Investment climate: vision of private sector

- Entrepreneurial activity is limited due to power shortages (especially in winter), and natural gas, as well as in connection with the problems of processing and transportation of goods to the regions within the country and abroad.
- The availability of loan resources for business is limited due to high interest rates on bank loans (24-30% per annum). About 4/5 of small and medium-sized enterprises do not use bank accounts in their business operations and prefer to deal in cash.
- Insurance companies and banking institutions that do not have sufficient capital, operate as monopolistic companies, limiting the use of its services.
- Difficulties in enforcing contractual relations, protection of property rights and other related rights, the ineffectiveness of legal system.
- Administrative barriers to enter the market (limited information support, poor development of road transport services, air transportation and hotel, a complex procedure for obtaining visas)
- The high cost of doing business, a large number of audits, serious limitations in regard to certification;
- Limited information for entrepreneurs and the absence of a common database on investor activities

So far, four free economic zones have been established in the country, including the free economic zone "Sogdiana" in Khujand (Sughd Province), "Panj" in Kumsangir area, "Dangara" in Dangara district (Khatlon Province) and "Ishkoshim" in Gorno-Badakhshan Autonomous Region. In 2011, the total amount of portfolio investment projects implemented in the country by attracting foreign investment reached over 1.7 billion U.S. dollars.

Notwithstanding the above-mentioned aspects, Tajikistan still faces several obstacles in establishing a sustainable investment climate and improving the attractiveness of the country, and its ability to sustain long-term, economic growth (see Text Box 2). From an investor's perspective, uncertainty surrounding policy legislation, poorly developed mechanisms to ensure accountability and transparency, and excessive and discretionary administrative barriers prevent large and long-term investments.

## 25. Private investments into heat supply

In Tajikistan, there are no heat supply companies or private companies offering special technology to generate heat. In this area, the private sector mainly supplies fuel and heaters (mainly electric heaters). There are few examples of private sector investment in the development and introduction of modern technologies based on renewable energy sources (see Text Box 3).

It is worth noting the contribution of international organizations (UNDP, ADB, EU and others) in implementing projects to pilot and raise awareness about energy-efficient household stoves and heating stoves for cooking (otashdon), Cold winters in 2008 and 2011/2012 forced many households to use more energy-efficient and solar stoves made by local and foreign manufacturers. Together with the lack of relevant companies to perform installation and maintenance, the high cost of energy-efficient stoves can be viewed as a major factor impeding their availability.

### Text Box 4: Best Practice

JSC "Specavtomatika" developed and manufactured various modifications of single-circuit solar water heaters used to heat the water in the food Text Boxes, fitness clubs. Foreign models of single-circuit solar water heaters were installed in hospitals and mountain border posts. Various modifications of double-circuit solar water heaters were developed, that provide hot water all year round. Heat pumps for heating systems were installed at the Republican Clinical TB hospital in the Machiton area.

**In consultation with representatives of private companies, the following proposals were received:**

#### Proposal:

It is necessary to develop high-tech single-circuit and double-circuit water heaters based on modern technology. For this purpose, required are investments to purchase equipment and technology transfer for the manufacturing of aforementioned water heaters.

#### Challenges:

- Lack of economic incentives
- Absence of illustrative examples showing the benefits of new technologies
- Lack of promotion of new environmentally-friendly technologies
- Changing standards for construction, in addition to existing problems
- Poor infrastructure and lack of healthy competition in the market
- Absence of an effective mechanism to control movement of goods, services and capital.

## 26. Private investments in Hydropower and other RES

### Large and medium private HPP

JSC "Sangtuda-1" (670 MW) operates under an agreement between Government of the Republic of Tajikistan and the Russian Federation in effect since July 30, 2009. According to the agreement and the law "On Production Sharing", the power generated is divided in proportion to the funds invested in the construction of "Sangtuda HPP -1", namely 25% for Tajikistan, and 75% for the Russian Federation. In 2011, JSC "Sangtuda-2" (220 MW) commissioned the first unit of Sangtuda - 2. Sangtuda-2 is built by BOT method by the Iranian construction company "Farob" which will remain the owner until the expiration of the concession period (12.5 years once HPP enters into full operation), Again, the wholesale purchaser of the generated electricity is "Barqi Tojik".

### Small HPP

The Pamir Energy Company "Pamir Energy" provides energy/power to the Badakhshan region. It is a privately held company, which under the Concession Agreement with the Government of the Republic of

Tajikistan, has received electrical grid and generation capacity for a 25 year term; while Barqi Tojik remains the end owner. The experience of this company confirms that the development of small-scale hydropower is a catalyst for accelerating progress towards the achievement of the MDGs in remote mountainous rural communities by improving access to energy.

Today, people living in mountainous rural areas are actively starting the construction of micro and mini hydropower plants, using their own and donors' funds. In January 3, 2011, the sHPP "Panchrud" was launched in Pendjikent district. The owner of this sHPP is a private company "Long Island". To date, this sHPP has generated more than 2 (two) million kilowatt hours of electricity. Customers include the inhabitants of three villages (more than 5,000 people), two rural hospitals and two schools, which receive power all year round, without any restrictions. Additionally, there are over 230 private small hydropower plants throughout the country, with a total installed capacity of 55 MW.

## **Other RES**

Considering the abundance of sources of renewable energy, the Republic of Tajikistan is the ideal platform for learning, developing and using affordable, small renewable energy technologies. The possibility for the effective use of solar energy available throughout the country can significantly reduce the inappropriate use of electricity in the domestic sector, (and provide free energy) to priority sectors - agriculture and industry. At the present time, when energy prices sharply increased, the cost of using solar energy for domestic needs, especially for heating and access to hot water, are comparable to the cost of using electricity and other energy sources. This type of energy is becoming increasingly popular, especially in social sectors. In particular, JSC "Sistemavtomatika" deals with the implementation of programs on the use of renewable energy to design, supply, install and commission photovoltaic systems. Several projects have been implemented, notably with the financial support of the U.S. Embassy to install hot water systems and photovoltaic power systems on the Hirmandzho frontier (Shurabad district of Khatlon Province). Projects realized with the help of other sources of funding include: a hot water system in the dining room at Kohi Istiklol; a solar panel system and a solar water heater at a hospital in Jamoat Bozorboy Burunov (Vakhdat district); the installation of photovoltaic power systems at Dushanbe Clinical Hospital named after Dyakov and at the Maternal Health Institute; the construction of a heat supply system at the RCTB Hospital in Machiton village based on alternative heating sources, etc.

One of the main activities of JSC "T-rank" is the development and implementation of low cost, but socially important projects, the installation of independent autonomous power supply based on renewable energy sources (solar panels) and autonomous Internet access (simultaneously). Several projects have been implemented jointly with EAT.

External and internal investments are mainly used for the construction of large and medium-sized HPPs. Despite the great potential/capacity of renewable energy sources, their use remains limited. Low electricity prices, the lack of funding for new technology and lack of awareness among the population make renewable energy non-attractive to private investors (see Text Box 5).

### **Text Box 5:**

**Representatives of private companies identified several problems in the sector of small energy**, elimination of which can improve the investment climate in construction and operation of small hydropower plants, in particular:

**Tariff policy** in area of small energy, its appeal is the primary tool for attracting investment in construction of small hydropower plants. Legislation has been enacted in a way that "Barqi Tojik" agrees to buy electricity generated from small hydropower plant at a bargain price. However, at present, there are few practices in Tajikistan. The solution of this problem will contribute to creation of the National Trust Fund for renewable energy sources and energy efficiency

**The information field** in Tajikistan is poorly developed, and in the way of acquiring information, investor is facing with the weak capacity of the local specialists

**Technological base:** the lack of production and repair facilities for service (maintenance, manufacturing of spare parts and optional equipment) of RES installations

**Access to financing:** lack of access to financing of investment projects of sHPP is a serious barrier for development of the industry. Commercial banks do not provide favorable long-term loans because the return of long-term investments has their own risks, and financial institutions have no experience in financial analysis of investments in small hydropower plants; as a result, there is no practice of long-term loans from commercial banks for the construction of small hydropower plants.

### 3.4 KEY GAPS AND BARRIERS

---

In order to achieve the key objectives in the frames of the UN Global Initiative “Sustainable Energy for All”, Tajikistan prioritizes the following tasks to be fulfilled:

- Construction of new facilities to satisfy the needs of energy deficit, especially during the autumn-winter period and speed-up of the renovation and upgrade of the existing equipment and facilities;
- Construction of new power transmission lines both inside the country (to improve the access to energy for the population) and outside of the country (to export the energy to the neighboring countries);
- Construction of small HPPs and exploitation of other sources of renewable energy in the remote and inaccessible districts of Tajikistan that would be not cost-effective for off-grid energy supply;
- Increase of energy efficiency and energy saving in energy production sector, industry, agriculture and households.

In order to achieve the abovementioned tasks, the following priorities were identified:

1. **Improvement of the normative and legislative base and institutional reform of the energy sector:** First of all, the restructuring the energy sector of Tajikistan will require the revision of the legislation. Therefore, the revision of the Law of RT “About the Energy” is important. For the time being, the existing legislation basis created the platform for disaggregation of regular duties among the management structures of the sector. Moreover, the management of the energy issues is politicized and sometimes uncertain. The lack of independent, concrete and regular coordination often leads to unpaid bills, ignorance of interests of vulnerable population and decline of energy-dependent enterprises.

In this regard, the priority is to **establish the independent coordination body in the energy sector**. This body should be independent and isolated from the political and interdepartmental impact and will result in more efficient functioning of the energy sector, decrease of current expenses and minimize the level of corruption. These recommendations were considered in the draft of the new Law of the RT “About the Energy”, which was developed by the working group of Association of Energy specialists and was submitted to the Parliament of RT for review.

2. **Amendment of the tariff policy:** It is known that the effectiveness of the resource mobilization to the implementation of the national energy policy and creation of stimulus for better functioning of the energy sector are mostly dependable on efficient tariff policy that is able to cover the expenditures associated with energy production, transmission and supply and guarantee the accumulation of the own investments for renovation and construction of new energy facilities. The tariff practice that exist for the time being in the country is, first of all, not cost-effective, poor managed at the administration level and is often blamed by the institutions of economic sector and population as being not rational.

Moreover, the process of tariff development should be agreed and consulted **with civil society, vulnerable people and other users’ groups**, so that the preliminary assessment of the tariff plan revision is ensured and the flexibility in using the tariffs by target groups guaranteed.

3. **Involvement of private investments, in particular for the deployment of RES and development of market relations in the energy sector:** Although a series of steps were undertaken in this area, the private sector still does not have enough rights and voice in the development of energy sector of Tajikistan. Apart from the tariff setting, one of the main challenges hampering the involvement of the private sector is the weak and complex taxation, administrative barriers and limited access to credits for the development of small and medium entrepreneurship.
4. **Establishment of the National Trust Fund on RES and energy efficiency:** In order to meet the goals of the Strategy of the GoT on RES deployment, promotion of socio-economic development of the remote districts located in off-grid system but possessing good capacities in

using RES, as well as alleviating the poverty, it is necessary to establish the non-commercial organization to support and deploy the RES, named as the *National Trust Fund on RES and energy efficiency*. It is expected that the fund will facilitate the implementation of the long-term programmes aiming at construction and development of the small HPPs and other RES facilities. On the other hand, the National Trust Fund will also support the effective use of energy resource and, therefore, contribute to the national strategy to reduce the energy intensity and unproved energy consumption. The Fund will also provide organizational support for the producers of RES, especially for small ones, including local communities, and act as mediator between the systematic operator “Barki Tojik” and RES investors, ensure the regular payments and other. It is also expected that the National Trust Fund will minimize the risks associated with administrative issues (the institution with the government mandate will guarantee the payments while power production and supply), and involvement private and public investments to the RES sector.

5. **Development of the long-term Programme and promote the policy to withdraw out-dated and inefficient equipment and facilities from production in industry and other sectors**, including the improvement of normative and legislation basis on energy saving, development of new standards of energy efficiency that are echoed with international ones as well as the establishment of the laboratory to test energy-saving technology and other energy saving appliances.
6. **Development of the national production and repair base, materials and equipment for energy sector and technology transfer and know-how**: For the time being, there does not exist a modern repair and exploitation system that can serve (technical servicing, production of spare parts and non-standard devices) energy facilities in Tajikistan. Therefore, one needs to contact to the producer-country. On the other hand, the variety and diversity of the materials, devices and equipments are growing rapidly given the fact that many countries are advancing in energy development over the past time. Tajikistan has a series of relevant enterprises (“Vostokredmet”, “Tajiktekstil mash”, “Tajikenergo remont” and “Specavtomatika”) that have the capacity to produce the relevant devices and spare parts by themselves once they are modernized and equipped. They can also act as servicing companies to provide testing and repair support for the energy facilities, which function with the use of RES.

In order to address these issues, it is necessary to revise the existing normative and legislation basis in different directions, including the repair and renovation of the energy equipment and establishment of the Centre of testing and repairing of the energy devices and equipment, using the RES. Technology transfer and know-how are regulated by the legislation of the Republic of Tajikistan in the area of intellectual property aligned with WTO policy.

7. **Regional cooperation and partnership in energy sector**: The Republic of Tajikistan is a partner of many regional projects focusing on regional collaboration on energy issues. For example, in the frames of the CAREC (Central Asian Regional Economic Cooperation) the Investment Plan for the energy sector of CA for 2012-2022 was development. According to it, Tajikistan needs to attract more than 3,73 milliard USD. The key partners of the projects are Kyrgyzstan, Kazakhstan, Uzbekistan and Afghanistan. Priority projects until 2030 stand for renovation of producing capacity of Nurek HPP, Kayrakkum HPP and Sarband HPP, completion of the Rogun HPP and implementation of the CASA-1000 project. The latter envisages the regional energy trade among Kyrgyzstan, Tajikistan and Afghanistan. The investment share for Tajikistan is 270 million USD. Therefore, it is necessary to leverage investment from MFI and other donor organizations as well as expedite implementation of priority regional projects.

## Annex 1 – On-going initiatives by the Government and development partners

Title	Lead Agency	Financier	Relevant SE4ALL Goal(s) (Access/Efficiency/Renewable Energy)	Brief description and time frame	Value, US\$
<b>Energy Loss Reduction Project</b>	Barki Tajik/Tajiktrans gas	World Bank	Reduction of technical/commercial losses; improvement of access to available electricity; improvement of financial management of energy utilities	to assist (i) in reducing the commercial losses in the electricity and gas sectors, and to lay the foundation for the improvement of the financial viability of the electricity and gas utilities in a socially responsible manner; and (ii) in the viability assessment of the proposed Rogun HEP in Tajikistan.	36 mln
<b>Energy Emergency Recovery Assistance Project</b>	Barki Tajik/Tajiktrans gas	World Bank	to urgently increase the volume and reliability of the national energy supply, especially in the winter season, by supporting the implementation of the Government of Tajikistan Energy Emergency Management Action Plan	to urgently increase the volume and reliability of the national energy supply, especially in the winter season, by supporting the implementation of the Government of Tajikistan Energy Emergency Management Action Plan	15 mln
<b>Energy Efficiency Audit of TALCO</b>	TALCO	World Bank	decrease energy consumption and losses as well as estimate associated investment needs and Identify priorities for energy efficiency	Complete a comprehensive energy audit for the aluminium plant; Identify energy and in particular electric power consumption related to all equipment, processes and sub-processes in the plant; Analyze and recommend opportunities to decrease energy consumption and losses as well as estimate associated investment needs; Identify priorities for energy efficiency improvements in terms of cost-effectiveness and the potential for electricity savings;	0.07 mln
<b>Power Supply Options Study</b>	Ministry of Energy and Industry	World Bank	Energy efficiency/sustainability in power supply	To present to Government of Tajikistan an unbiased analysis of available supply options to meet the power demand in the country.	0.22 mln
<b>Central Asia Energy-Water Development Program</b>	Ministry of Melioration and Water Resources; Ministry of Energy and Industry	World Bank	effective use of the water and energy resources and energy conservation	The overall objective is to establish “roadmap” for strengthening regional energy-water modelling and analytics (decision support system) that is agreed among all countries.	
<b>Support to Energy Market Integration and</b>	EU	EU	Energy Efficiency	2009-2012 Promoting the development of sustainable energy policies and assisting Partner Countries (EECCA) in their	EUR 6 million

<b>Sustainable Energy in the NIS (SEMISE)</b>				implementation, with a particular focus on the promotion of demand-side management, energy efficiency in all pertinent sectors, renewable energies, and the mitigation of the negative impact of energy-related activities on the environment.	
<b>Energy Saving Initiative in the Building Sector in the Eastern European and Central Asian countries (ESIB)</b>	EU	EU	Energy Efficiency	2010-2012 Assistance to the beneficiary countries (EECCA) in ensuring improved control of their energy consumption in the building sector by promoting and developing EE, as well as the use of RE where applicable, in this particular sector	EUR 5 million
<b>Efficiency in Farming and Energy Consumption - Consolidating the watershed approach in Baljuvon</b>	Welthungerhilfe	EU	Energy Efficiency	2010-2013 To contribute to reduced poverty of the population in Baljuvon District through efficient use of natural resources and rehabilitation of unproductive land. Specific objective is aimed at building on successful past interventions, and widen and reinforce the used model	EUR 714,685
<b>Sugd Energy Loss Reduction Project</b>	EBRD	EU	Energy Efficiency	2011-2017 The Project aims at promoting the achievement of the following results: i) Improved technical efficiency of the electricity network attained through the installation of meters; ii) Improved financial standing of the Khujand Company achieved through a general reform programme of the energy sector (tariffs methodology, establishment of a separate billing and collection division, conduction of a gap analysis of the present regulatory framework in Tajikistan, etc.)	EUR 7 million (out of a total of EUR 21 million)
<b>Project for Introduction of Clean Energy by Solar Electricity Generation System</b>	JICA Ministry of Health of RT	JICA	Renewable Energy	Promote clean energy utilization to achieve emission reduction by installing photovoltaic system in Diyakov hospital in Dushanbe city and Maternity Hospital No. 1. The project started on 14/09/2011 and is going to finish on 15/09/2012 (12 months).	JPY 450,000,000
<b>RESET – Regional Energy Security, Efficiency &amp; Trade</b>	USAID		Access / Efficiency / Renewable Energy	This project involves linking the power systems of Tajikistan and The Kyrgyz Republic with those of Afghanistan and Pakistan. It would allow the two Central Asian nations to export power to the two South Asian nations on a seasonal basis. The RESET project itself is	approx. \$500K for Tajikistan TA

				merely a technical assistance project and does not involved the purchase of any hardware to do the linking. The World Bank and other lenders are considering financing this project's hardware needs.	
<b>Construction of small HPPS in rural areas of Tajikistan</b>	OJSC "Barqi Tojik"	Islamic Development Bank and OJSC "Barqi Tojik"	Access to energy	To provide reliable energy access to remote rural areas of the country and construction of 8 small HPPs.	\$11.589.000
<b>Construction of the regional electricity transmission lines</b>	OJSC "Barqi Tojik"	Islamic Development Bank, Asian Development Bank, OJSC "Barqi Tojik" and OPEC Fund	Access to energy and energy efficiency	The main objective of the project is to ensure energy security and link energy system of Tajikistan with Afghanistan.	\$58.067.000
<b>Integration of solar energy</b>	Ministry of Health and JICA	The Government of Japan	RES	Integration of Japan technology (solar energy) to reduce GHG emissions	\$4.500.000
<b>Regional project on energy transfer</b>	OJSC "Barqi Tojik"	Asian Development Bank	Access to energy and energy efficiency	The main objective of the project is to ensure energy security and energy efficiency for commercial purposes and industry.	\$112.500.000
<b>Replacement of outdoor switchgear (500kW) in Nurek HPP</b>	OJSC "Barqi Tojik"	Asian Development Bank	Energy efficiency	The main objective of the project is to ensure sustainable transfer of the energy from Nurek HPP to power supply system.	\$54.770.000
<b>Technology Transfer and Market Development for Small-Hydropower in Tajikistan</b>	UNDP	GEF and UNDP	RES	The project will significantly accelerate the development of small-scale hydropower (SHP) generation in Tajikistan by removing barriers through enabling legal and regulatory framework, capacity building and developing sustainable delivery models, thus substantially avoiding the use of conventional biomass and fossil fuels for power and other energy needs.	\$ 8,450,000