UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

INTERNATIONAL CENTER
ON SMALL HYDROPOWER

SMALL HYDROPOWER SERVICE PACKAGE

6 MODULES

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The efforts under the project are to benefit SHP investors, owners, operators, social organizations, regulators, and environmental organizations by providing modules that enable them to develop projects best suited to a country-specific context. The authors wish to thank all the contributors and experts of UNIDO, ICSHP and HHU for hosting and sponsoring the initiatives.

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Abbreviations

CSR	Corporate Social Responsibility
DP	Displaced Person
EOI	Expression of Interest
FIT	Feed in Tariff
GIS	Geographic Information System
HPP	Hydraulic Power Plant
IRR	Impoverishment Risks and Reconstruction
IRR	Internal Rate of Return
ICSHP	International Center on Small Hydro Power
ICTs	Information and Communication Technologies
IDP	Integrated Design Process
LOI	Letter of Intent
LICs	Low-Income Countries
L-MICs	Lower-Middle-Income Countries
M&E	Monitoring and Evaluation
NSDS	National Sustainable Development Strategies
O&M	Operation and Maintenance
ROTC	Resources Optimization for Technical Cooperation
PDCA	Plan, Do, Check, and Act
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
PUE	Productive Uses of Energy
RE	Renewable Energy
RM&U	Renovation, Modernization and Upgrading
SDG	Sustainable Development Goal
SECP	Stakeholder Engagement and Communications Plan
SHP	Small Hydropower
SMART	Specific, Measurable, Achievable, Realistic and Time-Bound
TNA	Training Needs Assessment
UNIDO	United Nations Industrial Development Organization

Table of Contents

Executive Summary

A global increase in electricity needs and a heightened interest in renewable energy sources make small hydropower (SHP) development a subject of interest worldwide. As with any green energy source, the development of SHP across the world over the past decades has created significant benefits. SHP provides green energy and can promote the development of remote areas through the creation of job opportunities for both genders through linkages with productive uses, and provides social benefits such as energy for schools, health centres and information communication technology systems. Unfortunately, less developed economies often lack supporting mechanisms and local know-how for sustainable and profitable SHP development. Specifically, many countries urgently need guidance on how to conduct an assessment-and-demand analysis, strengthen policy support, build capacity, scale up, finance, de-risk investment, and communicate with media and the public when designing, building and operating SHP plants.

To actively respond to the challenge, the United Nations Industrial Development Organization (UNIDO), in collaboration with the International Centre on Small Hydro Power (ICSHP), scale-up sustainable SHP development for productive uses under the umbrella of the inclusive and sustainable industrial development (ISID) framework. Both organizations have come together providing comprehensive skill set. During more than 20 years of cooperation UNIDO and ICSHP have developed sustainable and viable projects (from concept to implementation) by bringing together key elements: partners, knowledge, technology, and fund attraction from international donors. Now they have developed an innovative approach - the Service Package (SP). The goal of the SP is to provide UNIDO's and ICSHP's services for anyone interested. The SP is a model that facilitates the mobilization of partners and resources to achieve a scaled-up development impact and builds synergies with ongoing government and partner interventions that are relevant to sustainable development.

Overview

The SP is to benefit governments, SHP investors, owners, operators, social organizations, regulators, and environmental organizations by providing modules that enable them to develop SHP in the best suited way to a country and region-specific context. It also provides knowledge and good practice examples covering project assessment, management, stakeholder engagement, stakeholder support, funding and community development.

The modules have a fluid connection with each other, with Module 1 acting as the fundamental source for the other modules and Module 4 providing the essential goal. Individuals may make use of the entire document, or pick certain services of particular modules that best suit their objectives. Customizable service packages will assist them in achieving their aims.

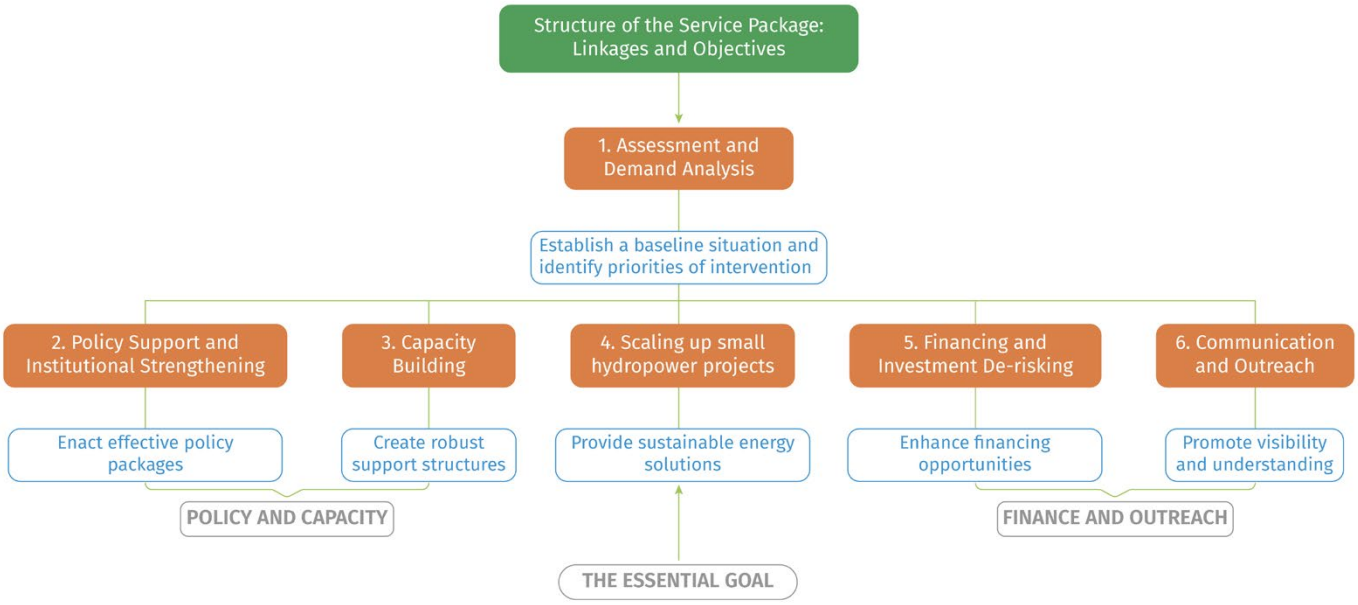


Figure A. Structure of the Service Package: Linkages and Objectives

The Service Package (SP) consists of 6 modules:

1. The Module 1: Assessment and Demand Analysis
2. The Module 2: Policy Support and Institutional Strengthening
3. The Module 3: Capacity Building
4. The Module 4: Scaling up Small Hydropower Projects
5. The Module 5: Financing and Investment De-risking
6. The Module 6: Communication and Outreach

Module 1: Assessment and Demand Analysis

The objectives of Module 1 are to establish a baseline situation of the national energy situation, identify priorities & areas of intervention in hydroelectricity, ensure stakeholders' support of the proposed interventions, etc. Since Module 1 is the basis of other modules, we strongly recommended that requestors understand the energy structure and security of the country by the services provided by Module 1. On the basis of such an in-depth understanding, each requestor can choose the relevant services provided by other modules according to their needs and country situations.

Module 1: Assessment and Demand Analysis provides 12 key services to tackle issues that often require additional attention in developing countries:

1. Improving national electricity system/development plans (including SHP/RE development targets)
2. Improving national energy security
3. Analyzing distribution of hydropower resources
4. Evaluating climate change risks
5. Analyzing potential for SHP development
6. Rehabilitating & improving existing SHP plants
7. Enhancing policy, regulations and financial instruments for SHP
8. Surveying social, economic and environmental demand in a given area
9. Analyzing SHP demand for rural industrial application (mini-grids)
10. Investigating social attitude towards SHP
11. Ensuring availability of local expertise
12. Enhancing gender balance and youth involvement in the sector

Module 2: Policy Support and Institutional Strengthening

The objectives of Module 2 are to enhance the capacity of policymakers in SHP/RE policymaking and support the development & adoption of the most suitable policy package. Module 2 is strongly linked to the other modules, particularly Module 3. To demonstrate, the introductory sessions Module 2 hosts for high-level policymakers provides the groundwork for the training modules and tutorials organized by Module 3. In addition, the execution and coordination modules Module 2 encourages are in fact part of the supportive structures established by Module 3.

Module 2: Policy Support and Institutional Strengthening provides 10 services to tackle issues that often requires additional attention in developing countries:

1. Designing introductory workshops to senior policy makers
2. Improving technical workshops on international best practices
3. Enhancing information gathering from all stakeholders
4. Developing policy enhancement proposals
5. Enhancing policy dialogues to discuss policy options
6. Upgrading policy roadmap for SHP improvement
7. Increasing institutional capacity for successful benefit sharing
8. Enhancing policy and institutional advocacy support
9. Promoting implementation & coordination modalities
10. Supporting with implementing policy instruments

Module 3: Capacity Building

The objectives of Module 3 are to enhance the capacity of local market actors in the design & implementation of SHP projects and support the institutionalization of the training programme to ensure sustainability. Module 3 takes the progress from Module 2 a step further, utilizing UNIDO's Small Hydropower Technical Guidelines to create training for all types of participants. This includes politicians, entrepreneurs, technicians, investors, and those in the community who have an interest in the area. Training covers planning, design, installation, and management of SHP plants of up to 30 MW.

Module 3: Capacity Building provides 7 key services to tackle issues that often require additional attention in developing countries:

1. Assessing capabilities and needs of SHP
2. Delivering training modules & organizing training workshops
3. Identifying & securing the commitment of host institutions
4. Preparing examination & final assessment
5. Establishing support structures
6. Generating case studies & disseminating knowledge
7. Enhancing gender balance and youth involvement in the sector

Module 4: Scaling up small hydropower projects

Module 4 provides the essential goal of the service package, which is the advancement of SHP projects and the implementation of sustainable energy solutions. The essential goal includes building up a collection of projects ready for financing, increasing the proficiency of SHP developers in putting together viable investment offers, and developing commercial plans to expand SHP investments. It also establishes connection platforms between projects, developers, and investors, and offers help in executing demonstration projects. The services offered by the other modules in the package are geared toward this module.

Module 4: Scaling up small hydropower projects provides 8 key services to tackle issues that often require additional attention in developing countries:

1. Identifying initial pipeline of projects / carrying out feasibility study/design
2. Supporting the development of bankable proposals
3. Sharing SHP proposals with the investors
4. Assessing the potential investment
5. Investigating possibilities for industries applications and supporting youth business incubators
6. Creating "matchmaking" platforms/portals for projects, developers and investors
7. Supporting the implementation of demonstration projects
8. Supporting the scaling up of SHP projects in the country

Module 5: Financing and Investment De-risking

The objectives of Module 5 are to provide guidelines for local and international SHP project developers to create a bankable business model to reduce potential risk and enhance financing opportunities for new SHP projects. The Module further hones the financial instruments supplied by Module 1 and helps with the construction of bankable proposals and the evaluation of possible investments served by Module 4.

Module 5: Financing and Investment De-risking provides 8 key services to tackle issues that often requires additional attention in developing countries:

1. Defining risks & success factors of financing SHP projects
2. Assessing capacity needs of banks & financial institutions
3. Establishing business models and financial models for SHP projects
4. Financing SHP projects
5. Supporting policy instruments to facilitate SHP development
6. Establishing investment criteria for financing agencies
7. Designing financial mechanism with de-risking instruments
8. Supporting financing for developers and investors

Module 6: Communication and Outreach

Module 6 works to boost the awareness and comprehension of SHP endeavours on a national or regional scale. To advance SHP promotion, it builds robust, long-lasting partnerships with significant partners, engaging with Module 4's matchmaking platforms for projects, developers, and financiers. Moreover, Module 6 has also produced case studies that serve as teaching material for Module 3.

Module 6: Communication and Outreach provides 7 key services to tackle issues that often require additional attention in developing countries:

1. Mapping communication and outreach needs and opportunities
2. Improving stakeholder mapping for engagement
3. Developing promotional and advocacy materials
4. Producing case studies to showcase SHP success
5. Engaging regularly with national media
6. Documenting key project milestones to promote SHP globally
7. Encouraging participation in global award initiative

Figure B. Service Package Services

Recommendations

The document might be used by international organizations, national and local agencies, SHP investors and operators, affected groups, and environmental or energy organizations. The requestors can either use the document as a whole or choose some services of specific modules that suit their purposes. They can also easily find the content they need with the help of the executive summary, the table of contents and the figures in the document.

As mentioned above, all six modules are interconnected. Since Module 1 serves as the basis of the other modules, the requestors, before they devise, construct or operate SHP projects, are strongly advised to establish a baseline for the national energy situation through the service provided in the Module 1.

As Module 1 provides guiding principles, the requestors who need further service might consider to benefit from other relevant modules. For example, the requestors who are interested in enhancing the know-how of government entities are advised to get the service provided by Module 2. Module 2 enhances SHP policy through core services like delivering interactive workshops, providing senior policymakers with an understanding of the scientific process and methodology, and formulating their policy on SHP development. Also, the requestors who hope to get further services on financial policy or practice are recommended to focus on the financial policy service provided by Module 5, which provides capacity needs assessment of financial institutions and financial models for SHP projects.

Importantly, the services provided by each module can be flexibly combined based on the requestors' needs to achieve their desired goals. For instance, the technical guidelines (TGs) training provided by Module 3 support enhanced SHP roles in knowledge sharing and community recovery by Module 4, as both facilitate meaningful learning from previous and ongoing practice to improve water productivity. Similarly, the outcomes of financial policy service provided by Module 5 could be elements of successful practice to showcase SHP success globally by Module 6.

The document is intended to be dynamic, consisting of regular updates. Some regions may feel the need to adapt these principles to their specific contexts. UNIDO thus encourage shareholders to raise their valuable comments and suggestions to improve the SP.

Conclusion

UNIDO and ICSHP offer countries in need of sustainable electricity, that possess available running water resource networks, a comprehensive service package to tackle the barriers and scale-up SHP development. Some countries, which possess suitable natural resources to develop SHP, can have limited in-house capacity to identify new sites, prepare feasibility studies and the necessary technical and managerial competence to leap-frog SHP development.

By developing a systematic service package, UNIDO and ICSHP support SHP implementation and its potential for productive uses worldwide. Countries and organizations are supported to scale up SHP development and improve industrial development as well as people's living conditions in rural and remote areas.

MODULE 1

ASSESSMENT AND DEMAND ANALYSIS

Module 1: Table of Content

1. Module 1. Assessment and Demand Analysis

Introduction

The United Nations Industrial Development Organization (UNIDO) is a specialized agency of the United Nations with the unique mandate to promote and accelerate sustainable industrial and economic development. Specially, UNIDO has a long track record and expertise in the area of small hydropower. UNIDO and the International Center on Small Hydropower (ICSHP), supported by its broad network of international experts, has been providing expert knowledge on SHP development and construction. The priorities of UNIDO and the ICSHP are to stop climate breakdown by using renewable energy and energy efficiency to reduce industrial greenhouse gas emissions.

Module 1 is targeting 12 services:

1. Improving national electricity system/development plans (including SHP/RE development targets)
2. Improving national energy security
3. Analyzing distribution of hydropower resources
4. Evaluating climate change risks
5. Analyzing potential for SHP development
6. Rehabilitating & improving existing SHP plants
7. Enhancing policy, regulations and financial instruments for SHP
8. Surveying social, economic and environmental demand in a given area
9. Analyzing SHP demand for rural industrial application/mini-grids
10. Investigating social attitude towards SHP
11. Ensuring availability of local expertise
12. Enhancing gender balance and youth involvement in the sector

The objectives of Module 1 are to establish a baseline for the national energy situation, identify priorities & areas of intervention in hydroelectricity, and ensure stakeholders' support for the proposed interventions. The module is to establish the Small Hydropower (SHP) programme/strategy formulated and validated with key stakeholders, assess capacity gaps and institutional needs, and conduct stakeholder consultation workshops. It is possible to choose only some of the services from this module (not mandatory to carry out all of them).

1.1. Module 1 Service 1: Improving national electricity system

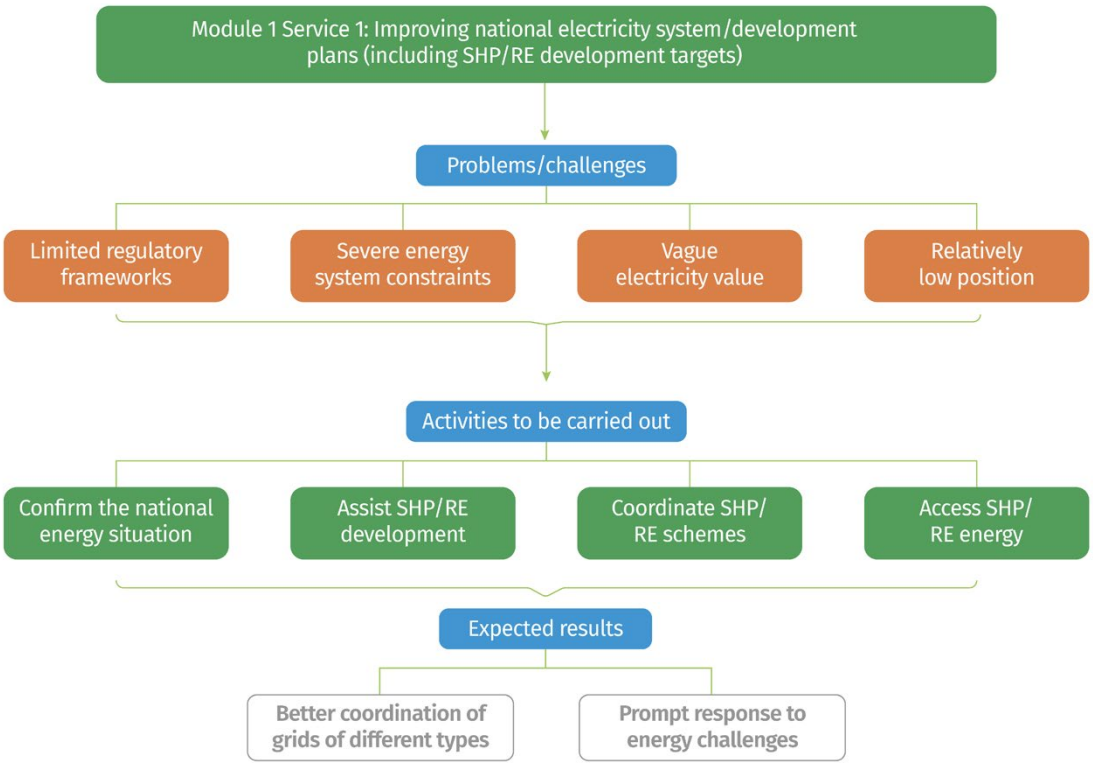


Figure 1.1. Overview of Module 1 Service 1: Improving national electricity system

1.1.1. Introduction

- The national electricity system is a system of power plants connected to end-users of electricity by a transmission and distribution network. The complex system of generation, delivery, and end-users is often referred to as the electric power grid.
- The applicability of this service is established during the overall planning of small hydropower development. The service applies to SHP/RE and addresses potential risks and impacts on communities that may be affected by SHP/RE.

1.1.2. Problems/challenges and possible solutions

- Limited regulatory frameworks: Adequate regulatory frameworks are limited and markets are fragmented in many emerging market economies.
  - ➢ Possible solutions: Module 1 Service 1 will evaluate the regulatory framework for microgrid development and suggest a possible way to establish an interconnected microgrid or to build a complete power market and regulatory mechanism (locally or nationally).

- Severe energy system constraints: Developing or fragile economies often face severe energy system constraints and must focus on improving the energy development outcomes for their citizens.
  - Possible solutions: Small-scale hydropower is in most cases "run-of-river", with no dam. SHP/RE is one of the most cost-effective and environmentally benign energy technologies to be considered for better energy development. Module 1 Service 1 will evaluate the development of SHP/RE in specific regions according to the national electricity development plans.
- Vague electricity value: The physical and structural domains of the SHP/RE value chain is not clear in some countries.
  - Possible solutions: Module 1 Service 1 will enhance the physical domain of the electricity value chain by evaluating energy equity and security. Module 1 Service 1 will also develop an enabling environment for structural domain interventions. These include governance & stakeholder interaction, market environment, and research development & indigenization.
- Relatively low position: SHP/RE has a relatively low position in national power development.
  - Possible solutions: Module 1 Service 1 will clarify the relationship between green investment and economic growth to ensure that the national power development plan paves way for renewable energy in specific regions.

1.1.3. Activities to be carried out

A. Confirm the national energy situation

- Analyze the official documents such as national or regional energy development plans or authorized energy assessment reports in the country or the region.
- Independently investigate the energy situation of the country or region, and compare the investigation with the official documents of the country or region. Using a hybrid model of quantitative and qualitative analysis could be beneficial.
- Based on such analysis and investigation, an SHP/RE development plan suitable for the country or region is designed. Possible locations of SHP/RE networks are suggested by using artificial intelligence techniques or spatial intelligence.

B. Assist SHP/RE development

- Once the SHP/RE development plan is adopted by the country or the region, proper monitoring and accountability frameworks are designed to ensure the compliance of subsequent actions with the SHP/RE development plan.
- Evaluate each of the objectives of the plan to attain a fundamental balance in policy goals.
- Evaluate the success of the plan towards the overall objectives of the national or regional energy development.

C. Coordinate SHP/RE schemes

- Coordinate the relationship between power supply and grid, renewable energy and traditional fossil energy, and renewable energy development and consumption.

- The generation, transmission, and distribution factors need to be well coordinated if getting entry into the plan is to be meaningful.
- Assist the country to address fundamental issues such as limited capacity to implement SHP/RE development plans across regions.

D. Access SHP/RE energy

- R&D efforts in SHP/RE will focus on both enhancing specialized planning tools and improving how these tools can be effectively coordinated to help the public gain SHP/RE energy safely and conveniently.
- Accelerate the construction of a new power system, improve the capacity of renewable energy consumption and storage, and realize the low-carbon transformation, safety and reliability of SHP/RE energy.

1.1.4. Expected results

- Better coordination of grids of different types: The generation and transmission of SHP gained better coordination especially as grids in developing economies are more interconnected than before.
- Prompt response to energy challenges: The service assists the countries or communities in addressing energy challenges promptly under the SHP grid expansion plan.

1.2. Module 1 Service 2: Improving national energy security

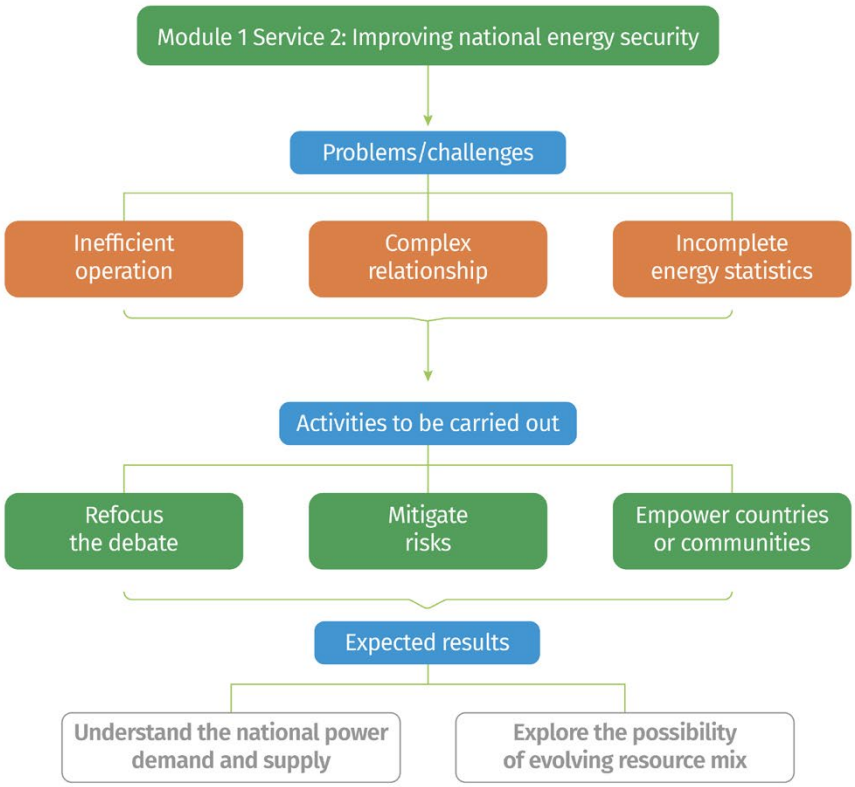


Figure 1.2. Overview of Module 1 Service 2: Improving national energy security

1.2.1. Introduction

- Renewable energy development has become an important strategic direction in the global energy transition and climate change response. SHP/RE generate energy from low-head stream flows or using existing dams or irrigation infrastructure. Installing small turbines often has less environmental impact than large erecting large hydropower equipment.
- The applicability of this service is established during the overall consideration of national energy security. The service helps alleviate the national power shortage.

1.2.2.Problems/challenges and possible solutions

- Inefficient operation: Due to lack of cooperation across geographical scales (local, regional, basin-level or national), scaling up SHP/RE services usually cannot operate efficiently.
  - ➢ Possible solutions: Trans-jurisdictional collaboration is necessary to secure the scaling up of RE/SHP power services. Module 1 Service 2 will help to evaluate the effects of building cooperation mechanisms, negotiation platforms and dialogue channels among governments at different levels as well as different sectors (such as water, the environment, agriculture, fishery and forestry).

- Complex relationship: Key stakeholders of SHP/RE form complex relationships.
  - ➢ Possible solutions: Module 1 Service 2 will assess the energy and environmental challenges of SHP/RE, as well as key stakeholders (international organizations, national governments, business, and civil society organizations) and their input.
- Incomplete energy statistics: The existing energy statistics are incomplete.
  - ➢ Possible solutions: Module 1 Service 2 will assess the systems in place to produce sustainable energy statistics and the completeness/quality of existing sustainable energy statistics. Module 1 Service 2 will also analyze and help to explain the adaptation service SHP/RE can offer and the refurbishment of existing plants with focus on climate change resilience.

1.2.3. Activities to be carried out

A. Refocus the debate

- Refocus on energy security and the future role of SHP/RE in meeting energy needs. Specifically, collect important information on energy supply, energy price, and international cooperation of the energy. Formulate targeted and open development plans according to the resource endowments and economic needs of the country.
- Strengthen ecological consciousness among energy producers and consumers. Encourage consumers to choose environment-friendly goods (including low-impact hydropower), and advise them to avoid consumption behaviour that harms the environment.
- Analyze and help to explain the relevant services of SHP/RE including adaptation and refurbishment of the existing plants with focus on climate change resilience.

B. Mitigate energy risks

- Assess the international risk factors that impact the global and domestic energy market. Help the government explore the possibilities of developing SHP/RE to actively respond to those risks.
- Mitigate the risks by promoting SHP/RE through the provision of legal frameworks, regulatory environments, and tax incentives.

C. Empower countries or communities

- Analyze the market and institutional arrangements to see whether they can benefit less-developed countries or communities. Assist in improving the efficiency and transparency of local politics. Help the local government in reducing its interference in communal markets.
- Assess the impact of technological change in SHP/RE development. Encourage the application of advanced technology and guide investors to cope with technological changes.

1.2.4. Expected results

- Attaining a comprehensive understanding the national power demand and supply.
- Exploring the possibility of an evolving resource mix: the reliability issues related to energy policy, security, the rapidly evolving resource mix and technology innovation are fully addressed.

1.3. Module 1 Service 3: Analyzing distribution of hydropower resources

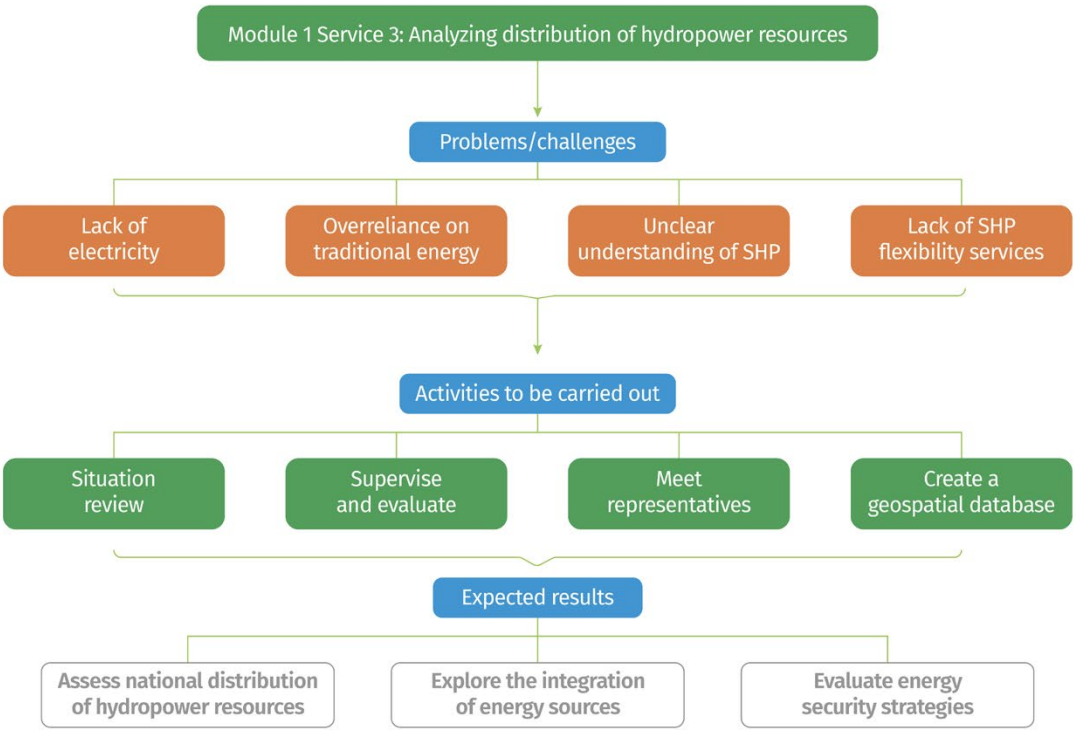


Figure 1.3. Overview of Module 1 Service 3: Analyzing distribution of hydropower resources

1.3.1. Introduction

- Hydropower is electricity produced by the movement of fresh water from rivers and lakes. Gravity causes water to flow downwards and this downward motion of water contains kinetic energy that can be converted into electrical energy.
- The applicability of this service is established by the provision of a national overview of the refurbishment of existing plants and of adaptation services in rivers and streams, and an evaluation of the impact of energy demand governance (especially of SHP) on the energy system. The service applies to the issue of understanding changes in the energy structure of communities caused by decarbonization.

1.3.2. Problems/challenges and possible solutions

- Lack of electricity: Many underdeveloped countries do not have access to cheap and reliable electricity.
  - ➢ Possible solutions: Access to cheap and reliable electricity has become increasingly essential to the functioning of the local economy, way of life and national security. Module 1 Service 3 will survey the degree of power shortage in different regions of the country and propose possible solutions (especially through SHP development)

- Overreliance on traditional energy: The dependence on traditional energy leads to economic and environmental fragility.
  - Possible solutions: Module 1 Service 3 will assess the possibility of developing SHP in countries with such a problem.
- Unclear understanding of SHP: SHP developers, institutions, and stakeholders do not have a clear understanding of management and mitigation options.
  - Possible solutions: Module 1 Service 3 will present a holistic coverage of the role of hydropower in providing hydropower balancing and flexibility services to the electricity grid. This will allow hydropower developers, agencies, regulators and stakeholders to have a clear understanding of the issues and options for management and mitigation.
- Lack of SHP flexibility services: There is a lack of hydropower balancing and flexibility services.
  - Possible solutions: Module 1 Service 3 will evaluate the role of SHP in new and transitioning power systems. This will enable the appropriate evaluation (and incentivizing) of hydropower balancing and flexibility services.

1.3.3. Activities to be carried out

A. Situation review

- Precisely quantify SHP resources of the country or region to fully utilize SHP resources.
- Review theoretical potential, which is the annual average amount of physical energy that is hypothetically available.
- Review technical resource potential, which is the portion of a theoretical resource that can be converted into electricity.
- Review practical resource potential, which is the portion of the technical resource that is available when other siting considerations and constraints are factored in.
- Supervise energy transition and its impact on local or regional energy structure.

B. Supervise and evaluate

- Collect background information on the existing SHP plants. Some of the accumulated data can be accessed by applying for an account on the Geographic Information System (GIS) service.
- Appraise the possibility of geographically dispersed SHP and reduce the energy risk to the local communities.
- Monitor and guide community clean energy development plan. This includes assisting in building a safe and efficient smart grid, improving the clean energy supply network, laying out energy facilities and promoting the development of distributed energy.

C. Meet representatives

- Meet representatives of public power utilities, energy producers, distributors, consumers, donors, business associations and government policy-makers. Discuss with them the efficient use and industrial application of clean energy.

D. Create a geospatial database

- Create a geospatial database of existing hydropower assets.
- Integrate SHP with other resource assessments, and run analyses on several different datasets to help inform decision-makers.

1.3.4. Expected results

- Assess national distribution of hydropower resources: The distribution of hydropower resources in the country is investigated and a development plan is formulated.
- Explore the integration of energy sources: SHP supports the integration of other energy sources. SHP is flexible and complementary to other forms of generation.
- Evaluate energy security strategies: Evaluate energy revolution and energy security strategies in the context of carbon neutrality.

1.4. Module 1 Service 4: Evaluating climate change risks

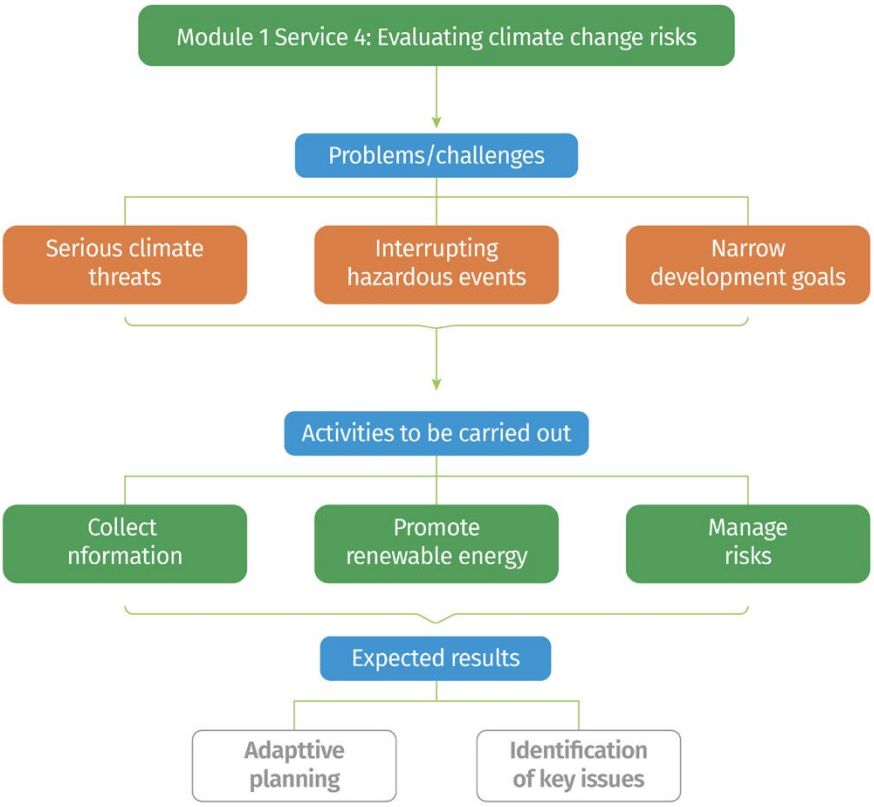


Figure 1.4. Overview of Module 1 Service 4: Evaluating climate change risks

1.4.1. Introduction

- Climate change will cause many different and interacting hazards. SHP contributes to the avoidance of greenhouse gas emissions and the adaptation of local communities to complex energy situations. Water availability and hydropower generation are likely to be affected by changing rainfall patterns, which can reduce or increase the flow of rivers.
- The applicability of this service is established during the overall consideration of climate change risk. This service applies to the issue of coping with climate change risks through regional clean energy plans.

1.4.2. Problems/challenges and possible solutions

- Serious climate threats: Climate change poses serious threats to sustainability, and virtually no industry is immune.
  - ➢ Possible solutions: Module 1 Service 4 will carry out a detailed analysis to evaluate the risks of, and offer the best solution for, the pertinent climate change scenario for both mitigation and adaptation services.

- Interrupting hazardous events: Climate change will cause many different and interacting hazards.
  - Possible solutions: Rapid and responsible deployment of clean, renewable energy is crucial to meet the goals of the global climate change agreement. Module 1 Service 4 will examine the effects of climate change on the entire country as well as the connections between these effects. Module 1 Service 4 will research how SHP/RE could help the country to mitigate these effects and adapt to challenging energy situations.
- Narrow development goals: SHP/RE development is usually only considered in the energy field.
  - Possible solutions: Module 1 Service 4 will evaluate the SHP/RE development in the context of broader development goals of the country, including (1) responsible environmental management, (2) poverty alleviation and social development, (3) integrated water and energy management, (4) institutional development, and (5) adaptation service.

1.4.3.Activities to be carried out

A. Collect information

- Improve the statistical method of annual water reporting, resulting in a more relevant analysis and reduced water use.
- Collect information about changes in related factors (land use, population growth, etc.) that could magnify global or local risks.

B. Promote renewable energy

- Offer recommendations on rapid and responsible deployment of clean, renewable energy.
- Investigate developing partnerships with SHP/RE utilities in highly vulnerable locations to offer electricity to meet mission-critical operational needs.
- Create innovative economic opportunities, create jobs, and develop prosperous communities. Encourage relevant industries based on local resource endowment, and train technical and management personnel.

C. Manage risks

- Establish criteria, requirements, and metrics for climate justice to inform decisions.
- Develop a robust and resilient capacity to manage climate change risks. The capability includes accurate assessment of risk drivers and the formulation of effective risk responses.
- Evaluate the existing SHP/RE plants which need refurbishment and climate change resilience increase.

1.4.4. Expected results

- Adaptation planning: The service develops a strategic direction for adaptation planning, based on climate risk and vulnerability assessments.
- Identification of key issues: The service identifies key adaptation issues (e.g., which sectors or climate impacts should be addressed first) based on the analysis of the immediacy and severity of impacts.

1.5. Module 1 Service 5: Analyzing potential for SHP development

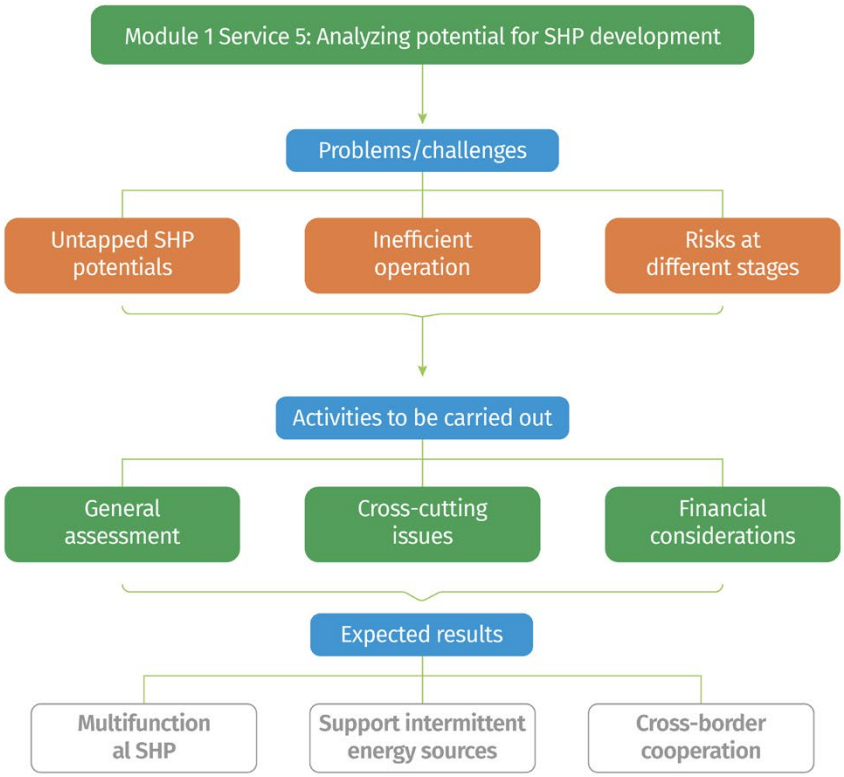


Figure 1.5. Overview of Module 1 Service 5: Analyzing potential for SHP development

1.5.1. Introduction

- SHP, a low-carbon source of energy derived from domestic natural resources, contributes to the energy security agenda and reduces the vulnerability of developing economies to situations similar to past oil price shocks.
- The applicability of this service is established during the overall evaluation of the potential for SHP development in a country or region. The service applies to SHP and addresses potential risks and impacts on communities that may be affected by SHP.

1.5.2. Problems/challenges and possible solutions

- Untapped SHP potentials: Despite the appeal and benefits of SHP solutions, much of the world's SHP potential remains untapped and, in some regions, capacity has decreased in recent years.
  - ➢ Possible solutions: Module 1 Service 5 offers to review the potential for SHP development in specific areas or basins.
- Inefficient operation: Efficient operation and maintenance of the SHP scheme might prove to be challenging for relevant parties.

- Possible solutions: Module 1 Service 5 explores ways of integrating SHP with the existing energy mix and predicts the reliability and affordability of such integration.

- Risks at different stages: Risks might appear at different development stages of SHP.
  - Possible solutions: Module 1 Service 5 identifies various development stages of SHP and assesses the possible risks in the stage of construction, operation, grid connection and scaling up of SHP in the country.

1.5.3. Activities to be carried out

A. General assessment

- Review the existing plants. Conduct a general assessment to reflect the performance of SHP in terms of environment, society, economy and safety, ensuring that SHP continuously operates at a high level.
- Build a pipeline of sustainable SHP that adds value to water management and mixed energy portfolios. The portfolio, a combination of lending, technical assistance, and analytical advisory services will continue to be characterized by diversity, with projects ranging from small local plants and rehabilitation of existing facilities to pumped storage and multipurpose transnational projects.

B. Cross-cutting issues

- Pay attention to environmental and social management and cross-cutting issues, such as revenue management and benefit sharing across all stakeholders.
- Focus on integrating the development of vulnerable groups with local energy improvement.
- Assist the government in capacity building to enhance regulatory environments for SHP development.

C. Financial considerations

- Offer recommendations on the alignment of financial instruments to hydropower needs, addressing public-private partnerships, and funding for regional projects.
- Guide region-specific lending strategies, taking into consideration country programmes and capacities, sector needs, and constraints.

1.5.4. Expected results

- Multifunctional SHP: The development of a suitable multifunctional SHP as part of the menu of options brings significant benefits in terms of supporting water-dependent activities and managing water scarcity (and surplus) energy options for access to electricity.
- Support intermittent energy sources: The service combines thermal and renewable energy by adding backup capacity to support intermittent energy sources such as wind and solar.
- Cross-border cooperation: SHP offers opportunities to build cross-border cooperation and achieve benefits across rivers through regional initiatives in water resource management and the development of energy pools.

1.6. Module 1 Service 6: Rehabilitating & improving existing SHP plants

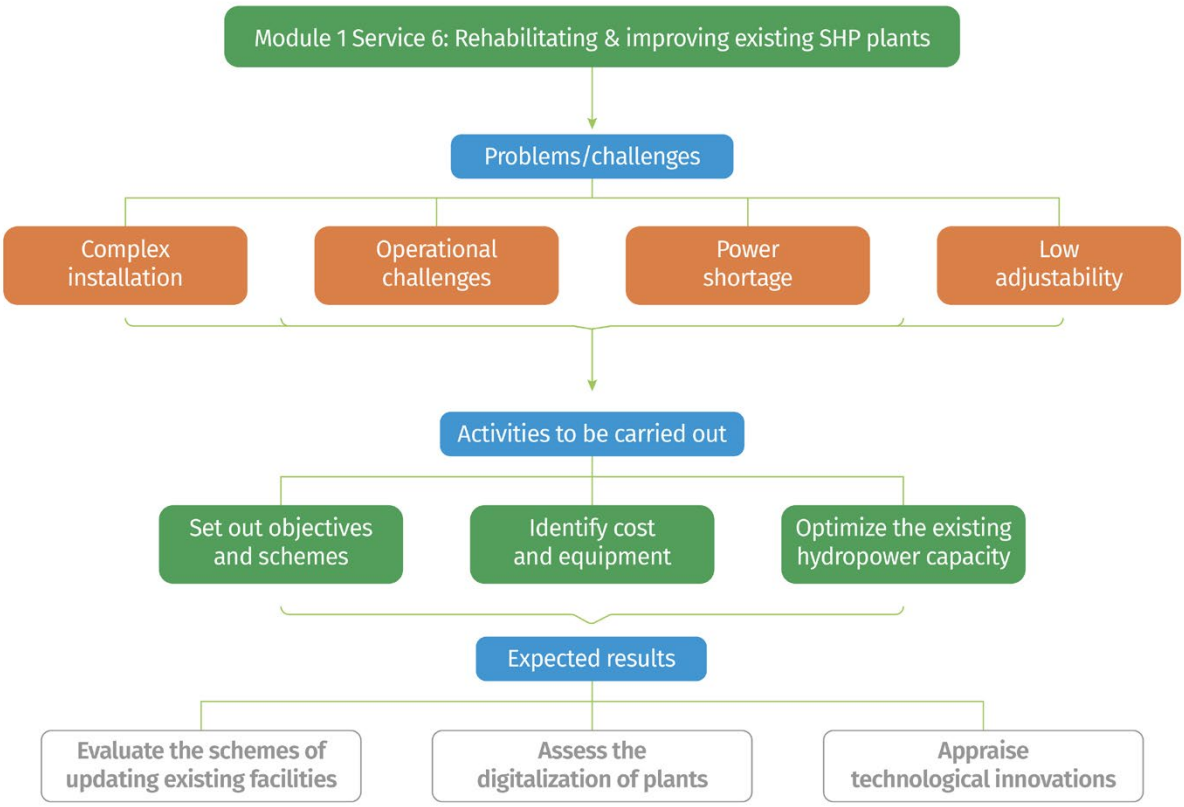


Figure 1.6. Overview of Module 1 Service 6: Rehabilitating & improving existing SHP plants

1.6.1. Introduction

- There has been a great interest in the rehabilitation and upgrading of hydroelectric power plants (HPP) for efficient use of water potential. Upgrading hydropower plants means replacing their old components with newer and more efficient ones, while expanding means increasing the production capacity of hydropower plants.
- The applicability of this service is established during the overall consideration of the Renovation, Modernization and Upgrading (RM&U) of existing SHP plants.

1.6.2. Problems/challenges and possible solutions

- Complex installation: The installation of SHP plants is complex, so SHP plants cannot be installed and forgotten.
  - ➢ Possible solutions: The major issue with such decentralized approaches tends to be long-term facility management. Module 1 Service 6 will analyze the country's needs in SHP installation and evaluate its existing capacity (both economic and technological).

- Operational challenges: Several operational challenges include inadequate desilting arrangements, lack of a communication system, low level of automation and inadequate instrumentation, and flood management & emergency operations.
  - Possible solutions: Module 1 Service 6 will evaluate the availability of spare stocks & maintenance plans in the country, and assess administrative & maintenance costs.
- Power shortage: Refurbishment of SHP plants has become an important way to alleviate power shortage.
  - Possible solutions: Module 1 Service 6 will review the financial and technological aspects of SHP plant refurbishment and upgrading.
- Low adjustability: SHP needs to be used in conjunction with other RE power sources like solar, and wind power.
  - Possible solutions: Module 1 Service 6 will access the possibility of integrating SHP and RE (such as solar and wind) when upgrading existing SHP plants.

1.6.3. Activities to be carried out

A. Set out objectives and schemes

- Offer recommendations on setting out sustainability objectives and decarbonization schemes to support clean energy needs. These plans should comprehensively consider the function, distribution and capacity of existing energy facilities.
- Identify the operational challenges of existing SHP plants and set out schemes to improve the plants' rehabilitation, sustainability and greening.

B. Identify cost and equipment

- The RM&U of older power plants is often less expensive than the development of a new power plant, has a relatively smaller environmental and social impacts, and requires less time to implement. This makes capacity additions through RM&U of older power plants potentially attractive. Identified hydropower components such as turbine runners, generator windings, excitation systems, governors, control panels, or waste cleaning devices can be selectively replaced or repaired to reduce cost and save time.
- Assess the programmes of upgrade existing SHP facilities, allowing them to be developed quickly to meet the energy demand. Devise and evaluate systematic approaches to upgrading SHP stations by using modern control and regulatory equipment.

C. Optimize the existing hydropower capacity

- Evaluate the possibility of increasing pumped storage and battery energy storage system application as well as increasing the hydropower mix in the generation fleet.
- Design and appraise the programmes of integrating SHP plants with other renewable energy resources such as wind and solar, creating an optimized delivery system.
- Assess the possibility of Refurbishing or upgrading SHP plants by using more efficient turbines and generators, which will lead to incremental increases in hydroelectricity generation. The hydroelectric generation equipment with improved performance can also be retrofitted, often to meet market demands for more flexible and peak operation modes.

1.6.4. Expected results

- Evaluate the schemes of updating existing facilities: Evaluate the way of updating hydropower facilities through a holistic approach, with an emphasis on improving system efficiency, reliability, and safety for decades to follow.
- Assess the digitalization of plants: Smart generation plants—with improved asset management, communication and performance—are enabled by digitalization.
- Appraise technological innovations: Appraise the feasibility of technological innovations (such as innovative pumped energy storage methods) in the country to meet the growing energy storage needs.

1.7. Module 1 Service 7: Enhancing policy, regulations and financial instruments

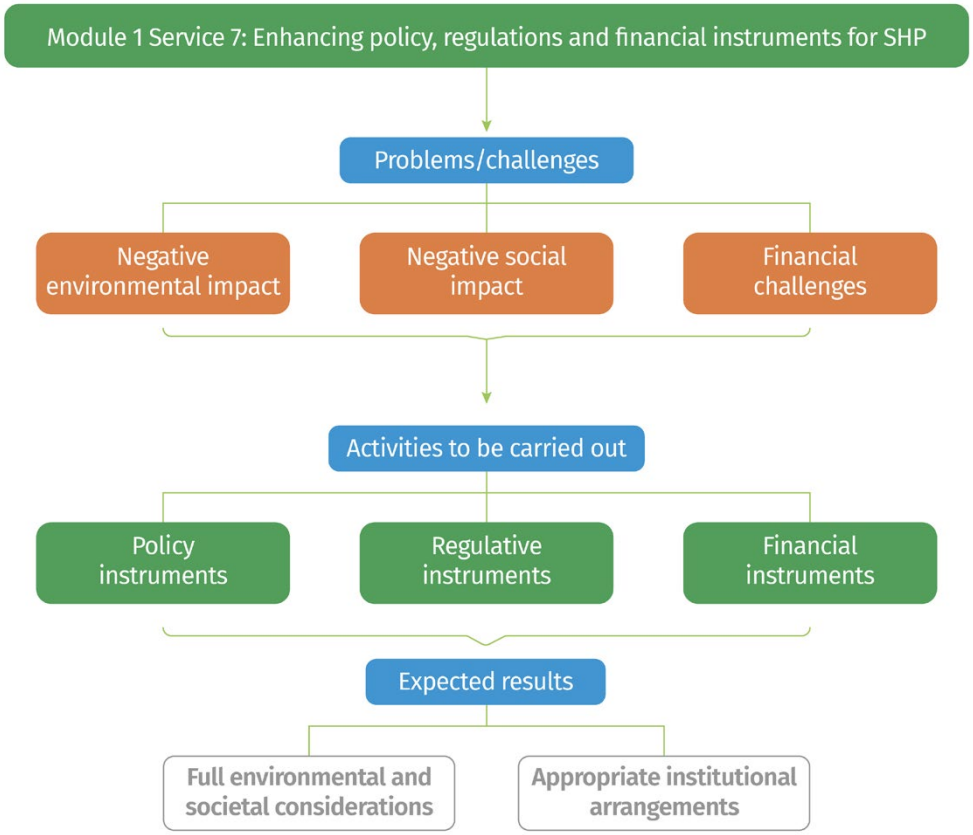


Figure 1.7. Overview of Module 1 Service 7: Enhancing policy, regulations & financial instruments for SHP

1.7.1. Introduction

- The construction of SHP plants is becoming an increasingly complex task amid tightening environmental standards. The use of policy, regulations and financial instruments for SHP is now becoming of great importance for business. Work with governments, civil society organizations and the private sector to support and plan for high-quality SHP in economies that lack tools and guidance.
- The applicability of this service is established during the overall planning and design of policy, regulations and financial instruments for SHP. The service applies to SHP and addresses potential strategy for developing it.

1.7.2. Problems/challenges and possible solutions

- Negative environmental impact: Some SHP plants might have environmental implications if the consequences are not properly considered. They can hinder the migration of some aquatic species and harm plants and wildlife. The changes in land use and water quality are typically a consequence of the submergence of large areas.

- Possible solutions: Module 1 Service 7 will devise and evaluate developing smaller-scale, more environmentally friendly ways of using water energy.

- Negative social impact: The negative social aspect might be associated with undermined social relationships, the loss of fertile cropping areas or irregular and insufficient release of water downstream.
  - Possible solutions: Module 1 Service 7 will carry out a comprehensive social assessment to mitigate the adverse social impact caused by SHP.
- Financial challenges: SHP development might involve expenses on preparatory works. Local entrepreneurship programmes have failed to capitalize on the projects.
  - Possible solutions: Module 1 Service 7 will evaluate the financial risk and assess ways of encouraging local enterprises to participate in entrepreneurship plans.

1.7.3. Activities to be carried out

A. Policy instruments

- Evaluate the extensive use of SHP/RE electricity to minimize the utilization of traditional energy. Assess the schemes for controlling energy prices, improving energy supply, and providing energy security knowledge.
- Assess the electricity rate to make it more affordable. Evaluate the tiered electricity pricing system to make electricity prices better reflect power supply costs. Make electricity sufficiently available to people.

B. Regulative instruments

- Assess existing SHP to meet interim and long-term electricity requirements. Analyze the programme of rural electrification to render assistance in the development of agricultural production. Assess the utilization of local expertise, skills and resources as well as foreign investment for the development of hydropower.

C. Financial instruments

- Assess the financial viability of SHP by means of interviews, questionnaires and other surveys.
- Evaluate holistic models that reflect the structure of revenues and costs for a given type of SHP.

1.7.4. Expected results

- Full environmental and societal considerations: The environmental and social management plans of SHP are fully assessed.
- Appropriate institutional arrangements: The service evaluates institutional arrangements which are made to implement benefit-sharing programmes. Such arrangements help to clarify (1) the responsibilities of agencies involved in benefit-sharing programmes; and (2) the arrangements to ensure appropriate coordination among agencies, companies, and organizations.

1.8. Module 1 Service 8: Surveying social, economic and environmental demand

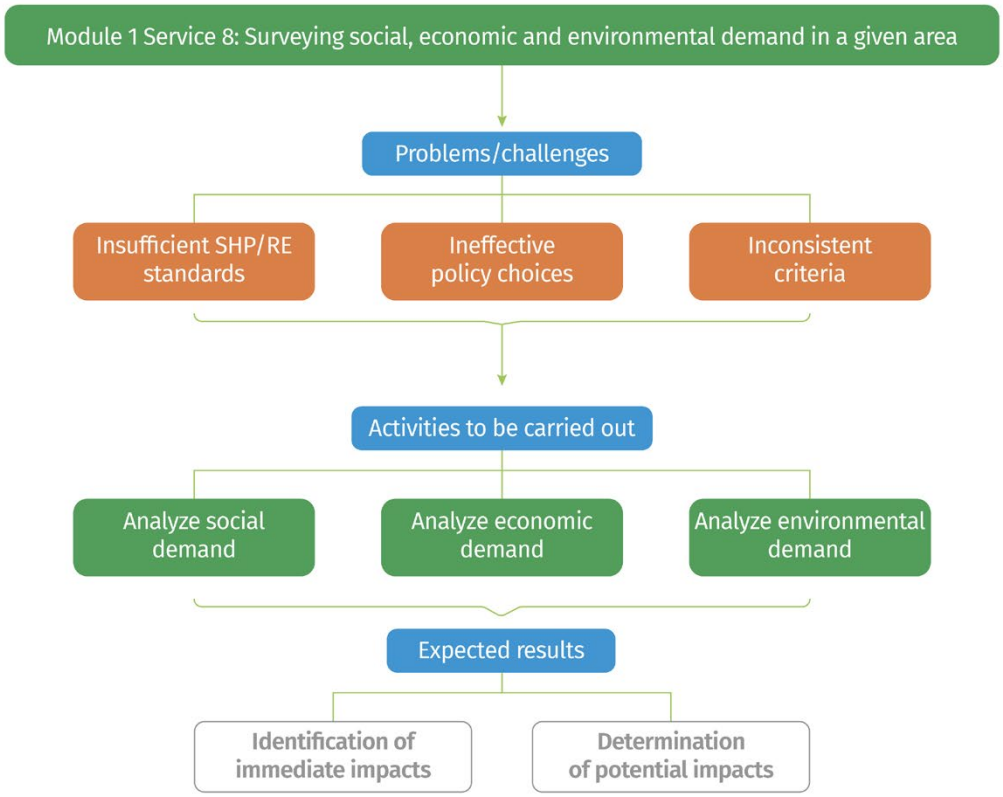


Figure 1.8. Overview of Module 1 Service 8: Surveying social, economic and environmental demand in a given area

1.8.1. Introduction

- There is an inextricable nexus between water, energy and changing climate. Availability of water is crucial for many energy technologies, and energy is required to secure water supply for agriculture, industries, and households, especially in water-scarce regions.
- The applicability of this service is established during the social, economic and environmental demand analysis in a given area. The service applies to the economically optimal operation of multi-use schemes that involve trade-offs between different uses including hydropower.

1.8.2. Problems/challenges and possible solutions

- Insufficient SHP/RE standards: Lack of social, economic and environmental related SHP standards.
  - ➢ Possible solutions: Module 1 Service 8 will evaluate a wide variety of sustainable SHP criteria for society, economy and the environment in a given area. These criteria range from generic to very detailed.

- Ineffective policy choices: Inconsistent sustainability criteria for SHP/RE lead to ineffective policy choices and incomplete proposals.
  - Possible solutions: Module 1 Service 8 will evaluate and improve appropriate and consistent sustainability criteria to support effective energy policy choices. Module 1 Service 8 will also assess the proposals to reduce as many uncertainties as possible in SHP/RE development in a given area.
- Inconsistent criteria: The social and environmental demand assessment criteria for SHP/RE are usually too simple, and often inconsistent with local or national sustainable development strategies (NSDS).
  - Possible solutions: Module 1 Service 8 will examine the assessment criteria and improve them according to the country's sustainable development strategies and local development goals.

1.8.3. Activities to be carried out

A. Analyze social demand

- Investigate cultural assets: Conduct surveys on the loss of cultural lands, sites and connections to place (cremation sites), traditional festivals and traditional lifestyles and practices.
- Examine indigenous knowledge and practices: Conduct surveys on the types and nature of indigenous knowledge
- Religious/cultural practices, rituals, and tribes: Investigate types of religion and ritual practice.
- Gender survey: Increase female participation, ensure land titles for women or joint titles for husband and wife, and improve gender roles/responsibilities and norms.
- Vulnerable people survey: The service collects and analyzes specific issues of relevance to vulnerable people.

B. Analyze economic demand

- Find economic opportunities: Find opportunities for individuals' employment in the sector of SHP; creation of new jobs and the need for skills development; opportunities for local/national businesses to supply goods and services to the project/workers camps/associate industries; local government revenue and service enhancement opportunities
- Assess existing power infrastructure: Evaluate the existing power generation and distribution infrastructure in the area including availability and reliability of grid connectivity. This helps understand the need for decentralized energy solutions like small hydropower.
- Review government incentives: Examine the policies, regulations, and government incentives available for small hydropower development like feed-in tariffs, tax rebates, subsidies, etc. See if the incentives are adequate to support projects economically.

C. Analyze environmental demand

- Investigate terrestrial, aquatic and riparian flora and fauna: Conduct surveys on terrestrial flora and fauna in the area of influence; riparian flora and fauna in the area of influence (fisheries and aquatic life); species of interest (e.g. important to locals); areas of high biodiversity values; existing anthropogenic influences within the area of influence; forest type and management practices.

- Investigate natural and critical habitats: Conduct survey on national and internationally designated protected areas; loss, degradation, fragmentation of forest; biodiversity hotspots, biological corridors and connectivity; direct habitat loss; critical habitats.
- Examine ecosystem services: Provide, regulate and support ecosystem services.
- Achieve environmental sustainability: Ensure, as much as possible, that the environment is not affected or polluted during SHP/RE construction. Offer recommendations on the sustainable development of SHP/RE.

1.8.4. Expected results

- Identification of immediate impacts: The entire affected community is identified and considered to capture SHP/RE's impact on community cohesion and community values.
- Determination of potential impacts: The temporal extent of SHP/RE's influence involves considering project activities over time - pre-construction, construction, commissioning, operation and decommissioning - and the season of the year when the above phases are expected to occur. This can be done by undertaking modelling studies to determine potential impacts on the physical and ecological attributes of the river system.

1.9. Module 1 Service 9: Analyzing SHP demand for rural industrial application/ mini-grids

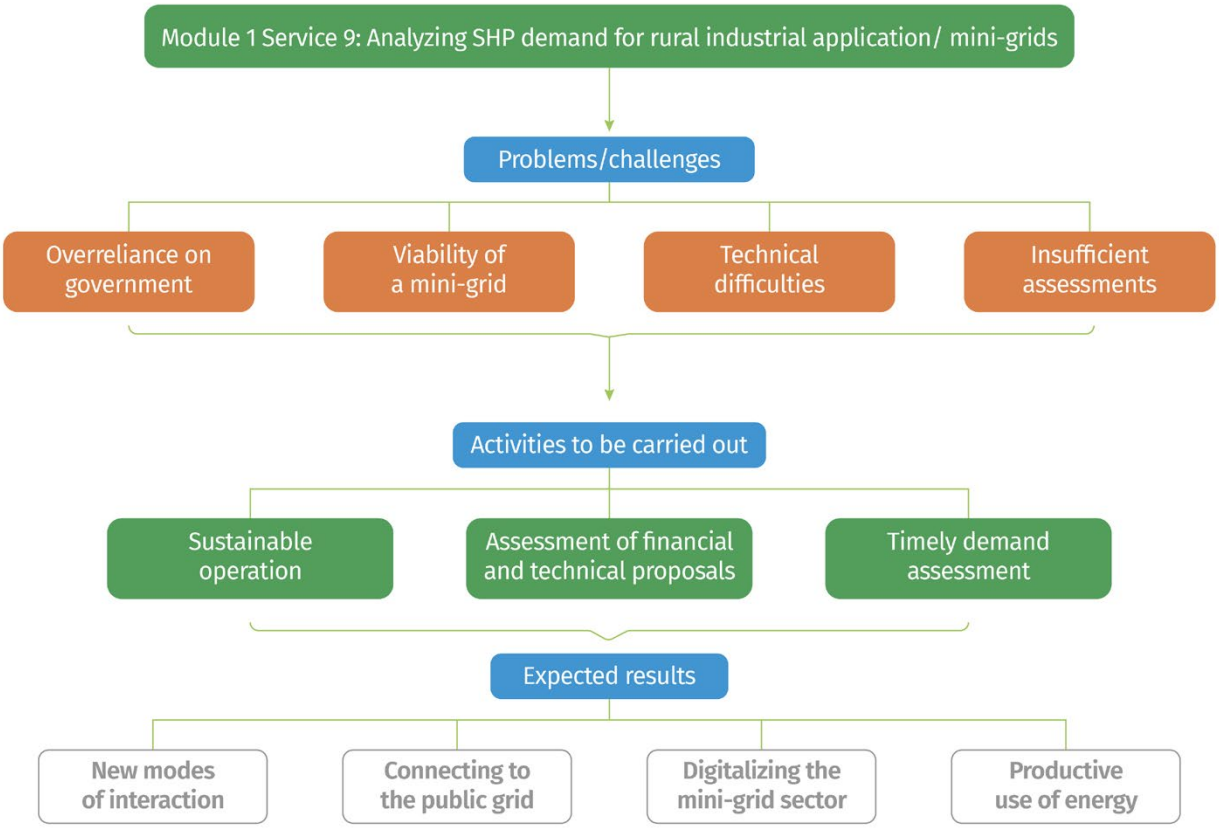


Figure 1.9. Overview of Module 1 Service 9: Analyzing SHP demand for rural industrial application/ mini-grids

1.9.1. Introduction

- Remote communities often heavily depend on expensive and polluting diesel generators that create significant financial and operational challenges. For many countries, access to clean, reliable, affordable energy is one of the major challenges. This is especially true in rural and more remote areas, which are often not connected to the country's main electricity grid.
- The applicability of this service is established during the overall planning of SHP demand analysis for rural industrial applications/mini-grids. The service applies to SHP and addresses potential risks and impacts on communities that may be affected by project activities.

1.9.2. Problems/challenges and possible solutions

- Overreliance on government: Mini-grids are still largely donor-driven or dependent on subsidies for deployment. Moreover, much depends on the regulatory environment in each country.

- Possible solutions: Module 1 Service 9 will assess the policy environment to provide suggestions on eliminating uncertainty and encouraging private investment.

- Viability of a mini-grid: A key issue for the long-term viability of a mini-grid is whether and when the national grid will arrive in a region. There is a chance that a previously installed mini-grid could become a stranded asset once the main grid reaches a community.
  - Possible solutions: Module 1 Service 9 will assess the coordination between different power grids and improve the negotiability of power grid policies.
- Technical difficulties: There remain technical difficulties associated with setting up and maintaining mini-grids and promoting rural industrial applications.
  - Possible solutions: Module 1 Service 9 will evaluate the initial deployment of mini-grid solutions and follow-up measures. Module 1 Service 9 will also assess decentralized energy technologies to provide viable solutions for rural industrial applications in a given area.
- Insufficient assessments: SHP demand analysis for rural industrial applications/mini-grids is not adapted to national and local circumstances.
  - Possible solutions: An essential step in the promotion of industrial application and the selection process for a mini-grid is the accurate assessment of the electricity demand before implementation. Module 1 Service 9 will conduct demand assessment using appropriate methodologies with varying processes.

1.9.3. Activities to be carried out

A. Sustainable operation

- Encourage the mini-grids to be powered by renewable power supplies. The guiding principle for the planning of new mini-grid projects should be only renewable energy sources (e.g. SHP).
- Encourage mini-grids to adapt to new conditions. Mini-grids should be designed to enable, if not even promote, flexible and demand-driven expansion at later phases. To achieve this goal, uniform interfaces and equitable grid access must be provided with all network participants having equal rights to operate at their full capacity.

B. Assessment of financial and technical proposals

- Explore the possibilities of creating mini-grids of affordable and equitable electricity costs in a given area. Assess and improve the mini-grids proposals that are designed in a cost-effective way.
- Assess the technical demand for the industrial application.

C. Timely demand assessment

- Estimate SHP demand for rural industrial application. Provide advice on the SHP application on irrigation, water supply, lighting, and public health.
- Devise flexible application plans. Adjust the application plan of SHP in time according to the fluctuation of demand.

1.9.4. Expected results

- New modes of interaction: Mini-grids enable new modes of interaction within the grid by, for instance, enabling electricity consumers to act as producers.
- Connecting to the public grid: The design of the mini-grid allows the possibility of connecting to the public power grid at any time so that potential investors are not deterred by the possible future arrival of the main grid.
- Digitalizing the mini-grid sector: The trend of digitalization enters the mini-grid sector. Modern information and communication technologies (ICTs) spreads to remote locations, opening new opportunities for productive use of energy (PUE).
- Productive use of energy: Gaining access to electricity leads to the productive use of energy which, in turn, boosts people's businesses and income-generating activities. People can benefit from lighting, for instance, to keep their shops open longer whilst also offering electrified services such as printing.

1.10. Module 1 Service 10: Investigating social attitude towards SHP

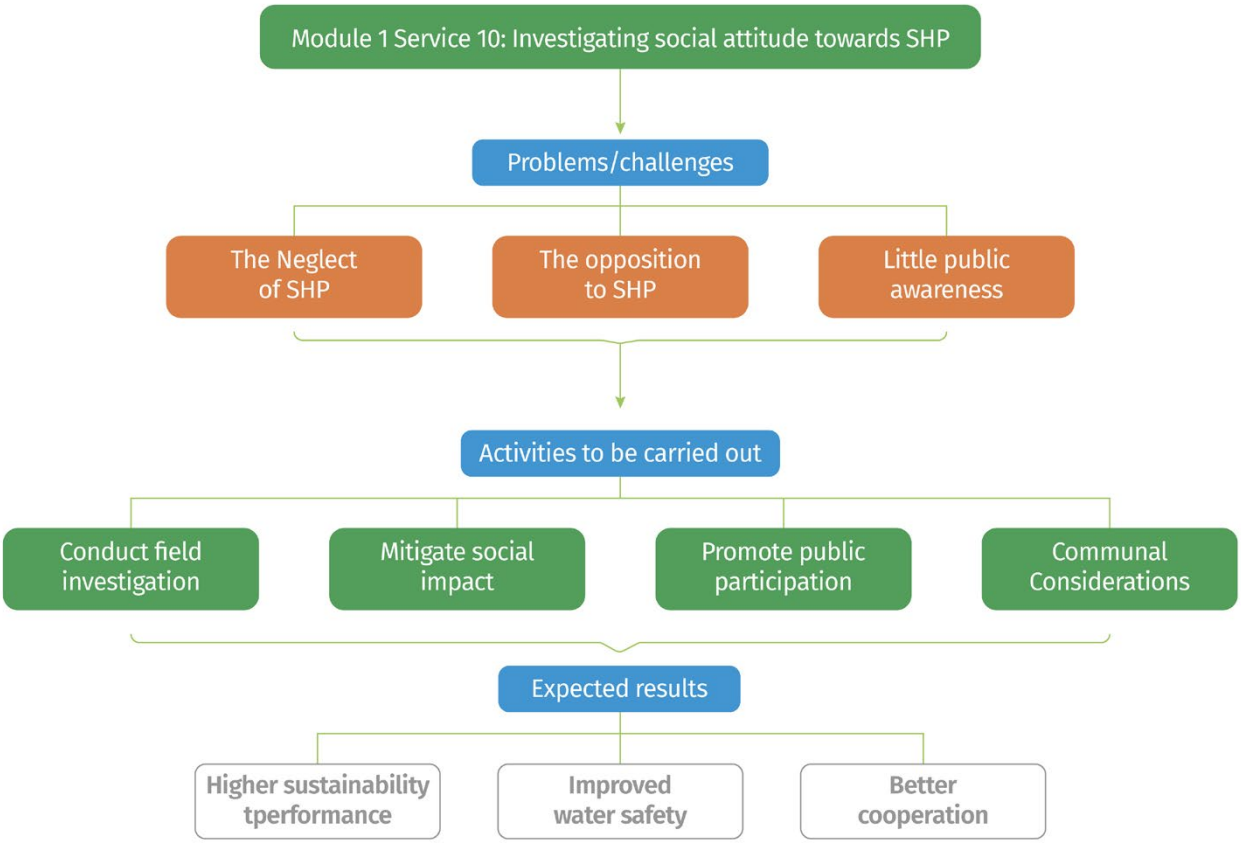


Figure 1.10. Overview of Module 1 Service 10: Investigating social attitude towards SHP

1.10.1. Introduction

- SHP has different social impacts depending on the type, size, and local conditions of the project. The social issues might affect deploying hydroelectricity. Although SHP can help increase the electricity demand in local communities, the public still needs to understand how communities near water sources view this technology.
- The service applies to SHP and addresses potential risks and impacts on communities that may be affected by project activities.

1.10.2. Problems/challenges and possible solutions

- The Neglect of SHP: Various factors or issues influence how people perceive hydropower solutions in their region. Many institutions and decision-makers are not aware of the possibilities for SHP development. The result is often that conventional energy options are preferred, where hydropower potential would be promising.

- Possible solutions: Module 1 Service 10 will survey the public's views on SHP to formulate targeted participation plans for the next step.

- The opposition to SHP: The acceptance of specific SHP projects on the local level is a different issue. While individuals may support the idea of clean energy, they often oppose the implementation of SHP technologies in their area.
  - Possible solutions: As the degree of local autonomy increases, Module 1 Service 10 will assess the degree and ways of public participation in decision-making.
- Little public awareness: There is insufficient public awareness of the impact of global warming.
  - Possible solutions: Each country has a responsibility to reduce carbon dioxide emissions and reduce the rapid depletion of its fossil fuel resources. Module 1 Service 10 will survey the concerns held by residents and local stakeholders and meet their expectations.

1.10.3. Activities to be carried out

A. Conduct field investigation

- Structured questionnaires and personal interviews are used in the survey. Personal interviews are adopted to gather statistics and are often used in opinion polls. Consideration was given to the multiple impacts (social, economic, development, environmental and other factors) of SHP.
- The questionnaire consists of fixed-answer questions covering various areas such as the respondents' attitudes towards SHP. In addition, socio-demographic data (gender, age, educational level, income, occupation) are collected from the respondents.

B. Mitigate social impact

- Reduce loss of cultural heritage assets. This includes the establishment of protection lists and protection plans.
- Reduce the most common impoverishment risks captured in the model of Impoverishment Risks and Reconstruction (IRR): landlessness, joblessness, homelessness, marginalization, increased morbidity and mortality, food insecurity, loss of access to common property and social (community) disarticulation.

C. Promote public participation

- Involve local citizens in the decision-making processes about water management based on different phases of SHP (feasibility study, bidding, construction, commissioning and operation).
- Consider the residents that are affected by the construction of hydropower facilities. Investigate changes in the landscape, the occupation of land as well as negative effects on species and habitats, and devise corresponding response plans.

D. Communal considerations

- Encourage the community to accept SHP by helping reduce future electricity costs without investment costs on their part, increase economic and social benefits and promote community participation.
- Address these factors to encourage SHP acceptance by communities. The affected groups are encouraged to participate in stakeholder consultations and information sharing.

1.10.4. Expected results

- Higher sustainability performance: Innovative planning based on stakeholder consultations supports high sustainability performance in future projects.
- Improved water safety: The management of SHP establishes an arena for public participation that can help promote economic growth and water safety.
- Better cooperation: The service advances the understanding of communities' attitudes towards SHP and supports SHP by enhancing the understanding of hydropower value.

1.11. Module 1 Service 11: Ensuring availability of local expertise

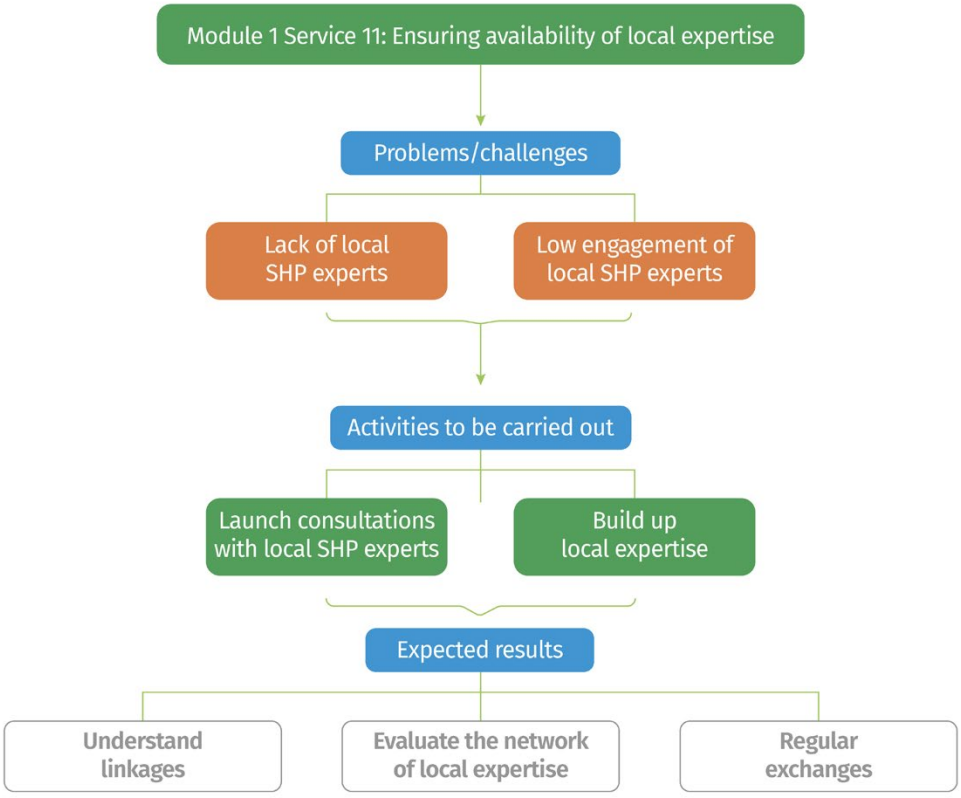


Figure 1.11. Overview of Module 1 Service 11: Ensuring availability of local expertise

1.11.1. Introduction

- It was important to strengthen working relationships with local SHP experts, local professional groups or networks to promote the sustainable SHP development. SHP must develop local expertise to ensure local energy security.
- The applicability of this service is established during the planning, implementation and maintenance of SHP/RE. The service applies to SHP in the country and enhances collaboration with local SHP experts.

1.11.2. Problems/challenges and possible solutions

- Lack of local SHP experts: The lack of local expertise concerning the selection of an appropriate site and the associated civil works can hinder the performance and benefits of SHP.
  - ➢ Possible solutions: Module 1 Service 11 will survey the availability of local experts in a given area.
- Low engagement of local SHP experts: Local SHP experts are not fully valued and engaged in the various stages of SHP development.

- Possible solutions: The involvement of local SHP experts enables sustainable SHP development. Module 1 Service 11 will investigate the degree of engagement of local experts in a given area.

1.11.3. Activities to be carried out

A. Launch consultations with local SHP experts

- Based on a detailed analysis of various metrics related to socio-economic, and political factors, layered with local experts, Module 1 Service 11 is offering to provide suggestions on how to include local experts in the SHP/RE development in a given area.
- Evaluate the role of local experts in SHP/RE's bottom-up consultations and planning. Establishing local expertise helps to chart national or local paths to sustainable development.

B. Build up local expertise

- Assess the plans for training local experts on SHP/RE technology.
- Evaluate the framework for enhancing the availability of local expertise that can be applied to SHP. An environmentally and socially sustainable SHP based on local expertise and support can provide a large range of development benefits to local communities.

1.11.4. Expected results

- Understand linkages: The service evaluates ways of integrating SHP development and local expertise at the community levels.
- Evaluate the network of local expertise: The service assesses the local experts' network and evaluates the potential impact of local expert networks on the development of SHP.
- Regular exchanges: The service evaluates the effect of regular exchanges between local experts and other staff (such as government officials, SHP technicians and investors). The service assesses whether these exchanges have facilitated SHP.

1.12. Module 1 Service 12: Enhancing gender balance and youth involvement

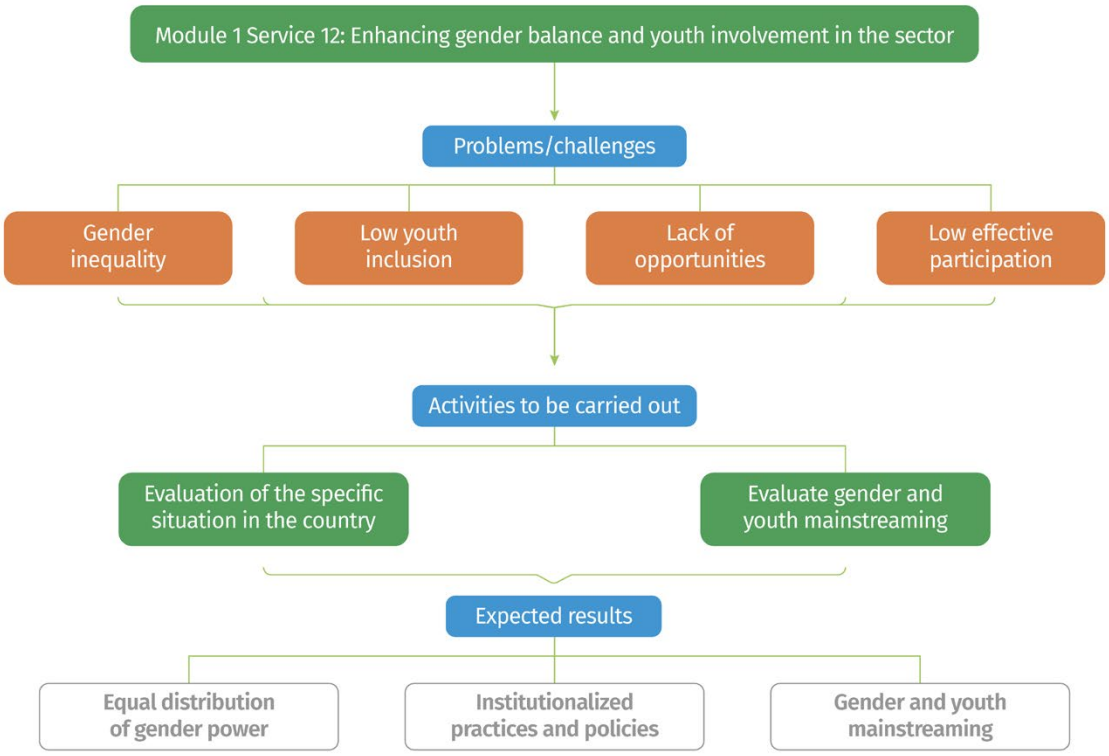


Figure 1.12. Overview of Module 1 Service 12: Enhancing gender balance and youth involvement in the sector

1.12.1. Introduction

- Gender relations are relationships of distribution of power between women and men. Women do not have equal access to power and decision-making structures of SHP development.
- Some progress has been made in ensuring youth inclusion in SHP, but significant gaps remain in the industry.
- The applicability of this service is established during the whole process of small hydropower development. The service applies to SHP and addresses women and youth that may be affected by project activities.

1.12.2. Problems/challenges and possible solutions

- Gender inequality: Women more often lack access to rights, property, resources, and decision-making in SHP.

- Possible solutions: Module 1 Service 12 will assess gender equality in SHP development in a given area.

- Low youth inclusion: Youth inclusion is relatively low in SHP development. The engagement of youth in the achievement of Sustainable Development Goals (SDGs) is critical.
  - Possible solutions: Recognize youth as agents of change. Module 1 Service 12 will evaluate the role of youth participation in decision-making.
- Lack of opportunities: Vulnerable groups, including women and youth, lack chances to participate in SHP development.
  - Possible solutions: Module 1 Service 12 will evaluate the possibility of greater participation of women and youth in SHP development by adopting policies benefiting women and youth.
- Low effective participation: In some projects, women and men are usually the same or in equal numbers in all activities but they have different statuses.
  - Possible solutions: Module 1 Service 12 will assess women's and youth's substantive participation in SHP.

1.12.3. Activities to be carried out

A. Evaluation of the specific situation in the country

- Survey national or local regulations or practices that ensure women's participation in SHP.
- Survey women's organizations or networks to investigate their activities in promoting gender equality and preventing discrimination.
- Investigate women and youth participation in meetings or dialogues related to SHP/RE.
- Assess the materials (such as SHP/RE training materials that meet the literacy level of women and youth) or mechanisms (such as training arrangements).

B. Evaluate gender and youth mainstreaming

- Evaluate the equity strategy of gender and youth mainstreaming in the sector of SHP/RE. Assess SHP/RE goals and outcomes in a way that accords equal value to the wishes and needs of both men and women throughout the project cycle.
- Assess the effectiveness of the strategy and practices within the country. Identify the practices' strengths and weaknesses in promoting gender and age equality.

1.12.4. Expected results

- Equal distribution of gender power: A gender-sensitive policy frame will be established to ensure a balanced gender relationship through the equal distribution of power between genders in SHP.
- Institutionalized practices and policies: The service institutionalizes gender or age equality in policy programmes, structures, decision-making processes and other practices.
- Gender and youth mainstreaming: The service assesses the effect of gender and youth mainstreaming in the country.

Module 1: Conclusion

- Module 1 serves as a basis for other module, providing a much wider scope of activities and services that give an overview of potential. Requestors do not need to take all of Module 1 services but can choose only some of them and mix and match with other modules.
- Module 1 will provide an overall evaluation of the SHP/RE sector, evaluation of the impact of SHP/RE development on the energy system and suggestion on new policy applications based on the understanding of changes in the energy structure of communities caused by decarbonization. Module 1 acts as the fundamental source for the other modules: it furnishes insight on the scattering of hydropower assets, examines climate change risks, examines the likelihood for SHP development and boosts policy and regulations for SHP.
- Module 1 will consider to what extent SHP/RE helps to alleviate the national power shortage and copes with climate change risks through regional clean energy plans. It also surveys social, economic and environmental demand in a given area and investigates social attitude towards SHP.

MODULE 2

POLICY SUPPORT AND INSTITUTIONAL STRENGTHENING

Module 2: Table of Content

2. Module 2: Policy Support and Institutional Strengthening

Introduction

The United Nations Industrial Development Organization (UNIDO) and the International Center on Small Hydro Power (ICSHP) are always keeping abreast of new trends in improving industrial energy efficiency by contributing to the transformation of markets for energy-efficient products and services. They promote sustainable energy solutions for making industries more productive and climate resilient, which in turn promotes green jobs and economic growth. They are experienced in promoting sustainable energy solutions for making industries more productive and climate resilient, which in turn boost green jobs and green growth.

Module 2 is targeting 10 services:

1. Designing introductory workshops to senior policy makers
2. Improving technical workshops on international best practices
3. Enhancing information gathering from all stakeholders
4. Developing policy enhancement proposals
5. Enhancing policy dialogues to discuss policy options
6. Upgrading policy roadmap for SHP improvement
7. Increasing institutional capacity for successful benefit sharing
8. Enhancing policy and institutional advocacy support
9. Promoting Implementation & coordination modalities
10. Support with implementing policy instruments

Educating policymakers with the newest technologies and innovative strategies for small hydropower is essential for promoting its adoption as a sustainable energy source. Policymakers play a critical role in shaping energy policy, and their decisions have a significant impact on the development and implementation of small hydropower projects. By educating policymakers about the latest technologies and innovative strategies for small hydropower, we can help them understand the potential of this technology to meet growing energy demands while reducing greenhouse gas emissions. Policymakers can also learn about the economic and social benefits of small hydropower, including job creation, rural electrification, and improved energy security.

Furthermore, educating policymakers can help to overcome the barriers that may prevent the widespread adoption of small hydropower. These barriers may include regulatory hurdles, lack of financing, and technical challenges. By providing policymakers with the most up-to-date information about small hydropower, we can help to identify and address these barriers, making it easier for communities to benefit from this technology.

Overall, educating policymakers about the newest technologies and innovative strategies for small hydropower is crucial for promoting its adoption as a sustainable energy source. By doing so, we can help to create a more sustainable, secure, and equitable energy future for all. However, it is possible to choose only some of the services from this module (not mandatory to carry out all of them).

2.1. Module 2 Service 1: Designing introductory workshops to senior policy makers

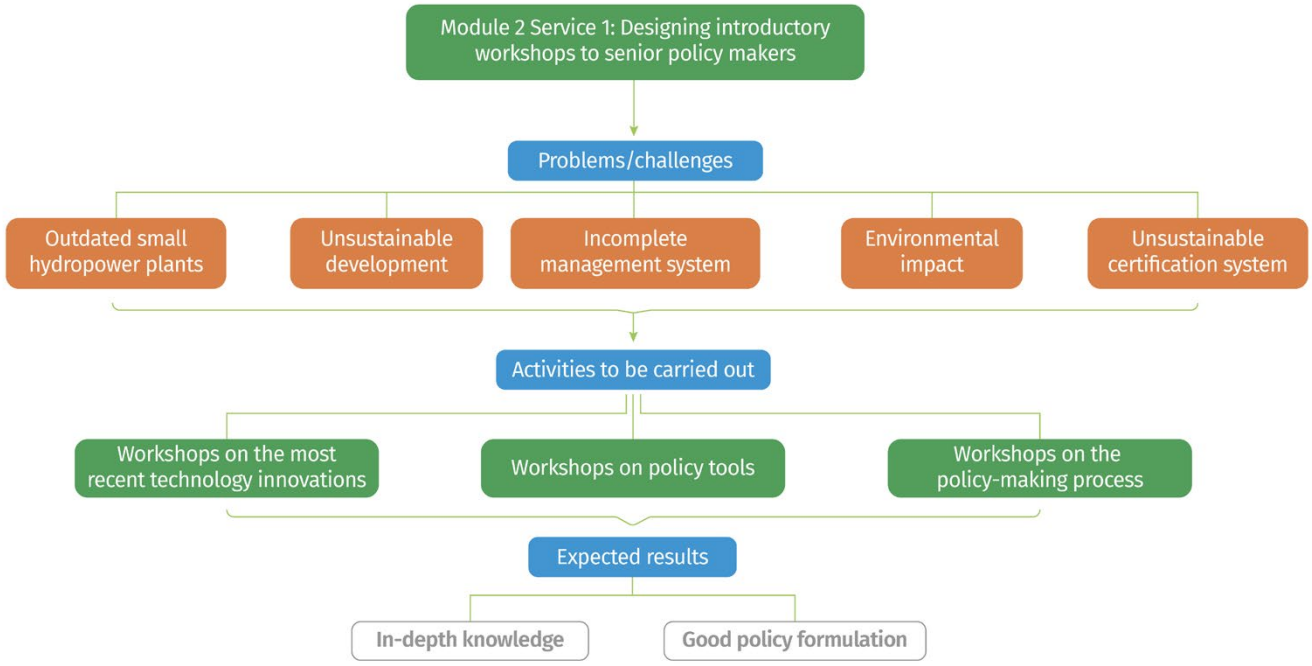


Figure 2.1. Overview of Module 2 Service 1: Designing introductory workshops to senior policy makers

2.1.1. Introduction

- The purpose of this service is to deliver interactive workshops and material with scientific researchers or advisors providing senior policy makers with an understanding of the scientific process, methodology and terminology, as well as giving them advice on how best to communicate their requirements and formulate their policy on SHP development.
- Introducing policymakers to the concept of life cycle thinking and demonstrating its value would help shape policies that truly enhance sustainability and modernization. The applicability of the service is established to facilitate the policy-making of SHP. The service applies to all senior policy makers who set the guidelines for SHP development.

2.1.2. Problems/challenges and possible solutions

- Outdated small hydropower plants: Many small hydropower plants were built decades ago and have not been updated or modernized to reflect current technology and best practices. As a result, these plants may not be operating at peak efficiency, may have safety issues, and may not be able to meet the current energy demands of their communities.

- Possible solutions: Module 2 Service 1 provides training on the most recent technology innovations/trends to keep the policy makers up to date (for example, on hybrid technologies, like hydrogen production from hydropower)

- Unsustainable development: Senior policy makers are generally inexperienced in achieving a balance between energy development and environmental protection.
  - Possible solutions: Module 2 Service 1 offers workshops that teach senior policy makers to address the environmental impact of SHP and establish ecological compensation mechanisms that conform to local laws and traditions.

- Incomplete management system: lack of sound operation and management systems.
  - Possible solutions: Module 2 Service 1 will support the establishment of a standardized SHP management system and improve the technical level of the management. Module 2 Service 1 will also strengthen the safety management of flood control and formulate emergency plans for flood control to ensure the safety of upstream and downstream areas.

- Environmental impact: Some SHP plants might affect local ecology (such as irrigation or fishery).
  - Possible solutions: Module 2 Service 1 will guide senior policy makers to restore the local ecology that has been affected. For SHP plants with obvious environmental impact, Module 2 Service 1 will train senior policy makers to implement ecological regulation, ecological flow guarantee, fish passing and other ecological restoration programs.

- Unsustainable certification system: SHP lacks sustainable evaluation and a green certification system.
  - Possible solutions: Module 2 Service 1 will teach senior policy makers to understand and apply SHP sustainable evaluation and green certification system. Through the analysis of sustainability evaluation norms and current relevant technical standards, Module 2 Service 1 will also introduce SHP sustainability index systems and green certification frames in terms of environmental protection, social impact, management level and economic benefits.

2.1.3. Activities to be carried out

A. Workshops on the most recent technology innovations

- There is a need for workshops on increased investment in modernization and upgrades. This includes funding for research and development, as well as incentives and support for plant owners to invest in new technology and best practices.
- Work with policymakers to create a regulatory framework that supports the modernization of small hydropower plants, while also protecting the environment and ensuring the safety of communities.

B. Workshops on policy tools

- Introduce a range of different policy tools on which to draw (laws, regulations, money, standards, skills) and provide some examples of sector-specific policies that have created a positive impact.
- Study success cases from practitioners. Be sure they all point to the theme of the workshop.
- Explore the multi-layered approach to public policy—including local policy, regional policy and national policy—and strategies for a coherent and comprehensive approach to policy making.

C. Workshops on the policy-making process

- Understand the policy-making process, including qualities of good policy-making, instruments of policy implementation, cooperation with policy makers and the monitoring and evaluation of policy.
- Understand the dimensions of policy-making, including health policies, environmental policies, economic policies, social policies, law and policy-making, politics and policy-making and case studies.
- Learn to contribute and leverage public policy, including developing a communication strategy, practical steps for an effective take-up strategy of your proposals, navigating the decision-making process and creating alliances.
- Understand stakeholder engagement, including identification of risks, developing engagement programs, and introducing policy-relevant issues to the public and presenting evidence for policy-making.

2.1.4. Expected results

- In-depth knowledge: Module 2 Service 1 provides senior policy makers with an in-depth knowledge of what public policy is and how to participate in its design from a corporate perspective.
- Good policy formulation: Module 2 Service 1 makes senior policy makers develop meaningful stakeholder engagement techniques and learn how to best leverage their knowledge for policy formulation.

2.2. Module 2 Service 2: Improving technical workshops on international best practices

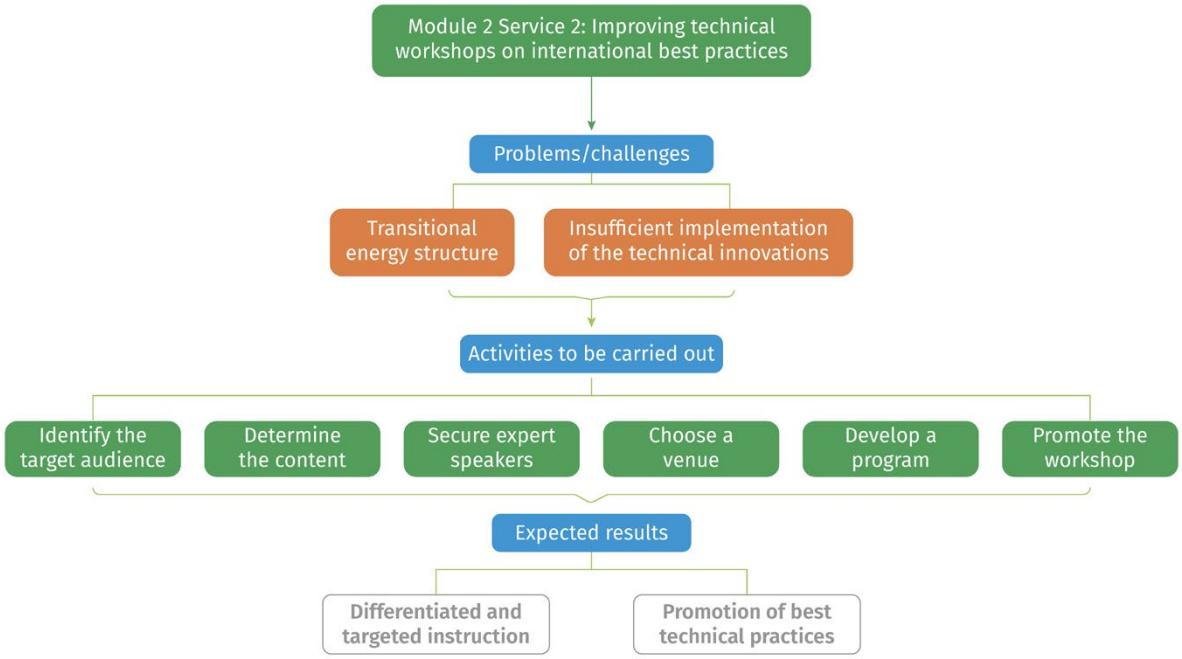


Figure 2.2. Overview of Module 2 Service 2: Improving technical workshops on international best practices

2.2.1. Introduction

- The technical workshops on international best practices are geared towards professionals who develop and operate hydropower facilities. The courses are also ideal for those who need to assess project performance, or those wishing to enhance their understanding of international definitions of good and best practices of SHP.
- SHP development should be focused on the standardization and simplification of the facilities, technologies of efficiency improvement and system automation to form the commercial business.

2.2.2. Problems/challenges and possible solutions

- Transitional energy structure: SHP projects have been neglected in many countries in favour of larger, more expensive projects. However, SHP has the potential to provide clean, renewable energy to remote and rural areas that are not connected to the main grid.
  - ➢ Possible solutions: there needs to be greater awareness of the benefits of small hydropower projects. Many people are not aware of the potential of small hydropower to provide clean energy to remote areas. Module 2 Service 2 will help more people get interested in investing in these projects by raising awareness of the benefits of SHP.

- Insufficient implementation of technical innovations: Technical innovations have the potential to transform the industry and improve our lives. However, the implementation of these innovations can often be insufficient, leading to missed opportunities and slow progress.
  - Possible solutions: Module 2 Service 2 will provide training and development programs to ensure that employees have the necessary skills and knowledge to use new technologies effectively. The service will develop a roadmap for the implementation of new technologies, including assessing their potential impact, identifying the necessary resources and skills, and ensuring clear communication between stakeholders.

2.2.3. Activities to be carried out

A. Identify target audience

- Decide on the target audience for the workshop, such as engineers, policymakers, or local communities. This will help you tailor the content & format of the workshop to meet their specific needs.

B. Determine the content

- Identify the key topics and areas of focus for the workshop, such as the latest technical innovations, best practices in project development, or case studies of successful SHP projects.

C. Secure expert speakers

- Identify and invite expert speakers who have experience in the relevant fields and can share their knowledge and insights. Consider reaching out to industry associations, research institutions, or government agencies to identify potential speakers.

D. Choose a venue

- Select a venue that is easily accessible and can accommodate the expected number of attendees. Consider factors such as availability of audiovisual equipment, seating arrangements, and breakout rooms for smaller group discussions.

E. Develop a program

- Develop a detailed program for the workshop, including the agenda, session topics, and speaker bios. Ensure that the program allows ample time for networking and interactive discussions among attendees.

F. Promote the workshop

- Promote the workshop through various channels, such as social media, email newsletters, and industry associations. Consider offering early bird discounts or other incentives to encourage early registration.

2.2.4. Expected results

- Differentiated and targeted instruction: The workshops allow the participants to integrate differentiated activities seamlessly into their lessons. For the workshop, the participants can be assigned different work based on learning styles.
- Promotion of best technical practices: The workshops promote the best SHP technology through teaching, discussion and sharing.

2.3. Module 2 Service 3: Enhancing information gathering from all stakeholders

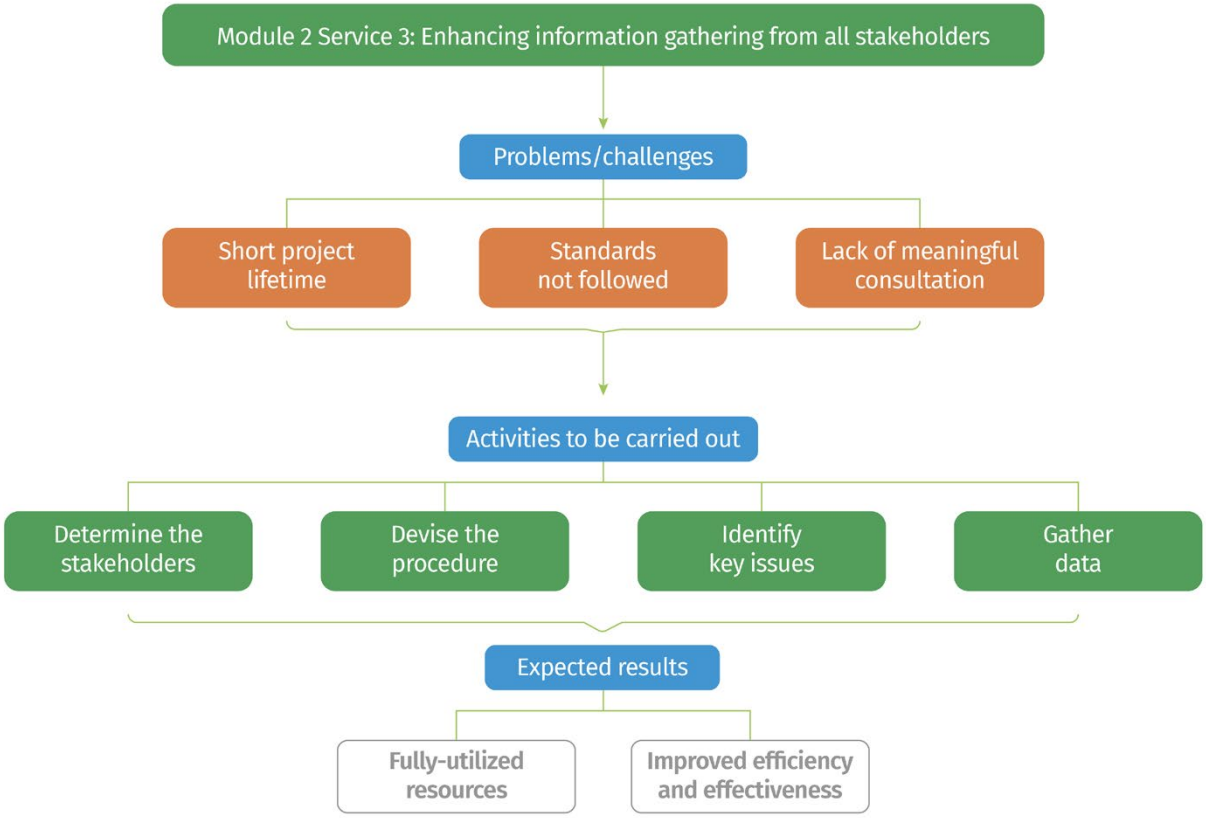


Figure 2.3. Overview of Module 2 Service 3: Enhancing information gathering from all stakeholders

2.3.1. Introduction

- Information gathering from all stakeholders is often neglected. Active information gathering from the stakeholders is particularly important in community-based systems where stakeholders are paid for managing and completing the project.
- The applicability of this service is established to facilitate information gathering from the stakeholders of SHP. The service applies to all stakeholders who may affect SHP development.

2.3.2. Problems/challenges and possible solutions

- Short project lifetime: Inactive information gathering often results in a short project lifetime.
  - ➢ Possible solutions: Module 2 Service 3 will gather information from stakeholders by using shifting/sorting techniques technology. Meanwhile, it will explore more diverse sources to broaden the stakeholders' vision and thematic understanding of SHP.

- Standards not followed: Information collection usually does not follow certain standards.
  - ➢ Possible solutions: Module 2 Service 3 will consider the features of the specific SHP project (e.g. siting, scale, ownership, benefit sharing, or opportunities for public participation).
- Lack of meaningful consultation: Consultations with stakeholders are often superficial and their key concerns and inputs are not incorporated into decision making.
  - ➢ Possible solutions: Module 2 Service 3 will undertake intensive, culturally-appropriate consultation processes. Give stakeholders opportunities to voice their concerns, provide feedback, and participate in project planning and management.

2.3.3. Activities to be carried out

A. Determine the stakeholders

- Determine the appropriate stakeholders and conduct data-gathering sessions. SHP stakeholders may come from any or all of the following groups:
  - » Government officials
  - » Project sponsors/funders
  - » Executives/leadership team
  - » Managers/business owners
  - » Customers/users
  - » Suppliers/vendors
  - » Affected groups
  - » Vulnerable people (women, old, youth, and the disabled)

B. Devise an information gathering procedure

- The procedure of information gathering:
  - » Prepare questions ahead of time. Share those questions with stakeholders so they can be prepared to speak in detail about their needs/wants for the project.
  - » Ensure the project is designed appropriately and that the result would meet their needs.
  - » Pull all the data together and send it to the stakeholders to get their comments.

C. Identify key issues

- The identification of key issues and information will be stakeholder-led. From the initial consultations, it can be anticipated that the issues will relate to the following strategic themes:
  - » Social issues, conflict and livelihoods
  - » Economic development
  - » Hydropower
  - » Geomorphology and sediment
  - » Aquatic ecology and fisheries
  - » Biodiversity and environmental quality
  - » Climate change and extreme events
  - » Identification of problems observed in the integration of SHP or SHP networks
  - » Technical solutions for solving problems that might arise

D. Gather data

- Use a variety of tools for gathering data from the stakeholders:
  - Small group facilitated workshops
  - Conference call interviews (ideally only when in person is not possible)
  - One-on-one interviews in person
  - Focus groups
  - Online surveys
  - Review any data already available – especially if there is a previous system or product in place that is like this project.
  - Hire a facilitator to conduct small group workshops or focus group sessions.

2.3.4. Expected results

- Fully-utilized resources: The service makes full use of modern information technology, and utilizes water conservancy information resources.
- Improved efficiency and effectiveness: The service modernizes SHP information collection, transmission, storage, processing and service to improve the efficiency and effectiveness of SHP comprehensively.

2.4. Module 2 Service 4: Developing policy enhancement proposals

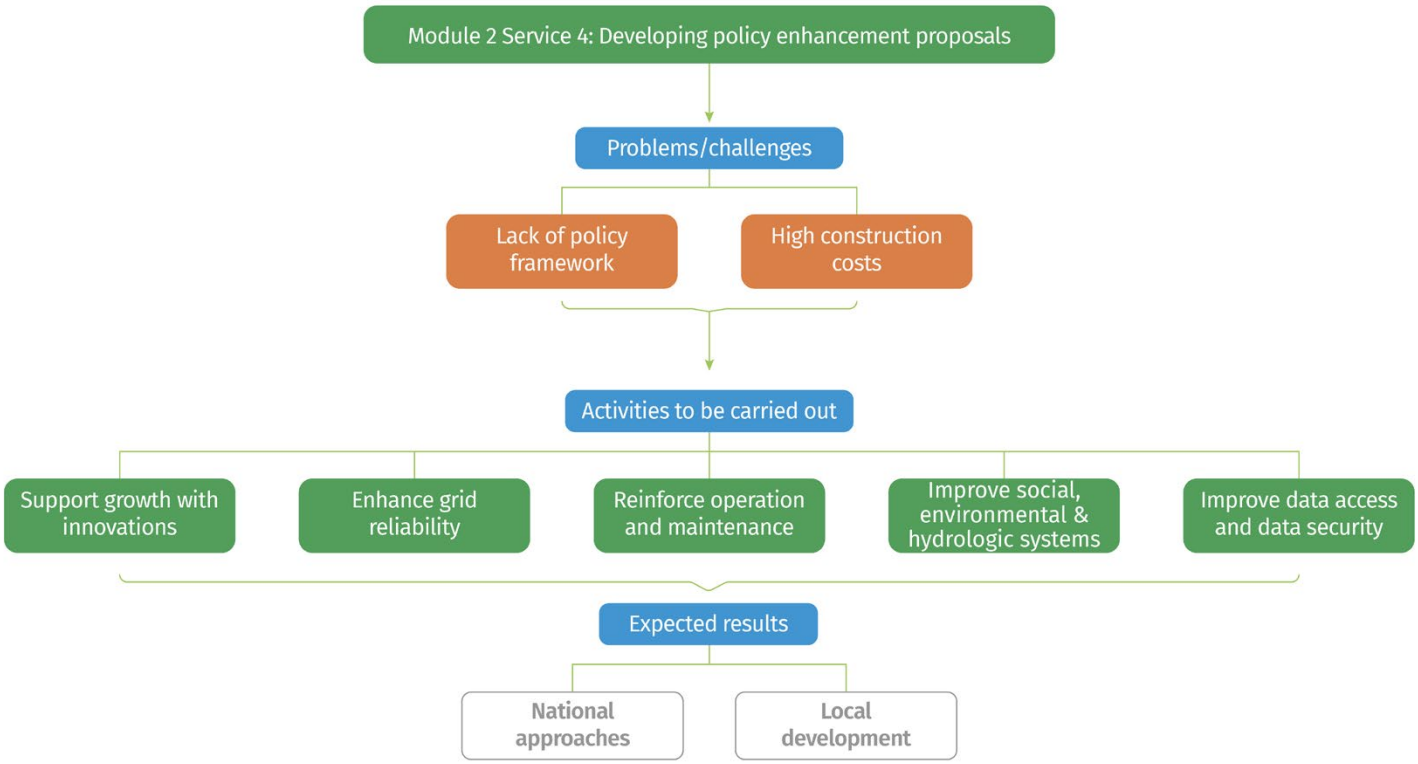


Figure 2.4. Overview of Module 2 Service 4: Developing policy enhancement proposals

2.4.1. Introduction

- SHP is at the crossroads of different policies such as renewable energy, climate change, water and nature. SHP practitioners need to understand current policies and regulations at different levels.
- The applicability of this service is established to enhance SHP policy through the five core service areas. The service applies to policy making and implementation concerning SHP development.

2.4.2. Problems/challenges and possible solutions

- Lack of policy framework: There is a lack of policy framework and standard power purchase agreements for electricity production from SHP projects.
  - Possible solutions: Module 2 Service 4 will advance SHP by providing five core policy areas: (1) SHP growth with innovations for low impact; (2) SHP grid reliability, resilience and integration; (3) SHP modernization, operation and maintenance; (4) SHP social, environmental & hydrologic systems; (5) SHP data access, cybersecurity and analytics.
- High construction costs: Construction costs for SHP power projects are still high compared to conventional projects, especially for small projects located far from the national grid.

➢ Possible solutions: Module 2 Service 4 will help to access suitable financing sources and encourage entrepreneurs to invest in projects with high profitability and low risk.

2.4.3. Activities to be carried out

A. Support growth with innovations

- Support testing of new technologies, including the development of necessary testing infrastructure for SHP.
- Leverage advancements in manufacturing and materials to dramatically lower the cost of SHP component and system designs.
- Enable new technology development for both existing SHP and new applications that incorporate ecological and social objectives.

B. Enhance grid reliability

- Devise new SHP grid operational strategies.
- Find innovative technology solutions for the SHP grid.
- Develop SHP projects of various standards and capacities to meet medium and long-term power demand. Emphasize the rural electrification plan to help the development of agricultural production and small families.
- Ensure normal and reliable power supply and distribution. Diversify the use of electricity by utilizing local labours, skills and resources as well as foreign investment in hydropower development technologies.

C. Reinforce operation and maintenance

- Classify diverse SHP by mechanical systems and identify exemplary facilities and best practices.
- Improve capabilities to analyze multifaceted types of SHP to better identify opportunities and weigh potential trade-offs across multiple objectives at basin or community scales.
- Support the development of new educational resources where gaps currently exist, including curricula and training, and increase awareness of SHP opportunities.

D. Improve social, environmental and hydrologic systems

- Improve monitoring technologies to study river systems and evaluate the environmental impacts of SHP.
- Develop technologies and strategies to avoid, minimize, or mitigate the environmental impacts of SHP.
- Support the development of metrics to better evaluate environmental sustainability for new SHP developments.
- Assess the potential impacts of long-term hydrologic variations of SHP.

E. Improve data access and data security

- Develop digital systems and advanced sensor suites to empower data-driven decisions on SHP operation and maintenance.
- Research advanced technologies and data evaluation approaches.
- Develop systems and standards to improve access to integrated water data and information relevant to SHP stakeholders.

2.4.4. Expected results

- National approaches: Nationally, a series of structural regulatory and institutional disconnects that bedevil sustainable SHP will be addressed. A mixed method approach, including policy interviews, case studies, household surveys, and ethnographic analysis, will be adopted.
- Local development: Locally, an adaptive policy framework that facilitates SHP as well as social and environmental development will be established.

2.5. Module 2 Service 5: Enhancing policy dialogues to discuss policy options

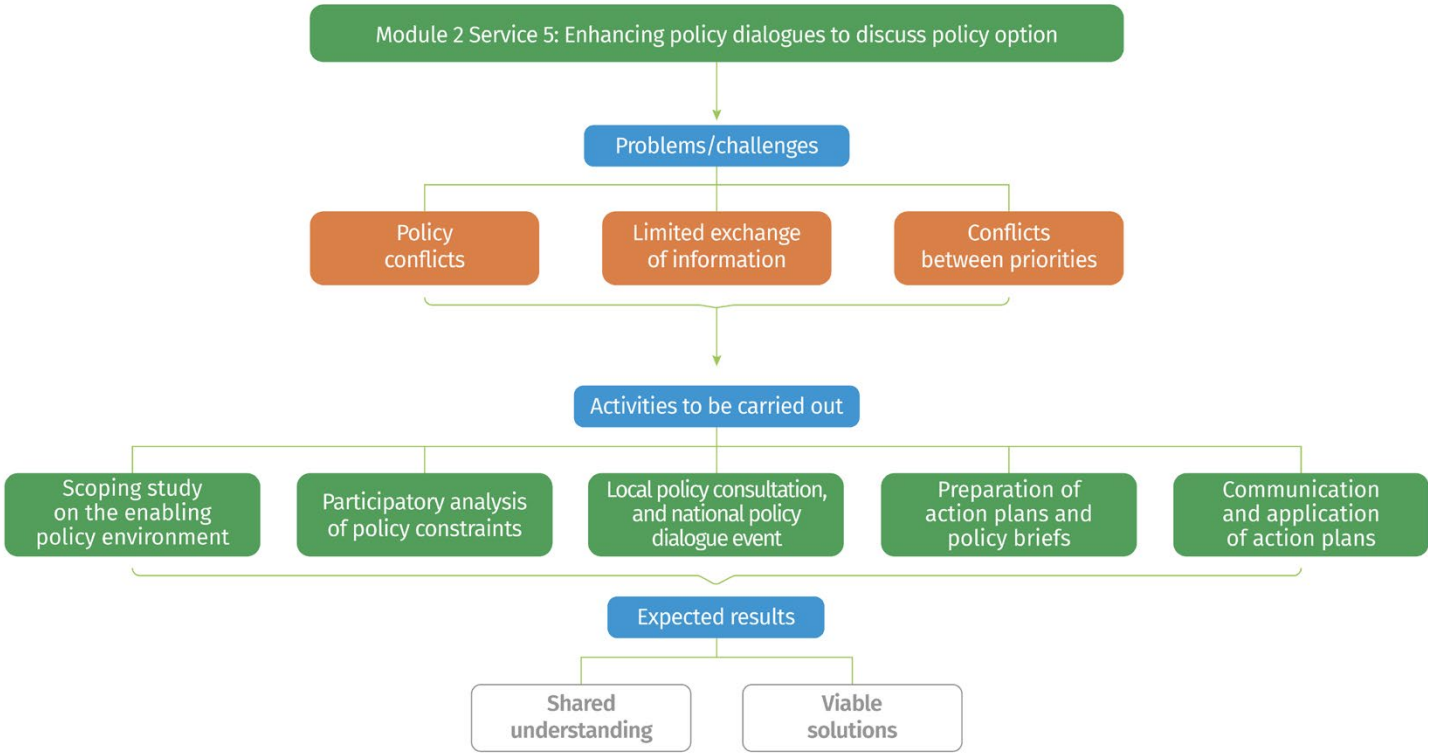


Figure 2.5. Overview of Module 2 Service 5: Enhancing policy dialogues to discuss policy options

2.5.1. Introduction

- Policy dialogues in SHP cover the social and environmental effects, the regulatory framework and public acceptance issues. The dialogues aim to share the idea that thoughtful discussion and careful consideration should contribute to a well-informed hydropower decision for the communities. Well-informed decision-making processes are necessary to ensure the best outcomes for a given area.
- The applicability of this service is established to enhance policy dialogues in SHP to cover the social and environmental effects. The service applies to all the relevant activities that may affect SHP policy-making.

2.5.2. Problems/challenges and possible solutions

- Policy conflicts: The objectives, processes and implementation of different policies may conflict with each other.
  - ➢ Possible solutions: Module 2 Service 5 will analyze these policies and encourage dialogues which aim to reach a consensus.

- Limited exchange of information: The exchange of information/experience regarding SHP is limited.
  - ➢ Possible solutions: Module 2 Service 5 will encourage policy dialogues to resolve regulatory, policy, and community conflicts with multiple stakeholders.
- Conflicts between priorities: There may be conflicts between SHP development priorities.
  - ➢ Possible solutions: Module 2 Service 5 will make useful checklists for agreeing on the most important objectives of SHP development. Subsequently, this can be used to design a dialogue in which priority is given to achieving the objectives selected.

2.5.3. Activities to be carried out

A. Scoping study on the enabling policy environment

- Review of key policies and their implementation, with focus on their practical influence on SHP projects.
- Identification of ongoing national and regional policy process mechanisms and platforms related to the SHP project.
- Preliminary study of the enabling environment for (proposed) innovation niche partnerships in the SHP project.
- A more in-depth study will be carried out when the partnership has matured and gained experience in jointly analyzing the external environment.

B. Participatory analysis of policy constraints

- Building on step A, the policy expert/consultant will lead a deeper analysis of the enabling environment for each SHP innovation niche partnership, as well as at the national level, to provide additional insights on policy-related problems.
- A meeting or workshop involving all actors of the value chain is organised to develop a shared understanding of the policy issues facing each partnership. Interviews with key actors could add further insights into the issues.

C. Local policy consultation and national policy dialogue events

- Local policy consultation: This consultation provides a deeper analysis of policy issues affecting the achievement of SHP objectives. Recommendations are prepared and possible actions are suggested. The event is also used to decide which issues need to be elevated to the national level.
- National policy dialogue events: These carefully planned events aim to create spaces for SHP stakeholders to engage with policy actors and present priority policy issues that hinder the partnerships from achieving their objectives. The expected results are a set of recommendations and a draft action plan for enhancing the enabling environment for SHP innovation in general, and that of the SHP partnership in particular.

D. Preparation of action plans and policy briefs

- Detailed action plans for each innovation, with focus on addressing policy issues at the local level and, if relevant, including the strengthening of capacities related to addressing these policy-related actions.

- A national action plan, with focus on addressing policy issues that are specific to a partnership, but which cannot be acted upon locally, and policy issues that several partnerships have in common and hence are of relevance for the country's energy system more broadly.

E. Communication and application of action plans

- Identify key stakeholders, i.e. those who can engage early in the dialogue processes and influence ongoing policy processes and existing platforms and partnerships, and can also play a key role in implementing the policy recommendations.
- Develop communication strategies for reaching out to target groups who decide upon policies and act on their implementation.
- Providing project support to implement selected activities in the action plan, depending on resources.
- Multimedia communication activities.

2.5.4. Expected results

- Shared understanding: The service obtains consensus and helps develop a shared understanding of the pros and cons of the considered options.
- Viable solutions: The service clarifies and frames problems and identifies viable solutions which are likely to be priority objectives.

2.6. Module 2 Service 6: Upgrading policy roadmap for SHP improvement

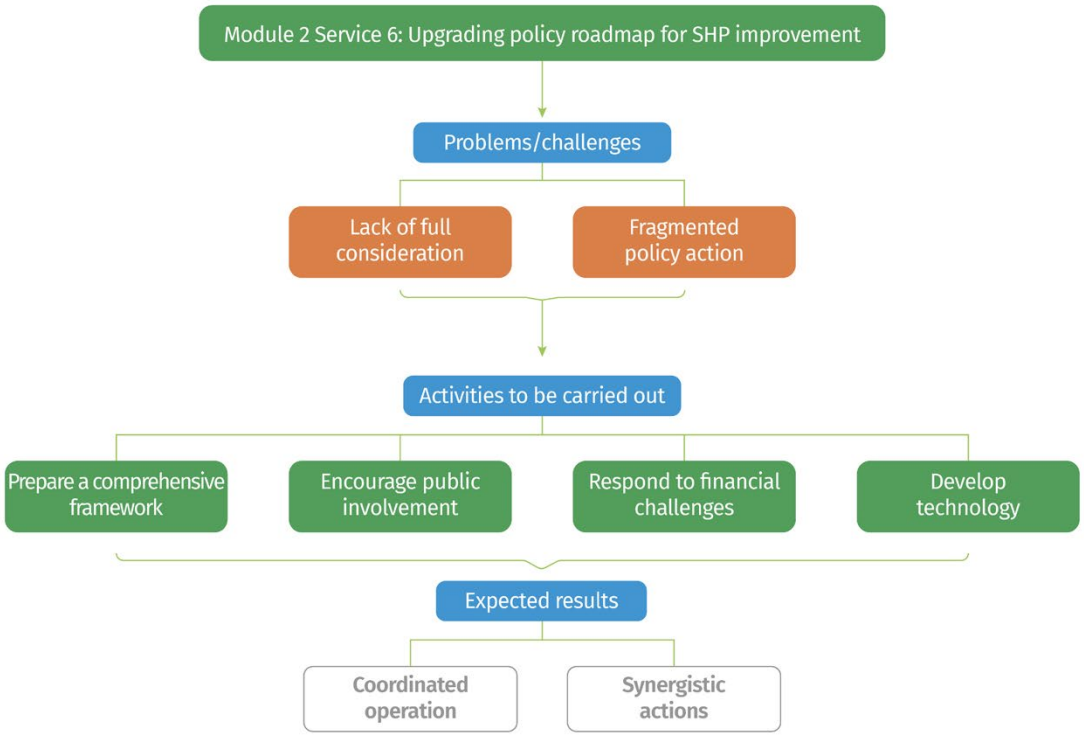


Figure 2.6. Overview of Module 2 Service 6: Upgrading policy roadmap for SHP improvement

2.6.1. Introduction

- A policy roadmap for SHP improvement is developed as a supportive tool to highlight some key areas and actions that should be promoted. It considers the systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies towards achieving the agreed objectives of SHP.
- The applicability of this service is established to enhance the policy roadmap for SHP improvement. The service applies to all the relevant tasks that may affect SHP policy-making.

2.6.2. Problems/challenges and possible solutions

- Lack of full consideration: SHP policy development lacks full consideration.
  - ➢ Possible solutions: Module 2 Service 6 will direct the roadmap for the development of SHP at the following targets: (1) Technical solutions are available to address the identified problems. (2) Non-technical issues impacting SHP: legal framework, regulation, financial incentives and capacity building. (3) Identification of examples of successful small hydro/grid integration activities.

- Fragmented policy action: The risk of making progress in one goal might be at the expense of another. For example, an increase in the density of SHP stations upstream affects irrigation and fishery downstream.
    - Possible solutions: Module 2 Service 6 will overcome fragmented policy action by developing coherent, integrated cross-sectoral strategies for implementation, particularly to address complex issues of SHP.

2.6.3. Activities to be carried out

A. Prepare a comprehensive framework

- Create an inventory of potential hydropower at the basin or local scale.
- Prepare plans for SHP with targets and track progress towards meeting those goals.
- Develop a strategic framework and market design for suitable and sustainable hydropower projects.

B. Encourage public involvement

- Suggest that developers and operators record sustainability approaches to be followed, such as environmental impact assessment reports and/or voluntary agreements.
- Disseminate information to the public and stakeholders on the role of SHP in sustainable energy production and its contribution to climate change reduction targets.
- Consider sustainability issues in the coordinated operation of hydroelectric power plants at the river basin level to take advantage of hydrologic complementarities.

C. Respond to financial challenges

- Offer recommendations on the financing of hydropower on governments' policy agendas and develop new risk-mitigating public financing instruments.
- Give suggestions on how to build effective financial models to support SHP projects in developing economies that lack tools and guidance.
- Give guidance to determine the actual value of pumped storage and mechanisms for compensation.

D. Develop technology

- Expand and disseminate results of technology development to improve operational performance and reduce costs of development.
- Recommend that the industry develop technologies at hydropower plants to better support grid integration of large amounts of variable renewable energy.

2.6.4. Expected results

- Coordinated operation: Module 2 Service 6 evaluates the coordinated operation with upstream and downstream hydropower plants in the same river basin as well as the operation of other power plants in the interconnected electrical power system.
- Synergistic actions: Module 2 Service 6 breaks out of institutional and policy silos to fully realise the benefits of synergistic actions, identifies unintended negative consequences of policies and effectively manages unavoidable trade-offs across SHP. Governments and stakeholders are increasingly recognising the need to work differently to effectively address the integrated nature of SHP.

2.7. Module 2 Service 7: Increasing institutional capacity for successful benefit sharing

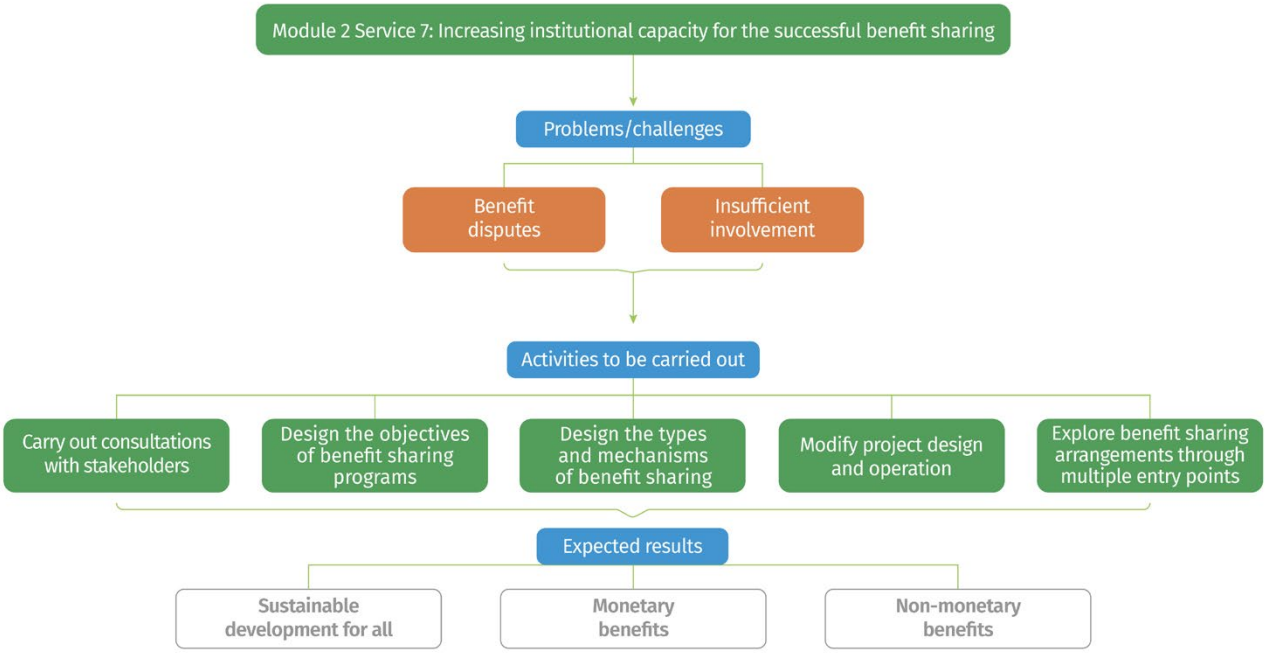


Figure 2.7. Overview of Module 2 Service 7: Increasing institutional capacity for successful benefit sharing

2.7.1. Introduction

- Benefit sharing means the fair and equitable sharing of monetary and non-monetary benefits in terms of a benefit sharing agreement among various stakeholders. Institutional capacity is important for the successful implementation of benefit sharing programs. The capacity of local institutions is often weak. Successful implementation of benefit sharing programs requires the strong capacity of all relevant institutions, particularly the local communities and local governments. Successful implementation of benefit-sharing programs requires strong capacities of all relevant institutions.
- The applicability of this service is established during the improvement of institutional capacity for successful benefit sharing. The service helps to create benefit-sharing programmes that will help mitigate the risks and maximize the benefits of their projects.

2.7.2. Problems/challenges and possible solutions

- Benefit disputes: Unclear benefit-sharing system leads to disputes.
  - ➢ Possible solutions: Module 2 Service 7 will design a benefit-sharing program that (1) has clear objectives; (2) carefully defines the target population; (3) includes mechanisms for benefit sharing; and (4) identifies responsible agencies and arrangements for implementation.

- Insufficient involvement: SHP development cannot be successful and appropriate without the involvement of local governments and the consensus of local communities.
  - ➢ Possible solutions: Module 2 Service 7 will identify all relevant local stakeholders and prioritize benefit sharing mechanisms to gain consensus from local stakeholders for SHP development.

2.7.3. Activities to be carried out

A. Carry out consultations with stakeholders

- Categorize stakeholders by the following interest groups, depending on their roles in the project and development planning and on how they are affected: (1) directly and indirectly affected people; (2) displaced and host communities; (3) downstream and upstream communities; (4) local government and central government; (5) indigenous peoples; (6) project proponents, developers, and operators; and (7) NGOs.
- Engage local communities and interest groups at an early stage in the project cycle in designing benefit sharing programs. The early and continual engagement of local authorities, government institutions, developers, and local communities can allow for the negotiation of benefit sharing arrangements.

B. Design the objectives of benefit sharing programs

- Work with clients, including the local government and development companies, to define the targeted local communities of the benefit sharing programs.
- Identify the formal and informal organizations at the community level and implement the benefit sharing programs.
- Make the benefit sharing programs cover all local communities in the whole watershed area or river basin, particularly when a hydropower project uses the run-of-the-river approach or the benefit sharing arrangement is integrated into local development plans.

C. Design the types and mechanisms of benefit sharing

- In terms of temporal scale: Short-term benefit sharing may start during the project design and construction period and can span several years. Long-term benefit sharing commences after the project becomes operational, and can normally last over the economic life of the project.
- These arrangements mainly include (1) monetary benefit sharing, and (2) non-monetary benefit sharing.

D. Modify project design and operation

- Enhance benefits to local communities by modifying either the project design or the operational rules of an SHP project. Particularly in the case of multipurpose hydropower projects, local communities can benefit from modifying the project design, such as complementary irrigation and flood protection.
- Promote associated infrastructure and public service investment. The investment can cover (1) physical infrastructure, including all infrastructure investment undertaken by the project companies that are directly or indirectly related to the SHP project; and (2) social and environmental investment such as for schools, health facilities, or watershed protection.

- Employment creation: Offer preferential employment to local people. Project-related employment results in cash income and skills development for local people.

E. Explore benefit sharing arrangements through multiple entry points

- Mitigation instruments: Include measures to mitigate or compensate for the negative impacts resulting from the construction and operation of an SHP project. These plans can be used as entry points for benefit sharing programs since they can include enhancement measures that comprise a sustainable development program.
- Corporate social responsibility: In some cases, benefit sharing programs are strongly linked to companies' Corporate Social Responsibility (CSR) policies and business models. Encourage the companies to support local development initiatives associated with their hydropower projects.
- Local development plan: When hydropower companies transfer a certain percentage of electricity sales to a government, the funds can be one source of funding to implement local development plans. Link specific measures associated with the construction and operation of an SHP project with local or regional development plans.

2.7.4. Expected results

- Sustainable development for all: Benefit sharing in SHP projects move beyond compensation for negative environmental and social impacts, to designing and implementing projects in such a way as to create sustainable development for all.
- Monetary benefits: Benefit sharing can be financial, such as revenue or equity sharing, the creation of community development funds, and preferential electricity rates.
- Non-monetary benefits: The service provides support for health and education programmes, improved access to fisheries, better watershed management and employment opportunities.

2.8. Module 2 Service 8: Enhancing policy and institutional advocacy support

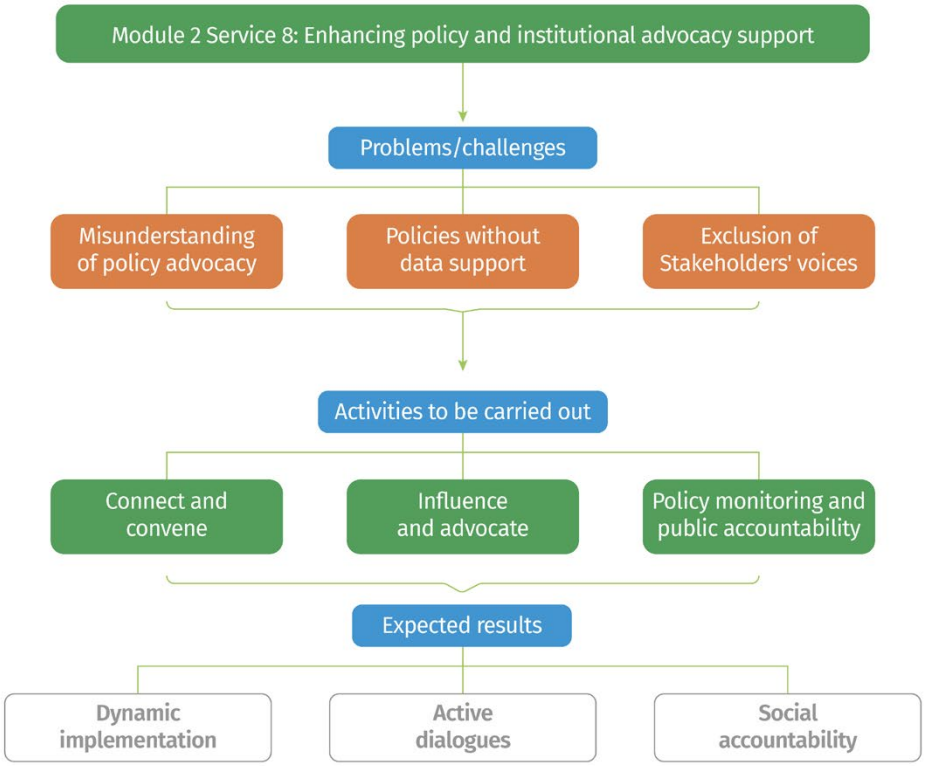


Figure 2.8. Overview of Module 2 Service 8: Enhancing policy and institutional advocacy support

2.8.1. Introduction

- Advocacy is any attempt to influence public policy and practice. It involves the active espousal of a point of view or a course of action. Advocacy activities may be aimed directly at the decision makers or they may be seeking to influence indirectly through shaping public opinion by disseminating alternative models of policy and practices.
- Policy and institutional advocacy support for SHP can be generally understood as the process of building support for SHP to create a change in attitudes, policies and systems. The service creates an enabling environment to strengthen SHP inclusion and, as a result, to improve long-term legal, financial, and political positioning to carry out effective advocacy actions for the benefit of the affected people.
- The applicability of this service is established during the improvement of institutional capacity for successful policy and institutional advocacy. The service applies to efforts to mobilize institutions around SHP development, improve their functioning, and promote horizontal and vertical coherence.

2.8.2. Problems/challenges and possible solutions

- Misunderstanding of policy advocacy: Policy and institutional advocacy can change policy overnight.
  - Possible solutions: Policy change rarely happens overnight and is often linked to a broader change in the political environment. With long-term as well as short-term thinking, Module 2 Service 8 will provide an understanding of the points of resistance and the means to gain traction, the readiness to form alliances, and the flexibility to seize windows of opportunity.
- Policies without data support: Policy formulation does not rely on data and surveys. Policy objectives and processes are not clear.
  - Possible solutions: Good policy starts with good data. Module 2 Service 8 will generate data on the environmental and social impacts of SHP projects under different policy contexts. Such data catalyzes and informs national action to prevent and respond to SHP risks. With strong data to guide the way, Module 2 Service 8 will guide the national or local governments to develop and implement a comprehensive multi-sector policy.
- Exclusion of Stakeholders' voices: Stakeholders' voices and priorities are often excluded from public debate and policy decisions.
  - Possible solutions: Module 2 Service 8 will collect and analyze public opinions and incorporate them into the policy frame.

2.8.3. Activities to be carried out

A. Connect and convene

- Create spaces and platforms for different groups of civil society to connect, deliberate, share and learn about topical policy issues. The tactical spaces and platforms are used to enhance civil society's engagement and collaboration with the government, the private sector, and development partners.
- Encourage multi-stakeholder engagements on critical issues, thereby ensuring inclusive and engaged civic voices that shape the public agenda. Proffer policy alternatives and demand accountability. Collect relevant data.

B. Influence and advocate

- Influence institutions, policies, legislation and funding practices to promote an enabling environment for civil society to operate.
- Focus on increasing the awareness of, and the adoption of, innovative and sustainable strategies for resourcing civil society for development.

C. Policy monitoring and public accountability

- Almost all effective policy-related advocacy efforts commence with observation and monitoring of the implementation and effectiveness of policies already in place. Module 2 Service 8 conducts a baseline study at the commencement of a new policy, and a follow-up study later to establish what results were achieved; Module 2 Service 8 also makes a periodic monitoring report, such as an annual review.

- Module 2 Service 8 maintains and publishes data and reports in a timely fashion and undertakes research and consultation to facilitate decision making in the public interest.
- Where information is poor or unreliable, or where independent data is needed, Module 2 Service 8 organises its research and data gathering, or it may rely on third-party sources such as commercial and academic research.

2.8.4. Expected results

- Dynamic implementation: The advocacy implementation is dynamic and meets changing needs. Good advocacy plans can address newly identified needs for political support and outreach in the community.
- Active dialogues: The service supports dialogues on key SHP development issues through platforms for collaboration between the government, humanitarian and development agencies, donors, private sector, development partners and communities.
- Social accountability: The service involves citizens and civil society organisations in the process of policy monitoring and review.

2.9. Module 2 Service 9: Promoting implementation & coordination modalities

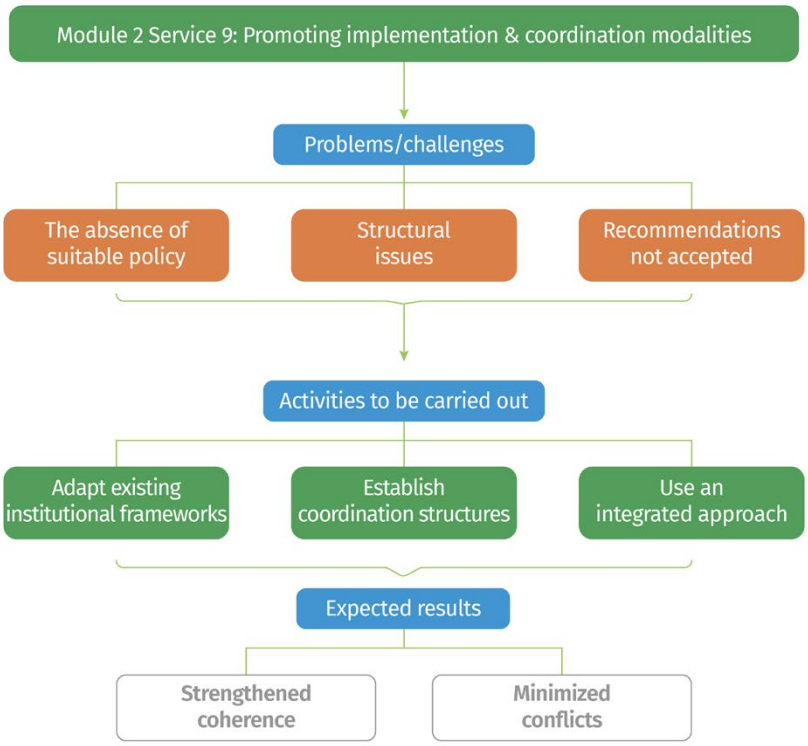


Figure 2.9. Overview of Module 2 Service 9: Promoting implementation & coordination modalities

2.9.1. Introduction

- Determining the optimum implementation & coordination modalities will be key to the success of an SHP project. The arrangements may range from formal to informal, with varying degrees of authority, accountability, and responsibility for coordination, handover, and delivery. Governments, NGOs, communities and international institutions all have a role to play.
- The applicability of this service is established during SHP's efforts to mobilize institutions around SHP development and functioning and promotion of horizontal and vertical coherence. The service applies to the improvement of existing institutional framework or the provision of an overview of key factors which should be considered when establishing new modalities.

2.9.2. Problems/challenges and possible solutions

- The absence of suitable policy: SHP projects generally face the absence of suitable implementation modalities.
  - ➢ Possible solutions: Module 2 Service 9 will enhance suitable policy, legal and regulatory modalities, and understanding of SHP.

- Structural issues: These include the inadequacy of institutions to perceive social and economic realities, and difficulties in coordinating policies and initiatives in efforts towards achieving the national sustainable energy targets.
  - Possible solutions: Module 2 Service 9 will establish coordination modalities by assessing the governmental, institutional and political contexts in the country. This entails understanding the current processes, institutions, actors, policies, mandates and other factors that affect the coordination modalities of SHP projects.
- Recommendations not accepted: It is difficult to ensure that recommendations are accepted or considered seriously enough by the government or investors.
  - Possible solutions: Module 2 Service 9 will take stock of major national and sector development policies that are relevant for SHP planning and identify challenges to better articulate their actions on the ground.

2.9.3. Activities to be carried out

A. Adapt existing institutional frameworks

- Help the government establish a stronger coordination framework which supports SHP development. This includes the monitoring and evaluation (M&E) function as well as the horizontal coherence across ministries and vertical coherence across government levels.
- Parliaments usually directly contribute to inclusive outcomes for the common good. Examine the inclusiveness of the outcomes in representing all segments of society, particularly marginalized groups, and whether their interests, needs and views are considered in the adoption of legislation. Develop action plans based on the results.

B. Establish coordination structures

- The traditional “separate” approach to hydropower development taken by many countries in the past undermines the integrated planning approach necessary for sustainable development. Help the government to create institutional frameworks to enable coordination for implementing the SHP development goals. This requires strong inter-agency coordination.

C. Use an integrated approach

- The integrated nature of the SHP sustainable agenda requires strong collaboration across sectors. Offer recommendations on building strong cross-sectoral coordination, addressing issues such as gender, health and climate change.
- The integrated nature of SHP development requires institutional arrangements, within and across national and local governments. Assist the government in enhancing SHP coordination across multiple ministries, departments and government institutions.

2.9.4. Expected results

- Strengthened coherence: Effective institutional and coordination modalities are established to improve stakeholders’ functioning and promote horizontal and vertical coherence.
- Minimized conflicts: The conflicting interests among stakeholders are minimized in the policy process by taking coherent actions.

2.10. Module 2 Service 10: Support with implementing policy instruments

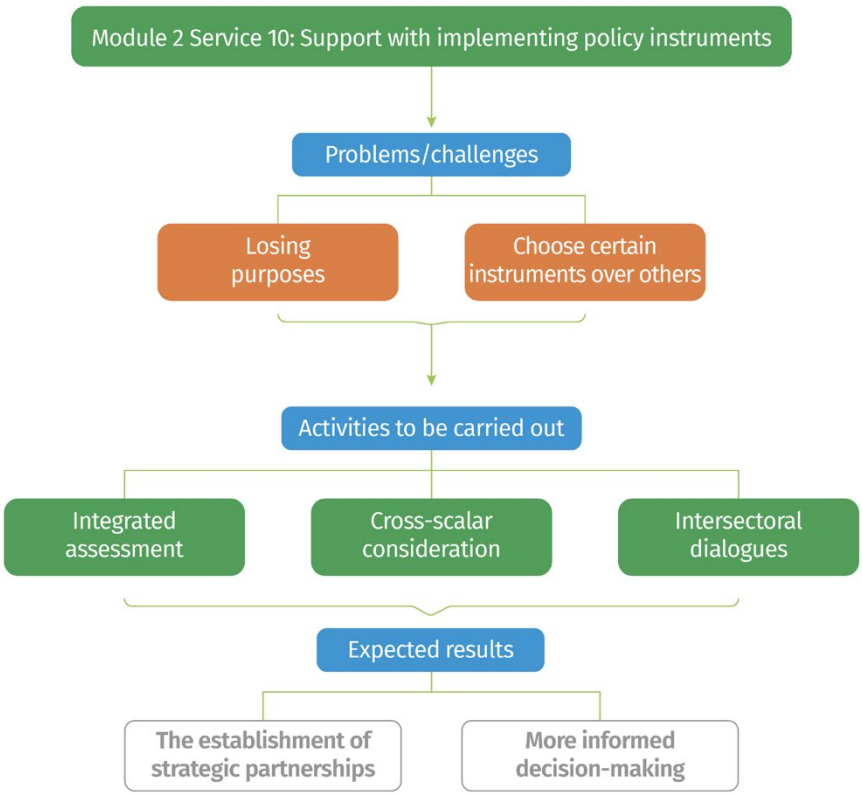


Figure 2.10. Overview of Module 2 Service 10: Support with implementing policy instruments

2.10.1. Introduction

- Policy instruments are the techniques used by the governing authorities to promote certain policies to achieve a predefined set of goals. They are interventions designed by the authorities intending to motivate all stakeholders involved in the issue at stake. The choice of policy instruments is only partly a technical matter of selecting the instrument that offers the most efficient means of delivering policy objectives. It is also a highly political process in which decisions are shaped by competing interests.
- The applicability of this service is established by enhancing support by implementing policy instruments. The service applies to the improvement of the existing policy framework or the provision of effective policy instruments.

2.10.2. Problems/challenges and possible solutions

- Losing purpose: Policies without objectives tend to lose their purpose in the long run. They may also fail in the process of implementation if there is a lack of motivation.
  - Possible solutions: Module 2 Service 10 will set clear and realistic objectives which are key to success.
- Choosing certain instruments over others: Governments will choose certain instruments over others due to resource constraints, political pressures, legal constraints and lessons learned from past instrument failures.
  - Possible solutions: Module 2 Service 10 will support countries in maintaining or consolidating SHP sustainability while deepening structural reforms in key areas in which sustainable energy growth and social development are constrained.

2.10.3. Activities to be carried out

A. Integrated assessment

- Explore the mismatch between SHP implementation and environmental (or social) planning. Mitigate its negative impact and promote policy coordination at various scales.
- Pay special attention to government planners, scientists, the private sector and civil society. Offer suggestions on stakeholders' coordination or policy adaption in case of policy conflict.

B. Cross-scalar consideration

- Consider other relevant projects, programs and policies planned or implemented for an area. Promote trans-jurisdictional planning, construction and operation stages, which can take place both at the project scale and at regional or national scales.

C. Intersectoral dialogues

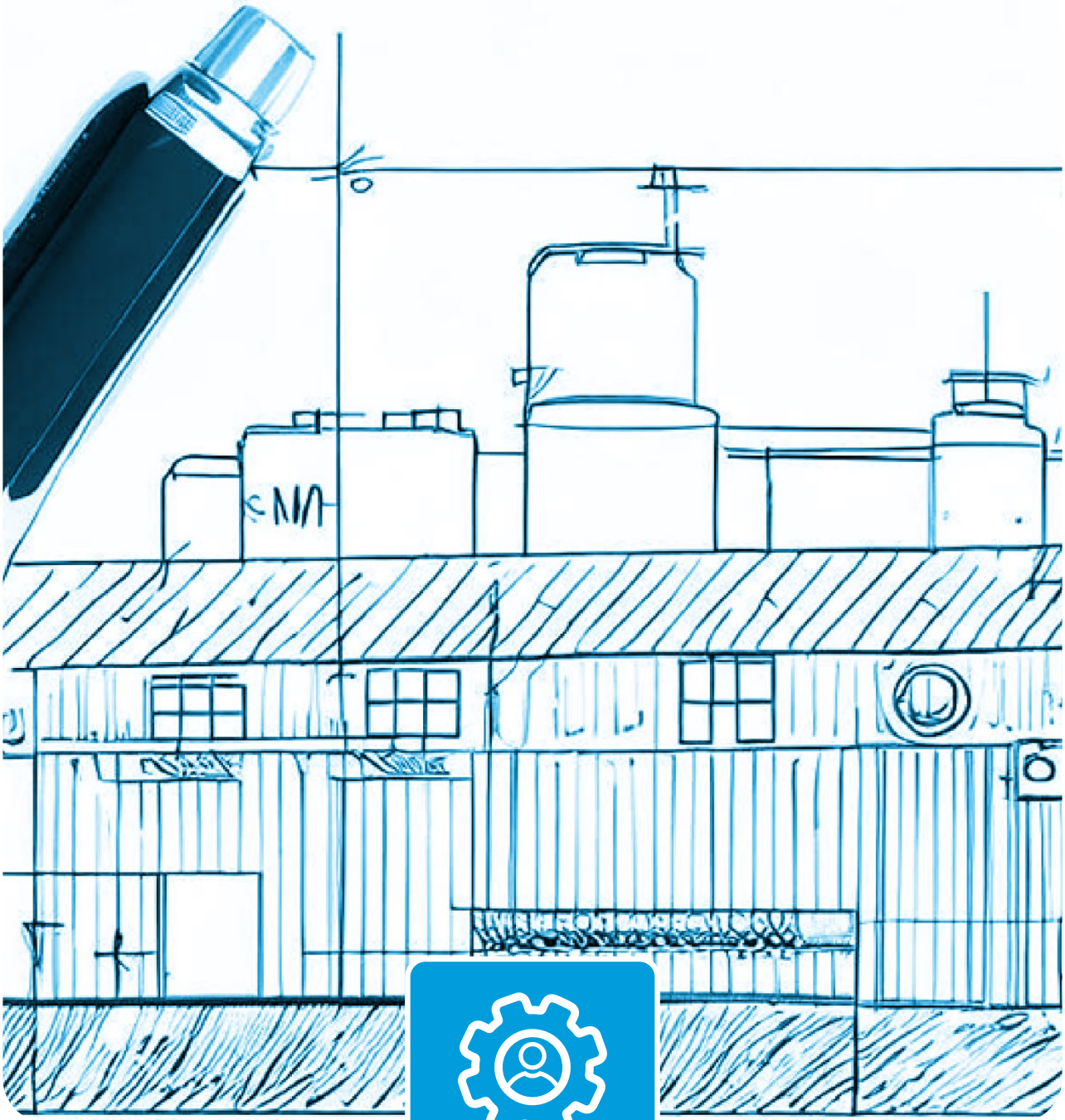
- Provide suggestions on strengthening existing governance structures that would allow enhanced benefit sharing and transparency, and public participation in decision making, such as multi-stakeholder watershed committees.

2.10.4. Expected results

- The establishment of strategic partnerships: The improvements in the current instruments for SHP management may occur through the establishment of strategic partnerships between governmental agencies, the private sector and civil society.
- More informed decision making: Policy instruments to promote integrated social and environmental impact assessment will provide society with enough information to support more informed decision making.

Module 2: Conclusion

- Module 2 is based on Module 1, but can enhance Module 3. Module 2 provides the groundwork for the services organized by Module 3. Requestors do not need to take all of Module 3 services but can choose only some and mix and match with other modules.
- Module 2 will facilitate the policy making of SHP and enhance policy dialogues in SHP to cover the social and environmental effects based on Module 1 advances. It will enhance the policy roadmap for SHP improvement and improves institutional capacity for successful benefit sharing.
- Module 2 will improve institutional capacity for successful policy and institutional advocacy and mobilize institutions around SHP development. It will also improve the existing institutional framework and enhance support for SHP by implementing policy instruments.



MODULE 3

CAPACITY BUILDING

Module 3: Table of Content

3. Module 3. Capacity Building

Introduction

United Nations Industrial Development Organization (UNIDO) and International Center on Small Hydro Power (INSHP), through global expert cooperation based on successful experiences, developed the Small Hydropower Technical Guidelines (TGs) to meet the demand coming from the Member States. TGs address the current limitations of the regulations applied to the technical guidelines for Small Hydropower (SHP) by applying the expertise and best practices from across the globe. Training areas are classified as planning, designing, units, construction and management of SHP plants. UNIDO and ICSHP are good at training policymakers, project developers, technical personnel or investors based on the TGs and international best practices.

Module 3 is targeting 7 services:

1. Assessing capabilities and needs of SHP
2. Delivering training modules & organizing training workshops
3. Identifying & securing the commitment of host institutions
4. Preparing examination & final assessment
5. Establishing support structures
6. Generating case studies & disseminating knowledge
7. Enhancing gender balance and youth involvement in the sector

The objectives of Module 3 are to strengthen SHP by assisting countries or transition economies in the adoption of improved technologies and conforming to the standards required by international markets. Capacity building does not necessarily refer to a one-off intervention. It is an ongoing process that involves continuous rounds of stakeholder engagement, evaluation and readjustments. It is possible to choose only some of the services from this module (not mandatory to carry out all of them).

3.1. Module 3 Service 1: Assessing capabilities and needs of SHP

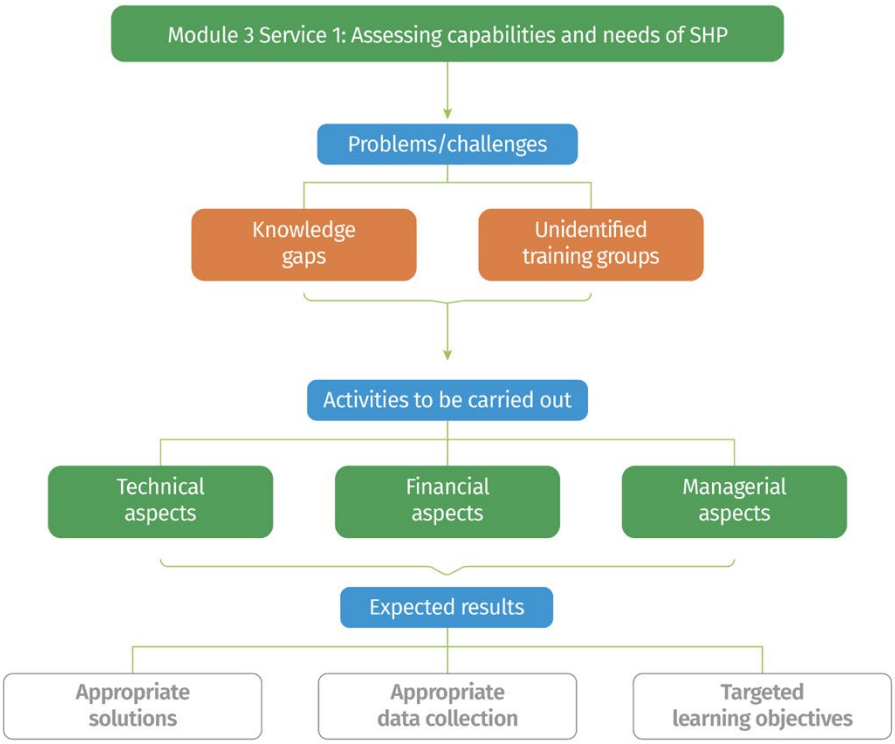


Figure 3.1. Overview of Module 3 Service 1: Assessing capabilities and needs of SHP

3.1.1. Introduction

- Based on its successful global experiences, UNIDO develops the SHP Technical Guidelines (TGs) to meet the demand of its member states in collaboration with INSHP. The TGs address the current limitations of the regulations applied to the technical guidelines for SHP Plants by applying expertise from across the globe. The TGs cover the planning, designing, units, construction and management of SHP plants.
- Assessing the capabilities and needs of SHP projects is a critical first step in ensuring the success of the project. This is important in order to understand the technical, managerial, and financial needs of the project.
- The applicability of this service is established to ensure that project technicians or management take fully into account the characteristics of SHP and link them closely to community development. The service applies to the participants who hope to acquire the technical, managerial, financial and organizational capacities required for the sustainable operation of SHP projects.

3.1.2. Problems/challenges and possible solutions

- Knowledge gaps: As SHP projects grow and change, the stakeholders may have gaps in their knowledge, skills and abilities.
  - ➢ Possible solutions: Module 3 Service 1 will identify the knowledge and skill gaps and improve the abilities needed to meet SHP objectives.
- Unidentified training groups: It is necessary to identify training groups and develop targeted training programs
  - ➢ Possible solutions: Module 3 Service 1 will classify training groups as (1) policymakers; (2) project developers/managers; (3) technical personnel; (4) investors/ businesses; (5) community. Module 3 Service 1 will also formulate effective training programs suitable for each group.

3.1.3. Activities to be carried out

A. Technical aspects

- An in-depth understanding of the power system and the type of turbines being used is required, as well as an analysis of how much power can be generated, based on the type of available water and the expected conditions for operation.
- the operating parameters for the turbines should be carefully studied in order to determine their maximum capacity and any necessary load balancing requirements.
- the characteristics of the waterways should be analyzed in order to assess potential sites for optimal construction, taking into consideration the potential for seasonal fluctuations and possible land development restrictions.
- A thorough review of existing or planned power grid interconnection requirements should be conducted to ensure that the proposed small hydropower system is able to efficiently and safely deliver the generated electricity.

B. Financial aspects

- Review the project proposal, compare it to industry standards, and make sure it aligns with your specific needs.
- Calculate the energy cost, which includes the capital and operating costs. This involves factoring in elements such as capital costs, installation fees, and power generation costs. In addition, consider the environmental costs and externalities such as water availability and river flow impacts.
- Consider any regulatory aspects, such as government approvals and permits, and look into subsidies or tax incentives available for renewable energy sources.

C. Managerial aspects

- Determine whether the management team is sufficiently prepared to manage all of the tasks associated with the project. This includes hiring staff with the right expertise, developing appropriate organizational structures, and having the financial resources to support the project.
- Analyze whether the executive team has a complete understanding of the field and marketplace in which the venture will run. They need to assess the competitive environment, potential regulations, and potential technology changes that could impact the project's success.

- Determine whether the management team understand and stay abreast of the technological innovations that can increase efficiency and productivity for the project.

3.1.4. Expected results

- Appropriate solutions: Following a comprehensive assessment of these factors, appropriate solutions can be identified that are tailored to the specific requirements of the project.
- Appropriate data collection: Module 3 Service 1 analyzes and sorts the data as a result of a training needs assessment (TNA) and selects appropriate data collection methods/instruments for each of the evaluation levels.
- Targeted learning objectives: Module 3 Service 1 defines the various evaluation levels and specifies instructional learning objectives targeting each level.

3.2. Module 3 Service 2: Delivering training modules & organizing training workshops

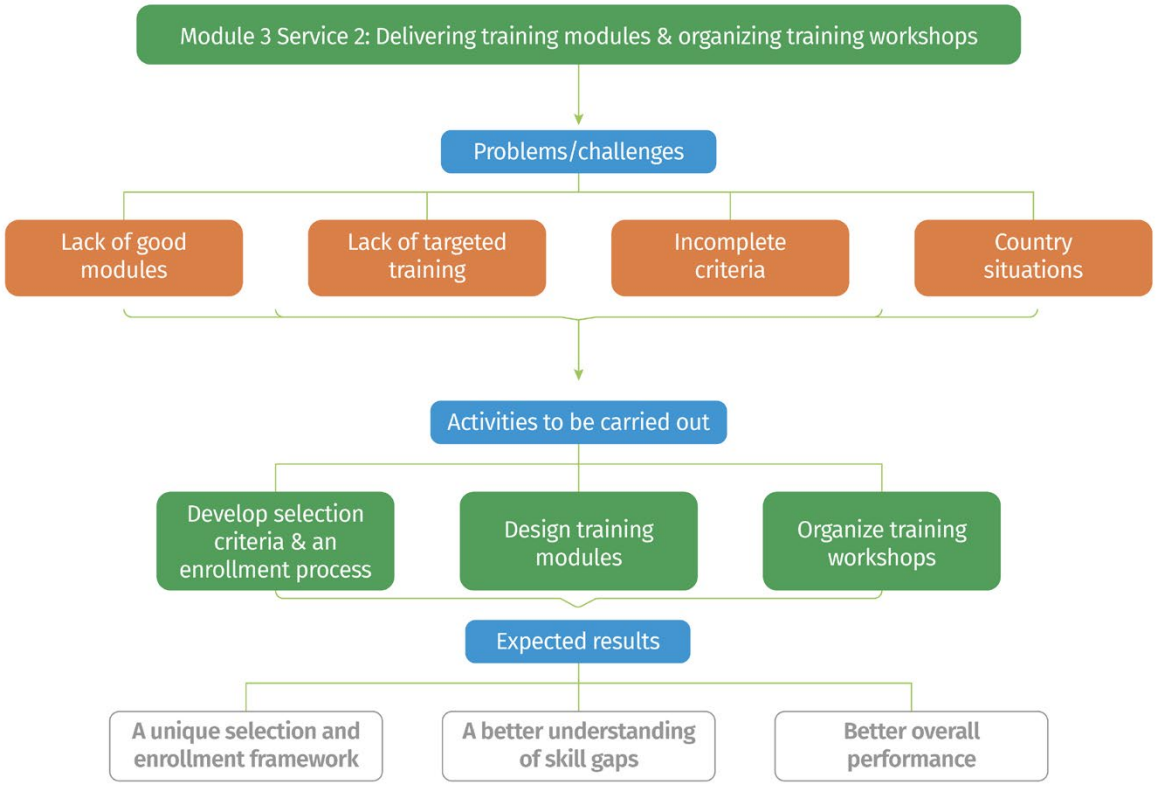


Figure 3.2. Overview of Module 3 Service 2: Delivering training modules and organizing training workshops

3.2.1. Introduction

- The training consists of SHP planning, designing, unit, construction and management (mainly based on the five parts of SHP TGs). For each training module, set SMART goals (specific, measurable, achievable, realistic and time-bound) or PDCA cycles (plan, do, check, and act). During the training, participants will have the opportunity to work on real-world projects and gain hands-on experience.
- Developing selection criteria an enrollment process that covers all steps from initial resume screening to making a final enrollment decision and preparing a training offer. The whole process will follow the usual steps which include criteria development, application and resume review, interviews, and decision-making.
- Training workshops provide platforms for a discussion of past and current practices, as well as how to construct development benefit mechanisms within the specific context of SHP projects.
- The applicability of this service is established to ensure the delivery of comprehensive training modules and the provision of implementation support. The service applies to course design and implementation to meet the needs of SHP and related industries in specific regions.

3.2.2. Problems/challenges and possible solutions

- Lack of good modules: Creating good training modules doesn't just happen.
  - Possible solutions: A training module is a component of a course that focuses on a specific objective and is designed to teach a learning topic. Module 3 Service 2 will make it effective and fit for purpose.
- Lack of targeted training: The participants need to achieve their theoretical and practical aspects of hydropower systems.
  - Possible solutions: Module 3 Service 2 will design training activities that improve SHP planning, designing, units, construction and management.
- Incomplete criteria: The criteria for selecting and enrolling applicants are incomplete.
  - Possible solutions: Module 3 Service 2 will establish selection criteria based on assessment data that affect how participant selection is prioritized. The community assessment is designed, in part, to identify which applicants are most in need of training services. The service will determine types of interviews, write interview questions and be aware of interview bias.
- Country situations: The effects and impacts of each capacity-building strategy differ from country to country.
  - Possible solutions: Module 3 Service 2 will achieve an in-depth understanding of the country's situation in which the training workshops are conducted.

3.2.3. Activities to be carried out

A. Develop selection criteria and an enrollment process

- Establish selection criteria: Factors to be considered when establishing selection criteria include community needs, community energy structure, and applicants' background (work experience, education background, eligibility for training, and other relevant factors). The criteria should be directly related to SHP objectives. Ensure that technicians, policymakers, project developers/managers, investors, grid company managers and community representatives are the main groups to receive training.
- Plan the enrollment process: Support access to training services by offering multiple options to complete the enrollment process, like flexible locations, times of day, and virtual or in-person interactions. Provide a safe, welcoming environment and meet language needs. Begin this relationship-building process in a respectful, accepting, and nonjudgmental manner.

B. Design training modules

- The SHP Planning training module: This module is designed for junior to middle SHP planners, and middle to senior officers with project management or oversight responsibilities.
- The SHP Design training module: This module is designed for the following participant profiles: hydrologists, engineers, and management with oversight responsibilities.
- The SHP Units training module: This module is designed for hydrologists, engineers, and management with oversight responsibilities.
- The SHP Construction training module: This module is designed for civil engineers, and middle to senior management with project management or oversight responsibilities.

- The SHP Management training module: This module is designed for middle to senior management with project management or oversight responsibilities, and community leaders or representatives.

C. Organize training workshops

- Coaching: The training is given by a senior employee or internal trainer to recruits. Trainees can find answers to their queries and do hands-on training through the demonstrations and instructions given by their seniors.
- Mentoring: Mentoring is given by a manager or an internal trainer, who is well known to trainees through their day-to-day tasks. The training is based on a one-to-one basis where the manager or trainer guides the trainee in difficult situations.
- Structured Training: The trainer designs a step-by-step training procedure for the trainee, which includes job overview, instruction and demonstration of the skills needed in the job role. Support public and private training institutions to produce graduates who are in line with the country's needs through successful integration and implementation of sustainable hydropower policy through the new training curriculum.

3.2.4. Expected results

- A unique selection and enrollment framework: Module 3 Service 2 will improve training outcomes by jointly enabling participant access to, and success in, training and best practices.
- A better understanding of skill gaps: Module 3 Service 2 gives comprehensive feedback on the value of the training programs and their effectiveness in achieving SHP goals. It helps the management to better understand and identify skill gaps to analyze the desired outcomes of training programs.
- Better overall performance: Institutionally, the training focuses the training workshops on the overall SHP organizational performance and functioning capabilities, as well as the ability of the SHP organization to adapt to change.

3.3. Module 3 Service 3: Identifying & securing the commitment of host institutions

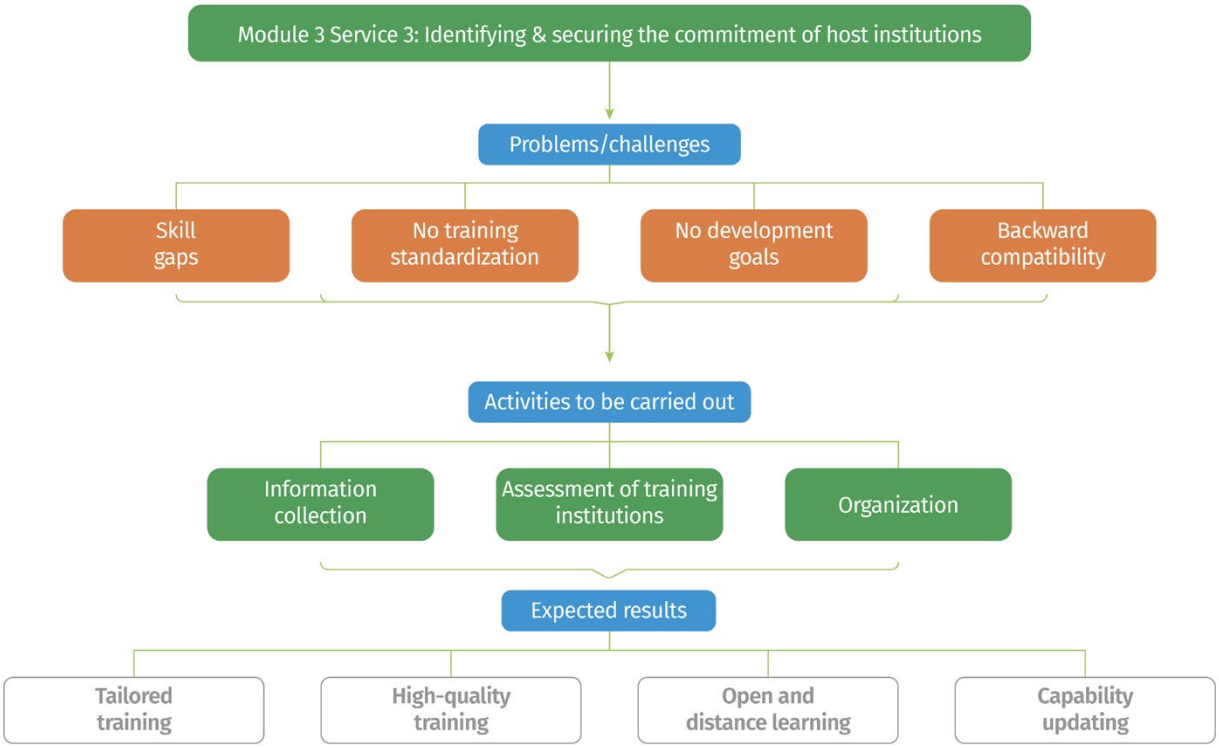


Figure 3.3. Overview of Module 3 Service 3: Identifying & securing the commitment of host institutions

3.3.1. Introduction

- Host institutions should touch on how training institutions utilize management and planning methods to enhance training outcomes. They provide participants with excellent training services.
- The applicability of this service is established to ensure the commitment of host institutions. The service applies to a complete and effective training framework.

3.3.2. Problems/challenges and possible solutions

- Skill gaps: Skill gaps are not identified in advance by host institutions.
  - ➢ Possible solutions: Module 3 Service 3 will identify the participants' skill gaps. The service will tell which employees are struggling with the material and which are more advanced based on their training progress. It will plan how to close the skill gaps and give participants the attention they need. This means assigning more beginner-level training or even training highly advanced participants to move on to other teams and projects.

- No training standardization: This greatly affects the quality of work submitted to clients, especially when participants with different educational or work backgrounds attend the courses or different lecturers are responsible for delivering consistent quality.
  - Possible solutions: Module 3 Service 3 will set the goal of standardization to ensure uniformity to certain practices within the industry. Standardized while tailored training focuses on the construction process, installation methods, plant operation, technology in use, and how specific compulsory processes are instituted or carried out.
- No development goals: Participants cannot use their training to meet their personal career goals after skill gaps are addressed by host institutions.
  - Possible solutions: Module 3 Service 3 will give participants the ability to choose different courses that are essential for attaining their development goals.
- Backward compatibility: SHP development in most countries has experienced ups and downs over the past years. During longer periods without significant development and new construction, specific know-how has been lost due to retirement and movement to other more profitable areas.
  - Possible solutions: Module 3 Service 3 has a function not only to fill knowledge gaps but also to update staff on the newest developments, especially in the field of project safety and monitoring, environmental and social impact and their mitigation and omission.

3.3.3. Activities to be carried out

A. Information collection

The following information is collected on training programmes offered by the institutions:

- Type and nature of the programme
- Duration
- Source of funding
- Target audiences
- Identification of skill gaps
- Outreach
- Subjects covered
- Reference material/manual developed/distributed
- Participation Response in the training programmes
- Feedback or training evaluation mechanism
- Suggested areas of future training
- Training of trainers

B. Assessment of training institutions

- Compile the details of institutions engaged in training and capacity-building programs.
- Collect information on training and capacity-building initiatives undertaken by various agencies and institutions in the country.
- Gather information on the institutions' course contents, coverage, target groups, outcomes, etc.

C. Organization

- Adjust and review the overall training programs. Develop training plans suitable for local conditions or project development. Technicians, management or affected groups can attend the training.
- Assist host institutions to develop goals and benchmarks, as well as guide and encourage other employees by finding ways to communicate the concrete benefits of sustainability.
- Consistency across locations. Organize standard training across locations that can help improve collaboration and consistency.

3.3.4. Expected results

- Tailored training: Module 3 Service 3 produces content to accommodate participants' needs and delivers impactful courses. It optimizes the training calendar that makes sure that seasoned employees get refreshed on the material they already learned.
- High-quality training: Module 3 Service 3 builds sustainable SHP systems and the corresponding human resource capabilities through high-quality training.
- Open and distance learning: Module 3 Service 3 provides curriculum and content development, and conversion of content into electronic/mobile learning for open and distance learning.
- Capability updating: Module 3 Service 3 addresses the participants' needs and includes new developments and state-of-the-art technologies.

3.4. Module 3 Service 4: Preparing examination & final assessment

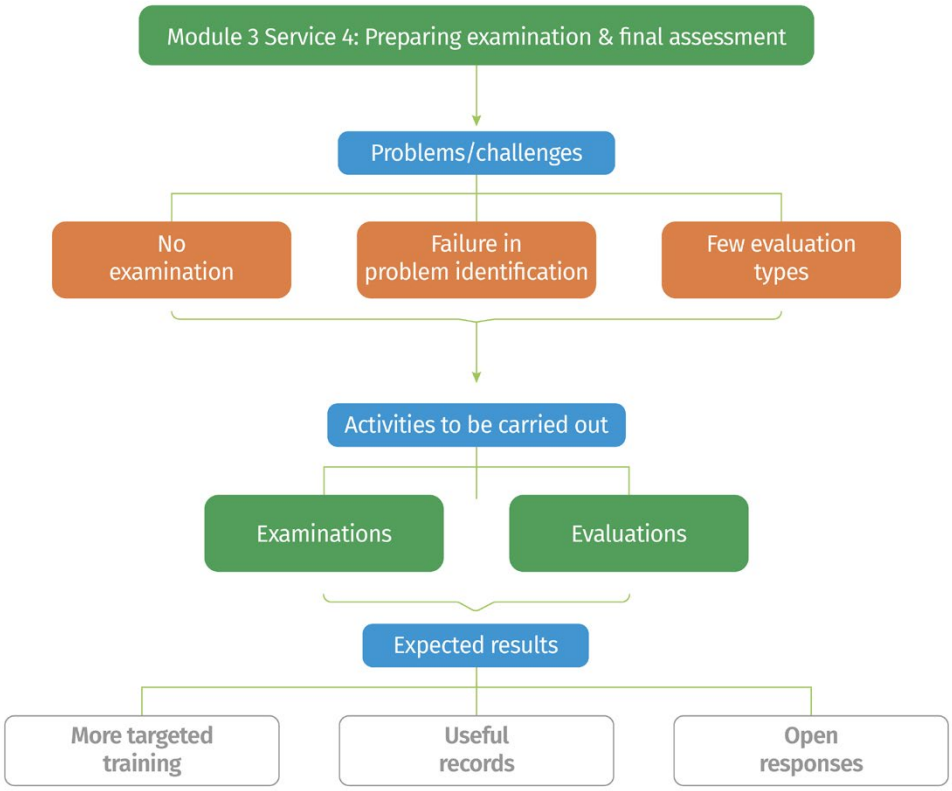


Figure 3.4. Overview of Module 3 Service 4: Preparing examination & final assessment

3.4.1. Introduction

- Examination & final assessment are the systematic evaluation process of the training programs to ensure the effective implementation of the programs. They provide comprehensive feedback on the value of the training programs and their effectiveness in achieving SHP goals. They also help the management, technicians and community representatives better understand and identify specific SHP skill gaps.
- The applicability of this service is established to conduct the systematic evaluation of the training programs to ensure the effective implementation of the programs. The service applies to the design and implementation of examination & final assessment of the various training activities.

3.4.2. Problems/challenges and possible solutions

- No examination: Many work-related training courses do not have an examination attached.
  - ➢ Possible solutions: Module 3 Service 4 will establish a complete examination question bank and examination process for each training module. The service will design an examination that aligns with the results they are aiming for.
- Failure in problem identification: Many examinations fail to identify problems and improve the overall process of the training programs.

- Possible solutions: By analyzing the outcomes of an examination, Module 3 Service 4 will analyze the effectiveness of training materials and evaluate participants' overall training effects.

- Few evaluation types: Uncertainty about evaluation types.
  - Possible solutions: Module 3 Service 4 will choose the most suitable types of evaluation depending on the stage at which the program is and whom it is for. Each evaluation can help understand the effect of the training programme.

3.4.3. Activities to be carried out

A. Examinations

- Closed examinations: These exams allow the testee to bring only their writing and drawing instruments. Such examinations are suitable for examining the basic technical abilities of the testee.
- Restricted examinations: These exams allow the testee to bring in only specific things such as a single page of note. The testee may be required to hand in their notes or formula sheet with their examination papers.
- Open book exams: These examinations allow the testee to have access to any printed or written material during the exam. The emphasis in open book examinations is on conceptual understanding and application of SHP knowledge rather than just the ability to recall facts.
- Problem- or case-based examinations: Problem- or case-based examinations are designed to test the testee's analytical skills, and how well they can deal with certain situations of SHP.
- Oral examinations: The testee discusses specific topics or important aspects of SHP with the examiner.

B. Evaluations

- Formative Evaluation: This evaluation is used before program design or implementation. It generates data on project needs and establishes a baseline for subsequent monitoring. It also identifies areas for improvement and priorities for insight.
- Process evaluation: Once project evaluation begins, process evaluation occurs and measures the effectiveness of the project programme. The data it generates identifies inefficient measures and generates streamlined processes.
- Outcome evaluation: This is conventionally used during program implementation. It generates data on the program's outcomes and to what degree those outcomes are attributable to the program itself.
- Goals-based evaluation: This assessment is usually conducted at the end of the project or within a pre-agreed time interval. Programmes usually set "SMART" targets: Specific, Measurable, Attainable, Relevant, and Timely.

3.4.4. Expected results

- More targeted training: Module 3 Service 4 sets targeted training programmes for the participants by evaluating the outcome of the previous programmes.
- Useful records: Module 3 Service 4 assesses the records of the examinations or evaluations to improve the training programs.
- Open responses: Module 3 Service 4 conducts evaluations of each of its course components, which enable participants to respond openly about the course topics, materials, and instructors.

3.5. Module 3 Service 5: Establishing support structures

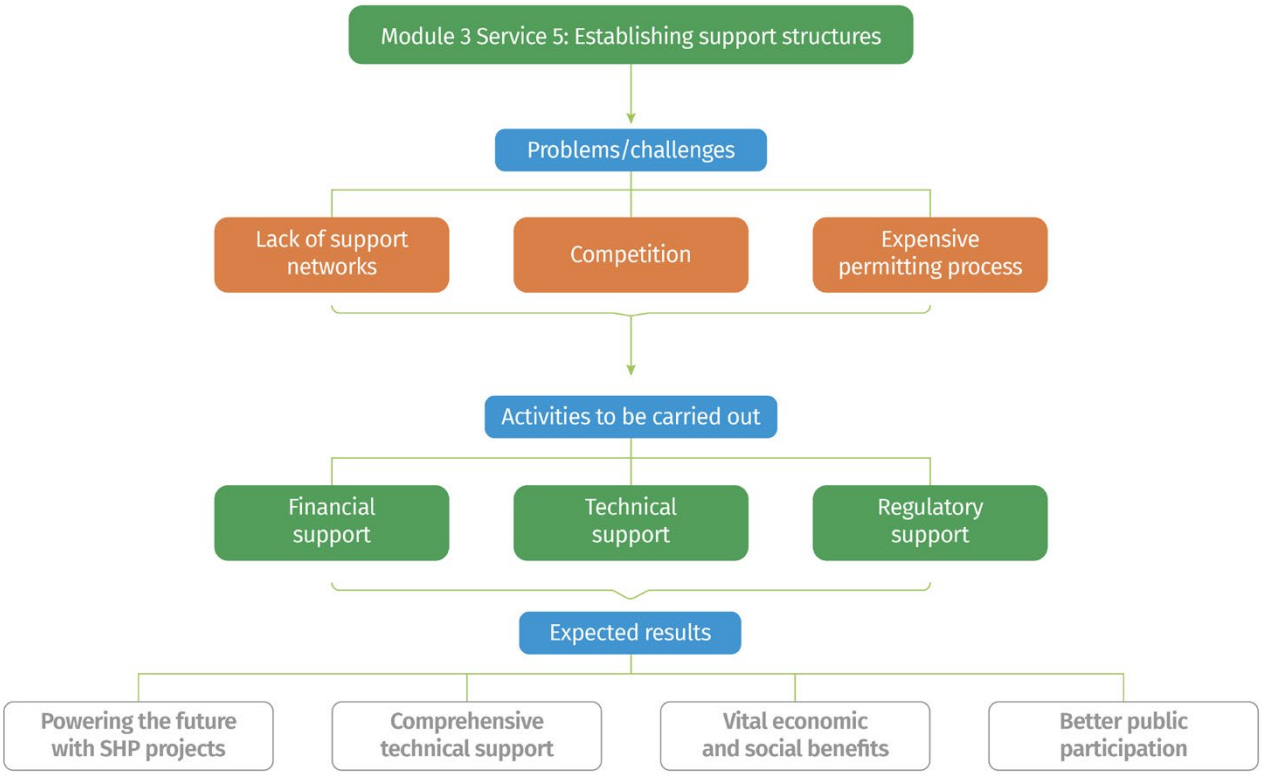


Figure 3.5. Overview of Module 3 Service 5: Establishing support structures

3.5.1. Introduction

- Small hydropower projects offer numerous benefits, both locally and globally, that should be nurtured and protected. By establishing a supportive structure, we can ensure their viability and allow them to continue providing sustainable, renewable energy sources for many years to come.
- Ultimately, creating a support structure for SHP projects can help ensure their long-term success and protect the benefits they bring to local communities. This can have a positive ripple effect that reaches far beyond the immediate vicinity, leading to healthier ecosystems and a greener, more prosperous country.
- The applicability of this service is established to ensure the establishment of support structures for SHP development. This service caters to establish a system of assistance to address financial, technical, and regulatory needs of a given situation.

3.5.2. Problems/challenges and possible solutions

- Lack of support networks: While the basics of hydropower engineering may be the same regardless of the size of a project, smaller installations often lack the support networks, operational resources and skilled technicians to take full advantage of the benefits of hydropower.

- Possible solutions: it is important for operators of SHP projects to develop robust training and support networks, to maintain equipment in good condition and to monitor best practices. Module 3 Service 5 will help operators to access well-trained and experienced professionals who are familiar with hydropower engineering. Module 3 Service 5 will also help operators learn about safety protocols, relevant standards and industry best practices.

- Competition: The interdependence and competition of a series of decisions will affect the implementation of the policy. For example, SHP may not be the best decision from a national energy efficiency standpoint but is a good choice from a community sustainability standpoint.
  - Possible solutions: Careful definition of the problem and required decisions are critical. Module 3 Service 5 will assist decision-makers in objective decision making.
- Expensive permitting process: Currently, the permitting process can be long and expensive, which can prevent many potential developers from pursuing these projects.
  - Possible solutions: Module 3 Service 5 will assist Governments to make the permitting process simpler, less costly, and more transparent.

3.5.3. Activities to be carried out

A. Financial support

- Utilize grant programs offered by governmental organizations or agencies. Grant programs provide funding for these projects in order to help offset the cost of planning, development, and construction of hydropower projects.
- Help to establish public-private partnerships to share the costs of SHP projects. Such partnerships allow public and private entities to provide both technical and financial support to projects in the form of subsidies and loan guarantees.
- Assist SHP projects to take advantage of the numerous incentives offered by both governments and energy utilities. These could come in the form of financial subsidies or reduced rates for renewable energy.

B. Technical support

- Gather all the relevant project documents and understand them. This includes gaining a comprehensive understanding of the site requirements, environmental impacts, technology, local regulatory frameworks, etc.
- Develop a comprehensive design of the project based on the relevant documents. This should include detailed plans, drawings, cost estimations, and timelines.
- Get in contact with the relevant local government offices, regulatory bodies, and other stakeholders to seek their approval. Submit the documents to relevant authorities to receive the necessary permits and licenses.
- Assess the environmental and social impacts of the project to ensure compliance with relevant guidelines.
- Develop an operations plan, including budgets and maintenance schedules, for the long-term success of the project.
- Prepare detailed training materials for operating and maintaining the project, including best practices.

C. Regulatory support

- Advocate for the local and state governments to create zoning laws that promote and incentivize the construction of SHP projects. By enacting such laws, more developers will be encouraged to build such projects.
- Advocate for the governments to provide funding to help with research and development of new technologies and approaches to increase the efficiency and environmental friendliness of SHP. Additionally, they should work to create and promote incentives such as tax credits or subsidies that would reduce the cost of construction of the projects.
- Assist the governments to create regulations that make the permitting process for hydropower projects less cumbersome.

3.5.4. Expected results

- Powering the future with SHP projects: By taking advantage of these various funding options, SHP projects can gain access to the capital necessary to complete the projects, making them a viable energy source and a more environmentally friendly option for powering the future.
- Comprehensive technical support: Module 3 Service 5 provides comprehensive technical support for SHP projects. A comprehensive understanding of the requirements and regulations, along with sound technical know-how, is essential for successful technical support for such projects.
- Vital economic and social benefits: By providing the necessary infrastructure to ensure SHP projects remain successful, Module 3 Service 5 can provide vital economic and social benefits to local communities. This could include anything from education and job training, to microfinancing and public works projects.
- Better public participation: Module 3 Service 5 can promote better public participation and create better regulations and procedures that support local economic growth. This can include having rules and regulations in place that encourage the sustainable use of natural resources and local knowledge, as well as offering incentives for businesses to become more energy efficient.

3.6. Module 3 Service 6: Generating case studies & disseminating knowledge

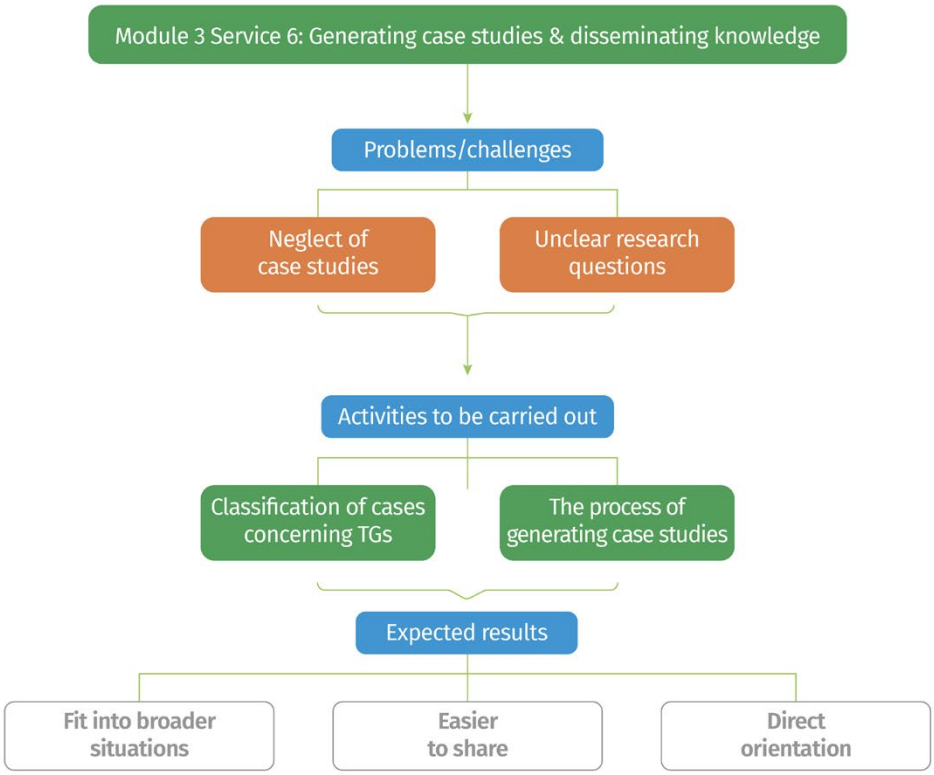


Figure 3.6. Overview of Module 3 Service 6: Generating case studies & disseminating knowledge

3.6.1. Introduction

- Dissemination is a proactive process of customizing and packaging the science and management and communicating the results to potential requestors by targeting a specific SHP target audience. The strategies of dissemination include conducting case studies, sharing relevant research results through networking and communication activities, encouraging media participation and developing researcher and knowledge user networks.
- The applicability of this service is established to ensure new collections of case studies highlighting good practices in sustainable hydropower development and sharing relevant knowledge through networking and communication activities. The service applies to designing and implementing knowledge sharing and case study collection.

3.6.2. Problems/challenges and possible solutions

- Neglect of case studies: Lack of awareness of the importance of case studies.
  - ➢ Possible solutions: Module 3 Service 6 will generate case studies & disseminate knowledge (especially of the TGs) to bring knowledge to the participants. Case studies are often a good option in SHP. They keep the projects focused and manageable.

- Unclear research questions: Unclear research questions usually lead to low impact of the case studies.
  - ➢ Possible solutions: Module 3 Service 6 will conduct a complex case study with a targeted research question where a single subject can be explored in depth, or multiple case studies to compare and illuminate different aspects of the research question. The service will gain concrete, contextual, in-depth knowledge about a specific real-world subject. It allows you to explore the key characteristics, meanings, and implications of the case.

3.6.3. Activities to be carried out

A. Classification of cases concerning TGs

The case studies are closely related to TGs and answer the following question:

- The Terms and Definitions: How can uniform terminology facilitate the dissemination of technical specifications?
- The Design Guidelines: How can TGs provide guidelines for basic requirements, methodology and procedure in terms of site selection, hydrology, geology, project layout, energy, construction, project cost estimates, economic appraisal, financing, and social and environmental assessments?
- The Units Guidelines: How can the unit guidelines specifying the SHP technical requirements affect the construction or operation of SHP plants?
- The Construction Guidelines: How can the construction guidelines promote the construction of SHP projects?
- The Management Guidelines: How can the cases of good management stimulate technical renovation and project acceptance of SHP projects?

B. The process of generating case studies

- Select a case: Choose the specific cases it will focus on. A good case study should provide new insights, challenge existing assumptions, and suggest practical courses of action to solve problems.
- Build a theoretical framework: A case study is not just an isolated description, but is integrated into existing knowledge on the subject. SHP case studies pay more attention to specifics than general theories. They also usually have some degree of connection to the hydroelectrical theories in the field.
- Collect data: Use several different research methods to collect data on research subjects. Case studies tend to focus on qualitative data using methods such as interviews, observations, and analysis of primary and secondary sources.
- Describe and analyze the case: Combine all relevant aspects to describe the topic as completely as possible. The type of study determines the style of description.

3.6.4. Expected results

- Fit into broader situations: Module 3 Service 6 provides contextual details about the cases, links them to the literature and theories, and discusses how it fits into the broader SHP situations.
- Easier to share: Module 3 Service 6 promotes sharing good practices among SHP technicians and management and makes them easier to apply.
- Direct orientation: Module 3 Service 6 directly orients case collections towards SHP sustainable development and tailors the cases for each audience.

3.7. Module 3 Service 7: Enhancing gender balance and youth involvement in the sector

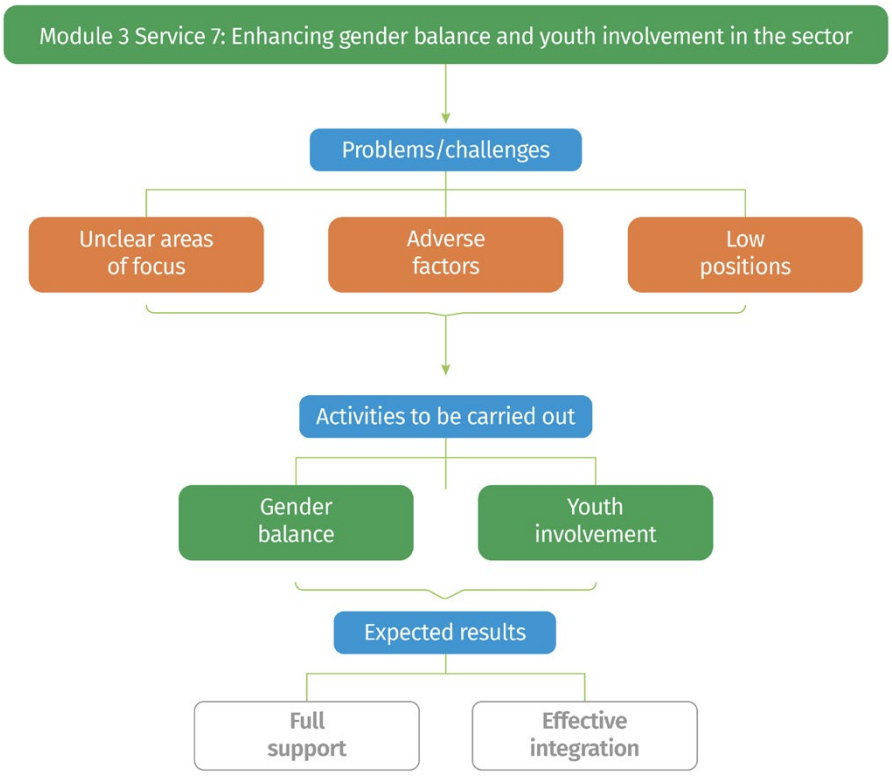


Figure 3.7. Overview of Module 3 Service 7: Enhancing gender balance & youth involvement in the sector

3.7.1. Introduction

- Improving access to energy for development can affect gender balance and youth participation in many ways, including through electrification and improved livelihoods. Encourage initiatives on gender balance and youth participation, which underpin many actions on SHP.
- The applicability of this service is established to ensure gender balance and youth involvement in SHP development. This service applies to the endeavour to promote women and youth benefit-sharing from the hydropower industry.

3.7.2. Problems/challenges and possible solutions

- Unclear areas of focus: Areas of focus within the SHP project for gender balance and youth participation are unclear.
  - ➢ Possible solutions: Module 3 Service 7 will facilitate gender balance and youth participation in the areas of (1) investment and financial affairs; (2) land acquisition and livelihood restoration; (3) environmental sustainability; (4) community consultation and participation.

- Adverse factors: Several factors hindering the participation of women and youth in the energy sector are identified: gender or age stereotypes, remote locations of hydropower projects and lack of women in science education.
  - ➢ Possible solutions: Module 3 Service 7 will make conscious efforts to deal with the difficulties and alter the adverse situation by promoting gender equality and dedicating resources to support gender mainstreaming in SHP projects.
- Low positions: It is difficult for women and young people to take leadership positions.
  - ➢ Possible solutions: Module 3 Service 7 will create pathways to having more women and young people not merely in the power sector but also in leadership positions.

3.7.3. Activities to be carried out

A. Gender balance

- Investment and financial affairs: Adopt strategies that purposely leverage small hydro capital to close the "gender gap" – the persistent inequality between men and women. Encourage gender-smart investing in SHP, which highlights key trends in gender balance improvement. Share the approaches the service is taking to channel more investment capital towards removing barriers to women fully participating in SHP decisions.
- Livelihood restoration: Reduce the adverse impacts of the project. Help the women and girls who are vulnerable to significant negative impacts. Strengthen this group's income and social status which may have been weakened by hydropower development.
- Environmental sustainability: Women play a key role in managing natural resources at the household and community levels. Protect women from the negative impacts of climate change and infrastructure development, reducing the proportion of poor communities that are highly dependent on local natural resources for their livelihoods.
- Community consultation and participation: Promote gender equality by strengthening communication with groups with different interests, and by changing the power relationship between men and women. Engage women as agents of change for green, resilient and inclusive development.

B. Youth involvement

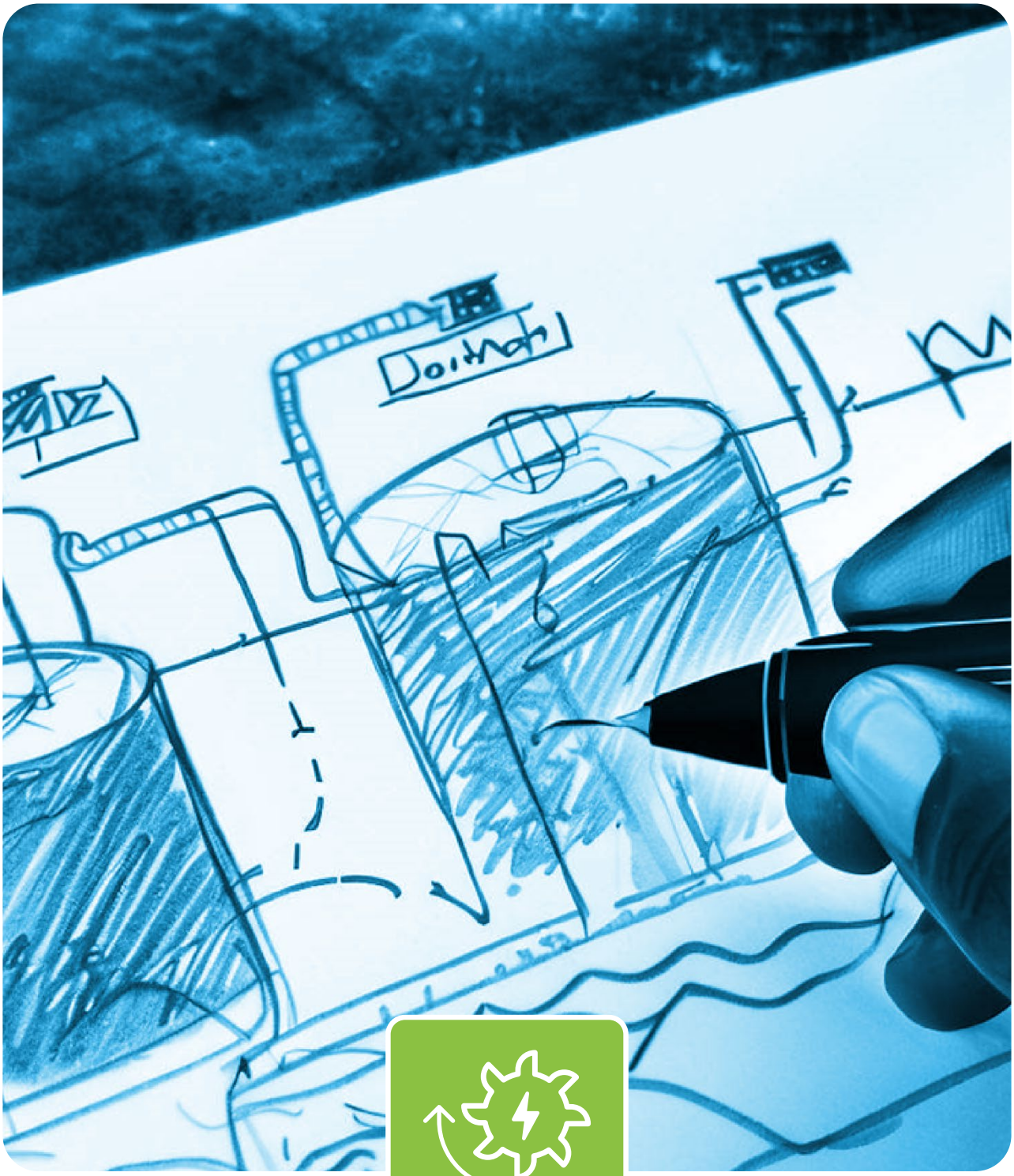
- Investment and financial affairs: Encourage the re-prioritization of national investment strategies by combining short- and long-term fiscal policies, and emphasizing earlier stages in the individual's life cycle.
- Land acquisition and livelihood restoration: Seek to empower the youth to become meaningful participants and agents of changes in land and ecosystem restoration. Achieve these goals through formal or informal training and mentoring.
- Environmental sustainability: Young people are directly dependent on land and natural resources. Design environmental policies and actions to avoid, minimize and reverse land and ecosystem degradation caused by SHP projects. Young people voice their opinions on multiple recovery policy platforms and act on topics such as climate change and biodiversity.
- Community consultation and participation: Encourage the youth to actively participate in decision-making processes on issues that affect them. Ways of participation include consulting young people for their ideas, young people participating in youth committees, and young people participating in adult-defined decision-making bodies. Give young people a voice, listen to them, and work with them to think about solutions that would ensure their leadership in land and resource management.

3.7.4. Expected results

- Full support: At the local level, Module 3 Service 7 encourages gender equality and youth participation and supports the local implementation of gender policies through systematic design.
- Effective integration: At the national level, Module 3 Service 7 encourages awareness-raising campaigns on gender stereotyping and gender equality and integrates youth participation policies into decision-making.

Module 3: Conclusion

- Module 3 is based on Modules 1 and 2, but can enhance Module 4. Module 3 takes the progress from the previous modules a step further, utilizing UNIDO's Technical Guidelines to create training for all types of participants. Requestors do not need to take all of Module 3 services but can choose only some and mix and match with other modules.
- Module 3 will strengthen SHP by assisting developing economies that lack tools and guidance in the adoption of improved technologies and conforming to the standards required by international markets based on Module 1 and 2 findings. It will ensure that project technicians or management take fully into account the characteristics of SHP and link it closely to community development.
- Module 3 will collect critical information about the participants to better plan training and establish a complete and effective training framework. It will further promote the smooth transition of decision-makers from situational awareness to decision-making and facilitate course design and implementation to meet the needs of small hydropower and related industries in specific regions. It will also conduct a systematic evaluation of the training programs to ensure the effective implementation of the programs and promote gender balance and youth involvement in SHP development.



MODULE 4

SCALING UP SMALL HYDROPOWER PROJECTS

Module 4: Table of Content

4. Module 4. Scaling up Small Hydropower Projects

Introduction

United Nations Industrial Development Organization (UNIDO) and International Center on Small Hydro Power (ICSHP) are professionals in exploring long-term climate change risk mitigation and supporting established scale-up models for future projects. They develop business models for upscaling Small Hydropower (SHP) investment, promote the local industry in project preparation and local youth entrepreneurs and ensure gender balance.

Module 4 is targeting 8 services:

1. Identifying initial pipeline of projects/carrying out feasibility study/ design
2. Supporting the development of bankable proposals
3. Sharing SHP proposals with the investors
4. Assessing the potential investment
5. Investigating possibilities for industries application and supporting youth business incubators
6. Creating “matchmaking” platforms/portals for projects, developers and investors
7. Supporting the implementation of demonstration projects
8. Supporting the scaling up of SHP projects in the country

The objectives of Module 4 are to identify a pipeline of projects for financing, enhance the capacity of SHP developers in preparing bankable investment proposals and develop business models for upscaling SHP investment. UNIDO and the ICSHP aim to formulate or change policies, laws, regulations and resource allocation that affect people and the environment. It is possible to choose only some of the services from this module (not mandatory to carry out all of them).

4.1. Module 4 Service 1: Carrying out feasibility study

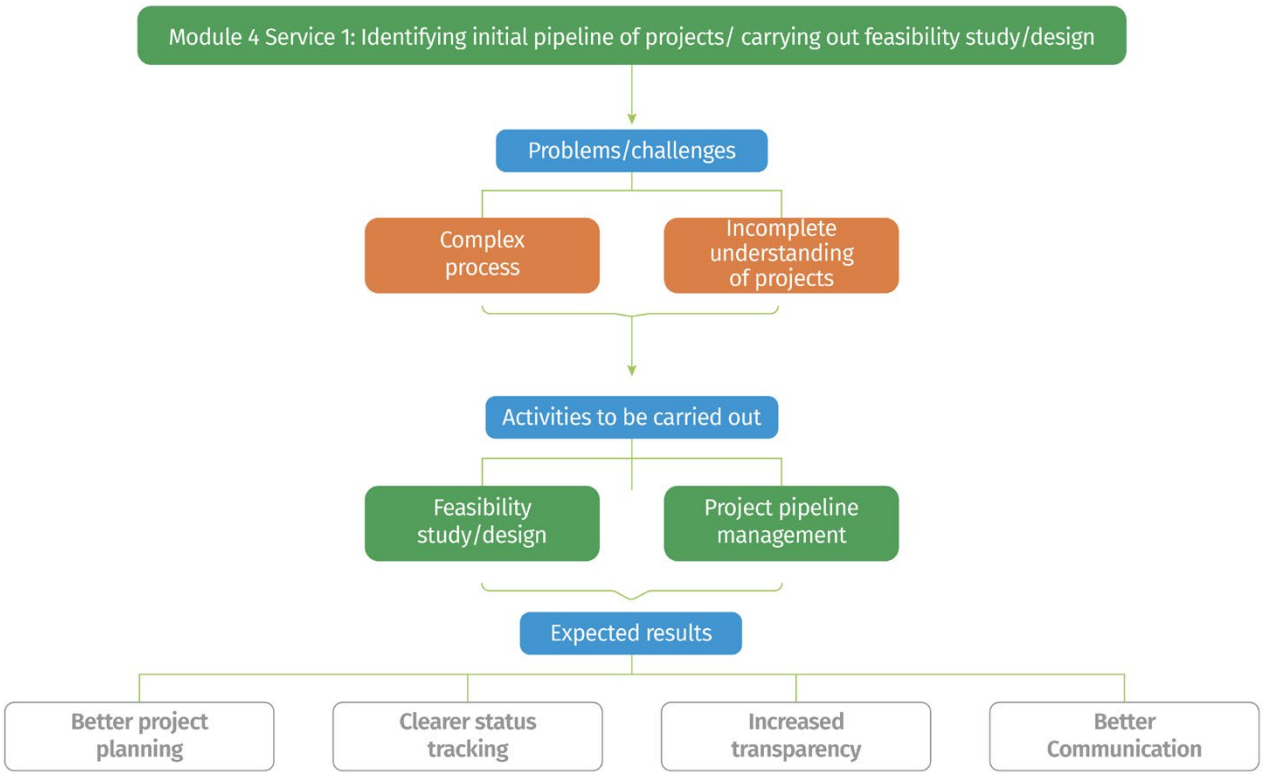


Figure 4.1. Overview of Module 4 Service 1: Identifying initial pipeline of projects/carrying out feasibility study/design

4.1.1. Introduction

- A project pipeline is a visual representation of all phases of a project from start to finish. SHP project pipeline management includes steps to ensure that a relevant number of project proposals are generated, evaluated and executed at different development stages. It acts as a simple project pipeline tracker that managers can use to understand the various stages of different projects and the progress they have made so far.
- The applicability of this service is established to identify the initial pipeline of SHP projects and carry out feasibility studies/designs for the projects. The service applies to systematically documenting the project plan, financial estimation, and resource capacity plan and streamlining the SHP development by enabling smooth coordination and collaboration between different sectors.

4.1.2. Problems/challenges and possible solutions

- Complex process: Failing to monitor the complex progress of SHP projects.
  - ➢ Possible solutions: Module 4 Service 1 will track the progress of the project throughout its life cycle, which makes it easy for the stakeholders to understand which phases are covered and which are not yet completed.

- Incomplete understanding of projects: Not getting a holistic perspective of an SHP project.
  - ➢ Possible solutions: To avoid getting lost in the details, Module 4 Service 1 will map the project pipeline and provide bird's eye views of the various projects, ensuring the goal is always clear. Module 4 Service 1 understands what is not going according to the plan, including if some stages such as "project review" are taking more time than normal.

4.1.3. Activities to be carried out

A. Feasibility study/design

- Resource analysis and location survey: Arrive on site to discuss goals and understand local needs and expectations. Then obtain an initial site assessment including (but not limited to) site analysis and land survey, head and flow measurements, grid connectivity, an appraisal of all relevant infrastructure, traffic and transportation, supply and demand, and required access to machinery.
- Flow modelling: Use accurate, real-world data and advanced modelling software. These are crucial to ensuring the project uses the most suitable hydro turbine and can meet its business projections.
- New structures mapping: Provide a sketch showing how the new structure would fit into the site. The location of the proposed intake channels and screens, the location of the turbine shed and discharge arrangements will all be discussed. Other issues will also be discussed, including ecology, grid connection and, turbine system size and power.
  - » Financial projections: The financial viability of a project depends to a large extent on the performance of the hydraulic system. Provide accurate cost estimates for project implementation costs based on current real-world data and advanced cost engineering.
  - » Health and safety: Appoint a CDM coordinator (construction, design and management) to identify and address any health and safety issues.
  - » Conduct a formal review. The review shows the accuracy of the overall study and helps make a project decision. At this point, the project gets approved, revised or rejected.

B. Project pipeline management

- Set priorities: What should be given priority at each stage include (1) financial capability; (2) social resilience; (3) environmental requirements; (4) reducing the risks; (5) vulnerable groups and indigenous people; (6) independent review of sustainability issues; (7) comparison with international best practices; (8) communication with stakeholders.
- Ideation: Collect the best ideas at the starting point for project pipeline management. Generate enough project management proposals to select high-quality ones.
- Recommended management proposals: Present the selected management proposal to the client or stakeholders. Incorporate into the plan any suggestions that the client or stakeholders may make, and then share the revised proposal with them.
- Planning: Decide on the final content, including the task assignment schedule, staff, financial issues, etc. Adopt project resource scheduling tools to simplify the process.
- Completion: Share it with stakeholders, clients and partners for their approval and feedback.

4.1.4. Expected results

- Better project planning: The service displays all stages of a project and simplifies project planning.
- Clearer status tracking: The service tracks the progress of each project easily, modifies any content when necessary and identifies any possible risks.
- Increased transparency: The service shares the pipeline with stakeholders to make them understand their roles in the big picture and the contribution they could make to the plan.
- Better communication: The service answers project-related questions anyone might have.

4.2. Module 4 Service 2: Supporting the development of bankable proposals

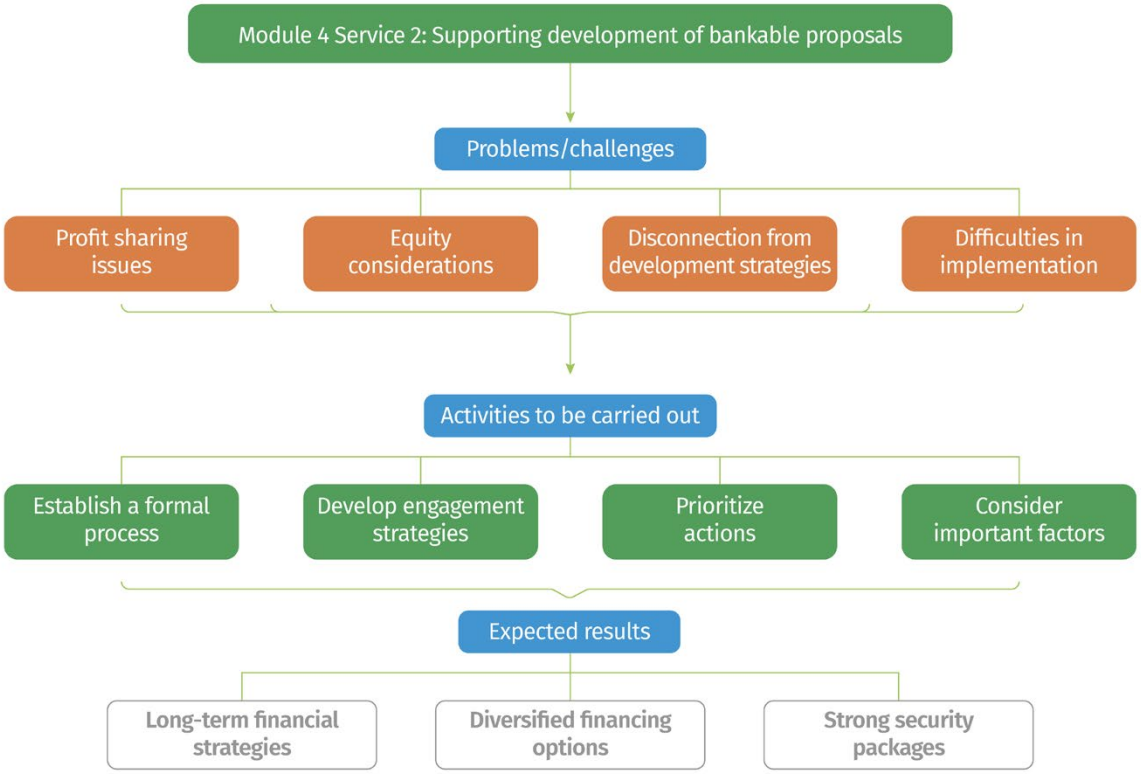


Figure 4.2. Overview of Module 4 Service 2: Supporting the development of bankable proposals

4.2.1. Introduction

- The transformation of the hydropower development mode is reflected in the contracting mode from state-owned organizations undertaking hydropower projects to international competitive bidding and financing. This presents both substantial opportunities for developers and financiers to increase revenue streams and new risks for SHP.
- The applicability of this service is established to bring small hydropower projects to bankability. The service applies to substantial actions that developers and financiers take to increase revenue streams.

4.2.2. Problems/challenges and possible solutions

- Profit sharing issues: SHP contracts are not likely to be signed with one party. The contractual regime does not always allow the savings to be realised and properly attributed to the relevant party.

- Possible solutions: A partnership is an association of two or more parties who carry on as co-owners and share profits. Module 4 Service 2 will suggest three types of partnerships (general partnerships, joint ventures, and limited partnerships). There can be a contribution of money (capital investment in the business project) or services in return for a share of the profits based on different partnership types.

- Equity considerations: Banks would like to see a reputable sponsor in a transaction.
  - Possible solutions: Module 4 Service 2 will prepare essential elements for preparing bankable SHP projects, from the perspectives of government support, market economics, project economics, contract structure, lenders' security issues, and sponsor support.
- Disconnection from development strategies: Failure to associate the projects with national/regional development strategies.
  - Possible solutions: Module 4 Service 2 will align SHP projects with bankable proposals: (1) Alignment with national/regional/local development planning; (2) Mainstream climate actions in all sectoral investments/projects.
- Difficulties in implementation: Financial regulations in host countries vary widely, which can make project finance plans difficult to implement.
  - Possible solutions: Module 4 Service 2 organizes representatives from various interesting groups to jointly assess and improve the financial performance of the project, which aims to bridge gaps and identify potential gaps.

4.2.3. Activities to be carried out

A. Establish a formal process

- With certified appraisers at each stage, the formal financial appraisal process applies to any stage of SHP development. Use the protocol to manage financial risks and to help disseminate information about its use and benefits (for example, presenting experiences and feedback to participants of the workshops).

B. Develop engagement strategies

- Meet with the representatives and investigate their willingness to support, capitalizing on the project profiles prepared. Flag the key elements they require in the project profiles (e.g. action type, risk profile, direct and indirect benefits, financial returns).
- Adapt the scale of the project to the target. Consider clustering small projects into components of larger projects, as small projects may benefit each other and leverage funding.

C. Prioritize actions

- Set priorities to address climate and social vulnerabilities.
- Map opportunities based on goals and requirements and screen the project lists.
- Government support: Access the acceptability of country risk, possibilities of carbon credits and the schemes to support efficiency and renewability.

D. Consider important factors

- Market economics: Evaluate electricity shortages, base load opportunity, supportive industry, and specific sources.
- Project economics: Analyze technology to be used, efficiencies and track record of equipment.
- Contract structure: Identify the types of contracts (fixed-price, unit-price or cost-plus contracts), the reputation of Operation and Maintenance (O&M) contractors, and the connection to electricity networks.
- Lenders' security issues: Confirm product warranties, comprehensive risk coverage available from equipment vendors and mortgage possible on land or other assets.
- Sponsor support: Confirm the reputation and experience of sponsors, level of equity investment and level of contingent equity available for completion.

4.2.4. Expected results

- Long-term financial strategies: Prepare long-term strategies integrating renewables and efficiency, and improve capacity in the financial organizations to appraise SHP projects.
- Diversified financing options: Devise a viable business plan, verify feasibility studies and consider different technical and financing options.
- Strong security packages: Build strong SHP security packages, arrange comprehensive risk coverage and arrange for a mortgage on land or other assets.

4.3. Module 4 Service 3: Sharing SHP proposals with the investors

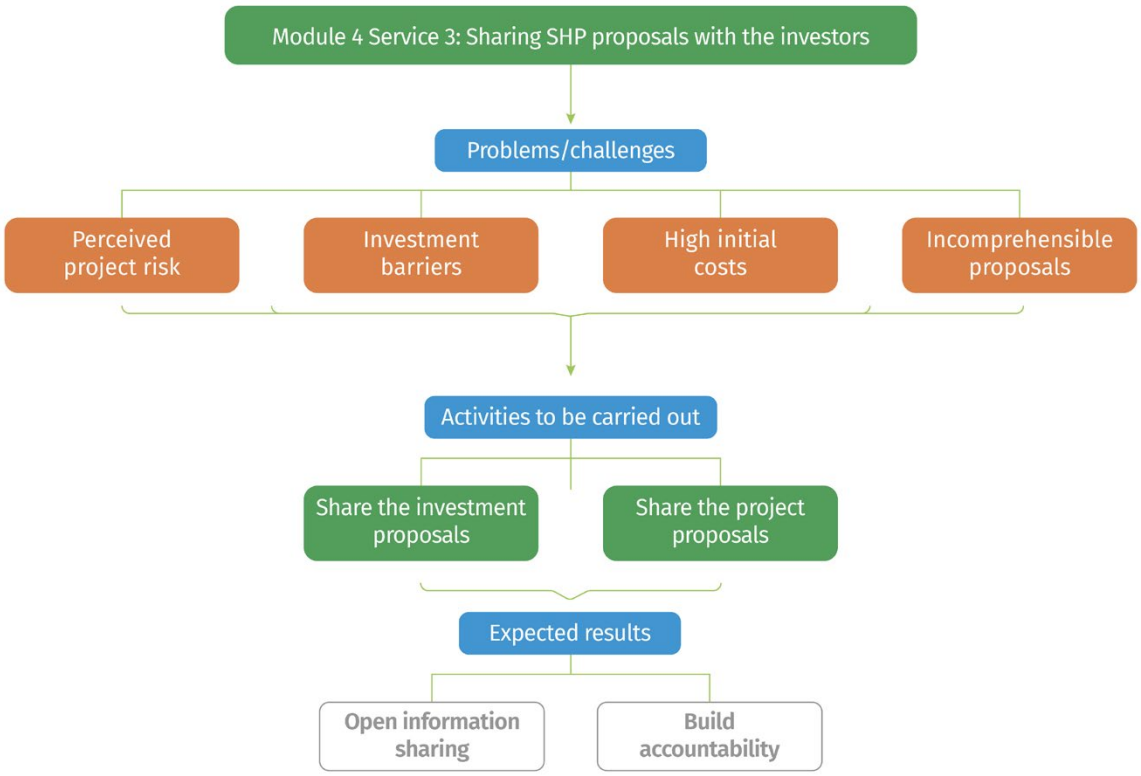


Figure 4.3. Overview of Module 4 Service 3: Sharing SHP proposals with the investors

4.3.1. Introduction

- In the era of climate finance, many converging institutions are still grappling with how to best invest in climate-friendly projects. The key to solving this dilemma is to fully share SHP proposals with the investors.
- The applicability of this service is established during SHP information sharing with the investors. The service applies to the issue of effective preparation and sharing of SHP proposals.

4.3.2. Problems/challenges and possible solutions

- Perceived project risk: A profitable project must have an equal or higher return than a hurdle return on investment. The hurdle return rate reflects the investor's perceived project risk.
  - ➢ Possible solutions: Module 4 Service 3 will evaluate potential profitability from an investor's perspective through a benefit and cost analysis of the SHP project. The service will also judge the risks of the SHP project through the responses of the investors.
- Investment barriers: For hydropower, most project delays are non-technical, but are often related to the environment, permitting and social acceptance.

- Possible solutions: Module 4 Service 3 will prepare a well-researched and well-thought-out proposal, which is the first step in convincing the various affected groups. The service will get ready to answer frequently asked questions concerning investment.

- High initial costs: Hydropower investments are characterized by high upfront costs, complex financing models and long investment periods.
  - Possible solutions: Module 4 Service 3 will come up with new and innovative ways to solve project financing problems. Hybrid financing is a common approach. It not only shares project costs but also risks.

- Incomprehensible proposals: It can be tempting to use technical terms and jargon to demonstrate the service package's proficiency in the field. But the investors are more concerned with understanding the proposals.
  - Possible solutions: Module 4 Service 3 will keep it simple. The service will make the published and shared information concise, and clear and avoid any embellishments.

4.3.3. Activities to be carried out

A. Share the investment proposals

- Market statistics: Communicate the ideas with persuasive statistics and articulate the competitive advantages of the SHP project.
- Team logistics and operations: Provide all possible details, including supply chain, talent needs, team assignments, operating expenditures, etc.
- Timelines and plans to measure progress: Inform the investors of the duration of the agreement and investment schedules.
- Exit strategy: Suggest what can be done to divest funds if the investors wish to withdraw from the agreement.

B. Share the project proposals

- Project description: Describe the design and typical layouts, project development, site selection, hydrology and energy calculations, permits and licensing, social and environmental resilience, construction, commissioning, operation & maintenance, and economics and financial analyses.
- Country analysis: Procedures depend on the country of investment and specific project characteristics. Investors should be thoroughly informed of procedures before making investment decisions.
- Risk analysis: Since local environmental and social impacts of SHP projects vary depending on project size, technology, site and other local conditions, the SHP investments must be wisely selected, sited and managed to maximize overall benefits.

4.3.4. Expected results

- Open information sharing: The service bases Information sharing on openness, transparency, third-party expertise, and two-way engagement.
- Build accountability: The service builds accountability through financial assurance mechanisms that represent the views of all stakeholders in the hydropower industry, not just the hydropower industry.

4.4. Module 4 Service 4: Assessing the potential investment

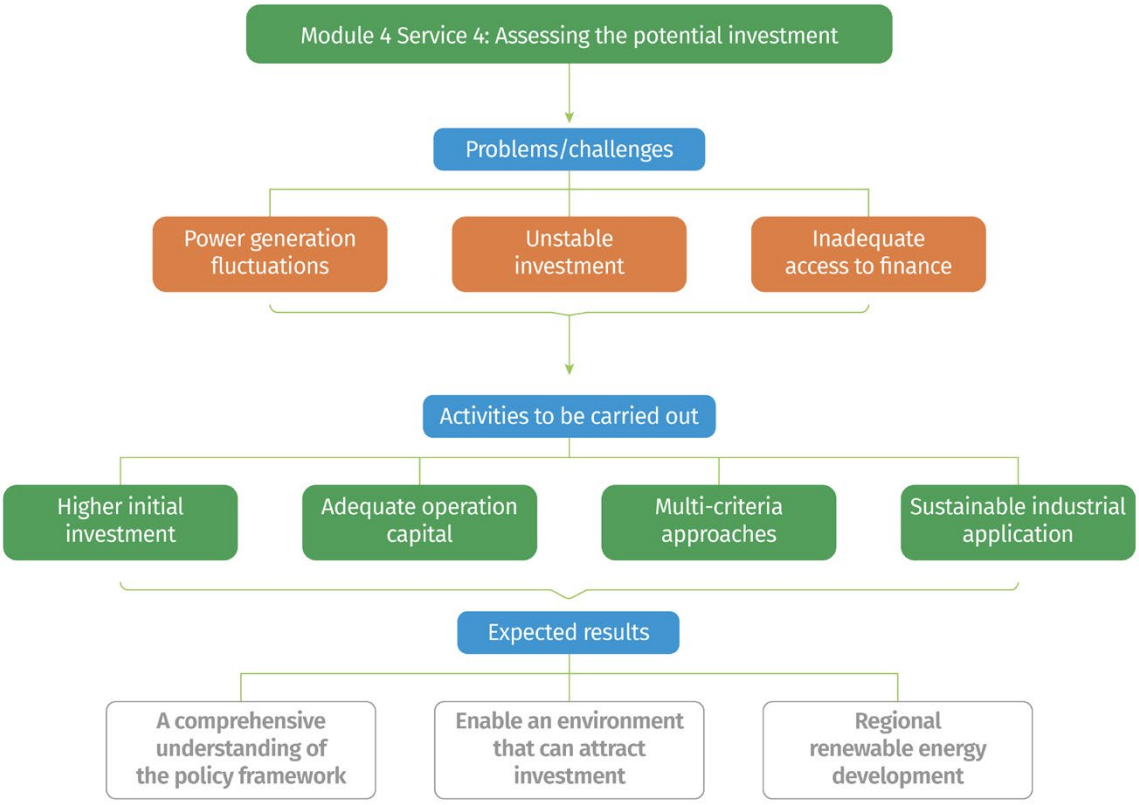


Figure 4.4. Overview of Module 4 Service 4: Assessing the potential investment

4.4.1. Introduction

- The developing economies that lack tools and guidance in the energy sector remain highly energy-intensive, and energy efficiency improvement has the potential to unlock multiple economic benefits with further market interventions. Attracting high-quality SHP investment is important to promote energy development.
- Green growth requires long-term investment and sustained financing. Public budgets have historically been an important source of green infrastructure financing. But given the pressure on public finances, the transition to a green economy requires large-scale private investment.
- The applicability of this service is established during the comprehensive assessment of the potential investment for SHP projects. The service applies to the appraisal of the feasibility of SHP investment.

4.4.2. Problems/challenges and possible solutions

- Power generation fluctuations: Power generation fluctuations of SHP present a challenge for investors.
  - ➢ Possible solutions: Module 4 Service 4 will reduce dependence on short-term meteorological and hydrological developments. Going a step further, this is especially the case if the power

plant is connected to a storage lake. In times of high production of other forms of generation, the storage capacity of SHP enables the excess energy to be stored by filling the reservoirs. SHP allows for relatively small fluctuations in power generation over the day or year.

- Unstable investment: Compared with large-scale hydropower and thermal power, many small hydropower investment sources are less clear and stable.
  - ➢ Possible solutions: SHP plants are typically used for consumptive (i.e. residential) purposes. Module 4 Service 4 will attract suitable funds (such as O&M funding sources) to ensure stable long-term operation of SHP projects.
- Inadequate access to finance: SHP plants have high capital costs for installation, but relatively low operating and maintenance costs.
  - ➢ Possible solutions: Most of the total project cost is spent in the development phase, requiring long-term financing to meet the initial high capital. However, Module 4 Service 4 will help investors to disperse capital pressure and obtain timely returns.

4.4.3. Activities to be carried out

A. Higher initial investment

- An SHP plant is rarely "off the shelf" and requires more investment to adapt to the natural elements and environment on site. Encourages the customization of SHP projects to promote scalability by increasing initial investment.

B. Adequate operation capital

- Attract adequate operation funds to facilitate the operation and maintenance of the plant.
- Offer recommendations on how to operate SHP plants economically and get adequate returns.

C. Multi-criteria approaches

- Firstly, the assessment of the attractiveness of an investment project is made based on several criteria, but the final investment decision is made based on one chosen criterion, which is considered the main one. Secondly, the assessment is carried out based on several criteria with different "weights", and then the decision will require a more complex approach.
- When choosing the right set of criteria, the weights assigned by the organization, finance, marketing, technology, and resources should be considered comprehensively. Assign a certain "weight" to the criteria objectively and reasonably, by their real value for a project.

D. Sustainable industrial application

- Support countries to accelerate inclusive and sustainable industrial application by building effective multi-stakeholder partnerships.
- Focus on priority industrial sectors and areas that are critical to the country's development agenda.

4.4.4. Expected results

- A comprehensive understanding of the policy framework: The service familiarizes the investors with clean energy financing and investment policies in specific regions, and makes them understand the national or regional energy policy.
- Enable an environment that can attract investment: The service promotes and mobilizes private finance and investment to support green growth, overcomes barriers to green investment and provides an enabling environment that can attract domestic and international investment in SHP.
- Regional renewable energy development: The service explores the possibility of a country or region becoming a major regional market for renewable energy in a short period if facilitated by favourable support mechanisms.

4.5. Module 4 Service 5: Investigating possibilities for industrial application

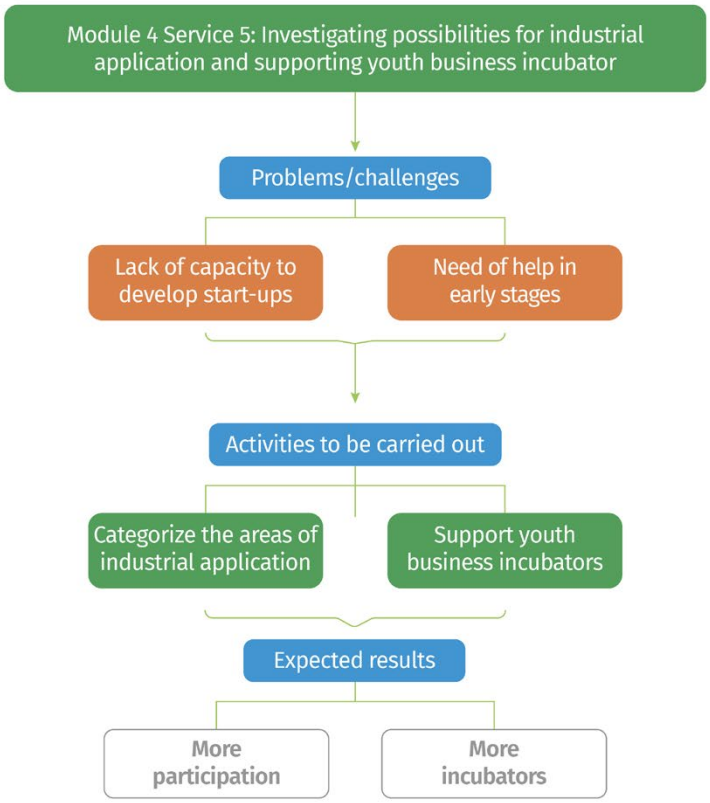


Figure 4.5. Overview of Module 4 Service 5: Investigating possibilities for industrial application and supporting youth business incubators

4.5.1. Introduction

- SHP has many applications in the industrial and agricultural sectors. From processing grains to extracting certain types of ore from the ground, this solution is a viable option in many situations. Indeed, humans have been using water power for thousands of years.
- Young people are interested in renewable energy, but they are largely unaware of SHP opportunities. Therefore, familiarizing them with SHP-related enterprises and incubating such enterprises is important. A youth business incubator is a discovery-oriented process, in which young people can experiment with, learn and build a profitable project.
- The applicability of this service is established during the investigation of possibilities for industry application and support of youth business incubators in SHP. The service applies to the wide use of hydropower in various sectors and encourages youth to share benefits from SHP development.

4.5.2. Problems/challenges and possible solutions

- Lack of capacity to develop start-ups: The youth cannot develop their start-ups in SHP sectors.
  - Possible solutions: Module 4 Service 5 will establish a youth business incubator program to support young entrepreneurs wishing to start a business. The program focuses on the following areas: SHP concept, target market identification and business plan writing. During the course, participants will be paired with experienced entrepreneurs and participate in networking and workshop activities.
- Need of help in early stages: New businesses have a unique set of challenges and needs in the early stages of growth.
  - Possible solutions: Module 4 Service 5 will help start-ups meet these challenges through innovative programs, and promote the development of communities and enterprises.

4.5.1. Activities to be carried out

A. Categorize the areas of industrial application

- Investigate the current situation of youth participation in industrial application in the region, including data, network, investment, etc.
- Explore the possibilities of youth participation in the various areas of industrial application. For example, offer recommendations on how the youth can find investment opportunities in electricity generation, irrigation or environmental recovery.
- Flood protection: In areas with frequent flooding, hydropower applications may hinder flooding. SHP plants are often built in these areas to control flooding because reservoirs are built to collect large amounts of water.

B. Support youth business incubators

- Encourage the youth to bring together renewable energy information resources and influence the market with publications, events and networks.
- Encourage young people to start businesses to supervise suppliers, constructors or operators. For example, implementing supervision, inspection, testing and expediting of mechanical and electrical equipment in the hydroelectric industry.

4.5.2. Expected results

- More participation: The service encourages young start-ups to participate in the sustainable development of SHP projects and the social network reconstruction of local communities.
- More incubators: The service builds incubators catering for the power station and related industries for young enterprises, providing workplaces, guidance, education and opportunities.

4.6. Module 4 Service 6: Creating “matchmaking” platforms/portals

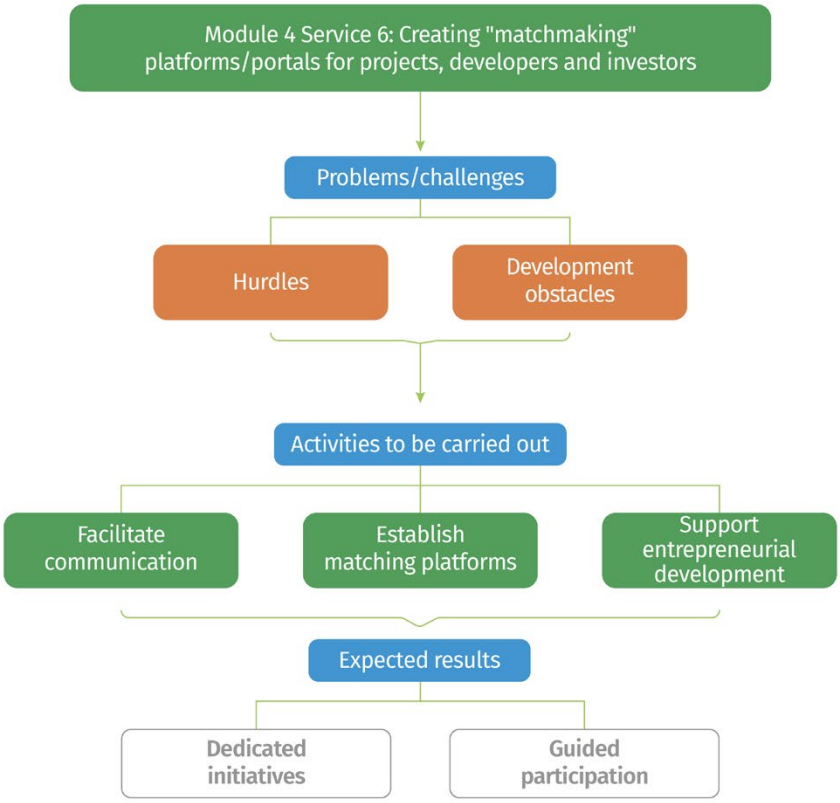


Figure 4.6. Overview of Module 4 Service 6: Creating “matchmaking” platforms/portals for projects, developers and investors

4.6.1. Introduction

- There is a need for virtual or physical platforms to bring together hydropower stakeholders in a way that builds knowledge to address the challenges facing hydropower, promote investment cooperation, and jointly address key issues related to the future of SHP. Matchmaking platforms help to connect investors and start-ups: the former to find trusted startups and the latter to find the right investors.
- The applicability of this service is established during the establishment of a “matchmaking” platform/portal for projects, developers and investors in SHP. The service applies to connecting investors to high-potential climate and clean energy projects in the emerging markets of SHP.

4.6.2. Problems/challenges and possible solutions

- Hurdles: SHP startups face huge hurdles when it comes to finding the right investors for their businesses, and it is also difficult for investors to find credible startups to invest in, especially when they are just entering the hydropower sector or are looking for companies in a specific business area.

- Possible solutions: Module 4 Service 6 will help investors familiarize the investment supervision policies of the investing country and understand the risks of hydropower investment.

- Development obstacles: Some of the other issues hindering SHP development include high investment costs, unbalanced investment, lack of knowledge about SHP and insufficient information exchange.
  - Possible solutions: Module 4 Service 6 will help investors understand the current channels and ways of communication between investors, projects and developers.

4.6.3. Activities to be carried out

A. Facilitate communication

- Build communication and collaboration platforms. For instance, some cloud-based software is adopted to allow for multiple simultaneous users.
- Promote information exchange. For instance, build mobile apps or web platforms to encourage communication and reduce communication barriers.
- Create AI-powered matchmaking platforms that connect founders, investors and businesses with a fast and user-friendly interface that matches investors with hydropower development opportunities. The platforms should provide unique information such as investment size, valuation and traction. They should also show the hydropower-related experiences of these investors.

B. Establish matching platforms

- Establish a comprehensive pre-screening and review process to ensure that high-quality organizations enter the platform.
- Establish a matching platform designed to facilitate “blended” financing of SHP, expand the investors’ network, and reduce search costs. The platforms provide startups, investors and government offices with favourable opportunities to connect and collaborate.

C. Support entrepreneurial development

- Provide full-cycle expertise for all stages.
- Mix public, private and philanthropic sources of capital for SHP financing, making it easier for public and private investors to pursue goal-driven investments and find co-investors in SHP sectors.

4.6.4. Expected results

- Dedicated initiatives: The service creates dedicated initiatives to reach out to project developers or investors.
- Guided participation: The service guides platform participants to participate in specific financing theme forums.

4.7. Module 4 Service 7: Supporting the implementation of demonstration projects

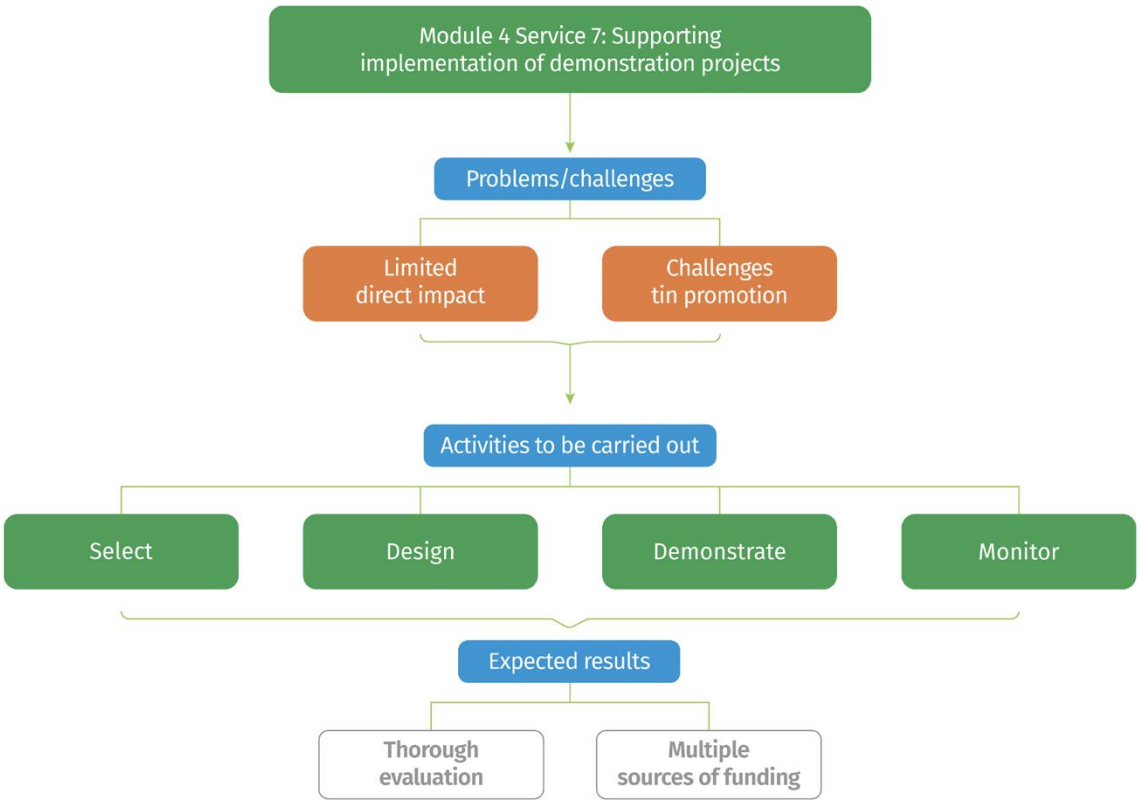


Figure 4.7. Overview of Module 4 Service 7: Supporting the implementation of demonstration projects

4.7.1. Introduction

- A demonstration project is a relatively independent small-scale capital investment or technical assistance project, whose purpose is to "demonstrate" a specific method. The demonstration of the model project is an effective mechanism for building partnerships between the public, private and (especially) community sectors, developing new forms of cooperation, learning by doing and producing tangible results on the ground. The demonstration project can be implemented at any time in the process.
- The applicability of this service is established during the promotion and replication of innovative methods. This service applies to selecting appropriate projects, demonstrating ex-ante, fulfilling the demonstration-monitoring-replication cycle and conducting a thorough evaluation.

4.7.2. Problems/challenges and possible solutions

- Limited direct impact: The direct impact of demonstration projects is usually limited because, by definition, they are small-scale interventions. However, the potential benefits of expansion and replication are obvious.

- Possible solutions: Module 4 Service 7 will encourage the expansion and replication of demonstration projects. The service will copy demonstration projects from one problem to another, from one geographical area to another, or from small scale to larger scale.

- Challenges in promotion: Although many projects have achieved sustainable development goals, they still face some challenges in promotion: the allocation of funds is not always fair or transparent, participants do not always have enough choices & very complex management limits innovation opportunities.
  - Possible solutions: Module 4 Service 7 will seek support or feedback for demonstration projects through online surveys, seminars and continuous discussions with the industry and participants.

4.7.3. Activities to be carried out

A. Select

- Selected demonstration projects should have the characteristics of small scale and limited scope because the planning, financing and implementation of these small projects are easier and faster than those of larger projects. The short cycle of the project can quickly bring "demonstration" benefits and reduce the implementation risk and management burden.

B. Design

- Select a small and clear area, promote small-scale actions that can be completed quickly in a short project cycle, focus on poverty reduction and/or improving the livelihood of the poor, and encourage the participation of local partners and stakeholders.
- Provide a learning framework for better solving small hydropower schemes and methods. Demonstration projects showcase methods and solutions that can motivate and further promote change.

C. Demonstrate

- Design the demonstration project from the beginning. The functions to be demonstrated by the project need to be reflected in the design. The project should demonstrate new ways of action.
- Design the demonstration projects for stakeholders to see for themselves what and how much they can do, which will eventually reveal the potential for real change.

D. Monitor

- Demonstration projects are properly monitored. An effective monitoring mechanism must be established from the outset, using clear and easily measurable indicators, to collect and synthesize lessons learned.

4.7.4. Expected results

- Thorough evaluation: A demonstration project should be thoroughly evaluated afterwards by means of being analyzed according to the original objectives and project design parameters. Such monitoring and evaluation will lay the foundation for a sound replication and scaling-up process.
- Multiple sources of funding: A demonstration project can be financed through various funding methods, possibly through seed capital or leveraged by small grants or cost-sharing through partnership arrangements. The financing of demonstration projects often has an impact on their sustainability and the feasibility of expansion and replication.

4.8. Module 4 Service 8: Supporting the scaling up of SHP projects in the country

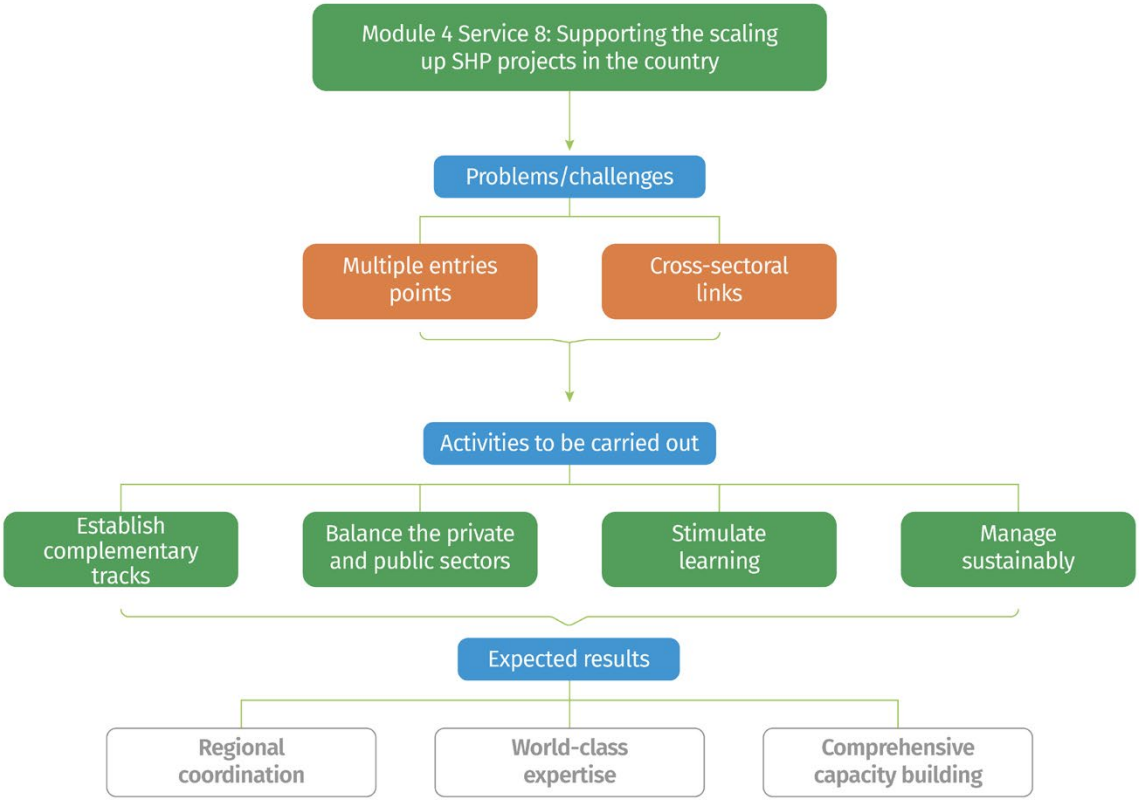


Figure 4.8. Overview of Module 4 Service 8: Supporting the scaling up SHP projects in the country

4.8.1. Introduction

- Two tracks are established to scale up SHP projects: strengthening financing opportunities and improving the social management capacity of SHP.
- The applicability of this service is established during the scaling up of SHP. The service applies to selecting appropriate projects, demonstrating ex-ante, fulfilling the demonstration-monitoring-replication cycle and conducting a thorough evaluation.

4.8.2. Problems/challenges and possible solutions

- Multiple entry points: There is a need to find multiple entry points to scale up SHP projects in the country.
  - ➢ Possible solutions: Module 4 Service 8 will investigate the operation of SHP plants and their affiliated social and cultural facilities. The service will also comprehensively review SHP roles in knowledge sharing and community recovery.

- Cross-sectoral links: The need to identify and utilize cross-sectoral links to maintain an efficient project structure.
  - Possible solutions: Module 4 Service 8 will help stakeholders to understand the bottlenecks of implementation and operation of SHP projects, the policy framework and the roles of the stakeholders.

4.8.3. Activities to be carried out

A. Establish complementary tracks

- Track 1: Explore investment opportunities. This includes consolidating the possible increases in lending to SHP projects and demonstrating the application of progressive approaches to hydropower to possible investors. It is also necessary to confirm that sustainable water resource management has become an integral part of the economic planning document.
- Track 2: Strengthen social foundations. This includes maximizing the strategic value of hydropower by moving upstream to capacity building, planning, and policy development in client countries. The track takes a central place in helping governments and communities define their roles in social resilience, resource management and public-private partnerships.

B. Balance private and public sectors

- Promote the balance of public and private responsibilities and the allocation of risks and benefits. Confirm the value of the key role that the private sector plays in the required financial management.
- Establish risk sharing mechanism. Such a mechanism encourages both the private and public sectors to play their roles in reducing hydropower development risks, maximizing a range of potential benefits, and ensuring balanced access to, and use of, natural resources.

C. Stimulate learning

- Create a framework to “freely” discuss the implications of various policy alternatives for the productive use of land and water, and the diverse interpretations of water productivity.
- Facilitate meaningful discussion between participants driven by different sources of information and learning from previous and ongoing practice to improve water productivity and draw conclusions for policy decisions.
- Generate an overview of how productive a country or region is with its water resources.

D. Manage sustainably

- Identify potential opportunities for improving water management around tangible cases and bringing people and different sources of information together in a manner that will have a lasting impact on government departments, scientists, the private sector and the country at large.
- Establish a sustainability framework, with focus on integrating environmental and social values. Core elements of the framework echo the priorities in scaling up hydropower, including leveraging finance and recognition of the need for more agile responses to client and stakeholder demands.
- Investigate the legal framework (sustainable water resource protection, defined feed-in tariffs, and transparent licensing procedures) for SHP development.

4.8.4. Expected results

- Regional coordination: Supervise the countries' work across sectors and integrate water and energy needs. Convene across national borders in regional coordination in both energy and water.
- World-class expertise: Bring world-class expertise to clients at the policy and project levels through access to consultants and, importantly, convening independent panels on environmental and social safeguards.
- Comprehensive capacity building: Supervise capacity building in areas such as environmental management, social analysis and sector-level planning.

Module 4: Conclusion

- Module 4 establishes connection platforms between projects, developers, and investors, and offers help in executing demonstration projects. The services offered by the other modules in the package are geared toward this module. It systematically devises the project plan, financial estimation, and resource capacity plan and streamlines SHP development by enabling smooth coordination and collaboration between different sectors. Requestors do not need to take all of Module 4 services but can choose only some and mix and match with other modules.
- Module 4 will encourage SHP information sharing with the investors, effective preparation, sharing of SHP proposals and comprehensive assessment of the potential investment for SHP projects. It will explore the possibilities for industry application and support of youth business incubators in SHP and promote the wide use of hydropower in various sectors and encourage the youth to share in the benefits of SHP development.
- Module 4 will encourage the establishment of a "matchmaking" platform/portal for projects, developers and investors in SHP, select appropriate projects, demonstrate ex-ante, fulfil the demonstration-monitoring-replication cycle and conduct a thorough evaluation.

MODULE 5

FINANCING AND INVESTMENT DE-RISKING

Module 5: Table of Content

5. Module 5. Financing and Investment De-risking

Introduction

United Nations Industrial Development Organization (UNIDO) partners with a variety of development actors, including international financial organizations, in helping governments achieve their development priorities. UNIDO, in collaboration with International Center on Small Hydro Power (ICSHP), support financing environmental-friendly SHP plants.

Module 5 is targeting 8 services:

1. Defining risks & success factors of financing SHP projects
2. Assessing capacity needs of banks & financial institutions
3. Establishing business models and financial models for SHP projects
4. Financing SHP projects
5. Supporting policy instruments to facilitate SHP development
6. Establishing investment criteria for financing agencies
7. Designing financial mechanism with de-risking instruments
8. Supporting financing for developers and investors

The objectives of Module 5 are to provide guidelines for local and international Small Hydropower (SHP) project developers to set up a bankable business model to reduce potential risk and enhance financing opportunities for their SHP projects. This module focuses mainly on SHP projects for power generation or substitutes the conventional energy sources. UNIDO can not provide financing. It is possible to choose only some of the services from this module (not mandatory to carry out all of them).

5.1. Module 5 Service 1: Defining risks & success factors of financing SHP projects

Figure 5.1. Overview of Module 5 Service 1: Defining risks & success factors of financing SHP projects

5.1.1. Introduction

- SHP, when properly planned and implemented, provides an affordable, reliable, sustainable and modern source of low-carbon electricity. However, SHP projects in low-income countries (LICs) and lower-middle-income countries (L-MICs) carry various risks due to lack of guidance. Given the shortage of public funds for infrastructure investment, these projects will need to be increasingly financed and developed by private sector actors through alternative financing arrangements such as public-private partnerships.
- The applicability of this service is established to analyze financial factors that affect SHP. The service applies to coping with financial risks including tariff/ability to pay, investment availability, financial viability (cost/benefit), subsidies (which are a political factor too), willingness to pay (which is a social factor too), cost of energy and end-use.

5.1.2. Problems/challenges and possible solutions

- Project-level challenges: At the project level, various risks and barriers include technology risk, resource availability and supply risk.

- Possible solutions: Module 5 Service 1 will remove market barriers, and build financial, legal and institutional frameworks to support the uptake of SHP projects.

- Macro-economic level challenges: Investors face actual and perceived financial risks, but there are no reliable policy support mechanisms to reduce such risks.
  - Possible solutions: Module 5 Service 1 will provide stable policy support measures to mitigate the real and perceived risks for investors in renewable energy projects and technologies. Only long-term policies can change the familiar pattern of commercial investment away from conventional energy sources in favour of large-scale investment in clean technologies.

5.1.3. Activities to be carried out

A. De-risk financing tools to be carried out:

- Strengthening of the equity portion so that the debt-financed portion is smaller and the bank has less risk in a project.
- Provision of quasi-equity via Mezzanine Debt (which ranks for interest payments behind Senior Loans/Debt). Risk sharing of the debt portion by syndication or bringing other lenders into the structure.
- Provision of collateral by, for example, the provision of Credit Guarantees or Insurance.
- Provision of Foreign Currency Hedging facilities for foreign currency loans if funding is provided from offshore.

B. Enhance financial risk management

- Understand the nature of risks, and their drivers and consequences.
- Fully appreciate the risks inherent in SHP projects when they begin to seek finance, especially when this involves needing to attract risk-averse private sector financiers.
- Strengthen risk management to increase the probability and impact of positive events and decrease the probability and impact of negative events.

5.1.4. Expected results

- Market-oriented financing: The service establishes a market-oriented financing system of SHP under the guidance of the government.
- Capital utilization: The service directs the capital to places where SHP needs to be built.

5.2. Module 5 Service 2: Assessing capacity needs of banks & financial institutions

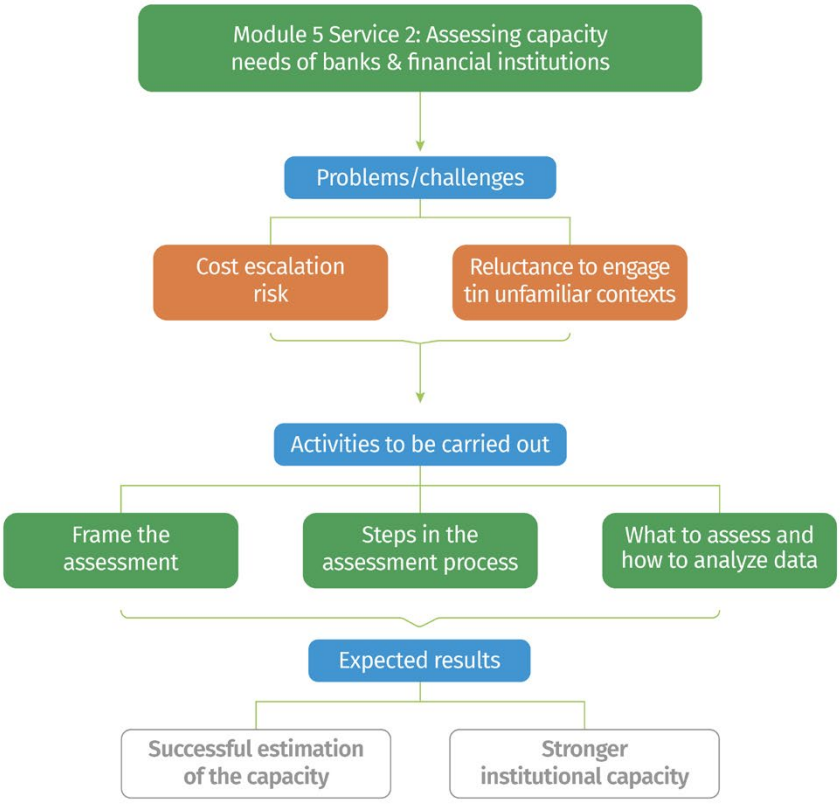


Figure 5.2. Overview of Module 5 Service 2: Assessing capacity needs of banks & financial institutions

5.2.1. Introduction

- Financial agencies are an important part of the financing system of SHP projects. Except for the responsibility of providing financial services for small and medium-sized enterprises and residents, they also shoulder the important responsibility of promoting the development of the market economy in modernization.
- The applicability of this service is established to implement capacity needs assessment of banks & financial institutions. The service aims to ensure a successful SHP project implementation by appraising the elements of operational and financial capacity, effectiveness, sustainability and cost-effectiveness of financial agencies.

5.2.2. Problems/challenges and possible solutions

- Cost escalation risk: Inflation, commodity price changes, competition for resources and other local and international cost effects are grouped under cost escalation risk.

- Possible solutions: Module 5 Service 2 will investigate and forecast costs well enough before the decision to proceed.

- Reluctance to engage in unfamiliar contexts: Financing organisations tend to be reasonably risk-averse and are often reluctant to engage in ventures in country contexts with which they are less familiar.
  - Possible solutions: Module 5 Service 2 will assist potential investors in accessing the information that enables them to comprehensively estimate the risks associated with SHP investment.

5.2.3. Activities to be carried out

A. Frame the assessment

- Clarify the purpose of the assessment, based on the development goal for which capacity is needed.
- It is a structured approach for analyzing capacity across three dimensions: individuals, organizations and the enabling environment.

B. Steps in the assessment process

- Form a team: Establish a team that will do the assessment and decide how the assessment will be carried out (surveys, desk reviews, focus groups, etc.)
- Scope the assessment: Clarify what and whose capacities need to be strengthened. Use the stakeholder analysis tool to identify key stakeholders. Customize the capacity assessment questionnaire for different stakeholders (farmers, government staff, etc.) as well as the specific sector or challenge.
- Facilitate or undertake the assessment: Collect and analyse the data on capacity and communicate the findings to key stakeholders.
- Consolidate findings: Define and gain consensus on the next steps.

C. What to assess and how to analyze data

- Levels of capacity: Understand all the factors enabling or inhibiting performance and capacity change.
- Types of capacity: Assess both hard and soft capacities, including power distribution, incentives and sanctions, leadership, and values and beliefs.
- Themes for application: the capacity development framework will help to prioritize the areas for the assessment.

5.2.4. Expected results

- Successful estimation of the capacity: The service estimates the capacity of the banks & financial institutions to implement a successful project.
- Stronger institutional capacity: The service contributes to strengthening the institutional capacity of banks & financial institutions in undertaking their functions of SHP development.

5.3. Module 5 Service 3: Establishing business models and financial models

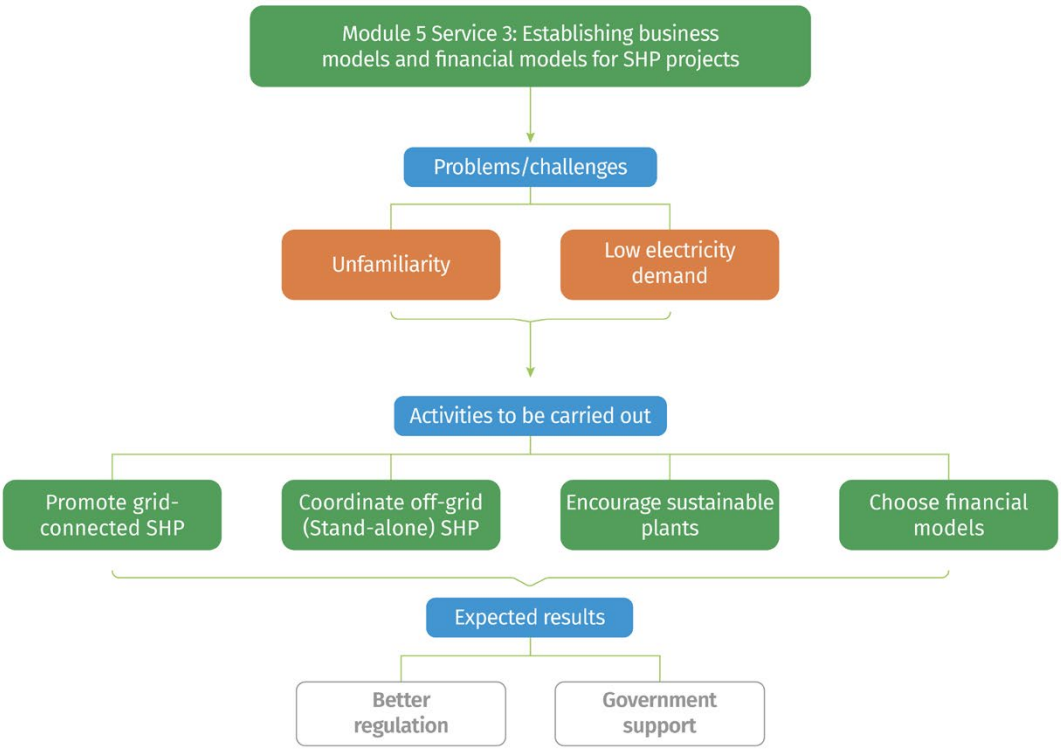


Figure 5.3. Overview of Module 5 Service 3: Establishing business models and financial models for SHP projects

5.3.1. Introduction

- The business or financial models are important tools that open the door to external financing in modern capital markets. In corporate finance practice, the term "financial model" refers to a comprehensive analytical tool that is used to evaluate and compare projects.
- The applicability of this service is established to explore business models and financial models for SHP. The service applies to dealing with financial risks including tariff/ability to pay, investment availability, financial viability, willingness to pay, cost of energy and end-use.

5.3.2. Problems/challenges and possible solutions

- Unfamiliarity: Some investors or partners are not familiar with the productive uses of SHP electricity that increase income or productivity.
  - ➢ Possible solutions: Module 5 Service 3 will encourage typical productive uses in mining, water supply/sanitation, irrigation, agro-processing (e.g., grain milling), various manufacturing industries such as carpentry, tailoring, welding and looming in some rural contexts.

- Low electricity demand: In many regions with rich SHP resources, electricity demand sometimes tends to be very low due to low population densities and low energy consumption per household.
  - ➢ Possible solutions: Module 5 Service 3 will conduct a feasibility study to avoid unnecessary investment.

5.3.3. Activities to be carried out

A. Promote grid-connected SHP

- Improve SHP's representation and its ability to provide high-capacity extended-duration storage in capacity expansion models—a capability that is increasingly important as renewable penetrations increase.
- Permission to grid connect must therefore be secured early during the project.

B. Coordinate off-grid (Stand-alone) SHP

- Facilitate stand-alone SHP systems which are sometimes more cost-effective than extending a power line to the electricity grid.
- Successful stand-alone SHP systems generally take advantage of a combination of techniques and technologies to generate reliable power, reduce costs, and minimize inconvenience. Some of these strategies include using fossil fuel or renewable hybrid systems and reducing the amount of electricity required to meet your needs.

C. Encourage sustainable plants

- Encourage low-impact hydropower (like run-of-river SHP) which often avoid detrimental environmental and social impacts that can be problematic for larger hydropower systems.
- Help to establish mini-grid village hydro systems—the isolated water-driven power supply intended to provide a village with energy for various applications.

D. Choose financial models

- Corporate finance: Encourage lending institutions to finance corporations that will implement the hydro project and assume responsibility for debt servicing-interest and capital repayments. The lender focuses on the corporation's ability to service the interest and repay or refinance the debt.
- Project finance: Focus on hydro project bankability because the project or the company will rely on the project-generated cash flow alone to cover lender obligations. Under such scheme, project assets may serve as collateral to reduce lender risk.

5.3.4. Expected results

- Better regulation: This service helps to improve financial regulation for SHP to facilitate investing in the sector.
- Government support: The service urges governments to provide subsidies for the exploration and investment of SHP.

5.4. Module 5 Service 4: Financing SHP projects

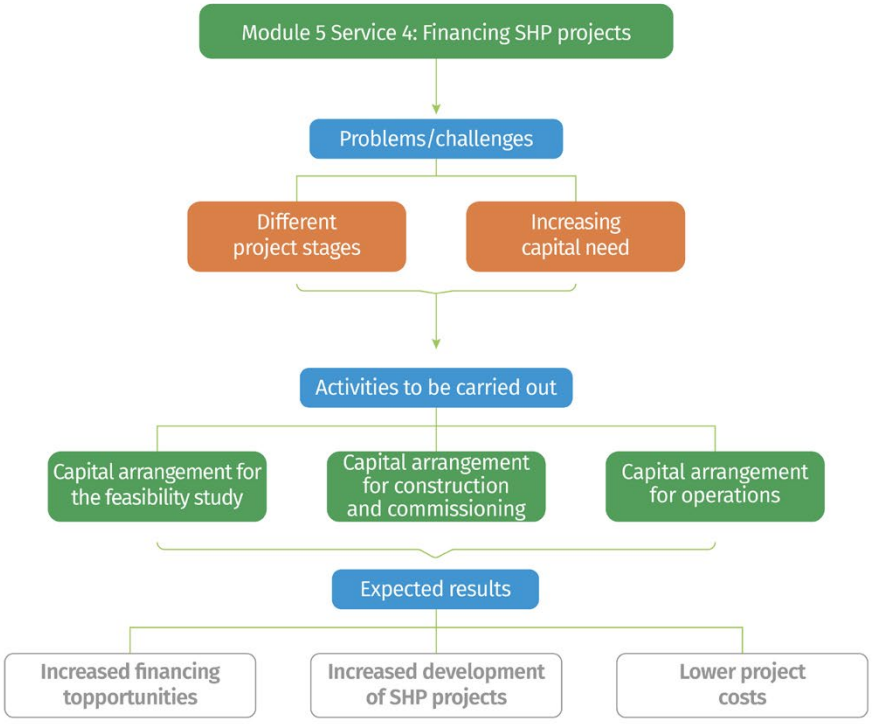


Figure 5.4. Overview of Module 5 Service 4: Financing SHP projects

5.4.1. Introduction

- Financing small hydropower projects might be less profitable than larger ones. Many SHP cost components are fixed regardless of project scale, so larger hydro facilities offer economies of scale. In addition, most small facilities are designed as run-of-river so output depends on the water flows, which can vary seasonally and annually, creating revenue uncertainty. Therefore, SHP is highly cost-sensitive: the impact of unforeseen costs is higher. Consequently, limited-recourse project finance is difficult for SHP plants without support mechanisms.
- The applicability of this service is established to explore financing plans and financing options for SHP. The service applies to establishing financial investment plans with a full understanding of financial challenges and barriers to energy efficiency funding.

5.4.2. Problems/challenges and possible solutions

- Different project stages: SHP projects require capital (funds or physical assets). Different types and amounts of capital are available for different project stages.
  - ➢ Possible solutions: Module 5 Service 4 will develop financial plans to meet three key project stages of feasibility studies: construction, commissioning and operations.
- Increasing capital need: As the project moves from the feasibility stage to construction and operations, risk decreases and capital needs increase.

- Possible solutions: Module 5 Service 4 will encourage different types of funding during each stage of the project.

5.4.3. Activities to be carried out

A. Capital arrangement for the feasibility study

- Coordinate the funds from various sources. At this stage, funding typically comes from the project developers themselves, sometimes with funds or technical support from donor-funded programs, grants or angel investors.

B. Capital arrangement for construction and commissioning

- Coordinate private or public financing sources to back the project. The overwhelming majority of capital needed in an SHP project is for construction, including the purchase of land, equipment and materials.
- Help to deal with elements that can impact the SHP project cost. The construction phase of SHP development is most prone to cost overruns and management challenges. Offer recommendations on how to respond to elements that can impact the SHP project cost, such as poor communication, resettlement issues, adverse weather, local unrest or supply chain trouble.

C. Capital arrangement for operations

- Help the developers seek funds to operate the SHP plant by conducting financial analysis and cost control. At this point, the project is largely funded through its cash flows (such as retail tariffs).
- Provide the developers with suggestions on how to make scheduled loan repayments to banks and other lenders.
- Offer suggestions on the design of two-tiered tariffs. If the SHP plant sells electricity to the main grid, it may want to design two-tiered tariffs (if permitted by the utility and local regulations).
- Mitigate the effect of various stakeholders on each other's engagement in the project. For example, financing structures have the potential to influence Power Purchase Agreement (PPA) terms with the utility or host agency. Even project developers' contracts with Engineering, Procurement and Construction (EPC) and service companies will affect the decision of investors.

5.4.4. Expected results

- Increased financing opportunities: As climate change becomes a global issue, there is a certain number of available local and international green finance schemes. The service encourages SHP project developers to find opportunities in the carbon market.
- Increased development of SHP projects: With greater availability of funds, more SHP projects can be built to utilize the existing hydro potential and provide clean energy access. This contributes to energy security and climate change mitigation.
- Lower project costs: Financing instruments like subsidies, tax rebates and low-interest loans can make SHP projects more affordable by reducing upfront capital costs. This makes the levelized cost of SHP energy cheaper for consumers.

5.5. Module 5 Service 5: Supporting policy instruments to facilitate SHP development

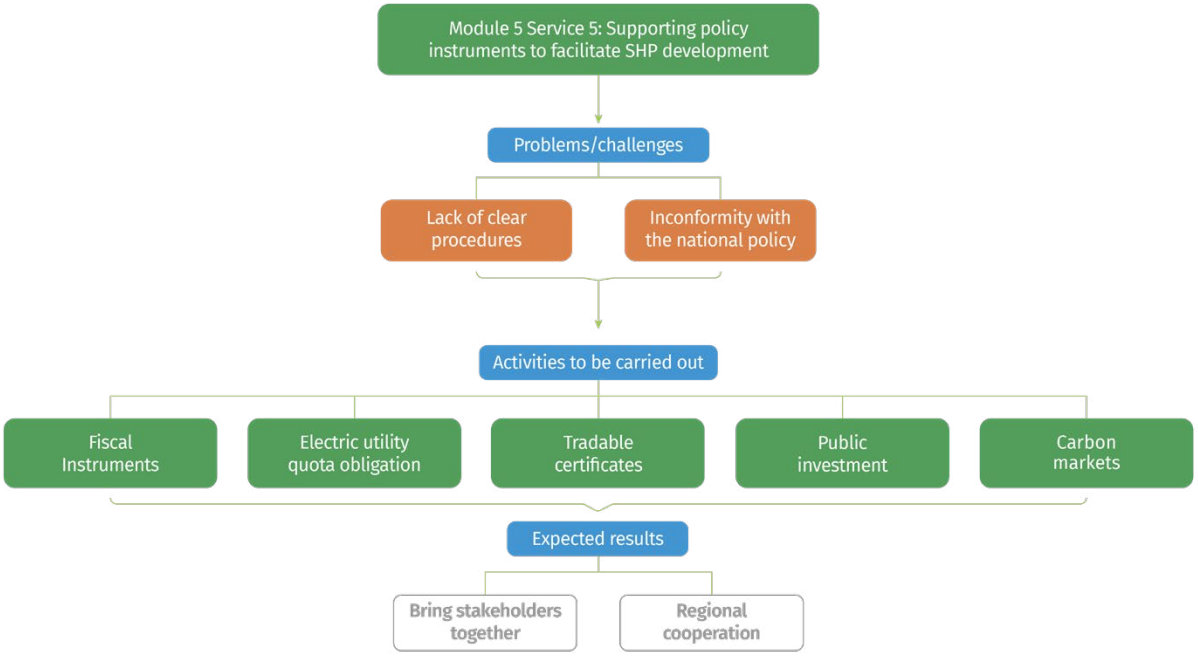


Figure 5.5. Overview of Module 5 Service 5: Supporting policy instruments to facilitate SHP development

5.5.1. Introduction

- SHP project typically employs financial incentives to increase investment attractiveness and develop a clean energy market. Under the green policy, there is a cap on carbon emissions allowed for different entities and the government provides financial support to support the development of renewable energy.
- The applicability of this service is established to promote policy support for SHP. The service applies to establishing support for member countries in maintaining or consolidating energy sustainability while deepening structural reforms in key areas in which growth & poverty reduction are constrained.

5.5.2. Problems/challenges and possible solutions

- Lack of clear procedures: Lack of clear, simple and transparent procedures which promote private sector participation in the development of hydropower.
  - ➢ Possible solutions: Module 5 Service 5 will provide appropriate incentive provisions and establish a transparent process to attract private investment in hydropower development.
- Inconformity with national policy: Failure to implement SHP projects focusing on national interest, environment protection and maximizing benefits in the development of water resources of the country.
  - ➢ Possible solutions: Module 5 Service 5 will make the river basins the basis of the development and management of water resources to achieve maximum benefits from the utilization of water resources of the country.

5.5.3. Activities to be carried out

A. Fiscal Instruments

- Fiscal incentives: Help to devise fiscal incentives (like clean energy subsidies) to make investments more attractive to project developers and investors.
- Set feed-in tariff for clean energy. Incentivize renewable energy generation to be cost-competitive with other conventional generations. Offering long-term power purchase agreements (PPAs) for the sale of renewable electricity. The PPA typically provides a specific rate for every unit of electricity generated based on renewable energy technology, size, and location of the project for a specific contract period.

B. Electric utility quota obligation

- This policy sets an obligation on a utility company, group of companies, or consumers to provide or use a predetermined minimum targeted share of renewable energy sources in total installed capacity. This policy is also named “renewable obligations” and “mandated market shares”. Offer recommendations on devising such renewable electricity standards.

C. Tradable certificates

- Help to promote renewable energy certificates which are awarded to generators for each unit of renewable energy produced. Under this policy, participants in the market, such as generators or suppliers, participate in buying or receiving some certificates to meet the mandatory quotas established for the year.
- Offer suggestions on how to collect such certificates to meet obligations and to provide a tool for trading among participants.

D. Public investment

- Offer suggestions to the government to make green policies. For example, financial support from the government is provided to support renewable energy development. The policy can include a capital subsidy to cover a part of the upfront capital cost of an asset and may include consumer grants, rebates or one-time payments by a government agency or a government-owned bank.

E. Carbon markets

- Help countries to be involved in carbon markets, including Clean Development Mechanism (CDM) and Joint Credit Mechanism (JCM). The scheme provides incentives to adopt low-carbon fuels, renewables, and energy-efficient technologies.
- Help countries prepare themselves for the implementation of carbon market initiatives, including emissions trading schemes (ETS) and crediting mechanisms in the coming years.

5.5.4. Expected results

- Bring stakeholders together: This service brings stakeholders together to make sure SHP projects benefit local communities and provide the investors in a qualifying property with a tax credit based on the amount of renewable energy generated.
- Regional cooperation: The service establishes a regional cooperation mechanism to utilize the hydropower potential of the country to the maximum extent to meet the communal demand for electricity.

5.6. Module 5 Service 6: Establishing investment criteria for financing agencies

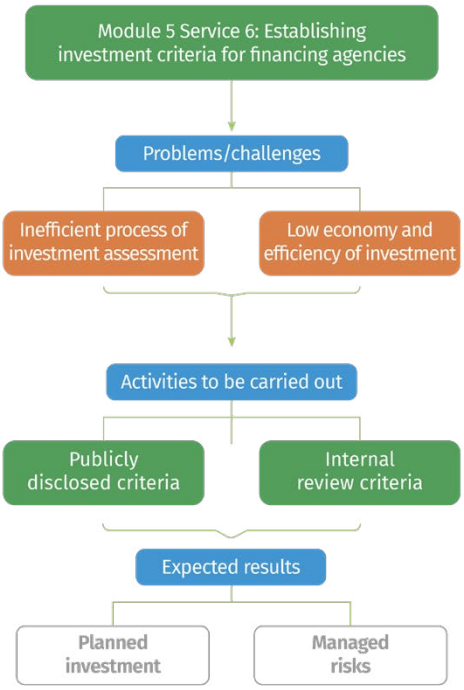


Figure 5.6. Overview of Module 5 Service 6: Establishing investment criteria for financing agencies

5.6.1. Introduction

- Investment criteria are a defined set of parameters used by financial agencies (or strategic buyers) to assess an acquisition target. The criteria usually consist of two sets: publicly disclosed criteria and internal review criteria.
- The applicability of this service is established to screen and judge reliable investments for SHP. The service applies to the evaluation of investments in SHP.

5.6.2. Problems/challenges and possible solutions

- Inefficient process of investment assessment: Financing agencies usually lack effective evaluation of investments in SHP.
  - ➢ Possible solutions: Module 5 Service 6 will set investment criteria that can be used by the financing agencies to quickly assess acquisition opportunities. Financing agencies can make the process of sourcing and qualifying new opportunities more efficient with the assistance of those investment criteria.
- Low economy and efficiency of investment: The economy and efficiency in the use of capital are the abiding concerns of the financing agencies.
  - ➢ Possible solutions: Module 5 Service 6 will guide the investment activities of the financing agencies according to the specific energy objectives & economic priorities set forth by the country.

5.6.3. Activities to be carried out

A. Publicly disclosed criteria

- Publicly disclosed criteria include the parameters that are disclosed publicly to intermediaries such as investment bankers, so they know what financial agencies are looking for to source deals that fit.
- The parameters appraise technical, financial, and economical feasibility, which include: (1) national, sectoral, and local needs for the investment; (2) technical, financial, and economic justifications for the proposed project; (3) sustainability; (4) the extent to which the project contributes to human and technological advancement; (5) good governance aspects.
- The parameters emphasize that the investment does not result in an increase in energy consumption and emissions compared to the current situation in the facility where the projects are located.
- The parameters emphasize that the investment avoid any designated environmental protection zone and cultural heritage site and do not involve commercial development of local cultural resources without indigenous peoples' consent.
- The parameters emphasize that the project be designed, constructed and operated by national and local social and environmental laws and regulations and meet environmental and social requirements.

B. Internal review criteria

- Once the details of the opportunity are gathered and the publicly disclosed criteria are reviewed, the internal investment criteria will be applied to determine whether an expression of interest (EOI) or letter of intent (LOI) should be issued.
- Internal review criteria include the parameters developed for internal review that allow the financial agencies to quickly determine whether the acquisition should be pursued further. The parameters include: (1) the strength of the management team; (2) the estimated internal rate of return (IRR) on the investment; (3) customer diversification; (4) barriers to entry.
- Importantly, the parameters emphasize the importance of building a strong local team with the skills and expertise required for the project and seeking strategic partners. It is strongly encouraged to have international partners that bring expertise, technology and ability to navigate the regulatory/licensing requirements and/or financing.

5.6.4. Expected results

- Planned investment: The service helps financial agencies to invest in a planned way.
- Managed risks: The service helps financial agencies to manage investment risks and gain the best performance from their investment.

5.7. Module 5 Service 7: Designing financial mechanism with de-risking instruments

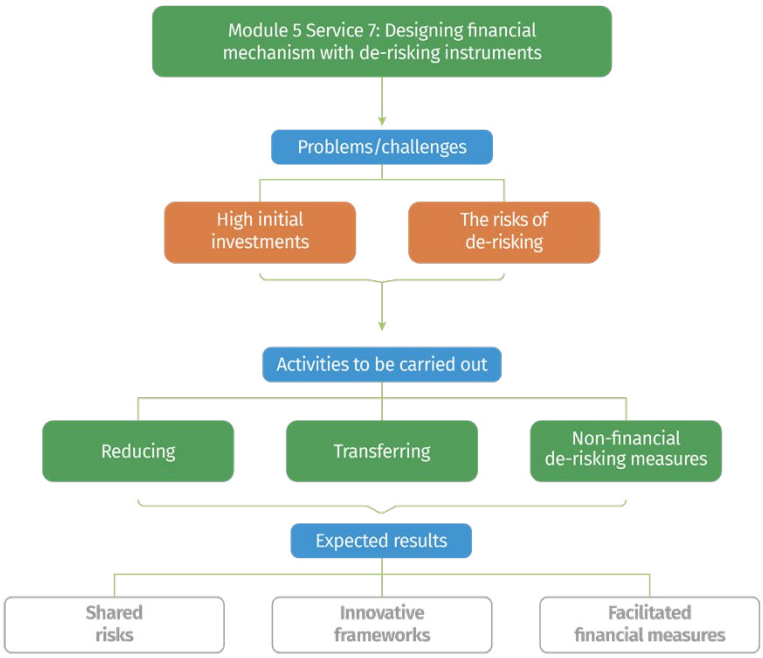


Figure 5.7. Overview of Module 5 Service 7: Designing financial mechanism with de-risking instruments

5.7.1. Introduction

- De-risking can be achieved by using such instruments as public loans, government implicit guarantees, political risk insurance and public equity co-investments. Module 5 Service 7 assists policymakers in putting in place packages of targeted interventions to address financial risks. Designed financial mechanisms with de-risking instruments act in one of two ways: either reducing or transferring.
- Risk mitigation needs to be understood not only as a financial risk mitigation product but also as a broader concept of non-financial risk mitigation measures.
- The applicability of this service is established to strengthen and devise financial de-risking measures to address the underlying barriers in the investment environment of SHP. The service promotes cooperation between all parties to achieve financial security for SHP.

5.7.2. Problems/challenges and possible solutions

- High initial investments: Even though the costs of renewable energy sources keep falling, the initial investments required for their build-up can pose a substantial challenge in countries with high capital costs.
  - ➢ Possible solutions: Module 5 Service 7 will identify the barriers and related risks that hinder private and public sector investment in renewable energy.

- The risks of de-risking: De-risking practices by global financial institutions threaten to cut off access to the global financial system for remittance companies and local banks in certain regions, putting them at risk of losing access to the global financial system. Some local financial organizations have also reported that they have lost access to financial services as a result of de-risking.
    - Possible solutions: Module 5 Service 7 will encourage a dialogue between international and local financial organizations. The service will also devise and practice financial and non-financial de-risking measures and encompass broader, early-stage macro or sectoral interventions.

5.7.3. Activities to be carried out

A. Reducing

- Transaction risk: Address and attempt to remove the underlying barriers that are the root causes of specific financial risks at the transaction level.
- Public loans: Promote SHP development through a medium-term public grant program. Call on developed countries to support developing economies that lack tools and guidance to obtain innovative funds through medium-term grants and technical assistance.
- Integrated hydro-economic models: SHP generators rely on stream flows to serve as "fuel," which can lead to volatility in revenues that can be financially disruptive. This link between hydrologic and financial uncertainty suggests that hydropower producers need to begin to consider new strategies and tools for managing these financial risks. Module 5 Service 7 will devise an integrated hydro-economic model of a given river basin to characterize the financial risk faced by hydropower generators as a result of hydrologic variability and develop several index-based financial hedging contracts intended to mitigate this risk.

B. Transferring

- Equity: Strengthen the equity portion so that the debt-financed portion is smaller and the bank has less risk in a project, and risk sharing of the debt portion by syndication or bringing other lenders into the structure.
- Public equity co-investments: Public financial institutions play a critical role in de-risking, as they provide the de-risking capital, instruments or mechanisms. When public resources are deployed strategically, a previously unbankable project can attract and mobilize capital from commercial and institutional investors.

C. Non-financial de-risking measures

- Reduce the risk of energy investment in the humanitarian sector. Humanitarian agencies recognize the need to shift their dependence on fossil fuels to more sustainable power generation, but systemic obstacles have led to the continued purchase of diesel generators in energy-poor areas.
- Encourage commitment and cooperation from all parties to achieve energy transition and sustainable development goals of communities. The foundation and system-driven aspects of non-financial risk reduction require the private sector, donors and the government to be consistent in the various elements that make the approach successful.

5.7.4. Expected results

- Shared risks: This service involves public entities such as donor governments, multilateral development banks, development financial institutions and climate funds encouraging private investors to deploy capital by offering to bear a share of the risk.
- Innovative frameworks: The service develops innovative frameworks to help policymakers in developing economies that lack tools and guidance to promote and expand private and public sector investment in SHP in a cost-effective manner.
- Facilitated financial measures: While financial de-risking measures are effective immediately, non-financial de-risking instruments are also widely adopted to facilitate financial measures.

5.8. Module 5 Service 8: Supporting financing for developers and investors

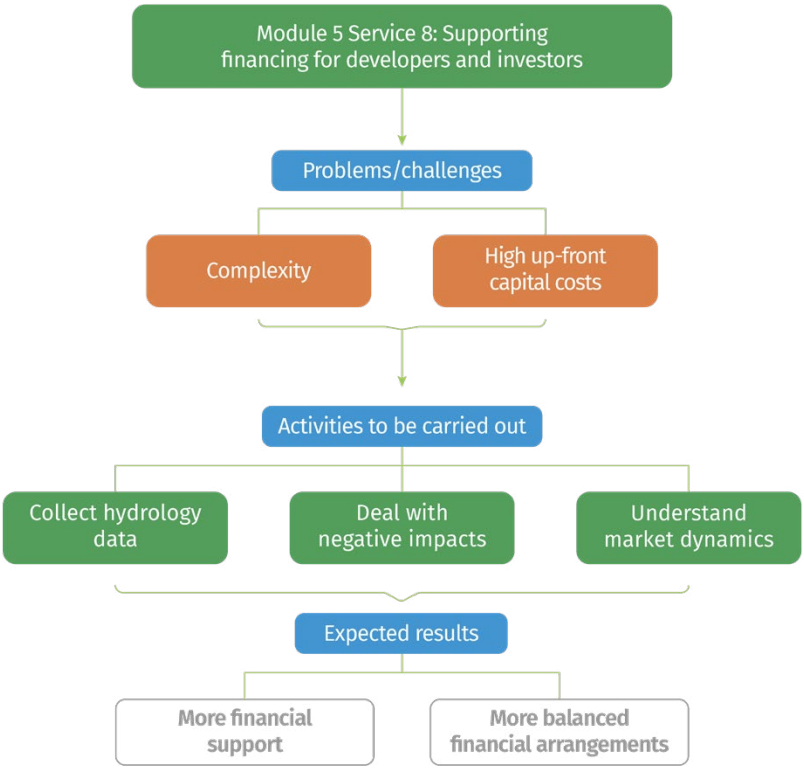


Figure 5.8. Overview of Module 5 Service 8: Supporting financing for developers and investors

5.8.1. Introduction

- SHP finance is complex due to the following characteristics: (1) Long operating life; (2) High capital costs; (3) High construction risks; (4) Site-specific, each development is unique; (5) Environmental and social considerations.
- Hydropower projects usually require a large amount of upfront capital expenditure. However, once the project is put into operation, a good hydropower project will operate for many years with low operating expenses.
- The applicability of this service is established to identify the risks and areas of intervention in financing SHP. The service applies to support financing for investors by dealing with high construction risks, site-specific nature, market dynamics etc.

5.8.2. Problems/challenges and possible solutions

- Complexity: Hydropower project financing is complex because it is highly dependent on hydrology.
  - ➢ Possible solutions: Module 5 Service 8 will structure financing activities to mitigate this risk.

- High up-front capital costs: A major consideration in financing SHP schemes is that high up-front capital costs can make them less attractive in the short term.
  - ➢ Possible solutions: Module 5 Service 8 will help investors understand that this is offset to some degree by long operating lifespans and low operating costs that provide significant long-term benefits.

5.8.3. Activities to be carried out

A. Collect hydrology data

- Provide reliable hydrology data, which is a prerequisite for sound project planning.
- Provide investors with detailed information about possible sites (hydrology, geology, community structure and public opinion) for them to judge. Power output can be unpredictable due to the stochastic nature of water flows, in particular for run-of-river plants.

B. Deal with negative impacts

- Assist investors to establish a project pipeline, carry out a feasibility study/ design and make investment plans. SHP facilities can provide multiple benefits such as flood mitigation, irrigation, aquaculture and recreational potential, among others. However, they can also bring about negative effects such as inundated infrastructure or disappearing cultural heritages. Encourage considerable investment in communications and mitigation measures for ecology and society.
- Assist contractors, employers and consulting engineers in constructing the plants through the programme. Construction periods are usually long and risks are high due to local geological conditions, flooding, lack of site access, and other risks.
- Help to take well-planned mitigation measures and risk-sharing arrangements to attract financiers and keep tariffs low.

C. Understand market dynamics

- Assist investors to consider the impact of the dry season and rainy season on electricity prices and develop appropriate mitigation measures. Countries dominated by hydropower may encounter typical seasonal market challenges, such as insufficient supply in the dry season and excess supply in the rainy season.
- Assist investors to evaluate the sustainability of the regulatory framework and the affordability of the off-taker. The government may make changes to the regulations, retroactively affecting the signed contract. This is not common, but it has happened in recent years.
- Encourage long-term off-take agreements. Such agreements make hydropower projects more attractive to private investors to compensate for the fact that generation and power sales are variable due to water flows' stochastic properties.

5.8.4. Expected results

- More financial support: SHP projects are financially supported especially in the early planning and construction stage.
- More balanced financial arrangements: SHP projects have more balanced financial arrangements.

Module 5: Conclusion

- Module 5 further hones the financial instruments supplied by Module 1 and helps with the construction of bankable proposals and the evaluation of the possible investment served by Module 4. Requestors do not need to take all of Module 5 services but can choose only some and mix and match with other modules.
- Module 5 will be developed to clarify the key issues of how financial agencies make decisions on SHP investment and what issues financiers consider when investing based on the understanding of the national electricity development plans in Module 1. Requestors do not need to take all of Module 5 services but can choose only some and mix and match with other modules.
- Module 5 will cope with financial risks including tariff/ability to pay, investment availability, financial viability, subsidies, willingness to pay, cost of energy and end-use, and ensure a successful SHP project implementation by appraising the elements of operational and financial capacity.
- Module 5 will explore financing plans and financing options for SHP and establish financial investment plans with a full understanding of financial challenges and barriers to energy efficiency funding.

MODULE 6

COMMUNICATION AND OUTREACH

Module 6: Table of Content

6. Module 6. Communication and Outreach

Introduction

United Nations Industrial Development Organization (UNIDO) and International Center on Small Hydro Power (ICSHP) are experienced in the promotion and advocacy aimed at policymakers, journalists, development agencies, and large non-governmental organizations. Promotion and advocacy solutions are adapted to the needs of Member States and their industries, including SMEs, and UNIDO serves as an enabler and a mediator for projects of varying scales.

Module 6 targets 7 services:

1. Mapping communication and outreach needs and opportunities
2. Improving stakeholder mapping for engagement
3. Developing promotional and advocacy materials
4. Producing case studies to showcase SHP success
5. Engaging regularly with national media
6. Documenting key project milestones to promote SHP globally
7. Encouraging participation in some global or regional award initiatives

The objectives of Module 6 are to enhance the visibility & understanding of Small Hydropower (SHP) projects and efforts at the national level, establish strategic and sustainable partnerships with key stakeholders to strengthen advocacy around SHP at the national level and contribute to global Accelerator advocacy efforts with project inputs. It is possible to choose only some of the services from this module (not mandatory to carry out all of them).

6.1. Module 6 Service 1: Mapping communication and outreach needs and opportunities

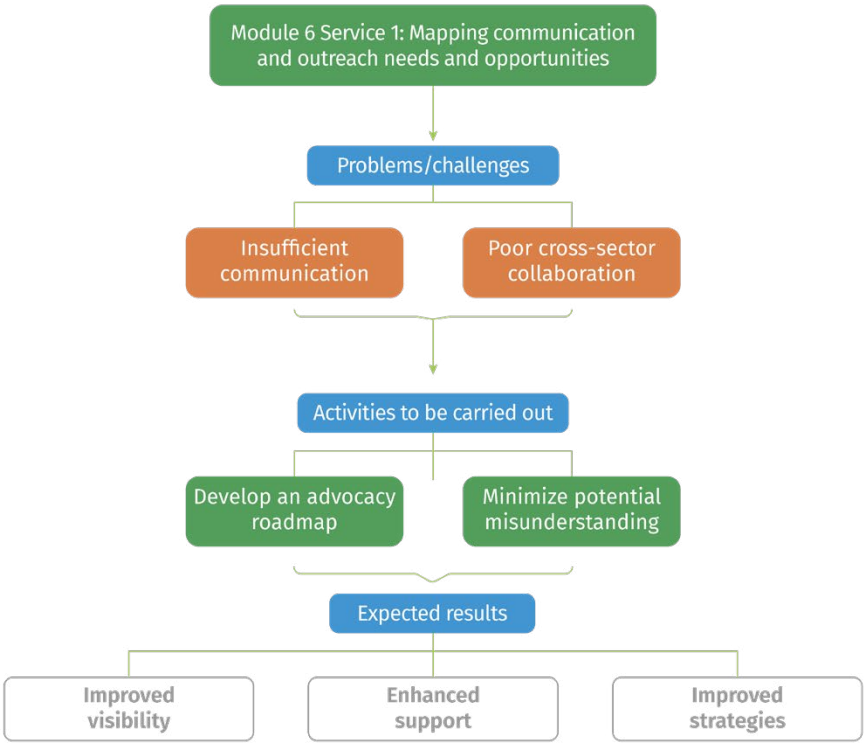


Figure 6.1. Overview of Module 6 Service 1: Mapping communication & outreach needs and opportunities

6.1.1. Introduction

- Communication is the act of transferring information from one place, person, or group to another. Module 6 Service 1 facilitates communication with various parties in SHP development.
- The applicability of this service is established to strengthen the communication and outreach needs and opportunities in the implementation of SHP projects. This service applies to the mitigation of the adverse impact of the projects by providing effective and timely information.

6.1.2. Problems/challenges and possible solutions

- Insufficient communication: There are potential barriers to communicating with the stakeholders in a timely manner.
  - ➢ Possible solutions: Module 6 Service 1 will keep the relevant information about SHP projects available to the stakeholders, providing stakeholders with easy access to the projects. This service will help to avoid, minimize, reduce or mitigate the adverse social, economic, and environmental impacts of the projects by providing timely information.
- Poor cross-sectorial collaboration: Some economic, social, cultural, and political factors involved can cause low transparency, inefficiency or even failure of communication and outreach.

- Possible solutions: Module 6 Service 1 will facilitate good cross-sectorial collaboration through positive interaction and communication, community sharing or joint construction activities, and cross-departmental meetings.

6.1.3. Activities to be carried out

A. Develop an advocacy roadmap

- Explain to stakeholders the nature, purpose, and progress of SHP projects, stakeholder engagement and anticipated product, providing a brief overview, which, in turn, helps SHP projects get necessary political, financial and social support.
- Provide stakeholders with a voice or a stake in the projects being undertaken on their behalf or that may have an impact on their lives. Ensure full respect for human rights, local culture, and natural resources which are essential to the sustainable development of SHP projects. Set long, medium and short-term objectives: An advocacy strategy may have various objectives in the short, medium, and long terms. Define them with precision to get them through. Give priority to the measures that are most appropriate for a given situation of SHP development.
- Identify the right targets: Identify policy and decision-makers who have the power to introduce the policy changes you propose.
- Define key messages: Clear requests or recommendations should be developed for a limited number of key actions to achieve specific, concrete and realistic objectives. Tailor the message to the target audience and situation.
- Consider partnerships and networks: Working in coalition with like-minded organizations can bring added value since it bears the potential to increase the pressure on advocacy targets.

B. Minimize potential misunderstanding

- Communication channels: Adopt different communication channels: verbal, nonverbal, or written ones, such as face-to-face conversations, telephone calls, text messages, email, radio and TV, written letters, brochures and reports, with different stakeholders.
- Feedback: Seek out feedback from stakeholders as to how they understand the message and attempt to correct any misunderstanding or confusion as soon as possible. Keep feedback loops to ensure that activities are tailored towards the specific contexts in which they are being undertaken and reflect on the lessons from any successes or failures experienced during implementation.
- Professionals: Engage professionals with good communication skills before, during and after the implementation of SHP. Professionals help to hone the messages and plan and implement communication and outreach activities to reduce misunderstanding among stakeholders.

6.1.4. Expected results

- Improved visibility: The visibility and accountability of the projects are improved.
- Enhanced support: The support among key stakeholders throughout the project life cycle is enhanced and the misunderstanding of key stakeholders about the development narrative is corrected.
- Improved strategies: The development strategies are improved in line with the findings of the evaluation process.

6.2. Module 6 Service 2: Improving stakeholder mapping for engagement

Figure 6.2. Overview of Module 6 Service 2: Improving stakeholder mapping for engagement

6.2.1. Introduction

- Stakeholder mapping for engagement refers to a process of communicating information and knowledge, seeking to understand and respond to the concerns of stakeholders, and building constructive and responsive relationships. Any proposal for an SHP project needs to be discussed with all stakeholders involved and tailored to their needs, and successful negotiations need to be concluded with the affected local communities for a project to move forward.
- The applicability of this service is established to conduct stakeholder mapping for the engagement of various groups in SHP projects. The service applies to stakeholder analysis and mapping that will continue to be revised in light of continuous comments and input from local, national and international stakeholders directed to the projects.

6.2.2. Problems/challenges and possible solutions

- Resistance: Even the clearest stakeholder mapping may encounter resistance for a variety of reasons, including lack of political will, bureaucratic inertia, and rebuttal from well-resourced interest groups.
  - ➢ Possible solutions: Module 6 Service 2 will make a clear classification of key actors and a sound analysis of political relations and interests.

- Exclusion: The potential inclusion of benefit-sharing programs in projects sometimes fails to be explored in consultations with different stakeholders.
    - Possible solutions: Module 6 Service 2 will form the Stakeholder Engagement and Communications Plan (SECP) for the pre-construction, construction, operational and decommissioning phases of SHP projects. The SECP identifies an SHP project's stakeholders and describes how these stakeholders will be engaged throughout the project's lifecycle.

6.2.3. Activities to be carried out

A. Identify stakeholder groups

- Inception and baseline assessment: Preliminary stakeholder analysis is conducted to determine for each stakeholder group their potential role in the project and its degree of importance and influence.
- Sustainable development pathway setting and assessment: Participatory stakeholder analysis will be used during the impact assessment phase to determine which stakeholders will be most adversely affected by the planned hydropower development.
- Mitigations and enhancements: Institutional and legal analyses are conducted to determine the interests of each stakeholder group. Consult with various stakeholders with differing opinions and expectations, and facilitate cooperation with those stakeholders. The sustained involvement of local authorities, government agencies, developers and local communities lead to the negotiation of benefit-sharing arrangements.

B. Establish stakeholder engagement programs

- Engagement methods and tools: Various methods of engagement will be used as part of the project's interactions with stakeholders to ensure that different stakeholder groups are successfully involved in the consultation of impact management solutions.
- Information communication: Information that is communicated in advance of public consultations must be widely available, readily accessible and clearly outlined.
- Public/community meetings: Meetings will be open house events where the government, contractors, and investors will present information and people will be invited to make comments and express any concerns. If there is sufficient interest, separate meetings will be held for women.

6.2.4. Expected results

- Consultations with various stakeholders: Consultations are carried out with various stakeholders—governments, communities, developers, and NGOs—depending on the specific project context.
- Information sharing: Consultations are carried out in a variety of ways including individual interviews, focus group discussions and town hall meetings. The relevant stakeholders are better informed about the background of the project and the objectives of the consultation.

6.3. Module 6 Service 3: Developing promotional and advocacy materials

Figure 6.3. Overview of Module 6 Service 3: Developing promotional and advocacy materials

6.3.1. Introduction

- Advocacy has the power to make a tangible difference. Stakeholders' attention has been focused on the benefits of the projects to ensure that the stakeholders involved support the projects. Among advocacy campaigns at various scales, developing promotional and advocacy materials is the fundamental and cost-and-time-efficient one to optimize its potential outreach.
- The applicability of this service is established to develop promotional and advocacy materials for SHP projects. The service applies to the provision of both digital and traditional advocacy materials to fulfil its communication goal.

6.3.2. Problems/challenges and possible solutions

- Ineffective advocacy: Developing advocacy materials is a low-budget campaign. However, developing valid and effective advocacy materials is not an easy task.
  - ➢ Possible solutions: Module 6 Service 3 will consider what to include in advocacy materials, and how to customize them according to specific project contexts which include geography, natural resources as well as local education level, customs, culture, & different groups of stakeholders.
- Failure to identify priorities: Advocacy materials usually fail to identify priorities and opportunities for better cooperation with project-affected communities.

- Possible solutions: On a needs basis, Module 6 Service 3 will prepare specific outreach material and publications for particular stakeholders, which can take the form of policy briefs, technical publications or publications for specific groups.

6.3.3. Activities to be carried out

A. Prepare promotional and advocacy materials

- Leaflets, brochures and fact sheets: (1) Printed materials present illustrated and narrative information on the project; (2) Graphics and pictures used to describe technical aspects
- Newsletters/updates: (1) Important highlights of achievements; (2) Announcements of planned activities and overall progress
- Printed advertisements in the media: (1) Notification of forthcoming major events or the commencement of specific project activities; (2) General description of the project and its benefits to the community
- Visual presentations: (1) Description of the project and related solutions; (2) Updates on project development
- Radio or television entries: (1) Description of the project, development updates, and solutions for impact mitigation; (2) Advance announcement of forthcoming public events or the commencement of specific activities
- Notice boards: Advance announcements of forthcoming public events, or changes to scheduled processes

B. Communication and assessment

- Information repositories accompanied by a feedback mechanism: Various project-related information is collected and analyzed
- Dedicated telephone line (hotline): Collect, sort and assess the information raised by callers
- Internet/digital media: Collect and assess information about the developers, investors & contractors
- Surveys, interviews and questionnaires: (1) Description of the proposed project and related solutions/impact management measures; (2) Questions targeting stakeholder perception of the project; (3) File out questionnaires to learn about the stakeholders' views on the SHP project.
- Public hearings: Detailed information on the service and/or facility in question, with focus on impacts and mitigations
- Household visits: Survey and assess the effect of the project on households

6.3.4. Expected results

- Efficient access to information: Appropriate advocacy materials are central to the implementation of SHP projects. With these materials, the service ensures stakeholders' efficient access to background information and the subsequent development of the projects.
- Validated materials: To ensure the validity of the materials, the service implements regular consultations with local communities, government and other stakeholders to ensure the validity of the materials and the way to promote them.

6.4. Module 6 Service 4: Producing case studies to showcase SHP success

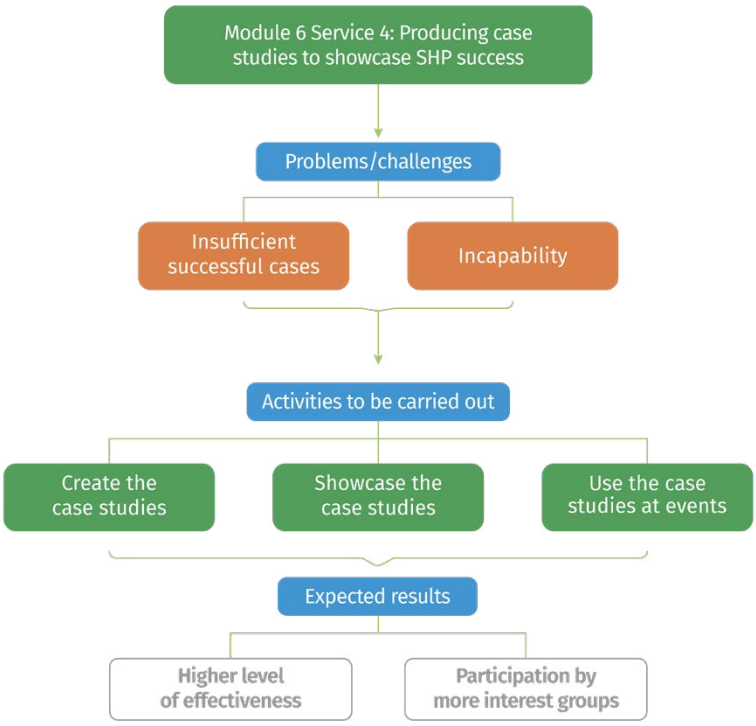


Figure 6.4. Overview of Module 6 Service 4: Producing case studies to showcase SHP success

6.4.1. Introduction

- Case studies, which are good for describing, comparing, and evaluating different aspects of projects, are essential to help stakeholders understand SHP projects. Case studies can deliver concrete, contextual, in-depth knowledge about SHP projects, which allows stakeholders to explore the key characteristics, meanings and implications of the cases.
- The applicability of this service is established to consider using case studies to promote SHP and solve development challenges. The service is an ongoing process of finding powerful ways to showcase SHP success examples.

6.4.2. Problems/challenges and possible solutions

- Insufficient successful cases: There are not enough successful SHP cases to study in local areas with similar contexts.
  - ➢ Possible solutions: The experience of successful cases can be generalized in a different context if there are no successful cases. Module 6 Service 4 will replicate the good cases in a similar context.
- Incapability: Lack of capacity to summarize the merits of SHP.

- Possible solutions: Module 6 Service 4 will provide predictable long-term energy costs after the initial capital investment during construction is completed. The service will offer SHP with the attendant global benefits while having no exposure to fuel pricing uncertainty. The service will provide dynamic benefits such as frequency regulation, reserve capacity, and peaking capacity.

6.4.3. Activities to be carried out

A. Create the case studies

- Write persuasive and authentic case studies. Choose communities that had good SHP practices and reach out to such communities to help produce the case study.
- Collect information on success cases and exemplify their benefits or risks. To ensure the value of those cases, workshops should be held during preparatory phases to identify the factors that impede project implementation.

B. Showcase the case studies

- Promote the case studies in the appropriate places. These cases show customers, users or financial institutions how SHP is better than other energy choices.
- Showcase the case studies (or parts of the research) on various pages of select influential websites. Display case studies on social media accounts and blogs.
- Inspire potential stakeholders' engagement by showcasing SHP success examples.

C. Use the case studies at events

- Think about items that a company should always have for marketing events. Logo pens, shirts, and goodie bags are great places to start. Use case studies at networking events, such as trade shows, speaking engagements, and other industry events.
- Use case studies in webinars and videos: Case studies serve as talking points in webinars or workshops. They feature plenty of persuasive information in one spot. A webinar can be based on one excellent case study.

6.4.4. Expected results

- Higher level of effectiveness: This service improves the effectiveness of case studies through supervision and evaluation, with theoretical knowledge, technical skills, and impacts taken into consideration.
- Participation by more interest groups: This service conducts supervision and evaluation not only by technical staff and professionals, but also by native people in local communities, the government, and other stakeholders.

6.5. Module 6 Service 5: Engaging regularly with national media

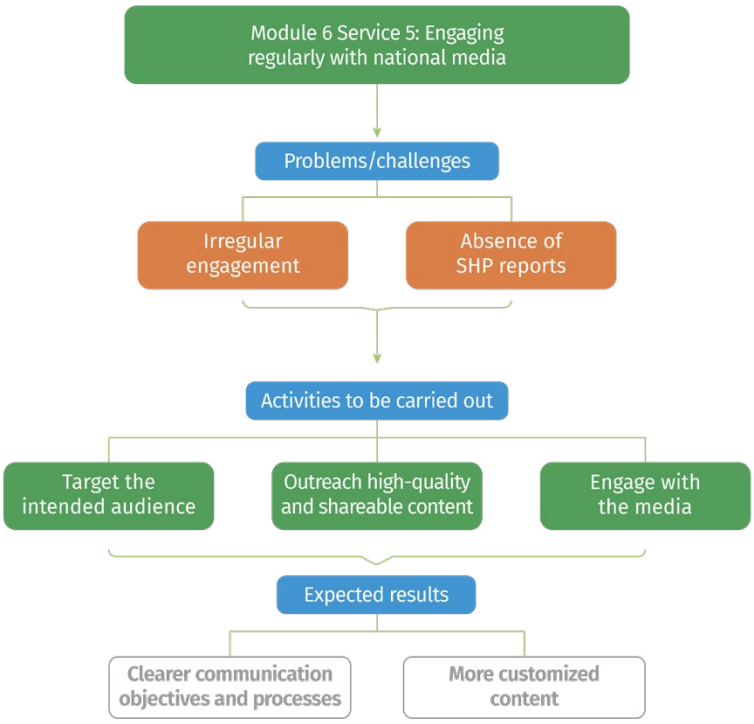


Figure 6.5. Overview of Module 6 Service 5: Engaging regularly with national media

6.5.1. Introduction

- Getting the attention of top and target media is crucial to increase public interest in products or behaviours. Media placements, whether in news stories, human interest stories or product reviews, will affect the way consumers collect knowledge, understand trends and make decisions.
- The applicability of this service is established to engage regularly with national media. This service applies to boosting social media engagement.

6.5.2. Problems/challenges and possible solutions

- Irregular engagement: The SHP sector usually attaches little attention to engagement with the national media.
  - ➢ Possible solutions: Module 6 Service 5 will build and maintain strong working relationships with a wide range of national media.
- Absence of SHP reports: The national media organizations may be more interested in broad themes (such as the economy, society or politics) than SHP. They may not be very interested in SHP.
  - ➢ Possible solutions: Module 6 Service 5 will help the national media to find interesting themes about SHP, such as energy transformation, vulnerable groups, and community development.

6.5.3. Activities to be carried out

A. Target the intended audience

- Think about the age, gender, location and interests of the audience and the frequency of the potential audiences' use of national media. Develop outreach plans according to the investigation results.
- Assist the media in conveying the relevant messages to the target audience or the wider audience, and help policymakers and governments take responsibility.
- Build trust with the audience. Tell the audience fascinating stories of SHP. Make sure that cultural, ethical and religious sensitivities have been considered.

B. Outreach high-quality and shareable content

- Sharing best practices for maintaining, operating and constructing facilities & developing curricula for programs to train new SHP professionals are needed to usher in the next era of hydropower.
- Emphasize that SHP offers the flexibility and reliability the national electricity grid needs to deliver affordable clean energy to the country.
- Announce the development of some comprehensive sets of science-based environmental performance metrics and assessment tools, which will further the design and sustainable operation of SHP projects.
- Tell the audience what has been done to increase access to shared data, make information on relevant scientific advances available, and enhance process efficiency and reduce risks and costs.
- Emphasize that although SHP is one of the country's oldest forms of renewable electricity, many actions and efforts remain critical to further the advancement of domestic hydropower as a key energy source of the future. These include continued technology development that lowers costs, and also include the availability of market mechanisms that consider the value of the grid reliability services, air quality and reduced emissions that SHP provides.
- Ensure that the content is succinct, easy to read, free from jargon and stimulates curiosity or action.

C. Engage with the media

- Press releases: Ensure that press releases have news value. The press releases vary according to the target media.
- Media interviews: (1) Be familiar with the typical structure of media interviews. (2) Increase the impact of the announcement by inviting senior members of the SHP sector.
- Communication with journalists: Establish close contact with magazine journalists. They are very important in conveying and contextualizing the information of stakeholders and usually have very tight working hours. For print media, the deadline is usually a few days or weeks before publication.

6.5.4. Expected results

- Clearer communication objectives and processes: The service sets clearer communication objectives and processes to ensure that the reports or articles released by the media introduce a new SHP vision and highlight future pathways for SHP.
- More customized content: The content is more customized according to the requirements of the media platform. Link the content to be released with other thematic activities, such as publicity activities, anniversaries and national activities.

6.6. Module 6 Service 6: Documenting key project milestones to promote SHP globally

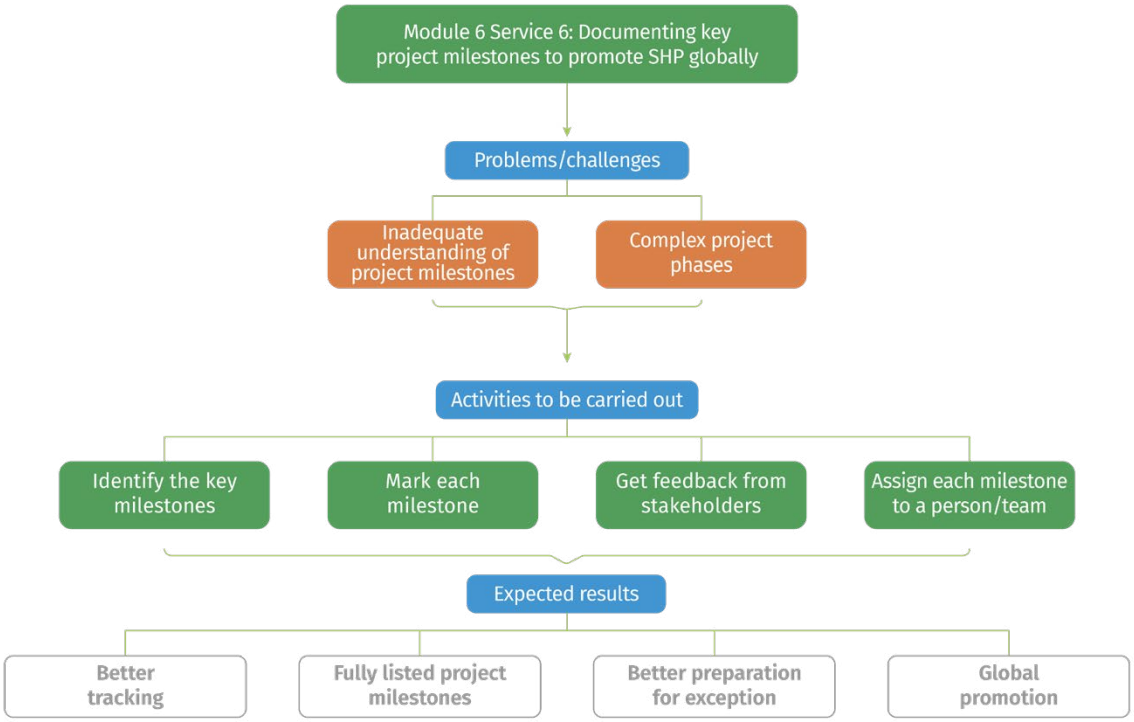


Figure 6.6. Overview of Module 6 Service 6: Documenting key project milestones to promote SHP globally

6.6.1. Introduction

- Milestones are like road signs leading the SHP plan towards its destination. Project milestones outline the project road map, which is the components of the larger picture of the project. They can help break down the project into smaller parts so that the participants or the developers know what tasks need to be completed and when to complete them. Unlike deadlines and goals, project milestones can refer to smaller, more specific tasks.
- The applicability of this service is established to document key project milestones to promote SHP globally. The service applies to discussing the real purpose and function of project milestones, when to plan and track them, and how to define major and minor milestones.

6.6.2. Problems/challenges and possible solutions

- Inadequate understanding of project milestones: Inadequate understanding of the key differences between project milestones and goals or project milestones and schedules negatively affects SHP progress.
  - ➢ Possible solutions: Milestones are checkpoints on the journey to achieve a project's goal. On the other hand, goals represent the overall picture of the objectives that the stakeholders wish

to achieve with the project, and the project schedule includes all the activities that need to be executed to complete a project. Module 6 Service 6 will provide essential management tools that help to track, manage, and complete an SHP project successfully.

- Complex project phases: Some complex project phases are difficult to be managed.
  - ➢ Possible solutions: Module 6 Service 6 will break off project phases into manageable parts that are easier to plan, schedule, and execute. The service will use milestones in project management as a reference point to indicate a significant event or decision point within a project. As a scheduling tool, the service will apply project milestones to delineate different points in a project schedule such as the start and finish of a project or a major phase in the project.

6.6.3. Activities to be carried out

A. Identify key milestones

- Record the key milestones which mark important project phases. They are the main checkpoints on the way to successfully meet the project's schedule.
- Conveying the core values of SHP, and communicating with the public & civil society could also be some major milestones.

B. Mark each milestone

- Write out summaries for each key milestone, including a series of tasks and steps required for the completion of the project phase. These tasks can be further broken down with a detailed description of what each task entails. For example, the milestone of "When to communicate" could be broken into four parts: (1) Design Phase; (2) Before Implementation; (3) During Implementation; (4) Delivery and operation.
- Complex hydropower projects are broken down into smaller work batches, and clear plans are created for how to complete each project stage.

C. Get feedback from stakeholders

- Identify the stakeholders who are in total control of project execution. Their input, feedback, and approval of the milestones and project plan, which are crucial to the project's success, are recorded or monitored.

D. Assign each milestone to a person/team

- After implementing the feedback and getting the project milestones approved, the next step is to assign every milestone to the appropriate stakeholders. Assign a milestone to a specific team or an individual to see it through. The creative stage of SHP may be assigned to a design team, while the construction stage could be assigned to a technical team.
- Visualize project milestones to aid productivity and teamwork.

6.6.4. Expected results

- Better tracking: This service tracks the project to confirm that the project is moving forward as planned, especially when the team needs to make small process corrections along the way.
- Fully listed project milestones: This service issues a list of project milestones, including goals, decisions and achievements related to each milestone.
- Better preparation for exception: The service reports exceptional cases to the senior management; that is, when the service realizes that they cannot reach the milestone by the scheduled date or achieve the deliverables or goals of a certain project stage.
- Global promotion: This service marks the main progress points of the project and the smaller target points to promote SHP globally.

6.7. Module 6 Service 7: Encouraging participation in the global award initiative

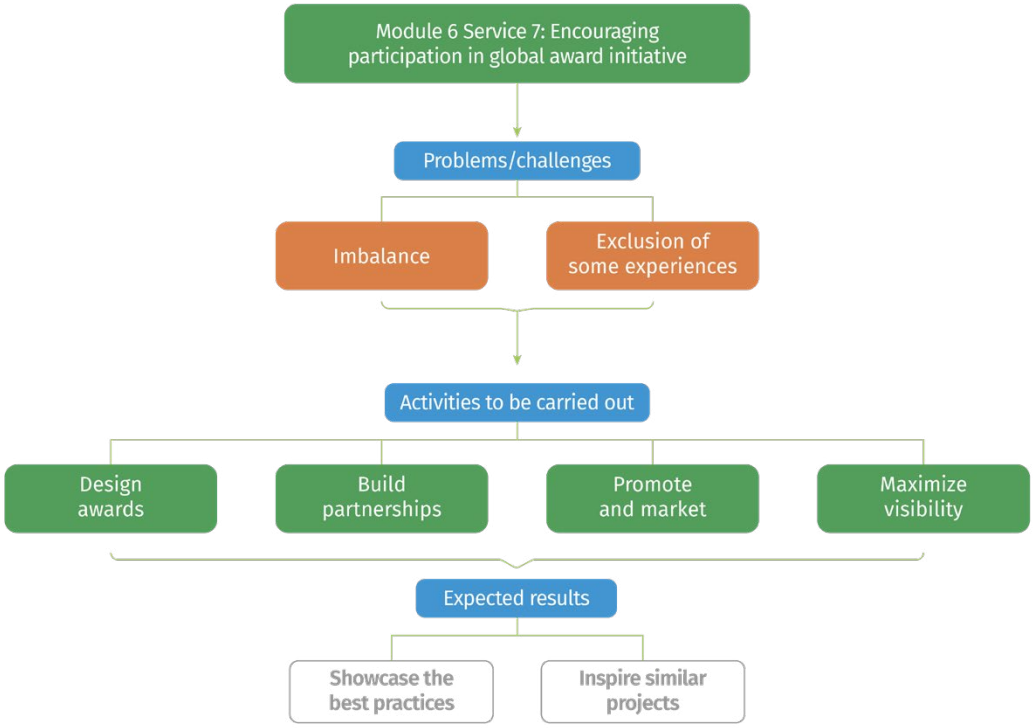


Figure 6.7. Overview of Module 6 Service 7: Encouraging participation in the global award initiative

6.7.1. Introduction

- Highlight the key benefits of participating in the initiative like international recognition, networking opportunities, exposure for funding, and useful knowledge exchange. This motivates SHP stakeholders to get involved.
- Design the initiative, criteria, process and awards to be as inclusive, accessible and equitable as possible for SHP stakeholders across different geographies, backgrounds and capacities. Make participation feasible for those with limited resources or experience but impactful work. This encourages diversity by reducing barriers.
- The applicability of this service is established to strengthen the green transition of energy use by participating in global or regional award initiatives and invisible solutions campaigns. The service recognizes and rewards exceptional community-centered small hydropower projects of all sizes. It also aims to promote accessible SHP technology for community benefit.

6.7.2. Problems/challenges and possible solutions

- Imbalance: Hydropower development has achieved great economic benefits in terms of economic development goals. However, it must be weighed against other sectors in the economic, environmental and social fields.

- Possible solutions: Module 6 Service 7 will reward and promote excellent SHP projects or talents globally to achieve efficient and sustainable development.

- Exclusion of some experiences: Some countries may fail to include a variety of experiences which engage SHP staff in the sustainable development of communities.
  - Possible solutions: Module 6 Service 7 will launch the global award initiative which is intended to recognize outstanding community-engaged SHP experiences.

6.7.3. Activities to be carried out

A. Design awards

- Design different award categories, criteria, evaluation process, prizes etc. to recognize excellence across the small hydropower sector. Consider having separate regional and global awards. Incorporate feedback from key SHP stakeholders.

B. Build partnerships

- Forge partnerships with SHP networks, membership organizations, development agencies, sponsors and media platforms. Partners provide reach, expertise, funding and in-kind support. Assign roles and responsibilities through partnership agreements.

C. Promote and market

- Roll out a promotional campaign to raise awareness and interest in the initiative worldwide. Use social media, email marketing, videos, media engagement and live events. Build a user-friendly website as the primary source of information.

D. Maximize visibility

- After each award event, implement a publicity drive to announce winners, highlight key moments and maximize media exposure. Issue press releases and newsletters, encourage social media activity and get feature stories published to bring global visibility to award recipients and the overall initiative.

6.7.4. Expected results

- Showcase best practices: This service serves as a platform to showcase the best practices and success stories of SHP projects and raise awareness of the importance of SHP in meeting the growing demand for energy while reducing greenhouse gas emissions.
- Inspire similar projects: By recognizing and celebrating the achievements of those involved in the industry, the initiative inspires others to pursue similar projects and contribute to the sustainable development of their communities.

Module 6: Conclusion

- Module 6, based on Module 1, builds robust, long-lasting partnerships with significant partners, engaging with Module 4's matchmaking platforms for projects, developers, and financiers. Requestors do not need to take all of Module 6 services but can choose only some and mix and match with other modules.
- Module 6 will formulate SHP's national or regional communications and outreach strategy based on the findings of the previous modules. The promotion and advocacy are aimed at policymakers (politicians and government officials), the private sector leaders whose decisions affect people's lives and those whose opinions and actions affect decision makers (journalists and the media, development agencies, and large non-governmental organizations). Requestors do not need to take all of Module 6 services but can choose only some and mix and match with other modules.
- Module 6 will conduct stakeholder mapping for the engagement of various groups in SHP projects and develop promotional and advocacy materials for SHP projects. The module will also consider using case studies to promote SHP, solve development challenges and find powerful ways to produce case studies to showcase SHP success. By participating in global award initiatives and invisible solutions campaigns, the module will promote SHP globally and strengthens the green transition of energy use.

CONCLUSION

Conclusion

SHP is a reliable form of renewable energy, and it helps reduce greenhouse gas emissions that contribute to global warming. Furthermore, SHP has many positive impacts on local communities and environments. SHP projects provide reliable, safe and low-cost energy, which reduces financial pressure on those in need and helps create jobs.

For SHP to reach its highest potential, effective service and support is essential. The Service Package (SP) has been designed to create a comprehensive service system that supports governments, investors, owners, users, and the public in promoting a sustainable approach to SHP development. The SP has provided key resources such as training courses, engineering and consultancy services, feasibility studies, and much more. By offering access to this array of services, the package has enabled SHP developers or investors to pursue projects with more confidence.

The technical expertise and support provided by the SP has proven especially beneficial. Through the package, developers have been able to access valuable insights into different types of projects, from complex concepts to simpler implementations. This has enabled them to craft successful and cost-effective solutions, something that might have been more challenging before.

Furthermore, the SP has provided a platform to raise the standard of projects by connecting the developers with essential stakeholders such as policy makers, engineering companies, suppliers, banks and users. It has made the exchange of ideas, insights, and resources much easier, allowing developers to benefit from an improved level of support throughout the project's duration.

Each module of the SP has its specific functions. Module 1 (Assessment and Demand Analysis) serves as the basis for all other modules. It provides a national overview of the SHP development opportunities, evaluates the impact of SHP development on the energy system and suggests new policy applications. It also surveys social, economic and environmental demand in a given area and investigates social attitude towards SHP.

Under the guiding principles of the Module 1, Module 2 (Policy Support and Institutional Strengthening) creates an enabling environment to strengthen SHP sustainability and, as a result, improve long-term legal, financial and political positioning to carry out effective political advocacy actions by the stakeholders for the benefit of all. It also provides the workshops on international best practices. It focuses on the standardization and simplification of the facilities, technologies of efficiency improvement and system automation to form the commercial business.

The outcomes of Modules 1 and 2 could be strengthened by Module 3 (Capacity Building). Module 3 could assist countries or regions in the adoption of improved SHP technologies and conforming to the technical standards required by international markets. It is an ongoing process that involves continuous technical training.

While Module 3 focuses on technical guidelines (TGs) training, Module 4 (Scaling up Small Hydropower Projects) enhances the capacity of SHP developers in preparing bankable investment proposals and develops business models for upscaling SHP investment. It also emphasizes the support of youth business incubators in SHP and the wide use of hydropower in various sectors. Module 4 systematically explores the possibilities for industry application and strongly encourages youth and women to partake in the benefits of SHP development. Importantly, the establishment of a "matchmaking" platform enables smooth coordination and collaboration between different sectors.

The last two modules focus on financing and communication issues respectively. Module 5 (Financing and Investment De-risking) promotes financial support for SHP and screens reliable investments for SHP. It strengthens risk management to increase the probability and impact of positive events and decreases the probability and impact of negative events. Module 6 (Communication and Outreach) meets the communication and outreach needs during the implementation of SHP projects and all the SP modules. It explains the nature, purpose and progress of the projects to communities, organizations, agencies and the media, thereby helping the projects to obtain social support.

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