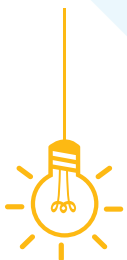




Empowered lives.
Resilient nations.

THE UNDP-GEF PROJECT “SMALL HYDRO POWER DEVELOPMENT” **GLOBAL CHALLENGES, NATIONAL PROBLEMS AND SOLUTIONS**

2010 – 2015





Ban Ki-Moon,
Secretary-General
of the United Nations,

*“Energy for a sustainable
future”, 2015*

THE UN INITIATIVE “SUSTAINABLE ENERGY FOR ALL”

“The decisions we take today on how we produce, consume and distribute energy will profoundly influence our ability to eradicate poverty and respond effectively to climate change.

Addressing these challenges is beyond the reach of governments alone. It will take the active engagement of all sectors of society: the private sector; local communities and civil society; international organizations and the world of academia and research. To that end, in 2009 I established a high-level Advisory Group on Energy and Climate Change, chaired by Kandeh Yumkella, Director-General of the United Nations Industrial Development Organization (UNIDO). Comprising representatives from business, the United Nations system and research institutions, its mandate was to provide recommendations on energy issues in the context of climate change and sustainable development.

The Advisory Group has identified two priorities – improving energy access and strengthening energy efficiency – as key areas for enhanced effort and international cooperation. Expanding access to affordable, clean energy is critical for realizing the MDGs and enabling sustainable development across much of the globe. Improving energy efficiency is paramount if we are to reduce greenhouse gas emissions. It can also support market competitiveness and green innovation.”



...Addressing energy needs in ways which relieve the burden on women and children requires integrated approaches which go well beyond the provision of electricity and fuels, and link energy services to national development priorities, including to women's and children's health, and to livelihoods, job creation, environment, transportation needs, and education.

For UNDP, access to energy is not an end in itself. It is a means to lifting human development, and ensuring that the progress countries make actually reaches the most vulnerable, including women and children.

Helen Clark,
the UNDP Administrator,

*(from her statement at the
forum "Energy and Women and
Children's Health Event,
Sustainable Energy For all
Forum", June 5, 2014,
New-York)*

GLOBAL LEVEL

Energy has a central meaning for almost each of the main issues and opportunities that the world faces today. This can be employment, security, climate change, food production and income generation - access to energy is the determining factor for all. Sustainable energy sector is necessary for reinforcement of the economy, eco-systems protection and justice achievement.

In 2011, UN Secretary-General Ban Ki-moon has launched Sustainable Energy for All Initiative. This initiative is focused on achieving three objectives by 2030:

- ▶ Ensure universal access to modern energy services.
- ▶ Doubling the global rate of improvement in energy efficiency.
- ▶ Doubling the share of renewable energy in the global energy mix.

The World Bank experts suggest that for implementing “Sustainable Energy for All” Initiative is necessary to triple investment into energy sector: from current 400 billion US Dollars up to 1.25 trillion US Dollars.

The UN General Assembly has specially noted the importance of investment into more pure kinds of energy technologies, more sustainable to a climate change. It also underlined a necessity for broadening access to a reliable, not expensive, economically effective, socially adjustable and ecologically safe energy procurement and energy sources within interests of the sustainable development.

National policy and strategy important in providing a more broad exploitation of new and renewable sources of energy and technologies for reducing carbon emissions, including purer technologies of using the extractable fuel is obvious. It is also necessary to pay a special attention to a sustainable exploitation of traditional energy sources and broadening national opportunities of population's stable access to energy supply.

FIGURES AND FACTS



One in **five** globally lacks access to the energy sources



The energy sector is the prevailing factor in the **climate change**, and its share is about 60% from a total volume of the global greenhouse gas emissions.



Nearly **3 billion** people depend on a traditional biomass such as wood substance or vegetation remnants, which are used for cooking meals and heating.



Reducing an intensity of carbon emissions in the energy sector is the key objective in reaching out long-term goals in the battle of climate change.

HOW CAN AN ACCESS TO A SUSTAINABLE ENERGY BE USEFUL?

The access to energy resources, especially sustainable energy resources, is the complex part of creating sustainable future for a developing world and it cannot only change life for a better but can:

- ▶ broaden income generation – for instance, by using solar energy and energy of small hydropower plants, irrigation pumps and obtaining energy for small and medium size businesses;
- ▶ supply energy for community hospitals, refrigerators for storing medicines, and providing mobile connection that plays an important part in trade;
- ▶ reduce time for collecting wood, and introducing pure and effective ways of heating and cooking food;
- ▶ ensure electricity so that children could continue studying during the night;
- ▶ maintain uninterrupted enterprises operation and create new opportunities for businesspersons.

NATIONAL LEVEL

Small Hydro Power Development in Kyrgyzstan is a project implemented by the Government of the Kyrgyz Republic launched in 2010 and focused on acceleration of sustainable small hydropower electricity generation in Kyrgyzstan by leveraging 20 million US Dollars in private sector investment and by introducing competitive private power framework into power grid of the KR. The project is financed by the Global Environment Facility and UNDP in Kyrgyzstan. Officially, the project has started in June 2010 after signing of the project document by the Government of the KR and by the UN Resident Coordinator.

The main executive partners are Ministry of Energy and Industry of the Kyrgyz Republic, State Agency on Environment Protection and Forestry under the GKR, Directorate for Small and Medium-scale Power Project in the Kyrgyz Republic, Center for Renewable Energy and Energy Efficiency Development.

CURRENT STATE OF POWER ENGINEERING OF KYRGYZSTAN. FACTS AND FIGURES



Electric power generation is carried out by **7** hydropower stations, **2** thermal power stations at the national level and **11** small hydropower stations of different forms of ownership.



93 % of overall power energy is generated through hydropower engineering.



Predicted shortage of hydropower energy in 2017 is **3 billion kWh**



Total installed power capacity is **3784 MW**, available capacity is **3315 MW**



Deficit of hydropower in recent years is **1.5 billion kWh**



The most efficient reduction of hydropower energy shortage is possible through small hydropower development

CURRENT STATE OF SMALL HYDROPOWER IN KYRGYZSTAN. FACTS AND FIGURES



Currently, there are **12 small hydropower** plants with a total installed capacity of **42 MW** and average annual power generation of **140.5 million kWh** in Kyrgyzstan.



Experts proposed constructing 87 new small hydropower plants with a total capacity of **178 MWh** and average annual output of up to **1.0 billion kWh** of electricity in a short term.



There is a potential of rehabilitation of **39** existing small hydropower plants with a total capacity of 22 MWh and average annual electricity output of up to **100 million kWh**.



Total gross hydropower potential estimated in our country of **172 rivers** and stream flows with water consumption from 0.5 to 50 m³/s exceeds **80 billion kWh** per year out of which **5-8 billion kWh** per year is technically suitable for exploitation.



Construction proposals for **7** small hydropower plants on the irrigation water reservoirs with installed capacity of 75 MWh and average annual energy output of about **220 million kWh**

MAIN OUTCOMES OF THE PROJECT'S ACTIVITY.

Outcome 1.

Streamlined and comprehensive market-oriented energy policy and legal/regulatory framework for small hydropower development.

- ▶ Concept of small hydropower development in the Kyrgyz Republic for 2015-2017 is developed and approved by the Government of the KR (Resolution of the GKR #507, July 20th, 2015);
- ▶ Amendments to the Kyrgyz Republic laws streamlining land tenure and water use rights to small hydropower developers are approved by the Government of the KR and submitted to the Jogorku Kenesh of KR for further approval process (Resolution GKR# 501, July 15th 2015).

For the first time, the Land Code included:

- the notion of the energy land and a detailed description of these lands (Articles 10,82)
- energy land included into the lands for water funds (article 89);
- these lands are permitted to be used for RES construction (article 90, 92).

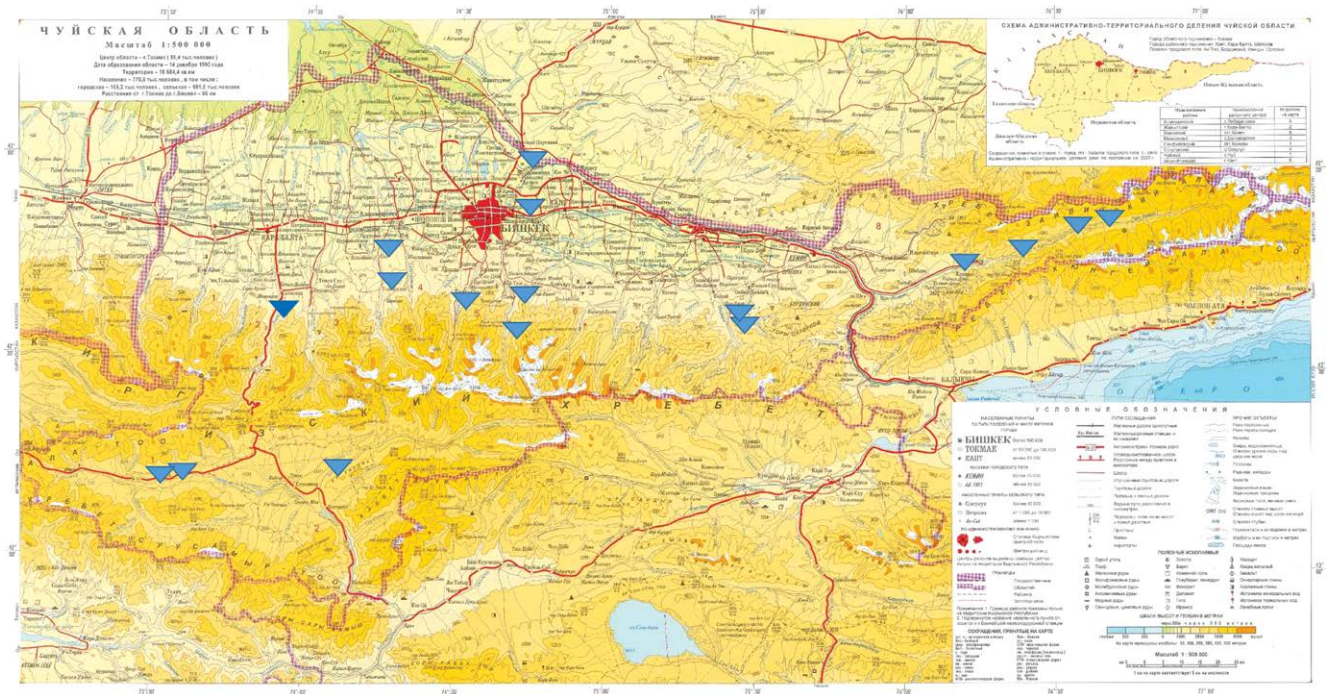
Water code for the first time mentioned a priority of water use for hydropower needs. In the first place - for drinking water, the second – for irrigation, the third – for hydropower. Priorities following hydropower are industry, fishing, sport and recreation, etc.

This draft law provides the following amendments to the Laws of the Kyrgyz Republic: «On natural monopolies in the Kyrgyz Republic», «On State Statistics» and «On the National Academy of Sciences of the Kyrgyz Republic.» These include compulsory purchase of energy generated by renewable energy sources, accounting and maintenance of the state registry on energy and the need for renewable energy research support in the field of renewable energy.

- ▶ The Law of KR “On licensing system in the Kyrgyz Republic” in 2013 included an amendment on excluding sources of renewable energy, including small hydropower plants, in obtaining licenses. This helps to create a more attractive investment climate for the development of renewable energy sources and small hydropower plants.
- ▶ The procedures for introduction of competition in the award of sites/concessions for development and construction of small hydropower plants, a standard power purchase agreement (PPA), the rules of technological connection of small hydro power plants to the electric grids are developed and transferred to the Ministry of Energy and Industry for further processing.

- ▶ The methodology of financial mechanism for calculating small hydropower tariffs adopted by the State Agency for Fuel and Energy Complex Regulation on September 18th, 2015, #06/1117 and sent to the Apparatus of the Government of KR for further processing.
- ▶ Changes to the law «On renewable energy sources» developed in 2012 providing incentives to small hydropower plants developers, such as:
 - introduction of the project payback period of preferential tariffs established by multiplying the maximum tariff for end users by 2.1;
 - ensuring a non-discriminatory access by all of the electricity companies to their networks of power generators using RES to supply electricity generated to the grid, subject to its compliance with established standards;
 - connection of plants using RES is made to the network of the electricity company, which has the lowest cost for grid connection;

*Map of perspective sites for SHP construction in Chui oblast
(maps were developed separately for each oblast)*



Outcome 2.

Capacity available within Directorate of Small and Medium-Scale Power Projects (DSMP) to evaluate the economic and financial viability of small hydropower projects and within the Ministry's RE Unit to monitor and enforce regulations related to SHP.

- ▶ In 2011, the following has been done:
 - A training module and the manual for the financial and economic analysis software of small hydropower plants projects are developed.
 - 3 trainings are held and 15 specialists from the Ministry of Energy and Industry, DSMP and other institutions are trained.
 - Ministry of Energy and Industry RES department and DSMP purchased and handed over office equipment and surveying software.
 - Field surveys of selected rivers for 12 projects of small hydropower plants in 6 regions are held; feasibility study for Karakol small hydropower plant (1,6 mW) in the Issyk-Kul region is conducted.
- ▶ In 2012, inter-ministerial Working Group on legislative acts development is created and launched under the Ministry of Energy and Industry with DSMP cooperation. The Working group has fulfilled the following during 2012-2014:
 - Developed a standard PPA from the producers of RES power.
 - Developed a standard financial evaluation methodology for calculating RES power.
 - Developed changes to the law «On renewable energy sources» and the ad-hoc allowance rates for renewable energy, adopted by the Jogorku Kenesh of KR and signed by the President of the Kyrgyz Republic.
 - Drafted 3 technical regulations for the energy sector.
 - Drafted guidance on conducting tenders for investors of small hydropower plants.
 - Conducted a study on the impact of gender-based small hydropower plants on local communities.
- ▶ On November 25th, 2014, the Government of the KR approved a new tariff policy for a thermal and hydropower energy on the basis of a financial mechanism developed within the framework of the Project and passed to the Ministry of Energy and Industry for further use.

Further development and use of the tariff policy is continued in the framework of the new independent State Agency for Fuel and Energy Complex Regulation.

*Representatives from Kyrgyzstan
on SHP development study tour
to Czech Republic*



Outcome 3.

Capacity available to assess hydrological resources, design, evaluate and implement projects, and provide maintenance and repair services.

- ▶ Programme for updating the 30-year old hydrological data on 65 economically perspective sites for SHP construction depicted on GIS-maps on <http://www.energo.gov.kg> and www.greenenergy.kg
- ▶ Purchase of equipment for the measurement of flow and velocity of water in rivers and passed to DSMP, to Center for Renewable Energy and Energy Efficiency”, RES Association
- ▶ Training on SHP development conducted for 10 specialists from Ministry of Energy and Industry of KR, Ministry of Economic Development of KR, DSMP and Association for renewable energy sources in Montenegro.
- ▶ Study tour organized together with the Czech Trust Fund in 2015 for 6 of decision-makers, businesses and civil society sector on the development of small hydropower in the Czech Republic.
- ▶ Trainings and seminars organized by the project in 2010-2014, has been provided capacity building of 47 specialists of state, business and civil sector as well as 175 experts from all regions and districts of Kyrgyzstan.
- ▶ Capacity building provided together with the draft EU CASEP in 2015 of a cross-sectoral working group (35 people), established under the Ministry of Energy and Industry for the

Government of KR and business community at the Republican conference on SHP development



development of energy saving strategies, energy efficiency and renewable energy, including small hydropower plants.

- ▶ Platform for dialogue between the Government and the business community, launched for the first time, included investors on the development of SHP. On February 17, 2015, the Republican meeting was held on the development of small hydropower plants under the chairmanship of Deputy Prime Minister V. Diehl, and with the participation of other ministers, businesses, donors and civil society. The number of participants was more than 100 people. The meeting recommended that the Ministry of Energy and Industry of the Kyrgyz Republic:
 - provide amendments and changes to the Law «On renewable energy sources» and other normative legal acts streamlining existing legislation to improve the investment climate for RES developers, including the construction of small hydropower plants (completed);
 - submit to the Government of the Kyrgyz Republic in the established procedure a draft «Concept of small hydropower development in the Kyrgyz Republic until 2017», taking into account the proposals of the participants of the meeting (completed);
- ▶ develop specific mechanisms of interaction between the public and private sector in the construction of small hydropower plants in the framework of the Law «On public-private partnership in the Kyrgyz Republic» and create a department for renewable energy sources in the Ministry of Energy and Industry of the Kyrgyz Republic (not completed due to the abolition of the Ministry of Energy and Industry)

Transfer of documentation on Environmental Impact Assessment for SHP construction on the river Chandalash from the Ministry of Energy and Industry of KR to the German investor



Outcome 4.

Full feasibility and technical design studies for 5 small hydropower sites followed by construction of power stations.

- ▶ Following documents were developed and passed onto the investors in accordance with the previously concluded framework agreements or decisions of the Advisory Group of the Project:
 - Feasibility study and working drawings for Karakol SHP (1,6 mW) and passed onto Herrmann Verftungs GmbH and Karakol Energy LLC;
 - Technical design studies for the reconstruction of hydraulic structures at Kalinin SHP (1,4 mW) on Kara-Balta River in Chui valley and passed onto Kyrgyz-France Ltd;
 - Feasibility Study and working drawings for SHP (0.54MW) on Beles River in Batken oblast and passed to Ibragimov LLC;
 - EIA for small hydropower plant on the river Chandalash (6.8 mW) was developed and passed onto Herrmann Verftungs GmbH and Chandalash Energy LLC.
- ▶ Ibragimov LLC started a construction of small hydropower (0.54MW) on Beles River in Batken Oblast.
- ▶ Meetings with representatives of the EBRD, KfW Bank, Asian Development Bank, International Finance Corporation, KICB (a local bank), the Islamic Development Bank, the Korea Development Fund KOICA, with representatives of the Turkish business cooperation in order to attract investors for small hydropower plants. However, construction started only by local investors – Ibragimov LLC on the River Beles. The main constraint to investment is the low level of tariff

for electricity generated by small hydropower plants. Even after calculating as in the Law «On renewable energy sources», where tariff for small hydropower plants is defined as multiplier of maximum tariff for electricity to consumers by 2.1, it continues to remain low for investors.

Outcome 5.

Outreach programme and dissemination of project experience/best practices/lessons learned for replication throughout the country.

- ▶ In 2010, information booklet on the state and official languages published with the largest circulation on «Development of small hydropower plants in Kyrgyzstan» and during its implementation, the project published annually 2-3 of the press releases on the actual results of the project
- ▶ In the same year, 2010, Manual published with 500 copies: Lipkin V.I., Bogombaev E.S. Micro and small hydropower plants in the Kyrgyz Republic and distributed to the scientific and technical libraries, universities, design institutes.
- ▶ In 2010, published 500 copies in two volumes of «Digest of normative legal acts in the field of energy» and distributed to the relevant organizations.
- ▶ In the same year, 2010, guidebooks on designing, equipping and functioning “Renewable energy sources in the system of energy supply of healthcare objects”.
- ▶ From 2010 to 2013, a number of articles were published on development of small hydropower energy in informational bulletins of CARTNet.
- ▶ In 2011, brochure was published on “The study of the potential impact of small and micro-hydropower plant on the social and gender development of the local communities of the Kyrgyz Republic in the places of their planned construction”. This study has allowed flexible and deep involvement of the human dimension in the matter of the impact of the use of RES on the men and women in their future work.
- ▶ In 2012, in partnership with other UNDP projects, the EBRD, the Public Fund CREED 200 copies of the brochure on five different directions was published and distributed. As «Introduction to micro and small hydropower plants», «Introduction to Energy Efficiency», «Introduction to biogas technology», «Introduction to the heat pumps», «Introduction to solar installations»
- ▶ In 2013, brochures in state language «Introduction to micro and small hydropower plants», «Introduction to solar installations»

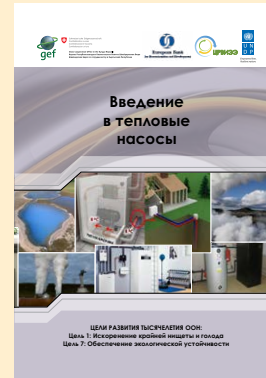
*Publications
issued in the
framework
of the Project*



Introduction to biogas
technology



Introduction
to Energy Efficiency



Introduction to
the heat pumps



Introduction to solar
installations

- ▶ In 2014, handbook “Hydraulic structures and equipment of the small hydropower plants diversion» and in 2015, “The choice of electrical equipment of small hydropower plants: in 500 copies and distributed to the scientific and technical libraries, relevant universities, colleges and design organizations.
- ▶ In 2013, together with the Center for Renewable Energy and Energy Efficiency”, in state and official languages, brochure «Introduction to the small and micro hydropower plants», 40 pp., manual on “Small and micro hydropower plant», 90 pp., published and distributed to the construction universities and colleges, relevant government agencies and NGOs.
- ▶ • In 2014, published works of the international scientific-practical conference «Energy: the state, problems and perspectives», prepared jointly with «Energy» The Kyrgyz Scientific and Technical Center under the Ministry of Energy and Industry.
- ▶ Series of articles and interviews on the Internet at the web site: www.greenenergy.kg, www.undp.kg, published interviews with journalists of local media.
- ▶ Website on the latest developments in renewable energy (www.greenenergy.kg) is launched and handed over to the administration of PF “Center for Renewable Energy and Energy Efficiency»

WHAT WAS NOT CARRIED OUT BY THE PROJECT?



Opinion of Executive Director DSMPE, Frants Sergey.

“The Project have not managed to leverage 20 million US dollars into development of small and medium hydropower that was planned in the project document. This was not because of the project failure, but due to the existing banking system in the country. The Russian private business has offered 25 million US Dollars to build 4 small hydropower plants, but according to the existing regulations the financing should have gone through local banks, demanding more than 25% for their services!!! And the remaining amount of money was not enough to build up planned facilities”.

WHAT IS EXPECTED TO FULFILL IN THE SMALL HYDROPOWER SECTOR?



Baetov B.I., State-Secretary of the Ministry of energy and industry of the KR

“We acknowledge UNDP for supporting in energy sector development, for a mutual cooperation towards the goals of sustainable energy for all. We would like to express gratitude for provided assistance in renewable energy development including small hydropower. For the past 5 years of a joint work with the UNDP/GEF Small Hydro Power Development project, especially during the last year we have managed to move forward significantly. But for the small hydropower sector to function in its full scale, it's essential to make further steps more: to create a block system of a smooth land tenure and water use for SHP construction; to build at least one pilot SHP; to practice preferential tariff period, compliant with payback period, as foreseen by the Law of the KR on RES; to elaborate financial, organizational and legislative aspects that accompany this process.”