

Energy and Other Examples of Sustainable Development

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Chaired by:

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Introduction

The Central Asian Region is abundantly endowed with many different types of energy resources, both renewable and non-renewable. In the past, emphasis was primarily on exploitation of energy resources and not on sustainable use. With increasing recognition of the environmental impacts and degradation of natural resources, the countries of Central Asia are beginning to undertake different measures towards environmental sustainable use of energy resources. This is not, however, feasible without some major changes in the economic activities that are the primary sources of demand for energy. With changes in the economic scene, many adjustments are needed in terms of investments, pricing, and distribution of energy resources. One move towards harnessing renew-

able resources is a new effort that has been encouraging.

The Central Asian Region needs to promote stronger regional cooperation in the area of sustainable use of energy resources. The geography, the past history, and the future needs of the region emphasise the role of regional cooperation as well as specific measures within each of the countries.

Major Issues and Experiences

REGIONAL COOPERATION IN THE USE OF WATER AND FUEL AND ENERGY RESOURCES

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The Central Asian Region has significant power resources, such as fuel, located basically in Uzbekistan, Kazakhstan, and Turkmenistan, and hydropower, mostly in mountain and other regions of Kyrgyzstan and Tadzhikistan.

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The stocks of organic and mineral fuel in the region, as well as available water resources, are limited and underscore the necessity of their rational use.

The basic reason limiting cooperation is the aspiration of the republics to avoid dependence on others for power.

With the formation of the independent states, the situation has changed in Central Asia. Since 1991, complications of interstate connections and the introductions of national currencies, rises in prices of petroleum, coal, gas and tariffs for rail transportation, and reduced deliveries of fuel and electricity have affected the fuel and energy balance in the region. At the same time, production of fuel has sharply decreased, forcing households to cut back drastically on the use of energy for heating and even cooking. There are also changes in the seasonal availability of water, giving rise to a complex set of interrelated problems.

The aspiration of each country to use the available energy resources most efficiently, at the same time not creating problems for other countries in the region, makes it necessary to work out plans and programmes for the balanced use of water and other energy resources in the region. The coordinated water and power policies of the republics of Central Asia directed towards joint development and cooperation in use of fuel and energy and water resources are obviously a very high priority for the region.

WIND ENERGY IN XINJIANG

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China is comparatively rich in wind energy resources. Two hundred and fifty-three million kW of wind energy are distributed widely from south-east China to Gansu Province. Xinjiang is not only rich in oil but also has a vast potential

for wind and solar energy. This is currently being harnessed and distributed mainly in the northern part of Xinjiang throughout a total area of 150,000sq.km. Forty kilometres from Urumqi City, from an area of 10,600sq.km., two million kW of wind power can be supplied.

The harnessing of wind energy in Xinjiang started in the mid-1980s and the total installed capacity was 196 Megawatt using small generators. In 1986, 100kW wind turbines were installed. In 1989, 13 sets of wind turbines with a capacity of 150kW were imported and installed with Danish grants. Between 1992 and 1995, 33 sets of wind turbines, generating 300kW and 500kW, were imported and the first wind farm was established.

Currently the total capacity of wind turbines has reached 66.3 Megawatts. Wind power has advanced from the testing and demonstration stage to proper usage for Xinjiang's energy-consuming industries.

By 2,000, the planned target for the wind energy generated 150 to 200 Megawatts, and five years hence it is 350 to 400 Megawatts. The estimate is that each year there should be an increase of from 30 to 50 Megawatts. A series of strategies has been made to achieve these targets.

The benefits from wind energy are that it is not harmful to the environment in comparison to other forms of energy; the construction period is short; it is easy to construct and operate, and it is relatively cheaper than other renewable sources.

The Government has made certain laws and regulations to develop wind power in Xinjiang and the country as a whole. However, in order to harness this energy resource effectively a proper overall construction plan should be made by the government.

MANAGING WATER FOR A SUSTAINABLE ENVIRONMENT

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The interdisciplinary approach to common problems is obviously the best way to deal with them. These problems also require the participation of the communities who will benefit from their solution because the systems finally accepted after discussion are best managed by the communities themselves. Other conditions that are also becoming compelling are low energy use and recycling to avoid pollution and further damage to the ecosystem.

Erosion is the result of inadequate vegetative cover in watershed areas, resulting from agricultural or activities permitting unrestricted grazing of animals or the building of roads and industrial infrastructure. Watershed management could provide significant employment with complementary use of the area for eco-recreation.

Pollution is the result of inadequate waste treatment and can be controlled by proper treatment and recycling. Industrial waste water can be treated and re-used almost totally. Similarly, sewage after proper treatment can be used for irrigating crops and recharging ground and surface water.

At the Water Environment Federation's (WEFTECH) Conferences held in March 1998 in Bombay, Singapore, and Kuala Lumpur, papers were presented that referred to the desirability of using biological processes for treatment of sewage. These are the most economical systems in which the energy requirement is just a fraction of that of mechanised systems requiring aeration. Even chemical oxygen demand (COD) as high as 5,000ppm — including industrial chemicals — can be reduced to less than 200

ppm in five days' retention by the use of lemna, duckweed, and other aquatic plants. Rootzone treatment similarly shows promise. Where much higher COD figures are involved, as in distilleries and breweries, Upflow Aerobic Sludge Blanket or Fixed Film Aerobic Reactors followed by the natural systems referred to above could be considered.

SOLAR ENERGY IN XINJIANG PROVINCE
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The representative of Shell Company began by notifying the audience about the series of products they had displayed. Then, focussing on Xinjiang, he pointed out that the Province is rich in energy resources such as natural gas, solar, and wind energy. He added that Xinjiang's solar energy was unique. The region's solar energy radiation amounted to a total of 5.8 x 10m peta joules, which is 10 to 15 per cent more than in other regions at the same latitude. Xinjiang stands second in terms of solar energy resources in China; 2,500 to 3,500 hours annually. The potential market for solar energy in Xinjiang is underdeveloped.

Owing to poverty, remoteness, and dispersed settlements, not many have access nor can they afford electricity. Using public grids is neither economical nor efficient. Therefore, against such a background, it is better to use wind and solar energy as they adapt better to local conditions.

The Solar Energy Institute, which has been set up in Xinjiang, has carried out research on energy options and has been awarded 10 prizes already. In the context of solar energy products, solar heaters and household power sources have been well received by the public. The institute is interested in joining hands with others wanting to produce solar energy-based products in institutional ex-

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change programmes. Some of the first products were produced in collaboration with France and included the solar energy pump system and batteries. Later, in 1996, Holland assisted in initiating the 'Bright Project' in Xinjiang. Besides active participation in the project, the institute has also made attempts to popularise solar energy systems at the household level.

SUSTAINABLE AGRICULTURAL DEVELOPMENT AND ENVIRONMENTAL PROTECTION IN XINJIANG

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Lying in the centre of the EuroAsian continent, Xinjiang is characterised by an arid climate and wide distribution of deserts. The land is sparsely populated in the oasis which covers a relatively small area and is surrounded by desert. As a land with a long history of civilisation, agriculture plays the most important role in productive activities, along with the development of water and land use in the region. This creates heavy pressure on the fragile environment. With rich natural resources, Xinjiang has been determined as an important development area for China in the next century. The development of agriculture will reach a new level, as will the pressure on the environment. The development and protection of the environment are keys to the sustainable development of agriculture in Xinjiang.

In Xinjiang, agricultural development was achieved by expanding the area of cultivated land before the 1980s. The development of agriculture in Xinjiang can be divided into five main stages.

The Period of the Qing Dynasty to Minggu - The first era of large-scale land development was introduced in this period. The production of agriculture was not stable in this period because of continued wars.

1949-1957 - The area of cultivated land was expanded continually in the early period of the new-founded China and many state-run farms were set up in this period.

1958-1967 - This was a special period for the development of agriculture in Xinjiang. The area of cultivated land reached its highest level in 1963. However most of the land did not show increasing productivity.

1968-1995 - Sub-stage one (1968-1976): This was the period of the so-called cultural revolution. Agricultural production decreased rapidly, the area of cultivated land decreased by about six per cent compared to 1967, and the productivity decreased by seven per cent.

Sub-stage Two (1977-1995) - This was a period of increased production and efficiency. On the one hand, the policy of reforms aroused the enthusiasm of the farmers and, on the other hand, the improvement in agricultural techniques and the construction of the windbreak forest system supported agriculture effectively.

Although agriculture has developed greatly in Xinjiang to feed the increasing population, its continued expansion has brought about many environmental problems. Among the main problems are desertification, salinisation, and degradation of the land. Balanced use of water resources so that they are not all used for irrigation, controlling overuse of grasslands, and better understanding of the oasis environment are some of the important priorities for the future.

Recently, more and more people in Xinjiang have begun to understand the importance of environmental protection as well as the role of balanced use of water and land resources. Environmental protection is now a part of the government's long-term plan, and the legal

system related to environmental protection is also being completed.

PRINCIPLES OF SUSTAINABLE USE OF BIODIVERSITY

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The strategy of sustainable and balanced use of biodiversity is based on the principles of the Agenda for the 21st Century. This new global policy direction has become the basis for development of the national strategy and plans of action and the ideology behind the reforms. It is focussed on the search for non-traditional approaches to improving the well-being of the people and a deepening of cooperation for the achievement of regional ecological safety based on global flows of material and intellectual resources.

The Republic of Kazakhstan has adopted the general principles of sustainable development outlined by the World Commission on Environment and Development. It has emphasised the importance of protecting nature in all international contracts in the country. It has established the Ministry of Ecology and Natural Resources for necessary coordination in the control, regulation, and use of environmental and biological resources. In order to conserve the biological diversity of the country, it has introduced adequate provisions in all aspects of investment, trade, technology, and prices. While identifying the permitted thresholds for influencing the environment, it has also maintained that the responsibility lies with the users of natural resources for alterations in the condition of the environment and for transboundary pollution. Many manda-

tory, ecological sanitary-epidemiological examinations of projects, products, and programmes have been introduced. Proper economic accounting methods, along with appropriate databases and monitoring, are also being developed. The basic purpose behind all these measures is conservation of the environment and strengthening of the natural resource potential of the Republic, as well as maintaining a balanced use of resources and a safe environment.

Conclusions

The presentations and the discussion that followed raised the following points.

- ▶ Economic changes have severely affected the availability of energy inputs and households are experiencing great difficulties in accessing energy resources even for their day to day needs.
- ▶ Increased regional cooperation is needed for balanced use of energy resources and the management of transboundary pollution.
- ▶ Xinjiang has made substantial progress in developing the capacity to harness wind energy, and other countries could benefit from this development as well as from their experiences.
- ▶ Energy is a derived demand and consequently without changes in economic activities there would be little change in the use of energy resources or in environmental impacts. In the selection of economic activities and choice of technology, more emphasis on sustainable methods is needed.
- ▶ Energy resources cannot be seen in isolation and need to be reviewed in the context of the country's development; including regional and international considerations.

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