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

(G77 Project)

Final Report

on

Efficiency Improving and Energy Saving Scale Up of Existing SHP Plants in Rural Areas

INTERNATIONAL CENTRE ON SMALL HYDRO POWER

AUGUST 2013, HANGZHOU, CHINA

I. Project Overview

1. **Project Title**: Efficiency Improving and Energy Saving Scale Up of Existing SHP Plants in Rural Areas
2. **Abstract**: Given the significant potential in the field of rural SHP in developing countries, the project aims to facilitate the mass implementation of the energy efficiency improvement for existing rural SHP plants in China by project demonstration in researching and implementing policy, financing and technical mechanism to overcome the existing barriers as well as encourage investment towards the energy improving and energy saving in SHP. Furthermore, the project outputs will be extensively replicated in developing countries through the ICSHP network particularly in Africa, Asia and Latin America.
3. **Background Analysis**: Small Hydro Power (SHP) is a proven, clean, environmentally sound form of energy with solutions to rural electrification and promoting poverty alleviation in remote rural areas in developing countries. Endowed with abundant hydro resources, China is the leading country in SHP development and achieved great success. A rural population of over 300 million in China has enjoyed electrification through SHP. China's small hydro power practice has also set a model of sustainable development for one third of the world population, numbering 2 billion, who have at present no access to electricity. By end of 2008, a total of 45,420 SHP stations with 53,100MW installed capacity under operation in China, accounting for 38% of the hydro installed capacity and 8% of total electricity installed capacity of the country. 25% of the population and one third of the counties covering 50% of the territory in China are provided with electricity mainly by the existing rural SHP plants. Obviously, the development of rural hydro resources plays a significant role for promotion of the rural and even national economy, reduction of greenhouse gas emissions as well as protection of the environment. Particularly, the rural SHP promotes dramatically local economic development in Africa and Asian countries.

However, the rural SHP plants are not operated with full efficiency and maximized functioned due to the following problems:

• Technical defect of units. Due to the limits of design and manufacture of the hydro equipment as well as the inadequate input for maintenance of rural SHP plants, the units are operated with great energy loss and low efficiency, which causes frequent breakdowns and inability of maximized output.
• Unmatched parameters between units and practical operation of SHP plants. Most rural SHP plants were not constructed at the suitable location due to objective factors such as technical and economic limits, which cause inefficient operation of the plants. It is surveyed that comprehensive efficiency of rural SHP plants reaches only 38%-80%.
• Unreasonable planning and unordered development. This has caused serious deterioration of river environment and unbalance of river ecology. Besides, SHP resources are significantly wasted and thus reduced dramatically.

These problems not only waste hydro resources, but also lower the social and economic profits of rural small hydropower. Moreover, with the rapid development of rural SHP, the feasible sites became less and less despite the nature of being renewable energy for sustainable development. Therefore, it is of great urgency and importance for technical updates of rural SHP plants in order to improve their energy efficiency as well as energy saving capacity. In developed countries, governments attached great emphasis on refurbishment for hydro power plants by technical innovation as well as equipment update. For instance, the Hoover dam in the U.S. was updated by installing innovated units from 1985 to 1992. Consequently, the operating efficiency was increased by 6% and 30% for output. However, the situation in developing countries is not so optimistic, not even in China. A preliminary survey shows that 70% of the stations were built before the 1990's, 54% of which operates below an average efficiency of 80%.

Given the significant potential in the field, the project aims to facilitate the mass implementation of the energy efficiency improvement for existing rural SHP plants in China and other G-77 Members.

This will be done through:
• project demonstration in researching and implementing policy
• innovation of financing and technical mechanisms to overcome the existing barriers
• encouraging investment towards the energy improving and energy saving in SHP
• replicating the project extensively in developing countries.

This final point is of particular importance for the countries taking part in the project. Vietnam, Sri Lanka and Indonesia will, as partners in this project, be the first countries to benefit from the increase of efficiency of their existing and future SHP installations. Vietnam, Sri Lanka and Indonesia are important partners in South-South cooperation, in particular with African countries such as Zambia, Ethiopia and Zimbabwe.

Moreover, economic considerations predominantly justify this project on the refurbishment and/or updating of hydro-electric generators. Many years of experience indicates that only some 30% of hydro power station kilowatt loss capitalization arises from the electromechanical equipment. The electrical machine is responsible for about half that; consequently generator refurbishment is generally well worthwhile.

Retrofits and refurbishments not only extend the lifespan of hydro power stations and increase their reliability and availability at a low cost and with minimal environmental impact, but can also increase the output of the power station.

This project is of such a nature that they lead to balanced social, environmental and economic benefits for the member countries of the Group of 77. It is designed so as to have a maximum multiplier effect, as it is a clear pilot project for other regions. Also there is a strong TCDC component, i.e. deliberate and voluntary sharing, pooling and exchange of technical resources, knowledge, experience, skills and capabilities on improving the efficiency of small hydropower units through refurbishment.

II. Implementation

1. **Potential**: China attaches great importance to rural hydro development and electrification. As per the 11th Rural Hydropower FYP (2006-2010)and 2020 Vision, by 2020 rural hydropower will reach a capacity of 93,493MW and an output of 309,200Gwh. Refurbishment has also been planned with a target of an annual 11,400Gwh output increase for the 11th FYP. The project receives support from the Ministry of Water Resources (MWR) and the Guideline is expected to be adopted for the Rural Hydropower Refurbishment Action Plan by the government. ICSHP will work closely with the Rural Hydropower & Electrification Bureau, MWR and NDRC, and the local offices at the provincial and county level to ensure the project implementation within timeline at minimized risks. Besides, by collaborating with the major SHP users Indonesia, Vietnam and Sri Lanka, the project will be ensured to be replicated to other developing countries on a continuous basis.
2. **Innovation:** The project explores an innovative mechanism to enhance private sector investment towards improving efficiency for existing SHP plants in particular as follows.

• Finance Innovation: although hydropower has been a popular CDM type already, the innovation of carbon finance to support the SHP refurbishment to improve the energy efficiency will be explored and demonstrated.

• Technology Innovation: this will stimulate research of new medium-and-small sized turbine generator units and control equipment with features of more appropriateness, higher efficiency and more stability for operation and popularization? Thus, the new high-efficiency unit and controlling technology, high efficient and safe refurbishing technology as well as economical operating and dispatching technology will improve the operating efficiency of rural hydro power stations. With the application of an advanced and high-efficiency unit as well as economical technical refurbishment, the average output of the most existent power stations will be increased by 10%-25%.

3. Benefits: *Social benefit.* Rural hydro is a basic infrastructure of great importance for development. China will continue to construct 400 rural electrified counties and accelerate the ecology protection program of replacing fossil fuels with small hydro power, thus the project can provide important technical support for it. In addition, the project will positively promote rural hydropower development and utilization as well as improve rural productivity. *Ecological benefit.* No new reservoir, new immigrant and land inundation is required for technical refurbishment of existent power stations, which is good for ecological environment improvement and energy-saving society construction. Besides, the issue of environment protection relating to small hydro power development will be highly researched and promoted.

The project outputs will be selected as the training material for the ICSHP training program worldwide. Through the promotion of the INSHP network, the EI&ES for SHP will be disseminated and replicated to other developing countries. A designated ICSHP program officer will along with stakeholders periodically evaluate and keep the project outputs up to date.

III. Completed Activities in the first stage

Activity – 1

Time: June 2011

Location: Zhejiang Province

Implementation: the working schedule and guideline for the project had been stipulated, and the questionnaire for survey on potential breakdown and risk as well as present efficiency of the serving rural hydropower stations in China had been designed specifically for conduction.

Participants: IC-SHP, MWR

Activity – 2

Time: July- August 2011

Location: Guizhou, Jilin, Zhejiang and Gansu Provinces

Implementation: conducted extensive site survey to hand out the questionnaire and finished the survey on potential breakdown and risk as well as present efficiency of the serving rural hydropower stations in typical basins.

Participants: IC-SHP, local counterparts

Activity – 3

Time: October 2011

Location: Zhejiang Provinces

Implementation: based on the result of the survey, five typical and representative hydropower stations were selected for on-site evaluation and analysis both on potential breakdown, risk and efficiency tests

Participants: IC-SHP, local counterparts

Activity – 4

Time: November 2011

Location: Zhejiang Province

Implementation: according to the comprehensive analysis on records of site survey and tests, a consultation seminar was organized by IC-SHP to discuss and put forward the comprehensive evaluation methodology for operational efficiency of serving rural hydropower stations. With review of current energy improving and energy saving practice in SHP, the seminar was also to identify barriers and priorities in terms of policy, financing and technology viabilities etc. for scaling up.

Participants: IC-SHP, MWR, local counterparts


Activity – 5
Time: December 2011
Location: Zhejiang Province
Implementation: starting preparatory works for stipulation of policy-making modality on upgrade and refurbishment of rural hydropower stations with potential breakdown and risk as well as low efficiency, and software development of intelligent optimized dispatching and operating for hydropower station(s).
Participants: IC-SHP, MWR, Zhejiang University of Industry


IV. Completed Activities in the Second Stage

Activity – 1
Time: January 2012
Location: Zhejiang Province
Implementation: To set up preliminary policy-making modality on upgrade and refurbishment of rural hydropower stations with potential breakdown and risk as well as low efficiency. Experts, scholars and officers as well as stakeholders from MWR and national institutions of rural small hydro power are invited for stipulation of preliminary modality on policy-making mechanism to promote refurbishment and development of rural hydropower energy.
Responsible by: IC-SHP, MWR


Activity – 2

Time: February 2012

Location: Zhejiang Province

Implementation: To research and develop the technology of intelligent optimized dispatching and operating for rural hydropower station(s). The professors from Zhejiang University of Industry and experts from ICSHP as well as officers from MWR, even technicians and engineers from SHP equipment manufacturing enterprises are invited particularly for discussion on promoting intelligent optimized dispatching and operating for rural hydropower stations. SHP equipment manufacturing enterprises will bear the responsibility to develop and popularize such specific technology with policy and expertise support both from MWR and university.

Responsible by: MWR, Zhejiang University of Industry


Activity – 3

Time: March 2012

Location: Hangzhou, IC-SHP

Implementation: To organize a national seminar on energy improving and energy saving for consultation of setting up policy-making modality of upgrade and refurbishment for rural hydropower station with potential breakdown and risk as well as low efficiency ICSHP invited officers of MWR and provincial bureaus of water conservancy, experts and professors of universities as well as institutions, chief engineers of main SHP equipment manufacturing enterprises, and local owners of rural hydropower stations as well as other stakeholders for the national seminar. Representatives discussed and exchanged ideas with all parties in aspects of policy, capital, technology, management as well as capacity building. A coordinative and liaison office is set up in ICSHP for contact and cooperation among parties and stakeholders specifically for the programme even

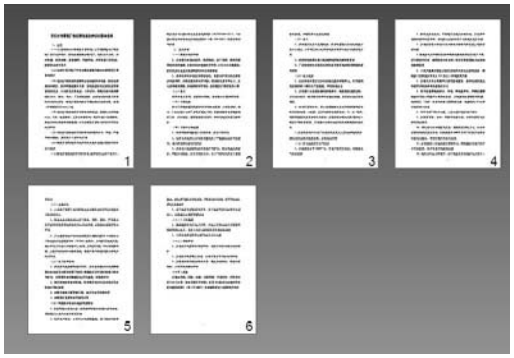
up-following activities.
Responsible by: IC-SHP

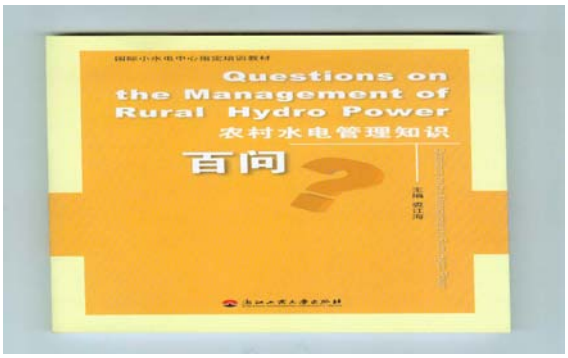

Activity – 4
Time: April 2012
Location: Hangzhou, ICSHP
Implementation: To put forward methodologies on efficiency analysis and efficiency improving for rural hydropower stations, to develop practical and cost-effective technology of efficiency improving as well as systematic software with independent intelligence rights, and to complete stipulation of relevant national standards and guidelines.. *Guidelines of General Design for Rural Hydropower Refurbishment Project of Efficiency Improving and Capacity Increasing* and *Guidelines of Construction and Management for Rural Hydropower Refurbishment Project of Efficiency Improving and Capacity Increasing* are stipulated as national standards for the programme.
Responsible by: IC-SHP, MWR


Activity – 5
Time: May 2012
Location: Zhejiang Province
Implementation: To publish the guidelines and EI & ES training materials, and to select one rural hydropower station for demonstration on technical refurbishment and efficiency improving in line with energy improving & energy saving. *Guidelines of General Design for Rural Hydropower Refurbishment Project of Efficiency Improving and Capacity Increasing* and *Guidelines of Construction and Management for Rural Hydropower Refurbishment Project of Efficiency Improving and Capacity Increasing* are officially published and issued to provincial bureaus of water conservancy and relevant agencies as well as institutions from central

level to village level. Besides, ICSHP organized experts to compile specific training material for capacity building of this programme. The Dakeng small hydropower station is selected as the demonstration site for technical refurbishment and upgrade of this programme.

Responsible by: IC-SHP, MWR





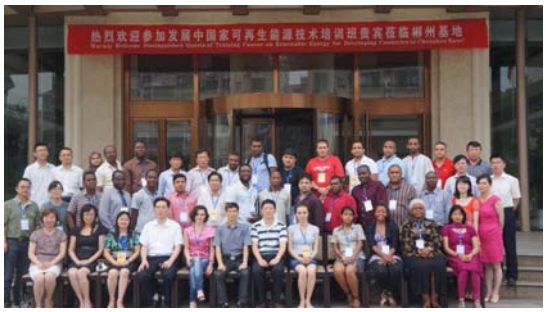
Activity – 6

Time: June 2012

Location: Changsha, Chenzhou, Hunan Province

Implementation: To organize regional training workshop for developing countries on energy improving and energy saving of rural hydropower station, and to share the policy framework, financing mechanism, technical innovation as well as capacity building regarding to the EI & ES. ICSHP and its national sub-centre in Hunan province organized training workshops for developing countries in Changsha and Chenzhou in Hunan Province as capacity building support for the programme. Over 30 trainees from more than 25 countries participated the workshop.

Responsible by: IC-SHP



V. Financial Costs and Expenses

The project costs for activities are strictly based on the financial budget. IC-SHP organized financial staffs specifically for evaluation and review of the economy for the project. Project leaders are also responsible for monitoring of cost for each activities regarding to the project and required for submission of periodical report to the Director General of IC-SHP for processing and stage of the project.

No.	Items	PGTF Fund	ICSHP Fund	Total
1	International travel	0	0	0
2	Equipment purchase	0	0	0
3	Experts fees	8,000 USD	16,000 USD	24,000 USD
4	Trainings	6,000 USD	9,664 USD	15,664 USD
5	Meetings	9,600 USD	15,800 USD	25,400 USD
6	Domestic travels	2,500 USD	9,536 USD	12,036 USD
7	Administration fee	0	15,000 USD	15,000 USD
8	Unpaid PGTF fund	2,900 USD	0	2,900 USD
	Total	29,000 USD	66,000 USD	95,000 USD

VI. Project Management and Monitoring

The project is implemented by the International Center on Small Hydropower (IC-SHP). The Chinese government appointed the Ministry of Water Resources (MWR) to ensure that national support for research and development of SHP. Chinese governments & the PGTF will co-finance the proposed consultation missions, case study on the selected SHP projects, seed money for project construction. IC-SHP(in-kind) & PGTF will co-finance the trainings. IC-SHP will provide 'in-kind' assistance for projects, which will form part of the budget contributed by the Chinese government. Progress and monitoring will be done by China International Center for Economic and Technical Exchanges, Ministry of Commerce, the People's Republic of China. 6-monthly progress report will be provided.

VII. Appendix

1. *Guidelines of General Design for Rural Hydropower Refurbishment Project of Efficiency Improving and Capacity Increasing*

农村水电增效扩容改造项目初步设计指导意见

一、总则

（一）为指导农村水电增效扩容改造（以下简称增效扩容改造）项目初步设计，促进水能资源合理利用，做到技术先进、安全适用、经济合理、质量保证、节能环保，全面发挥工程效益，特制定本指导意见。

（二）本指导意见适用于中央财政补助的农村水电增效扩容改造项目。

（三）增效扩容改造以提高综合能效和安全性能、促进水资源综合利用、维护河流健康为目标，改造内容应以机电设备更新改造为重点，并对影响发电效益、工程安全、河道生态和运行环境的挡水、泄水、引水、厂房等建筑物、金属结构及送出工程等进行必要的改造。增效扩容改造项目不增加原有机组台数，原则上不新增移民和永久占地。

（四）增效扩容改造项目初步设计应收集、整理和分析河流水文、气象、地质资料，以及电站原设计、运行和接入系统资料，开展必要的现场调查和勘测，对电站增效扩容的必要性和可行性进行评价。

（五）增效扩容改造项目初步设计应遵循生态、节能、环保的设计理念，并实现少人值守的目标。

（六）增效扩容改造项目初步设计应由具有相应资质的设计单位承担。

（七）增效扩容改造项目初步设计，除应满足本指导意见外，

还应符合《小型水电站技术改造规范》（GB/T50700-2011）、《小型水电站初步设计报告编制规程》（SL 179-2011）等现行标准的要求。

二、基本要求

（一）现状分析与评价

1、应对原电站基本情况、运行现状、存在问题、规划目标等进行必要论述。对电站综合能效进行评价，对相关水工建筑物、机电设备和金属结构等进行安全性分析评价。

2、根据电站综合能效的评价结论，比较与目前先进机电设备性能差距，分析提高效率的可行性；依据电站历年的水文、发电量等运行资料，分析增容的可行性，提出增效扩容改造的内容。

（二）水文

应延长水文系列，复核设计径流、设计洪水和泥沙成果等。

（三）工程地质

应对工程地质情况进行必要的评价成说明。对涉及挡水、泄水、引水系统和电站厂房改扩建的工程，应根据需要补充地质勘察工作。存在滑坡、泥石流塌岸的项目，应进行地质灾害风险评估。

（四）工程任务和规模

1、根据河流规划和接入系统要求，复核工程任务。

2、说明电站建成以来的运行情况及上下游梯级水位衔接情况，对水库特征水位进行复核。

3、根据水工建筑物现状及改造的可行性，综合考虑机组特性、河流生态流量、发电年利用小时、与上下游电站发电引用流

量的协调，合理确定电站装机规模。

（五）水工

1、根据拟定的发电引用流量，复核计算引水系统过流能力及水头损失，对不满足要求的应经过技术经济比较后提出改造方案。

2、根据改造内容对水工建筑物进行稳定和强度复核。

3、厂房改造设计应满足机电设备更新改造和运行环境改善的需要。

（六）水力机械

1、机组改造方案应充分考虑原机型和布置形式，尽可能利用原机组埋入部件和厂房建筑，节省改造成本。

2、应根据引水系统和流道限制条件，选用能效指标先进、空化特性优良、运行稳定性好的水轮机转轮，并复核水轮机吸出高度。

3、进行扩容设计时，应对机组和输水系统的调节保证参数进行复核计算，对辅机、监控和励磁系统以及油、气、水、通风、消防等辅助设备系统作相应复核，按照经济合理的原则同步纳入增效扩容设计范围，并根据水轮机性能参数复核调速器性能参数。

4、应按最重起吊件对厂内起重设备及其支撑结构进行复核。超过起重机额定起重量时，应改造或更新。

（七）发电机及其它电气设备

1、单机容量小于 800kW 的，宜采用低压发电机，以降低电气设备投资。

2、除更换发电机外，可采用更换通风冷却系统、更换定子绕组和转子磁极线圈、改造发电机轴承等方式改造原有发电机。

3、应对机组最大轴向水推力和推力轴承的承载能力进行校核计算。

4、改造后的定子绕组和转子磁极线圈绝缘等级宜采用 F 级，按 B 级温升考核。对湿度较大的电站，应在发电机基坑内加装加热除湿装置。

5、主变压器额定容量应满足改造后的发电机额定容量。高耗能主变压器应更换为 S11 及以上节能型变压器。

6、应采用具有自动调节功能的励磁装置。励磁系统宜优先采用可控硅励磁或无刷励磁方式。

7、电气设备应选择安全、节能、环保型产品，严禁使用高耗能和可能对环境产生污染的设备。应选择无油型高压断路器，选择满足“五防”要求的封闭式高压开关柜，选择通过 3C 认证的低压开关设备。

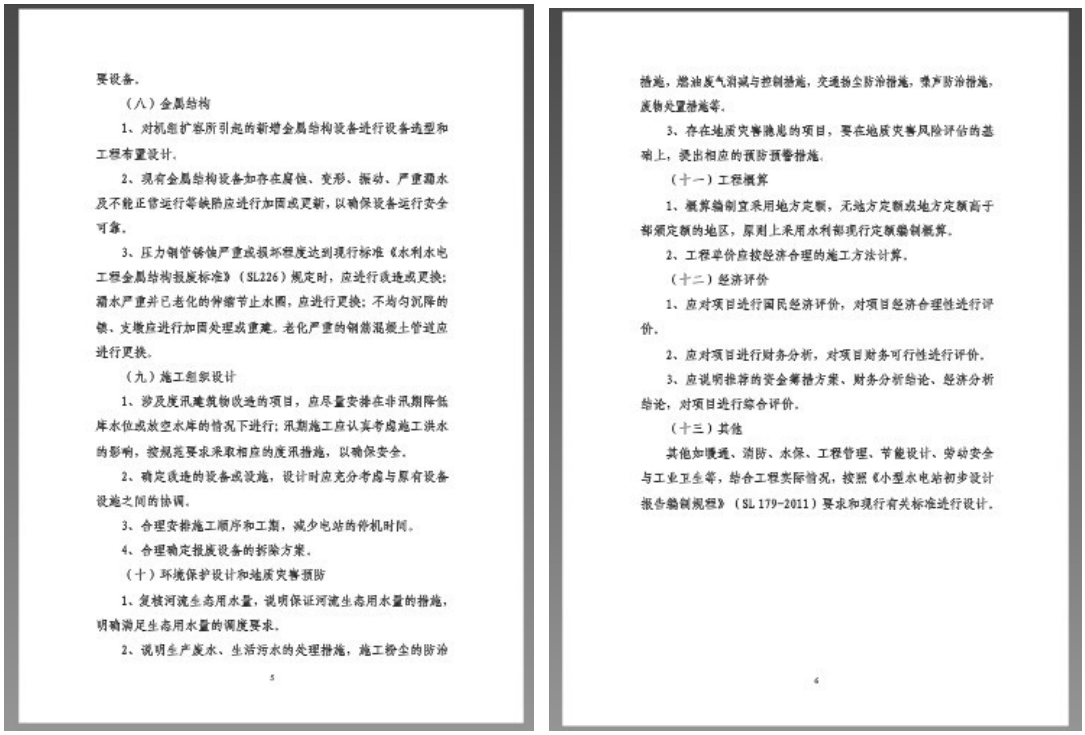
8、35kV 及以下电力电缆、二次电缆导体应采用铜材。

9、应配置可靠、安全、环保的操作电源，无事故照明的应增设事故照明。

10、简述水电站与调度的关系，明确调度控制方式。水电站宜采用计算机监控系统。单机容量为 800kW 及以下的低压机组宜采用结构简单、经济实用的自动化系统。

11、应根据接入系统及相关规程要求，配置相应的保护及安全自动装置，保护设备宜选用微机型。

12、选定水电站内部通信、对外通信及系统通信的方案和主



要设备。

（八）金属结构

1、对机组扩容所引起的新增金属结构设备进行设备选型和工程布置设计。

2、现有金属结构设备如存在腐蚀、变形、振动、严重漏水及不能正常运行等缺陷应进行加固或更新，以确保设备运行安全可靠。

3、压力钢管锈蚀严重或损坏程度达到现行标准《水利水电工程金属结构报废标准》（SL226）规定时，应进行改造或更换；漏水严重并已老化的伸缩节止水圈，应进行更换；不均匀沉降的镇、支墩应进行加固处理或重建。老化严重的钢筋混凝土管道应进行更换。

（九）施工组织设计

1、涉及度汛建筑物改造的项目，应尽量安排在非汛期降低库水位或放空水库的情况下进行；汛期施工应认真考虑施工洪水的影响，按规范要求采取相应的度汛措施，以确保安全。

2、确定改造的设备或设施，设计时应充分考虑与原有设备设施之间的协调。

3、合理安排施工顺序和工期，减少电站的停机时间。

4、合理确定报废设备的拆除方案。

（十）环境保护设计和地质灾害预防

1、复核河流生态用水量，说明保证河流生态用水量的措施，明确满足生态用水量的调度要求。

2、说明生产废水、生活污水的处理措施；施工粉尘的防治

措施，燃油废气泪减与控制措施，交通扬尘防治措施，噪声防治措施，废物处置措施等。

3、存在地质灾害隐患的项目，要在地质灾害风险评估的基础上，提出相应的预防预警措施。

（十一）工程概算

1、概算编制宜采用地方定额，无地方定额或地方定额高于部颁定额的地区，原则上采用水利部现行定额编制概算。

2、工程单价应按经济合理的施工方法计算。

（十二）经济评价

1、应对项目进行国民经济评价，对项目经济合理性进行评价。

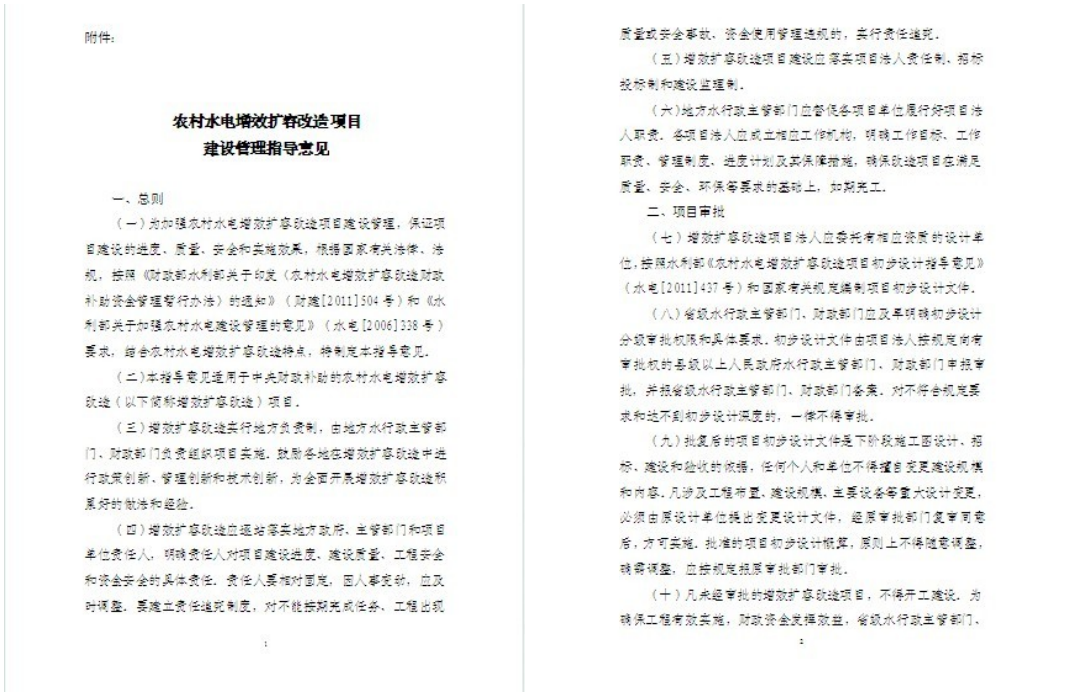
2、应对项目进行财务分析，对项目财务可行性进行评价。

3、应说明推荐的资金筹措方案、财务分析结论、经济分析结论，对项目进行综合评价。

（十三）其他

其他如暖通、消防、水保、工程管理、节能设计、劳动安全与工业卫生等，结合工程实际情况，按照《小型水电站初步设计报告编制规程》（SL 179-2011）要求和现行有关标准进行设计。

2. *Guidelines of Construction and Management for Rural Hydropower Refurbishment Project of Efficiency Improving and Capacity Increasing*



附件：

农村水电增效扩容改造项目
建设管理指导意见

一、总则

（一）为加强农村水电增效扩容改造项目建设管理，保证项目建设的进度、质量、安全和实施效果，根据国家有关法律、法规，按照《财政部水利部关于印发〈农村水电增效扩容改造财政补助资金管理暂行办法〉的通知》（财建[2011]504号）和《水利部关于加强农村水电建设管理的意见》（水电[2006]338号）要求，结合农村水电增效扩容改造特点，特制定本指导意见。

（二）本指导意见适用于中央财政补助的农村水电增效扩容改造（以下简称增效扩容改造）项目。

（三）增效扩容改造实行地方负责制，由地方水行政主管部门、财政部门负责组织项目实施，鼓励各地在增效扩容改造中进行政策创新、管理创新和技术创新，为全面开展增效扩容改造积累好的做法和经验。

（四）增效扩容改造应逐级签订地方政府、主管部门和项目单位责任人，明确责任人对项目建设进度、建设质量、工程安全和资金安全的具体责任。责任人实行对口原则，因人事变动，应及时调整。要建立责任追究制度，对不能按期完成任务、工程出现

质量或安全事故、资金使用管理违规的，实行责任追究。

（五）增效扩容改造项目建设应落实项目法人责任制、招标投标制和建设监理制。

（六）地方水行政主管部门应督促各项目单位履行好项目法人职责，各项目法人应成立相应工作机构，明确工作目标、工作职责、管理制度、进度计划及其保障措施，确保改造项目在满足质量、安全、环保等要求的基础上，如期完工。

二、项目审批

（七）增效扩容改造项目法人应委托有相应资质的设计单位，按照水利部《农村水电增效扩容改造项目初步设计指导意见》（水电[2011]437号）和国家有关规定编制项目初步设计文件。

（八）省级水行政主管部门、财政部门应及早明确初步设计分级审批权限和具体要求，初步设计文件由项目法人按规定向有审批权的县级以上人民政府水行政主管部门、财政部门申报审批，并报省级水行政主管部门、财政部门备案。对不符合规定要求和达不到初步设计深度的，一律不得审批。

（九）批复后的项目初步设计文件是下阶段施工图设计、招标、建设和验收的依据，任何个人和单位不得擅自变更建设规模和内容。凡涉及工程布置、建设规模、主要设备等重大设计变更，必须由原设计单位提出变更设计文件，经原审批部门复审同意后，方可实施。批准的项目初步设计概算，原则上不得随意调整，确需调整，应按规定报原审批部门审批。

（十）凡未经审批的增效扩容改造项目，不得开工建设，为确保工程有效实施，财政资金实行预算

财政部门可在批复的实施方案总规模内，根据实际情况对项目进行适当调整，调整情况应及时报财政部、水利部备案。

三、招标投标

（十一）对增效扩容改造项目的施工、监理及重要设备、材料采购等，按照国家有关规定，结合《水利工程建设项目招标投标管理规定》（水利部令第14号）和当地政府出台的有关规定进行招标。机电设备采购招标应符合水利部《农村水电增效扩容改造项目机电设备选用指导意见》（水电[2011]438号）的要求。

（十二）对同一县级区域内机组数小、范围相对集中的增效扩容改造项目，可采取集中建设管理模式，对项目施工、监理及重要设备材料采购等进行打捆招标，引进资质高、实力强、信誉好的承包商参与项目建设。

（十三）禁止转包、违法分包和出租、出借资质。

四、工程监理

（十四）按照《水利工程建设监理规定》（水利部第28号令）、《水利工程建设监理单位资质管理办法》（水利部第40号令）等有关规定，承担增效扩容改造项目监理任务的监理单位，必须配备具有施工监理、机电及金属结构设备制造监理相对应资格的监理人员，应按照规范要求，编制监理工作细则，按要求进行记录和填写监理日志、监理月报等监理文件，履行好进度控制、质量控制、投资控制、安全控制和合同管理、信息管理及协调等职能，重点应做好机电及金属结构设备制造监理工作。

五、质量、安全管理

（十五）增效扩容改造项目要严格质量与安全管理，逐项落实工程质量与安全监督措施，建立和健全项目法人负责、施工单位保证、监理控制、政府监督的质量保证体系，明确和落实参建各方的质量与安全责任。

（十六）参建单位必须严格按照批准的设计文件、图纸和有关技术标准组织建设，要全面落实安全生产责任制，对工程建设安全工作全过程、全方位进行控制，做好安全生产教育和培训，加强现场安全监督检查，防止发生安全生产事故，特别是要防止围堰失事、工程坍塌和群死群伤事件。项目未经验收合格，不得造机运行。

（十七）增效扩容项目实施期间，项目法人应正确处理工程建设进度、质量与水库运用、安全度汛的关系，要按规定及时制定度汛方案报主管部门批准，严格按照施工组织设计和度汛方案的要求实施施工。有管辖权的水行政主管部门要组织制定好项目实施期间水库的调度运用方案，并监督实施。

（十八）项目法人和各参建单位要加强重大质量与安全事故应急管理，制定相应的应急预案，落实好相关措施，提高质量与安全事故应急管理能力。

（十九）增效扩容改造项目的竣工验收和增效评价由省级水行政主管部门、财政部门组织，具体办法由财政部、水利部另行制定。

（二十）对电站改造初设状、改造的重要环节和改造后情况，各项目法人应留存必要的技术文件、影像资料等证明材料，作为项目验收、增效评价和归档的重要依据。

六、监督检查

（二十一）省级水行政主管部门、财政部门要全面负责辖区内增效扩容改造项目的实施、监管、增效考核和总结工作，要建立健全有关工作制度，确保工程建设质量合格、生产安全、资金安全，整体进度满足要求，达到预期的实施效果。

（二十二）对非季节性河流因水电开发造成局部河段减水脱流的，不仅要认真落实增效扩容改造项目初步设计中确保河流生态流量的工程措施，还要采取非工程措施（包括合理的运行调度方案）予以解决，确保生态环境需要的下泄流量，保证下游生产、生活、生态用水需求。

（二十三）水利部、财政部按照本意见及有关规定，对各地增效扩容改造项目进度、质量、建设、安全、管理以及中央财政补助资金安排使用情况等进行统一指导、监督检查和考核评价。

（二十四）各级地方水行政主管部门、财政部门和各项目单位，都应认真做好增效扩容改造信息报送工作，按季度填报《__年__季度农村水电增效扩容改造项目实施进度和资金使用情况表》（见附表）。

附表：__年__季度农村水电增效扩容改造项目实施进度和资金使用情况表

3. Breakdown of Expenditure

Expenses covered by the PGTF

Training	**US$6,000**
Local Transportation	US400
Local Accommodation	US$4,800
Living Allowance	US$800
Domestic Travel	**US$2,500**
Travel cost to Zhejiang province	US$900
Travel cost to Hunan province	US$1,600
Experts Fees	**US$8,000**
Consulting Fees	US$5,400
Accommodation	US$800
Living Allowance	US$1,800
Meeting	**US$9,600**
Venue	US$3,500
Local Transportation	US$500
Local Accommodation	US$2,200
Living Allowance	US$1,500
Equipment	US$800
Printing	US$350
Other fittings	US$200
Electronic fittings	US$550
Subtotal	**US$26,100**
Unpaid	**US$2,900**
Total	**US$29,000**