

Asian Cooperation in the Sphere of Renewable Energy

V.K. Strukova

Abstract. Renewable energy plays an important role in ensuring the energy needs in countries with growing economies, and its value over time will all increase. Cooperation is one of the most effective mechanisms that accelerate the development of RES in the region.

Keywords: renewable energy, the Asian region, energy cooperation

I. INTRODUCTION

Renewable energy is currently one of the fastest growing areas of business. Biomass, geothermal and hydropower, solar and wind energy are of great interest in various countries. State of the Asian region do not remain aloof from this field of energy, adopting bills and stimulus packages to promote the ideas of energy efficiency and maintenance of ecology. At the same time, unlike in developed countries of Europe and America, it is often extremely difficult for Asian countries to develop and carry out on their own reforms and changes, that are required for the development of renewable energy sources (RES), because of existing financial, social and environmental problems. Then energy cooperation comes to the aid.

II. THE NECESSITY OF RES DEVELOPMENT AND PROBLEMS

Development of RES in the region is of great importance for the following reasons:

1. It allows to make a contribution to solving the problem of global climate change;
2. It gives a chance to increase the country's energy self-sufficiency and diversify energy balance;
3. It is consistent with global trends in the energy sector.

Support of the growth of electricity generation on the basis of renewable energy technologies retards the depletion of natural resources reserves and contributes to the replacement of imported energy to the resources available within the country.

However, like other states, that make renewable energy a priority direction of development, Asian countries face at the initial stage serious challenges and problems. In developing countries, the main obstacles for the development of renewable energy are:

- high initial investment costs,
- lack of access to finance,
- low level of technical knowledge,
- lack of information dissemination
- lack of technical expertise,
- limited number of suppliers of technologies of renewable energy,
- inefficient distribution and marketing,
- weak or completely lacking financial and fiscal incentives,
- capacity that is inconsistent with the required characteristics necessary for the implementation of technology and research process,
- lack of institutional framework.

Depending on the country, the challenges are varied.

III. CURRENT SITUATION

At present, most Asian countries are characterized by initial development of renewable energy. This does not mean that the use of renewable energy for the region is the new trend. In many Asian countries, large hydropower evolved quite a long time ago (more than 20 years ago), combustible renewable energy sources and waste are widespread in the energy use. If we talk about hydropower, this field of renewable energy industry is mature enough and has favorable economic viability in the region, but its potential is rather limited in many countries [3]. The use of biomass and waste is also not an innovative area, these fuels are used mostly for thermal energy, or used in cogeneration power plants (together with coal). At the same time now a global understanding of renewable energy technologies primarily imply the use of new technologies, innovation, and combating environmental pollution. From this

V.K. Strukova is with Energy Research Institute, Russian Academy of Sciences, Moscow, Russia (e-mail: vera.strukova@gmail.com).

point of view, the level of development of renewable energy in Asia is really low.

Unfortunately, data and statistics on the development and use of renewable energy is difficult to compare for many countries, because they are often not representative (potential resources are unvalued or their significance is not understood). If data exist, they are given for countries by their national sources for the TABLE I

country; and there are very few competent sources that provide relevant information throughout the region. For this reason the statistical part of this paper will include data for 2007 provided by the International Energy Agency (IEA) and the most recent available (Table 1). It gives a possibility to compare the development and use of renewable energy situation across the region.

ENERGY PRODUCTION AND THE SHARE OF RES IN ASIAN COUNTRIES

Country	Total primary energy supply (TPES), mln. toe	Of which RES, mln. toe	Share of RES in TPES, %	Share of main fuel categories in total RES,%		
				Hydro	Geothermal, Solar, Wind, Tide	Combustible RES and Waste
India	595,3	173,5	29,1	6,1	0,7	93,2
Indonesia	190,6	59,4	31,2	1,6	10,2	88,2
Kyrgyzstan	2,9	1,2	41,3	99,7	-	0,3
China	1955,9	241,3	12,3	17,3	2,1	80,6
Pakistan	83,3	30,7	36,9	8,0	-	92,0
Russia	672,1	19,4	2,9	78,5	2,2	19,4
North Korea	18,4	2,2	11,9	52,4	-	47,6
Tajikistan	3,9	1,5	37,7	100,0	-	-
Philippines	40,0	17,2	43,0	4,3	51,1	44,6
Japan	513,5	16,3	3,2	39,0	21,9	39,1

In countries such as, for example, South Korea, Kazakhstan, Uzbekistan, Turkmenistan, Mongolia, Malaysia, Singapore, renewable energy represents not more than 3-5% of total energy production, most part is combustible RES and waste. Russia stands out separately, with the share of renewable energy equal to 3%, but the main role in this index is played hydropower. Then in Pakistan, India, Indonesia and Thailand, the share of renewable energy is from 20 to 40%, with "extreme" values in North Korea (12%), China (14%) and in Cambodia (70%). In this group of countries, renewable energy is represented by more than 50% by combustible renewable energy and waste, and hydropower (in case of China wind energy is also developed). The next group of countries - Tajikistan and Kyrgyzstan - are characterized by a high share of renewable energy in total energy production (39 and 45% respectively), presented by hydropower. In the last group used RES are the most diverse: solar energy and combustible RES and wastes in Philippines (49%) and hydro, wind and solar

energies and combustible RES and wastes in Japan (3%).

Thus, as seen from the statistics in the Asian region "countries with the largest share of RES in energy production" and "countries that are technologically advanced in the use of renewable energy sources" are often represented by different states. Kyrgyzstan, Pakistan, Tajikistan and Philippines are countries with the highest shares of RES in TPES. But between these states only the latter can be characterized as a country using innovative technologies in renewable energy (among RES the most developed technology is geothermal energy - 8.8 million toe in 2007). Leaders in the growth rate of the production of energy from RES and use of new technologies in this area are China, Japan, and India. At the end of 2009 the installed capacity of wind turbines in Japan amounted to 2,056 MW, India - 10 926 MW, while in China - 25,104 MW (which is comparable with that of Germany - 25,777 MW). With regard to solar

energy, the installed capacity of solar cells in Japan together with Germany and Spain is about 75% of global installed capacity of solar cells.

The contribution of RES in electricity production also gives an idea of the role that the "clean" energy could play in maintaining sustainable development (Table 2).

TABLE II

ELECTRICITY GENERATION AND RES SHARE IN ASIAN COUNTRIES

Country	Total electricity net generation, bln. kWh	Of which RES electricity net generation, bln. kWh	Share of RES in Total electricity net generation, %
India	787,55	130,57	16,6
Indonesia	142,24	18,31	12,9
Kyrgyzstan	n/a	10,61	n/a
China	3221,80	537,92	16,7
Pakistan	90,43	27,70	30,7
Russia	983,00	162,97	16,6
North Korea	n/a	n/a	n/a
Tajikistan	16,08	15,76	98,0
Philippines	57,77	20,00	34,6
Japan	1009,45	93,93	9,3

IV. ENERGY COOPERATION

Government financial initiatives to support renewable energy sources are of great importance in promoting the development of commercial markets and reduce capital costs and life-cycle costs of renewable energy equipment. Other necessary incentive policies are:

- effective long-term planning;
- careful establishment of priorities;
- coordinating programs with the participation of various government and commercial institutions (long-term research and technology transfer programs);
- establishment of organizations for further development of renewable energy technologies to increase energy efficiency and renewable energy;
- creation of cooperation and coordination mechanisms (including public and private sectors). [5]

Cooperation is one of the most effective mechanisms that accelerate the development of renewable energy in the Asian region.

Areas of cooperation are:

- the establishment of a framework of energy cooperation;
- improving the quality of energy data and statistics;
- priority of energy efficiency and energy saving;
- promotion of renewable energy.

To promote the development of renewable energy in Asia, countries in the region need: a specific policy on renewable energy, technological and financial support. For this reason different kinds of cooperation are already developed and implemented. There are two possible classification of cooperation in the sphere of renewable energy. Firstly, by engaged foreign aid:

- 1) Cooperation within the region (within regional organizations and individual countries);

- Eight countries in Central Asia are partners in the energy sector within the Central Asia Regional Economic Cooperation. The strategy of member countries in terms of investment activity is aimed at the development of alternative and renewable sources of energy.
 - An example of cooperation within the region is also the Association of Southeast Asian Nations (ASEAN), one of the objectives of which is promoting the development of new and renewable energies as a tool for sustainable energy development in member countries. Asian cooperation is carried out including in the framework of the Intergovernmental Collaborative Mechanism on Energy Cooperation in North-East Asia (one of the participating countries is a Russia). This five-year strategy that since 2010, particularly in the area of renewable energy, is aimed at the development of a database on the use of renewable energy by countries, the promotion of joint action in the development and use of renewable energy, the definition of policies, practices and measures to improve energy efficiency, use renewable energy and energy efficiency .
 - With regard to cooperation between individual countries in the region, it is formed by bilateral and multilateral agreements. For example, in 2005 an agreement was concluded between Russia and Japan, implying, among other areas, bilateral cooperation in the field of new and renewable sources of energy (sharing of information, developing effective mechanisms for training of Russian specialists).
- 2) international cooperation (within the framework of international organizations and individual countries).
- An important role in promoting renewable energy in Asia is played by international organizations established by developed countries of Europe, America and Asia. For RES it is primarily the International Renewable Energy Agency).
 - Within the established by United Nations UN Economic and Social Commission for Asia and the Pacific a special project to support the development of institutional mechanisms of cooperation "to increase the capacity of member countries in the use of renewable energy" was introduced. This project's aims were to collect and disseminate relevant information, identify best practices within other countries, the development of capacity for implementing RES projects, as well as promotion of research and development. Subsequently, in 2008 to increase the efficiency of action in these four areas there has been established the Renewable Energy Cooperation Network for Asia-Pacific.
 - If we talk about international cooperation, the Asia Pacific Partnership on Clean Development and Climate can serve as an example. It was created jointly by Australia, Canada, China, India, Japan, South Korea and the United States. In the field of renewable energy, the initiative aims to identify the needs and potential of member countries, to promote cooperation, to study advantages and disadvantages of various projects, etc.
- Secondly, by engaged actors the cooperation can be:
- 1) interstate;
Examples are bilateral and multilateral agreements between countries, such as Russia-Japan agreement, or cooperation between ministries: in 2007 between the Ministry of Industry, Energy and Tourism of Iceland and the Ministry of New and Renewable Energy of India a memorandum on cooperation in the field of renewable energy was signed.
 - 2) between manufacturing companies;
As an example – by the London company Green Gas International BV and the Singaporean company Asia Renewables Pte. Ltd. a company Asia Greentech Pte Ltd. Was

established in Singapore in order to create a joint venture (JV) to build, own and operate renewable energy projects throughout Asia. The new company is aimed to develop projects utilizing coal mine gas, biogas and biowaste. [7]

3) between research institutions;

In the field of renewable energy in different directions there is cooperation between different research institutes of the Nordic-Asian research funding cooperation NORIA-net with various agencies, organizations and institutions of China and India. Also, as an example - the National Environment Agency in Singapore conducts applied research in the field of renewable energy in conjunction with other research institutes in Singapore and other Asian countries.

4) between banks and other financial institutions;

In this case we can speak about the agreements and programs among international banks (Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), financial institutions of the World Bank Group).

5) mixed cooperation.

An example is the cooperation of Asian countries' governments (eg. Vietnam, the Philippines, Thailand) with the Asian Development Bank and the World Bank Group, which consists of providing funding of the development of new technologies and projects in the field of renewable energy, energy efficiency and climate change. In particular, the World Bank has created a special Asia Sustainable and Alternative Energy Program which main activities are financing, project development and other assistance to increase the levels of energy efficiency, renewable energy use and reduce CO₂ emissions in East Asia (for the period 2007-2009 within the Program there has been paid 5,2 million US dollars [6]).

5. CONCLUSION

In the short-run and long-run periods the sector of 'clean', renewable energy will be an important element of the Asian economy and national development plans, being a concept

of sustainable development, entering into other spheres of the economy.

To increase quantitatively and qualitatively the level of development and use of renewable energy, the Asian countries need to receive information, share experiences and technologies not only within their region, but also with the world's leading economies that have achieved high performance in the field of renewable energy and use the latest technologies and equipment. It allows not only to increase production efficiency, but also to make a contribution to maintaining social stability and protect the environment. In this situation, the best mechanism is the energy cooperation.

Despite the fact that the development of renewable energy resources is not on a high level in Asia, cooperation between the countries of the region and the world is already widespread and takes places in different directions. Of particular importance is cooperation with the countries-leaders in the field of renewable energy, as well as international organizations that support Asian countries not only through assistance in developing policies, projects, etc., but also through funding. However, partnerships within the region are also very important, because neighboring countries are aware of the conditions in which the development should be promoted, and the barriers that should be faced.

Unfortunately, if we compile a rating of the Asian region countries by their participation activity in international and regional programs and initiatives on energy cooperation in the field of RES, the Russian Federation will take one of the last places. In this area, interaction between Russia and other countries is represented only by a few selected articles of general bilateral agreements on energy cooperation. Despite the fact that Russian Federation is rich in such types of hydrocarbons, like oil, natural gas and coal, the development of renewable energy can play an important role in positioning the country on the international arena, as promotion of renewable energy - is a matter of increasing the level of not only energy self-sufficiency and security, but also

international prestige. It is for this reason the development of renewable energy is a priority direction in many other countries in Asia.

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VII. BIOGRAPHY

Vera K. Strukova works as analyst of the Centre for International Energy Markets Studies of the Energy Research Institute, Russian Academy of Science, Moscow, Russia. She graduated from the State University – Higher School of Economics, Faculty of World Economics and Politics in 2009. Major interests include following research fields: renewable energy, energy efficiency, world economy development perspectives.

