ACADEMY OF SCIENCES OF TURKMENISTAN
SOLAR ENERGY INSTITUTE

Regional Workshop on Policy Support Mechanisms in Central Asia

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The priority goal today is providing all-encompassing, inclusive and undivided energy security. It should embrace the production sphere of the energy carriers as well as their transportation and final use. Such an extensive approach lies in the roots of the energy policy of our state, determining the content and orientation of our proposals and practical actions in this sphere.

Being one of the major world producers of the hydrocarbon resources, our country consistently stands for establishing a wide international dialogue dedicated to the issues of energy security.

The initiatives developed by Turkmenistan on the guarantees of reliability and protection of energy carriers supplies to the world markets find greater appreciation in the world. The proof of that became the unanimous support of the United Nations General Assembly shown to the Turkmen projects in Resolutions of 2008 and 2013, co-authored by more than 70 countries of the world.

The Republic of Turkmenistan

Increasing the export of its energy carriers the world market, Turkmenistan ***pursues a policy of the wide introduction of innovative, resource-saving and ecologically safe technologies, defining alternative energy as a priority direction of the national fuel and energy complex development***.

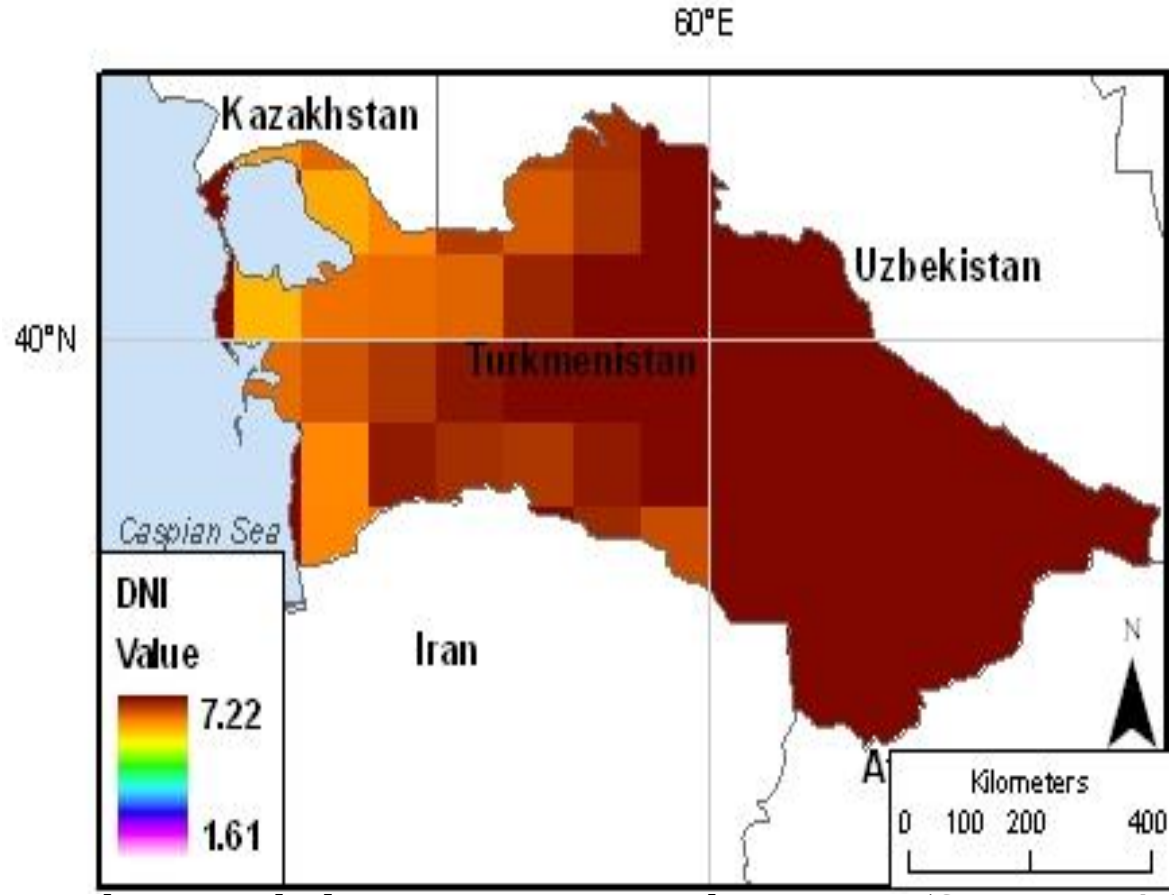
Sun and **wind** are the most prospective renewable energy sources.

The natural and climatic conditions of Turkmenistan are extremely favourable for wide use of renewable energy. The duration of sun shining in Turkmenistan is 2,768-3,081 hours per annum, almost all year round. At the same time, the wind speed in the Caspian zone is enough for the all-year stable work of wind plants.

Solar Energy

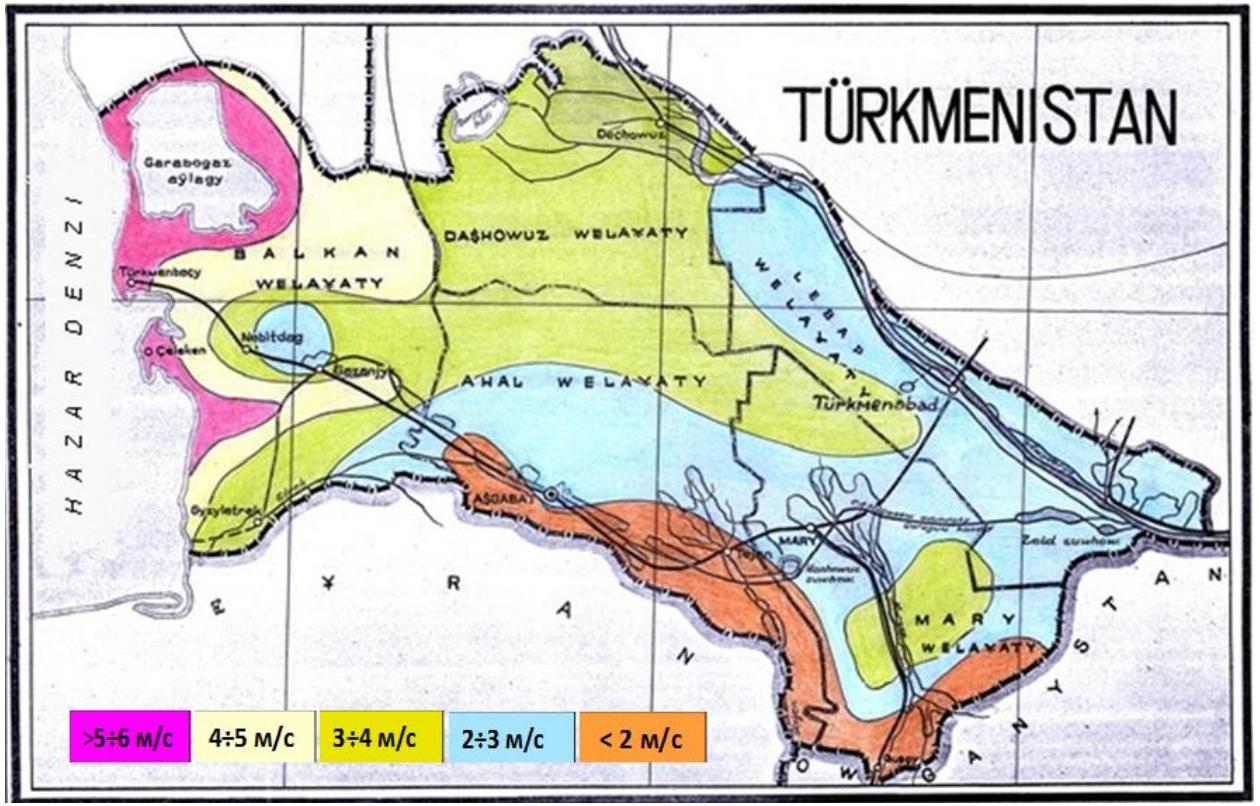
There are about 300 bright days per annum; in the vast territory of the country, the average annual intensity of solar radiation is about 700-800 W/m^2, which is equal to energy supply of 2,000 kWh/m^2 per annum to one square metre of the earth surface.

The annual energy potential of solar energy is estimated at the level of 110 billion tonnes of equivalent fuel.



Lighting with direct sunrays in Turkmenistan (Source: NASA)

The distribution of the energy potential of solar energy in the territory of Turkmenistan can be considered even owing to its latitudinal position. However, when designing solar heating systems it is necessary to take into consideration the temperature regime of the place of location of renewable energy objects. Due to low outside temperatures in winter, especially in the Dashoguz velayat (up to 20-28° C below zero) big heat losses, which can reduce the efficiency of solar heating plants, will take place.



WIND ENERGY POTENTIAL OF TURKMENISTAN

Wind Energy

Turkmenistan is characterised by a great potential of using wind energy (640 billion kW-hr per annum). Up to 40% of the country's territory are favourable for using wind energy. The western and north-western regions (including the Caspian zone) where the wind speed of more than 4 m/s prevail are most favourable for wind energy development.

In the northern Caspian coastal zone the specific power of air flow is comparatively great, about 110-135 W/m^2.

The map was drawn in 2009-2010 and reflected the enlarged regionalisation by the prevailing average annual wind speed.

The map allows estimating as a rough approximation the wind energy sources in different parts of Turkmenistan and developing a necessary complex of wind energy activities.

The high level of the wind energy potential is characteristic of the Balkhan-Kopetdag corridor, more than 150 W/m^2. In the central region up to the northern border the specific power of wind not more than 100 W/ m^2 prevails.

As a whole, the wind energy potential can be estimated at 5.5 billion tonnes of equivalent fuel per annum.

The hydropower resources of the country include such large trans-boundary rivers as the Amudarya, the Murgab, the Tejen and the Etrek as well as twenty small rivers flowing down the northern slopes of the Kopetdag Mountains. The largest river is the Amudarya 1,000 km long, supplying with water about 95% of the country. It flows along the plain part of the territory of Turkmenistan, and the construction of special dams on it is not rational.

The construction of hydropower stations along the riverbeds of other rivers (the Murgab, Tejen and Etrek) is not economically rational either owing to their shallowness. But it is rational to use small water turbines with the capacity of 0.5-2.0 kW on small swiftly flowing mountainous rivers to supply individual consumers with electric power.

Turkmenistan has small operating capacities of hydropower.

At present, the domestic needs in electric power are fully satisfied at the expense of the using the country’s own capacities.

Turkmenistan Develops the Study of Alternative Energy Sources

The natural and climatic conditions of Turkmenistan are extremely favourable for the wide use of such alternative energy sources as solar, wind, geothermal and biomass ones to produce electric power, biofuel, heat and cold.

In order to increase the role of renewable energy sources in the energy balance of the country and to develop alternative energy, the following measures will be taken:

- Further support of the scientific research and tests renewable energy technologies and their adaptation to the climatic conditions of Turkmenistan;
- Introduction of small and medium renewable and alternative energy plants in the remote and sparsely populated areas in the nearest future;
- Introduction of domestic production capacities and increase in the share of renewable energy in the energy balance of the country in the medium and long terms;
- Creation of economic impetuses for using alternative energy sources.

The State Commission for ensuring the execution of Turkmenistan's commitments, following from the UN Conventions and Programmes on environment, was established in 1999.

- The State Commission, as the main body realising the sustainable management of environment, is called to promote the introduction of principles, goals and tasks of sustainable development into all spheres of the state and social life of the country in accordance with the National Programme of the Socio-Economic Development of Turkmenistan until 2030.

Now great attention is paid to implementing actions relating to climate change.

The National Strategy of Turkmenistan on Climate Change in 2012.

- Within the framework of the Strategy the development of renewable energy takes a special place.
- The Institute of Solar Energy functions within the Academy of Sciences.
- The field of investigation of the Institute includes scientific and technological research, design and creation of sample systems and units for desalination, water extraction from wells and holes, hot water supply, heating, cooling, drying, research into the property of materials under high temperatures, growing and processing of algae biomass, utilisation of waste products of agriculture for producing biofuel and creation of comfortable conditions for the people, living far from the centralised systems of power, heat and water supply, with the use of wind and solar complexes.

At present, two photovoltaic stations with the capacity of 2 and 6 kW operate at the Institute of Solar Energy.

In total, there are small photovoltaic stations with the total capacity of about 100kW operating in the country.

Wind Energy

Based on the wind energy survey, the wind energy sources, capacity, duration of operation and downtimes, efficiency of different equipment and their regionalisation were determined, and requirements for wind plants designed were formed for the most efficient use of wind energy sources of this or that region.

The work done allowed determining that for the regions of Turkmenistan with the average annual wind speed less than 4 m/sec wind turbines with the vertical axis are more suitable. That was why the Institute designed a wind turbine with the vertical axis.

For the wide use of renewable energy sources in Turkmenistan specialists are trained for working in the sphere of solar and wind energy.

The Turkmen State Energy Institute train specialists in alternative energy sources.
A laboratory in renewable energy sources has been established at the Turkmen State Institute of Transport and Communications.
The State Conception of the Development of the Energy Branch of Turkmenistan 2013-2020 envisages searching for possibilities of electric power production using renewable energy sources.

It should be noted that the Conception and the *Joint Action Plan between the Government of Turkmenistan and UNDP 2016-2020* plan to realise a project for research into possibilities of using renewable energy sources in electric power production.
The aims of the project are rendering technical support to the Ministry of Energy of Turkmenistan in realising the mandate in renewable energy sources, training engineers and exploiting solar and wind plants.
There are regions in the desert parts of the country (about 80% of the territory) where it is economically and ecologically expedient to use not traditional fuel but alternative energy.

In 2012, the National Strategy of Turkmenistan on Climate Change was developed. According to it, the Action Plan is to be developed to take measures for preventing climate change and adapting the national economy to the corresponding changes. The plan is intended for all branches of economy, but the emphasis will be put on its key sectors (industry, transport and housing and communal services). The priority directions will be the following:

Introduction of energy efficient and energy saving technologies; development of the alternative energy sphere;

Technological modernisation to ensure the future development and competitiveness of the country's economy.

To realise successfully the tasks set by the government it is planned the following:

– development of the national law on energy efficiency;

– improvement of the legislative basis;

– establishment of a special state organ responsible for the energy-saving sector;

– development of the national programme for energy efficiency;

– development of a strategy of renewable energy development;

– granting of tax privileges for investors into the renewable energy sector;

– exemption of organisations from import duties for renewable energy equipment.

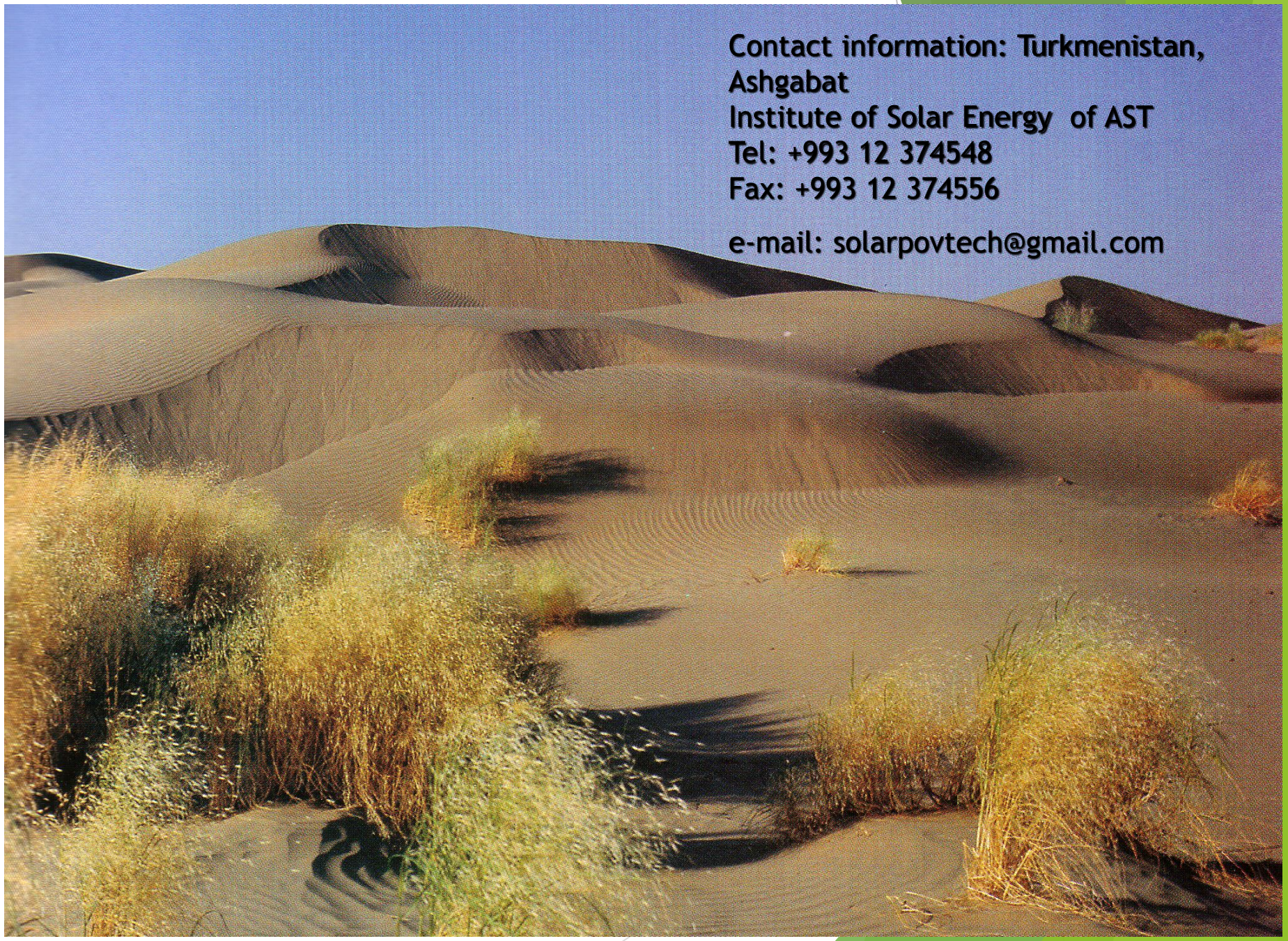
Thus, Turkmenistan is in the process of creating energy efficient and ecological economy.

The Energy Strategy of Turkmenistan 2030 is being developed. The Draft Energy Strategy highlights the following priority directions of development:

- Raising the efficiency of using fuel at electric power stations due to he tmodernisation of fuel-burning systems;
- Raising the energy efficiency of the municipal services and industry and modernisation of the heating systems;
- Taking measures for energy efficiency in the housing sector and industry;
- Increasing the share of renewable non-mining energy sources in the energy balance.

The draft law on energy saving and energy efficiency has been developed.

THANK YOU FOR YOUR ATTENTION!



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