

IRENA Project Navigator

Regional Workshop on Accelerating Renewable Energy Investments in Southeast Asia

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Da Nang, Vietnam

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The challenge of RET project development



The IRENA Project Navigator



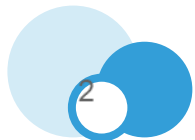
Technical Guidelines



Status and Outlook



Q&A





RE project development challenge



- Most countries know they have RE potentials. However, they lack the projects to achieve the desired deployment.



- Conditions inherent to certain countries/regions translate into high costs and financial risks, e.g. SIDS.

- Stakeholders involved in a project often lack the know-how to complete a bankable project proposal.

- This leads to higher project development costs and risks.



- Fund securement process and financing options themselves aren't transparent.

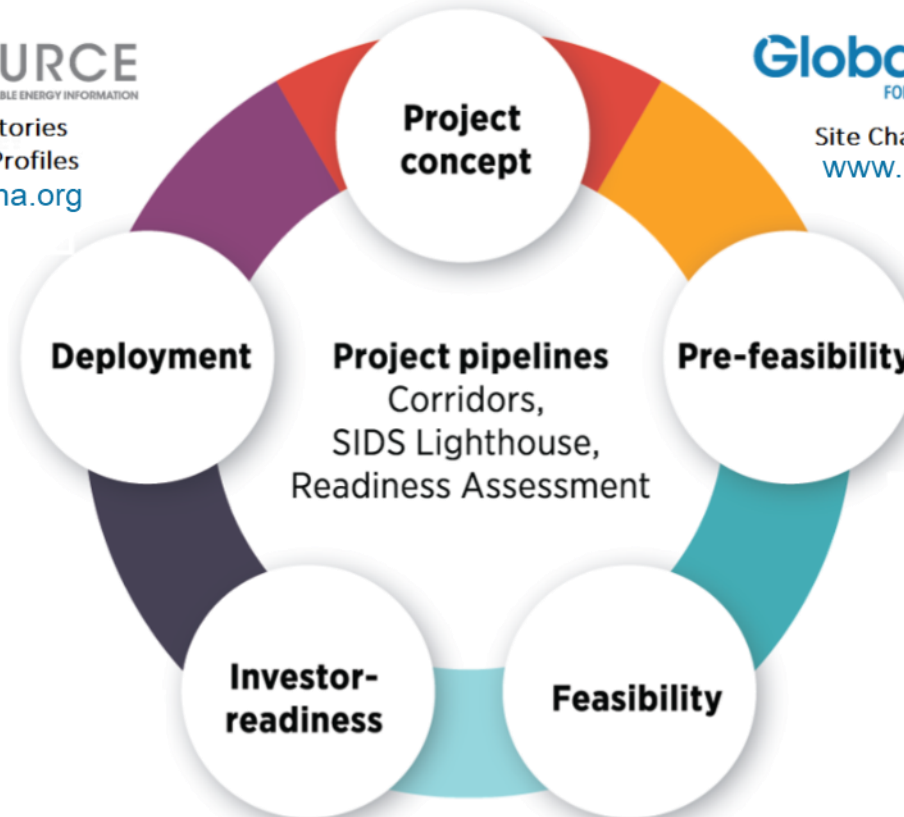
→ The IRENA Project Navigator aims to strengthen the project development base, enhance the quality of proposals and increase their bankability, attracting better financing conditions.

IRENA's project facilitation tools & platforms

RESOURCE
YOUR SOURCE FOR RENEWABLE ENERGY INFORMATION
Success Stories
Country Profiles
irenaresource.irena.org

Global Atlas
FOR RENEWABLE ENERGY
Site Characterisation
www.irena.org/globalatlas

IRENA ADFD
Supporting Energy Transition
Assistance to financial
closure and debt facility
www.irena.org/adfd



IRENA PROJECT NAVIGATOR
Bankable Project
Development Guidelines
www.irena.org/navigator

**SUSTAINABLE ENERGY
MARKETPLACE**

**OPEN SOLAR
CONTRACTS**

Evaluate, Technical Assistance
www.irena.org/marketplace



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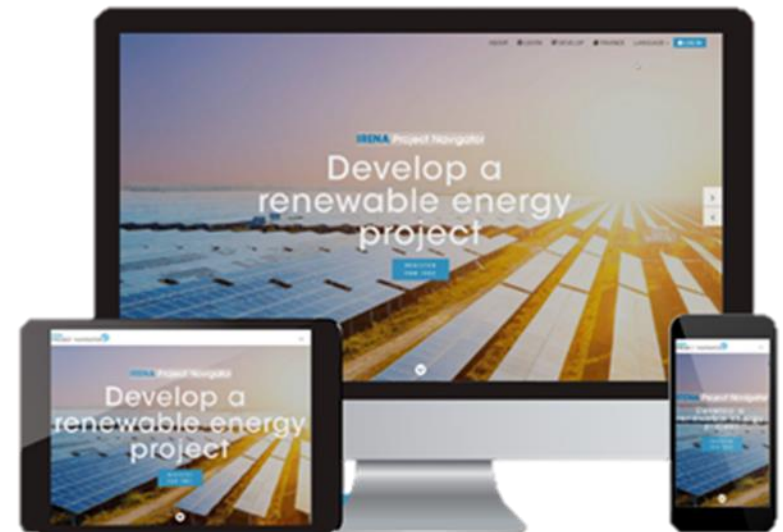
IRENA Project Navigator

Objectives

- » Increase the bankability of projects by:
 - » Strengthening the project development base
 - » Reducing costs and mitigating risks through proper planning and efficient use of funds
 - » Enhancing the quality of project proposals
 - » Facilitating effective implementation

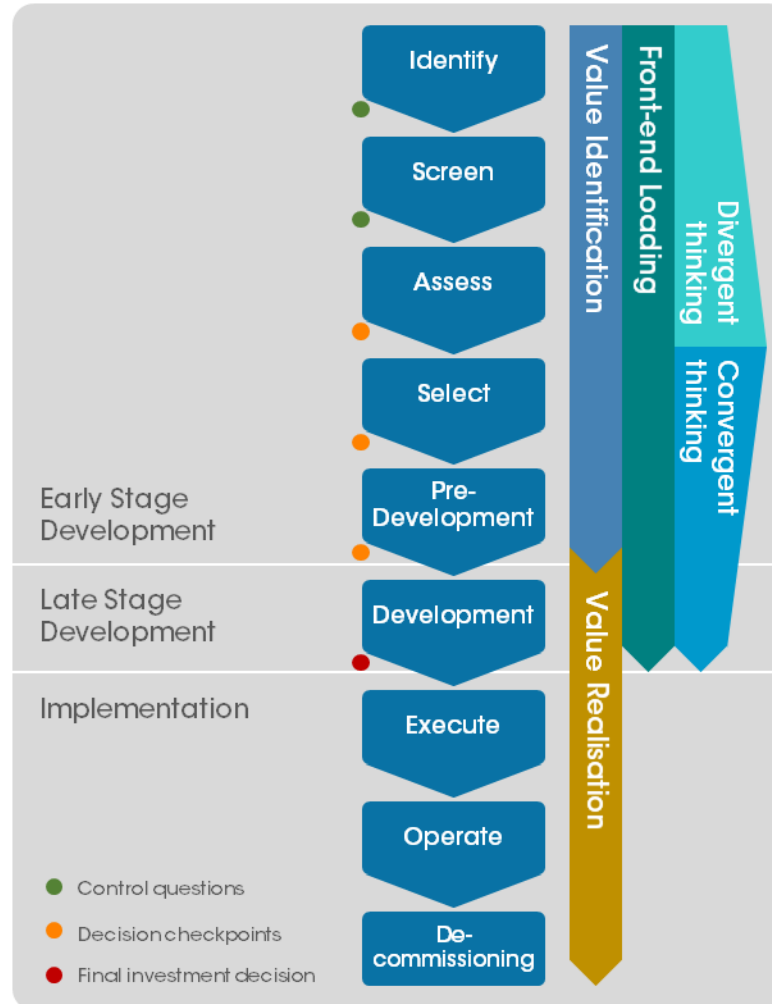
Scope

- » All RETs
- » Different finance types: grants, loans, equity
- » Project sizes: from individual use to utility scale projects
- » Global: all geographical regions





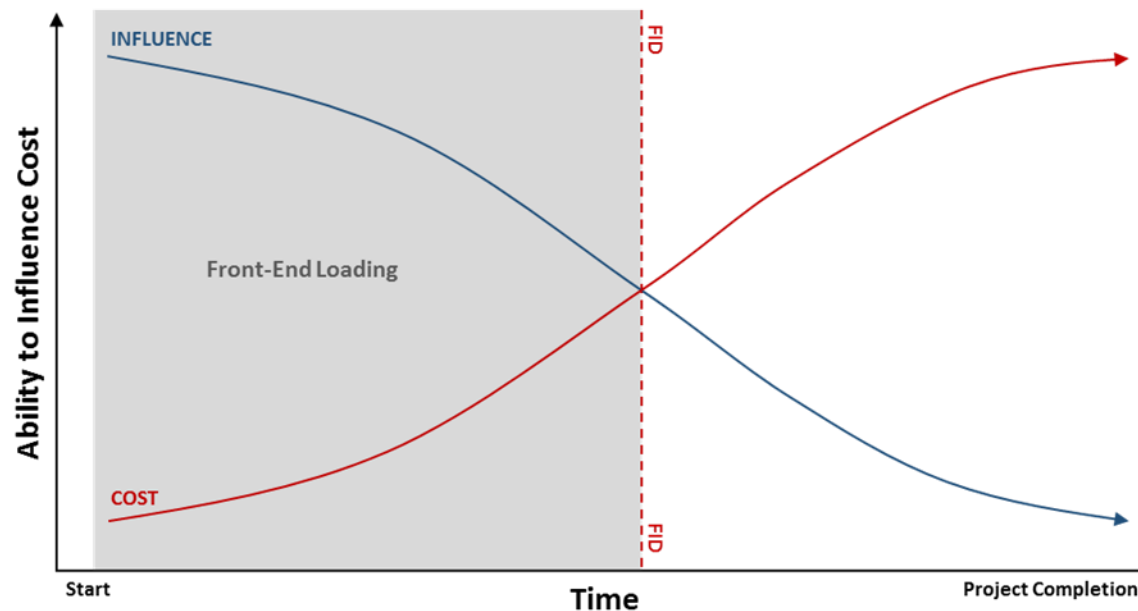
The project development process





Front-end loading

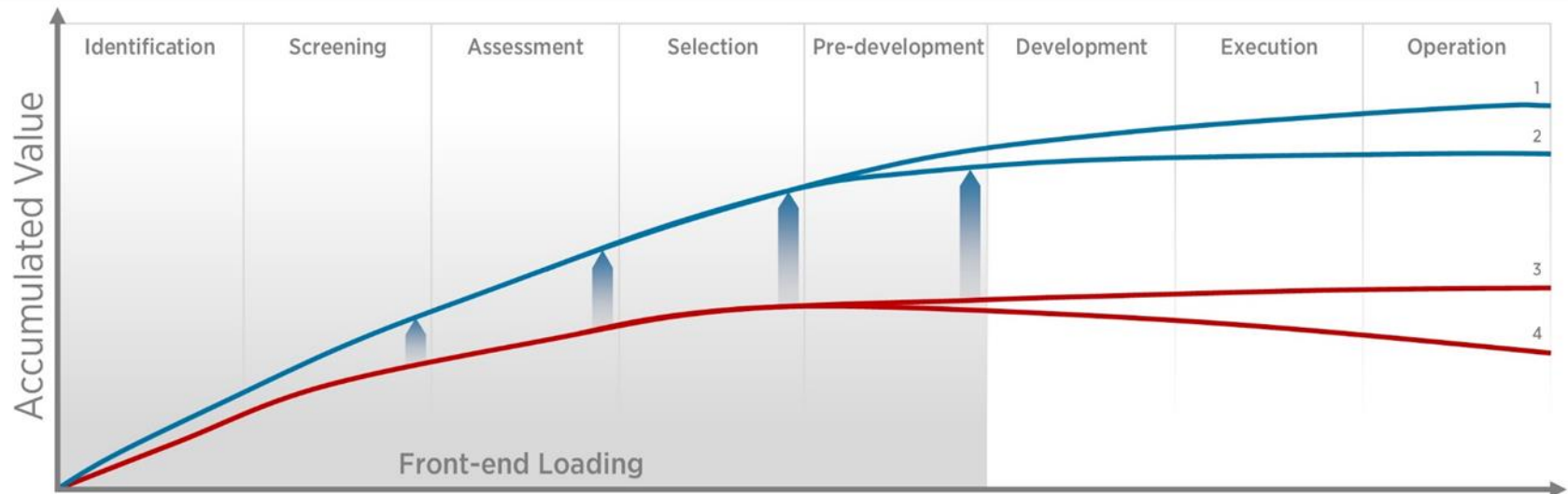
- Early stages of project development
 - Important decisions and large investments have not been made
 - Changes are easily made and are low cost
- Later stages
 - Decisions and investments have been made
 - Changes imply costs





Creating a valuable project

- If a **good project selection** is complemented by a **good execution** of the project, the increase in the value and the quality of a project will be substantial.



- | | |
|---|---|
| 1 Good project selection and good project development | 3 Poor Project selection and good project development |
| 2 Good project selection and poor project development | 4 Poor project selection and poor project development |



IRENA Project Navigator platform



Learning Section

- » Project development and technical guidelines
- » Best practices
- » Examples & Case Studies

Interactive Workspace

- » Personal and private workspace
- » Tools, templates, checklists
- » Stepwise approach
- » Track your progress
- » Export documents

Financial Navigator

- » Information on multiple funds
- » Filter by region and technology
- » Information includes fund types, requirements and contact details among others.



Feature #1: Learning section

Project development Guidelines

- » Clear project development process
- » Tools
- » Key Actions
- » Control questions and deliverables
- » Contract templates

Technical Concept Guidelines

- » Land and resource assessment
- » Technology selection and sizing
- » Contractual aspects
- » Lessons learned from previous projects

How others did it

- » Find examples
- » Case studies
- » Templates





Feature #2: Interactive workspace

#ProjectNavigator

Create your own workspace

- » Password protected workspace
- » Interactive tools
- » Store up to three projects

Follow a clear project development process

- » Clear objectives
- » Interactive tools
- » Control questions to ensure that nothing important has been overlooked

Track your progress

- » Store your data
- » Keep track of your project
- » Export and download reports

The screenshot shows the IRENA Project Navigator interface. At the top, there is a navigation bar with links for Home, Learning section, Start a project, Financial Navigator, My account, and Sign out. Below this is a red header for the 'Project Workspace'. The main content area is divided into two columns. The left column, titled 'My development progress', lists various tasks under different phases: Identification phase (Identification Checklist), Screening phase (SWOT Analysis, SCOPE Analysis, PRIMO-F Analysis, PEST/PESTLE Analysis), and Assessment phase. Each task has a 'Completed' status indicator (a yellow checkmark icon) and an 'Export' button. The right column, titled 'Project information', displays details for 'Project 1', including a short description, creation date (05 Sep 2014), region (Africa), and technology (Solar power). An 'Edit' button is located at the bottom right of this section.

Identification Questionnaire

I Stakeholder Analysis and Target Group Selection	
Who is involved?	Investors, government, manufacturers and suppliers, electricity buyers, local community and competitors.
Who has power/control over the benefits?	Investors, government, customers, community
What needs have to be met?	Environmental and legal frameworks, market price must cover production costs, quality of electricity supply.
Who are the direct recipients (directly affected target groups)?	Electricity buyers/consumers
Who are the ultimate beneficiaries (benefit from the long-term outcome)?	Government, local community
II Problem Analysis	
What is the core problem that the project should help to solve?	Limited electricity access.
What are its causes?	Insufficient grid infrastructure and geographic isolation.



Feature #3: Financial Navigator

Find a fund that suits your project

The Financial Navigator is a detailed database of funds that actively provide finance to renewable energy technology projects.

It increases the transparency of the funding process and helps project developers identify potential funding opportunities

The available information includes:

- » Geographical Coverage
- » Technological Coverage
- » Type of fund
- » Project Size
- » Funding requirements
- » Administrating organization
- » Contact details

Home > Financial Navigator > Funding details: Strategic Climate Fund (including Scaling Up Renewable Energy Program (SREP))

<p>General information</p> <p>Name of fund Strategic Climate Fund (including Scaling Up Renewable Energy Program (SREP))</p> <p>General description The Scaling Up Renewable Energy Program in Low Income Countries (SREP) is a targeted program of the Strategic Climate Fund (SCF), which is one of two funds within the framework of the Climate Investment Funds (CIF). The SREP was established to scale up the deployment of renewable energy solutions and expand renewables markets in the world's poorest countries. It aims to pilot and demonstrate the economic, social, and environmental viability of low carbon development pathways.</p> <p>Geographical coverage </p> <p>Details on geographical coverage -</p> <p>Technology coverage <input checked="" type="radio"/> Solar power <input type="radio"/> Wind power <input type="radio"/> Biomass <input type="radio"/> Geothermal power <input type="radio"/> Hydropower </p> <p>Details on technology coverage Solar, wind, bio-energy, geothermal, and small hydro technologies (less than 10MW)</p> <p>Check annual report from November. Analysis of portfolio. In Africa: Liberia mini-grid technologies to be confirmed. Mali: mini hydro and solar. Kenya: Geothermal. WB was supposed to develop mini-grid. Wind in Ethiopia. Tanzania: geothermal.</p> <p>Technology agnostic.</p> <p>Type of fund This fund can only be accessed indirectly by project developers. SREP provides co-financing which is channeled</p>	<p>Core funding information</p> <p>Administering organisation(s) African Development Bank (AfDB)</p> <p>Funding organisation(s) Australia/Canada, Denmark/Switzerland, Germany/Spain, Japan/Korea, Netherlands/Sweden, Norway, United Kingdom and United States</p> <p>Link Website</p> <p>Total fund size (M USD equivalent) 340</p> <p>Comments on total fund size Country allocations on average have been 15 M USD (envelopes) for African countries. For project preparation grants there are no caps under SREP. For example, Mali received 2.2 M USD for a feasibility study.</p> <p>Initial launch of the programme or fund 2008</p> <p>Contact See multilateral development bank</p>
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Size of grant
Around 20-50 M USD per country. Though funding is determined on a project level. (Usually 2-3 projects/country)



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Status and Outlook



Q&A



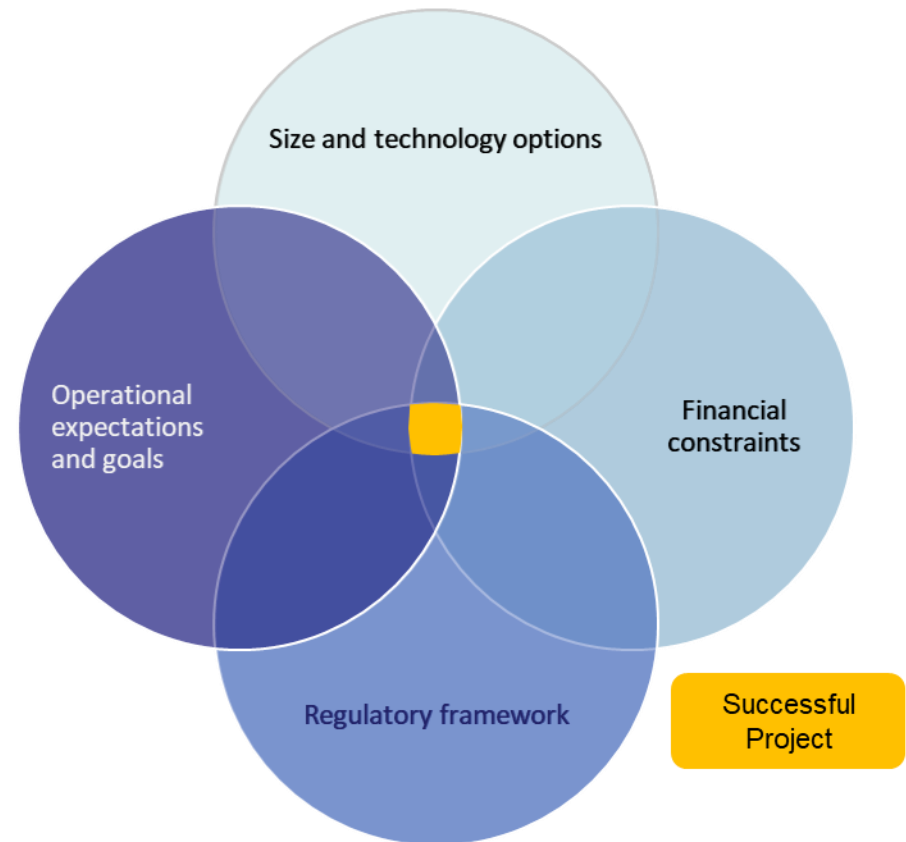
Technical Concept Guidelines

Scope

- Technology evaluation
- Technical Project planning and design
- Technical aspects for Financial closing
- Project execution and commissioning
- O&M

Main Features

- Minimum requirements for bankability of a project
- Comparison of possible options
- Case studies and tools
- Project Evaluation Model
- Lessons learned / Do's and Don't's from previous projects





Technical Concept Guidelines

Home > Learning section > Technical Concept Guidelines > Mini-Grids



Pre-development

Resources

- Home
- Introduction
- Overview
- ▶ Identification
- ▶ Screening
- ▶ Assessment
- ▶ Selection
- ▶ Pre-development
- ▶ Development
- ▶ Construction
- ▶ Operation & maintenance
- ▶ Decommissioning
- References

Preliminary economic and financial analysis

On this page

Key Performance Indicators	☰
Cost estimation	☰
Revenue streams	☰
Economic indicators	☰
Financial indicators	☰

Outline

Economic and financial analysis is based on a clear understanding of how cost estimates are made and how robust are contractual agreements to guarantee enough revenue streams during the project lifetime. This information should be laid down and documented in a business plan. This analysis is backed by a series of indicators that are of interest for different stakeholders.



Toolkit

- Project Brief Template
- Bankability Checklist
- Risk Assessment Tool
- Project Evaluation Model - Mini-Grids

Quick Access to Tools

Case study

- Mini-Grids - Case Study - India

Summary of activities

Links

- IRENA Inspire
- IRENA Global Atlas
- IRENA/ADFD Financing Facility

Menu and navigation



Early stage project development phases



- Identify potential project opportunities
- Screen options and discard unfeasible projects
- Perform a preliminary technical assessment
- Evaluate project options on qualitative and quantitative metrics, and their risks:
 - Operational aspects, financial metrics, revenue certainty, reliability, funding availability, etc.



Late stage project development phases



- Preparations for detailed design, financing and construction of the project:
 - Define suitable technologies.
 - Identify operational and site constraints.
 - Estimate preliminary costs and obtain technical specification sheets.
- Model performance based on historical and projected loads, yield estimates, tariffs and operational regulations.
- Finalize financial model and risk management plan
- Finalize contractual agreements and permits

Project implementation and operation



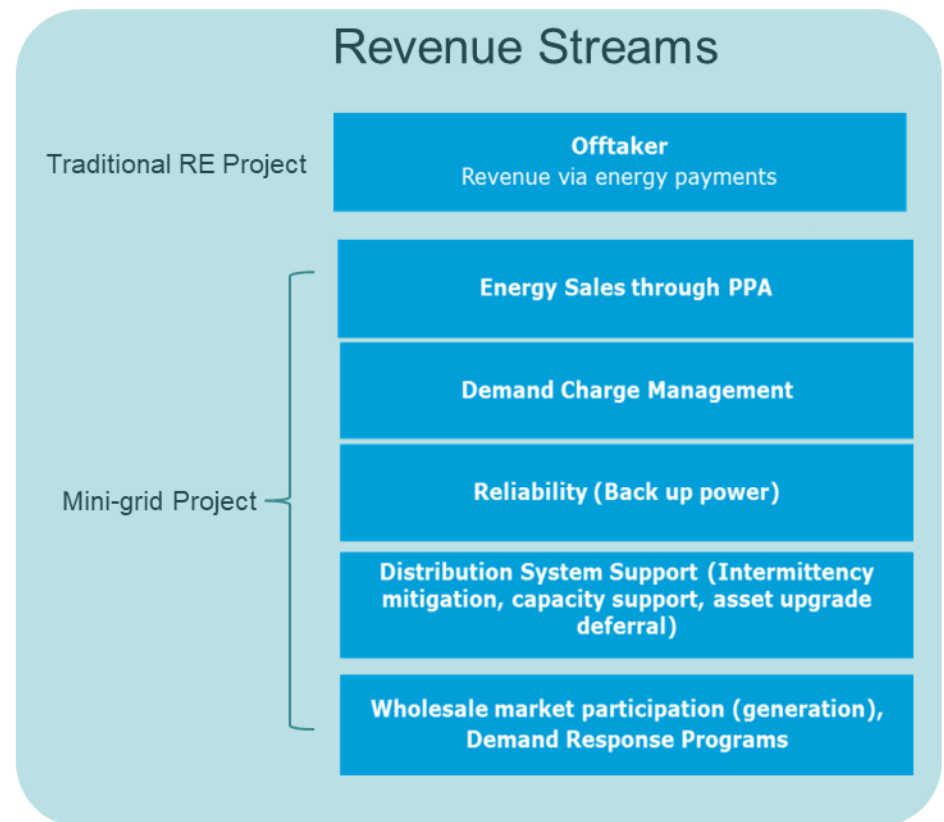
- Start construction of the project; ensure it is completed on time and on budget
- Testing and Commissioning
- Execute and audit O&M procedures to achieve contractual performance guarantees
- Refurbishing or decommissioning





Example: Bankability requirements for Mini-Grids

- ⦿ Revenue certainty
- ⦿ Conservative estimates:
 - ⦿ Fixed and variable expenses
 - ⦿ Revenues
- ⦿ Warranties and guarantees
- ⦿ Independent verification of assumptions



Project Evaluation Model



ECONOMIC ANALYSIS

Revenues (year 1)	Value	Unit
Electricity Distribution	2.42	\$m
Electricity Export	0.46	\$m
Heat sales	0.56	\$m
Total Annual revenues	3.45	\$m

Costs (year 1)	Value	Unit
Fixed OPEX	0.38	\$m
Variable OPEX	1.12	\$m
Fuel costs	0.49	\$m
Total Annual costs	1.98	\$m

Uses of funds	Value	Unit
CAPEX	10.80	\$m
Other CAPEX	-	\$m
Other Costs	-	\$m
Total Uses	10.80	\$m

Sources of funds	Value	Unit
Equity	3.24	\$m
Debt - Tranche A	3.78	\$m
Debt - Tranche B	3.78	\$m
Total Sources	10.80	\$m

PROJECT RETURNS

Economic returns	Value	Unit
Internal Rate of Return (IRR)	7.5%	
Net Present Value (NPV)	2	\$m
Payback time	15	Year(s)

Financial returns	Value	Acronym
Return on Equity	12%	ROE
Minimum Debt Service Coverage Ratio	1.17	DSCR
Minimum Loan Life Coverage Ratio	1.60	LLCR
Minimum Project Life Coverage Ratio	1.96	PLCR
Funding gap	-	\$m

Environmental indicators	Value	Unit
Average emission factor	0.225	g CO ₂ /kWh
Avoided emissions	105,971.58	t CO ₂
Subsidy cost of CO ₂ reduction	0.00	USD/t CO ₂

Risk Evaluation Matrices

IRENA Project Navigator - Technical Concept Guidelines for Mini-Grids



1 - Project Screening Tool

				Total Screening Score			
				Option 1	Option 2	Option 3	Option 4
				30%	34%	24%	33%
String & Logistics	Criteria	Guidance on criteria	Impact on Project	Score	Score	Score	Score
1.1	Land availability	How available and suitable is the real estate?	Real estate may not be available. Real estate suitable under single ownership is more ideal than multiple ownership.	Far	Far	Good	Far
1.2	Leasing/owning requirements	What is the complexity of the leasing/owning requirements?	Complex leasing or ownership requirements may have a negative impact on the project in terms of cost and scheduling.	Good	Excellent	Poor	Good
1.3	Distribution system infrastructure	What is the quality of the distribution system infrastructure (a non-existing distribution system would be graded "poor")?	Construction of distribution system may entail additional costs and planning requirements. 3rd party entry ownership and operation of the distribution system may require additional resources to be included in the project.	Excellent	Far	Poor	Far
1.4	Renewable production capability	What is the quality of the solar/wind production capability?	Environmental conditions may inhibit renewable production, or substantial investment is required to modify topographical or site conditions for renewable production. Production may be too low because of low solar irradiation or low wind production capability.	Far	Very Good	Far	Far
1.5	Fossil fuel access	How convenient is the access to fossil fuel reserves?	Substantial investment may be required for direct access to fossil fuel reserves.	Good	Excellent	Far	Very Good
1.6	Integration requirements	How simple are the integration requirements? No integration required gives the score "excellent".	Integration of generator, load and control resources can be complex and costly.	Good	Poor	Very Good	Very Good
1.7	Customer load suitability	Evaluate the combined quality of customer load requirement, base load, duration peaks, and coincidence with renewable production.	Customer load with huge seasonal variation, and with zero or no load for substantial part of the year will not result in viable project.	Far	Good	Far	Very Good
1.8	Site accessibility	Evaluate the site accessibility.	Site accessibility can determine the feasibility of the construction phase.	Good	Very Good	Far	Excellent
1.9	Labour availability	Evaluate the labour availability. Easy availability to skilled labour for O&M gives the score "excellent".	Unavailability of local labour may entail additional costing requirements.	Very Good	Far	Far	Very Good
1.10	Anchor customer availability	Evaluate the Anchor customer availability from a set of small customers ("poor") to a single large mini-grid customer ("excellent").	Contractual requirements and permissions from a single anchor customer may be less burdensome.	Poor	Very Good	Good	Poor

Economic & Financial	Criteria	Guidance on criteria	Impact on Project	-	-	-	-
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1 - Risk assessment

#	Project phase	Risk category	Risk description	Impact category	a) Initial risk assessment				b) Post-mitigation risk assessment			c) Risk mitigation effectiveness
					Likelihood	Impact severity	Risk rating (initial)	Proposed mitigation measures	Likelihood	Impact severity	Risk rating (post mitigation)	Risk mitigation effectiveness
2	1) Identification	Research	Having insufficient information. Site visit and desk study do not provide enough information (on expected temperatures and subsurface permeability) for having confidence in the presence of a geothermal resource.	Financial	Likely	Severe	High		Unlikely	Significant	Medium	Effective
2	1) Identification	Construction	Working area is not appropriate. An appropriate working area cannot be selected, because other activities on site are blocking an eventual concession-right for the geothermal project.	Financial	Certain	Significant	High		Likely	Significant	High	Not effective
3	1) Identification	Market	No financial possibilities. No financing possibilities found, for the geothermal development in the area.	Financial	Rare	Moderate	Low		Rare	Minor	Low	Not effective
4	1) Identification	Organisational	Political and regulatory instruments have not been identified yet. Political and regulatory instruments have not been identified yet and e.g. geothermal friendly policies have not been found.	Financial	Unlikely	Significant	Medium		Likely	Significant	High	Detrimental
5	2) Screening	Organisational	Stakeholders are not properly known.	Financial	Unlikely	Significant	Medium		Unlikely	Minor	Low	Effective
6	2) Screening	Social	No public acceptance. The issue of public acceptance has not been addressed.	Financial	Unlikely	Moderate	Medium		Unlikely	Minor	Low	Effective
7	2) Screening	Contracts and agreements	Missing surface exploration permit. A surface exploration permit has not been assigned for phase 3 assessment.	Financial	Unlikely	Moderate	Medium		Unlikely	Minor	Low	Effective
8	2) Screening	Contracts and agreements	Incomplete identification of concession rights and licence issues.	Financial	Likely	Moderate	Medium		Likely	Moderate	Medium	Not effective

Toolkit: Case studies

Inappropriate drainage system and enhanced erosion



Mounting structure issues



Site in Central Italy

- › Mounting structure problems especially in steeply sloped zones: poles, connection plates, washers, module clamps, module positions; improperly attached modules affect manufacturer warranties



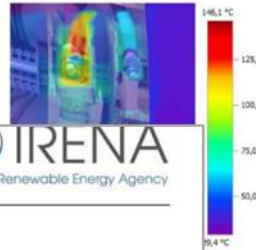
Plant installation in flooding region



Infrared (IR) thermographic measurement



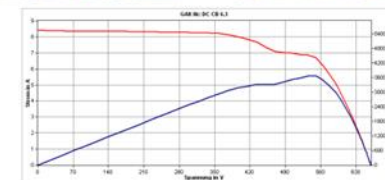
DC combiner box



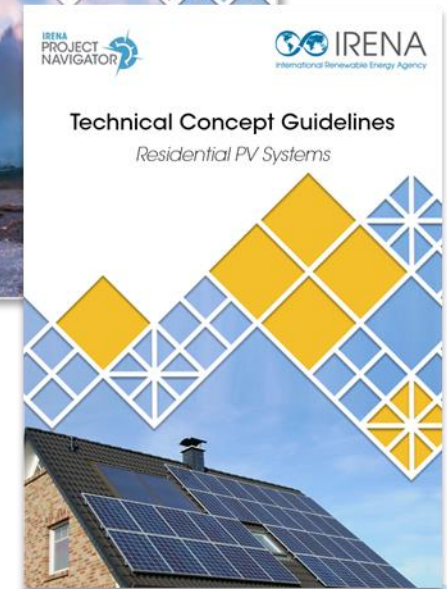
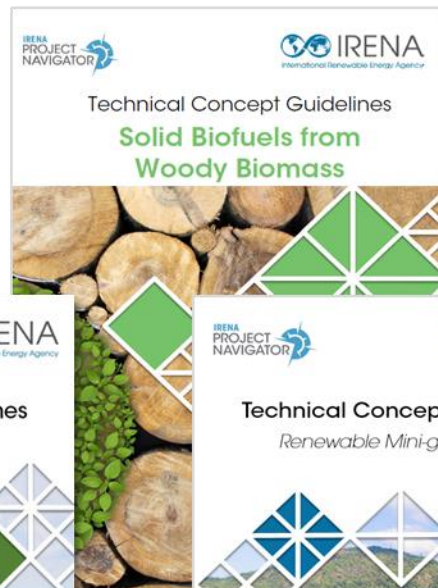
Bad connections can lead to fires, injuries and energy losses



Electrical fault detection by IV-curve measurement



Technical Concept Guidelines





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The Project Navigator in numbers



6 000+ users
registered on the platform



1 000+ developers
trained in workshops



3 000 people
reached through webinars



users from
190+ countries



2 000+ projects
created on the platform



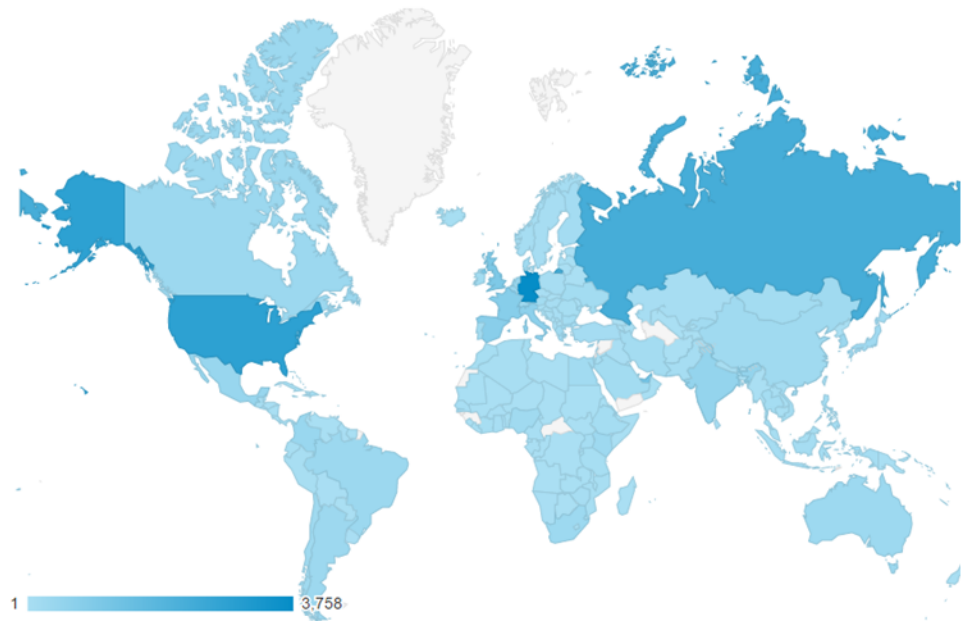
9 Technologies
and a SIDS module



Project Navigator platform development

Content

- » Online Technical Concept Guidelines:
 - » Onshore Wind
 - » Utility-scale PV
 - » Residential PV
 - » Bioenergy (Woody Biomass)
 - » Mini-grid applications
 - » Small Hydro
 - » Geothermal Power



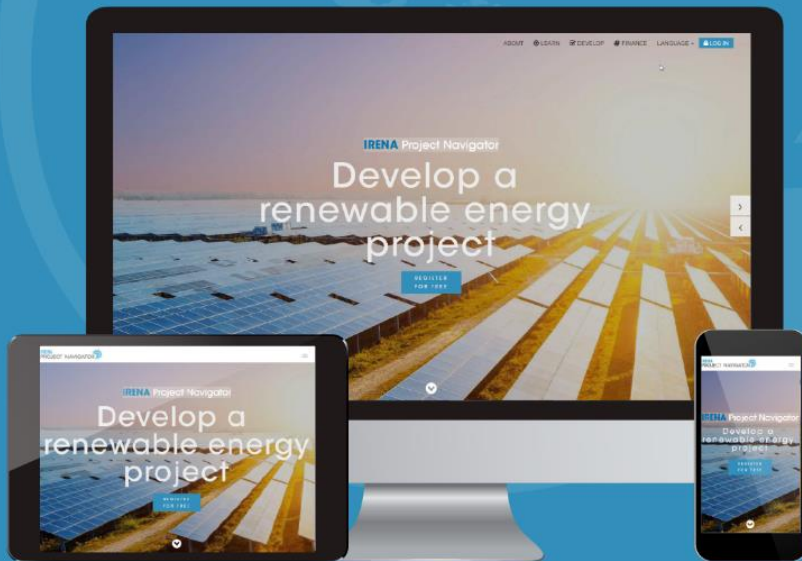
Capacity building

- » **Outreach activities including Workshops & Webinars in cooperation with member countries**
- » Case studies with member countries

IRENA PROJECT NAVIGATOR



Access practical information, tools and guidance for the development of bankable renewable energy projects



-  A **learning section** with easy-to-access knowledge materials
-  An **interactive workspace** to develop projects and track progress
-  An **online search engine** to find renewable energy funding sources



Obtain project development guidance with 50+ tools for:



Utility-scale
Solar PV



Onshore
Wind



Woody
Biomass



Mini/
Microgrids



Geothermal
Power



Solar Home
Systems



Small
Hydropower

www.irena.org/navigator



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Questions?

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Contact us: navigator@irena.org



IRENA

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**IRENA Project
Navigator**
Supporting
renewable project
development
worldwide



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