south pole
Carbon Asset Management Ltd.

Micro and Small Scale Hydropower Stations, Rural South West China

South Pole has a strong commitment and experience on climate change and carbon offsetting. We are working on over 200 high quality projects all over the world, which deliver sustainable development to local communities.

The Locations

Covering an area of 1.14 million m^2 (12 million ft^2), the south-western provinces Sichuan, Chongqing, Yunnan, and Guizhou span through a variety of landscapes from the subtropical South over severe karst hills up to the Tibetan plateau.
Several important rivers flow through the region such as the Yangtze, the Pearl River, the Mekong, the Salween, and the Red River.
With its destinct history, Sichuan and Chongqing are famous for their rich culture, especially their cuisine.

The Projects

The *Rural South West China Micro and Small Scale Hydropower Grouped Project* is a bundle of small hydro power plants; the project activity generates electricity from run-of-river hydro power. Greenhouse gas emission reductions are thus achieved by the project activity through replacing electricity from fossil fuel based power plants with renewable electricity.

GHG emission reductions are achieved by replacing fossil fuels with sustainable energy, thereby avoiding the release of CO_2 into the atmosphere.

Individual projects spread widely across the less developed rural area of southwestern China, consisting of four provinces: Yunnan, Sichuan, Chongqing, and Guizhou.

The entire bundle project complies with the Voluntary Carbon Standard.
Besides bringing emission reduction the

View of the turbine hall of one of the Chonqing based projects.

project is well developed and operated and brings significant and multiple benefits.
Projects mentioned hereafter are deliberately chosen to best represent the overall feature of the grouped project.
These projects are located within the Wulong region of Chongqing province where the majority of the projects are coming from.
Wulong county and Wanzhou county are two poverty-stricken counties as defined by the central government. In order to explore one of the many important aspects of sustainability, alleviation of inequality, it is reasonable to observe the changes the projects bring to these two poor regions.

Forebay of one of the projects

Social Benefits

The project is contributing to the development of the region. Its activity leads to investments in the region, which would not happen in the project's absence. The construction of the power plant and associated infrastructure provide considerable economic benefit through employment of local people. Moreover operation and maintenance of the power station generate employment opportunities on a regular and permanent basis. As a result of on-job-training received when participating civil works, local peasants increase their labour skills and working experience.
Through the reliable, affordable power brought to remote communities the villagers now have access to more electrical appliances, which both improves their understanding of the 'outside' world and eases the daily domestic burden. As a part of the construction, the project developers upgraded access roads and community infrastructures.

Outside view of Lianghekou hydro plant

In Yunnan sustainable hydropower stations improve the livelihoods of ethnic minority communities. Yunnan has an abundance of water resource and diverse ethnic minority groups, which live with traditions born from their long history; they are partially self-sufficient and partially supported by the local government. Because of the difficult-to-access mountain regions, many of them are isolated from the outside world, so the introduction of small hydro stations gives them achance to get to know the modern world, and more importantly encourages cultural integration. The project builds bridges between the predominant Han nationality and minority groups by creating chances of working jointly and exchanging ideas.

Socio-Economic Benefits

The projects bring a source of income to the communities and the development of skills. Embracing wider opportunities are being created for income generation, local people are able to upgrade houses, buy consumer goods and send children to school etc.

Electricity replaced the burning of fuel and wood in rural households

Thanks to the construction skills obtained and increasing awareness of the modern civilisation, more local people now have the courage and confidence to explore the outside world.

In recent years, China has witnessed a huge increase in power consumption. Both public and private parties are struggling to meet the demand for electricity. The hydropower project is contributing in a sustainable manner to bridging the gap between supply and demand of power on a regional and national level. The project activity also leads to diversification of the national energy supply, which is dominated by fossil fuel (mainly coal) based generating units. The generated electricity is supplied to the regional grid, thereby improving the grid stability and availability of electricity to local consumers. Local available elec-tricity can provide new opportunities for industries and economic activities to be set up in the area, resulting in greater local employment, ultimately leading to overall development.

The projects support technological and know-how transfer from other regions. Technology development has been largely happening through the introduction of villagers to a greater array of electrical items for their homes as well as indirect benefits resulting from advanced power generation equipment in the power plants. Villagers have also been taught how to handle electricity safely.

Embracing wider opportunities are being created for income generation, local people are able to upgrade houses, avoid the burning of coal or wood for heating and cooking, buy consumer goods and send children to school etc.

Most of the hydro power stations are privately owned, hire local people and provide employment and additional income for less developed rural regions. Income tax benefits apply to small scale stations, which only need to pay 6% income tax to the central government. Some micro stations are even exempt from central state income tax, thus revenues from electricity sales are transferred more directly to the local community.

The Dou family in front of their newly built house containing a convenience store

Environmental Benefits

This canal is used to divert run-off water for the irrigtion of agriculture terraces

In China, the lion share of total electricity production is derived from coal based power plants. With China being so heavily dependent on coal for its energy requirements, this project increases the share of renewable energy generation and also thus carries environmental benefits for the country's air, soil and water resources. The pollution created by hydroelectric energy generation is minimal. As compared to fossil fuel power plants, the project reduces CO_2, SO_X, NO_X and other emissions significantly, thus mitigating air polution and its adverse impacts on human health.

Usually, the most important sources of anthropogenic air pollution, particularly in China, are combustion processes, at least with regards to SO_2, NO_X, CO and TSP. Applying literature values* to the grouped project over the whole lifetime, in addition to the CO_2 reduction 23 356 t CO, 55 123 t SO_2, 2 1 485 t NO_X, 2 92 9 068 t VOC and 1 339 857 t TSP emissions are avoided.

Stakeholder Statements

Female employee Ms Xingxia Dou from Baijia village says: "Before I started here in October 2008, I needed to go out to the cities to work. But now my life has changed: I can work here earning more or less the same income as I earned as a babysitter, and I can spend more time with my children. There are skills training courses, and safety and security lessons every year. Rain has fallen less and less in recent years, we experienced heavy snow for two months of last year, which severely damaged our crops. Because abundant water can be distributed, we now can grow both rice and corn."

Local stakeholders profit in many ways from the projects

* N. Chakrabortya, I. Mukherjeea, A.K. Santraa, S. Chowdhurya, S.Chakrabortyb, S. Bhattacharyac, A.P. Mitrad, C. Sharmac: Measurement of CO_2, CO, SO_2, and NO emissions from coal-based thermal power plants in India, Atmospheric Environment 42 (2008), 1073–1082 / G. Fernandez-Martinez, P. Lopez-Mahia, S. Muniategui-Lorenzo, D. Prada-Rodriguez, E. Fernandez-Fernandez: Distribution of volatile organic compounds during the combustion process in coal-fired power stations, Atmospheric Environment 35 (2001), 5823–5831 / Yu Zhao, Shuxiao Wang, Lei Duan, Yu Lei, Pengfei Cao, Jiming Hao: Primary air pollutant emissions of coal-fired power plants in China: Current status and future prediction, Atmospheric Environment 42 (2008), 8442–8452

Employees of Qingtongxi Hydroelectric Plant, in Chongqing city, told us that the power station uses a unique time management system, which enables workers to have a system of working in rotation. While workers are gaining the additional income (7000 - 8000 RMB p. a.) generated from electricity production, they are still managing to cultivate their own farmland. As a result, their total income has increased threefold.

Mr Wanlu Dai from Qingtongxi: "The power station was built by ourselves, who know the place best and certainly will use it for long. So, it is very nice fitted within the area, bringing no harms to us or to our animals. We are very pleased that we can both look after our own crops and plants and also be able to work in the station. Now we have doubled the income, but it is not a big deal of work-load. Further more I now have learnt some skills through which we can try other types of jobs in the future!"
An Employee from Nanmu Village told us about the operating situation of the hydro-power station:
"Since I started my full-time job here in January 2008, my role has been to monitor and collect data from meters. I need to report the data gathered to the grid-company once a month, and they usually come to calibrate every year. The turbine has been working smoothly, with no malfunctions or anything similar. From my point of view, I don't think the power station has any harmful impact on the local ecosystem; in fact, one main purpose of it is to ensure a water supply for irrigation. I think it's very sustainable. However, the electricity cost is rising, and we were badly hit by the heavy snowstorms last year, we only reached 80% of our normal electricity production."

The Details

KEY DATA South Pole Project No. 300 494
Average emission reductions per year: 500' 000 t CO_2e
Expected Standard: VCS 2007

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