PEREZ-GUERRERO TRUST FUND FOR ECONOMIC AND TECHNICAL COOPERATION AMONG DEVELOPING COUNTRIES

Final Report on

Organizing a Training on Technical Guidelines for Development of International Standards for Small Hydropower Plants

International Center on Small Hydro Power
December 2022, Hangzhou, China

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Ⅰ. Project Overview

1. **Project Title:** Organizing a Training on Technical Guidelines for Development of International Standards for Small Hydropower Plants

2. **Abstract:** China has nearly half of the global small hydropower (SHP) capacity installed, which make it a world leader in this field. For the development of SHP some countries and regions have complete technical guidelines and legislations to address the current scenarios of SHP development. However, in the global scale the updated and scientific guidelines, addressing the global climate change and promoting green development, are lacking. Thus, ICSHP has aimed to solve this problem by establishing a globally accepted technical guidelines for SHP development. During the preparation of this project, International Organization for Standardization (ISO) Technical Management Board (TMB) Secretariat has approved the proposal for International Workshop Agreement (IWA) on the Technical Guidelines for the development of Small Hydropower. In 2019 and 2021, three IWA33 documents were published. As a part of the progress of ICSHP to disseminate these standard documents at a global scale, this project aims to organize a training program on technical guidelines for development of international standards for small hydropower plants, for developing countries, especially those without proper SHP standards or guidelines.

3. **Background Analysis:** SHP is known as a green and renewable energy source that drives rural electrification and climate change mitigation without the ecological footprint similar to large hydropower or fossil fuels. In addition, for areas without access to the power grid, SHP can replace traditional fuels such as firewood and charcoal with relatively stable, low investment, diversified and low-cost electricity. It plays a crucial part in poverty alleviation, environmental protection and economic and social development of rural areas. While looking at the development history of small hydropower, some countries and regions have developed complete standards and legislation. However, unbalanced, uncoordinated and discrepant development problems still exist globally to establish the technical standards of small hydropower and none of the standards provide a solution to assist in the facilitation of SHP development on a global scale. Bridging this gap would prove to be beneficial in terms of efficient electricity generation supporting in national socioeconomic development whereby assisting in poverty alleviation while promoting environmental awareness. Within this background, ICSHP makes efforts to establish a robust international standards and guidelines to promote inclusive and sustainable industrial development, realize energy supply, improve energy efficiency, facilitate utilization of renewable energy resource worldwide and achieve the 2030 UN SDG goals.

   In February 2019, ISO TMB has approved the proposal for IWA on technical guidelines for the development of small hydropower. As a part of the progress of ICSHP to disseminate these standards at a global scale, it is planning to organize a training program on technical guidelines for development of international standards for small hydropower plants. Later in the year of 2019 and 2021, three IWA 33 standard documents on vocabulary, site selection planning, and design principles and requirements have been published by ISO formally. These three documents were the framework for this training program.

The selected developing countries for this project encountered several barriers in the adoption of small hydropower policies. While there is substantial capacity for constructing and operating such plants, the lack of well-defined legislative framework and standards, as well as the multiple financial obstacles prevented effective development in the SHP sector. In Zambia, only 25% of the urban and 3% of the rural population has access to electricity, according to most recent reports. The developed standards will ensure the success and cost-efficient construction, management and operation of the planned small hydropower plants. Micronesia is not only lack of site-specific hydrology data, but also no proper standard for small hydropower development. Most of the hydropower plants are operated in rural and remote areas of Thailand.

China's vast experience in the implementation of SHP projects both at a domestic level and at an international one, which makes the country an authority in this field. Besides, China has a completed and systematic small hydropower development standard which provide essential basis for the implementation of this project.

Ⅱ. Implementation

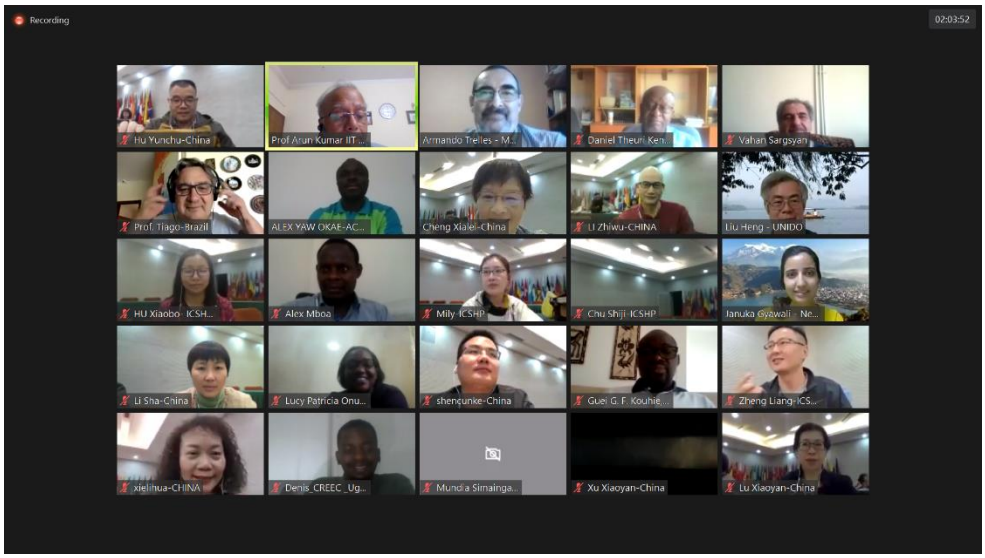
To meet the objective of this project, it was implemented as the following steps:

- **The first stage** is to research the developing countries profiles regarding the legislation and standards of SHP to analyze their training needs. In this stage, a virtual workshop was held to share with each other the small hydropower status quo and relevant regulations and standards, as well as the needs of small hydropower industry for standards. Following up, needs and requirements for SHP standards were analyzed by correspondence, and a training plan was made.
- In **the second stage**, ICSHP invited the international and national consultants/experts who can prepare the training materials that are not only beneficial to the global development of small hydropower but also correspond to the economic development of the majority of developing countries. In this stage, experts have developed training materials small hydropower and the application of the technical guidelines for small hydropower development, mainly covering SHP terms and definitions, design, units, construction and management.
- **The third stage** is to invite trainees and trainers and organize an online training. During the implementation of this project, an unexpected outbreak of COVID-19 disrupted the original plan. In order to disseminate the technical guidelines as planned and promote the implementation of this project, an online training was organized. In the preparation stage, through research and analysis and many communication surveys, we clarified the training content, designed the course schedule, invited developing countries through multiple channels, including the three targeted countries of this project, invited trainers, and finally held a four-day training online in September 2022. The training content includes the overview of small hydropower, sustainable development, green hydropower, and the development and application of small hydropower standards, which has been widely praised.
- **The final stage** is to develop a summary report covering all activities during the training. ICSHP summarized the experience from the training and collected more demands and requirements for SHP international standards from developing countries, which is conducive to the development of ISO SHP international standards, and better promotion and application worldwide.

Beneficiaries:
Beneficiaries of this project includes manufacturers, developers, investors, regulatory authorities and experts of the developing countries – whose legislations include limited and incomplete technical guidelines or standards to build and operate SHP. For this event, selected few countries will be benefited but in long term this sort of program will be extended for significant impact on a regional scale. It is highly necessary to ensure the standards address small hydropower while keeping in mind the conditions, challenges and needs encountered by developing nations. After the training program, ICSHP will closely engage with each regulatory authority in the targeted countries to ensure the standards developed and implemented will maximize output and ensure success of future SHP projects.

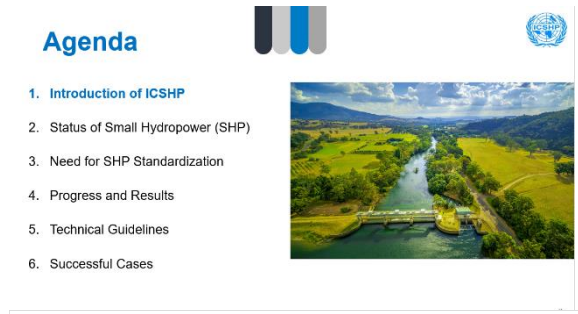
Ⅲ. Completed Activities

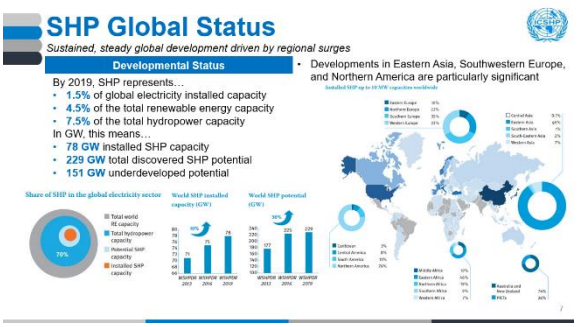
Activity-1
Time: September 2021
Location: Online

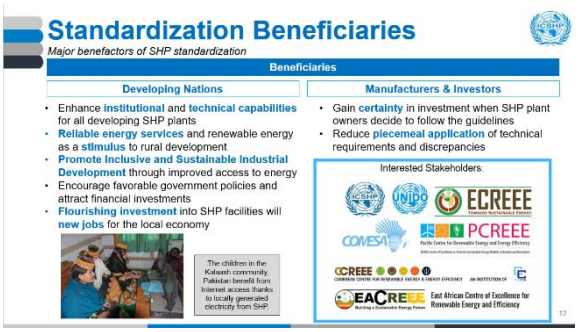


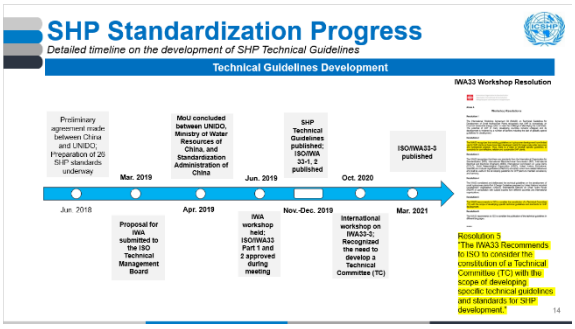
Implementation: ICSHP organized a virtual workshop to share with each other the small hydropower status quo and relevant regulations and standards, as well as the needs of small hydropower industry for standards. Experts and scholars, from Burundi, China, India, Nepal, Japan, Nigeria, Thailand and Zambia, with professions of water resources, hydropower engineering, environmental policy, renewable energy policy and standards attended.

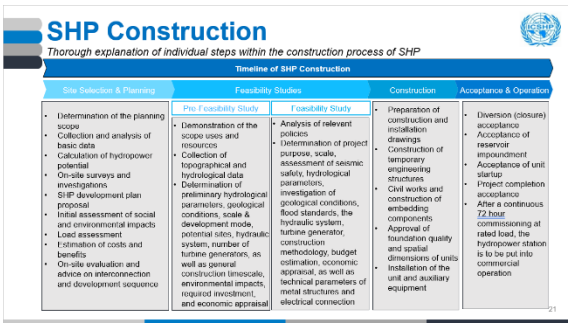
Activity-2
Time: October 2021-May 2022
Location: Hangzhou, China
Implementation: ICSHP invited experts to develop training materials on the application of the technical guidelines for small hydropower development, mainly covering SHP terms and definitions, design, units, construction and management.

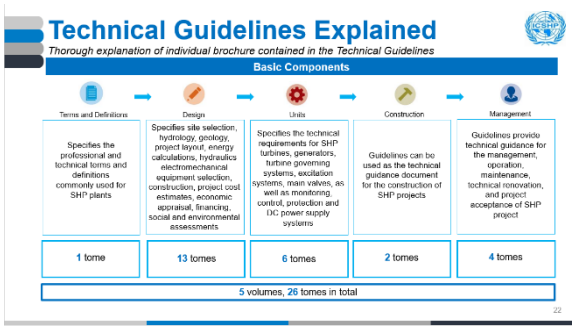












Activity-3:

Time: September 2022

Location: Online

Implementation: A online training on SHP technical guidelines was organized for Zambia, Thailand, Micronesia, Nigeria, Madagascar, Ethiopia, etc.

Due to the impact of the COVID-19, the offline training could not be carried out in the end. In order not to affect the progress of this project anymore and to achieve the project target to promoting the SHP technical guidelines, ICSHP held an online training course from September 5 to 10, 2022.

A total of 26 trainees from night countries attended the training. They are engineers and practitioners engaged in the fields of hydropower, environment, machinery and

standardization. According to the preliminary research and communication, the course content was designed, including small hydropower technology, green transformation of small hydropower, application of small hydropower technical standards, etc. The trainers are experts from these industries. Although it was an online training course, ICSHP also organized online visits to small hydropower station and manufacturers, which enriched the forms of the training course. The training course received high praise, and participants also expressed that they would continue to participate in the development, promotion and application of international standards for small hydropower.

Activity-4:
Time: Ocboter to December 2022
Location: Hangzhou, China
Implementation: the training programme completed, ICSHP developed a training summary report, including project background, preparation, implementation, and risks and mitigations.

Ⅳ. Activities Costs

Activities costs of this project were strictly based on the financial budget. ICSHP referred specialized accountants to manage the economic evaluation and review for this project. Project leaders were also responsible for monitoring of cost for each activity regarding to the project and required for submission of periodical report to the Director General of ICSHP for processing and stage of the project. The cost mainly included the international and national consultant fees, venue and equipment rental for the workshop, domestic trips and reporting cost, details shown below:

No.	Items	PGTF Fund	ICSHP Fund	Total
1	International consultants	6,000 USD	20,000 USD	26,000 USD
2	National experts	5,000 USD	10,000 USD	15,000 USD
3	Workshop organization	10,000USD	20,000 USD	30,000 USD
4	Domestic travels	0 USD	4,000 USD	4,000 USD
5	Reporting Cost	5,000 USD	0 USD	5,000 USD
	Total	**26,000USD**	**54,000 USD**	**80,000USD**

Ⅴ. Project Management Arrangements

The project is implemented by the International Center on Small Hydropower (ICSHP). ICSHP has appointed a project coordinator. All project staff is appointed by ICSHP. ICSHP is responsible for producing and submitting a report to the UNDP China Office following allocation of 90% of the budget resources. The ICSHP Director General (DG) bears the ultimate responsibility for overall management of the project.

IC-SHP has executed the project under UNDP National Execution modality (NEX). As executing agent for the project, ICSHP is responsible for the reporting and financial requirement foreseen under the UNDP's national execution procedures and guidelines.

Progress monitoring is mastered by the China International Center for Economic and Technical Exchange, Ministry of Commerce. However, any staff from the UNDP or Perez-Guerrero Trust Fund undertakes monitoring activities in line with managerial roles above. All lessons learned will be written into a report after the project has been implemented.

Ⅵ. Appendixes

Appendix-I Training Summary Report

Summary Report

for

the Training Programme on Technical Guidelines for Development of SHP International Standards

PREPARED BY

International Center on Small Hydro Power (ICSHP)

December 15th, 2022

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Executive Summary

This report provides a summary of an online training programme on technical guidelines for development of international standards for small hydropower conducted from September 5 to 10, 2022 for developing countries, especially those without proper SHP standards or guidelines. The purpose of this training was to disseminate SHP technical guidelines and standards at a global scale and enhance participants' knowledge in SHP development in an orderly and healthy way, in order to contribute to the achievement of SDG goals.

Due to the impact of the COVID-19 pandemic which limited the international trips, the training was conducted via a virtual platform, allowing participants from different locations to access the sessions remotely. According to the preliminary research and communication, the course content was designed, including small hydropower technology, green transformation of small hydropower, application of small hydropower technical standards, etc. The trainers are experts from these industries. Although it was an online training course, ICSHP also organized online visits to small hydropower station and manufacturers, which enriched the forms of the training course. Finally, a total of 26 trainees from nine countries attended the training. They are engineers and practitioners engaged in the fields of hydropower, environment, machinery and standardization.

The dissemination of technical guidelines generated interest in SHP international standards among SHP owners, government agencies, technicians and manufacturers, and academic and design institutes, ensuring the promotion and application of SHP technical guidelines globally.

The online training sessions were delivered through a combination of live webinars, pre-recorded videos, and interactive online discussion and study tours. Participants had access to the training materials and resources through a dedicated online platform. The training sessions were facilitated by SHP and standard experts who provided comprehensive explanations and engaged participants in discussions and activities. The training received positive feedback from the participants.

1. Project Background

1.1 Introduction

Small hydropower (SHP) is often promoted as a ‘green’ and ‘renewable’ energy source that drives rural electrification and climate change mitigation without the ecological footprint similar to large hydropower or fossil fuels. In addition to this, for areas without access to the power grid, SHP can replace traditional fuels such as firewood and charcoal with relatively stable, low investment, diversified and low-cost electricity. It plays a crucial part in poverty alleviation, environmental protection and economic and social development of rural areas.

In order to upgrade the utilization of SHP and reduce the proportion of non-fossil energy consumption, it requires not only continuous development of SHP, but also improvement of SHP dispatching management. While looking at the development history of small hydropower, some countries and regions have developed complete standards and legislation. However, globally speaking—unbalanced, uncoordinated and discrepant development problems still exist to establish the technical standards of small hydropower and none of the standards provide a solution to assist in the facilitation of SHP development on a global scale. Bridging this gap would prove to be beneficial in terms of efficient electricity generation supporting in national socioeconomic development whereby assisting in poverty alleviation while promoting environmental awareness.

With this background, ICSHP has designed an international SHP standard framework, and the Technical Guidelines (TG) have been developed for development of international standards of SHP. These standards/guidelines address the current limitations of the regulations applied to the terms and definitions and design principles of small-scale hydroelectric power generating plants by applying the expertise and best practices that exist across the globe. They will be used to train manufacturers, engineers and decision-makers and promote sustainable and green development, especially in developing countries. The standards would be valuable for all countries but would allow for the transfer of best practices between countries that do not have much technical know-how available. The detailed technical guidelines—design guidelines, equipment technical guideline, construction technical guidelines, operation and management

guidelines-- have been developed. The update for peer-review of SHP TG is ongoing with the support from the technical committee and other international experts.

1.2 Project target

The project aims to organize a training programme on small hydropower (SHP) technical guidelines which will serve as basis for the development of international standards for SHP development, so as to facilitate green, regulated, ordered and healthy development of SHP, contributing to the UN SDG goals.

1.3 Beneficiaries

Beneficiaries of this project includes manufacturers, developers, investors, regulatory authorities and experts of the developing countries –whose legislations include limited and incomplete technical guidelines or standards to build and operate SHP. For this event, selected few countries will be benefited but in long term this sort of program will be extended for significant impact on a regional scale. It is highly necessary to ensure the standards address small hydropower while keeping in mind the conditions, challenges and needs encountered by developing nations. After the training program, ICSHP will closely engage with each regulatory authority in the targeted countries to ensure the standards developed and implemented will maximize output and ensure success of future SHP projects.

2 Preparation

2.1 Training schedule design

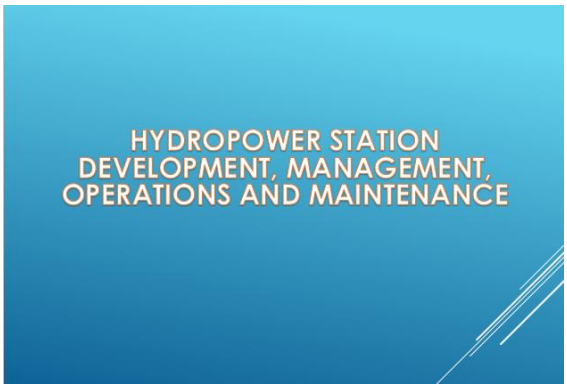
In order to make the course arrangement more scientific, ICSHP has communicated with developing countries, including targeted countries of this project, many times through communication to learn more about the SHP development status, policy framework and relevant standards, development obstacles and needs of these countries, and designed a set of courses including small hydropower technology, standards, and so on.

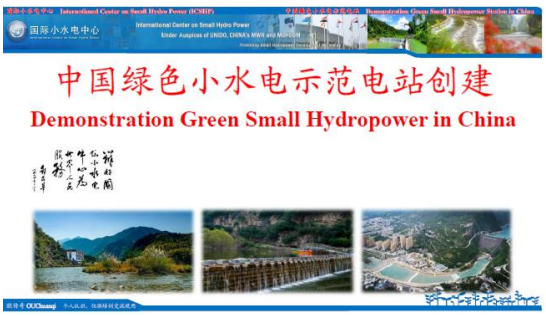
Due to the impact of the COVID-19 pandemic, ICSHP finally planned to organize an online training programme. Considering the unification of time difference, ICSHP planned to arrange a 6-day course, which was arranged as follows:

Date	Beijing Local Time (GMT+8)	Main Activities (tentative)
1st day	16:00-17:00	Opening ceremony
	17:00-19:00	Lecture 1: China in brief
	20:00-22:00	Lecture 2: International Case of Small Hydropower for Urban Community Development
2nd day	16:00-19:00	Lecture 3: Hydropower Station Development, Management, Operation and Maintenance
3rd day	16:00-19:00	Lecture 4: Global Small Hydropower Standardization Status and Prospect
	20:00-22:00	Lecture 5: SHP Technical Guidelines and case studies
4th day	16:00-18:00	Lecture 6: Small hydropower Technology Transfer Case Study
5th day	16:00-19:00	Lecture 7: Green Small Hydropower Evaluation and Practice
6th day	16:00-18:00	Panel discussion: SHP standards demands and application
	20:00-22:00	Seminar Summary and Closing Ceremony

2.2 Training materials development

According to the training schedule, ICSHP invited experts in small hydropower development and standardization to develop the training materials.





2.3 Invitation on trainers and trainees

Upon the support from the targeted countries of this project, as well as the International Network of Small Hydro Power, ICSHP invited trainees from developing countries, and they are government officials, SHP owners, investors, technicians, designers, etc. Experts in the development of training materials and experts from universities, enterprises and design institutes were invited as trainers.

Once the schedule of all personnel was confirmed, ICSHP determined the training programme would be scheduled from September 5th to 10th, 2022.

2.4 Device and online platform preparation

During preparation, ICSHP ensured a reliable internet connection and a suitable device for accessing the online training platform, installed some necessary software for the course. ICSHP took some time to explore the online training platform before the course begins, and leant its features, navigation, and tools that would be used during the sessions. This helps us navigate smoothly and make the most of the training.

3 Implementation

3.1 Course schedule

Date	Beijing Local Time (GMT+8)	Main Activities	Trainers
5th September Monday	16:00-17:00	Opening ceremony	
	17:00-19:00	Presentation 1: China in brief	Ms. Huang Yan
	20:00-22:00	Presentation 2: International Case of Small Hydropower for Urban Community Development	Mr. Ding Wei
6th September Tuesday	16:00-19:00	Presentation 3: Hydropower Station Development, Management, Operation and Maintenance	Mr. Wang Weiquan
	20:00-22:00	Online Visit 1: Visit to Chinese Rural Area in Zhejiang Province	
7th September Wednesday	16:00-19:00	Presentation 4: Global Small Hydropower Standardization Status and Prospect	Ms. Hu Xiaobo
	20:00-22:00	Presentation 5 SHP Technical Guidelines and case studies	Ms. Hu Xiaobo
8th September Thursday	16:00-18:00	Presentation 6: Small hydropower Technology Transfer Case Study	Mr. Dong Guofeng
	20:00-22:00	Online visit 2: Visit to Tianhuangping Pumped-Storage Hydro Plant	
9th September Friday	16:00-19:00	Presentation 7: Green Small Hydropower Evaluation and Practice	Mr. Ou Chuanqi

Date	Beijing Local Time (GMT+8)	Main Activities	Trainers
	20:00-22:00	Online Visit 3: Visit to hybrid Power Generation Lab	
10th September Saturday	16:00-18:00	Panel discussion: SHP standards demands and application	
	20:00-22:00	Seminar Summary and Closing Ceremony	

3.2 Trainee list

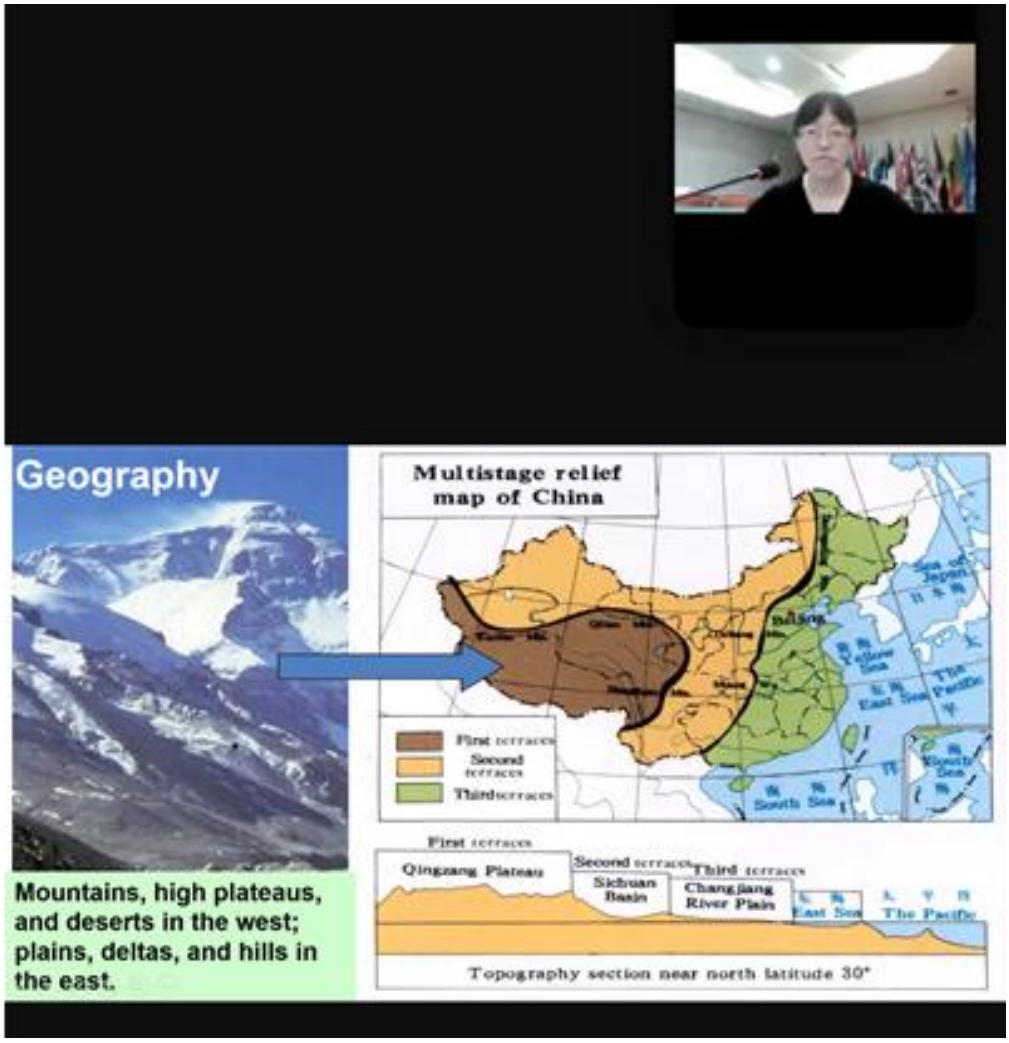
No.	Name	State	Gender	Organization	Position
1.	Shiferaw Demisei	Ethiopia	Male	Ministry of Water and Energy	Director
2.	Kibire Tesemma	Ethiopia	Male	ECDSWC	Senior Hydraulic Engineer
3.	Sangam Shrestha	Thailand	Male	Asian Institute of Technology	Associate Professor
4.	Karim Choukri	Morocco	Male	University Hassan II de Casablanca	Researcher
5.	Zineb Dahbi	Morocco	Female	Mohammed V University of Rabat	PhD student
6.	Sidney Kilmete	Micronesia	Male	Pohnpei Utilities Corporation	Manager
7.	Ranjan Ashutosh	Nepal	Male	Nepal Academy of Science and Technology	Associate Researcher
8.	Sharma Ashutosh	Nepal	Male	Nepal Academy of Science and Technology	Associate Researcher
9.	Mewang Gyeltshen	Nepal	Male	International Center for Mountain Development, Nepal	Programme Coordinator
10.	Saajan Bhusal	Nepal	Male	Alternative Engergy Promotion Centre, Nepal	Consultant Engineer
11.	Bassey Edet Nkposong	Nigeria	Male	Federal Ministry of Water Resources	Officer
12.	Adeyemi Muyiwa Arowosebe	Nigeria	Male	Nigeria Water Resources Management Council	Senior Civil Engineer
13.	Grace Onoh	Nigeria	Female	Federal Ministry of Environment	Officer
14.	John Uwem	Nigeria	Male	Jomekson Nigeria Ltd.	Supervisor
15.	Olumide Taiwo Alade	Nigeria	Male	Standards Organization of Nigeria	Standard Engineer
16.	K.H.Dhanushka Tharindu Gunathilake	Sri Lanka	Male	Ceylon Electricity Board Ministry of Power	Mechanical Engineer
17.	Madushani Nilanka	Sri Lanka	Female	National Institute of Cooperative Development	Assistant Lecturer
18.	Eric Imanizabayo	Rwanda	Male	University of Rwanda	Researcher
19.	Tumusifu Rabbi	Rwanda	Male	University of Rwanda	Researcher
20.	Adrien Mugabushaka	Rwanda	Male	Rwanda Polytechnic	Lecturer
21.	Chileshe Kapaya Matantilo	Zambia	Female	Zambia Bureau of Standards	Standard Officer
22.	Simukoko Mpezilwe	Zambia	Male	Kraft Canyon Regional Training Center	Training Consultant

23.	Kamungu Tanelly	Zambia	Male	Kamusime Engineering Construction Co., Ltd.	COO
24.	Ngosa Kaibela Reston	Zambia	Male	YBS Zambia Ltd.	Manager
25.	Allan Kasokomba Chivunda	Zambia	Male	Ministry of Energy	Officer
26.	Musonda Amon	Zambia	Male	Ministry of Water Management	Engineer

3.3 Training content

Presentation 1：China in brief, by Ms. Huang Yan

Ms. Huang Yan, Deputy Director of ICSHP, firstly gave a brief introduction about China, including geography, water resources, climate and fauna, population distribution, Chinese history and culture, etc.



Presentation 2：International Case of Small Hydropower for Urban Community Development, by Mr. Ding Wei

Mr. Ding Wei, Senior Hydraulic Engineer, introduced a small hydropower development project in Zambia. The project, namely "Shiwang'andu small hydropower station, is located in Muchinga Province of Zambia. Since the independence of Zambia in 1964, this area had been without electricity but relying on diesel oil or other mineral energy. Zambian government constructs renewable energy generation projects based on independent grid, in order to deal with climate change and reduce the carbon emission. Shiwang'andu station is one of the successful completed projects. It is also a part of the "Lighting up Rural Africa" project carried out by ICSHP.

He introduced the design, project construction, start-up test and commissioning, and social and economic benefits of the project.

Presentation 3：Hydropower Station Development, Management, Operation and Maintenance, by Mr. Wang Weiquan

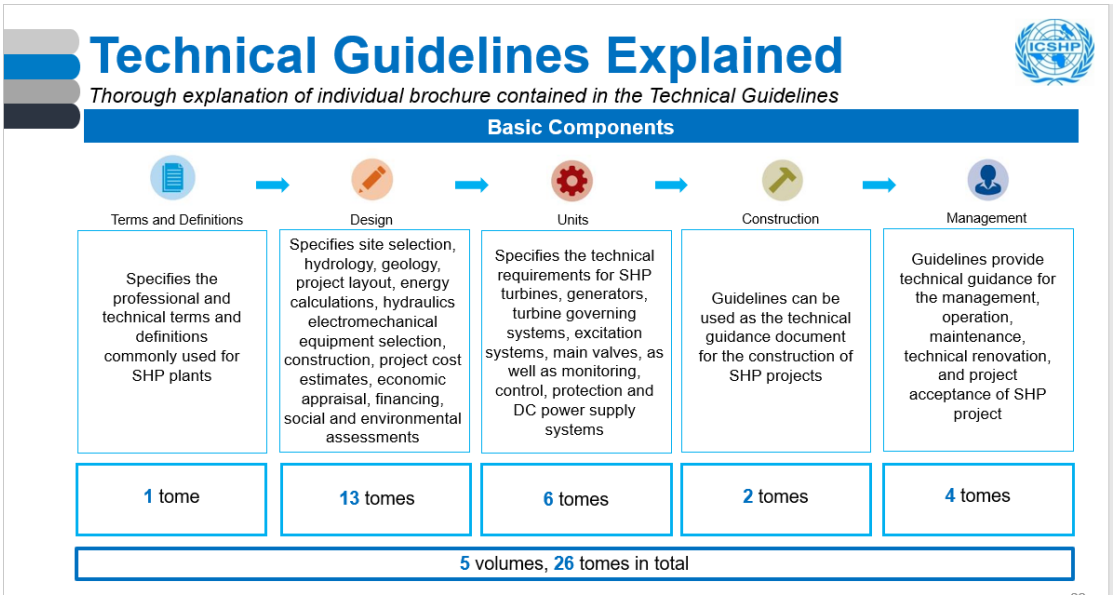
Mr. Wang Weiquan, COO at ENSOPHX GROUP, has years of experience in SHP development and management. In his lecture, he introduce the general situation of a hydropower station, pre-development, investment and financing, management in project construction phase, and operation and refurbishment.

Presentation 4：Global Small Hydropower Standardization Status and Prospect, by Ms. Hu Xiaobo

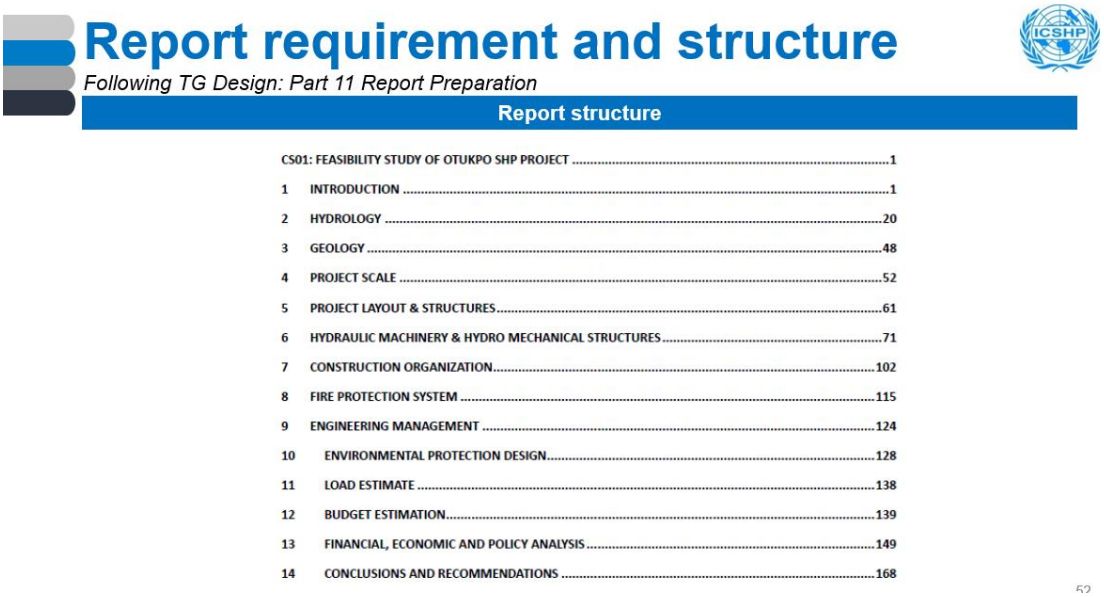
Ms. Hu Xiaobo, Division Chief of ICSHP, has many years of experience in small hydropower development and standard management. She firstly gave a lecture about the global SHP standardization status and prospect, including global SHP development overview and status, some regional status, standardization objectives and beneficiaries.

Presentation 5：SHP Technical Guidelines and case studies, by Ms. Hu Xiaobo

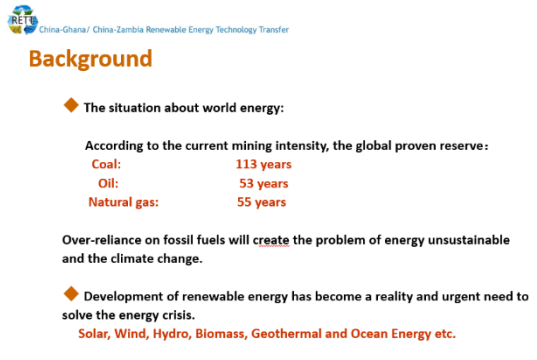
Then, Ms. Hu continued to give some cases on the application of SHP technical guidelines. She firstly introduced the details about the SHP technical guidelines which comprises of 5 volume and 26 documents.



She introduced a case from Nigeria, a feasibility study report of Otukpo SHP project. The report compilation and detailed parameters are guided by technical guideline-Design and technical guideline-Unit. This case followed the outline given by SHP technical guidelines.



Presentation 6：Small hydropower Technology Transfer Case Study, by Mr. Dong Guofeng



Mr. Dong Guofeng, Division Chief from ICSHP, gave a lecture about the SHP technology transfer case study from China to Zambia. He firstly introduced SHP background and its technical features, and then introduced the different stages and experience of China's small hydropower development. Since the reform and opening up, SHP development in China has experienced five stages, which are: rural electrification (1982-2000), substitute fuel by SHP (2003-2015), poverty alleviation (2016-2020), efficiency and capacity expansion (2011-2020), and green SHP development (2017-present). He also gave a brief introduction on the policies and incentives of small hydropower, including ownership, financing, taxation and so on.

Presentation 7：Green Small Hydropower Evaluation and Practice, by Mr. Ou Chuanqi

The last presentation was delivered by Mr. Ou Chuanqi, who has many years of experience in green SHP transformation. He introduced from the connotation and necessity of green small hydropower development to the evaluation criteria and requirements as well as the long-term mechanism and incentives for sustainable development of green small hydropower.

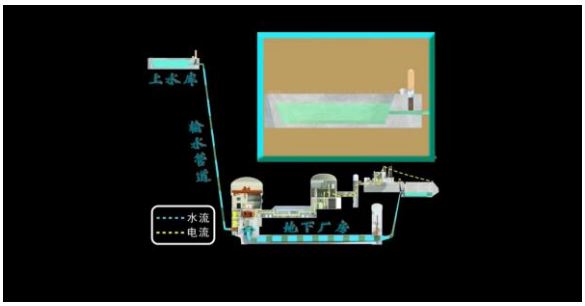
3.4 Online study tour

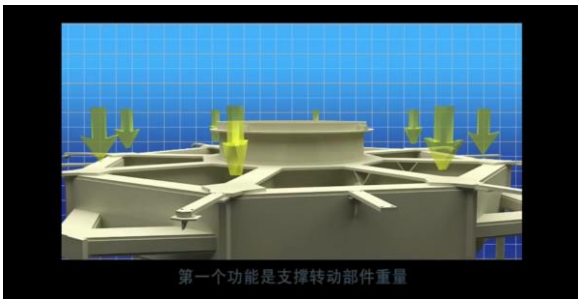
Online visit 1: Visit to Chinese Rural Area in Zhejiang Province (screen capture)

Online visit 2：Visit to Tianhuangping Pumped-Storage Hydro Plant (screen capture)

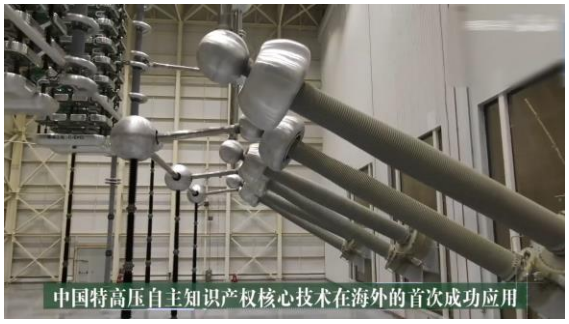








Online visit 3：Visit to hybrid Power Generation Lab (screen capture)

3.5 Performance evaluation

The training programme provided the capacity building courses for 26 SHP project owners, developers, technicians and standard engineers from nine countries. The feedback from the trainees was carefully analyzed according to the three sections of Training Plan, Training Implementation, and Training Effectiveness.

The Training Plan receives an average score of 26.68/30, indicating that trainees are generally satisfied with the training objectives, schedule, and assessment arrangements. This score demonstrates the programme's strengths in delivering a well-designed and well-structured plan.

The Training Implementation is rated slightly higher, with a score of 38.97/40. This score is encouraging and suggests a high level of satisfaction with the course content, teaching materials, teaching quality, teaching methods, and course organization.

The Training Effectiveness receives an average score of 27.59/30. Trainees felt that the training effectively helped them achieve their goals, understand new theories, develop new knowledge, and experience significant changes in their attitudes and work spirit. This also shows their substantial enhancement in their overall capability and quality.

The overall average score is 93.24/100, indicating a highly successful training programme. It must be noted that the programme not only achieved its objectives, but also achieved a high level of satisfaction among the participants.

4 Risks and Mitigation

Preparing for a training program involves several risks that need to be addressed effectively. Here are some risks and their corresponding solutions:

1) Insufficient participant engagement

Mitigation action: Prioritize interactive learning methods, such as group discussions, case studies, and hands-on activities. Encourage active participation and provide opportunities for participants to apply their knowledge in real -life scenarios.

2) Inadequate resources and materials

Mitigation action: Conduct a thorough needs assessment to determine the required resources and materials. Allocate sufficient budget for procuring necessary equipment, software, and training materials. Ensure that all resources are available and in good working condition before the training program begins.

3) Technical issues and equipment failure

Mitigation action: Conduct a comprehensive technical check before the training sessions start. Test all equipment, including audio visual systems, intenet, and computers, to ensure they are functioning properly. Have backup equipment readily available in case of any failures or technical glitches.

4) Lack of qualified trainers

Mitigation action: Invest time and effort in selecting experienced and knowledgeable trainers who possess excellent communication and facilitation skills. Trainers are experts with many years of experience in small hydropower development and standardization.

5) Poor time management

Mitigation action: Develop a detailed training schedule that allocates sufficient time for each topic and activity. Ensure that trainers adhere to the schedule and keep the sessions

on track. Allow for flexibility to address unexpected questions or issues without compromising the overall program timeline.

By proactively identifying these risks and implementing appropriate solutions, the training programme can be better prepared to deliver a successful and impactful learning experience for participants.