THE GOLD STANDARD:
Project Design Document for Gold Standard Voluntary Offset projects

(GS-VER-PDD)

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Explanatory information on how to complete the PDD and how to obtain Gold Standard registration can be found in the project developer's manual available on the Gold Standard website.

This template of the PDD is applicable for micro-, small- and large-scale projects. Note that the shaded boxes present information on the Gold Standard VER project development procedures. Project developers should delete these shaded boxes when preparing their PDD.

VOLUNTARY OFFSET PROJECTS

PROJECT DESIGN DOCUMENT FORM (GS-VER-PDD)
Version 01 - in effect as of: January 2006)

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SECTION A. General description of project activity

A.1 Title of the project activity

Title: Dora-II 9.5 MWe Geothermal Energy Project
Version: 01
Date: 08/12/2017

A.2. Description of the project activity

Menderes Geothermal Elektrik Uretim A.S. (shall be referred to as MEGE in the rest of this document) is promoting the "Dora-II Geothermal Power Plant" in Salavatlı geothermal area, Aydin province of Turkey. MEGE is focussed on electric energy generation in Aydın Salavatlı geothermal site. DORA-I geothermal energy plant, a precursor to the project activity under consideration, also developed by MEGE with a capacity of 8.5 MWe was commissioned in May 2006 and has the unique distinction of being the first privately-held geothermal power plant in Turkey. DORA-1 Geothermal Power Plant has acquired carbon financing in the form of VCS certification and has also issued its first voluntary carbon credits in 2009.

Dora-II GPP, the second project developed by MEGE in the same geothermally potential area has an installed capacity of 9.5 MWe with an annual electricity production of 70,000 MWh. The electricity generated by this project is connected to the national grid to replace the fossil fuel power generation, which could reduce the emission of carbon dioxide. The project will utilize Binary cycle system where the fluid obtained from the well transmits its temperature to another fluid (pentane) with lower evaporation degree. The hot water outgoing from the heat converter is not used in energy generation, it is re-injected to the wells in a closed cycle. The organic gas in the secondary cycle (closed cycle) propels the turbine. The system is environmental friendly as non-condensable gases are captured and no emission is a point in question.

This project has been registered as GS project. And the reference number is GS 445. The first credit period is 26/03/2010 to 25/03/2017. And the second credit period is from 01/03/2018 to 27/02/2025.

The project involves the implementation of Organic Rankine Cycle System for electricity generation from geothermal resources at temperatures between 171°C-174°C. The fluid is drawn from AS-3 and AS-4 generation wells as well as ASR-1 spare well and re-injected to ASR-4 and ASR-5 wells after used in electricity generation. The well design conditions of the project have been provided in the Table.1. below:

Table.1. Design conditions

Sl. No.	Well Name	Purpose	Depth	Max. Temperature
1	ASR-1	Production	1,419m	157°C
2	ASR-4	Reinjection	1,923m	148°C

3	ASR-5	Reinjection	1,300m	152°C
4	AS-3	Production	1,325m	171°C
5	AS-4	Production	1,300m	174°C

For electricity generation, the plant employs the organic Rankine cycle, that is aimed at the use of an organic, high molecular mass fluid with a liquid-vapor phase change, or boiling point, occurring at a lower temperature than the water-steam phase change. The fluid allows Rankine cycle heat recovery from lower temperature sources such as geothermal heat. The low-temperature heat is converted into useful work that can itself be converted into electricity.

The ORMAT Energy Converter (OEC) system is an Integrated Two Level Units (ITLU) modular power plant working by a closed thermodynamic cycle. The brine and steam are separated and flow to the system which operates in two levels. At the first level, the geothermal fluid from two generation wells and steam from AS-3 well flow to the first level vaporizers operating at 11.7 bars. At the exit of the vaporizers, the geothermal fluid flows to 2-tube sided pre-heaters and supplies its heat to the organic fluid – pentane. Then brine and steam together, at 127.2 ^{o}C, flow from low pressure separators to second level vaporizers, operating at 5.4 bars, and meets with steam flow from AS-4. The geothermal fluid exchanges heat through pre-heaters and then its temperature drops to 105.6 ^{o}C. The organic fluid in both levels vaporizes upon heat addition and the vapour expands in the turbine producing rotational shaft power to generate electricity. The brine is re-injected at temperature of 80.4^{o} C and pressure of 5 bars through the reinjection wells ASR-4 and ASR-5.

Technical specifications of major equipments:

Sl. No.	Equipment	Make	Model	Capacity
1	Turbine	Ormat Industries Ltd.	786	4750kW X 2
2	Generator	Brush	410164	11875 kVA, 11000V

Non-condensable gases resulting from the operation will be captured and carried out of the project boundary with pipelines to be used as industrial gas in production.

The lifetime of the equipment is accepted as 20 years as defined Communiqué for Amortization 333 under Tax Procedural Law[1] . ORMAT will provide the equipment and training on operating and maintenance to the employees. TEDAS will provide training on monitoring electricity generation to the staff responsible.
MEGE is a subsidiary of MB Holding A.Ş. and it was established in order to generate electricity with alternative, environment-friendly, renewable and sustainable resources in order to meet the increasing electricity demand in parallel to the economic developments experienced in Turkey and in the surrounding countries.

[1] http://www.vergiturk.com/teblig/vukgt333ek.htm#ust (Article 45.1.3)

The project aims to:

- Develop the existing geothermal site potential,
- Reduce the air pollution caused by electricity generation,
- Reduce the dependency on the import for petroleum,
- Contribute the development of the region.

Sustainable Development Matrix

The sustainable development matrix in Table.2 summarizes the environmental and social changes created by the project activity. Compared to the baseline, which is generation of the same amount of electricity by the grid dominated with thermal power plants, the project will have positive impacts on air, water and soil quality. In addition creating job opportunities for local people, the project will provide employment and income to the community. Some of the employees will be trained and acquire technical skills.

The project will also provide renewable energy to increasing demand of a developing industry in Turkey. This will also have positive impacts by reducing the dependency on imported fossil fuels, particularly natural gas; for electricity generation.

In addition, the contributions made to the primary school by the project owner. The exterior walls of the school have been painted and handrails are placed on both sides of the stairs at the entrance. Ceiling panels are placed inside the rooms and a projector is granted for educational activities. A pergola and a basketball hoop are also placed in the playground.

Table.2: Sustainable Development Matrix for the project activity

Component • Indicators	**Score** (-2 to +2)	**Rational**
Local / Regional / Global Environment		
• Water quality and quantity	0	The brine is only used for electricity generation and will be re-injected underground. Therefore either groundwater resources or surface water is not negatively impacted or disturbed. Furthermore, as the plant is operated in a closed cycle, neither the geothermal fluid nor the organic Rankine Cycle fluid is discharged causing any potential damage to the ambience including soil. It may further be noted that the project has been exempted from conducting an EIA by the Directorate of Environment and Forestry in Aydın, Turkey in line with the relevant environmental laws of the country as there are no adverse effects foreseen from the project on the water quality and quantity.
• Air quality (emissions other than GHG)	0	The fluid circulation system is closed and no emission of any gases that may potentially hamper the air quality is caused during power generation.

		Brine extraction causes limited sulphur odour but it does not cause any negative impacts. As mentioned above, the non-condensable gases resulting from the project operation are captured and carried out of the project boundary with pipelines to be used in another industrial facility, thus not released to the atmosphere. It may further be noted that the project has been exempted from conducting an EIA by the Directorate of Environment and Forestry in Aydın, Turkey in line with the relevant environmental laws of the country as there are no adverse effects foreseen from the project on the air quality.
• Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases)	0	No significant change compared to the baseline, since the plant will be a closed circulation system. Noise level during operation is estimated to be below the limits allowed by the regulations and hence the project activity has been issued with the generation license by the regulatory authority named Energy Market Regulation Authority. It may further be noted that the project has been exempted from conducting an EIA by the Directorate of Environment and Forestry in Aydın, Turkey in line with the relevant environmental laws of the country as there are no adverse effects foreseen from the project by release of other pollutants.
• Soil condition (quality and quantity)	0	The project activity will not produce any waste, which decreases soil condition in quality and/or quantity. The extraction will not cause any earthquake impacts according to the local expert opinions. It may further be noted that the project has been exempted from conducting an EIA by the Directorate of Environment and Forestry in Aydın, Turkey in line with the relevant environmental laws of the country as there are no adverse effects foreseen from the project on the soil quality.
• Biodiversity (species and habitat conservation)	0	As compared to the baseline, no significant change in biodiversity is expected. It may further be noted that the project has been exempted from conducting an EIA by the Directorate of Environment and Forestry in Aydın, Turkey in line with the relevant environmental laws of the country as there are no adverse effects foreseen from the project on the biodiversity.
Sub Total	**+0**	
Social Sustainability and		

Development		
• * Employment (including job quality, fulfillment of labor standards)	+1	The project leads to employment generation during construction and for operation of the power plant itself and in the implementation as a GS VER project. During operation 14 skilled and 8 unskilled personnel will be hired. The workers will be registered to social security and benefit from health services as well as retirement benefits afterwards. Considering the fact that a majority of the villagers were farmers previously, the project will provide better jobs with social benefits. It may further be noted that this parameter shall be monitored for the entire duration of the project activity and the contribution of the project towards the upliftment of the local area shall be constantly be monitored as per the monitoring plan.
• * Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services)	0	The project will generate additional job positions and therefore income in the area. The villagers working in the power plant will have a regular income which increases their life quality. The workers' families will also benefit from health services covered by social security payments. Those who have jobs in the power plant were farmers previously and 40% of farmers have been established to live in poverty in the country in 2008[2]. Thus it is evident how much the project activity contributes to the alleviation of poverty in the area. As the score of this parameter is 0, it does not need to be monitored.
• Access to energy services	+1	The project activity improves the scale and security of energy supply in the country. Turkey is highly dependent on imported energy resources to cater to the growing energy demand of the country. By utilizing national energy resources for energy generation, the security of energy supply will be improved. Being a regional grid connected power plant, the project adds capacity to the regional power matrix, thus alleviating the burden on the power grid in meeting the regional demand and improving electricity availability by some extent in an already power deficient country, the percentage of import dependency (extent to which an economy relies upon imports in order to meet its energy needs, calculated as net imports divided by the sum of gross inland energy consumption plus bunkers) of which has increased from 72.2% in 2008 to 77.5% in 2015[3]. By exporting the project's electricity to the grid system, the grid's electricity capacity is increased which enables increased access to clean energy in the region and ensures a wider scope of the national grid in providing electricity to more consumers. Transmission lines constructed for power evacuation result in improved infrastructure and contribute to increased grid stability.

[2] Turkish Statistics Institute (http://www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=480)

[3] Eurostat data (http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdcc310)

		Electricity exported by the project activity to the grid system is already included in the monitoring plan and shall be constantly be monitored as per the monitoring plan the entire duration of the project activity.
• * Human and institutional capacity (including empowerment, education, involvement, gender)	+1	People involved are trained with the necessary skills for the successful operation of the energy generation facility. ORMAT, the technology provider company will undertake a 1-week of operation and maintenance training course for the operators. Furthermore, the Turkish Electricity Transmission Company (TEIAS) will provide training on working in heavy current installations for technicians. These activities mean that the local populace would undergo technology related training thanks to the project activity, thus enhancing their technical skills, which would not be possible in the absence of the project activity. In addition, several efforts and contributions have been made to the public school including painting of exterior walls, placing of handrails on both sides of the stairs at the entrance, ceiling panels placed inside the rooms, a projector for educational activities, a pergola, a basketball hoop in the playground, etc. These initiatives shall somewhat contribute to imparting a better education in the region. It may further be noted that this parameter shall be monitored for the entire duration of the project activity and the contribution of the project towards the upliftment of the local area shall be constantly be monitored as per the monitoring plan.
Sub Total	**+3**	
Economic and Technological Development		
• * Employment (numbers)	+1	The project activity generates employment opportunities during the project's construction (97) and operation period (22). 20 of the permanent employees are from the village. It may further be noted that this parameter shall be monitored for the entire duration of the project activity and the contribution of the project towards the upliftment of the local area shall be constantly be monitored as per the monitoring plan.
• Balance of payments (sustainability)	+1	Through employment of clean electricity generation sources, the national electricity imports can be reduced by catering to the issues of energy security, thus also foreign exchange by minimization of imports.

		Turkey is listed as one of the main importers of natural gas[4] as the share of natural gas in electricity production is 32% as described below. The energy dependency of the county on imports was 74.4% in 2007 as well as consistently above 70% and steadily increasing over a 5-year period upto 2007[5]. Electricity generation from renewable energy sources like geothermal source is completely independent from imports and thus does not have any negative effects on the balance of payments.
• Technological self reliance (including project replicability, hard currency liability, institutional capacity, technology transfer)	+1	The share of geothermal energy in electricity production is as low as 0.07% as described below. The total estimated projected power generation potential of 17 geothermal sites in Turkey that have a potential of geothermal electricity generation is 710 MWe[6]. The project will encourage new investors in geothermal power generation. The system optimizes the usage of geothermal energy by organic rankine cycle. This is the second such project by the project promoting entity (MEGE) in the same region, with one more such project planned in the future. Thus more projects could be developed by other entities as well.
Sub Total	**+3**	
Total	**+6**	

The project proponent further wishes to clarify that there is no technology transfer associated with the project activity under consideration.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host)	Menderes Geothermal Elektrik Uretim A.S. (Private)	No
Switzerland	Swiss Carbon Value Ltd. (Private)	No

Turkey has ratified Kyoto protocol but does not have a quantitative reduction target under the protocol.

A.4. Technical description of the project activity:

[4] Key World Energy Statistics (http://www.iea.org/textbase/nppdf/free/2009/key_stats_2009.pdf), (page 13)

[5] Eurostat data (http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdcc310)

[6] TMMOB Jeotermal Kongresi , 2009 (http://www.tmmob.org.tr/resimler/ekler/081594975a764c8_ek.pdf), (page 41)

The project activity utilizes ORMAT Energy Converter (OEC) consists of:

1) Turbine-generator, consisting of two organic vapor turbines driving one generator, mounted on a skid. The power skid has clockwise turbine and counter clockwise turbine operating with a synchronous generator. The level 1 turbine is of the axial three-stage impulse type and the level 2 turbine is axial two-stage impulse type.
2) Oil systems: Bearing oil system is designed to supply oil to the turbine and the generator bearing for lubrication and cooling. **Seal oil system** supplies oil to the turbine double mechanical seal from cooling and as a barrier fluid.
3) Air-cooled condensers
4) Vaporizers are horizontal tube and shell heat exchangers constructed from sheet metal shell. Geothermal brine fluid flows through the tube side of the vaporizers while the motive fluid flows through the shell side of them.
5) Pre-heaters are horizontal tube and shell heat exchangers with a two-pass tube bundle and fixed tube sheet. Brine enters the tube side of the heat exchanger and exchanges heat with the motive fluid that flows through the pre-heater shell side in two passes.
6) Motive fluid pumps and motors are used to circulate the motive fluid throughout the process.

The project proponent further wishes to clarify that there is no technology transfer associated with the project activity under consideration.

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Turkey
Turkey has ratified Kyoto protocol but does not have a quantitative reduction target under the protocol.

A.4.1.2. Region/State/Province etc.:

The project is located in Western Anatolia, Eagean Region, Aydın Province (Figure.1.)

Figure.1. The location of the project site marked with A.

A.4.1.3. City/Town/Community etc:

The project is located between Aydın City and Nazilli Township (Figure.2.)

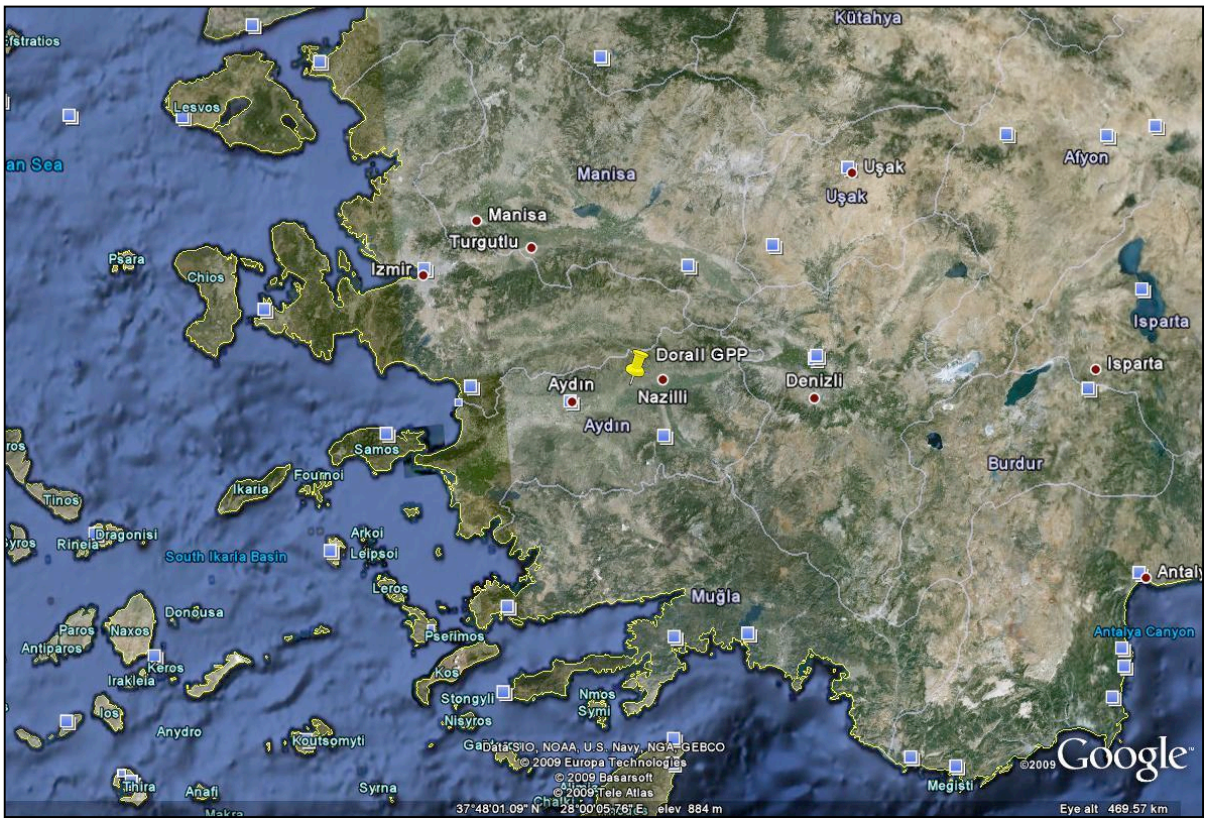


Figure.2. The project site in a closer view.

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project is located in Salavatlı Geothermal Area which is 26 km away from Aydin city center, between Aydin and Nazilli, and within the territories of Aydin Province's Sultanhisar and Köşk Districts. The geographical coordinates are; latitude (ϕ: 37°51'29"N & longitude (λ): 28°05'32"E & height (h): 60 meters.

A.4.2. Size of the project:

The project activity under consideration is a renewable energy project with an installed capacity of 9.5MW, *i.e.*, less than 15 MW, hence it is classified as a "small scale" project according to the relevant UNFCCC/ CDM rules. On the other hand, as the project shall result in potential annual GHG emission reductions of 41,160 tCO_2, *i.e.*, more than 15,000 tCO_2 per annum, hence it is classified as a "large scale" project according to the relevant GS VER rules.

A.4.3. Category(ies) of project activity:

The category of the project is A.1. Renewable Energy (Electricity, Heat) according to Gold Standard VER Project Developer's Manual; Sub-type: Geothermal.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

The baseline scenario is the supply of the same amount of electricity by the existing grid. It is assumed that the energy generation profile of the country will not change and the weight of fossil fired power plants will remain the same during the crediting period.

The share of fossil fuel-fired capacity of the grid is 60.72% (Natural Gas+ Lignite+ Hard Coal+ Imported Coal+ Liquid Fuels) of the total capacity in 2008 as shown in Figure.3. Renewable resources constitute 34% of total capacity where only 0.07% is geothermal resources[7].

[7] Annual report, Electrcity Generation Company, 2008 (http://www.euas.gov.tr/_EUAS/Images/Birimler/apk/YILLIK%20RAPORLAR/2008_yillikrapor.pdf)

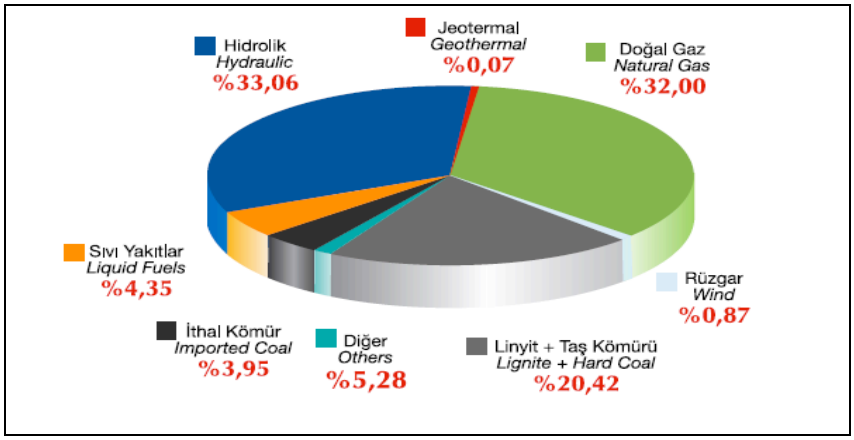


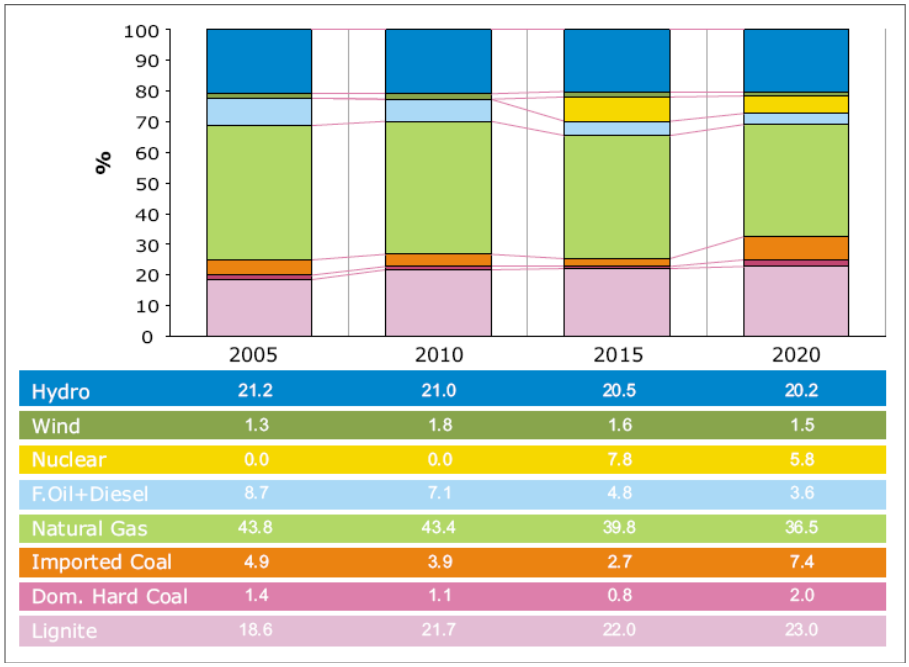
Figure 3. Share of Resources in Turkey's Installed Capacity

The electricity consumption has been 198 billion kWh in 2008 with a rise of 4.2% compared to the previous year and the generation has been 198.2 billion kWh with a rise of 3.5%. The electrical energy demand is expected to rise to anywhere between minimum projections of 440.1 billion kWh to a maximum projection of 483.6 billion kWh according to various probable scenarios. Therefore; the total installed capacity of 41,744 MW should be doubled until 2020 to supply the minimum demand. Turkey has been ranked as second after China in terms of the rates of rise in electricity and natural gas consumption. Natural gas has been widely used in by both industrial sector and for electricity generation[8].

Figure.4. below shows the expected share of resources in generating capacity between 2005-2020. The share of lignite and imported coal is expected to rise while the percentage of hydro power is also expected to slightly decreasing during the period. Thermal resources are expected to still comprise 72.5% of total capacity in 2020 in spite of the entrance of nuclear power into the calculation.[9]

[8] EUAS, sectoral report 2008 (http://www.enerji.gov.tr/yayinlar_raporlar/Sektor_Raporu_EUAS.pdf)

[9] Chapter.5.Projections and Mitigations Scenarios, First National Communication of Turkey on Climate Change, January 2007, (pg. 121-157) (http://www.undp.org.tr/Gozlem2.aspx?WebSayfaNo=531)



	2005	2010	2015	2020
Hydro	21.2	21.0	20.5	20.2
Wind	1.3	1.8	1.6	1.5
Nuclear	0.0	0.0	7.8	5.8
F.Oil+Diesel	8.7	7.1	4.8	3.6
Natural Gas	43.8	43.4	39.8	36.5
Imported Coal	4.9	3.9	2.7	7.4
Dom. Hard Coal	1.4	1.1	0.8	2.0
Lignite	18.6	21.7	22.0	23.0

Figure. 4. Electricity Generation Forecast (2008-2017)

Power generation has been the greatest contributor source to GHG emissions with a share of 76.7% in 2004 as stated in the First Communication of Turkey on Climate Change (pg:243, Annex.4). The continued reliance on fossil fuels in the power sector will give rise to emissions in the following years. The power sector sourced GHG emission is expected to rise 7.1% every year during 2003-2020.

Dora-II GPP will supply electricity to national grid which is dominated by fossil-fired power plants. Therefore; it is an additional alternative to the baseline scenario. The baseline scenario is that an equivalent amount of electricity would, in the absence of the project activity, have been generated by the operation of grid-connected thermal power plants and by the addition of new generation sources.

A.4.4.1. Estimated amount of emission reductions over the crediting period:

The project will generate emission reductions of about 39,358tCO_2e per year over the second 7 year crediting period from 01/03/2018 to 28/02/2025.

Table 3: Annual estimation of emission reductions

Year	Annual estimation of emission reductions in tonnes of CO_2e
01/03/ 2018 to 31/12/2018	32,798
01/01/2019 to 31/12/2019	39,358
01/01/2020 to 31/12/2020	39,358
01/01/2021 to 31/12/2021	39,358
01/01/2022 to 31/12/2022	39,358

01/01/2023 to 31/12/2023	39,358
01/01/2024 to 31/12/2024	39,358
01/01/2025 to 28/02/2025	6,560
Total estimated reductions (tonnes of CO_2e)	**275,506**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**39,358**

SECTION B. Application of a baseline methodology

B.1. Title and reference of the approved baseline methodology applied to the project activity:

Methodologies:
AMS-I.D. Grid connected renewable electricity generation (version 18)[10].
Tools:
Tool to calculate the emission factor for an electricity system (version 06.0)[11]
Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (version 03.0.1)[12]

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

The project is a standalone geothermal power plant with a unique generation licence and is not component of a large scale project activity. This has been explained as follows:

The following rule has been defined for debundling by UNFCCC/CDM (Reference – EB 47, annex 32, paragraph no. 2):

"A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

[10] http://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

[11] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf

[12] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

Dora-1 GPP belongs to the same project owner and developed by the same technology and was operational on 10 May 2006. Dora-2 GPP is utilising the same geothermal resources and will be operational in the first quarter of 2010, 4 years after Dora-1 GPP. The geographical location of Dora-1 GPP is 37°53'22 85 N and 28°06'33.50 E. Holding a separate licence for electricity generation, all the procedures including Pre-EIA studies have been conducted for the project separately. The distance between two projects is approximately 4 kms as could be seen in figure below:

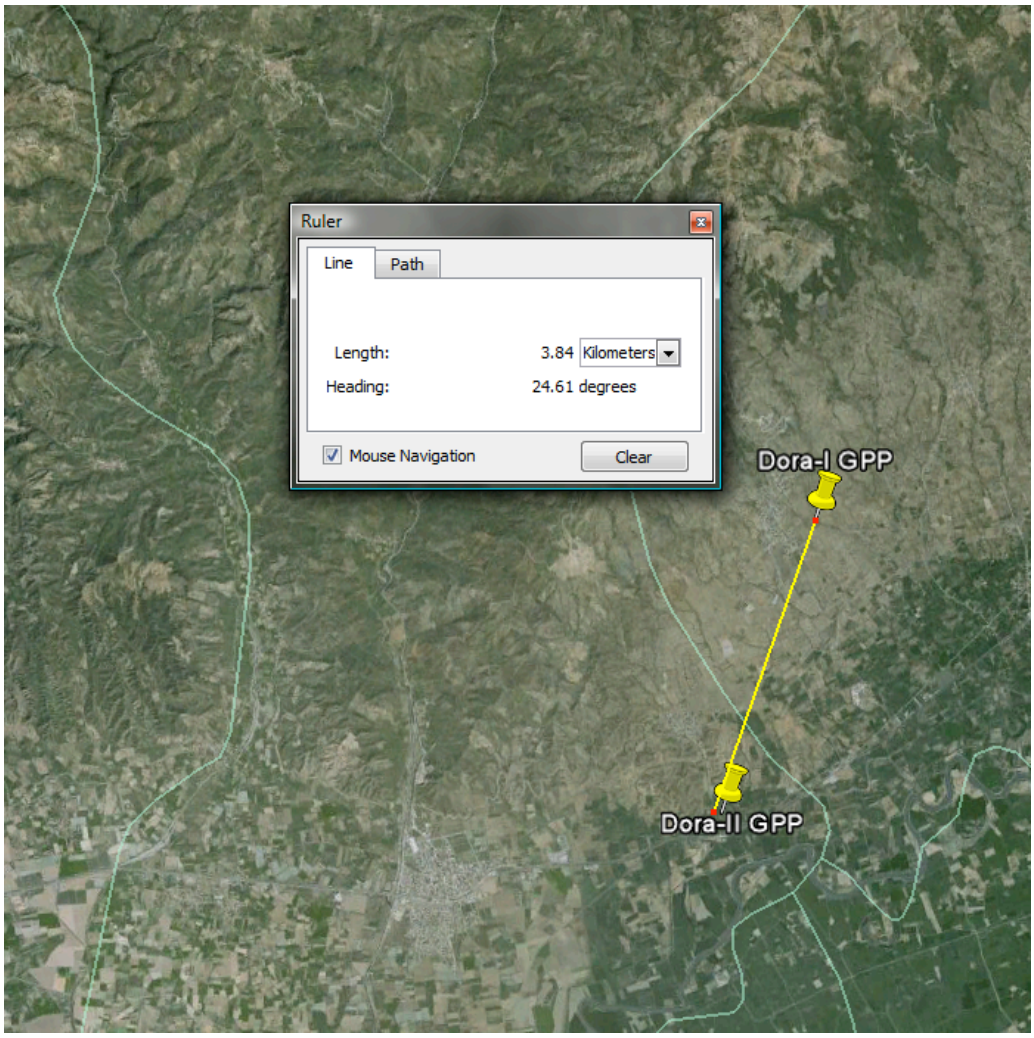


Figure5: The distance between Dora-1 GPP and Dora-2 GPP

Hence, it has clearly been established that the project activity under consideration is not a debundled component of any large scale project activity.

The choice of the CDM methodology AMS-I.D （v18.0） can be justified through its applicability criteria as listed below:

Applicability criteria	Compliance check

Applicability criteria	Compliance check
1.This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass : （a） Supplying electricity to a national or a regional grid;or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project is a renewable energy generation unit utilizing geothermal power and exports it to and in the process displaces electricity from the national electricity grid of Turkey.
2. This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s)	The project activity involves the installation of a Greenfield plant –a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity, as per option (a).
3. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: (a)The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 $W/m^{2;}$ •(c)The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	The project is not a hydropower plant.
4. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project has only renewable component with an installed capacity less than 15 MW.
5. Combined heat and power (co-generation) systems are not eligible under this category.	The project is not a combined heat and power system.
6. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct1 from the existing units.	This project does not include capacity addition.
7. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW	The project is not an additional to an existing renewable power generation facility as explained above.
8. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then	This project is not landfill gas, waste gas, wastewater treatment and agro-industries project.

Applicability criteria	Compliance check
the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	
9. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	This project does not include biomass consumption.

B.2. Description of how the methodology is applied in the context of the project activity:

In the absence of the project, the same amount of electricity will be supplied by the grid. According to the project category, and the corresponding methodology, the baseline emissions are the energy produced by the renewable generating unit (MWh) multiplied by an emission coefficient (tCO_2e/MWh) calculated in a transparent and conservative manner as:

"A combined margin (CM) emission factor, consisting of the combination of operating margin (OM) and build margin (BM) emission factors according to procedures prescribe in the approved methodological "tool to calculate the emission factor for an electricity system"

The geothermal power plant will be connected to the interconnected national grid, for which the OM and BM emission factors are calculated according to the "Tool to calculate the emission factor for an electricity system", version 06.0.The baseline emissions are calculated in a conservative manner by calculation of the emission factor of the grid mix consisting of several sources although new coal reserves are expected to be primarily utilized for power generation in the forthcoming years. It is assumed that the grid emission factor will remain same during the crediting period and the weight of thermal power plants will not change. Furthermore, the most conservative data have been used for calculations where no data is available. The lower emission factors for fossil fuels are applied and the power plants are assumed to use best available technology.

The baseline scenario includes only grid connected power plants.

The Project generates electricity and CO_2 reduction through the displacement of grid electricity generation by fossil fuel fired power. According to the baseline methodology AMS-I.D(v18.0)., the emission reduction ER_y by the project activity during a given year y is defined as;

$$ER_y=BE_y-PE_y-LE_y \qquad \textit{Equation 1}$$

where BE_y is calculated as;

$$BE_y=EG_{PJ,y}*EF_{grid,CM,y} \qquad \textit{Equation 2}$$

Where:

Parameter	SI Unit	Description
ER_y	tCO_2e	Emission reductions achieved by the project activity in year y
BE_y	tCO_2e	Baseline Emission in year y
PE_y	tCO_2e	Project Emission in year y
LEy	tCO_2e	Leakage Emissions in year y
$EF_{grid,CM,y}$	tCO_2e/MWh	Combined margin CO_2 emission factor for grid connected power generation in year y
$EG_{PJ,y}$	MWh/year	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of CDM project activity in year y

The operation margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed project activity. The build margin refers to a cohort of power plants that reflect the type of power units whose construction would be affected by the proposed project activity.

The combined emission factor $EF_{grid,CM,y}$ for the project activity is calculated as a weighted average of Operating Margin emission factor and Build Margin emission factor as described in the "Tool to calculate the emission factor for an electricity system" version 02;

$$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y} \qquad \text{Equation 3}$$

Where:

Parameter	SI Unit	Description
$EF_{grid,CM,y}$	tCO_2e/MWh	Combined margin CO_2 emission factor for grid connected power generation in year y
$EF_{grid,BM,y}$	tCO_2e/MWh	tCO_2/MWh Build margin CO_2 emission factor for grid connected power generation in year y
$EF_{grid,OM,y}$	tCO_2e/MWh	tCO_2/MWh Operating margin CO_2 emission factor for grid connected power generation in year y
w_{OM}	%	Weighting of operation margin emissions factor; Default value 25% for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.
w_{BM}	%	Weighting of built margin emissions factor; Default value 75% for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

PE and LE have been considered to be zero. Please see detailed calculations in Annex.2.

Based on the Methodological Tool " *Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period. (Version 03.0.1)"*, the follow steps are used for assess the validity of the current baseline for the next crediting period:

Step 1: Assess the validity of the current baseline for the next crediting period

The Procedures for the renewal of the crediting period of a registered Gold Standard project activity adopt approved by the CDM Executive Board require assessing the impact of new relevant national and/or sectoral policies and circumstances on the baseline.

The validity of the current baseline is assessed using the following Sub-steps:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

If the current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation or the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period, go to Step 1.2.

The current baseline also is the equivalent electricity is supplied by Turkey power grid, complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period, so go to Step 1.2.

Step 1.2: Assess the impact of circumstances

Assess the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario.

There is no impact of circumstances existing.

In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period.

The baseline scenario for the project is to import equivalent electricity from Turkey power grid, which is dominated by thermal power plants in the previous crediting period. In the renewal crediting period, the power grid is still dominated by thermal power plants. There is no big change in the national power grid. Moreover, the small changes of the power grid market has little relationship with the baseline scenario.

Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid. Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions;

Turkey power grid is dominated by thermal power plants, so new fuels, raw materials and electricity will not have significant impact on the baseline scenario. However, the electricity proportion of delivered to power grid from other power plants and renewable source plants may impact the emission factor a little. The emission factor has been updated according to 'tool to calculate the emission factor for an electricity system (Version 05.0). The baseline emission will be updated based on the methodology AMS-I.D (version 18.0)

If the new circumstances make a continued validity of the current baseline not plausible, then the current baseline needs to be updated for the subsequent crediting period.

Through the analysis above, the current baseline is continued. So the baseline would not be updated in the subsequent crediting period.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology.

The baseline scenario of this project is that the equivalent electricity generated by the project activity would be imported from the Turkey power grid, which was not an investment activity. So this is not applicable.

Assess whether the remaining technical lifetime of the equipment that would have continued to be used in the absence of the project activity, as determined in the CDM-PDD or CDM-PDD-REN, exceeds the crediting period for which renewal is requested.

This is not applicable.

Take into consideration the market penetration of different technologies. Evaluate the penetration rate of different technologies that are available in the market and evaluate how they could affect the baseline.

This is not applicable.

If the baseline scenario of the project activity is the continuation of use of the current equipment(s) without any investment and the projects proponents or third party(ies) will undertake an investment later, but before the end of a crediting period, then the current baseline needs to be updated for that crediting period or the crediting of emission reductions should be limited to the period before the baseline equipment would cease its operation.

This is not applicable.

Step 1.4: Assessment of the validity of the data and parameters

Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether they should be updated. Updates should be undertaken in the following cases:

• Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC, for example, in guidelines for national GHG inventories, IPCC assessment report or special reports by the IPCC;

For renewal of the crediting period, the updated IPCC 2006 was adopted.

• Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity.

The emission factors are updated.

If any of the data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, the current baseline needs to be updated for the subsequent crediting period.

The data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period, which are not valid anymore, so the data and parameters need to be updated for the subsequent crediting period.

If the application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline as well as data and parameters are still valid for the subsequent crediting period, then this baseline, data and parameters can be used for the renewed crediting period. Otherwise, proceed to Step 2.

The current baseline still valid, but the data and parameters are need to updated, so it proceeds to step 2.

Step 2: Update the current baseline and the data and parameters

This step is only applicable if any of the Steps 1.1, 1.2, 1.3 and/or 1.4 showed that the current baseline needs to be updated.

Step 2.1: Update the current baseline

Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.

This is not applicable, as the baseline is not changed.

Step 2.2: Update the data and parameters

If the application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project participants should update all applicable data and parameters, following the guidance in Step 1.4.

In this project, all the parameters related to the emission factors of the power grid are determined at the start of the crediting period and not monitored during the crediting period, so they are updated in the second crediting period. The detail can be seen in annex 2.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered VER project activity:

The baseline, investment and additionality analysis has been demonstrated in the first crediting period. According the tool of '*Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period. (Version 03.0.1)* ', the baseline scenario is the same as in the first crediting period. it is not required to reassess.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

The project boundary encompasses the physical, geographical site of the renewable generation source. The geothermal power plant with all installation including all the wells is the project boundary.

As the electricity generated by the project displaces the electricity generated by national grid, the baseline boundary is defined as the national grid. This includes the project site and all power plants connected physically to the national grid and excludes the off-grid power plants.

The greenhouse gases and emission sources included in or excluded from the Project boundary are compiled in Table 9 below:

Table 9: Emission sources included or excluded from the Project boundary.

Source		Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source. The dominant emissions from power plants are in the form of CO_2, therefore CO_2 emissions from fossil fuel fired power plants connected to the grid will be accounted for in baseline calculations.
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

Project Activity	Emissions related to the operation of geothermal power plants (e.g. non-condensable gases);	CO_2	Yes	Has been considered as an emission source
		CH_4	Yes	Has been considered as an emission source
		N_2O	No	Minor emission source
	CO_2 emissions from on-site consumption of fossil fuels due to project	CO_2	Yes	Has been considered as an emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

Baseline emissions:

Baseline emissions are the product of combined emission factor ($EF_{grid,CM,y}$) multiplied by the net electricity fed to the national grid by the project activity ($EG_{PJ,y}$), as explained above in B.2.

BE= 70,000 MWh *0.584 tCO_2e/MWh= **40,880 tCO_2e**

Project activity emissions:

According to the methodology AMS-I.D(v18.0), emissions related to the operation of geothermal power plants (e.g. non condensable gases, electricity/fuel consumption) have to be considered following the procedure described in the most recent version of ACM0002.

The most recent ACM0002(v17.0) defines the emissions from fossil fuel combustion, and emissions from the operation of geothermal power plants as follows:

$PE_y=PE_{FF,y}+PE_{GP,y}$ Equation 4

Where:

$PE_{FF,y}$ =Project emissions from fossil fuel consumption in year y (tCO_2e/yr)

$PE_{GP,y}$ = Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y (tCO_2e/yr)

Project emissions from fossil fuel consumption are calculated as per *Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion(version 02)* as follows:

$PE_{FF,y}=FC_{FF,i,y}*COEF_{FF,i,y}$ Equation 5

Where:

$PE_{FF,j,y}$ Are the CO_2 emissions from fossil fuel combustion during the year y (tCO_2/yr)
$FC_{FF,I,y}$ Is the quantity of fuel type i combusted during the year y (mass or volume unit/yr)
$COEF_{FF,i,y}$ Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i Are the fuel types combusted during the year y

The CO_2 emission coefficient $COEF_{i,y}$ can be calculated using Option B of the tool as follows

$COEF_{FF,i,y}=NCV_{i,y}*EF_{CO2,i,y}$ Equation 6

Where,

$COEF_{FF,i,y}$ Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
$NCV_{i,y}$ Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$ Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

The above calculation shall be used for calculating the GHG emissions due to diesel generator in the plant premises. Hence there shall be only one fuel of type i, i.e., diesel.

'For geothermal and solar thermal projects, which also use fossil fuels for electricity generation, CO_2 emissions from the combustion of fossil fuels shall be accounted for as project emissions ($PE_{FF,y}$). $PE_{FF,y}$ shall be calculated as per the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion(v03.0)'

This project may use little diesel. It is considered as 0 in ex-ante calculation. The diesel amount will be monitored in ex-post calculation, and calculated latest tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*(v03.0)'*.

For geothermal project activities, project participants shall account fugitive emissions of carbon dioxide and methane due to release of non-condensable gases from produced steam. Non-condensable gases in geothermal reservoirs usually consist mainly of CO_2 and H_2S. They also contain a small quantity of hydrocarbons, including predominantly CH_4. In geothermal power projects, non-condensable gases flow with the steam into the power plant. A small proportion of the CO_2 is converted to carbonate / bicarbonate in the cooling water circuit. In addition, parts of the non-condensable gases are reinjected into the geothermal reservoir. H*owever, as a conservative approach, this methodology assumes that all non-condensable gases entering the power plant are discharged to atmosphere via the cooling tower. Fugitive carbon dioxide and methane emissions due to well testing and well bleeding are not considered, as they are negligible'*

$PE_{GP,y}$ is calculated as follows:

$PE_{GP,y} = PE_{dry\ or\ flash\ steam,y} + PE_{binary,y}$ Equation 7

Where:

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e/yr)

$PE_{dry\ or\ flash\ steam,y}$ =Project emissions from the operation of dry, flash steam geothermal power plants due to release of non-condensable gases in year y

$PE_{binary,y}$=Project emissions from the operation of binary geothermal power plants due to physical leakage of non-condensable gases and working fluid in year y

$PE_{dry\ or\ flash\ steam,y} = (w_{steam,\ CO2,y} + w_{steam,\ CH4,y} * GWP_{CH4}) * M_{steam,y}$ Equation 8

Where:

$w_{steam,CO2,y}$ = Average mass fraction of carbon dioxide in the produced steam in year *y* (tCO_2/t steam)

$w_{steam,CH4,y}$ = Average mass fraction of methane in the produced steam in year *y* (tCH_4/t steam)

GWP_{CH4} = Global warming potential of methane valid for the relevant commitment period (tCO_2e/tCH_4)

Msteam,y = Quantity of steam produced in year *y* (tsteam/yr).

In this project, Msteam,y equals with Minflow,y of equation 7. It is taken as 0 for ex-ante. In ex-post, it will be calculated according to the monitoring record.

$PE_{binary,y} = PE_{steam,y} + PE_{working\ fluid,y}$ Equation 9

Where:

$PE_{steam,y}$ =Project emissions from the operation of binary geothermal power plants due to physical leakage of non-condensable gases in year y. In case the difference between steam inflow and outflow to the power plant is less than 1%, then the project participants are not required to account these project emissions.

It is taken as 0 for ex-ante. In ex-post, it will be calculated according to the monitoring record.

$PE_{working\ fluid,y}$=Project emissions from the operation of binary geothermal power plants due to physical leakage of working fluid contained in heat exchangers in year y

It is taken as 0 for ex-ante. In ex-post, it will be calculated according to the monitoring record.

$PE_{steam,y} = (M_{inflow,y} - M_{outflow,y}) * (W_{steam,CO2,y} + W_{steam,CH4,y} * GWP_{CH4})$ Equation 10

Where:

$M_{inflow,y}$ =Quantity of steam entering the geothermal plant in year y.

$M_{outflow,y}$= Quantity of steam leaving the geothermal plant in year y

$W_{steam,CO2,y}$ =Average mass fraction of CO_2 in the produced steam in year y

$W_{steam,CH4,y}$= Average mass fraction of CH_4 in the produced steam in year y

GWP_{CH4}=Global warming potential of methane valid for the relevant commitment period

$PE_{working\ fluid,y} = M_{working\ fluid,y} * GWP_{working\ fluid}$ Equation 11

Where:

$M_{working\ fluid,y}$ =Quantity of working fluid leaked/reinjected in year y

$GWP_{working\ fluid}$= Global warming potential for the working fluid used in the binary geothermal power plant

The fugitive carbon dioxide and methane emissions due to continuous well testing and well bleeding are neglected according to best practice and guidance from ACM0002 methodology version 17.0

Project leakage GHG emissions

According to AMS-I.D(v18.0), *General guidance on leakage in biomass project activities shall be followed to quantify leakages pertaining to the use of biomass residues.*
This is not the case of the project, so leakage can be considered as 0.

LE_y= 0.

Emission Reductions:

The annual emission reductions are calculated as **39,358 tCO_2e** in accordance with the Equation 1 in part B.2.

Contact Information:

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Completion Date: 08/12/2017
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SECTION C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

26 June 2008 (see section B.4 for an explanation)

C.1.2. Expected operational lifetime of the project activity:

20 years, 0 months (As implied in the Communiqué for Amortisation 333 under Tax Procedural Law)[13]

C.2 Choice of the crediting period and related information:

Renewable crediting period is selected.

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the second crediting period:

01/03/2018

C.2.1.2. Length of the second crediting period:

7 years, 0 months

C.2.2. Fixed crediting period:

N/A

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

[13] http://www.vergiturk.com/teblig/vukgt333ek.htm#ust (Article 45.1.3)

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

AMS-I.D "Grid connected renewable electricity generation", version 18[14]"

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

D.2. 1. OPTION 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
ID 1	$FC_{FF,i,y}$, quantity of fuel type i combust	Plant records	(mass or volume	M/ C	Yearly	Complete	Electronic/ paper	Fuel quantity shall be either measured directly or calculated as follows as per the monitoring practice on site: $FC_{FF,i,y} = Capacity_{DE} * Top * CF$

[14] http://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

	ed during the year y		unit/ yr)					Where, $FC_{FF,I,y}$, is quantity of fuel type i combusted during the year y (tones) $Capacity_{DE}$ is installed capacity of the diesel engine (kW) T_{op} is operating time of the diesel engine in the year y (hours) CF is consumption factor for fuel (tones/ kWh) Relevant data shall be archived for a period of two years post the crediting period of the project activity.
ID 2	$NCV_{i,y,}$ weighted average net calorific value of the fuel type i in year y	Values for gas/diesel oil printed in IPCC guidelines	GJ/mass or volume unit	E	*Once every crediting period*	-	*Electronic/ paper*	Table 1.2. Default NCVs for Combustion in the Energy Industries, Vol.2. Energy, 2006 IPCC Guidelines for National Greenhouse gas inventories (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf). This data shall be fixed ex-ante for the duration of the crediting period of the project activity and shall be updated at the renewal of crediting period.
ID 3	$EF_{CO2,i,y}$ Weighted average CO_2 emission factor of fuel type I in year y	Values for gas/diesel oil printed in IPCC guidelines	tCO_2/ GJ	E	*Once every crediting period*	-	*Electronic/ Paper*	Table 1.4 .Default CO_2 Factors for Combustion in the Energy Industries, Vol.2. Energy, 2006 IPCC Guidelines for National Greenhouse gas inventories (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf). This data shall be fixed ex-ante for the duration of the crediting period of the project activity and shall be updated at the renewal of crediting period.
ID 4	$w_{steam,CO2,y}$ average mass fraction of carbon diocide in the produced steam in year y	Plant records	tCO_2/t steam	M	*At least once every 3 months*	Sample	*Electronic/ paper*	Non-condensable gases sampling would be carried out in production wells and at the steam field-power plant interface using ASTM Standard Practice plant interface E1675 for Sampling 2-Phase Geothermal Fluid for Purposes of Chemical Analysis (as applicable to sampling single phase steam only). The CO2 and CH4 sampling and analysis procedure consists of collecting non-condensable gases samples from the main steam line with glass flasks, filled with sodium hydroxide

								solution and additional chemicals to prevent oxidation. Hydrogen sulphide (H2S) and carbon dioxide (CO2) dissolve in the solvent while the residual compounds remain in their gaseous phase. The gas portion is then analyzed using gas chromatography to determine the content of the residuals including CH4. All alkanes concentrations are reported in terms of methane. Relevant data shall be archived for a period of two years post the crediting period of the project activity.
ID 5	$w_{steam,CH4,y}$	Plant records	tCO_2/t steam	M	*At least once every 3 months*	Sample	*Electronic/ paper*	Same as above
ID 6	GWP_{CH4} ,y Global warming potential of methane valid for the relevant commitment period	IPCC or relevant UNFCCC guideliens or Future COP/MPdecisions	tCO2e/ tCH4	*E*	*Once every crediting period*	-	*Electronic/ paper*	This data shall be fixed ex-ante for the duration of the crediting period of the project activity and shall be updated at the renewal of crediting period.
ID 7	$M_{steam,y}$ ($M_{inflow,y}$) Quantity of steam produced in year y	Plant records	tsteamyr	M	*Continuous*	*Complete*	*Electronic/ paper*	The steam quantity shall be measured by means of a steam flow meter (or other equipment with at least the same accuracy). In case measurements of the steam flow meter are not available, then as a conservative approach, the maximum possible steam shall be accounted as per the rated well capacity for the duration of operation. Relevant data shall be archived for a period of two years post the crediting period of the project activity.
ID8	$M_{outflow,y}$ Quantity of steam leaving the	Plant records	tsteam/yr	M	Continuous		Electronic/ paper	The outflow steam will be monitored by steam flow meter (or other equipment with at least the same accuracy). In case the measurements of the steam flow meter are not

	geothermal plant in year y							available, it will be estimated with inflow steam deducted by the possible maximum amount of steam used for electricity generation. And this is conservative.
ID9	Mworking fluid,y Quantity of working fluid leaked/reinjected in year y	Plant records	tsteam/yr	M	Continuous		Electronic/ paper	It is monitored by a steam flow meter (or other equipment with at least the same accuracy).

D.2.1.2. Data to be collected in order to monitor project performance on the most sensitive sustainable development indicators:

Sustainable Development Indicator	Data type	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
ID 10	*Access to clean energy servicies*	*Net electricity exported to the grid in the year y*	Monthly official export reports issued by TEDAS officers on the online portal or joint meter reading statements	MW	*M*	Monthly	Complete	Electronic/ paper	Only the net electricity export to the grid shall be taken into account. This means that the monitoring measurement method shall exclude electricity imported from the grid by the project activity and possible transmission losses.

ID11	*Employment(quality)*	*Number of permanent jobs created for skilled employees and job related health and safty measures undertaken*	Relevant plant records	-	*M*	Annual	Sample	Electronic/ paper	This parameter shall be established by means of the relevant plant records like employee rolls, training records, evidence of health and safety measures undertaken at the plant, reports of the in-house physician, attendance registers, etc.
ID 12	*Employment*	*Number of jobs created for construction and operation*	Relevant plant records	-	*M*	Annual	Complete	Electronic/ paper	This parameter shall be established by means of the relevant plant records like employee rolls, attendance registers, etc.
ID 13	*Human and institutional capacity*	*Number of staff trained for operation and Contribution of the project proponent to local educational institutions*	Relevant plant records	-	*M*	Annual	Sample	Electronic/ paper	This parameter shall be established by means of the relevant plant records like technical training records of local populace, evidence of contribution of project to local educational and other institutions, etc.

D.2.1.3. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.)

Please refer to section D.2.1.1.

$PE_y = PE_{FF,y} + PE_{GP,y}$ Equation 4

$PE_{GP,y} = PE_{dry\ or\ flash\ steam,y} + PE_{binary,y}$ Equation 5

$PE_{dry\ or\ flash\ steam,y} = (w_{steam,\ CO2,y} + w_{steam,\ CH4,y} * GWP_{CH4}) * M_{steam,y}$ Equation 6

$PE_{binary,y} = PE_{steam,y} + PE_{working\ fluid,y}$ Equation 7

$PE_{steam,y} = (M_{inflow,y} - M_{outflow,y}) * (W_{steam,CO2,y} + W_{steam,CH4,y} * GWP_{CH4})$ Equation 8

$PE_{working\ fluid,y} = M_{working\ fluid,y} * GWP_{working\ fluid}$ Equation 9

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
ID 14	$EG_{PJ,y}$, Net electricity exported to the grid in the year y	Monthly official electricity export reports issued by TEDAS officers on the online portal or joint meter reading statements.	*MWh*	*M*	*Monthly recording*	*100%*	*Paper*	Only the net electricity export to the grid shall be taken into account. This means that the monitoring measurement method shall exclude electricity imported from the grid by the project activity and possible transmission losses. Relevant data shall be archived for a period of two years post the crediting period of the project activity.

ID 15	$EF_{grid,CM,y}$ Combined margin CO_2 emission factor for grid connected power generation in year y	Please refer to Annex 2: baseline information	*tCO2/MWh*	*C*	*Once every crediting period*	-	*Electronic/paper*	This data shall be fixed ex-ante for the duration of the crediting period of the project activity and shall be updated at the renewal of crediting period.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.)

The equation 2 explained in B.2. section is used for baseline emissions.

$BE_y=EG_{PJ,y}*EF_{grid,CM,y}$ *Equation 2*

D. 2.2. OPTION 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
N/A								

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

Described above in section B.5.

D.2.3. Treatment of leakage in the monitoring plan

No leakage emissions are accounted for the project.

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
N/A								

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

N/A

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

See section B.2 above.

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

According to the Turkish Law and Regulations, the methods of monitoring the net electricity fed to the grid and quality control and assures are explained below:

Monitoring data is collected in accordance with the agreement[15] done between the project owner and Turkish Electricity Distribution Company (TEDAS) which provides the infrastructure for the connection to the national grid. The metering system is defined in the agreement as two groups: main counter and back up

[15] http://www.tedas.gov.tr/7,Basvuru_Detay.html

counter. The technical specifications of the power meters should be in line with Measure and Metering Devices Regulation[16] by Ministry of Industry and Trade. In addition, the Communiqué for Power Meters announced by Energy Market Regulations Authority (EMRA)[17] requires all meters to be in line with either Turkish Standards Institution[18] or International Electrotechnical Commissions Standards. The meters are placed at the point the electricity is fed to the grid and sealed on behalf of the both parties. This prevents any intervention and assures the accuracy and quality of the measurements.

The main and spare meter readings are recorded monthly and cross-checked whether calibration is required. The capacity of the transmission line connected is 34.5 kVA, the accuracy class for power meters have been defined in the Communiqué for Power Meters19 as 0.5S class. The calibration will be implemented in accordance with the related standard procedures (Please see the table below). The periodical maintenance is under the responsibility of TEDAS and has been fixed as once in 10 years in accordance with Article.9 of Measure and Metering Devices Regulation[20].

Table 10: Standards for power meters

Capacity of the transmission line	**Greater than 100 MVA**	**100 MVA -10 MVA**	**Lower than 10 MVA**
Active power meters	IEC-EN 60687 0.2S class	IEC-EN 60687 0.5S class	IEC-EN 60687 0.5 class
Reactive power meters	IEC-EN 61268 2 class	IEC-EN 61268 2 class	IEC-EN 61268 2 class

Data *(Indicate table and*	Uncertainty level of data	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.

[16] http://www.mevzuat.adalet.gov.tr/html/21179.html

[17] http://www.epdk.gov.tr/mevzuat/teblig/elektriksayac.htm

[18] http://www.tse.org.tr/english/tsedefault1.asp

[19] http://www.epdk.gov.tr/mevzuat/teblig/elektriksayac.htm

[20] http://www.mevzuat.adalet.gov.tr/html/21179.html

ID number e.g. 3.-1.; 3.2.)	(High/Medium/Low)	
ID 1	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to b reliable. The measuring and testing equipments shall be calibrated regularly as per the internal schedule.*
ID 2	*Low*	*Data shall be obtained from genuine public domain and/or national government sources.*
ID 3	*Low*	*Data shall be obtained from genuine public domain and/or national government sources.*
ID 4	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to b reliable. The measuring and testing equipments shall be calibrated regularly as per the internal schedule.*

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
ID 5	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to be reliable.* *The measuring and testing equipments shall be calibrated regularly as per the internal schedule.*
ID 6	*Low*	*Data shall be obtained from genuine public domain and/or national government sources.*
ID 7	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to be reliable. The measuring and testing equipments shall be calibrated regularly as per the internal schedule.*
ID 8	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to be reliable. The measuring and testing equipments shall be calibrated regularly as per the internal schedule.*
ID 9	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to be reliable. The measuring and testing equipments shall be calibrated regularly as per the internal schedule.*
ID 10	*Low*	*Please refer to the above explanations in this section.*
ID 11	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to be reliable.*
ID 12	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to be reliable.*
ID 13	*Low*	*Data shall be sourced from the plant records that are updated and reviewed regularly, hence are established to be reliable.*
ID 14	*Low*	*Please refer to the above explanations in this section.*
ID 15	*Low*	*Data shall be obtained from genuine public domain and/or national government sources.*

D.4. Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

Monitoring Equipment and program

The electric energy metering equipments include two electric energy meters (or kilowatt meter) located at DORA-II substation by TEDAŞ
The electricity recorded by the electric energy meter suffices for the purpose of billing and emission reduction verification. The monitoring process is as follows:

Starting from December 2009, a new system of monitoring the electricity export has been introduced all across Turkey. Under the new procedures, the energy meters measuring electricity export are connected to the TEDAS system and online meter reading are taken by TEDAS officials. Copies of the periodic break-up of electricity data are also provided to the project owner in a soft copy format, based on which an invoice is raised by the company. Occasional visits are also made by the TEDAS officials to the site for inspection and performance checking of the energy meters. This method of online meter reading is comparatively more efficient, reliable, consistent and accurate, as it eliminates the degree of human error and ensures consistency of monitoring practices as well as effective management of time and resources.

The meter reading, the SCADA system storage data file, the monthly reports and sales receipts will be readily accessible for the verification entity.

Data Management

The Project Owner properly keeps the printout of the monthly records of the amount of supplied electricity to the grid as well as the firsthand record of the electricity supplied to the grid by the internal SCADA system. Besides that, the Project Owner collects sales receipts for the power delivered to the grid as a crosscheck. At the end of each crediting year, the Project Owner compiles a monitoring report. Physical documentation for the monitoring process, such as paper-based maps and diagrams, are collected in a central place, together with the monitoring plan. The Project Owner stores all paper-based information.

All data records will be kept for a period of at least 5 years following the end of the second crediting period.

Data quality assurance and data replacement procedures

The calibration and maintenance of the two power meters in the Dora-II GPP are done by Turkish Electricity Distribution Company (TEDAS). Both meters are jointly inspected and sealed on behalf of the officers and the plant operator. They are not interfered with by either party except in the presence of the other party. If the primary TEDAS meter fails, then data from the TEDAS spare meter are used. If both meters fail, conservative data substitution procedures based on the DORA-II internal SCADA system will be used.

D.5 Name of person/entity determining the monitoring methodology:

Contact Information:

Contact person: Lixiang Hu: x.hu@southpole.com
Entity: South Pole Carbon Asset Management Ltd.: www.southpolecarbon.com

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

The project activity is generation of electricity from renewable resources and does not result any GHG emissions. However, minor project emissions have been considered.

E.2. Estimated leakage:

No leakage can be attributed to the project activity.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

The sum of the project activity emissions is 1,522 tCO_2e per annum.

STEAM DATA

Average steam flow quantity	tonnes/ hr	14.6
Total steam annually	tonnes/ year	127,896

Steam NCG Test Results[39]

Composition of Steam	Sample 1 % weight	Sample 2 % weight	Composition of Dry Gas	Sample 1 % weight	Sample % weigh
Weight fraction of H_2O	99.12	98.97	CO_2	98.6905	98.8851
Weight fraction of Dry Gas	0.88	1.03	CH_4	0.5916	0.4875

Project Emissions

GHG Emissions from NCGs

$W_{steam,CO2,y}$	0.0094	tonnes/ tonne steam
$W_{steam,CH4,y}$	0.0001	tonnes/ tonne steam
GWP_{CH4}	25	
Msteam,y	127896	tonnes/hr
GHG emissions = $(w_{steam,CO2,y} + w_{steam,CH4,y} * GWP_{CH4}) * Msteam,y$	1,522	tCO_2e

GHG EMISSIONS FROM DIESEL ENGINE

GHG Emissions from Diesel Engine have not been considered in ex-ante 0 tCO_2e

GHG emission reduction calculations as it is envisaged that the diesel engine shall be used only in emergency situations. Hence the same shall be monitored during operation and accounted in the ex-post GHG emission reduction calculations as per the usage of the diesel engine

TOTAL PROJECT EMISSIONS

Total Project Emissions 1,522 tCO2e

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

The carbon emission factor for Turkey has been calculated as 0.584 tCO_2e/MWh. The annual electricity production of the project has been estimated as 70,000 MWh. Therefore, baseline emissions are 40,880 tCO_2e.

Baseline Emissions Calculations			
Sl. No.	**Item**	**Unit**	**Value**
1	Net Electricity Export	MWh/ year	70,000
2	Grid Emission Factor	tCO2/ MWh	0.588
3	**Baseline Emissions**	**tCO2/ year**	**40,880**

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

The overall annual emission reduction for the project is 39,358 tCO_2e.

E.6. Table providing values obtained when applying formulae above:

Year	Estimation of project activity emission reductions (tonnes CO_2 e)	Estimation of baseline emission reduction (tonnes CO2 e)	Estimation of leakage (tonnes CO_2 e)	Estimation of emission reductions (tonnes CO_2 e)
Mar. 1st , 2018 to Dec. 31th ,2018	1,268	34,067	0	32,798
January 2019 to December 2019	1,522	40,880	0	39,358
January 2020 to December 2020	1,522	40,880	0	39,358
January 2021 to December 2021	1,522	40,880	0	39,358

January 2022 to December 2022	1,522	40,880	0	39,358
January 2023 to December 2023	1,522	40,880	0	39,358
January 2024 to December 2024	1,522	40,880	0	39,358
Jan. 1st 2025 to Feb. 28th 2025	254	6,560	0	6,559
Total	**10,654**	**286,160**	**0**	**275,506**

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The EIA-exemption letter for the project has been issued by Ministry of Environment and Forest on 23.12.2007 with No:2008/05 (Annex.4).

There will be no waste water discharge as a result of the operation of power plant. The brine used will be re-injected to the underground for the continuation of the resources.

Water supply for the need of workers during the construction phase and the employees during operational phase will be taken from the supply line of the city. The wastewater will be discharged into a septic tank which will be emptied and carried away by the vehicles of the municipality. Similarly, solid waste which will be formed during construction and operational phases will be collected and disposed to the landfill site.

During construction, the maintenance of the heavy construction machines will be handled carefully in order to avoid oil leakage to the ground. Mud containing bentonite will be used during drilling activities in order to protect the machinery and it has been defined as hazardous waste depending on the bulk amount of the mud. If the amount of mud used reaches the threshold value defined in "Hazardous Waste Management Regulation", that mud will be disposed accordingly. Otherwise, the mud will be disposed in accordance with "Solid Waste Management Regulation".

The total dust formed during the works of the plant is calculated to be 0.092 kg/hr which is rather below the threshold limit defined in the law (1.5 kg/hr). Necessary precautions defined in the "Air Pollution Control in Industrial Sites regulation" are:

- Forming soil piles, structures or plantation in order to abandon wind,
- Covering the top of the carriers,
- Careful loading and unloading,
- Covering top of the materials with nylon canvas,
- Keeping the excavated bulk in 10% humidity
- Irrigating the roads.

The noise pollution in construction and operation are calculated to be below the threshold limit defined in the regulations. The machinery will be maintained periodically in order to keep the noise level low.

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

No significant impact has been considered significant as a result of the preliminary environmental impact assessment and EIA-Exemption letter has been issued by Ministry of Environment and Forestry.

SECTION G. Stakeholders' comments

G.1. Brief description how comments by local stakeholders have been invited and compiled:

In the first crediting period, the initial stakeholder consultation and main stakeholder consultation were implemented, with detail as follows. In the second crediting period, the initial stakeholder consultation will be done as soon as possible. The renewal PDD will be uploaded on the website of http://www.thesouthpolegroup.com/gold-standard-and-other-stakeholder-consultations for a period of two months, as well as mailed to main stakeholders for stakeholder feedback round consultation. The process and results will be added in the renewal PDD before the final validation report is finished.

Initial Stakeholder Consultation:

The initial stakeholder consultation meeting was held on 20 May 2008 by the Project Owner Menderes Geothermal Elektrik A.Ş. with the assistance of South Pole Carbon Asset Management Ltd. and its local partner Al Enerji. The meeting place was Dora-1 Power plant Conference Room in Aktaskiri site, Yavuzkoy, Aydın.

According to the Gold Standard requirements, local stakeholders were identified including local people, local and national NGOs, project developers and entities involved in implementation and operation of the project activity. A list of project participants invited for the stakeholder consultation meeting is presented in the stakeholder meeting report. Those stakeholders have been invited either by E-mail, fax or telephone calls asking for participation in the public meeting and for submission of comments on the project. The head of the village has been contacted to invite all the villagers to the meeting and women attendees are encouraged to attend. Furthermore, documents have been made available for download on the homepage of South Pole Carbon Asset Management Ltd (www.southpolecarbon.com).

A formal invitation was sent to representatives of Gold Standard supporting organizations in Turkey and international Gold Standard supporting organizations on April 29, 2008. Besides the invitation to the meeting, the documentation that was sent out included a description of the project, a summary of the social and environmental impacts, the Sustainable Development Matrix and the Gold Standard questionnaire.

Figure.7. A scene from the initial stakeholder's meeting

Mr. Haluk Tüfekcioglu, General Manager of Menderes Geothermal Elektrik Üretim A.Ş. opened the meeting by explaining the objective of the consultation. He further conducted a presentation in order to explain the project activity in a simple and non-technical language. The presentation included the project specification and an explanation about the geothermal reservoir "Menderes Graben", the environmental implications of geothermal energy as a renewable energy source, and the functionality of the geothermal technology as proposed to be employed in the planned project activity. He also gave a brief information about Menderes Geothermal Elektrik Üretim A.Ş. and the first privately financed geothermal project developed by the Project Owner. Afterwards, Mr. Baris Ergun from Al Enerji, talked about the purpose of the meeting and the special implications and requirements of the Gold Standard and carbon credit development. He explained the special features of sustainable development and its social, environmental and economical implications related with the project. Upon explaining the scoring and indicators of the Sustainable Development Matrix, the participants were asked to fill down the forms.

The following documents have been distributed to the participants:

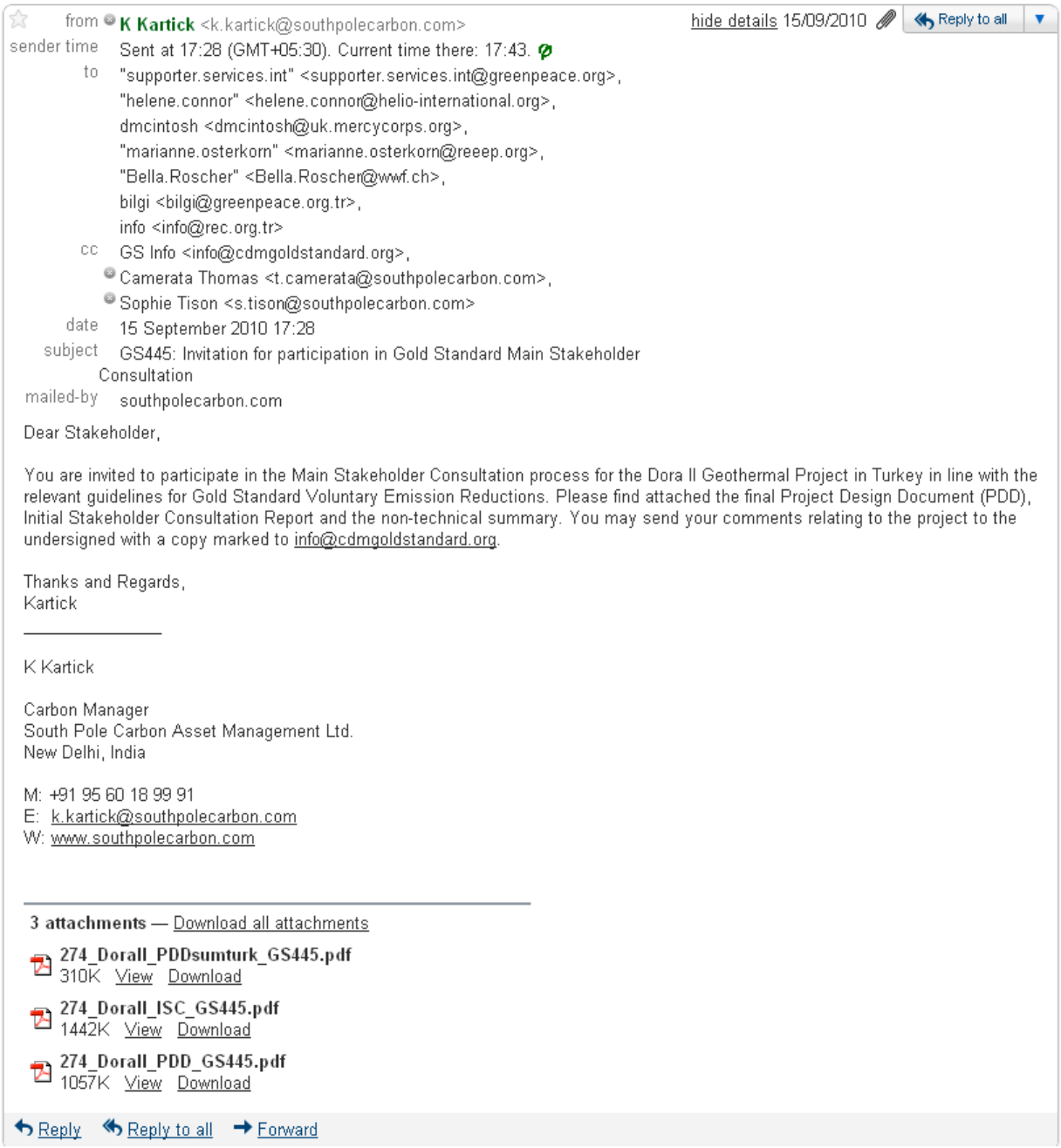
- Non-technical summary of the Project
- Documentation on social and environmental impacts of the project
- Sustainable Development Matrix (Box 3, Section 3.4.1 of the Gold Standard Project Developer's Manual)
- Questionnaire (Appendix E of Gold Standard, checklist)

- Presence list
- Notes for additional comments on the project activity

These documents are attached to the Appendices to the initial stakeholder meeting report. The questionnaires have been collected at the end of the meeting.

Main Stakeholder Consultation:

The project activity underwent another (final) round of stakeholder consultation, wherein the project documents were uploaded on the Project Proponent website (http://www.southpolecarbon.com/dev-gold.htm) for a period of two months, as well as mailed to several stakeholders (mail by South Pole Carbon official Mr. K. Kartick with a copy marked to the Gold Standard Foundation is provided below) for the purpose of inviting comments.



GS445: Invitation for participation in Gold Standard Main Stakeholder Consultation Inbox | x

from **K Kartick** <k.kartick@southpolecarbon.com> hide details 15/09/2010 Reply to all

sender time Sent at 17:28 (GMT+05:30). Current time there: 17:43.

to "supporter.services.int" <supporter.services.int@greenpeace.org>,
"helene.connor" <helene.connor@helio-international.org>,
dmcintosh <dmcintosh@uk.mercycorps.org>,
"marianne.osterkorn" <marianne.osterkorn@reeep.org>,
"Bella.Roscher" <Bella.Roscher@wwf.ch>,
bilgi <bilgi@greenpeace.org.tr>,
info <info@rec.org.tr>

cc GS Info <info@cdmgoldstandard.org>,
Camerata Thomas <t.camerata@southpolecarbon.com>,
Sophie Tison <s.tison@southpolecarbon.com>

date 15 September 2010 17:28

subject GS445: Invitation for participation in Gold Standard Main Stakeholder Consultation

mailed-by southpolecarbon.com

Dear Stakeholder,

You are invited to participate in the Main Stakeholder Consultation process for the Dora II Geothermal Project in Turkey in line with the relevant guidelines for Gold Standard Voluntary Emission Reductions. Please find attached the final Project Design Document (PDD), Initial Stakeholder Consultation Report and the non-technical summary. You may send your comments relating to the project to the undersigned with a copy marked to info@cdmgoldstandard.org.

Thanks and Regards,
Kartick

K Kartick

Carbon Manager
South Pole Carbon Asset Management Ltd.
New Delhi, India

M: +91 95 60 18 99 91
E: k.kartick@southpolecarbon.com
W: www.southpolecarbon.com

3 attachments — Download all attachments

274_Dorall_PDDsumturk_GS445.pdf
310K View Download

274_Dorall_ISC_GS445.pdf
1442K View Download

274_Dorall_PDD_GS445.pdf
1057K View Download

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G.2. Summary of the comments received:

Initial Stakeholder Consultation:

The participants have been asked to fill in the checklist, if they have any comments on the social and environmental aspects. The questions and requests were welcomed and answered by the Project Owner.

Except of the consultation meeting, no comments have been received through other media.

The questions raised were mainly about employment issues and about the general impacts and outcomes for the village community, which was a reaction to the lack of industries and job opportunities in the region. The Project Owner mentioned about the additional benefits already done for the village, such as the installation of road lighting to Yavuzköy that contributed to the safety of the village inhabitants. The access road is being maintained constantly and has already been extended. For the construction of the Dora-2 GPP, local people will be employed for both construction and operation of the plant. The new employees will be trained with respect to the technology and security staff will be hired, trained and certified.

For the impacts to the local environment, The Project Owner seeks to create a closed cycle in order to avoid leakage due to the project activity. The possible alternatives for a productive usage of the waste heat are considered, which include the utilization of waste heat for local bathes, greenhouse and mosque heating for benefit of the local community. These alternatives will be assessed and their feasibility will be tested taking into account the impacts on the geothermal reservoir and work efforts to be carried out on a civil works side.

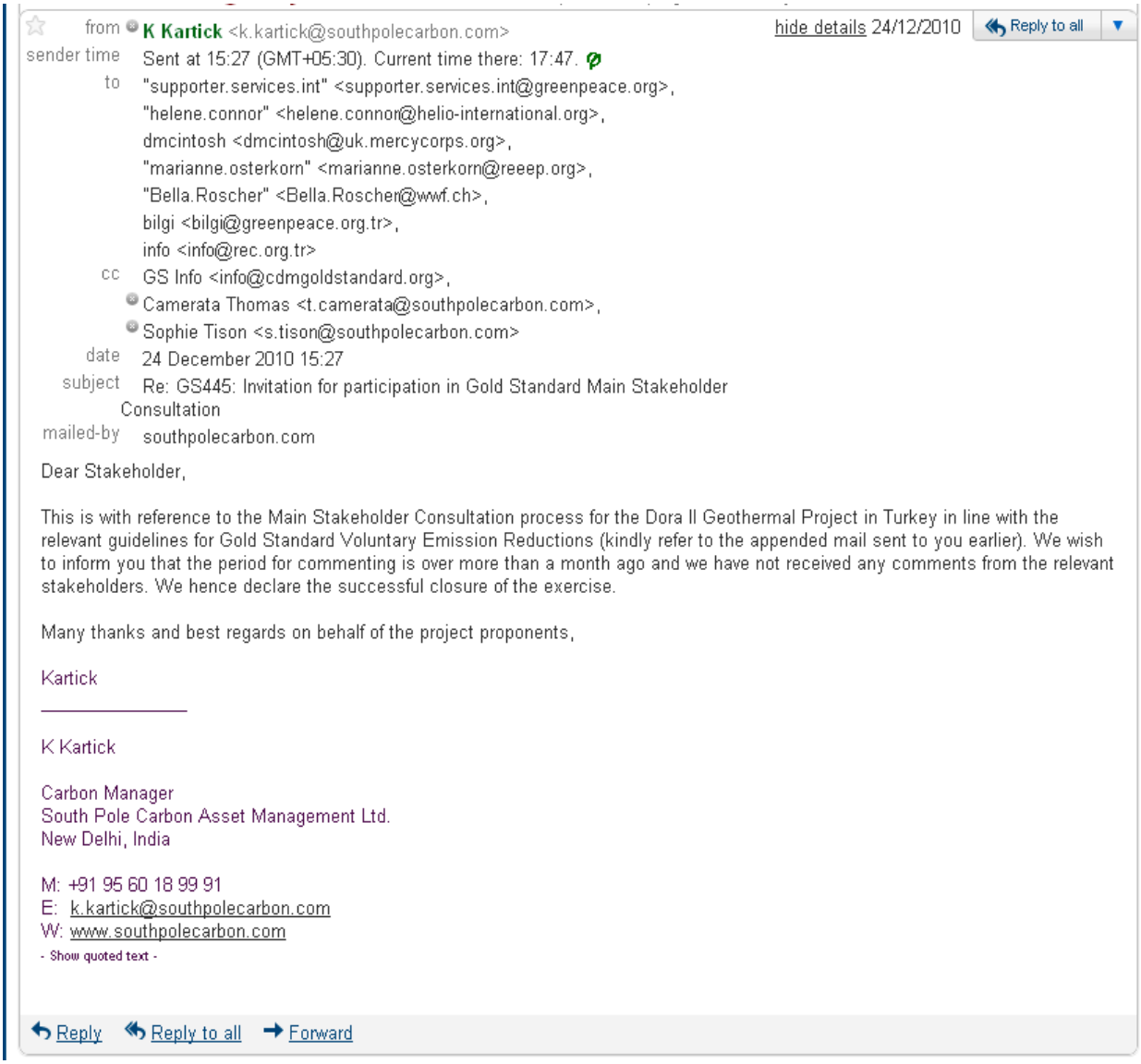
One of the participants asked for the impacts of the test wells and whether there could be any adverse impact on the Menderes River due to geothermal brine released to the surface while testing the wells. Mr. Tüfekcioglu said that the project activity is located in a secure distance to the river and that no uncontrolled discharge of geothermal water to the river will take place. The brine will be collected in a pool that will be dug by the Project Owner to cool down and will then be either re-injected (which will be known after knowing about the exact conditions of the reservoir) or discharged to the river in a slow and controlled manner to avoid critical concentrations of salty water. Further he explained, that testing of wells is a necessary step for the assessment of functionality of the site. It cannot be avoided and it will not expose the environment and the villagers to any mid- and long-term threat. If re-injection is considered as technologically not feasible (it has been found out to be feasible when the drilling was completed) the geothermal brine will be released for a period of 5 days as described above, which is considered as negligible taking into account the project lifetime of 20 years. One of the stakeholders advised the Project Owner to overcome that problem by doing test activities through the rain seasons, which already has been considered to keep the brine concentration to a minimum. Hence, any serious pollution will be avoided.

The sustainable development matrix has been explained and distributed to the participants. Four participants have scored the matrix and only positive scores, *i.e.*, no negative scores have been received.

10 questionnaires were turned in out of 12 participants and most of them have been partially filled in. There was only one issue highlighted by the participants. Question number 16 (“Will the project result in social changes, for example in demography, traditional lifestyles, employment?”) has 9 times been answered with “yes” as the community acknowledged the job opportunities resulting from the proposed project.

Main Stakeholder Consultation:

No comments were received in any form from any of the stakeholders invited to participate in the stakeholder consultation. The same was also intimated by mail to the stakeholders who were invited (mail by South Pole Carbon official Mr. K. Kartick with a copy marked to the Gold Standard Foundation is provided below).



from **K Kartick** <k.kartick@southpolecarbon.com> hide details 24/12/2010 Reply to all

sender time Sent at 15:27 (GMT+05:30). Current time there: 17:47.

to "supporter.services.int" <supporter.services.int@greenpeace.org>,
"helene.connor" <helene.connor@helio-international.org>,
dmcintosh <dmcintosh@uk.mercycorps.org>,
"marianne.osterkorn" <marianne.osterkorn@reeep.org>,
"Bella.Roscher" <Bella.Roscher@wwf.ch>,
bilgi <bilgi@greenpeace.org.tr>,
info <info@rec.org.tr>

cc GS Info <info@cdmgoldstandard.org>,
Camerata Thomas <t.camerata@southpolecarbon.com>,
Sophie Tison <s.tison@southpolecarbon.com>

date 24 December 2010 15:27

subject Re: GS445: Invitation for participation in Gold Standard Main Stakeholder Consultation

mailed-by southpolecarbon.com

Dear Stakeholder,

This is with reference to the Main Stakeholder Consultation process for the Dora II Geothermal Project in Turkey in line with the relevant guidelines for Gold Standard Voluntary Emission Reductions (kindly refer to the appended mail sent to you earlier). We wish to inform you that the period for commenting is over more than a month ago and we have not received any comments from the relevant stakeholders. We hence declare the successful closure of the exercise.

Many thanks and best regards on behalf of the project proponents,

Kartick

K Kartick

Carbon Manager
South Pole Carbon Asset Management Ltd.
New Delhi, India

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G.3. Report on how due account was taken of any comments received:

As no major environmental concerns were raised during the entire initial stakeholder consultation process, it was not necessary to make any changes to the Project design, nor to incorporate any additional

measures to limit or avoid negative environmental impacts. The attendees do not expect any negative impacts on the socio-economic environment stemming from the Project either. It can be summarized that there has been a great awareness of the positive effects and side effects of the Project among the participants. This has lead to a very supportive atmosphere.

It is evident from the stakeholder consultation process result, that the project is perceived as a positive example for the renewable energy sector in Turkey and that it contributes to sustainable development of the region.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Menderes Geothermal Elektrik Uretim A.S.
Street/P.O.Box:	Adnan Menderes Mah. Muğla Karayolu
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URL:	http://www.megeelektrik.com.tr/
Represented by:	Haluk Murat Tufekcioglu
Title:	Manager
Salutation:	Mr.
Last Name:	Tufekcioglu
Middle Name:	Murat
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Direct FAX:	
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State/Region:	
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FAX:	
E-Mail:	info@southpolecarbon.com
URL:	http://www.southpolecarbon.com
Represented by:	Thomas Camerata
Title:	Managing Partner
Salutation:	Mr.
Last Name:	Camerata

Middle Name:	-
First Name:	Thomas
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	t.camerata@southpolecarbon.com

Annex 2

BASELINE INFORMATION

In accordance with the selected methodology (AMSI.D), baseline emission is the electricity produced by the renewable generating unit multiplied by an emission factor as defined in section B.2. by the equation:

$BE_y = EG_{PJ,y} * . EF_{grid,CM,y}$ **Equation.2**

Parameter	SI Unit	Description
BE_y	tCO_2e	Baseline Emission in year y
$EF_{grid,CM,y}$	tCO_2e/MWh	Combined margin CO_2 emission factor for grid connected power generation in year y
$EG_{PJ,y}$	MWh/year	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of CDM project activity in year y

The emission factor is calculated using option (a).

(a): A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the „Tool to calculate the emission factor for an electricity system'(hereafter referred to as the Tool).

STEP 1. Identify the relevant electricity systems.

Turkish interconnected electricity grid comprises all the power plants connected together serving the whole country. The power plants could be dispatched without significant transmission losses. Therefore, the spatial boundary is selected as national electricity grid for the project.

In order to determine the CO_2 emission factor for net electricity imports from a connected electricity system within the same host country, the following options are available:

a) $0tCO_2/MWh$,or
b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4, if the conditions for this method, as described in step 3 below, apply to the exporting grid;or
c) The simple adjusted operating margin emission rate or of the exporting grid, determined as described in Step 4 below; or
d) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 below.

Option b) has been chosen for the calculations.

STEP 2. Choose whether to include off-grid power plants in the project electricity system(optional).
"Option I: Only grid power plants are included in the calculation. " has been chosen.

STEP 3. Select a method to determine the operating margin (OM).

In order to calculate the emission factor, "Tool to calculate the emission factor for an electricity system" version 06.0 has been used. Four different methods for the calculation of the operating margin are proposed by the tool:

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch Data Analysis OM; or
(d) Average OM.

The simple OM method only can be used when low-cost/must run resources constitute less than 50% of total amount of grid generating output 1) in the recent five years, or 2) by taking into account long-term normal for hydroelectricity generation.

Table 11 shows the share of primary sources in electricity generation for the five most recent years. There are no nuclear power plants in Turkey and there is no indication that coal is obviously used as a must run. Therefore; hydro and other renewable energy sources are accepted as low cost/must run sources and their share is below 50%. In accordance with the Tool, (a) Simple OM method will be used in the calculations. Simple adjusted OM and Average OM methods are not applicable due to data constraints. Dispatched Data analysis Method is also not applicable as there is no hourly dispatch data is publicly available for Turkish grid.

Table 11 – Share of primary sources in electricity generation, 2011– 20015

	2011	2012	2013	2014	2015
Hydro	52,338.6	57,865.0	59,420.5	40,644.7	67,145.8
Wind	4,723.9	5,860.8	7,557.5	8,520.1	11,652.5
Geothermal	694.4	899.3	1,363.5	2,364.0	3,424.5
Solar	0.0	0.0	0.0	17.4	194.1
Renewable Wastes+waste heat	469.2	720.7	1,171.2	1,432.6	1,758.2
Renewable total	58,226.1	65,345.8	69,512.7	52,978.8	84,175.1
Total electricity	229,395.1	239,496.8	240,154.0	251,962.8	261,783.3
Share of primary sources	25.4%	27.3%	28.9%	21.0%	32.2%

Data source:
Annual development of renewable electricity generation share in Tuekey total electricity generation 2000-2016 (https://www.teias.gov.tr/tr/iii-elektrik-enerjisi-uretimi-tuketimi-kayiplar)

For the data vintage, the ex-ante option is selected and 3 year-generation-weighted average based on the most recent data available is used as data vintage.

STEP 4. Calculate the operating margin emission factor according to the selected method.

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low cost must run power plants. Two options are offered based on the data available:

- Option A : Based on the net electricity generation and a CO_2 emission factor of each power plant / unit , or
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:
(a) The necessary data for Option A is not available; and

(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and

(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

Since there is no power plant specific data available for every power plant Options A is not applicable for the calculation. There is no nuclear power plant in Turkey and renewable power generation is considered to be low cost/must-run power sources and the quantity of electricity supplied to the grid by those sources is known. Off-grid power plants are not included in the calculations as well. Therefore; Option B has been selected.

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} * NCV_{i,y} * EF_{CO2,i,y}}{EG_y}$$ **Equation.12**

Parameter	Definition
$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	Amount of fossil fuel type *i* consumed in the project electricity system in year y (ton or $1000m^3$)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type *i* in year y (GJ/ton or TJ/mil m^3)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type *i* in year y (tCO_2/GJ)
EG_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including lc-mr power plants, in year y (MWh)
i	All fossil fuel types combusted in power sources in the project electricity system in year y
y	Relevant year as per the data vintage chosen in Step 3

Net Calorific Values could be calculated by annual heating values for each fuel type divided by the fuel consumption for each year. NCV values for each year have been calculated. This approach gives more country specific values for OM calculations.(Table.12).

Table 12: Net Calorific Values for each fuel type for Turkey

Fuel Type	NCV (TJ/kt)		
	2013	2014	2015
Hard Coal+ Imported Coal	23.79	23.93	24.08
Lignite	7.26	7.11	7.16
Fuel Oil	42.61	41.32	44.22
Diesel Oil	44.11	43.44	43.78
Natural Gas	3714	37.49	37.84

Data source:
Fuels consumed in thermal power plants in Turkey by the electric utilities *2006-2016*(https://www.teias.gov.tr/tr/iv-turkiye-termik-santrallarinda-kullanilan-yakit-miktarlari-isil-degerleri-ve-kojenerasyon)
Heating values of fuels consumed in thermal power plants in Turkey by the electrici utilities 2006-2016(https://www.teias.gov.tr/tr/iv-turkiye-termik-santrallarinda-kullanilan-yakit-miktarlari-isil-degerleri-ve-kojenerasyon)

There are no country specific coefficients available for the power plants in order to estimate CO_2 emission factor (tCO2/TJ). Therefore; the lower values for CO_2 emission coefficient from IPCC 2006 guidelines for GHG inventories[21] have been used. The total CO_2 emissions generated by electricity generation have been approximately 286.5 million tonnes CO_2 during years 2012-2014.

Table 13- Calculation of emission by electricity generation (2013-2015)

Fuel	Lower COEF[22] ($kgCO_2/TJ$)	Total Fuel Consumption (t or m^3)			Total Emission (2013 - 2015) (tCO_2)
		2013	2014	2015	
Hard Coal+ Imported Coal	92,800	12105930	14501934	16,629,492	96,078,062.99
Lignite	90,900	47120306	57696139	49,940,131	100,857,343.3
Fuel Oil	75,500	573534	754283	66,569,623	5,923,843.48
Diesel Oil	72,600	129359	119988	516,912	1,550,435.17
LPG	61,600	0	0	238,388	0
Naphtha	69,300	0	0	0	0
Natural Gas	54,300	22909746	50426014	0	140,930,850.93

[21] Table 2.2.Default Emission Factors for Stationary Combustion in the Energy Industries, Vol.2. Energy, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf)

[22] 2006IPCC Guidelines for National Greenhouse Gas Inventories (https://www.ipcc-nggip.iges.or.jp/public/2006gl/)

Total Emissions				345,340,535.86

In order to estimate net electricity generation by thermal power plants, the ratio between total gross and total net generation (including low-cost/must run plants) has been calculated for each year. The same ratio is assumed to be valid for the thermal power plants. Summing up total net generation with the imported electricity, total supply excluding low cost / must run sources for each year is determined and given in Table 14.

Table. 14: Net Electricity Generation from thermal power plants (units in GWh)

Year	Gross generation [23] (GWh)	Net generation (GWh)	Net/ Gross	Gross Gen. Thermal	Net Gen Thermal	Import	Total Supply to the grid(GWh)
2013	240154.0	228977.0	0.953	171813.000	163816.7	7429.4	171,246
2014	251962.8	239448.8	0.950	200417.000	190463.1	7953.3	198,416
2015	261783.3	249899.5	0.955	179366.000	171223.6	7135.5	178,359
			Total Net Thermal Generation		525503.3	22518	548022.0

Data source of gross generation thermal *: Annual development of electricity generation, heat generation and fuels consumed in cogeneration power plants in Turkey 2007-2016 (https://www.teias.gov.tr/tr/iv-turkiye-termik-santrallarinda-kullanilan-yakit-miktarlari-isil-degerleri-ve-kojenerasyon)*
Data source of other parameters: *Annual development of electricity generation-consumption and losses in turkey1993-2016 (https://www.teias.gov.tr/tr/iii-elektrik-enerjisi-uretimi-tuketimi-kayiplar)*

The OM electricity factor for the Turkish national grid as described above has been found to be:

$EF_{grid,OMsi}$ *345340536tCO₂ / 548022 GWh= 0.630 tCO₂/MWh.*

STEP 5. Calculate the build margin (BM) emission factor.

In terms of vintage of data , there two options defined:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the

23
https://www.teias.gov.tr/tr/iv-turkiye-termik-santrallarinda-kullanilan-yakit-miktarlari-isil-degerleri-ve-kojenerasyon

build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 is selected for the data vintage.

The sample group of power units m used to calculate the build margin are determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently (SET5-units) and determine their annual electricity generation (AEGSET-5-units, in MWh);
The most recently 5 power plants can be seen from the Energy Ministries website[24]. However, the electricity generation of each plant is no longer provided by the website. Therefore, electricity generation of each power plant and each fuel is calculated with the installed capacity and operation time estimated by the database from TEIAS website.

Table 15. The latest plants capacity in 2015[25]

Name of plant	Type of fuel	Commissioning date	Generation capacity (MW)
İÇDAŞ BİGA RES	wind	31/12/2015	12.8
UMURLU JES	geothermal	30/12/2015	9.72
ITC-KA ELAZIĞ ÜRETİM TESİSİ	biomass	30/12/2015	2.83
HANAK HES	Hydropower	29/12/2015	5.139
ALPERTEKS SANTRALİ	Diesel	25/12/2015	4.290
Total			34.779

(b)Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20 per cent of AEGtotal (if 20 per cent falls on part of the generation of a unit, the generation of

[24] http://www.enerji.gov.tr/tr-TR/EIGM-Raporlari

[25] http://www.enerji.gov.tr/tr-TR/EIGM-Raporlari

that unit is fully included in the calculation) (SET≥20 per cent) and determine their annual electricity generation (AEGSET-≥20 per cent, in MWh);

For determination of plants that comprise 20% of the system's generation, gross generation in year 2015 which is 261,783GWh has been taken as reference and its 20% has been determined as about 52,357GWh. Summing up the capacity additions through 2015 to 21/06/2013, an amount of 50242GWh is reached. Since 20% of the most recent year's generation falls partly on capacity of a plant, this plant was fully included in the calculations as requested by the methodological tool applied. Thus, total capacity included in BM calculation has increased to 55824 GWh.

(b) From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SETsample); Identify the date when the power units in SETsample started to supply electricity to the grid. If none of the power units in SETsample started to supply electricity to the grid more than 10 years ago, then use SETsample to calculate the build margin. In this case ignore steps (d), (e) and (f).

SET≥20% is selected as (SETsample) because the set of power units that comprises the larger annual electricity generation. (Even if each power plant operates 8760h per year, the total electricity generation of the SET5-units is 306GWh, less than 52357GWh) . There is no power units in SETsample started to supply electricity to the grid more than 10 years ago. Therefore the steps (d), (e) and (f) are ignored.

STEP 6. Calculate the build margin emission factor.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \textbf{Equation.13}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/MWh).
$EG_{m,y}$= Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh).
$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
m = Power units included in the build margin.
y = Most recent historical year for which power generation data is available.

Table 16. Calculation of emission factor from most recent power plants

Fuel type	Emission factor[26] (tCO_2/GJ)	Efficiency[27]	Emission factor (CO_2/MWh)

[26] The lower value of 95% confidence interval from 2006IPCC Guidelines for National Greenhouse Gas Inventories (https://www.ipcc-nggip.iges.or.jp/public/2006gl/)

[27] Default value from Determining the baseline efficiency of thermal or electric energy generation systems(v02.0)

Coal	0.0946	40%	0.851
Lignite	0.0909	39%	0.838
Fuel Oil	0.0755	42%	0.647
Diesel Oil	0.0726	42%	0.622
LPG	0.0616	39%	0.568
Naphta	0.0693	39%	0.639
Natural Gas	0.0543	62%	0.315

The electricity generation of each power plant is not founded in public website of Turkey. However, installed capacity, commissioning date, fuel type can be searched from Energy Ministries website.
The total electricity generation of each fuel in Turkey can be found fromTEIAS website.Therefore, the average operation hours can be calculated. With the average operation hour and installed capacity, the electricity generation of each power plant is calculated.

The build margin emission factor has been determined for the most recent capacity additions as shown in table below.

Table 17. Most recent capacity additions corresponding to 20% by fuel source

Fuel type	Most recent power plant electricity generation in 2015 (MWh)			Total (MWh)	Emission factor (CO_2/MWh)	Emission (tCO_2)
	power plants commissioned in 2013	power plants commissioned in 2014	power plants commissioned in 2015			
Coal	0	15,050,000	125,465	15,175,465	0.835	12,671,513
Lignite	0	473,480	70,500	543,980	0.838	455,855
Fuel Oil	0	49,280	0	49,280	0.647	31,884
Diesel Oil	17,425,485	11,809,490	638,556	29,873,531	0.622	18,581,336
LPG	0	0	0	0	0.568	0
Naphta	0	0	0	0	0.639	0
Natural Gas	0	0	0	0	0.315	0
Renewable	3,825,383	4,132,338	2,223,909	10,181,630	0.000	0
Total	21,250,868	31,514,588	3,058,430	55,823,886		31,740,588

Finally, by summing up the weighted EF values, overall build margin emission factor have been calculated as:

$EF_{grid, BM, y}$ =31,740,588/55,823,886=0.569tCO_2/MWh

Step 6. Calculate the combined margin (CM) emissions factor.

$EF_{grid, CM, y} = w_{OM}^{*} EF_{grid, OM, y} + w_{BM}^{*} EF_{grid, BM, y}$ Equation 14

Where

$EF_{grid,BM,y}$=Build margin CO_2 emission factor in year y (t CO_2/MWh)

$EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (t CO_2/MWh)

$w_{OM=}$ Weighting of operating margin emissions factor (per cent) . 0.25 for the second and third crediting period

$w_{BM=}$ Weighting of build margin emissions factor (per cent) . 0.75 for the second and third crediting period

$EF_{grid,CM,y}$ = 0,630 tCO_2/MWh * 0.25 + 0,569 tCO_2/MWh * 0.75 = **0,584 tCO_2/MWh**

Annex 3

MONITORING PLAN

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emissions reductions during the whole crediting period. The Project Owner is mainly responsible for the implementation of the monitoring plan.

Monitoring Objective
The main parameter to be monitored for emission reduction calculations is the amount of net electricity supplied to the grid since the baseline emission factor is fixed by ex-ante calculations.

The methodology requires the electricity produced by fossil fuel to be deducted from the total emission reductions. There will be diesel generator for emergency cases when the power plant is not working and no electricity could be imported from the existing grid. This is a very rare situation throughout an operational year. Nevertheless, in order to follow up a conservative approach, the operating hours of the diesel engine will be monitored and the emission caused by the engine will be deducted in case the amount exceed 1% of the total emission reductions achieved by the project.

Monitoring Organization
The Project Owner supervises and verifies recording, collects data (meter's data reading, sales/ billing receipts), calculates emission reductions and will use a monitoring report prepared by South Pole.

The following data will be monitored during the crediting period:

1) Hourly monitoring data for gross electricity generation and internal electricity consumption in the plant from the plant SCADA system:

The project owner monitors the gross electricity generated and internal consumption in an hourly basis by a internal SCADA system. Those records include electricity generated before connecting to the transformer, excluding the transmission losses. Subtracting the internal consumption, the project owner has the balanced electricity generated in the plant for crosschecking.

2) Monthly power meter reading reports issued by Turkish Electricity Distribution Company (TEDAS) in accordance with day, peak and night hours:

For the sale of the electricity generated, TEDAS officers, accompanied by a representative of the project owner, do take the readings of two power meters at the end of each month. The electricity exported and imported is recorded as day, peak and night basis. The officer issues monthly reading reports which are signed by both parties' representatives.

3) Monthly net electricity fed into the grid

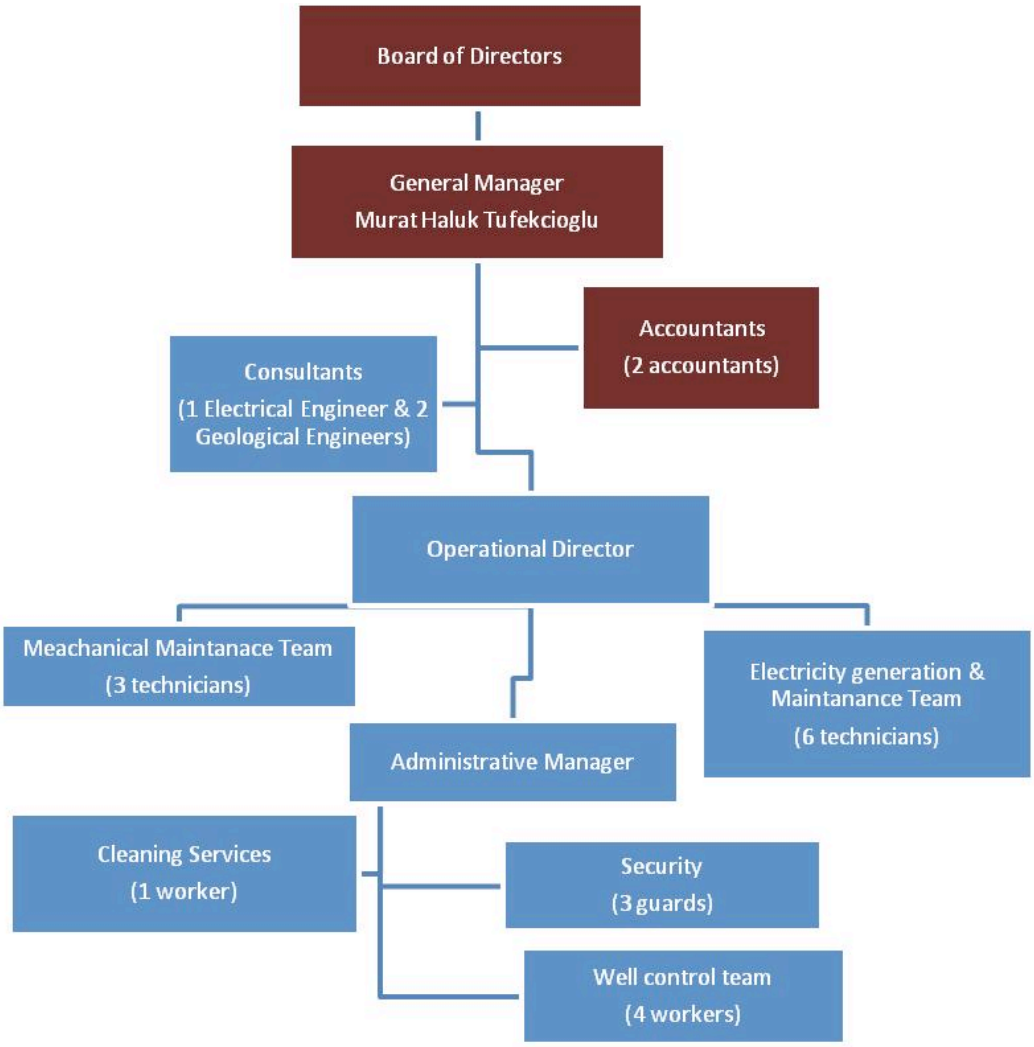
The project owner issues an sales receipt for the sale of net electricity exported to the grid.

4) The steam flow
the inflow, outflow and reject steam amount is monitored by flow meter or equivalent equipments. The daily, monthly and yearly data is recorded by monitoring staff.

5) Operating hours of the back-up engine.

The organizational chart is given below (dark brown color represents the core company working for both plants):

Figure 7: Organisation hierarchy chart



Emissions caused by diesel generator:
Carbon Dioxide emissions resulting from combustion of fossil fuels are neglected as those emissions are contributing less then %1 of baseline emissions. The project emissions due to the diesel consumption will

be monitored regularly and if these emissions contribute for more than 1% of baseline emissions than they will be deducted from the baseline emissions to calculate emission reductions of the project activity.

Annex 4

ENVIRONMENTAL IMPACT ASSESSMENT APPROVAL

T.C.
Çevre ve Orman
Bakanlığı

T.C.
AYDIN VALİLİĞİ
İl Çevre ve Orman Müdürlüğü

Belge Tarihi:23.01.2008
Belge No :2008/05

ÇED GEREKLİ DEĞİLDİR BELGESİ

16 Aralık 2003 tarih ve 25318 Sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği'nin 17. Maddesi gereğince, "***DORA-2 Jeotermal Enerji Santrali*** " projesi hakkında Çevresel Etki Değerlendirmesi Gerekli Değildir kararı verilmiştir.

Mustafa MALAY-
VALİ

Proje Sahibi : Menderes Geothermal Elektrik Üretim A.Ş.

Projenin Yeri : Yavuzköy Köyü, Kuruçeşme mevkiinde, tapunun 1880,1881,554,555,558 ve 553 parsel numaralarında kayıtlı alan Köşk/ AYDIN

English Translation:

According to the article 17 of the Regulation on Environmental Impact Assessment that is issued in 16 December 2003 and published in official gazette # 25318, EIA is not requested for "Dora-2 Geothermal Power Plant" project.

The document has been issued in 23.01.2008 by the Directorate of Environment and Forestry in Aydın.

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