

FINAL REPORT
On Implementation of PGTF Project PRK10/00048437 (INT/06/K02)

**“ Training of Experts of Construction and Operation of Small-Size Hydro Power Plants of
Developing Countries”**

**Institute of Electric Power and Remote Control,
Ministry of Electric Power and Coal Industry, DPR Korea
August 8, 2006**

The 29th Ministerial meeting of the Group of 77 held in New York on 22 September 2005 approved the PGTF project “ Training of Experts of Construction and Operation of Small-Size Hydro Power Plants of Developing Countries” which had been submitted by the Institute of Electric Power and Remote Control, Ministry of Electric Power and Coal Industry, D.P.R. Korea, hereinafter called as IEPRC.

DPRK National Coordination Committee for UNDP (the executing agency) and IEPRC (the implementing agency) started implementation of the project on December 2005.

This report includes background, activities, results, a bill and annexes relating to accomplishment of Perez-Guerrero Trust Fund’ s project PRK10/00048437 (INT/06/K02).

1. Background

Most of countries make great investments for the increase of electric production to solve the energy shortage problem which is a pressing issue in the socio-economic development in the world.

But there are still big differences in power supply between urban and rural with the lack of fund, technology and equipments, so that the life and agricultural production there have had less progress.

The power generation at SSHPP has advantages as benefited in D.P.R. Korea: solution of the shortage of power supply comparatively with small investments, keeping our environment from pollution due to coal burning, cutting down trees from mountains and fields to use as firewood, preservation of natural resources and ecological environment and comprehensive use of water by irrigation and fresh water fish breeding.

Developing countries have made abundant experiences and technologies of hydro power generation which have solved the power problem to a certain extent at rural and remote areas through the construction and operation of SSHPP in accordance with their specific features.

If we exchange them and help each other through the South-South cooperation on the principle of collective self-reliance, the power problem will be addressed adequately without any difficulty and

sustainable development be expedited in rural and remote areas.

IEPRC has a group of competent researchers and designers for construction, operation and modernization of the power plant.

With the active assistance from the Government it has built a number of SSHPPs that have been supplying electricity for lighting, heating, cooking and cultural life at houses of rural and remote areas and for agricultural production there.

IEPRC proposed a project of training developing countries' technical experts of construction and operation of small-size hydro power plants (SSHPP), which would contribute to the self power supply at the rural and remote areas.

This project has made a contribution to the scientific and research works related to the small-size hydro power development, the construction of the SSHPP and training of the operation engineers of the beneficiary countries: Nepal, Cambodia, Laos, Bangladesh and DPRK.

2. Activities for Implementation of Project

The 29th Ministerial meeting of the Group of 77 held in New York on 22 September 2005 approved the project PRK10/00048437 (INT/06/K02) " Training of Experts of Construction and Operation of

Small-Size Hydro Power Plants of Developing Countries" which had been submitted by the IEPPC.

After DPRK NCC for UNDP, IEPRC and UNDP Pyongyang CO signed on the project documents on 10 January 2006, the work plan was revised and the sub-contract was signed by NCC and IEPRC.

There have been inputs of US\$ 42,066 by the Government and US\$ 30,000 by Perez-Guerrero Trust Fund through the UNDP Pyongyang CO in DPRK for the project implementation.

On 15 January 2006, NCC and IEPRC appointed 1 project coordinator and 2 project co-managers. A working group was formed with 2 advisors (collection and analysis of data), 5 trainers (for lectures and practices) and 6 assistants. And they began the activities according to the work plan.

IEPRC conducted collection and analysis of power supply shortage problems of the beneficiary countries and prepared training course, lecture plans, reference materials, venues and facilities for lectures and practices.

Training schedule included 16-hour lectures, 8-hour field visits to some SSHPPs, 4-hour laboratory practices and 6-hour discussions to facilitate understanding of all the subjects. All materials were printed in Korean and English languages and visualized on power-point based presentations.

The participants learnt DPRK's rich experiences and technology on the construction and operation of the SSHPP and a deep attention was paid to the exchange of the real data and reference data of the concerned problems between them. This training would encourage the participants to introduce what they acquired into their own countries to meet the actual requirements.

Authorized by IEPRC were Ms. Kim Chang Ok and Mr. Jin Su Chol (both co-managers) to execute the workshop. Mr. Kim In Ryong, (coordinator) was nominated by NCC to supervise project activities.

Trainers were Mr. Jin Su Chol (Master. Head of room, IEPRC), Mr. Haun Gaung Sob (Master . Head of room, IEPRC), Mr. Ri Chol Hak (Master . Researcher, IEPRC), Mr. Ji Tae Hak (Master. Head of room, Institute of Electric Power Project Design) and Ms. Jon Sang Gum (Master .Designer, IEPPD).

The workshop took place at the People's Palace of Culture(for lectures and discussions), the three SSHPPs including the Sangwon power plant (for field trip), the Institute of Electric Power Project Design (for the SSHPP turbine test) with participation of 12 trainees (1 from Nepal, 1 from Cambodia, 1 from Laos, 1 from Bangladesh and 7 from the D,P,R, Korea).

All the participants were provided with the stationary and training stuff.

All the participants visited the statue of President **Kim Il Sung** to express their respect before the opening ceremony. The opening speech was addressed by Mr. Kim Jun Hong, Head of the Electric Power & Remote Control Research Institute and Mr. Jin Su Chol, co-manager, outlined workshop programme which was followed by participants' introduction.

Lectures were given on “ Location Selection & Unit Output Decision of the SHP” ,“ Structure of the SHP” ,“ Generating Equipment Selection of the SHP” ,“ Modernization of the Operation of the SHP” , and “ Recent Trend of the Generating Equipment of the SHP” .

They visited the Sangwon power plant, Unpaho power plant, Sohungho power plant, Dohwadong power plant.

There were trials and practices on the “ Flow & Efficiency Measurement of the SHP turbine” and

“ Drawing up of the Comprehensive Characteristic Curve of the SHP turbine” .

At the closing ceremony, Mrs. Kim Chang Ok made a wrap-up and closing speech.

The participants appreciated very much the deep care and support of H.E. Mr. **Kim Jong Il** and the Government for the successful training and expressed their hope for further cooperation with DPRK in the SHP sector.

3. Results of Project Implementation

- The projects which have been not developed due to the lack of fund, equipment, technology, etc, can be developed on their own or with a little investment if the South-South cooperation is made.
- The need to strengthen the cooperation in the investigation and utilization of the hydropower resources of the developing countries has been affirmed.

- Mutual understanding made in process of exchanging the technology and experience in the workshop has setup a basis for further cooperation between the countries.
- The experts have been trained who will be responsible for activities in the SHP in the countries.

4. Conclusion

The South-South cooperation based on the principle of collective Self-reliance is a sole way-out and essential to overcome the economic difficulties in the developing countries. Development of the SHP resources in the developing countries is one of the priorities to ease the energy shortage in the rural and remote areas, which is possible to get the projects implemented through S-S cooperation.

IEPRC would like to extend its warm gratitude to Perez-Guerrero Trust Fund, the Group of 77, NCC for UNDP (DPRK Government), Governments of participating countries, UNDP Pyongyang CO and all the participants for their full support and contribution to successful implementation of the project.

5. Bill

The fund of US\$ 30,000 from PGTF was spent for project implementation accountably as follows;

No	SPECIFICATION	COST(US\$)
1	PERSONNEL	
	Project Coordinator (1)	US\$ 500
	Project Manager (2)	US\$ 1,200
	Advisors (2)	US\$ 1,100
	Trainers (5)	US\$ 1,500
	Assistants (6)	US\$ 600
	Trainees (12)	US\$ 6,000
2	TRAVEL	US\$ 8,700
3	PLACES OF LECTURE/PRACTICE,	US\$ 2,800
4	MATERIALS, STATIONARY	US\$ 5,400
5	DATA PROCESSING	US\$ 1,000
6	DOCUMENTATION	US\$ 900
	TOTAL COST:	US\$29,700

※ IEPRC on 22 Mar. 2005 received through UNDP Pyongyang CO US\$ 27,000, 90% of US\$ 29,700 along with its deduction of US\$ 300, 1% as a UNDP service fare from US\$ 30,000 which is the allocation from PGTF for project implementation.

US\$ 3,000, the remaining 10% of US\$ 30,000 to be sent by the UNDP Resident Representative in DPRK right after receiving the project final report, will be used by IEPRC to pay for the services it has received for project implementation.

ANNEX 1

List of Participants at the“ Training of Experts of Construction and Operation of Small-Size Hydro Power Plants of Developing Countries”

1. Trainees

1 Nepal (1 person)

- **Mr. Shiva Prasad Upreti**, 49 yrs,

2 Cambodia (1 persons)

- **MrBun Narith**, 50 yrs,

3 Laos (1 persons)

- **Mr. Phonesavanh Phimmasone**, 34 yrs,

4 Bangladesh (1 persons)

- **Mr. Muhammad Quamruzzaman Shameem**, 30 yrs

5 DPR Korea(7 persons)

- **Mr. Kim Bong Hun** , 50 yrs, Master, Head of Room, Pongan, branch office, IEPRC
- **Mr. Ri Byong Chol** , 45 yrs, Master, Head of Room, North-Hamkyong BO, IEPRC
- **Mr. Gang Yong Su**, 33 yrs, Researcher, South-Hamgyong BO, IEPRC
- **Ms. Bak Gyong Hi**, 26 yrs, Researcher, Kangwon BO, IEPRC
- **Ms. Kim Myong ok**, 50 yrs, Master, Designer, North-Hanghae BO, IEPPD
- **Mr. Kim Won Il**, 42 yrs, Master, Head of Room, South-Hanghae BO. IEPPD
- **Mr. Kim Yong Chol**, 32 yrs, Researcher, Institute of Hydrographs, IEPPC

2 List of Coordinator, Co-managers and Trainers

1. Coordinator

- **Mr. Kim In Ryong**, senior official, NCC for UNDP

2. Co-managers

- **Mr. Kim Chang Ok**, Junior Official, External Cooperation Department, MEPCI
- **Mr. Jin Su Chol**, Master, Head of Room, IEPRC

3 Trainers

- **Mr. Jin Su Chol**, Master, Head of Room, IEPRC
- **Mr. Han Gaung Sob**, Master, Head of Room, IEPRC
- **Mr. Ri Chol Hak**, Researcher, IEPRC
- **Mr. Ji Tae Hak**, Master, Head of Room, IEPPD
- **Ms. Jon Sang Gum**, Master, Designer, IEPPD

ANNEX 2

Titles of Lecture and Practice

1. Titles of Lectures

- Location Selection & Unit Output Decision of the SHP
 - Hydrological Design
 - Water Power Management Design
- Structure of the SHP
 - Dam type and Design og SHP
 - Structure of Intake, channel, fore bay and as so on
- Generating Equipment Selection of the SHP
 - Type and application of the turbine
 - Kind of Generators and Speed Regulator and Application
 - Design of the Excitation Device
- Modernization of the Operation of the SHP
 - Multi-Protection, Measurement and Management of SHP
 - Optimal Distribution of the Load between the Unit of Generators
- Recent Trend of the Generating Equipment of the SHP
 - Recent Trend of the Generators and Turbines
 - Principle of Speed –change Generator and its Development Trend

2. Titles of Field Trip

- Sangwon Army-People's power plant

- Unpaho power plant
- Sohungho power plant
- Dohwadong power plant

3 Titles of Practices

- Flow & Efficiency Measurement of the SHP turbine
- Drawing up of the Comprehensive Characteristic Curve of the SHP turbine