CRITICAL FACTORS IN DETERMINING THE SUCCESS OF RENEWABLE ENERGY PROJECTS IN SOUTH ASIA

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In South Asia, as in other parts of the world, a number of renewable energy projects were started with a great deal of enthusiasm after the oil shock in the seventies. Many of these collapsed within a few years of their implementation, either due to the declining oil prices or because of the institutional and other reasons. In the backdrop of rising demand for commercial energy, while constrained with shortage in indigenous supply and price volatility of imported fuel coupled with environmental concerns, Renewable Energy (RE) development has become an important issue in energy-management and economic development in all the countries of the region in recent years. Each country has initiated actions to formulate RE policy for the country. Bangladesh, India, Pakistan and Sri Lanka have formulated RE policies exclusively, or as a part of energy policy for renewable energy development. Some of the countries have specific policies in respect of certain RE resources and have made institutional arrangements for promotion of renewables. Most of the national policies focus on providing incentives to promote Renewable Energy Technologies (RETs) by way of subsidy or tax concessions. The use of feed-in-tariff to encourage the sale of electricity through the use of RETs is slowly gaining momentum. It is encouraging that all countries are aware of the importance of development of RETs for energy security and environmental protection. In fact, all the countries in the region have, often with the technical and financial assistance of external agencies, experimented with many renewable energy technologies, devices and methods of dissemination. Among the projects, some have proved to be of outstanding success, while others launched with high expectations could not deliver as anticipated. Even among the unsuccessful projects, some are still languishing as pilot schemes, some have been abandoned. In respect of the successful projects, the countries are attempting to replicate these to the best extent possible.

Keeping in view the above-mentioned facts and the importance of renewable energy, the SAARC Energy Centre under its Technology Transfer Programme conducted a study in 2008 on renewable energy projects in SAARC Member States, by engaging seven country experts and a regional expert. Country experts prepared reports of their respective countries and the regional expert, Prof. T. L. Sankar, from India, synthesized them to prepare the regional report. The study covers brief energy status, status of RE policies, RE potential and overview of RE projects in the past 30 years with special emphasis on identification of factors responsible for successes as well as failures of the projects in the region. The study also attempted to identify the scope of technology-transfer and sharing of best practices in renewable energy projects, especially for rural development. The lessons derived from analyses can contribute greatly to planning and development of renewable energy projects in South Asia. Identification of risk factors will help the policy-makers and developers avoid steps that would lead to failure of similar technology projects contemplated to be built now. The study concludes that success of the renewable projects require appropriate policy initiatives, institutional mechanisms, national and international financial support, capacity-building, selection of appropriate technology and community participation, etc. This paper highlights some selected projects and lessons learnt, in general, from RE initiatives in the region.

A. COUNTRY-WISE SUCCESSFUL PROJECTS

A.1 Bangladesh: Solar Home Systems (SHS)

Grameen Shakti (GS), the sister organization of the pioneering micro-financing institution Grameen Bank, has made commendable contributions in popularizing RE, especially Solar PV. By 2008, GS has installed nearly 210,000 SHS with installed power capacity of 10.0 MWp. It has emerged as the fastest growing SHS-provider, with present installation rate of 8,000 units per month. Countrywide network, patronization of micro-financing institution and innovative payment mechanism have contributed greatly to the success of Grameen Shakti.

A.2 Bhutan: Chendebji at Trongsa Hydel Project

The country has surplus energy in the form of large hydro-electric potential and has plans for extending the grid-supply to all villages. A micro-hydel project, Chendebji, at Trongsa, commissioned in 2005 has

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been selected as a successful project, mainly because of the innovative and efficient management. It is community- owned and community-managed project, with a capacity of 70kW.

A.3 India: Wind Power Generation Programme

Wind power is the most successful of all RE programmes in India. Wind-power generation by private-sector players has grown so rapidly in the last five years that it contributes over 8,757 MW in 2009, which is 70% of the total contribution of renewable energy resources to power generation in India. This has been achieved without any "cash subsidy", as is the case of most RE programmes. The package of incentives to investments in wind-power generation by private sector included fiscal concessions like, accelerated depreciation, tax holidays, customs-duty relief, and liberalized foreign- investment procedures.

A.4 Maldives: Laamu Atoll PV Project

The most successful project in Maldives is the Laamu Atoll PV project, funded by the Japanese government and implemented by a Japanese contractor. Under this project, solar panels of 2.8 kW (4 in number) were installed to produce about 11 kW power to satisfy the needs of a multi-purpose building and its island office. The project was commissioned in 2006 and has been functioning very efficiently. The factors that contributed to the success of the scheme are selection of superior technical design and good implementation. Cost was not an inhibiting factor, as it was taken as a pilot research project.

A.5 Nepal: Rural Energy Development Programme

The most successful renewable energy programme in Nepal is Rural Energy Development Programme (REDP), which promotes decentralized energy-planning at district level. An establishment of community organization at the village-level for the operation of micro-hydel plants is the underpinning component. The programme relies greatly on community participation in planning and management of the district energy-systems. It has been extended to 15 districts, and is funded by the Government of Nepal and United Nations Development Programme (UNDP). The factors which contributed to the success of the REDP programme in Nepal are: conceiving the programme as a part of the overall socio-economic development of geographically and administratively defined area like a district; development of locally available energy- resources, like mini and micro hydel, which is the core of the development efforts; and generous funding by international aid agencies.

A.6 Pakistan: Agha Khan Rural Support Programme (AKRSP)

The AKRSP is a non-profit organization, which was established in 1982 by the Aga Khan Foundation of Pakistan. The main purpose of the AKRSP is to reduce poverty in Northern Pakistan. The Chitral Office of the AKRSP that manages the micro-hydro programme has a staff of about 50 people. The focus is on the communities in the remote areas of the Hindu Kush Mountains that are scattered and isolated and far away from conventional electricity supplies. Traditionally, they have used smoky and unreliable pinewood torches and, more recently, costly kerosene lamps for lighting. Many fast-flowing rivers of the area, however, make it well-suited for the electricity generation through small-scale hydro power plants without constructing large dams. The AKRSP has installed over 180 micro hydro-power units, with capacity of 20 to 75 kW. These projects supply electricity to about 175,000 people.

A.7 Sri Lanka: Energy Services Development/ Renewable Energy for Rural Economic Development

The most successful renewable energy project that spread through Sri Lanka to reach over 100,000 households was the Energy Services Development/ Renewable Energy for Rural Economic Development (ESD/RERED) project, targeting off-grid electricity supply, from solar home systems and micro hydroelectric systems. In the same project, funding was provided to develop an estimated 126 MW of grid-connected power plants (some of which are still under construction), which may be expected to generate an annual average of 419 GWh. Sustained support from the lending agency, project management by private institutions (DFCC Bank and participating credit institutions), matching funds provided by the government through the provincial councils, minimal dependence on "foreign" expertise for the design and implementation of village hydro-system, and quick move-in by an active group of solar industry players to implement the solar-home systems on a commercial scale, are the important factors that made the project a success.

B. CRITICAL SUCCESS FACTORS

The critical factors that have contributed to the

success of RE projects in South Asia are:

i) The presence of an approved policy for the renewable energy sector as a whole, or sub-sector policies relating to each technology or sub-sector;
ii) Availability of reliable resource-assessment data;
iii) Well-established, efficient, institutional arrangements for planning and implementation of RE projects/programmes;
iv) Incentives: financial, fiscal, and supportive feed-in tariff systems;
v) Participation of the community in the management and operation;
vi) Project activity identification and prioritization, with reference to the needs of the beneficiaries under the programme /project;
vii) Project financing tied up fully, in advance, for smooth flow of funds for implementation;
viii) Standardization of design, technology and specifications;
ix) Due diligence of the needs, locally available capability, and resources of the area, in advance;
x) Identification of training needs and provision of capacity-building assistance ahead of launching a programme and continuous capacity-augmentation support throughout the life of the project;
xi) Availability of efficient consultancy companies and well-established and reliable contracting firms; and
xii) Availability of knowledge-support from reputed academic or technical institutions.

C. COUNTRY-WISE UNSUCCESSFUL PROJECTS

C.1 Bangladesh: Wind Power

The most unsuccessful RE programme of Bangladesh is its Wind-Power Programme. A few small wind-turbines were installed in the late 90s and early 2000s. They all failed within a short time. This appears to be mainly due to the design-deficiency and use of non-validated wind-energy data.

C.2 Bhutan: Solar Photovoltaic

Efforts in developing solar PV systems in Bhutan have not been successful. It has not been popularized as a scheme to bridge the time-gap between the present situations of non-supply of electricity to a distant date, when there will be grid-connected electricity supply. The failure to appreciate and address the issue of differential cost between PV-based power and Hydel power from large power stations, like Tala Hydel Power project, have led to the consumers showing very little interest or enthusiasm for such projects. The lack of trained manpower to provide technical support for maintenance and repair has also contributed to the failure of the project.

C.3 India: Improved Cooking Systems

An unsuccessful RE project in India is 'Improved Cooking Systems' for poor households. The project aimed to reduce the use of firewood and, thus, the adverse health-impact of the indoor pollution. Many enthusiasts of the RE technology might object to the naming of this scheme as a failure.

National Programme on Improved Chulhas (NPIC) has led to the introduction of millions of smokeless chulhas (stoves) to many households in villages. It still is not considered as commercially and convenience-wise preferable over traditional cooking stoves by the users. Modern-tech models did not consider women's socio-culture aspects and zero cost of traditional chulhas (stoves).

C.4 Maldives: Landfill Gas Project at Thilafushi

In 2004, a project was undertaken with UNDP's assistance, to explore the possibility of utilizing the gases produced from landfill for power-generation in Thilafushi Island of Maldives. This island receives waste from Male, Villigili and other surrounding tourist resorts. However, on commissioning the project, it was found that the burning of waste in fire produced foul smell, which was spreading in the neighboring islands. The contamination of sea and air triggered strong objections from environmentalists. Poor project-investigation; selection of ineffective technologies; lack of critical evaluation of the appropriateness in selection of project parameters with reference to local conditions; and the failure to visualize the adverse environmental impacts, made the project a non-starter from the beginning.

C.5 Nepal: 10 KW Wind-Turbine at Kagbeni

The first effort to harness the wind-energy potential in Nepal was the installation of a 10 kW wind-turbine in the Kagbeni by Nepal Electricity Authority (NEA), in 1989. The feasibility study of wind-power plants in Mustang and Myagdi districts, in 1985, estimated the wind speed in Kagbeni to be about 10 m/s during the day time. However, improper dimensioning of the

turbine vis-à-vis the wind speed at the location resulted in the breakdown of the plant after two months of its installation. Lack of sufficient wind-data and rugged topography resulting in variations in the wind-speeds within a region, has posed a significant challenge in harnessing the wind-energy resource in Nepal.

C.6 Pakistan: Solar Photovoltaic

In the early 1980s, Directorate General of New and Renewable Energy Resources (DGNRER) installed eighteen imported PV-systems, with an installed capacity of nearly 440 kW for village electrification, in different parts of Pakistan. The project was unsuccessful, due to: lack of technical know-how and inadequate follow-up, since the package of project-development did not include capacity-building (both for working team and the beneficiaries); non-sustainable methodology; high cost with no community cost- sharing.

C.7 Sri Lanka: Pattiyapola Project

In Sri Lanka, an example of a failed project is one of the earliest attempts to promote a village-energy system, integrating several resources, to demonstrate that all the village energy-needs could be met from local renewable-energy resources. The project, along with two others, established in Africa and Latin America, was intended to serve as models for the rest of the world. This project, Pattiyapola Rural Energy Centre, was financed and implemented by the UN Agency for Habitation. It must be emphasized that the project, though classified as a failure, as it was unsustainable, had some positive outcomes as well. For example, it was able to demonstrate the workings of new technology to Sri Lankan professionals, enabling them to understand its capabilities and limitations.

D. LESSONS LEARNT

A number of very useful lessons regarding the design and implementation of RE policies, programmes and projects can be learnt from the analyses of the factors leading to the successful and the not-so-successful experiments made and large RE programmes/ projects implemented in South Asian countries. The major lessons learnt are:

i) Each country, small or large, should set up an agency to deal exclusively with RE resources;
ii) The RE development agency should first organize a well-designed and time-bound programme for the scientific assessment of the RE resource-potential of the country;
iii) The agency should draft an appropriate and comprehensive renewable-energy policy for the country and work towards obtaining enthusiastic support and cooperation from all concerned agencies in implementing the policy;
iv) For each RE resource, like wind power, solar and small hydro-power generation, etc., at least one pilot-plant should be established in the public or private sector, using state-of-the-art technology and through reliable contractors;
v) These model projects should be used to induce external development aid agencies, bilateral, multilateral and philanthropic organizations, to take up large programmes of RET applications in each country;
vi) Furthermore, procedures for identifying project-locations, obtaining licenses, permissions and clearances by investors in RE projects should be simplified and quickened;
vii) Fund-flow to RE projects in public and private sector, whether it be grant or loan, should be smooth and timely;
viii) Academic and technical institutions should be incentivized to take up research on all aspects of RETs and its adoption on a wide scale in the respective countries;
ix) Encouragement should be given for setting up efficient energy-consulting organizations and large number of contracting firms to support implementation-efforts in RE sector; and
x) Nation-wide campaigns should be launched to educate civil society on the need and benefits of adopting RE, using equipment and energy-conservation technology.

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