

中国绿色小水电实践

Green Small Hydropower Practice in China

国际小水电中心

International Center on Small Hydro Power

CONTENTS

01 中国小水电
SHP in China

02 绿色小水电示范
**Green SHP
Demonstration**

03 经验和结论
**Experience
& Conclusion**

01

中国小水电
SHP in China

小水电在解决我国农村用电、助力脱贫攻坚、优化能源结构、促进地方经济社会发展等方面作出了重要贡献。

SHP has played significant role in rural electrification, poverty alleviation, optimizing energy structure, and local economic and social development in China.

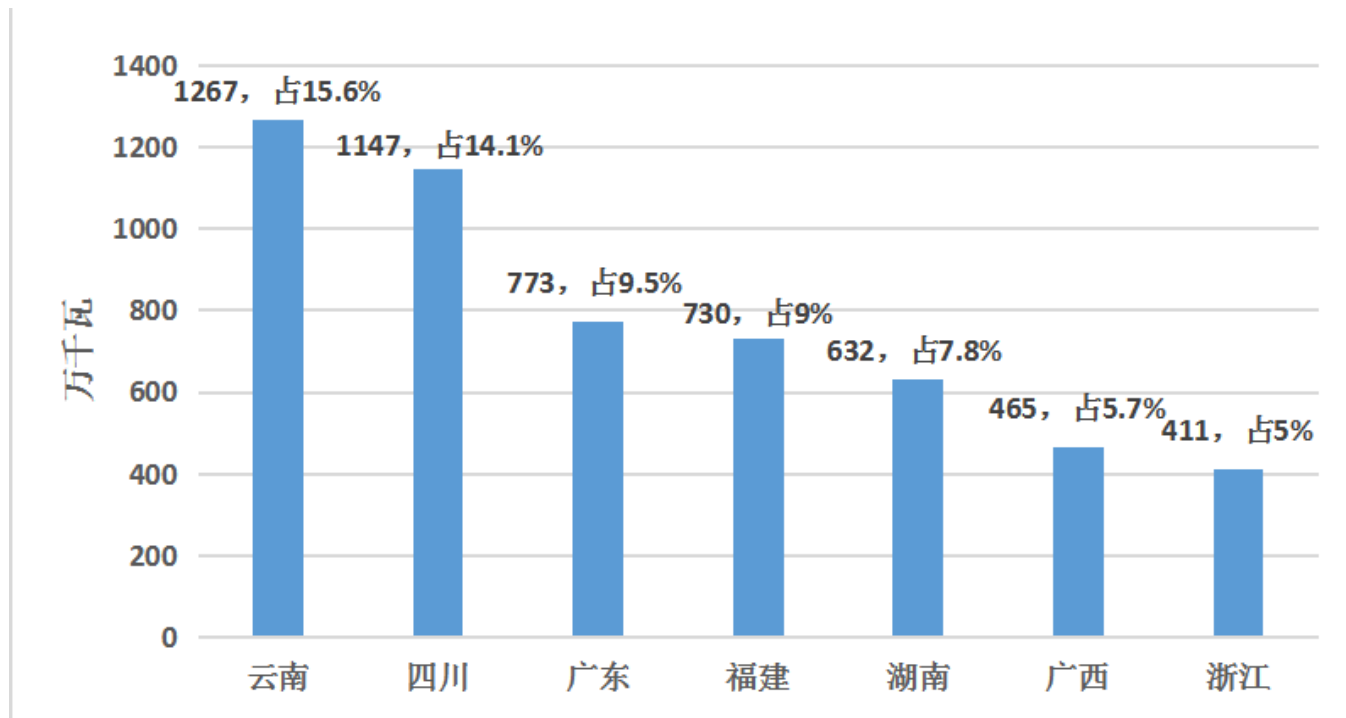
我国将单站装机容量5万千瓦及以下的小型水电站界定为小水电。我国农村水能资源丰富，技术可开发量1.28亿千瓦，广泛分布在1700多个县市区，居世界第1位。

The technical exploitable capacity of SHP in China is 128 million KW (definition: up to 50 MW), widely distributed in over 1700 counties, ranking first in the world.



01 SHP in China

截至2022年底，全国已建成小水电站4.24万座，装机容量8400多万千瓦，占全国水电装机容量（4.1亿千瓦）的20%；年发电量2240多亿千瓦时，占全国水电发电量（1.39万亿千瓦时）的16%，占全国非化石能源发电量的10%，开发程度约65%。全国小水电现有装机容量约为世界各国小水电装机容量的总和。



By the end of 2022, China has 42.4 thousand SHP stations with an installed capacity of over 84 million KW, accounting for 20% of the hydropower . The annual power generation is over 224 billion KWh, accounting for 16% of the hydropower.

01 SHP in China

国际小水电中心（ICSHP）是水利部直属事业单位，是联合国工业发展组织的法定咨询机构，同时也是国际小水电联合会的总部机构，宗旨是促进全球小水电的可持续发展。

International Center on Small Hydro Power (ICSHP) is a public and non-profit institution directly under auspices of United Nations Industrial Development Organization (UNIDO), Ministry of Water Resources and Ministry of Commerce, as well as, ICSHP is a headquarter of **International Network on Small Hydro Power (INSHP)**. In 1998 ICSHP was granted the consultancy status by UNIDO.



1 水利部直属事业单位

2 联合国工业发展组织的法定咨询机构

3 国际小水电联合会的总部机构

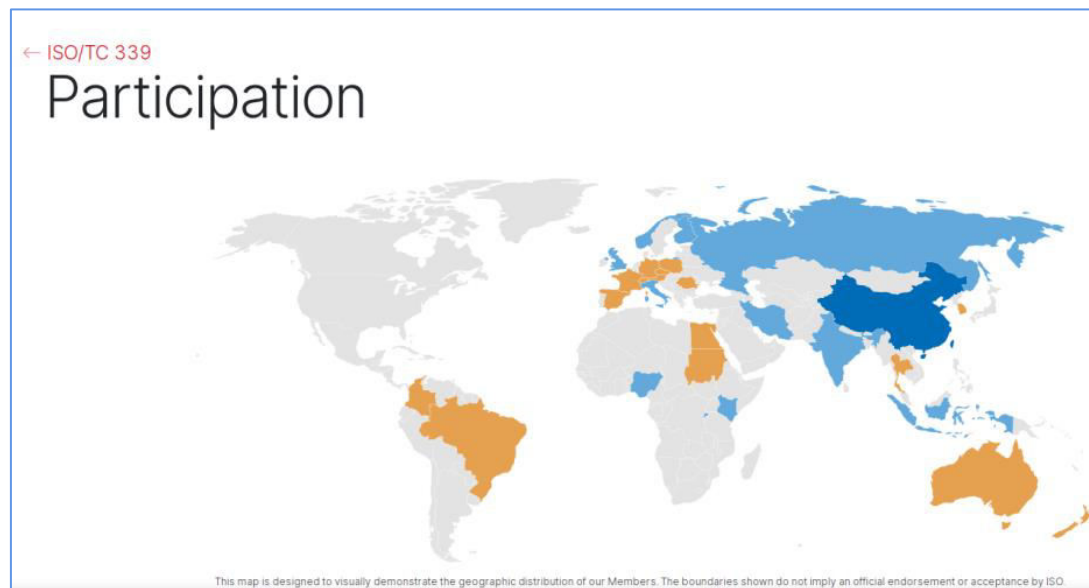
01 SHP in China

国际小水电中心经中国国标委向国际标准化组织技术管理局（ISO/TMB）提交了关于申请成立ISO/TC339的中国提案。2022年5月ISO/TMB正式通过了成立国际标准化组织小水电技术委员会（ISO/TC339 Small Hydropower Plants）的提案，并由中国承办秘书处，张建云院士担任主席。

In May 2022, ISO/TMB approved the proposal to establish ISO/TC339 Small Hydropower Plants with secretariat in China (ICSHP).



The screenshot shows the ISO/TC 339 website page. At the top, there is a navigation bar with 'Standards', 'About us', 'News', 'Taking part', and 'Store'. Below this, the page title is 'ISO/TC 339 Small hydropower plants'. Underneath, there is an 'About' section with the following information: Secretariat: SAC, Committee Manager: Ms Xiaobo HU, Chairperson (until end 2026): Dr Jianyun ZHANG, ISO Technical Programme Manager (TPM): Mrs Kirsi Silander-van Hunen, and ISO Editorial Manager (EM): Ms Jessica Navarria. The creation date is listed as 2022. At the bottom, there is a 'Scope' section with the text 'Standardization in the field of small hydropower plants'.



中国、芬兰、印度等**12个P成员**，**澳大利亚、奥地利、巴西等16个O成员**

12 P members and 16 O members



02

Green SHP Demonstration

绿色小水电建设的背景

小水电发展过程中，过去由于开发规划理念落后，未充分考虑生态环保要求，未预留足够的生态流量，一些地区的小水电开发导致部分河段减脱水甚至断流，河床裸露，河流连通性受阻，严重影响河流生态，影响河流健康生命。

2016年中央一号文件明确提出“发展绿色小水电”，为贯彻落实中央要求，2016年水利部印发《关于推进绿色小水电发展的指导意见》（水电〔2016〕441号），启动了绿色小水电示范创建工作。

Limited to the outdated development planning concepts on SHP, people paid less attention to ecological and environmental protection, neglecting ecological flow in the SHP development in some areas. It caused dehydration or even interruption of some river sections, seriously affecting river ecology.

In response to the requirement of “developing green SHP” proposed by the Central Government, the MWR issued the Guiding Opinions on Promoting the Development of Green Small Hydropower (SD [2016] No. 441) in 2016, starting the demonstration of green small hydropower.

结合中国小水电的特点和实际，2017年水利部组织制定并发布了《绿色小水电评价标准》，首次将生态友好、社会和谐、管理规范、经济合理的装机容量5万千瓦及以下的小型水电站定义为绿色小水电站。2019年根据新的形势要求组织进行了修订完善，新修订的《绿色小水电评价标准》（SL/T 752-2020）于2021年2月发布施行。

Based on the SHP practice in China, in 2017, MWR formulated the "Standard for Evaluation of Green Small Hydropower," which defined green small hydropower stations as hydropower stations with an installed capacity of up to 50 MW that meet the requirements of **ecological friendly, social harmony, standardized management, and reasonable economic viability**. In 2019, the Standard was revised and implemented in February 2021. (SL/T 752-2020)

绿色小水电示范电站

中华人民共和国水利部
二〇二〇年十二月

ICS 27.140
P.59

SL

中华人民共和国水利行业标准

SL/T 752—2020
替代 SL 752—2017

绿色小水电评价标准

Standard for evaluation of green small hydropower stations

2020-11-30 发布

2021-02-28 实施



中华人民共和国水利部 发布

Green SHP Demonstration

绿色小水电评价指标体系 Green SHP Evaluation Frame

聚焦生态环境、社会、管理和经济等四个方面

The Evaluation of Green Small Hydropower mainly

focus on four aspects:

- Ecological environment
- Society
- Management
- Finance

Category	Element	Indicator
Environment (55)	Hydrology (15)	Ecological flow (15)
	River morphology (5)	Disturbance of river morphology (3)
		Sediment transport (2)
	Water quality (5)	Changes of water quality
	Aquatic and terrestrial ecology (10)	Impact on protected aquatic organism (6)
		Impact on protected terrestrial fauna and flora (4)
Landscape (10)	Landscape coordination (5)	
	Landscape restoration (5)	
Energy-saving & emission reduction (10)	Substitution effect to fossil energy (5)	
	Efficiency of carbon emission reduction (5)	
Society (18)	Resettlement (6)	Performance of resettlement (6)
	Benefit sharing (8)	Improvement of public services (4)
		Guarantee of people's livelihood (4)
Management (18)	Comprehensive utilization of water resources (4)	Comprehensive utilization of water resources (4)
	Safety management (6)	Evaluation of safety standards (6)
		Construction of green hydropower (8)
Finance (9)	Technical progress (4)	Automation (4)
		Stability of finance (6)
	Regional economic contribution (3)	Rate of social contribution (3)

Application

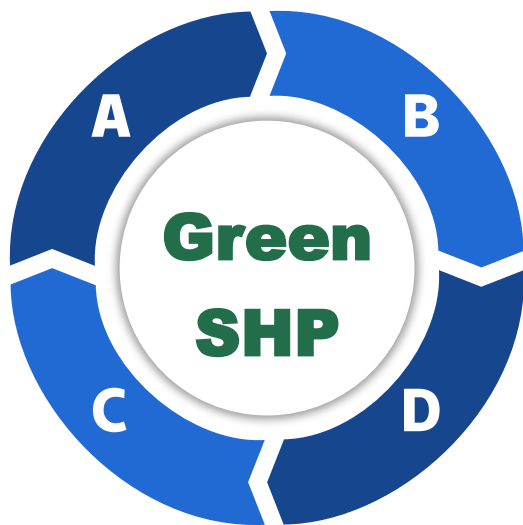
自愿申报

各类依法依规建设、能够基本满足下游用水要求、无水事纠纷并具备《绿色小水电评价标准》基本条件的小水电站，均可参加创建。

Review by MWR

水利部审核

水利部委托有关单位对通过省级初验的小水电站进行部级技术审核，形成年度绿色小水电示范电站推荐名单，报评定委员会办公室复核、评定委员会会议评审通过、提请部务会审定、公示无异议后，以水利部文件发布。



Validity period: 5 years

省级初验

Provincial Preliminary Inspection

省级水行政主管部门结合本地绿色小水电站创建工作重点，组织专家对申报的小水电站进行初验。对通过初验的小水电站，经公示无异议的，提出推荐意见，并报水利部。

动态管理

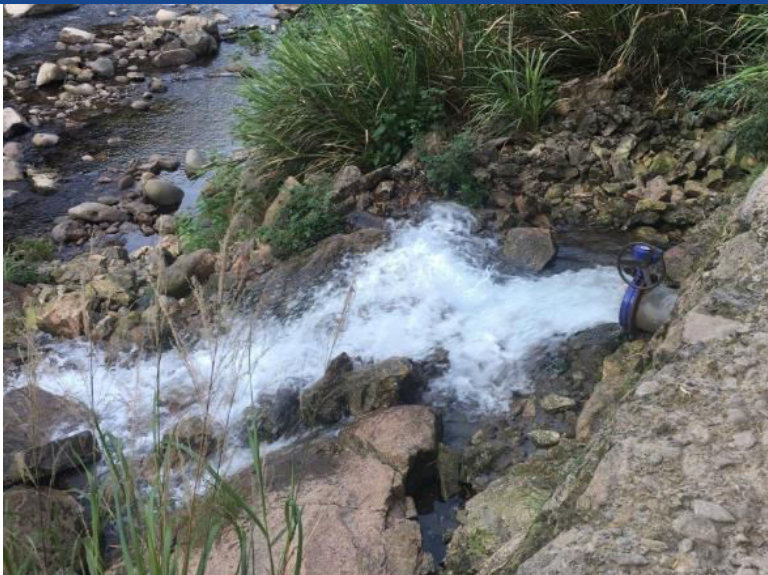
Management

绿色小水电示范电站有效期5年。创建成功后，示范电站需按要求开展年度自查和巩固提升。市县水利部门做好日常监管，省级水行政主管部门定期组织复核，水利部不定期组织复核并督促整改。

02 Green SHP Demonstration

目前已经成功创建的964座绿色小水电示范电站在保护和修复河流生态、复苏河湖生态环境、增进民生福祉、安全生产标准化建设等方面发挥了示范引领作用。

MWR has awarded 964 SHP stations as Green SHP Pilot Stations, which have played a leading role in protecting and renovating river ecology, improving people's well-being, and standardizing safety production.



浙江清水潭电站改造后的生态流量泄放设施

Ecological flow release facilities of
Qingshuitan Power Station, Zhejiang Province

湖北将军柱电站修建适合
鱼类洄游的生态堰坝

Ecological dams suitable for fish migration at
Jiangjunzhu Power Station, Hubei Province





03

Experience & Conclusion

小水电绿色发展目标

SHP Green Development Goals

- Planning for small/medium-sized rivers
- Efficiency Expansion and Efficiency Increase Projects
- Safety Production Standardization of Rural Hydropower Stations

生态环境友好

Ecological friendly

中小河流规划编制，以绿色发展理念为指导，积极转变规划思路，为保护特定目标和河流生态，近4000座小水电退出

经济合理

Economically reasonable

增效扩容改造



01

02

03

04

05

合法合规 Legality

长江经济带2.5万多座小水电全面完善合法合规性手续

社会和谐

Social harmony

水利风景区建设，打造“水旅融合”效益，开展水利风景区建设，

管理规范

Standardized management

农村水电安全生产标准化建设，绿色小水电示范电站创建

小水电清理整改 SHP Reorganization & Rectification



长江经济带清理整改（2018-2020）**Yangtze River Economic Belt**

共2.5万余座，2.1万余座电站按规定落实了生态流量，并已接入各级监管平台

Over 25,000 SHPs involved, 21,000 rectified with ecological flow and connected to regulatory platforms at all levels

黄河流域各省区清理整改（2021-2024）**Yellow River Basin**

共2800多座，正在进行中

A total of 2,800 SHP involved

目前全国已有10个省份出台了绿色小水电激励政策。

吉林

上网电价每度电提升2分钱

江西

每座50万元标准对成功创建绿色小水电的电站进行奖励

浙江

纳入省级财政“水保水电监管”
奖补资金的评价范围

湖南

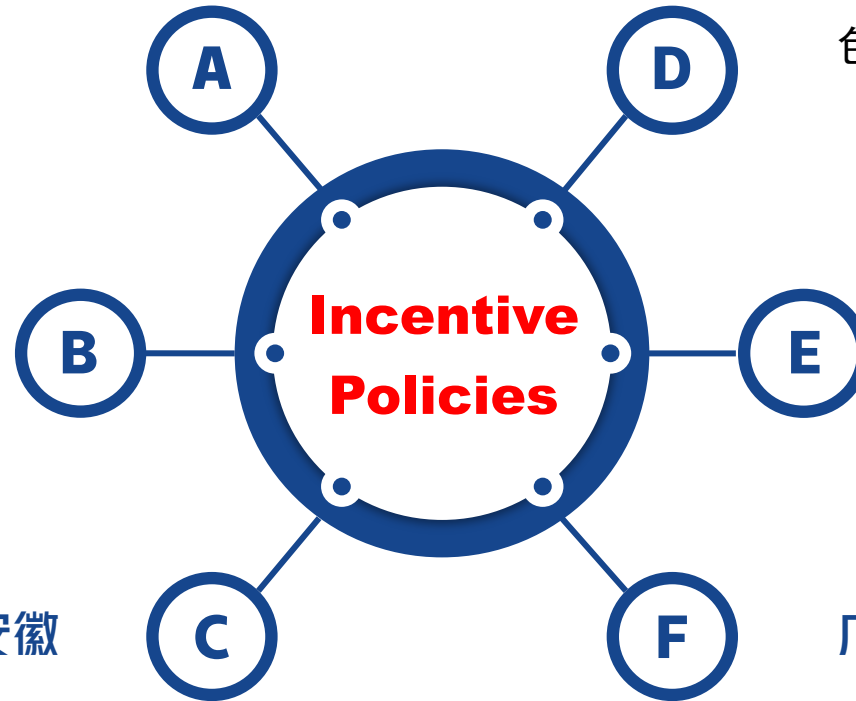
绿色小水电、安全标准化一级
电站20万元/座，

安徽

对每座电站奖励不少于10万元

广东

绿色小水电示范电站每宗奖励
5万元



10 provinces have formulated incentive policies: increase tariffs of electricity or provide rewards for green SHP stations ranging from 50,000-500,000RMB per station.

绿色小水电的机遇

Opportunities of the Green SHP
Development in China

小水电在实现**能源安全**和**气候目标**两方面
有独特的潜在重要作用!

Small hydropower plays a unique and potentially
important role in achieving **energy security** and
climate goals

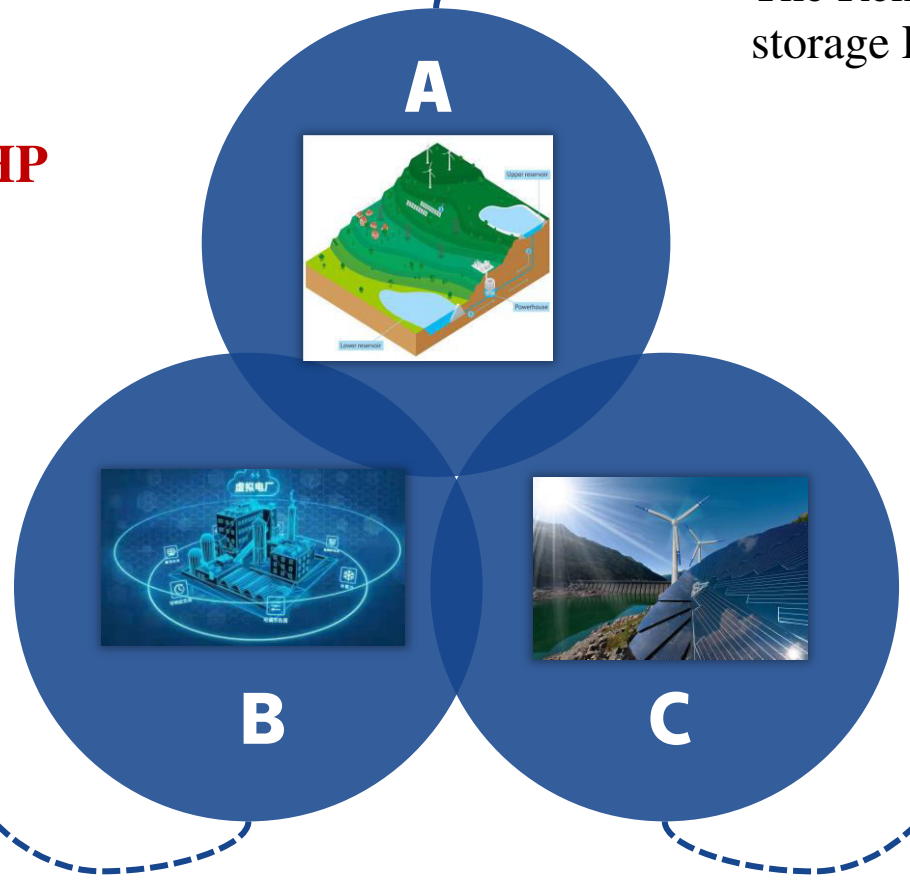


绿色小水电的机遇

Opportunities of the Green SHP Development in China

多能互补与虚拟电厂

Complementary Multi-energy & Virtual Power Plant



梯级电站抽水蓄能改造

The Renovation of Cascade Pumped-storage Power Stations

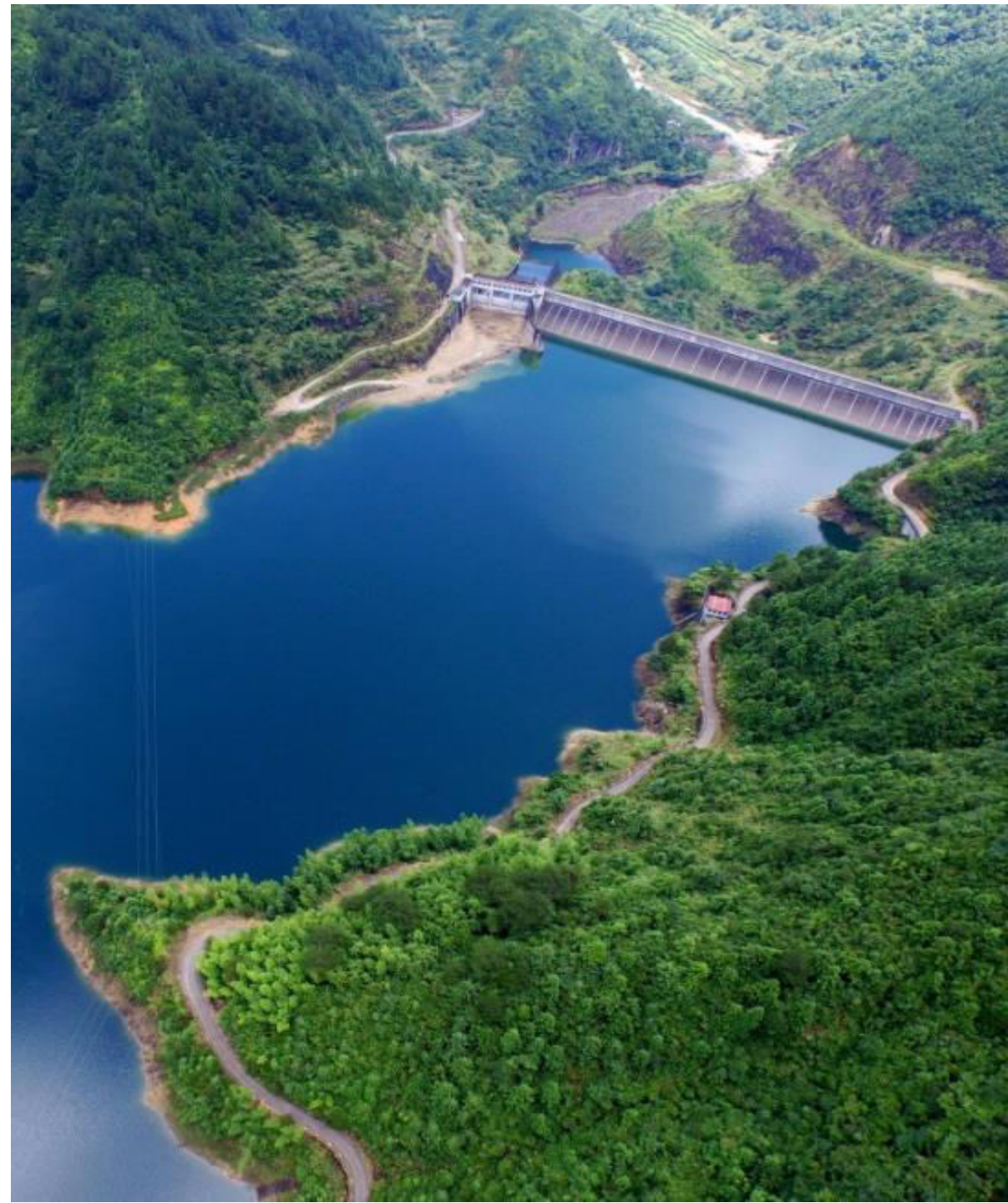
电网辅助调节

Ancillary Regulation of Power Grid

现在：改造小水电，提高效率、安全和生态效应。
将来：可持续发展，发挥独特的储能调节作用，助力实现双碳目标。

SHP renovation aims to improve efficiency, security, and ecological effects.

In the future, SHP will play its unique role in power storage and regulation to achieve sustainable development and dual carbon goals.





**THANK
YOU !**

Ms. Huang Yan

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