

WORLD SMALL HYDROPOWER DEVELOPMENT

REPORT 2019

Case Studies

SMALL HYDROPOWER FINANCING



UNITED NATIONS
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1. THE AKHMETA 9.4 MW SMALL HYDROPOWER PLANT IN GEORGIA



David Managadze, European Bank for Reconstruction and Development

The Akhmeta SHP in Georgia was financed under an innovative Risk Sharing Framework, a co-financing instrument between the European Bank for Reconstruction and Development and local partner banks. It also meets strong environmental standards, the plant feeds off an old Soviet-built irrigation scheme, which has kept local environmental impact to a minimum.

Located in Kakheti, a well-known wine region in eastern Georgia, the Akhmeta SHP (Figures 1-3) was constructed in just 10 months – a considerably shorter timeline than the average time required for SHP development. In part, this was due to its insightful design. The project leveraged an old Soviet-built irrigation structure, built in the 1970s and part-rehabilitated in 2007–2010, which connects to both the Alazani and Ilto rivers. Dams in the rivers, channels, tunnels and aqueducts comprise this well-functioning system that irrigates two local districts from mid-June to the beginning of September.

‘The Akhmeta plant generates 50 GWh of clean energy per year – a significant achievement for a small hydropower project amongst the vineyards and based on a decades-old irrigation network.’

Since the completion of the 9.4 MW hydropower plant in 2013, the irrigation structure has been used for renewable energy generation outside of the irrigation season over the rest of the year. The Akhmeta facility generates 50 GWh of clean energy on an average per year translating into an annual reduction of 15,000 tons of CO₂ emissions – a significant achievement for an SHP project amongst the vineyards and based on a decades-old irrigation network. Moreover, energy production is reliable as it is not linked to the hydrology of the basin but rather the irrigation channel, which has a constant year-round flow.

The European Bank for Reconstruction and Development (EBRD) Risk Sharing Framework

The Akhmeta SHP is notable for its use of the EBRD's unique financing model known as the Risk Sharing Framework or RSF. A key feature of this flexible co-financing instrument is that the EBRD takes on part of the risk of sub-loans made by partner banks to eligible clients (Boxes 1 and 2). This framework allowed the EBRD to finance the Akhmeta SHP in a way that neither local banks nor direct foreign investments could have done efficiently on a direct financing basis.

It is often the case that local banks' ability to support projects similar to the Akhmeta initiative is constrained by single-borrower exposure limits imposed by central banks, their own internal guidelines predominantly based on collateral borrowing. The RSF can help overcome this and other related obstacles. Of the overall costs of the Akhmeta development, which totalled around US\$ 10 million, US\$ 7 million was allocated for project financing and construction under the RSF co-financing instrument between EBRD and the local partner banks. The planned payback period is 10 years. Apart from the developers, partner banks benefit too – the RSF is supporting them in financing projects under a financing structure that allows for knowledge sharing and capacity development. As David Managadze, EBRD Senior Banker and Akhmeta HPP co-financer explains:

'In SHP development, it can be challenging to finance a small hydropower project, especially given the necessary legal and environmental requirements and it can be a large sum, which developers have to find up front. This is where the EBRD's RSF can have a positive impact. As in the case of the Akhmeta SHP development, the RSF was instrumental in successful project realization, particularly in the way it gave the necessary added security to the local banks, which themselves gained in terms of their own capacity building and knowledge share.'

'It can be challenging to finance a small hydropower project especially given the important legal and environmental requirements...this is where the EBRD's Risk Sharing Framework can have a positive impact.'

Taking a wider view, the Framework's usefulness in financing SHP development suggests a strong potential for further application. The RSF could play an important role in enabling the EBRD to assist local partner banks in meeting the growing financial needs of successful small and medium enterprises and local investors interested in the development of SHP projects in Georgia and even the wider Caucasus region.

Box 1. The EBRD Risk Sharing Framework

An important EBRD financial instrument, the Risk Sharing Framework or "The Framework" enables the EBRD to offer Partner Banks (PBs) funded or unfunded risk-participation schemes usually taking 50 per cent (exceptionally 65 per cent) of the risk of sub-loans extended by the PBs to eligible clients that have met pre-agreed eligibility criteria. Sub-loans under the Framework can amount up to EUR 20 million and have a maximum tenor of 10 years.

Box 2. The European Bank for Reconstruction and Development

A multilateral developmental investment bank, the EBRD uses investment as a tool to help further progress towards market-orientated economies. It is owned by 67 countries as well as the European Union and the European Investment Bank. Since its creation, the EBRD has invested over US\$ 130 billion in over 5,200 projects globally. Key EBRD goals are to support countries shift towards a low-carbon future and help countries on the path to sustainable growth. The EBRD assesses the environmental and social impacts of all the projects it invests in and works with clients to achieve good international standards. In 2016, the EBRD rolled out the Green Economy Transition Approach, which puts investments benefitting the environment at the heart of its activity. It encourages public participation through pre-investment consultation, information disclosure and regular dialogue with civil society and stakeholders. Over the last 10 years, the EBRD has made significant investments in the Georgian power sector including hydropower projects in Akhmeta, Upper and Lower Svaneti, Likhuni, Kazbegi, Adjara, and Racha-Likhuni. The EBRD also invested heavily in the 315 km high-voltage Black Sea Transmission Line, which runs between the east and west of Georgia and connects to the north-east of Turkey, stimulating unprecedented investment in renewable energy in the region.

Box 3. Hydrolea: Specializing in SHP in Georgia

Hydrolea specializes in the development of small-scale hydropower plants and the company was the main developer and investor for the 9.5 MW Akhmeta SHP. It is also the current owner. Since the Akhmeta project, the company's first SHP initiative, Hydrolea has developed and financed several other SHPs in Georgia. These include the 195 MW Pshavela SHP in the Kakheti region, which runs off the Stori River, and the 3 MW Debeda SHP, which runs off the Debeda River in Georgia's south-eastern Kvemo Kartli region. Hydrolea is also developing two SHPs in Mestia municipality in the Zemo Svaneti region of western Georgia – the 8.1 MW Kasleti-1 SHP, which has an estimated annual output of 46.4 GWh, and the 8.1 MW Kasleti-2 SHP, with an estimated annual output of 45.8 GWh.

Benefitting both the environment and the local communities

The Akhmeta project sets an example both in terms of the way it supports global environmental goals and how it provides specific benefits to local communities and local people.

From the environmental perspective, the Akhmeta SHP contributes to the UN Sustainable Development Goals (SDGs) designed to ensure access to affordable, reliable and modern energy for all (SDG 7) while answering the call for urgent action to combat climate change and its impacts (SDG 13). From the sustainability perspective, the plant is ideally located in an already modified water system with low biodiversity sensitivities, no water usage conflicts or social sensitivities. Having a "social licence" to operate was considered a key project component and the developer was keen to be involved in early engagement and informal communication with the local community to ensure there were no specific objections to the initiative. Following early and thorough consultation, the local population offered their unanimous support and the developers, a group of local investors with experience in the Georgian power sector, continue to maintain a positive relationship with local people, who have benefitted from the Akhmeta SHP in many ways.

First, now that the structure is used in part for energy generation purposes, it has yielded incremental revenues for the owner of the irrigation network and ensured a valuable additional source of funding for repair and maintenance of the overall irrigation infrastructure. Proper maintenance and repair have in turn provided security to local farmers and the local agricultural communities of this famous wine

region that are dependent on the irrigation system for their livelihoods.

Second and on a practical level, the development of the Akhmeta plant created various full and part-time jobs (Box 4) in construction for members of the local communities. It also created permanent posts linked to the plant's operation. There is also an expectation that in the medium term, there will be an upgrade of locally sourced skills in hydropower technology and there will be an important and related transfer of technological knowledge to the region.

Box 4. SHP for local job creation

'Previously, I was working only two months a year on a labour contract. This was during the melioration season. As a consequence of the Akhmeta SHP, I am now employed all year round as the plant is connected to the Zemo Alazani Channel. The plant is significant locally, it provides jobs and irrigation security for local agricultural communities, and it's actually the first industrial object built in Akhmeta since the 1970s.'

–Alexandre, Akhmeta, Akhmeta SHP worker

Lessons for future SHP development

The Akhmeta SHP development introduces a significant demonstration effect, particularly in terms of the financial structuring for hydropower projects of a similar size. Moreover, it sets an example in terms of environmental and social standards, which in the case of the Akhmeta SHP, were fully in line with the EBRD's rigorous environmental and social requirements related to sustainable development.

Lesson 1: The RSF as a useful business model

The identification of a proper financial structure will play an important role in the further development of the SHP sector. The Akhmeta project's successful utilization of the EBRD RSF, particularly the way this co-financing instrument provided security, knowledge sharing and PB capacity building, should be closely considered a business model for investors interested in future SHP development in Georgia, the region and farther afield.

Lesson 2: The importance of environmental standards and community engagement

The developers designed, constructed and currently operate the plant in compliance with good international standards and practices related to sustainable development.



Figure 1. Akhmeta SHP, Georgia

Specifically, EBRD performance requirements related to assessment and management of environmental impacts and issues, and biodiversity conservation were met. Importantly, so too were requirements on information disclosure and social engagement. The Akhmeta project serves to remind future investors of the importance of community dialogue. The developer’s dedication to an early engagement with the local community paved the way for the project’s success ensuring that the initiative benefitted from the broad community support and a “social licence” to operate. Moreover, the project’s aim to improve local skills in hydropower, transferring the future technological knowledge to the region and forging the way for further technological self-reliance, is an important aspiration.

In general, the Akhmeta SHP will be of particular interest to local stakeholders in Georgia given its abundant water resources, which carry a significant potential for generating hydroelectric energy. The country has approximately 26,000

rivers, which total 60,000 km in length and the EBRD estimates that 20–25 per cent of these are amenable to SHP. The untapped potential of this energy resource, once developed, could further reduce fossil fuel imports into Georgia and boost green energy exports to neighbouring countries and Europe.

Box 5. Akhmeta SHP and its main technical parameters

Diversion and waterway	
Type of intake	Free overflow weir with sand trap
Length of penstock	1,050 metres
Penstock diameter	2,000 mm
Power plant	
No. of units	2
Turbine type	Francis horizontal shaft
Design discharge	12 m ³ /s (2 x 6 m ³ /s)
Design head	96 m gross (84 m net)
Installed capacity	9,364 kW (2 x 4,682 kW)
Energy production	P50 = 52 GWh/a; P75 = 48 GWh/a
Plant factor	P50 = 63%; P75 = 59%

The project implementation was based on four main contracts – civil works, electro-mechanical, supply of pipes and construction of the transmission line (Box 6). Additionally, the project developer had several contracts for supply of equipment and construction materials to be used by electro-mechanical and civil works contractors. All contracts were based on reasonable and fair conditions and were in line with international standards.



Figure 2. Inside Akhmeta SHP

Box 6. Summary of contracts

Contract type	Comment
Engineering design	<p>Contract with the owners engineer with proven experience and track record.</p> <p>The design was reviewed by the EBRD's engineer and found appropriate and in line with good engineering practice.</p>
Civil works	<p>Contract with civil works contractor.</p> <p>Scope of works: intake, penstock trench, powerhouse, tailrace channel.</p> <p>The contract follows the International Federation of Consulting Engineers (FIDIC) for small works (Green Book), which is a good model for such work, and is accepted by both the EBRD and the PB.</p>
Supplemental equipment and materials supply contracts	<p>Several contracts on supply of various equipment and materials needed for civil works contractors – closing gates and mechanisms, machinery (crane, generator) and construction material (sand, gravel).</p>
Electro-mechanical equipment	<p>Contract with an electro-mechanical equipment supplier.</p> <p>Scope of works: supply and installation of a compact Francis type hydro turbine with generator, main inlet butterfly valve for the turbine, hydraulic pressure units, cooling water system, control SCADA system, 2 x three phase 6.3/ 35 kV step-up transformers rated 5.2 MVA, station service transformer with switchboard 400 V, medium voltage cubicles (7.2 kV and 35 kV), cabling system.</p>
Penstock	<p>Supply and install contract with pipe supplier with proven experience and track record.</p>
HV line and grid connection	<p>The grid connection was executed by the state-owned transmission network owner, the sponsor bearing the costs of services and purchase of transmission line. A single 6.3/35 kV transformation station was built next to the powerhouse. A 35 kV power line with a total length of 2.3 km connected these to the existing 35 kV grid substation, hence allowing connection to the transmission line that is part of the national grid.</p>

2. A COMMERCIAL BANK'S INNOVATIVE SMALL HYDROPOWER LOAN MODE FOR POVERTY ALLEVIATION



Xu Gang, Shi Hong, Wu Xiaoling, Ping An Bank; Zhengfu Rao, Zhaoheng Hydropower Group

Ping An Bank, a commercial Chinese bank, has identified the small hydropower (SHP) industry as an important sector to alleviate rural poverty. Offering customized financial assistance for hydropower construction and operation in poverty-stricken areas, the bank has found a way to use innovative financial tools to boost rural economic and social development, while promoting poverty reduction and sustainable development.

Based on research on the advantages of different resources in poverty-stricken areas, Ping An Bank, a Chinese joint-stock commercial bank, has identified the SHP industry as an important sector for potential poverty alleviation in China. By providing financial assistance for the construction and operation of hydropower projects through customized “loan + bond” mechanism, the bank has established an ecosphere in which hydropower assists agriculture and integrates with infrastructure, energy supply, empowerment and the holistic approach¹ to poverty alleviation.

Apart from hydropower financing, Ping An Bank also works with its sister companies of Ping An Group on Village Doctor and Village Education projects, actively providing support to poor households through initiatives, which promote good health and high-quality education. Overall, the bank’s target to alleviate poverty through hydropower poverty projects is consistent with three United Nations Sustainable Development Goals (SDGs) 1, 3 and 4, to eliminate poverty, to promote good health and well-being and to ensure quality education.

Ping An Bank and the hydropower poverty alleviation loan

Ping An Bank established its Poverty Alleviation Finance Office in 2018, the main platform of which has been implementation of the Industrial Poverty Alleviation Loan and other assistance methods, which

¹ The approach is officially referred to as “hematopoietic” poverty alleviation, which implies a set of measures, both economic and humanitarian, that are intended to enhance the endogenous motivation for rural development and permanently lift people out of poverty, including various arrangements to create work opportunities and improve labour productivity, and provide job training and skill building, turning the anti-poverty approach from “blood transfusion” to “hematopoiesis”.

focus on advantageous resources and industries in poverty-stricken areas.

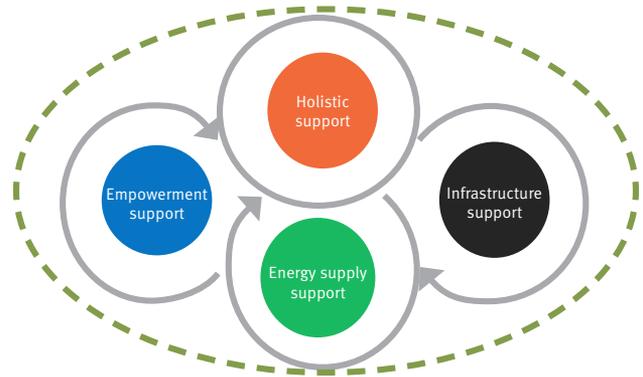
A key strategy has been to rely on core enterprises to actively build the “holistic poverty alleviation” mode, which closely connects banks, governments, enterprises and poor households. The overall aim is to encourage poor households to participate in all aspects of the industrial value chain and help marginalized groups to improve their quality of life while increasing their incomes.

Following in-depth research, Ping An Bank identified the hydropower industry as an important sector for poverty alleviation. According to statistics from the Ministry of Water Resources, 700 of 832 poor counties in China have abundant hydropower resources. Further, SHP construction is fast, the technology is mature and the impact on the local ecological environment is relatively small. In comparison to other industries, development is mainly on-site and the effects can be rapid with, for example, employment opportunities increasing the local income during the construction period.

Further, hydropower generation not only directly solves the issue of electricity shortages in remote and poverty-stricken areas, but also helps promote the growth of other industries, thereby playing an important role in the rural economic and social development and poverty reduction.

However, the remote location of SHP projects and the lack of traditional collateral mean that SHP financing can be both difficult and expensive. In fact, financing has become the bottleneck for poverty alleviation through SHP development. With this in mind, Ping An Bank customized a hydropower poverty alleviation loan mode to specifically support the construction and operation of hydropower projects in poverty-stricken areas (Figure 1).

- 4. **Advocate a holistic poverty alleviation mechanism, build archives and set up file cards for each poor household**
 - Dividends from village collective economy.
 - Obtain labour income.
 - Master advanced production skills.
 - Provide online and offline sales channels, boost sales volume and increase incomes.
- 1. **Infrastructure and engineering**
 - Poverty alleviation loans support the construction of hydropower stations.
 - Provide funds to support daily operations.



- 3. **Empower village collective economy**
 - Provide funds to scale up.
 - Provide technologies to improve quality.
 - Offer training to community and industry leaders for poor villages.
- 2. **Energy supply for developing the secondary and tertiary industries**
 - Provide electrical power support to meet the demand for electricity.
 - Give water conservancy support to ensure the water supply for production and living.

Figure 1. Ping An Bank’s Hydropower Poverty Alleviation loan mode

This model has been widely recognized in China and it has won many awards including the 2018 Shenzhen Financial Innovation Award, while Ping An Bank too bagged many awards including the 2018 Outstanding Contributor to Targeted Poverty Alleviation, Targeted Poverty Alleviation Pioneer Institution, Annual Excellent Brand for Innovative Agricultural Poverty Alleviation and the Pioneer Institution for Financial Poverty Alleviation. It was also selected as one of the “Thirty Excellent Cases” by the State Council Leading Group Office of Poverty Alleviation and Development.

Benefits and outcomes for communities: Infrastructure, energy supply, empowerment and haemopoietic support

The first tier of the Ping An Bank’s hydropower poverty alleviation ecosphere is infrastructure support. The bank provides financial support for the construction and operation of hydropower stations, customized with the non-traditional risk control mode of hydropower loan business and the innovative “211” assistance mode. This benefits tens of thousands of poor households, directly or indirectly.

More specifically, in 2018, the bank issued a total of US\$ 198 million of hydropower poverty alleviation loans with hydropower enterprises benefitting from preferential interest rates. Special

‘Financing has become the bottleneck for poverty alleviation through SHP development. With this in mind, Ping An Bank customized a hydropower poverty alleviation loan mode to specifically support the construction and operation of hydropower projects in poverty-stricken areas.’

poverty alleviation funds were allocated according to a certain proportion of the loan amount, and poverty alleviation activities were carried out in accordance with the specific assistance programme, negotiated with the bank.

Further, the bank has guided poverty alleviation funds to assist many state-level poverty-stricken counties in Yunnan, Guangxi, Sichuan and other provinces. Collective village economies have been helped to develop agricultural products and agricultural product-processing industries, which in turn aids in poor households' increase in wages, dividends and income through labour. Amongst the bank's hydropower poverty alleviation projects, employee assistance, cash assistance or material assistance have directly benefitted around 1,190 people in poor households.

The second and third tiers of the hydropower poverty alleviation ecosphere are energy supply support and empowerment support, respectively. Energy supply support means that once operational, hydropower projects backed by Ping An Bank, can provide power and water supply support for the development of secondary and tertiary industries in poverty-stricken areas.

The third level is empowerment support, which describes the bank's mobilization of resources to provide financial and technical support for the development of the village collective economy. For example, with the help of agricultural technology training from the State Council Leading Group Office of Poverty Alleviation and Development, the bank organized regular trainings of community leaders, which included arranging in-depth discussions on industrial policies and online marketing, facilitating a connection between planting and breeding projects. It also visited specialized cooperatives and planting bases, and provided ongoing technical support and mentoring for one year after the completion of the training. Overall, this support targeted 380 students from 31 poverty-stricken counties in 14 provinces including hydropower poverty alleviation areas.

The final tier of the hydropower poverty alleviation ecosphere is haemopoietic support. For example, Ping An Bank helped develop distinct agricultural products in hydropower poverty alleviation areas, assisted in building the "Ping An Orange" brand, and provided both online and offline sales channels to support poor households in expanding product sales. In less than one year, the accumulated sales revenue reached US\$ 0.7 million.

The effects of the previously mentioned tiers have benefitted communities and helped in poverty alleviation. Poor households profit from real economic benefits by sharing dividends from the village collective economy, gaining income from labour services and assistance in the sales of

agricultural products. They also benefit from the help received to improve production skills, while gaining experience in product sales and expansion of sales channels.

Case studies on small hydropower loan financing

Small hydropower projects in Yingjiang, Yunnan Province

Ping An Bank issued a 10-year industrial poverty alleviation loan (US\$ 33 million) to a hydropower company in Yunnan Province for the construction and operation of the Songpo hydropower station (27 MW, commissioned in 2018) and the Yinhe hydropower station (12.6 MW, commissioned in 2012).² The projects benefitted 1,279 people across 325 poor households in Yingjiang County, one of the nation's poorest counties. In addition to issuing one-time compensation and continuous dividends, the hydropower company also signed an assistance agreement with poor households. Over the next five years, the two hydropower stations aims to fund targeted poverty alleviation measures through the yearly savings made from the preferential loan interest rate agreed upon with Ping An Bank. The project aims to help poverty-stricken households by developing planting and breeding processing industries, and support other poverty alleviation measures in the township. It will help village collectives, which are mainly used to subsidize students, support poor households and the rural elderly, and carry out practical technical and skill training in rural areas.

In 2019, the hydropower company allocated US\$ 239,800 to help village collectives develop industries in this area. It is supporting the establishment of specialized cooperatives for tsaoko and walnut processing in Songpo Village, while promoting industrial upgrading through a "cooperation and farmers" model. This model saw villagers buy shares in the form of agricultural products and further enhanced the added value of products through drying, sorting and packaging. The cooperatives used 20–40 per cent of profits for dividends, thus providing a stable income for poor households.

Small hydropower project in Zhaotong, Yunnan Province

Ping An Bank issued an industrial poverty alleviation loan of US\$ 39 million to a hydropower company for SHP construction and operation in Dagan County, Zhaotong City, Yunnan Province. To help local villagers achieve long-term poverty alleviation and stability, the bank adopted the industrial chain poverty alleviation model of "agriculture-related enterprises

² China defines SHP as hydropower plants with capacity up to 50 MW.

+ cooperatives + farmers”, which combines enterprises and the local government. The project involved donating money to set up farmers’ professional cooperatives, planting morel (mushrooms) on approximately 20 acres of land, which have been transferred to the resettlement sites in Baoshan of Xinzhai Village. The farmers’ professional cooperatives absorb poverty-stricken households in the resettlement sites and encourage them to participate in dividends via labour.

Ping An Bank is also coordinating with the cooperative to sign a purchase order contract with a fungus product processing company in Yunnan to ensure a sale price of not less than US\$ 9 per kg of fresh morel. Moreover, the bank is cooperating with enterprises to support the local government in its Warm Winter Campaign by distributing winter funds to 149 poverty-stricken households (209 people) in Yuele Town.

Supporting United Nations’ Sustainable Development Goals (SDGs)

Ping An Bank’s hydropower poverty alleviation project is consistent with the UN SDGs especially SDG 1 to “end poverty in all its forms everywhere”. The bank’s multiple efforts to build a hydropower poverty alleviation ecosystem have focused on one central point: to implement the sustainable holistic poverty alleviation mechanism and make it possible for poor households to achieve sustainable poverty eradication.

When conducting hydropower poverty alleviation projects, the bank requires measures to directly benefit poverty-stricken households. For example, poor households can be employed by supporting infrastructure construction such as hydropower projects in poverty-stricken areas and setting up planting and breeding cooperatives according to local conditions. On the other hand, the bank has made clear that the focus of poverty alleviation is on a holistic approach. This aims to select industrial projects that can bring employment opportunities, upgrade employment skills or bring more entrepreneurial opportunities to poor households, in combination with local resources. Moreover, it takes advantage of technologies and channels of hydropower enterprises and industrial projects while boosting the economic income of poor households. Overall, this benefits enterprises, the Government and poor households, and also helps promote sustainable poverty eradication in support of UN SDG 1.

Meanwhile, the Village Doctor and Village Education projects support UN SDG 4 to “ensure inclusive and equitable quality education” and SDG 3 to “ensure healthy lives and promote well-being for all at all ages”. To consolidate poverty alleviation and avoid a return to poverty, Ping An Bank

cooperated with partners such as Ping An Good Doctor, Ping An Financial Leasing, Ping An Property & Casualty and Ping An Annuity to support projects. Over 100 training sessions for village doctors were organized and funding was provided for seven Ping An Wisdom Primary schools.

The Village Doctor project improves the level of village healthcare through provision of scientific and technological equipment and promoting health management for villagers by arranging regular doctor visits to villages, with an aim to reduce poverty caused by illnesses.

Through the “4+1” comprehensive education assistance action, the Village Education project utilizes technology to empower rural education, enhancing the level of educational development in local poor areas and helping to improve the level of school teaching. This not only ensures that students from rural areas enjoy access to good education but also helps to eradicate intergenerational transmission of rural poverty.

Lessons for future SHP development

The hydropower loan poverty alleviation projects successfully implemented by Ping An Bank cover three major river basins including the Jinsha River, Xijiang River and Irrawaddy River. It will continue to replicate and expand to more provinces in the future. Combined with the existing successful hydropower poverty alleviation cases, the lessons learned can be summarized as follows:

Lesson 1: Importance of the innovative hydropower loan mode and pre-loan risk

The loan mode has several distinct characteristics; it covers the principle of pre-loan risk. In light of traditional insufficient collateral for SHP development, it customizes a variety of portfolio guarantee modes including overall mortgage of hydropower assets, pledge of electricity tariff, phased guarantee, equity pledge and insurance. Prior to completion, the third party (including affiliated companies) takes responsibility for phased guarantee. After completion, the mortgage guarantee of fixed assets, right of land use and the pledge guarantee of electricity tariff (and pledge registration made in the receivable system of The People’s Bank of China) will be handled. The shareholders and controllers provide several joint liability guarantees for the whole loan period, and the procedures for pledging the borrower’s stock rights will be completed.

Lesson 2: Taking into account effects and local factors

Long-term assistance applies to all hydropower projects under the “211” projects. In order to meet the expected

effects of assistance, the project design includes specific provisions such as the form of assistance, the corresponding number of people and amount of each form of assistance. The implementation plan of poverty alleviation funds is led and designed by the bank. Overall, the bank must take into consideration multiple local factors such as local resources, job opportunities, improvement of local skills, and the potential for business development, in order to promote effective and sustainable poverty alleviation.

Lesson 3: ‘Closed-Circle Poverty Alleviation’ in four steps

To ensure that the hydropower poverty alleviation circle can benefit poor areas in the long run, and in a meaningful way, Ping An Bank has put forward the “Closed-Circle Poverty Alleviation” in four steps, an approach in which circles are linked with each other in an orderly holistic mechanism (Figure 1).

The first step is poverty alleviation training, which should target the industrial backbone of poor villages. For example, this includes those in charge of farmers’ cooperatives, large families involved in planting and breeding, managers of agricultural enterprises, village cadres, rural college students and rural personnel with entrepreneurial experience.

Training comprises special lectures, mobile classrooms and agrotechnical base learning. It provides comprehensive

knowledge and skills learning including planting and breeding technology, industrial policy, online marketing, e-commerce logistics, modern agricultural management and financial management. Moreover, training institutions provide technical support and tutor guidance for one year after the initial training has taken place. The overall aim is to develop capacity and skills, which in turn will promote the development of industry with an aim to reduce rural poverty.

The second step is industrial haematopoiesis. This involves making real concessions to support hydropower enterprises which actively take part in poverty alleviation activities, guides poverty alleviation funds to promote the development of the rural collective economy in poor areas and provides financial support and agricultural assistance for high-quality industrial projects.

The third step is to create a brand for each village. By selecting the characteristic industries of villages, assisting in creating an agricultural product brand with distinct elements, mobilizing multiple resources and facilitating e-commerce sales, it actively promotes increased income amongst poor households.

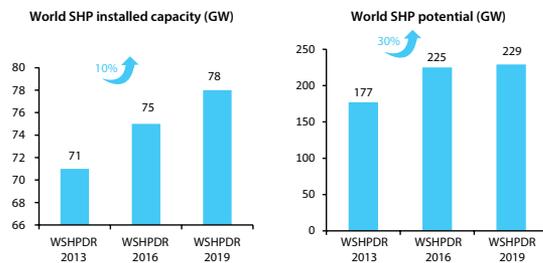
The fourth step is Village Doctor and Village Education, an initiative backed by Ping An Insurance Group, which supports basic literacy in poor areas and promotes physical examinations, disease prevention and training to avoid poverty caused by illness.



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World Small Hydropower Development Report

The *World Small Hydropower Development Report (WSHPDR) 2019* is an update of the Report's first two editions in 2013 and 2016. The *WSHPDR 2019* contains **166** national reports and **20** regional reports, with 21 new countries added since its first edition.



A special report with **Case Studies** is added to the *WSHPDR 2019*, showing the different roles small hydropower can play in achieving the SDGs.

- SHP for productive use
- SHP for social and community development
- SHP financing
- Technology, innovation and smart SHP
- Incentive policies for SHP development
- Green SHP

- The Report is available on **www.smallhydropower.org**;
- More than 230 experts and organizations have been involved;
- Every country report provides information on:
 - a. Electricity sector;
 - b. Small hydropower sector;
 - c. Renewable energy policy and;
 - d. Barriers to small hydropower development.



Small hydropower
for a better world

Contributing organizations



Ping An Bank

Smart Hydro Power

Sarhad Rural Support Programme

Turbulent

Virunga Power

Zhaoheng Hydropower Group



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