



MRC
TURKEY



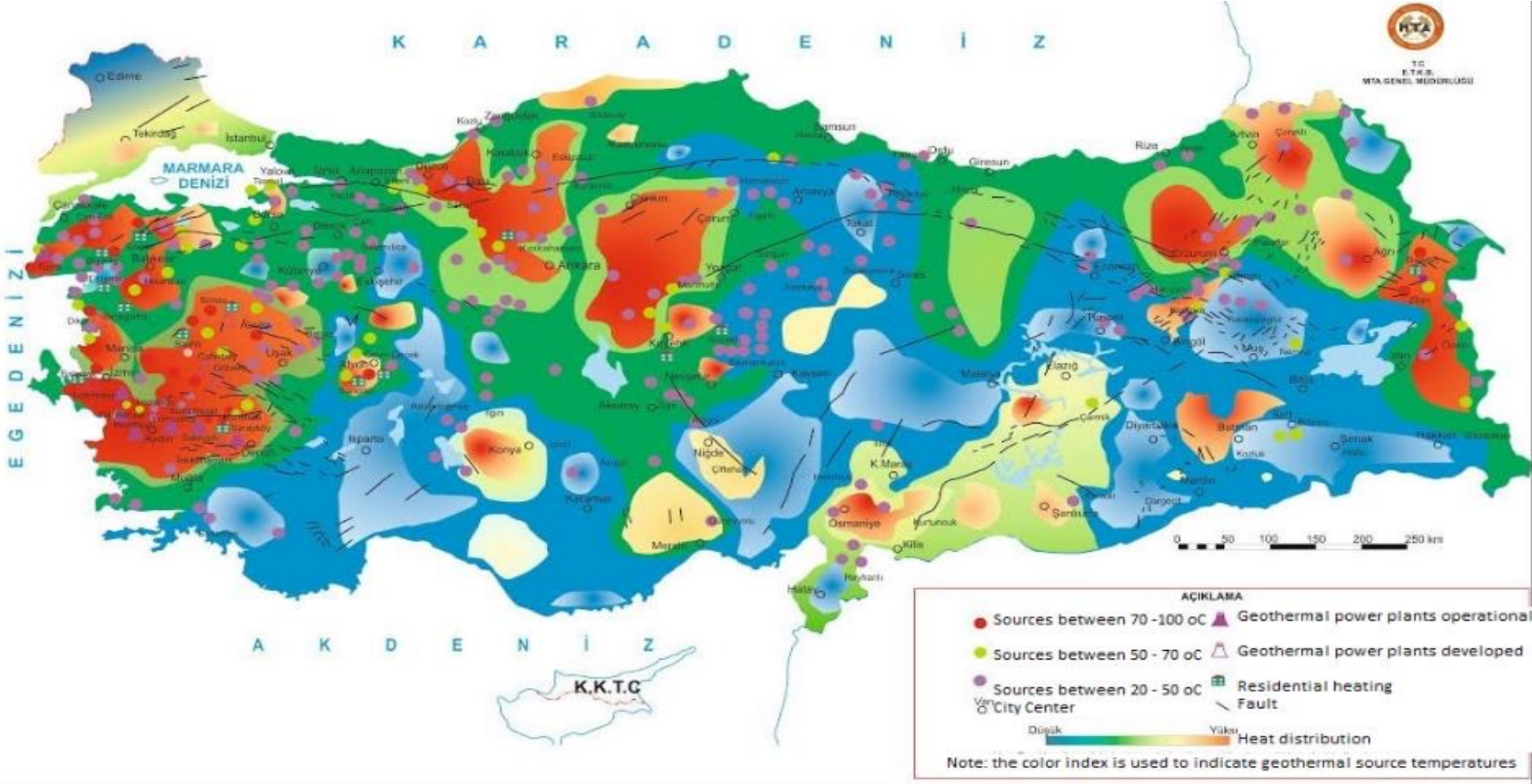
Financial requirements of Geothermal exploration drilling in RSM, link between success criteria and the business plan Launch of the call for Expression of Interest (EoI)

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Outline of the presentation

- Geothermal Energy Resources of Turkey
- Typical costs of geothermal power plant
- Financial Requirements
- Business Plan (BP)
- Determining success criteria
- Illustration of payout and success fees
- Details on the geographical coverage by number of wells
- 1-5 well drilling program
- Project application timeline

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

Financial Requirements

Business Plan:

1. The structure of the Beneficiary's consortium or Joint Venture
2. Feasibility of the drilling plan for direct use facilities or power plants
3. If any pre-feasibility study or socio-economic analysis are available, applicant should provide final reports



KEY DRIVERS OF THE

Business Plan

Estimated of the key data in the right table is requested from the Developer:

- Installed capacity of power plant or direct use facility
- Internal consumption
- Number of wells (under RSM, production and reinjection)
- Sales price of power or heat
- CAPEX and OPEX
- Results in terms of IRR and NPV

Indicator	Unit	Value
Total gross installed capacity aimed at	MWe or MWth	
Own consumption	MWe or MWth	
Annual duration of maximum power or heat	hour per year	
Number of wells under RSM	#	
Number of production wells	#	
Number of reinjection wells	#	
Average sales price year 1-10	USD/MWh	
Average sales price year 11-25	USD/MWh	
Estimated Drilling cost per well	USD	
Total capital cost of power plant or direct use facility	USD	
Total annual operating costs	USD per year	
Expected IRR	%	
Expected NPV (at 8% discount factor)	USD	

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.

Determining success criteria

Method for BP sensitivity:

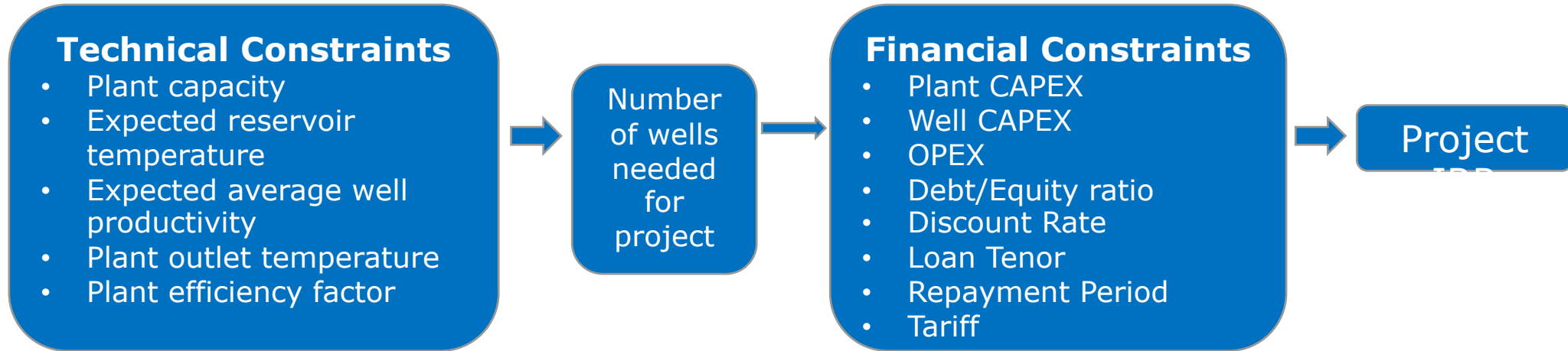
To determine success criterium, sensitivity analysis will be performed on BP in excel:

- Success criterium is expressed in **gross installed capacity** (in MWe or MWth)
- Derived by allowing for a number of **additional failed wells**, which will increase CAPEX of proposed project under which it remains **financially feasible**

Example of BP sensitivity:

Variables		
Number of Extra wells	#	2
Results		
IRR	%	8.19%
Installed capacity per well (gross)	MWe	1.43
Instructions		
Cells that can be changed in light yellow with blue text		0000000
Other cells should not be changed		

Key Input Parameters for Business Plan



Process for Defining Success Criteria

Business Plan Stress Test → Average Well Output Using Maximum Number of Wells at >8% IRR

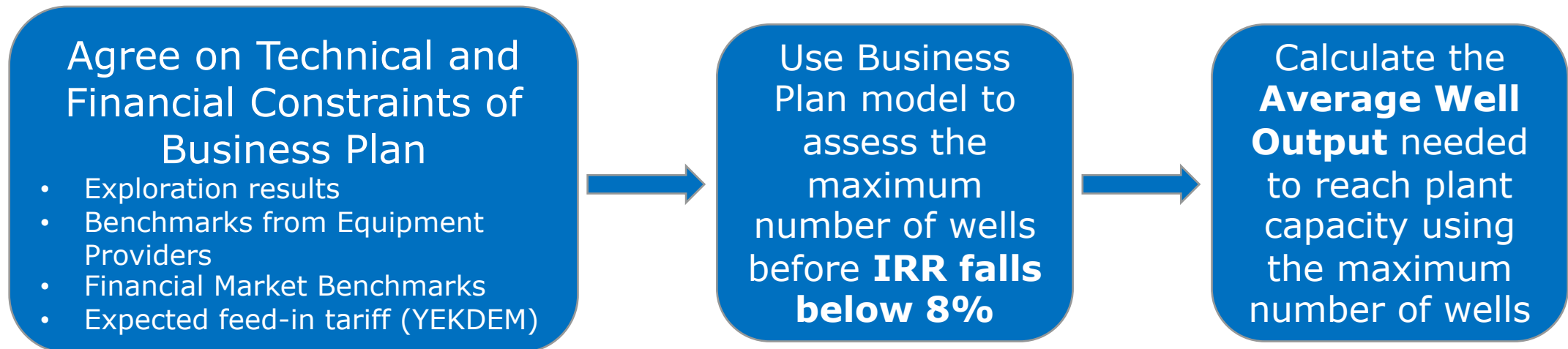


Illustration of payout and success fees



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 5% percent "Success Fee" of the actual acceptable well costs for the first three wells and 10% for the fourth and fifth well.



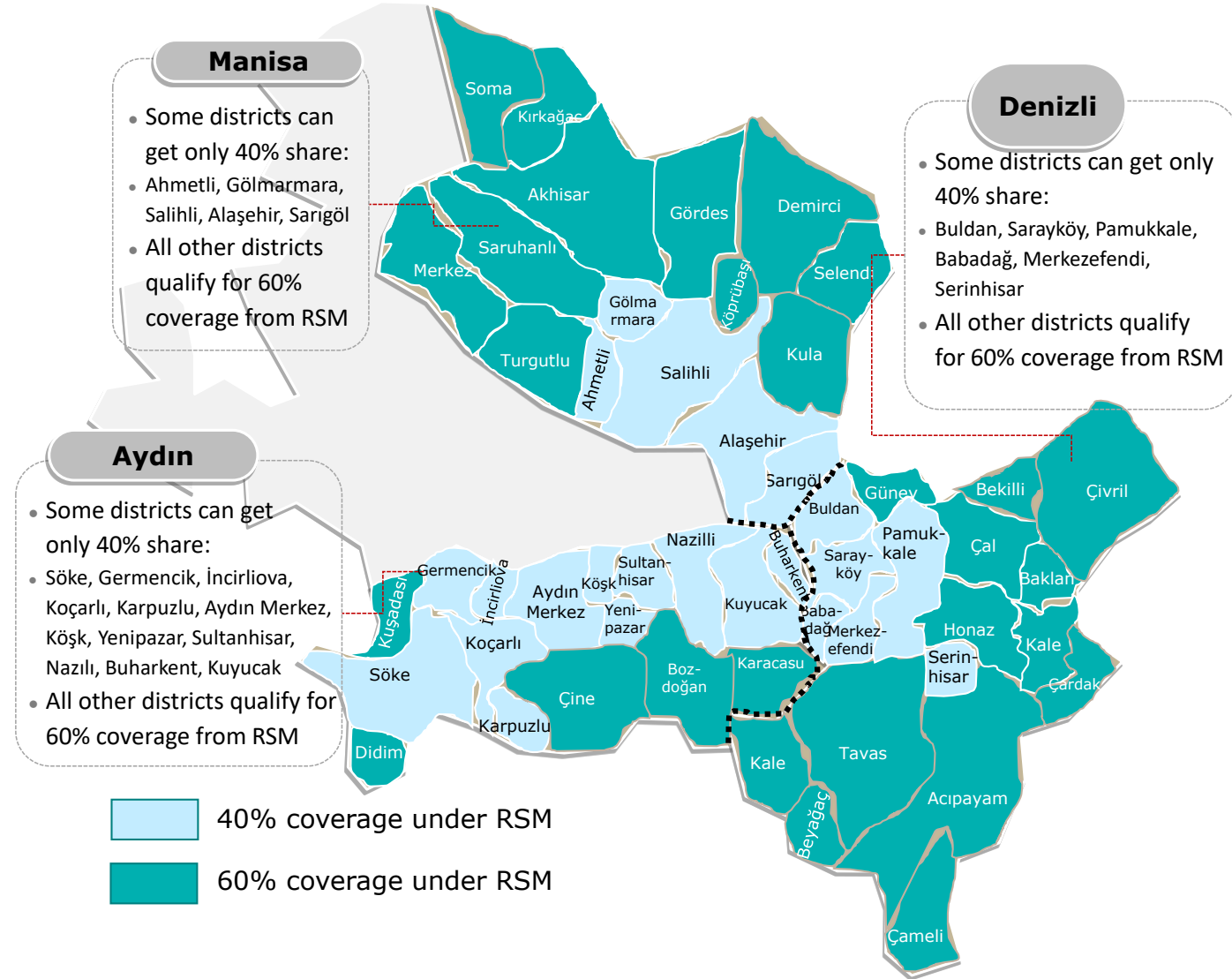
PAYOUT AND SUCCESS FEE

Details on the geographical coverage by number of wells

Success fee scheme from RSM

Payout scheme from RSM

Well No	Selected regions in Aydın, Denizli, Manisa	Other provinces	All provinces
1	40%	60%	5%
2	40%	60%	5%
3	40%	60%	5%
4	40%	40%	10%
5	40%	40%	10%



OVERVIEW OF ALL POTENTIAL OUTCOMES OF THE RSM PROGRAM

1-5 well drilling programme

In total 30 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				
2	U				
3	S	S			
4	S	U			
5	U	S			
6	U	U			
7	S	S	S		
8	S	S	U		
9	S	U	S		
10	S	U	U		
11	U	S	S		
12	U	S	U		
13	S	S	S	S	
14	S	S	S	U	
15	S	S	U	S	
16	S	S	U	U	
17	S	U	S	S	
18	S	U	S	U	
19	U	S	S	S	
20	U	S	S	U	
21	S	S	S	S	S
22	S	S	S	S	U
23	S	S	S	U	S
24	S	S	S	U	U
25	S	S	U	S	S
26	S	S	U	S	U
27	S	U	S	S	S
28	S	U	S	S	U
29	U	S	S	S	S
30	U	S	S	S	U
S	Successful well				
U	Unsuccessful well				
	RSM Contract stops due to two unsuccessful wells				

Project application timeline



Contents of EoI should demonstrate

- 1. Geothermal – technical:** A high potential of finding a geothermal resource based on submitted information
- 2. Business Plan:** The feasibility of the drilling plan when considered in the context of the proposed geothermal energy use, and the applicant's strength in financing the drilling plan and in following up on their project
- 3. Safeguards:** The likelihood that environmental and social issues will be properly implemented and effectively managed from the beginning of the project

Key qualification criteria

1. Hold a valid exploration license.
2. Have finished surface exploration, including geological, geophysical, and geochemical exploration.
3. Have constructed initial Conceptual Geothermal System Model (simple or extensive)
4. Have selected drilling targets (depth, flow rate, temperatures), well types (shallow/deep and vertical/directional) and conceptual well design.
5. Have prepared a business plan.

1. Geothermal – technical

- Conceptual model and list of data behind the conceptual model.
- Drilling plan
- References demonstrating previous drilling experience and CVs of key experts.
- If there are already exploration wells, provide an indication of the information from these wells.

Indicator	Unit	Value
Gross capacity per well	MWe or MWth	
Gross conversion efficiency (for power plants only)	%	
Expected average flow rate per well	kg/s	
Estimated reservoir temperature	°C	
Estimated depth of the well (True Vertical Depth-TVD)	m (from surface)	
Diameter of the well at target depth	" (inch)	
Well type (vertical/directional)	-	
Wellhead location of the wells under RSM	N E coordinates (ED50-UTM-6° coordinate system)	
Expected/predicted CO2 emissions	g CO2/kWh	

2. Business Plan

The **structure** of Beneficiary’s consortium or Joint Venture: description of Beneficiary.

- Submission of financial statements for the past 3 years: balance sheets, profit/loss statements and income statements.
- This should be submitted for the proposed special purpose entity and the group this belongs to.

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Expected NPV (at 8% discount factor)	USD	

FINANCIAL STATEMENTS

Description of the Developer

- Submission of financial statements for the past 3 years: balance sheets, profit/loss statements and income statements.
- This should be submitted for the proposed special purpose entity and the group this belongs to.

Profit (-Loss) Statements:

REVENUE/COST ITEMS	2017	2018	2019
Total Turnover (+)			
Cash O&M Costs (-)			
Depreciation Costs (-)			
Interest Costs (-)			
Other Revenues (-Costs)			
Profits Before Taxes			
Corporate Tax (-)			
Profits After Taxes			

Balance Sheets:

ASSET/LIABILITY ITEMS	31/12/2017	31/12/2018	31/12/2019
Current Assets			
Fixed Assets (NET)			
- Fixed Assets (GROSS)			
- Accumulated Depreciation (-)			
TOTAL ASSETS			
Current Liabilities			
Long-term Liabilities			
Equities			
- Paid-in Capital			
- Profit-for-Period			
- Accumulated Profits (-Losses)			
- Other Equities			
TOTAL LIABILITIES + EQUITIES			

EXPRESSION OF INTEREST

3. Safeguards

Social issues:

- Land use status in relation to land based livelihoods; use for agricultural purposes etc.
- Land acquisition needs (whether voluntary purchase or expropriation will be sought).
- Current and recent use of the land by project affected people and communities.

Indicator required per well:	Unit	Value
Well classification under Turkish EIA Regulation (I or II)	-	
Well classification under World Bank Environment and Social Framework (Category A, Category B, Category C)		
Distance to nearest protected area/sensitive habitats	km	
Distance to nearest area of cultural heritage and its sensitivity	km	
Distance to nearest settlement	km	
Distance to nearest water body	km	
Distance to nearest agricultural area	km	
Amount of estimated expropriation / land acquisition from private landowners (including lands to be rented)	m ²	
Estimated number of project-affected people (PAP)	#	
Estimated number of project-affected settlements	#	

Environmental issues:

- Information on project status with respect to Annex II of the Turkish Environmental Impact Assessment Regulations (Official Gazette Date: 25/11/2014 No. 29186I) and classified as Category B Project under World Bank Environmental and Social Safeguard Policies.
- Proximity to sites of cultural heritage.
- Proximity to protected areas/sensitive habitats with respect to national and international standards.
- Proximity to settlements (residential, commercial, and public).
- Proximity to water bodies, irrigation structures and designated water supply zones for groundwater and surface water.

Wells	Province	District	Neighborhood	Parcel No	Coordinates in Decimal Degrees	
					Longitude	Latitude
Well 1						
Well 2						
Well 3						

Status of permits

E&S Subject	Description	Relevant documentation	Is it applicable? (Yes/No)	If it is applicable, is it available? (Yes/No)	If it is not available please define expected date for obtaining relevant permit, license, opinion letter, etc. from relevant authority.
Exploration	Exploration license	Valid Exploration License			
EIA	The projects subjected to selection and elimination process fall into Annex-II of EIA Regulation and must obtain "EIA Not Required" certificate	Project Information File (PIF)			
	The projects fall into Annex II but obtained "EIA Required" decision	"EIA Not Required" certificate			
Land use	Private land	EIA Report			
		"EIA Positive" certificate			
		Rental / purchase agreement			
	Public land	Official letters on expropriation			
		Public interest decision(if any)			
		Official letters on land acquisition			
		Official letters on land acquisition			
		Non-agricultural utilization permit			
Pastureland	Official opinion letter on change of allocation purpose				
Forest land	Forest permit				
Stakeholders	Stakeholder engagement	Records on additional stakeholder engagements other than those conducted within the scope local regulation			
Other	Other permit requirements	Relevant permits			

A photograph of an industrial facility, likely a power plant or refinery, under a clear blue sky. Two prominent smokestacks in the center-left and center-right are emitting thick, white plumes of smoke that rise into the sky. The facility itself consists of various structures, including a large white building with red trim on the left, a complex network of silver pipes and metal frameworks in the middle, and a large, multi-story structure with yellow ladders on the right. In the foreground, there are some small green plants and a white car partially visible on the right. The overall scene is bright and clear.

Thank you!