Small-Scale Power Supply for Rural Development

Category: Strengthening Local Economies

Thanks to the rehabilitation of small-scale hydro-power plants in Tibet, the electrification of rural regions in Tibet with GTZ support has been a success. More than 95% of all households within the catchment area of a plant are now connected to the power grid. The productive use of electricity for various services and the manufacture of new products has increased and diversified the income of the local people. Local technology was incorporated as much as possible in the rehabilitation process. This secures further jobs. The private sector operating model involving local leasehold of the plants has become a model for Tibet as a whole and has also met with interest in other parts of the country.

Challenges

Sufficient energy supply is a key factor in a country's economic development. The poor population in particular can benefit from access to modern energy services if energy is provided in a sustainable manner.

Renewable energy sources, such as small-scale hydro-power plants, represent a good solution in this respect. They enable decentralised access to energy on the basis of local resources, which also means that energy supply to the more remote regions no longer represents an obstacle to development. However, sustainable energy development is only possible if energy supply is secured on a lasting basis, making it "credible" for the population. In the past, this was not the case with the small-scale power plants installed in Tibet in the 1960s. Owing to lack of maintenance, they had already been out of order for years. This is why the majority of the rural population in the AR of Tibet had no access to power supply.

In order to successfully rehabilitate the plants, GTZ above all had to ensure that the small-scale power plants can be overhauled and modernised cost-effectively. In addition, continuous operation and distribution had to be secured to cover the operating costs, for instance by organisational measures, but also by a sufficient demand among the consumers (e.g. small-scale entrepreneurs).

Strategies

In order to rehabilitate the small-scale hydro-power plants in the AR of Tibet in a sustainable manner, GTZ opted for close cooperation with the local authorities and strong participation of the population in the villages. To this end, the strategies referred to in detail below have been pursued:

❶ Boosting the efficiency of the water board with regard to utilising small-scale hydro-power. To this end, water board staff were trained by GTZ and a technical monitoring system was developed so that regional water board staff can immediately respond to interruptions in power supply to the villages.

Small-scale hydropower plants are key factors in a country's economic development.

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Training of vegetable farmers has not only increased cash crop yields, but has also resulted in local people eating more vegetables, which in turn improves local diets and generates additional income.

❷ Rehabilitating small-scale hydro-electric plants at selected sites by Tibetan engineers supervised by GTZ. Here, locally manufactured turbines, generators, switching and control devices were used exclusively to ensure sustainable operation of the power plants.

❸ Establishing operating structures for the small-scale hydro-power plants organised by the private sector. The power plants are administrated by the villages on a decentralised basis and are operated by local leaseholders. The servicing staff of the plants were trained in order to ensure smooth operation as well as qualified maintenance and repair.

❹ Billing of power supply according to consumption and in a manner that is comprehensible for all stake-holders. Every consumer understands the rate policy and knows what the fees debited are used for.

❺ Promoting the productive use of electricity generated by the small-scale hydro-power plants. This has been accomplished by, for example, establishing financing schemes for the purchase of electrically powered machines and providing technical upgrading for villagers in areas such as welding, wood processing and spinning. CEFE Business Training helps the up-and-coming micro-entrepreneurs to realistically assess their market prospects.

Benefits and Impacts

Long-term, free-from-interference use of 28 small-scale hydro-power plants in the three rural districts of Lhasa, Shannan and Linzhi in the AR of Tibet has now been secured. At all power plant sites, permanent jobs have been created for the respective private leaseholder, as the small-scale hydro-power plant operator, and his assistant. The private-sector-oriented operating model for the hydro-power plants is so successful that the Tibetan Government has ordered that this operating model be introduced in all districts of the region, i.e. for more than 700 small-scale hydro-power plants. And there is further interest in the scheme among national Chinese institutions and international organisations. The consistent identification of local manufacturers of turbines, generators, switching devices and the like has not only provided for spare parts supplies for the plants. In comparison to imported equipment, it has also resulted in considerably lower costs as well as additional secure jobs. More than 95% of all households are connected to the power supply in the catchment area of the small-scale hydro-power plants.

The local population benefits from modern energy supply. In comparison to purchasing candles, paraffin or petrol, it now has to pay 95% less for lighting.

At local level, people's income has risen thanks to the productive use of electricity for various services and the manufacture of new products. The women are benefiting from the schemes as well. For example, electric lighting as well as electric spinning machines and carpet shears make carpet knotting, which is above all done by women at home, more efficient and faster. Credits have been awarded to 26 women for these machines. Some women have set up small village stores, enabling them to generate extra income.

The use of electric oil presses and grain mills means that people no longer have to leave their villages to grind their harvest products. So not only do they save the fare to the town, but they can also partly offer grinding as a service. This in turn encourages internal village business cycles, raises local value added and boosts decentralised rural development.

Electric energy enables agricultural produce to be processed into marketable products, e.g. rapeseed into rapeseed oil, so that poor farmers can also be more involved in the money economy.

The productive use of energy also changes the economic behaviour of the population. In many areas of Tibet, goods are still bartered, which leaves the rural population with fewer options to acquire goods. Electric energy enables agricultural produce to be processed into marketable products, e.g. rapeseed into rapeseed oil, so that poor farmers can also be more involved in the money economy.

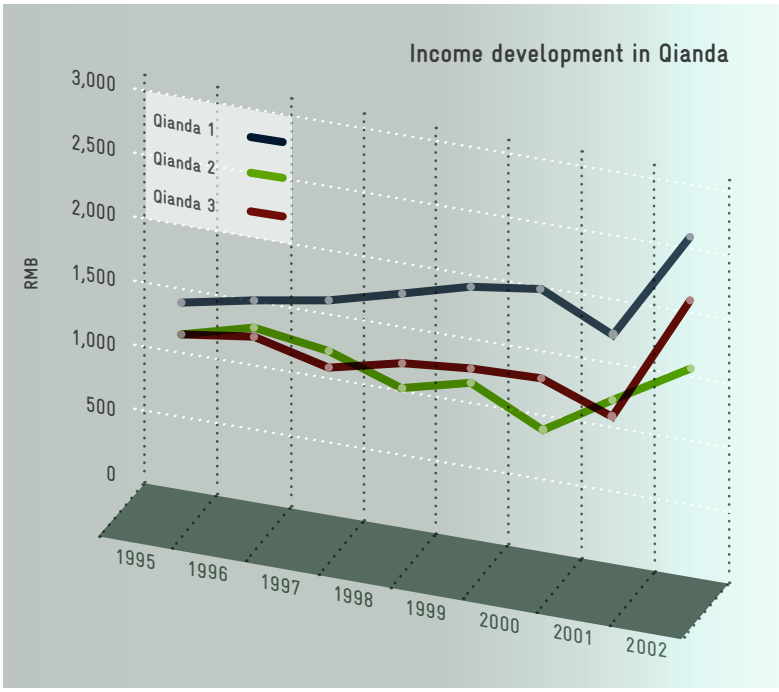
Growing confidence in power supply is encouraging new initiatives among the village population. In many places, local people have started to rehabilitate the abandoned irrigation systems. Effective irrigated agriculture is now possible thanks to electric pumps. Training of vegetable farmers has not only increased cash crop yields, but has also resulted in local people eating more vegetables, which in turn improves local diets and generates additional income.

Lessons learnt

All project measures always have to be adapted to the situation in the different villages, for the socioeconomic conditions (natural resources, the mode of production, existing infrastructure) differ considerably.

Upgrading for potential power users among the village population and very straightforward electricity rates result in a very high level of acceptance and paying morale in the target group.

The increase in electrically powered equipment creates a demand for qualified artisans who can repair domestic power wiring, pumps and domestic appliances should the need arise. Since there is usually a lack of such skills, vocational training is going to be implemented in a model scheme supported by GTZ.



The figure above shows income development in three comparable natural villages in the community of Samye. Qianda 1 is connected to the small-scale hydropower plant, Qianda 2 has been electrified by photovoltaic domestic systems and Qianda 3 is a village without electricity. Obviously, Qianda 3 has also benefited from a business cycle starting in Qianda 1 in which the inhabitants of Qianda 3 are participating.

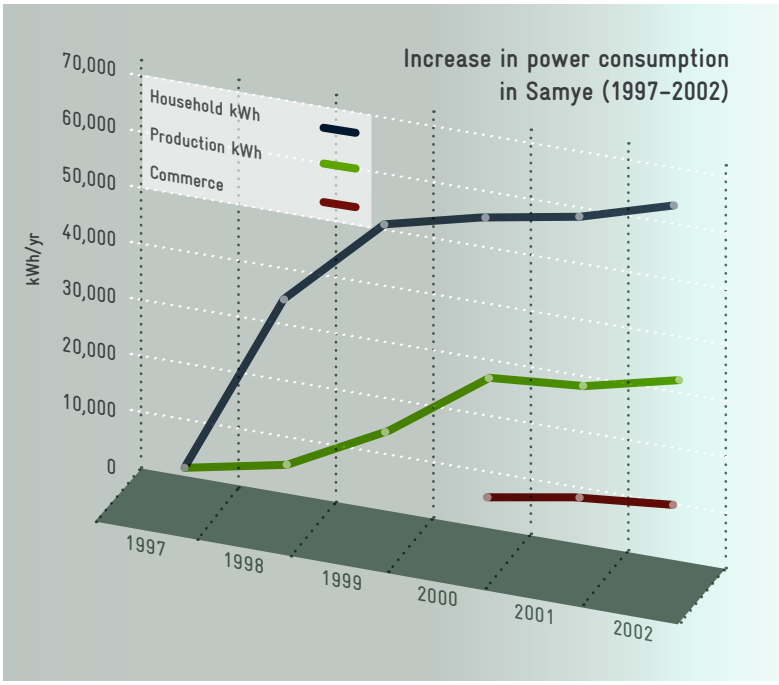


Figure 2 shows the increase in power consumption in the household, production and trade areas.

Due to the high costs of energy imports, Caribbean countries are increasingly interested in the utilisation of their renewable energy resources.

Rural electrification in Indonesia and Nepal

GTZ is also running projects to promote rural electrification with small-scale hydro-power plants in other Asian countries.

Setting out from the local conditions, different priorities are set here. In Indonesia, for example, technical cooperation above all focuses on the transfer of expertise regarding plant design in order to enable the local manufacture of turbines.

In collaboration with Indonesian manufacturers and specialist institutions, local value added in components for new power plants has been raised up to more than 80%. Now, turbines and components made in Indonesia are also exported to other countries in Asia and Africa.

In Nepal, locally manufactured suitable hydro-power components have long been available, and sufficient technical expertise exists as well. In order to promote the use of small-scale hydro-power plants, which makes sense both economically and ecologically in Nepal, the German-Nepalese project is seeing to the development of political framework conditions and access to suitable financing sources.

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