



Financial requirements of Geothermal exploration drilling in RSM

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JV Partners



Engineering firm with hundred twenty years of experience in engineering - 10,000 employees

Fields of Expertise:

- Project management and economics
- Feasibility studies and strategic investigations
- Design
- Construction management
- Operations and maintenance



Geoscience firm with sixty years of experience in geothermal investigation – 75 employees

Fields of Expertise:

- Geothermal Exploration
- Drilling Consultancy
- Drilling Engineering
- Resource assessment
- Resource management
- Geothermal Training



Engineering firm with fifty years of experience in geothermal engineering - 300 employees

Fields of Expertise:


- Project Management
- Geothermal power plant engineering
- Power System Engineering
- District Heating



Geothermal Energy Resources of Turkey



Typical costs of geothermal power plant



| Cost item | Steam plant | Brine plant |
|---------------------------------------|-------------|-------------|
| Preparation | 2% | 2% |
| Exploration | 8% | 5% |
| Geothermal well field development | 50% | 44% |
| Power plant | 30% | 39% |
| Indirect cost | 10% | 10% |
| Total installation cost, USD/kW Gross | 3,650 | 5,300 |
| Temperature oC | 250 | 150 |
| Installed capacity, MW | 50 | 10 |

Source: HOW DO FINANCIAL ASPECTS OF GEOTHERMAL COMPARE WITH OTHER ENERGY SOURCES?
Carine Chatenay and Thorleikur Jóhannesson
Verkís



TWO RELEVANT ITEMS IN THE APPLICATION

Financial Requirements

5. A professionally prepared business plan showing how the geothermal energy will be utilized and geothermal resource energy requirements necessary to meet such plan.

7. The financials and governing documents of the legal entity that will be the Beneficiary of RSM funds as well as clarification of any liabilities facing the legal entity.



Business plan requirements

| Item | Requirement | Points |
|------|---|--------|
| 1 | Legal name, legal structure and ownership (including total registered / paid capital and share structure) of the existing business producing the geothermal energy | 7 |
| 2 | Financial statements (Balance Sheets as of December 31st; Profit and Loss Statements for the financial year) of the existing business over last 5 years (external Audit Reports must be provided, if available) | 20 |
| 3 | Proposed contractual arrangements under which geothermal energy will be sold to the existing business | 7 |
| 4 | Minimum technical requirements of the geothermal resource in order for the geothermal energy source to meet the minimum business plan requirements, namely basic technical information (estimates): enthalpy, flow (kg/s), well head (pressure) / drawdown, installed capacity of the plant (MW), production (kWh/year) | 13 |
| 5 | Letter of commitment from an authorized representative of the existing business identifying acceptance of the proposed contractual arrangements and any conditions precedent that must be met prior to the proposed agreement's effectiveness | 7 |
| 6 | A professionally prepared schedule identifying the activities necessary to develop the geothermal resource and to meet the requirements of the proposed energy agreement with the existing business | 13 |

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Business plan requirements

| Item | Requirement | Points |
|------|---|--------|
| 7 | Budget and cash flow projections (throughout the whole project life cycle on annual basis including all assumptions and parameters used as open-source EXCEL file) for the CAPEX, OPEX and Revenue Stream for the project starting with the exploration of the geothermal resource through operation of the field and sale of energy to the existing business: | |
| 7a | Preliminary Investment Cost Estimates (land acquisition, civil works, equipment, M & E works, engineering/design/consultancy) and Financing Plan (capital, equity, internally-generated funds) (replacements / reinvestments (especially for equipment / M&E) must also be taken into account) and Financing Plan (capital / loan / internally-generated funds) | 7 |
| 7b | NPV and IRR of the Investment Project (discount rate of opportunity cost of capital to be used in NPV calculations must be specified – e.g. 10% p.a. in real terms) | 7 |
| 7c | Pro-forma Profit (-Loss) Statements of the Investment Project | 6 |
| 7d | Pro-forma Cash Flow Statements of the Investment Project | 6 |
| 7e | Financial Performance Ratios of the Investment Project (profitability, liquidity, asset/debt management, debt service coverage) | 7 |

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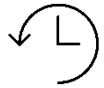
Business plan requirements

In addition, a short general description of the following items is requested:

1. Preliminary power plant description, indicating the type of power conversion technique to be used. The description needs to take into account the likely inlet temperature and pressure, cooling techniques, NCG capturing, injection strategy, and possible mitigating measures during production, if foreseen; or
2. Preliminary description of heating application or other direct use. This should include identification of the techniques and equipment that will be used to extract heat from the geothermal resource and supply it to the end user. Basic design parameters concerning the use of an open or closed loop system with reinjection must also be elaborated.



Illustration of payout and success fees



REIMBURSEMENT PROCESS

In case of an unsuccessful well, the RSM program will cover a pre-defined percentage of the actual acceptable well cost incurred by the license holder.



SUCCESS FEE

In case of a successful well when judged against the success criteria set forth in the Beneficiary Agreement, the Beneficiary shall be obligated to pay a 10% percent "Success Fee" of the actual acceptable well costs.



PAYOUT AND SUCCESS FEE

Details on the geographical coverage by number of wells

Payout scheme from the RSM

| Well number | Selected regions in Aydın, Denizli, Manisa | Other provinces |
|-------------|--|-----------------|
| 1 | 40% | 60% |
| 2 | 40% | 60% |
| 3 | 40% | 60% |
| 4 | 40% | 40% |
| 5 | 40% | 40% |

Success fee scheme from the RSM

| Well number | All provinces |
|-------------|---------------|
| 1 | 10% |
| 2 | 10% |
| 3 | 10% |
| 4 | 25% |
| 5 | 25% |

All three provinces, Manisa, Aydın and Denizli have only been partially covered with geothermal explorations. Therefore, projects in regions outside the already explored geothermal basin, will be considered to be covered by 60% for the first three wells in the drilling program, as elsewhere in Turkey.

- The four districts that qualify for 60% coverage in Manisa are Kula, Soma, Demirci, and Köprübaşı.
- The three districts that qualify for 60% coverage in Aydın are Çine, Bozdoğan and Karacasu.
- The six districts that qualify for 60% coverage in Denizli are Çivril, Kale, Beyağaç, Tavas, Çaneli, Acıpayam, Bekeilli, and Çardak.



OVERVIEW OF ALL POTENTIAL OUTCOMES OF THE RSM PROGRAM

2-5 well drilling programme

In total 28 possibilities were identified.

Within the table a successful well is labelled as (S) and an unsuccessful well as (U).

The red bars indicate that the RSM contract stops due to two unsuccessful wells.

| Case ID | Well 1 | Well 2 | Well 3 | Well 4 | Well 5 |
|---------|--|--------|--------|--------|--------|
| 1 | S | S | | | |
| 2 | S | U | | | |
| 3 | U | S | | | |
| 4 | U | U | | | |
| 5 | S | S | S | | |
| 6 | S | S | U | | |
| 7 | S | U | S | | |
| 8 | S | U | U | | |
| 9 | U | S | S | | |
| 10 | U | S | U | | |
| 11 | S | S | S | S | |
| 12 | S | S | S | U | |
| 13 | S | S | U | S | |
| 14 | S | S | U | U | |
| 15 | S | U | S | S | |
| 16 | S | U | S | U | |
| 17 | U | S | S | S | |
| 18 | U | S | S | U | |
| 19 | S | S | S | S | S |
| 20 | S | S | S | S | U |
| 21 | S | S | S | U | S |
| 22 | S | S | S | U | U |
| 23 | S | S | U | S | S |
| 24 | S | S | U | S | U |
| 25 | S | U | S | S | S |
| 26 | S | U | S | S | U |
| 27 | U | S | S | S | S |
| 28 | U | S | S | S | U |
| S | Successful well | | | | |
| U | Unsuccessful well | | | | |
| | RSM Contract stops due to two unsuccessful wells | | | | |



Project application timeline

Hold application workshop

- 1 day* (Calendar days)
- Thu 5 July 2018

Application period

- 57 days
- Fri 31 August 2018

Evaluation process and drafting of RSM agreements

- 49 days
- Fri 19 October 2018

Approval of list of selected beneficiaries and agreements

- 21 days
- Fri 9 November 2018

World Bank no- objection and Notification

- 14 days
- Fri 23 November 2018

Negotiations of Beneficiary Agreements

- 21 days
- Fri 14 December 2018

Approval and Signing of Beneficiary Agreements

- 21 days
- Fri 4 January 2019

Drill and test wells + submit reports and claims

- 300 days
- Thu 31 October 2019

Settlement and Closure

- 21 days
- Thu 21 November 2019



Thank you!

