Project management in deep geothermal projects: steps from first decision to the power plant

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Summary

1. Steps in planning and implementation of a geothermal project

2. Approval procedures
Steps in planning and implementation of a deep geothermal project
Project outline

Realization of a hydrothermal deposit

Phase
- Preliminary planning
  - Pre-feasibility study
  - Temperature & flow rate forecasts
  - Geological targeting & determination of drilling starting points
- Outline planning
  - Feasibility study
  - Seismic interpretation & structural modeling
- Detailed planning
  - Well design and well programming
  - Call for tenders
  - Evaluation of offers
  - Bidder meetings & awarding recommendation
- Tendering and award procedure for the GC
- Tendering and award procedure for the artificial lift
- Execution planning
  - Adjustment of the well design and the well program
  - Supervision of well stimulation and well tests
  - Call for tenders
  - Evaluation of offers
  - Bidder meetings & awarding recommendation
- Drilling operation
  - Drilling engineering supervision
  - Supervision of well stimulation and well tests
  - Hydraulic evaluation
  - Evaluation of offers
  - Bidder meetings & awarding recommendation
- Well stimulation & long term pumping test
- Supervision of well stimulation and well tests

Planning, Engineering, Consulting, Due Diligence

Permits and approval procedures
- Exploration
- Production

Cost management
- Cost estimation
- Cost calculation
- Cost determination
- Cost ascertainment & projection
- Cost statement & analysis

Risk management
- Exploration risk, contractor's all risk (CAR) & Lost in Hole (LH) insurance
- Warranty

Project management
- Coordination, leadership, organization, supervision, scheduling and documentation

min. 2-3 years
1. Pre-planning and design planning

- Preliminary planning
  - Pre-feasibility study
  - Feasibility study
  - Temperature & flow rate forecasts
- Outline planning
  - Reprocessing and/or seismic survey
  - Seismic interpretation & structural modelling
  - Hydraulic & thermal simulation
  - Geological targeting & determination of drilling starting points
  - Technical concept plan / Well proposal

Duration (netto): 4-6 months
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- Technical concept plan / Well proposal
2. Detailed planning, tendering and contracting procedure

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Duration (netto): 4-6 months

- Detailed planning
- Tendering and award procedure for the GC
  - Well design and well programming
  - Call for tenders
  - Well site planning
  - Evaluation of offers
  - Planning of well stimulation and well tests
  - Bidder meetings & awarding recommendation
3. Execution planning, drilling, testing

Duration (netto): 8-12 + 6 months
3. Execution planning, drilling, testing

- Execution planning
  - Adjustment of the well design and the well program
  - Adjustment of the well site planning
  - Adjustment of the well stimulation and well test planning
- Drilling operation
  - Drilling engineering supervision
  - Supervision well site geology
- Well stimulation & long term pumping test
  - Supervision of well stimulation and well tests
  - Hydraulic evaluation
  - Planning and supervision of long term pumping tests
  - Completion design

Duration (netto): 8-12 + 6 months
4. Definition of conveyor, plant operation

Duration (netto): 6 months and continuous support during operation
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Duration (netto): 6 months and continuous support during operation

- Tendering and award procedure for the artificial lift
  - Call for tenders
  - Evaluation of offers
  - Bidder meetings & awarding recommendation
- Assistance during plant operation
  - Supervision of the artificial lift installation
  - Reservoir characterization
  - Reservoir management
- Operating data analysis & optimization

Source: IECIP
Various aspects of a deep geothermal project
Legal framework and approval procedures
## Approval procedure in Bavaria

### Exploration phase

**Bavarian Ministry of Economic Affairs, Media, Energy and Technology**

**Mining Exploration and Prospecting License**
- Exploration permit
- Annual Reports, exploration tax

**Government of Upper Bavaria, South Bavarian State Mining Authority**

**Operations plan procedure**
- Statement on nuclear waste storage sites
- Preliminary environmental impact study
- (Management plan for geophysical campaigns)
- Framework management plan for drilling and drilling operations
- Specific Management plan for drilling works
- Management plan for pumping and long-term tests

**Water rights**
- Limited water rights permit for testing

### Production phase

**Bavarian Ministry of Economic Affairs, Media, Energy and Technology**

**Mining license (for 50 years)**
- Gewinnungsbewilligung inkl. Wärmebergbaumodell

**Government of Upper Bavaria, South Bavarian State Mining Authority**

**Operations plan procedure**
- Operation plan
- (if necessary, management plans for specific activities)
- Management plan for the recultivation of the drilling site

**Water rights**
- High water rights permit (25 years)
- Annual provision of operating data
- Evaluation of operating data every 5 years
Thank you for your attention!

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