IRENA PROJECT NAVIGATOR

IRENA
International Renewable Energy Agency

#ProjectNavigator

Understanding bankability requirements for geothermal power projects with the IRENA Project Navigator

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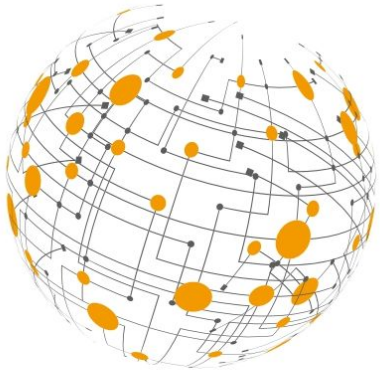
Introduction

Project development challenges

Bankability requirements

Global Geothermal Alliance

The platform for dialogue, cooperation and coordinated action between the geothermal industry, policy makers and stakeholders worldwide.



GLOBAL GEOTHERMAL ALLIANCE

Foster an enabling environment to attract investments in geothermal power generation

IRENA Project Navigator

Online platform featuring guidance, checklists, tools & real-life case studies to develop renewable energy projects

Learning Section

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

Start a Project

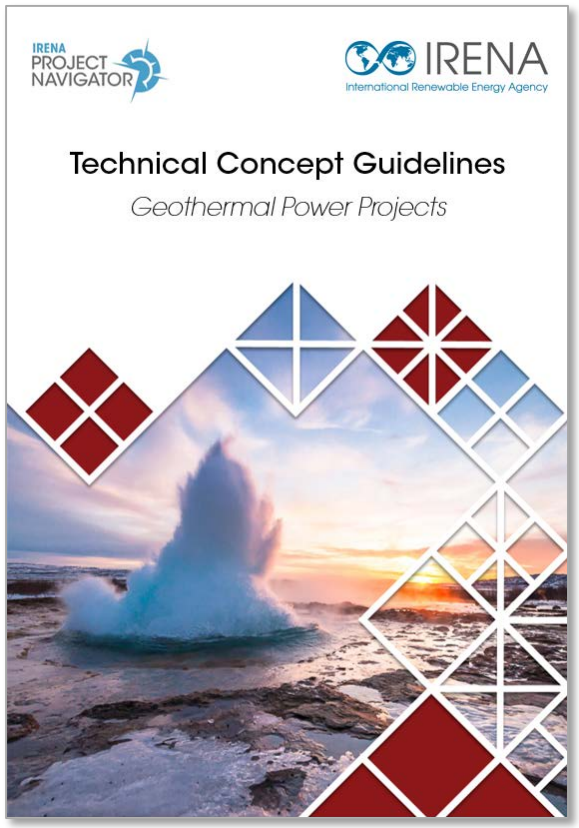
- Personal and private workspace
- Tools, templates, checklists
- Stepwise approach
- Track your progress
- Export documents

Financial Navigator

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

Project Navigator Geothermal module

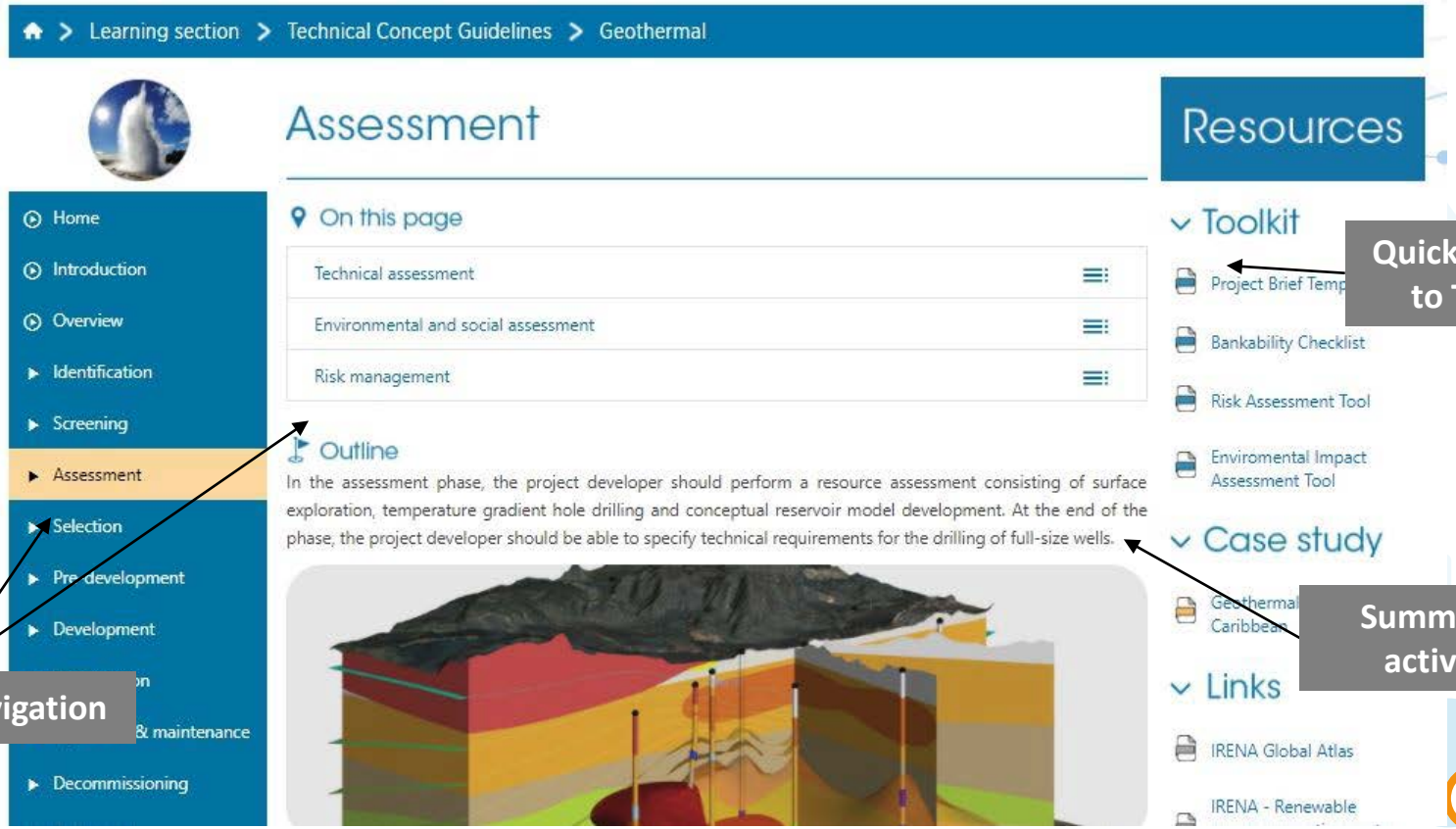
Online project facilitation tool available to understand how to enhance the bankability of geothermal power projects



- **State-of-the-art project guidance developed by IRENA with industry experts**
- **Scope**
  - Project planning
  - Technical feasibility
  - Economic & Financial indicators
  - Bankability requirements
- **Main features**
  - 9 progressive development phases with systematic guidance on activities and deliverables
  - Project documents, templates, case studies and analytical tools
  - Project evaluation model (excel)

Geothermal technical concept guidelines

Access online guidelines at no cost to improve the quality of your project proposals with the [IRENA Project Navigator]



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Geothermal project development

Renewable energy projects that rely on access to Earth's natural heat to pump hot water or steam up from deep wells

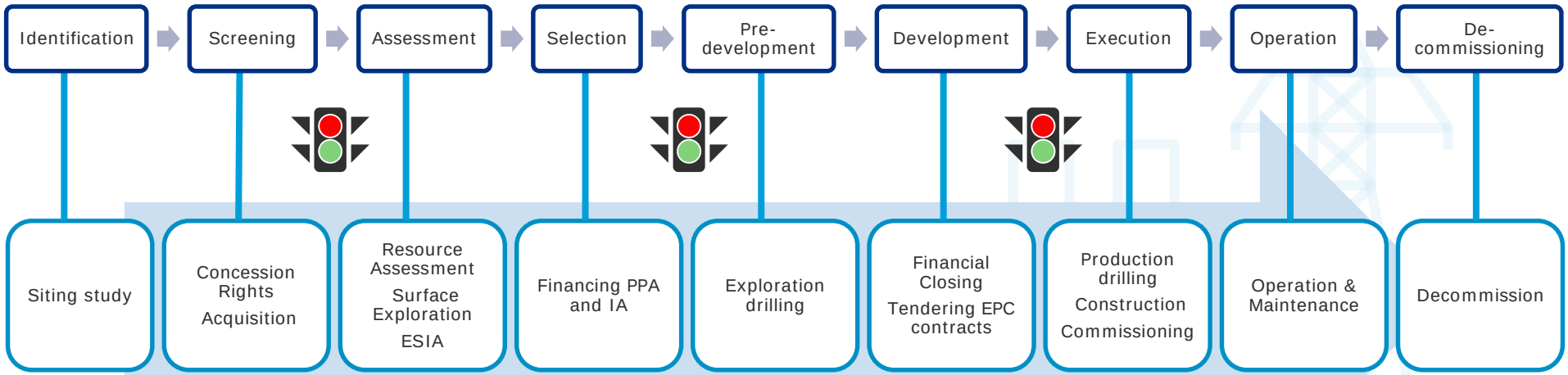
Geothermal strengths:

- **Baseload electricity with high capacity factors**
- **System flexibility and ancillary services**
- **Lower lifecycle greenhouse gas emissions**
- **Lower running costs**

Excellent system value to balance variable renewable sources such as Solar or Wind.

Geothermal project phasing

A bankable geothermal project has decision checkpoints where a developer evaluates whether the project is ready to proceed to the next development phase.



Systematic planning can help avoid pitfalls that jeopardize project success potential

Geothermal project scheduling

Experience indicates that the time required just for a typical geothermal power project development is around six years.

Project phase	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	x	year x+1
1 Identification										
2 Screening										
3 Assessment										
4 Selection										
5 Pre-development										
6 Development										
7 Execution										
8 Operation										
9 Decommisioning										

Developer to evaluate lead time until actual construction begins (critical path)

Geothermal: Reconnaissance and licensing

Identification | **Screening** | Assessment | Selection | Pre-development | Development | Construction | Operations | Decommissioning

Data gathering to verify the existence of geothermal resources and determine of the feasibility of the project at a given location

- Identify potential market for geothermal energy and potential stakeholders
- Screen options, discard unfeasible projects, estimate the ideal project location
- Obtain necessary permits for surface exploration

Geothermal: Surface exploration

Identification | Screening | **Assessment** | **Selection** | Pre-development | Development | Construction | Operations | Decommissioning

Preparatory work to specify resource assessment activities and inform the decision to invest in exploration drillings

- Perform surface exploration
- Develop conceptual reservoir model
- Perform ESIA
- Advance pre-feasibility analysis
- Finalize permits for exploration drilling
- Secure financing means for exploration drilling

Geothermal: Exploration drilling

Identification | Screening | Assessment | Selection | **Pre-development** | **Development** | Construction | Operations | Decommissioning

Detailed engineering activities to prove the presence of a geothermal resource and build the case to invest in a power plant

- Perform exploration drilling
- Prove the presence of the geothermal resource
- Finalize financial model, risk management plan, and contracts and permits
- Draft business plan for financial close

Geothermal: Construction & Operations

Identification | Screening | Assessment | Selection | Pre-development | Development | **Construction** | **Operations** | **Decommissioning**

Management of contractual performance targets and optimization of production & injection wells

- Drilling of production & injection wells
- Power block construction
- Plant testing and commissioning
- Preventive & corrective maintenance protocols
- Decommissioning planning

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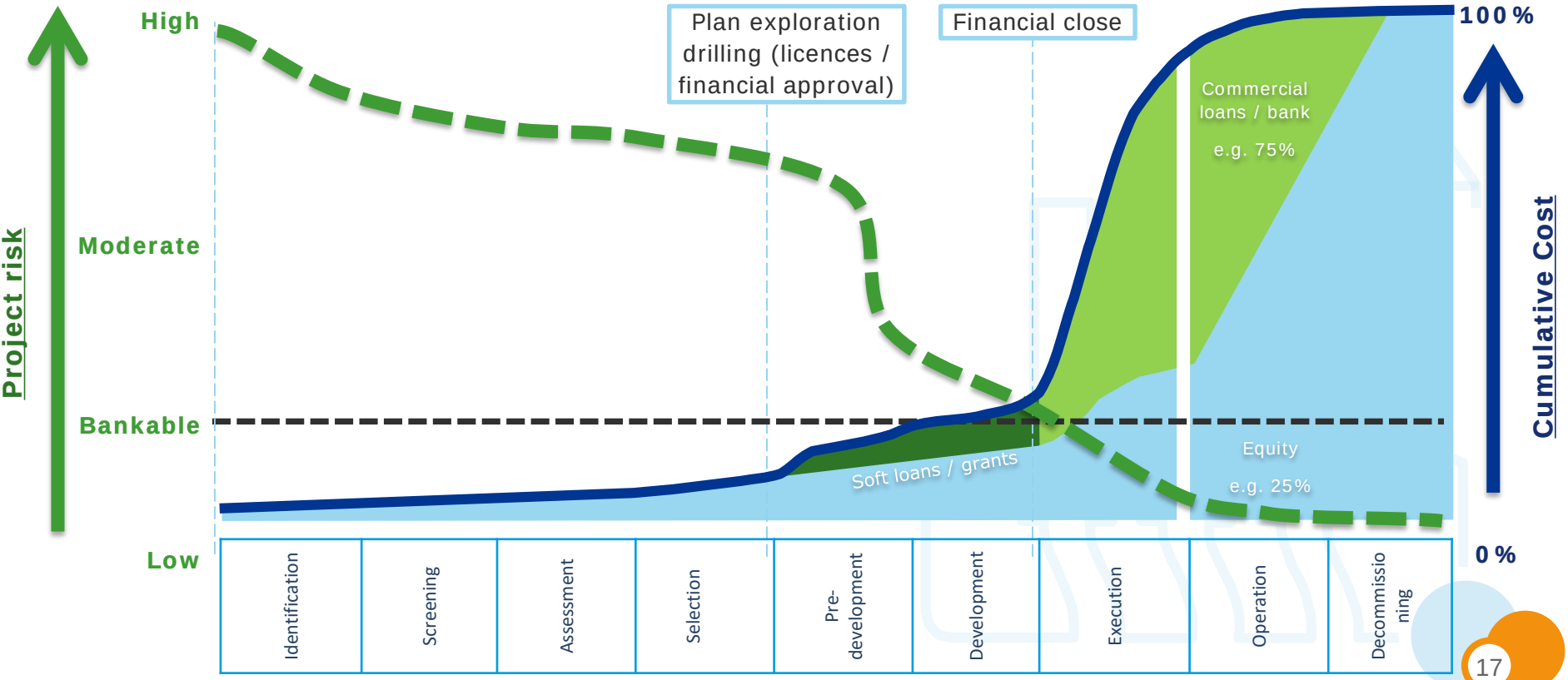
Geothermal: Bankability challenges

Developers should align expectations for risk allocation and project returns with those of investors and lenders

- Availability of a strong track record with successful references
- Contractors with appropriate financial strength and company size
- Low uncertainty over presence of suitable geothermal resources
- Controlled costs with no significant upfront capital pre-financing

Geothermal: Project risk management

Mitigating geothermal project risks to an acceptable level can be a long and complex process

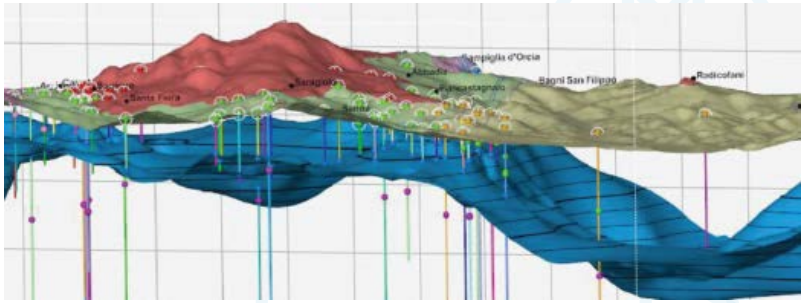


Geothermal: Bankability requirements (1/4)

Securing financing is often dependent on best-in-class project development & access to high-quality resource data

Bankability depends on the positive evaluation of 4 criteria:

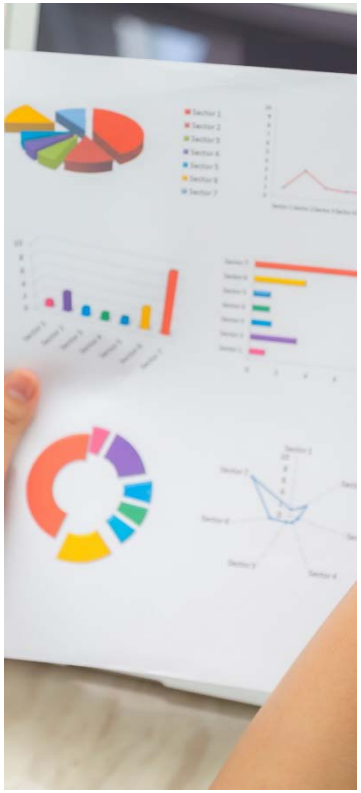
- Technical expertise
- Economic viability
- Credit worthiness
- Legal compliance



Lenders will rely on 3rd party evaluation.
Developers to be ready for due diligence

Geothermal: Bankability requirements (2/4)

A strong project documentation will provide confidence that requirements have been met to secure financing



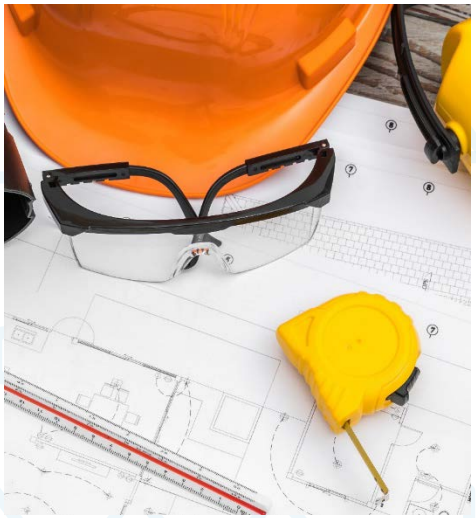
A project proposal has a better chance of being financed by equity/loans/grants when:

- **Strong feasibility study showing high probability of success;**
- **Financial model indicating adequate future cash flows;**
- **Superior risk mitigation plan where all risks have been identified in advance, mitigation measures implemented and risks allocated to appropriate parties**

Geothermal: Bankability requirements (3/4)

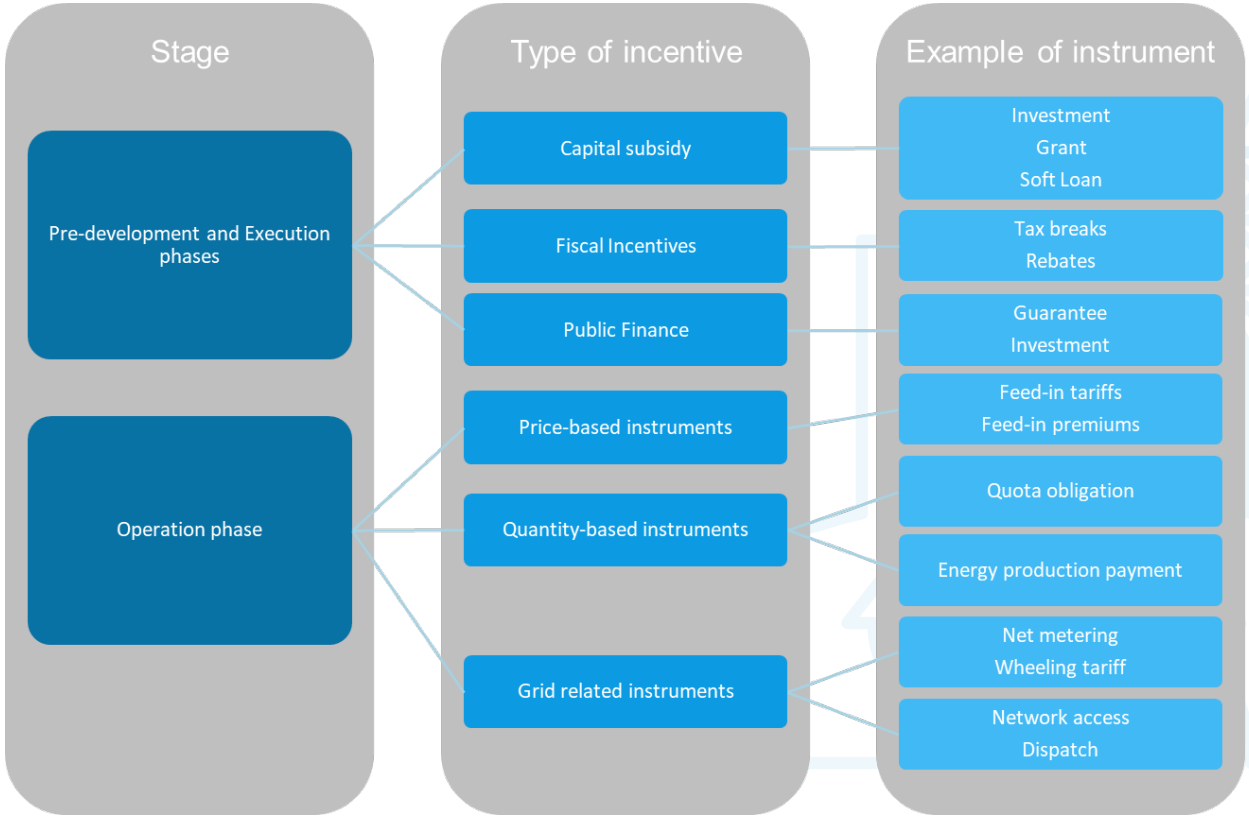
Securing favorable terms and conditions in contractual agreements are key to demonstrate a project's bankability

- ESIA and environmental permits
- Power Purchase Agreement (PPA)
- Engineering procurement and construction (EPC)
- Operation & Maintenance (O&M)
- Government guarantees



Geothermal: Bankability requirements (4/4)

Project developers should identify suitable financing instruments that can provide needed project financing



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Sign up for our free webinar on **Geothermal projects** In October 2017

Follow the link or flash the QR code

https://goo.gl/CKBTVb