



ACWA POWER ELECTRICITY OPERATION AND
MANAGEMENT INDUSTRY AND TRADE CO.



ACWA POWER KIRIKKALE NATURAL GAS COMBINED CYCLE POWER PLANT PROJECT Nontechnical Summary



MGS PROJECT CONSULTANCY ENGINEERING TRADE CO.

ANKARA – JUNE/2014

PROJECT NAME

ACWA POWER KIRIKKALE NATURAL GAS COMBINED CYCLE POWER PLANT AND
OVERHEAD TRANSMISSION LINE PROJECT

PROJECT LOCATION

Kırıkkale Province, Yahşihan County, Kılıçlar Municipality

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NONTECHNICAL SUMMARY
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ABBREVIATIONS

EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EU	European Union
GWh	Gigawatt hour
IFC	International Finance Corporation
KEXIM	Korean Exim Bank
kV	Kilovolt
MWe	Megawatt Electrical
MWm	Megawatt Mechanical
MWt	Megawatt Thermal
NGCCPP	Natural Gas Combined Cycle Power Plant
NTS	Non-technical Summary

SECTION I: INTRODUCTION

Within the scope of the project, the Natural Gas Combined Cycle Power Plant, having an installed power of 927.4 MWe / 960 MWm / 1,663 MWt, is planned by ACWA Power Electricity Operation and Management Industry and Trade Co. at 1/25,000 scaled Kırşehir I30-b2 within the boundary of Kılıçlar Municipality of Yahşihan District in Kırıkkale Province.

The necessary applications have already been filed to the Energy Market Regulatory Authority (EMRA) in order to obtain the Licenses to establish a Natural Gas Power Plant and to generate electricity within the scope of the project.

The power plant configuration (2 gas turbines and 1 steam turbine) have been proposed within the project scope and the power output from each turbine is 309.6 MWt. The turbine thermal power conversion efficiency is calculated by taking the value of 37.23%. The approximate thermal output power of gas turbine is calculated as $(309.6 \times 2) / 0.3723 = 1663 \text{ MWt}$ and steam turbine as 328 MW.

The Combined Cycle Plant's efficiency is around 58.6% at reference site conditions.

A ready-mix concrete plant with a capacity of 100 m³/hour is foreseen within the scope of the project to be used at the construction phase. The aggregate material which is required for production of the ready-mix concrete will be purchased from the market as pre-prepared. The ready-mix concrete plant will be shut down following completion of the construction phase..

The ESIA was commissioned by ACWA Power Electricity Operation and Management Industry and Trade Co. and undertaken by MGS Project Consultancy Engineering Trade Limited Company.

The international investment banks involved in the financing of the project will require compliance with the following standards:

- The European Bank for Reconstruction and Development (EBRD) Performance Requirements for Environmental and Social Standards,
- International Finance Corporation (IFC) Performance Standards on Social and Environmental Sustainability
- Environmental and Social Impact Assessment Standards of World Bank,
- Environmental and Social Principles and Standards of European Investment Bank,
- Equator Principles
- Korea Eximbank Common Approaches
- International Environmental Treaties and Conventions adopted by Turkey

The Project also needs to be in compliance with Turkish Republic environmental and social legislation. For this, Environmental Impact Assessment (EIA) Report was prepared according to Turkish Legislations. EIA process started by MGS Project Consultancy Engineering Trade Limited Company on 05.04.2013 by submitting EIA Application File to the Ministry of Environment and Urbanization. Moreover, since EBRD is one of the banks funding the Project and Turkey is a candidate country for entry to the European Union, the project must comply with EU Directives relating to environmental and social standards.

Evaluation of NGCCPP Project was carried out in accordance with the aforementioned guidelines and procedures. In the evaluation process, a systematic procedure was implemented including; physical, natural, cultural, social and socioeconomic impacts of the Project, mitigation measures, improvements and compensation of negative impacts and provision of positive benefits.

A Non-Technical Summary (NTS) describing the Project and a Stakeholder Engagement Plan (SEP) has been prepared for this project as per EBRD/IFC requirements. An Environmental and Social Action Management and Monitoring Plan (ESAMMP) has been prepared to describe the mitigation and monitoring measures necessary for this project. This plan includes relevant mitigations required during construction, operation and decommissioning to ensure compliance with both Turkish and International standards.

The NTS report should be read in conjunction with the related SEP, ESIA and ESAMP documents.

This project has been evaluated within the scope of the following annexes of the *Regulation on the Environmental Impact Assessment*, which became effective upon being published in the Official Journal dated 17.07.2008 and numbered 26939:

- ANNEX-1, Clause 2. a. Thermal power plants: Thermal power plants and other combustion systems with a total thermal power of 300 MWt or more,
- ANNEX-2, Clause 19. Ready-Mixed Concrete Plants, plants which has a production capacity 100 m³/h and over, which produces structured materials by means of compression, impact, shaking or vibration by using cement or other binding substances, plants which produce pre-stressed concrete elements, gas concrete, precast concrete panels and similar products.
- ANNEX-1, Clause 32. 154 kV (kilovolt) and above voltage overhead transmission facilities (transmission lines, substations and switching fields) longer than 15 km

The EIA process has been started for ACWA Power Kırıkkale NGCCPP and Overhead Transmission Line project. Public Participation Meetings were held in order to introduce and describe the Project to the public and authority institutions. Detailed information related with Public Participation Meetings is given in the Stakeholder Engagement Plan.

SECTION II. PROJECT DESCRIPTION

Section II.1. Project Definition, Life, Service Purposes, Importance and Necessity

The construction works will last approximately 18 months while the assembly of the equipment will take approximately 12 months. Therefore the overall construction period is foreseen as 30 months in total.

The Ready-Mix Concrete Plant to be used during the construction phase of the project will be constructed within the site. The Ready-Mix Concrete Plant will be utilized during the construction and closed after the construction works have been finalized.

The project will be transferred to the State as per the related legislations at the end of 49 years which is the period for Energy Production License or production may be continued by renewing the production license. In order for the electricity produced by the Plant to be transmitted to the National Interconnected System, a 380 KV energy transmission line is required to be constructed as per the requirement and procedures of Turkish Electricity Transmission Company (TEIAS).

ACWA Power Kırıkkale Natural Gas Combined Cycle Power Plant switchyard is planned to be connected to the Bağlum Substation (to the north of Ankara) located at Yenimahalle/Ankara which the route is assigned by TEIAS. A separate environmental and social impact assessment study has been prepared to comply with IFC, EBRD, KEXIM bank and other national and international standards.

The 380 kV ACWA Power Kırıkkale Overhead Transmission Line will connect the ACWA Power Kırıkkale NGCCPP Bağlum Substation situated on the outskirts of Ankara. The length of 380 kV OHTL is estimated to be 119 kilometers of which approximately 14.5 kilometers is inside the boundary of Kırıkkale Province and the rest (approximately 104.5 kilometers) is situated within the boundary of Ankara Province.

the overhead transmission line; will be constructed by ACWA Power Electricity Operation and Management Industry and Trade Co. and to be transferred to TEİAŞ together with its property rights. In this context, a System Connection Agreement will be signed between TEİAŞ and ACWA Power Electricity Operation and Management Industry and Trade Co.

About 1,250,000,000 m³ per annum of natural gas is estimated to be consumed by the plant for electricity production and energy production is estimated to be around 7,557 GWh/year.

Only Natural gas will only be used as fuel in the NGCCPP. The required gas connection will be provided from BOTAŞ Natural Gas Pipeline. BOTAŞ has indicated 2 alternative routes for the gas pipeline as described in Figure 1. Alternative 1 is approximately 3 km away from the site and Alternative 2 is approximately 4 km away to site. Pipeline routes as per initial feedback from BOTAS will be buried under the ground as per BOTAS regulations and standards. In case land acquisition/expropriation is required for the realization of the gas pipeline, then Turkish regulations on land acquisition/expropriation will be followed and the requirement of EBRD/IFC on expropriation will also be fulfilled.

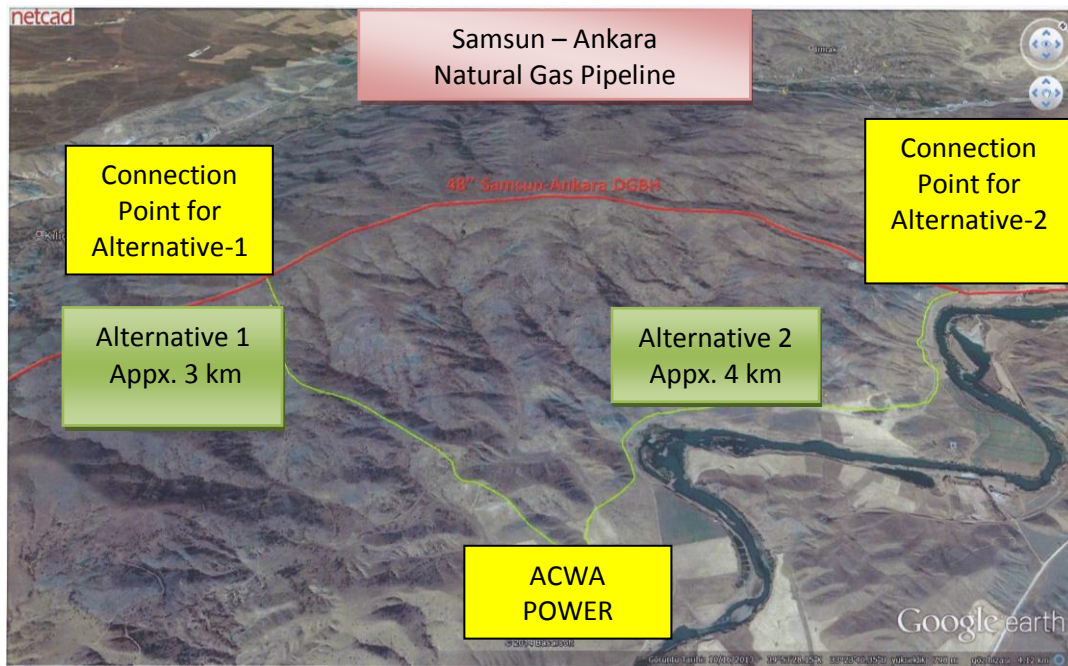


Figure 1. Map Showing Expected Natural Gas Pipeline Route

The plant cooling system will be a closed cycle system. The required amount of water during the operation will be provided from caisson wells to be located close to Kızılırmak River (Figure 6). The area of the land for the caisson wells is 25,000 m². In case land acquisition/expropriation is required for the caisson wells, then Turkish regulations on land acquisition/expropriation will be followed along with the requirement of EBRD/IFC on land acquisition/expropriation.

Table 1. Main and Auxiliary Units of the Plant

2 Dry Low NO _x Broiler Gas Turbine	3 Auxiliary Transformers	380 kV switchyard
2 horizontal flow type three pressure level Heat Recovery Steam Generator	15/380 kV main step-up transformer	Water Treatment Plant
1 Condensing, three pressure level Steam Turbine (ST) with horizontal exit,	Isolated Phase Connector	Waste Water Treatment Plant
3 water or air cooled generator units	Electricity systems	Boiler feeding water pumps
1 wet type cooling tower	Mechanical systems	Gas supply and heating system

In the proposed plant, burning of natural gas in burning chamber will generate hot burning gas; the gas will expand and pass through the gas turbine and will rotate the turbine blades. The shaft connected to the electric generator will rotate by the rotation of blades and electricity will be generated. Hot exhaust gas produced in the gas turbines will be taken into the Heat Recovery Steam Generator (HRSG) to be reused and the water in the boiler will evaporate. Steam generated at high pressure will operate steam turbine and generate additional electricity. This system is termed as combined cycle power plant as two separate processes are used to generate electricity; figure 2 provides a brief description of the combined cycle process.

Waste steam that will return in HRSG will be condensed passing through a condensation unit. Condensed water will be re-fed to the system for reuse.

The electricity consumption within the plant will decrease due to the use of the wet type cooling system. A Process flow diagram and mass water balance envisaged for the plant is presented in figures 2 and 3, below:

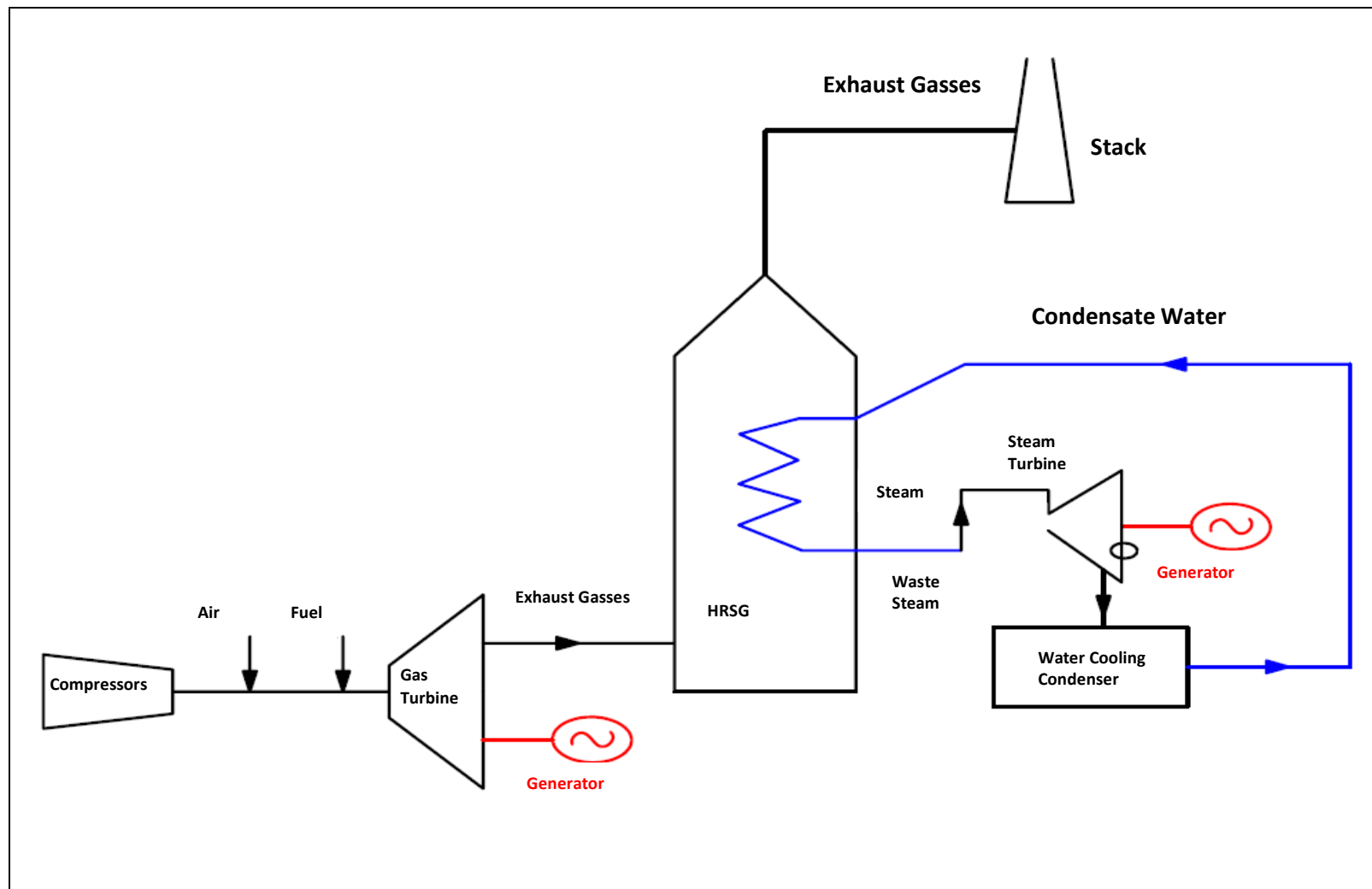


Figure 2. Plant Production Process Flow Diagram

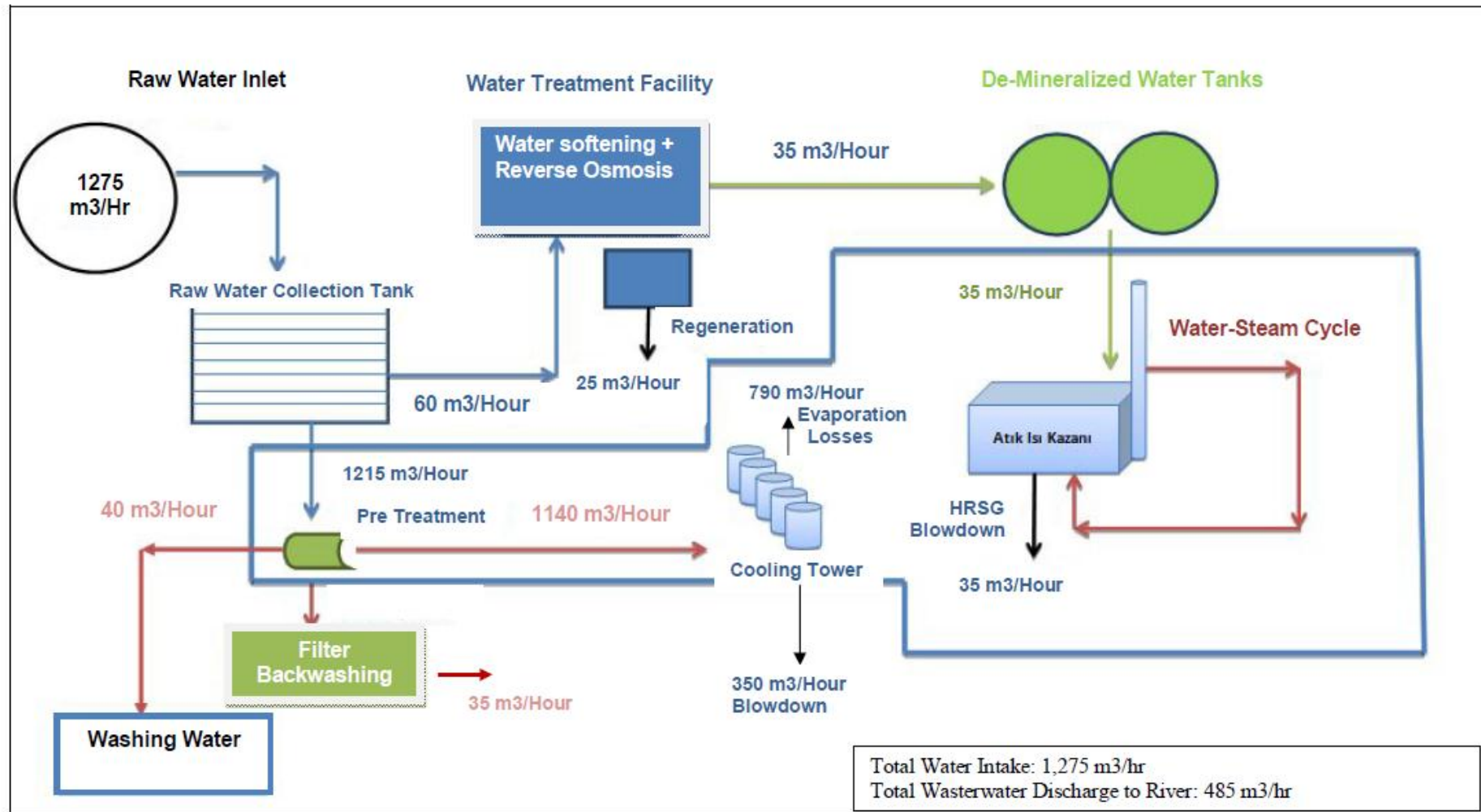


Figure 3. Water Mass Diagram

According to the Annual Report 2011 released by TEİAŞ, production of electricity in Turkey in 2011, increased over the previous year by 8.6% corresponding to 18,187.4 million kWh increased to 22,9395.1 million kWh. Electricity consumption increased by 9.4% corresponding to 19,872.4 million kWh increased and reached 230,306.3 million kWh. According to the same report, 74.8% of the electricity produced in 2011 based on thermal (coal, lignite, fuel oil, natural gas, LPG, naphtha, and others) and 22.8% based on hydraulic power and 2.40% based on geothermal and wind power plants. For the year 2010-2011 the amount of electrical energy production and electricity generation sources are given in Table 2 and Table3.

Table 2. 2010 - 2011 Electricity Generation in Turkey

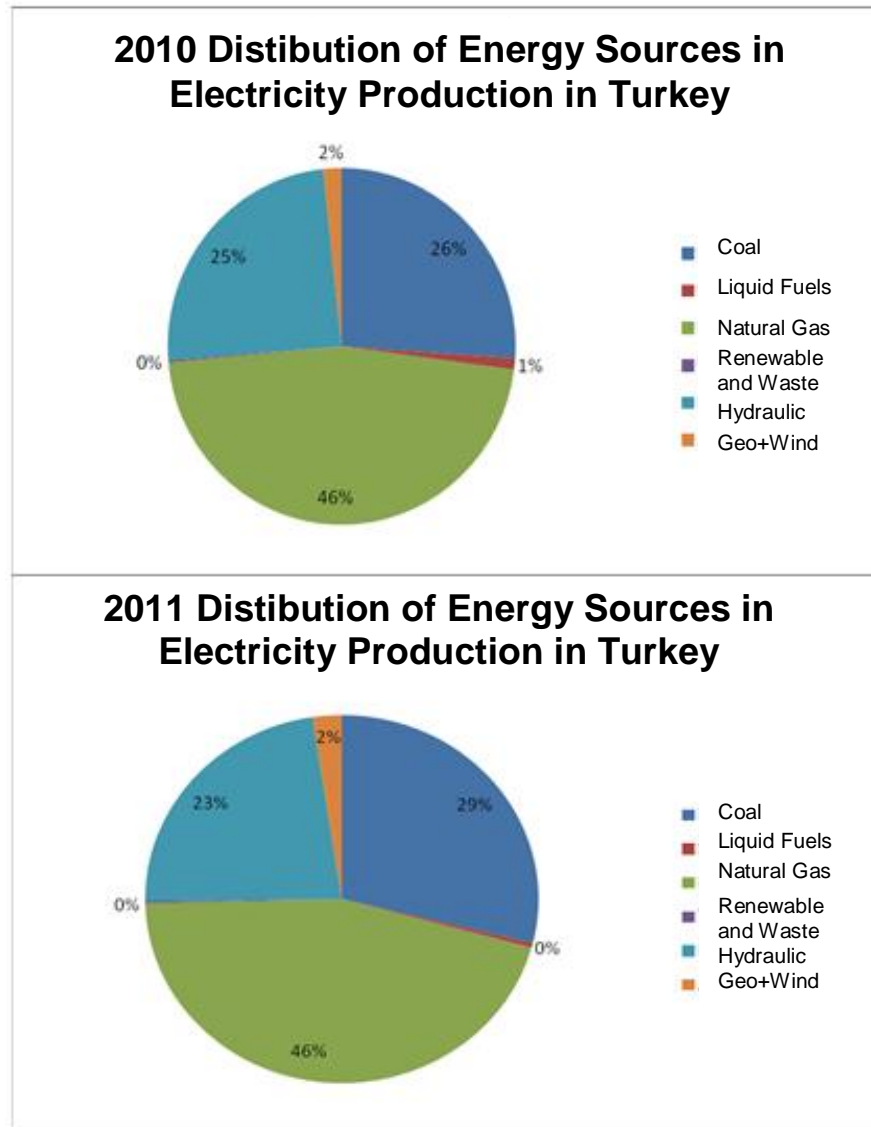
Energy Sources	2010		2011		Increase
	GWh	%	GWh	%	%
Thermal	155,827.6	73.8	171,638.3	74.8	10.1
Hydraulic	51,795.5	24.5	52,338.6	22.8	1.0
Geo+Wind	3,584.6	1.7	5,418.2	2.4	51.2
Total	211,207.7	100.0	229,395.1	100	8.6
Import	1,143.8		4,555.8		
Export	1,917.6		3,644.6		
Gross Consumption	210,433.9		230,306.3		9.4

In Turkey, as can be seen from Table 3, the share of coal in electricity generation was 26.1% in 2010 and 28.9% in 2011.

Table 3. 2010-2011 Distribution of Turkey's Electricity Generation by Primary Energy Sources

Energy Sources	2010		2011		Increase
	GWSaat	%	GWSaat	%	%
Coal	55,046.4	26.1	66,217.9	28.9	20.3
Liquid Fuels	2,180.0	1.0	903.6	0.4	-58.6
Natural Gas	98,143.7	46.5	104,047.6	45.49	6.0
Renewable and Waste	457.5	0.2	469.2	0.2	2.6
Hydraulic	51,795.5	24.5	52,338.6	22.8	1
Geo+Wind	3,584.6	1.7	5,418.2	2.4	51.2
Total	211,207.7	100.0	229,395.1	100.0	8.6

Reference: TEİAŞ 2011 Annual Report



Reference: TEIAS 2011 Annual Report

Figure 4. 2010-2011 Distribution of Turkey's Electricity Generation by Primary Energy Sources

Expected energy demand estimations are made between 2010 and 2019 by General Directorate of Turkey Electricity Transmission Company. Within the framework of the study, the highest and lowest demand conditions are given in the table below.

Table 4. Estimated Quantities of Energy Demand (GWh)

YEAR	LOWEST DEMAND		HIGHEST DEMAND	
	GWh	Increase (%)	GWh	Increase (%)
2010	209,000	7.7	209,000	7.7
2011	219,478	5.0	219,478	5.0
2012	234,183	6.7	235,939	7.5
2013	249,873	6.7	253,634	7.5
2014	266,615	6.7	272,657	7.5
2015	284,478	6.7	293,106	7.5
2016	303,254	6.6	314,796	7.4
2017	323,268	6.6	338,091	7.4
2018	344,604	6.6	363,110	7.4
2019	367,348	6.6	389,980	7.4

(Source: TEIAS Capacity Projection)

Accordingly, 5-8% increase in average annual demand is expected. This project is of great importance and thus is in the public interest in playing a role to meet the anticipated demand increase.

Section II.2. Project Area

Within the scope of the project, the Natural Gas Combined Cycle Power Plant, having an installed power of 927.4 MWe / 960 MWm / 1,663MWt, is planned by ACWA Power Electricity Operation and Management Industry and Trade Co in 1/25,000 scaled Kırşehir I30-b2 map within the boundary of Kılıçlar Municipality of Yahşihan District in Kırıkkale Province.

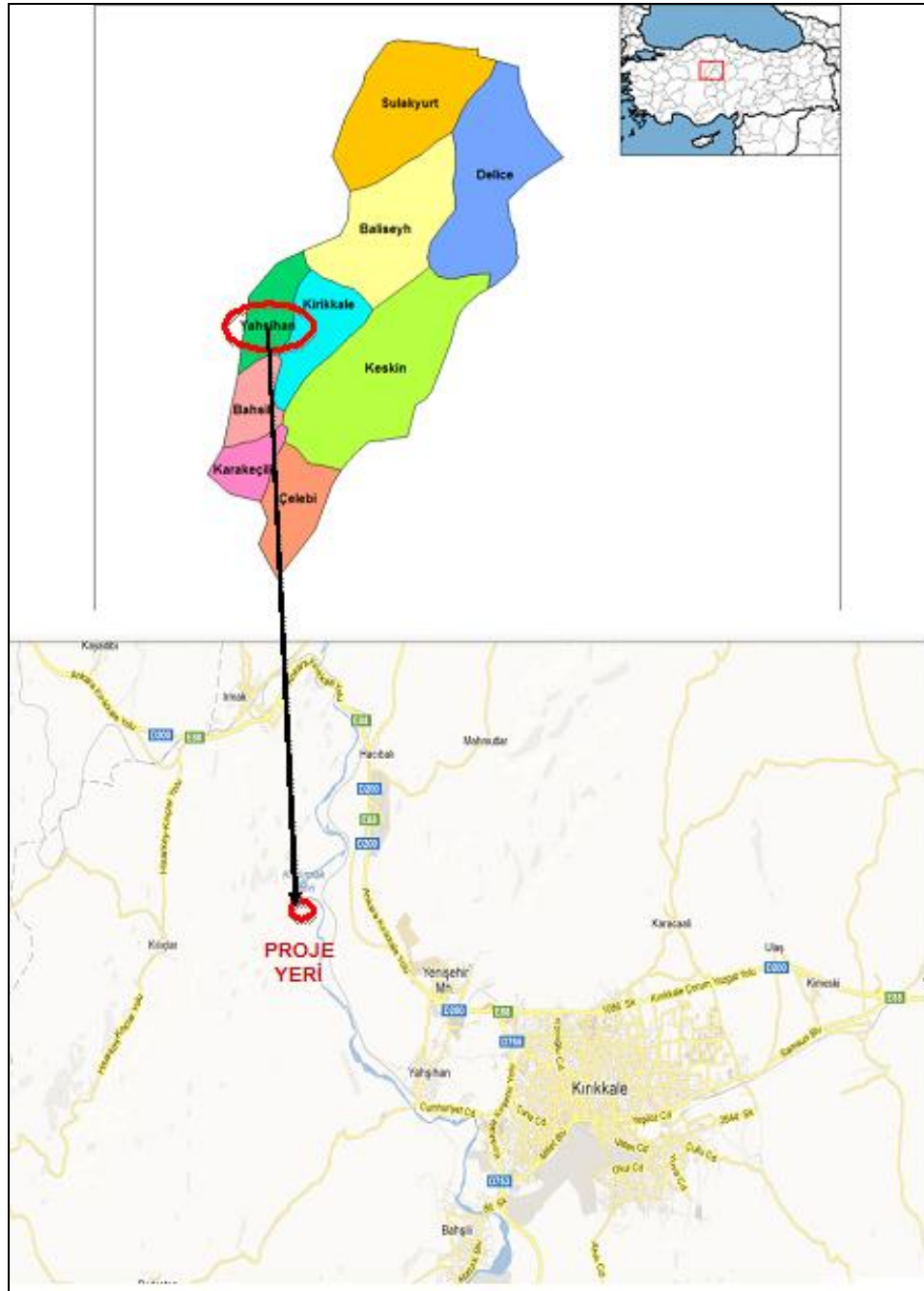


Figure 5. Site Location Map

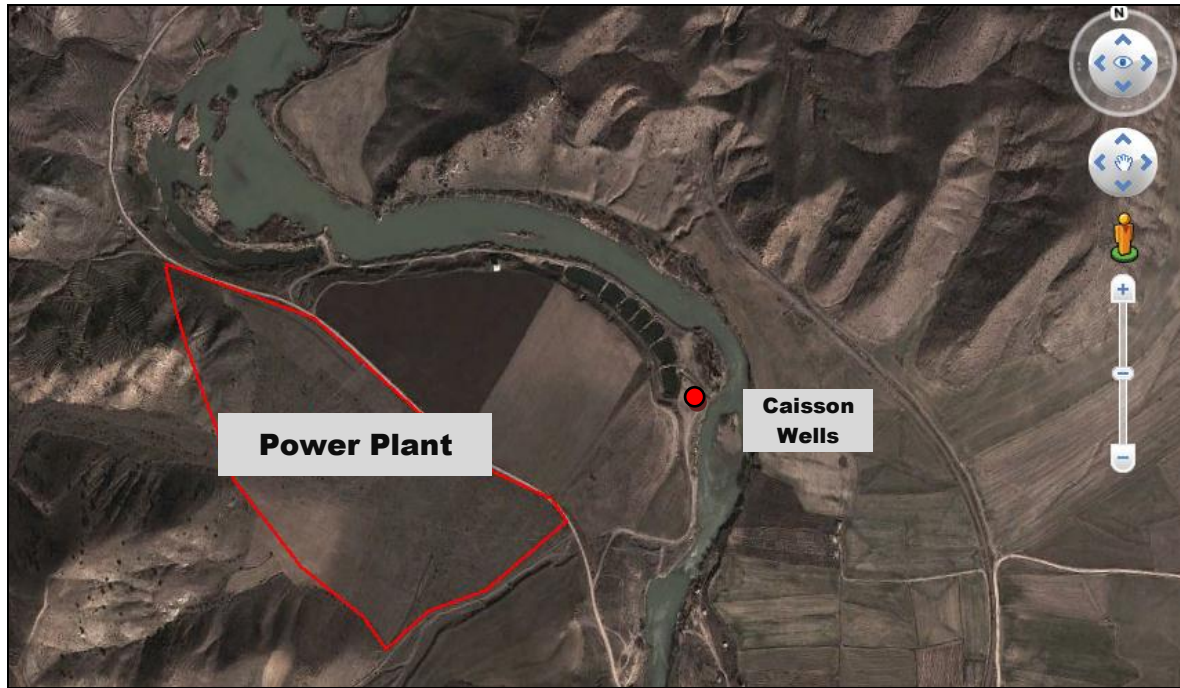


Figure 6. Project Area Satellite Image

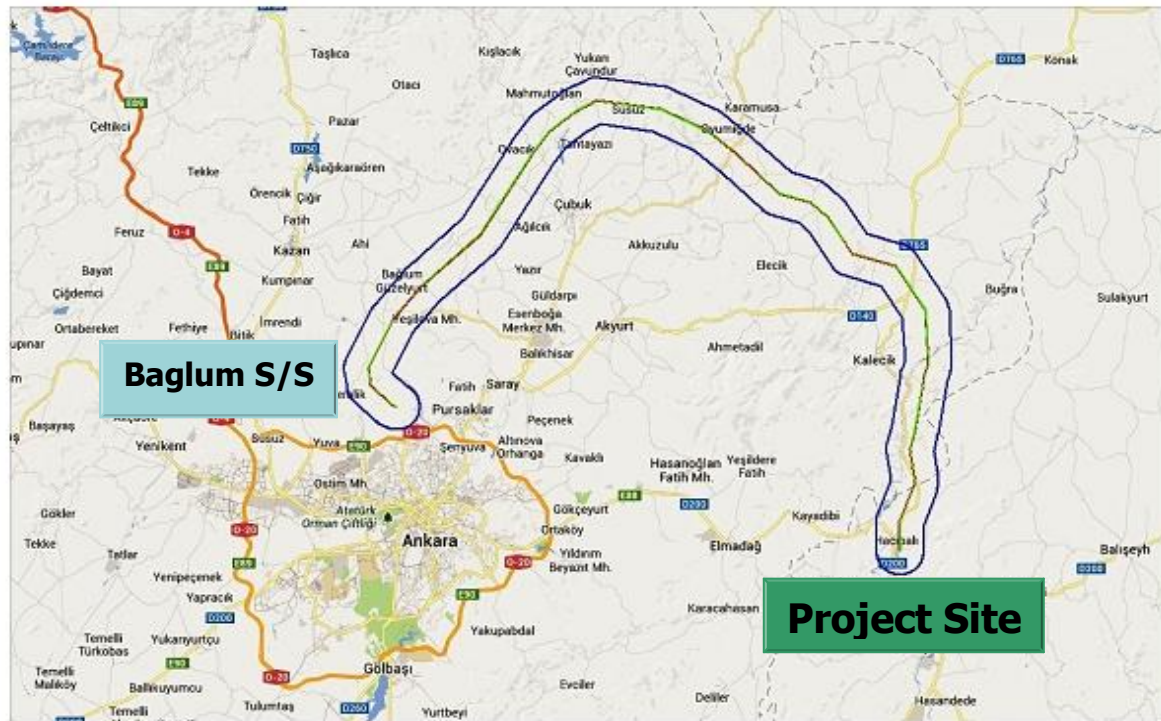


Figure 7. Overhead Transmission Line Route

No residential areas exist within the project footprint and therefore, no activity leading to resettlement is anticipated at this time. Access to the project area is available with Ankara-Kırıkkale road E88 in all seasons. Project area is about 13 km away from Kırıkkale City Center.

Acwa Power Kirikkale NGCCPP is located 4.5 km northwest to Yahşihan District, 3.7 km east to Kiliçlar Municipality and 4 km northwest to Yenisehir Village. The project area is located 200 m from the Kızılırmak River. In the context of Regulation on the Conservation of Wetlands, opinion of Ministry of Forestry and Water Affairs, General Directorate of Nature Conservation and National Parks will be taken regarding the project area. In addition opinion of State Hydraulic Works is taken regarding the Project in which it is demanded not do build any permanent structure within 200 m from the shore of the Kızılırmak River because the mentioned area is defined as “Area Covered by Flood Waters Law”.



Figure 8. Project Area Satellite Image

Table 5. Residential Area Centers In the Vicinity of Project Area

Residential Area	Distance	Direction (location as to plant)
Kiliçlar Municipality	3.7 km	West
Yahşihan	4.5 km	Southeast
Hacibaba	4.2 km	Northeast
Irmak	5 km	North
Mahmutlar	7 km	Northeast
Yenisehir	4 km	Southeast
Central Kirikkale	7.5 km	Southeast

Section II.3. Project Alternatives

As it can be seen from the table below of per capita electricity consumption in Turkey, electrical energy consumption is intensified in the western region of our country, as the per capita electricity consumption is over 1,500 KWh in the western region. When we consider the capital city of Ankara, per capita electrical energy production data approaches to 2,000 KWh.

Table 6. Electricity Consumption Rates per Capita (KWh)

Regions	Years		
	2007	2008	2009
Western Marmara	3976	3846	3947
Eastern Marmara	3708	3783	3600
Aegean	2879	2896	2550
Mediterranean	2209	2368	2371
Western Anatolia	1969	2022	1890
Central Anatolia	1656	1693	1662
North-East Anatolia	731	821	850
Western Black Sea	1709	1815	1820
Eastern Black Sea	1178	1247	1283
Centre-East Anatolia	887	918	928
South-East Anatolia	1292	1365	1206
Ankara	1821	1892	1852
Kırıkkale	1548	1811	1861

(Source: TUIK, 2007-2008-2009 data)

The reasons for choice of project area are the intense demand for electrical energy in west side of our country and especially its proximity to the capital Ankara. In addition, initially the project company has considered four locations for the project site in close proximity to the old site. The main criteria for the site selection was site usage and ownership in addition to proximity to gas connection point and water resources. During surveys two of the alternative sites were found to be agricultural lands and privately owned, and the third site was found to be mostly in the close vicinity of military protected zone. As per initially collected information which revealed that the current site was fully owned by the Treasury and is not an agricultural land, this site was selected as the best alternative site for the project.

Natural Gas Combined Cycle Plants with dry and wet cooling systems are evaluated alternatively. Finally, ACWA Power Kırıkkale Natural Gas Power Plant is to be designed with water-cooled cooling system in order to intensify the exhaust steam.

California Power Plants alternative cooling technologies comparison have been made by the California Energy Commission. In the scope of this study, operating systems are compared based on wet and dry system, hybrid wet/dry systems, water consumption on the central performance, cost, maintenance and repair and their environmental impacts

Result of the study is evaluated and given in the below figure:

	Wet Systems	Dry Systems
Advantages →	<ul style="list-style-type: none"> • Higher Performance • Low Cost 	<ul style="list-style-type: none"> • Lower Water Consumption
Disadvantages →	<ul style="list-style-type: none"> • Water Consumption 	<ul style="list-style-type: none"> • Higher Cost • Higher Maintenance and Repair Expenditures

(Source: California Energy Commission, Comparison of Alternate Cooling Technologies for California Power Plants, Economic, Environmental and Other Tradeoffs, Final Report, February 2002, http://www.energy.ca.gov/reports/2002-07-09_500-02-079F.PDF)

The reasons selecting the natural gas combined cycle power plants are summarized in below items;

- ✓ Natural gas is a non-poisonous gas.
- ✓ That the natural gas is a clean fuel provides an important advantage in terms of the maintenance and the operation of the facility. In case that the fuel-oil or the coal is burned, the layer of the ash and the soot accumulated on the heating surfaces of the radiator boilers both corrodes the surfaces and decreases the productivity of the boilers preventing the passage of the heat.
- ✓ Preliminary preparation and storage are not required for the burning of the natural gas: In case that the natural gas is used, the fuel preparation and the ash disposal procedures are not required. Both fuel-oil and the coal must be stored.
- ✓ The use of the other fuels requires preliminary preparations such as filtering, heating, breaking and drying. Those increase the costs of the facility. However, in the facilities of the power plant with the natural gas fuel, such a phase of the preparation of the fuel is not required. As can be seen in the work flow schema of the facility, the natural gas will be directly taken to the gas turbine.
- ✓ A secure operation is provided with the automatic controls. And this decreases the operations costs.
- ✓ Its thermal efficiency is higher in comparison with the fuel-oil and the coal.
- ✓ It is possible to decrease the production of the emission gases in the source in the Natural Gas Cycle Power plant. The burners producing low NOx will be used in the mentioned facility.

SECTION III: PROJECT AREA AND IMPACT AREA EXISTING ENVIRONMENTAL CHARACTERISTICS

Population

According to the 2012 year Turkey Address-Based Population Registration System (ADNKS), the population of Kırıkkale Province is 274,727 and 85% of the population (232,959) reside in the city center and the rest of the population which is 41,768 reside in villages and towns. The population of Yahşihan District is 17,675 in which 14,591 people reside in the center and 3,084 people reside in villages and towns.

Table 7. Distribution of Urban and Rural Population (2012)

Settlement	Urban Population	Rural Population	Total Population
Yahşihan District	14,591	3,084	17,675
Kırıkkale Province	232,959	41,768	274,727
Turkey	58,448,431	17,178,953	75,627,384

Reference: www.tuik.gov.tr

Population Movements and Migrations

Statistics of migration from and to Kırıkkale Province **Table 54..**

Table 8. Migration Statistics (2012)

Province	Population	Migration In	Migration Out	Net Migration	Net Migration Rate (‰)
Kırıkkale	274,727	13,776	13,912	- 136	-0.5

Reference: www.tuik.gov.tr

Population Growth Rate

According to the 2012 year data of TUIK; population growth rate in Kırıkkale Province is -0.96‰. Likewise migration to center of the province and districts within Kırıkkale is -3.5‰, migration to villages and towns are 13.1‰.

Average Household Population

Information about average household population in Kırıkkale Province is given in **Table 55.**

Table 9. Average Household Population (2012)

İl	Total			Provincial and District Centers			Villages and Towns		
	Household Population	Household Number	Average Household Size	Household Population	Household Number	Average Household Size	Household Population	Household Number	Average Household Size
Kırıkkale	383,882	78,760	4.87	282,067	61,195	4.61	101,815	17,565	5.80

Reference: www.tuik.gov.tr

Flora

The project area is located in B4 square according to Davis's grid system (Flora of Turkey and the East AEGEE Islands) and is included in the Central Anatolia region.

The figure below shows Davis's grid system:

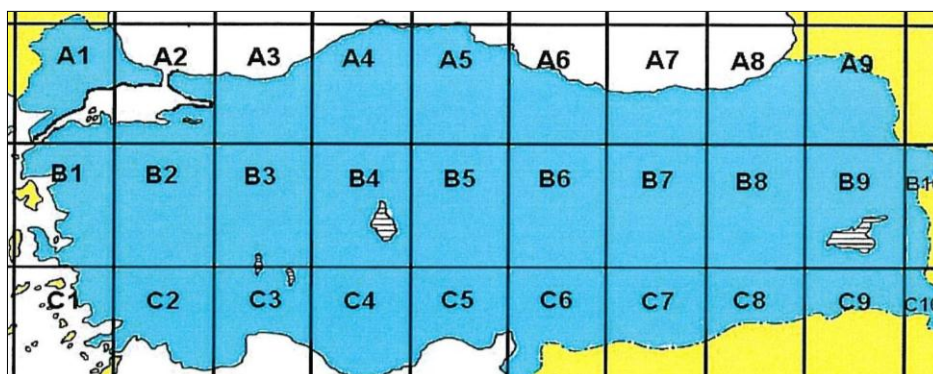


Figure 9. Davis's Squaring System

The Kırıkkale project site is under the influence of continental climate and dominant vegetation is steppe type. There are forest lands at higher elevations which are composed of dwarf oak and partially juniper but are not present on the project site.

EIA Report Format customized by the Ministry of Environment and Urbanization, field work has been carried out and lists will be created from literature studies supporting these works. Lists will be covered the Turkish names of plants, localities, in the field of existence ratios, hazard classes and conservation status according to national and international agreements.

Fauna

"Wildlife Protection Area" or "Wildlife Development Area" does not exist in the project area. Field work and lists of the literature studies, Turkish and Latin names of species their habitats, conservation status according to national and international conventions and hazard classes will be specified in the EIA Report.

- | | |
|----------------------------|---|
| Appendix List - I | Taken Wild animals under protection by the Ministry of Forestry and Water Works |
| Appendix List - II | Taken prey animals under protection by Central Hunting Commission |
| Appendix List - III | Prey animals that are allowed in certain time periods for hunting by Central Hunting Commission |

Conservation measures will be taken for the species included in protection lists of decisions prepared by Central Hunting Commission. Both BERN Convention and CITES Convention provisions must be observed.

Geological and Hydrogeological Properties:

Project area is situated on the İzmir-Ankara-Erzincan Suture Zone. The relation between the geological unites which exist along this Suture Zone is tectono-stratigraphical. These rocks from oldest to youngest are; Late Cretaceous aged Artova Ophiyolitic mélanges, Kocatepe Formation, Karadağ Formation, Ilıcınar Formation, Samanlı Formation, Haymana Formation, Paleocene-Eocene aged Dizilitaş Formation and Sakarya Formation.

Project area is located in the valley of the Kızılırmak River which is the longest river in Turkey. Formation age of the area is estimated to be Late Pliocene. River is located in an 800-1000 m altitude plateau. The most important surface water around the investigation area is The Kızılırmak River, which flows at east side of field. There is no any other surface water or river in the working area. There is dry river bed along the south border of investigated area, which runs towards Kızılırmak River Bed.

Natural Disaster Condition

In terms of seismicity, while the central province of Kırıkkale is in I. degree earthquake zone, seismicity decreases through the northward sides and finally decreases to the IV. transition. The project area is within the 2nd degree earthquake zone. Design studies will be accomplished according to the matters specified in the Regulation on Building Constructed in Disaster Areas should be followed.

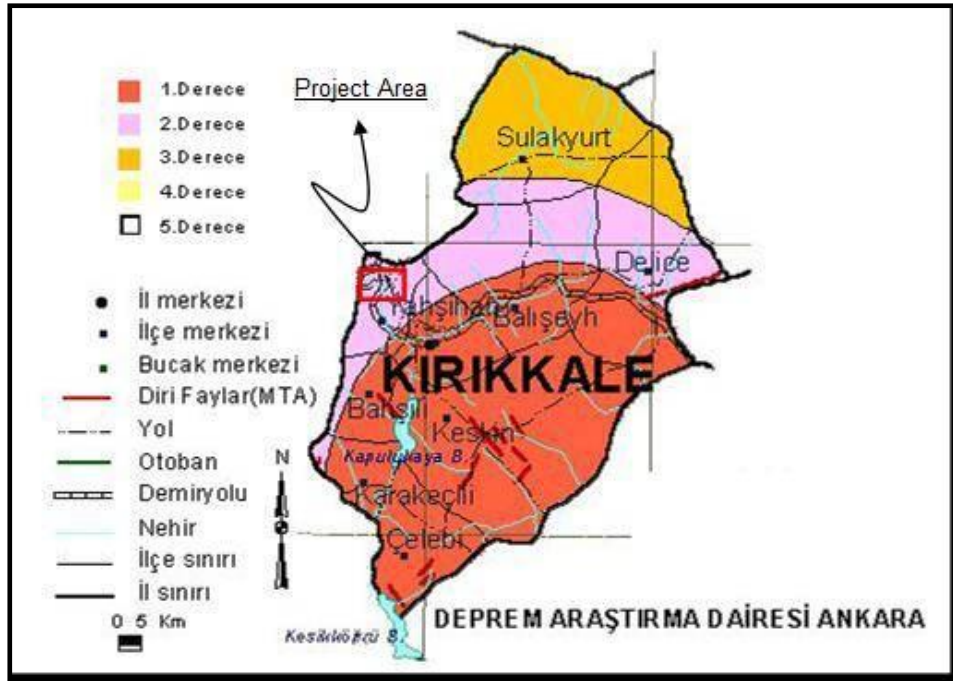


Figure 10. Seismic Zone Map of Kırıkkale Province

Soil Characteristics

Soil of Kırıkkale Province consists of brown soils in general. These soils, which are brown or grayish on the surface are fine grained and disperse easily. Lime ratio is rather high. These are soils rich in minerals. Alluvial soils are found in the southern parts of the province on the riversides, and these constitute thick covers in places. Inclinations are very small. They are suitable for cropland agriculture and irrigated farming. The small amounts of precipitation in the area and dryness is an important factor in the formation of the soil.

The total area of Kırıkkale is 463,000 ha. 306,506 ha of this is used in agricultural production. In other words, the land used for agricultural purposes is 66.2% in the ratio of total land area. Plantation fields have the largest share of agricultural land use.

Below Table shows the distribution of land suitable for agricultural production by districts and as it can be seen here, agricultural land in Yahşihan County has the rate of 3.88% within the total agricultural land.

Table 10. Agricultural Land Distribution of Kırıkkale Province Districts

Districts	Amount of Agricultural Lands (ha)
Center	25,078
Bahşili	9,447
Balıseyh	50,873
Çelebi	12,240
Delice	63,399
Karakeçili	12,736
Keskin	85,241
Sulakyurt	35,597
Yahşihan	11,895
Total	306,506

(Source: Kırıkkale Province Agriculture, Statistical Information)

Water Resources

In Kırıkkale Province, the main water supply is the Kızılırmak River which flows from from the mountains of the east sides of Sivas, Zara town. River enters from the south side, Celebi County and flows from the north side directing through the North West. Finally the river exits from the province and creates the provincial border.

The cooling water and the process water to be utilized in the Plant will be provided from caisson wells to be drilled not far from the Kızılırmak River. Kızılırmak River is approximately 200 m away from border of the site.

Kızılırmak River is being benefited for various purposes, primarily as irrigation water and drinking water and planned to be benefited in future as well.

On Kızılırmak River the main stream are: Kapulukaya, Kesikkopru, Hirfanli, Bayram Hacili, Yamulu and Imranli Dams are located towards upstream part respectively and Obruk, Boyabat, Altinkaya and Derbent Dams are located towards downstream part respectively. Those dams located at upstream and downstream sections bring the water flow to a more steady state by regulating the flows of Kızılırmak River.

The Kapulukaya Dam pond is the biggest artificial pond in the Kırıkkale Province. That's distance to the Project Area is approximately 23 km. The lake volume of the Dam,

which is earth fill dam type, at normal water level is 282.0 hm³, and the lake area is 20.70 km². That meets the drinking and service water of the Kırıkkale Province. Beside, the Çipi and Danacı Bonds are the other ponds of the province.

Table 11. The Flow Rates of Important Rivers and Areas in Kırıkkale Province

Name	Flow rate (hm ³ /year)	Total (hm ³ /year)	Area (ha)	Total (ha)
Kızılırmak River	2,500	3,250	595	669.7
Delice Creek	750		74.7	

Reference: Kırıkkale Province Environment Status Report

Weather

Natural gas distribution works in Kırıkkale Province have been completed and natural gas is starting to be used for heating purposes in residences at the city centre. Some industrial plants as well have switched to using natural gas in processes. Since natural gas is not being used in the entire provincial centre and in industry, domestic and imported coal, fuel oil no. 4 and LPG are currently being used for heating and industrial purposes.

Air pollution measurements (SO₂ and PM) Kırıkkale Provincial Health Directorate carried out in four different places on a daily basis. The most important cause of air pollution Kırıkkale is improper and irregular urbanization, lack of adequate insulation in buildings and weather conditions.

Climatic Conditions

Height of Kırıkkale Province from sea level changes between 570– 1744 m. province center has a height of 720 m. Project area is in the mild temperature zone. However, the climate become continental with reasons such as being far apart of the area from the sea, daily temperature difference changes because of being steppe.

According to meteorological data for long years 1975-2012 from the State Meteorology Affairs General Directorate, the average annual highest temperature is 1257⁰C. According to the results of the measurements in the center of the province during the observation period, the highest temperature value was determined as 41.8 ⁰C in July. The measured lowest temperature is -22.4 ⁰C. According to measurement results, the average low temperature in January was found to be 0.4 ⁰C. The months of January and February are of lowest temperature in the region.

According data of the State Meteorology Affairs General Directorate the average wind speed is 1.92 m/s. In Kırıkkale, measured annual average vapor pressure 929.68 hPa, the annual average relative humidity is 62.01%.

In Kırıkkale, the average evaporation is 1,001.7 mm, the most evaporation is obtained as 17 mm of per day in June.

Average annual rainfall is measured as 373.5 mm. Daily maximum rainfalls is 100.6 mm in June.

Architectural and Archaeological Heritage

In the project area and nearby, there are no architectural or archaeological features of interest.

Landscaping Characteristics

There are no designated landscape features in the project area. After installation of natural gas cycle power plant project in the field, landscaping work will be carried out.

Land Use Status

According to Land Use Map the project area is located on agricultural land and pasture field. However based on site visit in June 2012, it was confirmed that there is no agricultural activity on the project area.

SECTION IV: IMPORTANT ENVIRONMENTAL EFFECTS OF THE PROJECT AND MITIGATION MEASURES

Section IV. 1. Use of Natural Resources

Land Use

The project site is planned to be set up on a land of approximately 185,480 m², where activity units cover 116,765 m² in 1/25,000 scaled Kirşehir I30 map.

As can be seen from the below figure, the initial project site area was estimated to be around 26 ha, but as per information received from the General Directorate of Forestry the 75,663 m², the green highlighted below, is categorized as a forest area, and hence this part of the site was excluded from the project area, making the area designated for this project, the yellow highlighted below, about 185,480 m²

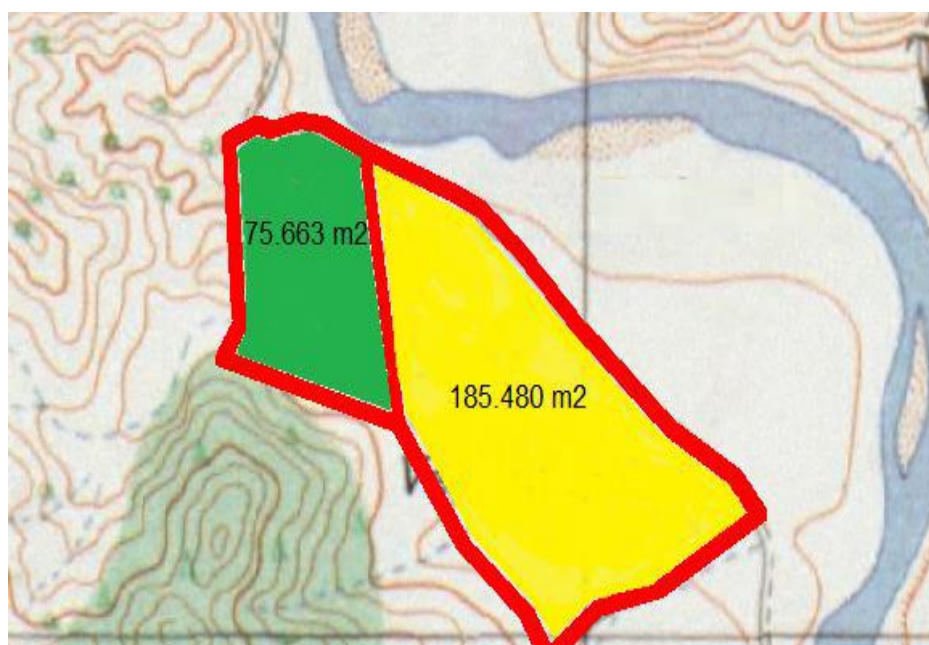


Figure 11. Old and New Areas of the Project

There is no agricultural activity on project site. As per new updated information available to the project company most of the area belongs to governmental treasury but there is a small private ownership area. This area will be acquired by direct negotiation first, and if no direct agreement is reached, then it will be expropriated following Turkish, EBR and IFC requirements on expropriation.

Water Use

Water will be used during the construction phase of the project to meet the needs of staff, additive water in Concrete Plant and water washing mixers and for the reduction of dust formation.

Potable water supply for personnel needs to be from the drinking water network in the region and/or purchased from the market.

In the scope of the project activity, water will be required in order to achieve operational steam to run the steam turbine and to operate wet-type cooling tower. Approximately 1,275 m³/hr (354.16 l/sec) of water will be used; the necessary water is planned to be provided from caisson wells. Caisson wells location as shown in figure 6, is believed to be privately owned, and land acquisition for this location will be first through direct negotiation, and if no direct agreement is reached, then it will be expropriated following Turkish, EBRD and IFC requirements.

In below table, monthly average flow rate of 10 years (1999-2008) as obtained from Flow Observation Station No:1503 located Yahşıhan bridge operated by EİE (General Directorate of Electrical Power Resources Survey and Development Administration) is presented. As can be seen from the table, the amount of water continuously required (estimated as 0.354 m³/s) for the plant to be supplied from the caisson wells is significantly very low when compared to the average monthly flow rate of the river.

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Agu	Sep
Average (m ³ /s)	40	41	47	53	43	31	24	42	58	80	78	64

Potable water supply for the personnel to be employed in operation phase will be supplied from the drinking water network in the region and/or purchased from the market. In case of failure to supply from drinking water network and/or the market, water will be provided from caisson wells.

Fuel Use

Machinery and equipment used in construction phase will be mainly diesel fueled. Electrical energy will be utilized for other needs. 1,250,000,000 m³ of natural gas is estimated to be consumed annually including losses.

Section IV. 2. Description of Environmental Impact and Mitigation Measures

A. Construction Phase

Solid Waste, Hazardous and Special Waste and Soil Pollution

In order to be used during construction activities, a construction camp will be built in the project area and all technical and social infrastructure needs of the staff such as dining hall, kitchen, locker space, shower, toilet, sink, storage, administrative and technical offices will be located within the construction camp.

Wastes, occurring in the scope of the project are municipal solid wastes (glass, paper, plastic, etc.), domestic organic wastes from personnel food consumption, and solid wastes resulting from the excavation and construction activities.

Packaging waste and recyclable wastes will be collected separately from other wastes and disposed by municipalities/licensed organizations.

Non-recyclable wastes (food, organic wastes, etc.) will be collected separately in the standard garbage containers to be kept closed in order to prevent environmental pollution and necessary measures will be taken. The solid wastes will be collected periodically by the municipality or transferred to designated areas indicated by the municipality.

During the preparation of the construction site, vegetable soil will be peeled off. Topsoil will be preserved by covering with grass. Upon completion of construction works, this soil will be used in landscaping.

During activities, in case of any accident or emergency situation, the nearest health establishment will be used.

If possible, maintenance of construction equipment including oil change is to be performed off site; therefore the possible emergence of waste batteries, tires, waste oils and the parts contaminated with waste oils as a source of these transactions will be disposed with the wastes collected in the related service establishment.

In case of non-availability of the authorized services for oil changes and maintenance procedures of construction machines, maintenance areas will be constituted in the construction site. Emerged waste oils and contaminated parts will be collected in perfect seal containers and delivered to organizations licensed by the Ministry

In the scope of the activity, tires/batteries resulting from the oil change of construction machinery and equipment will be delivered to companies licensed by the Ministry and/or related service.

Any activity causing soil pollution will not be carried out.

Wastewater

Water will be used in the project area to prevent dust formation during construction phase. Required water during the construction works will be provided from the creek and/or similar sources of water in the project area.

Most of the water used to prevent dust formation will be absorbed by soil and the remaining amount of water will be evaporated. Waste water will not emerged due to this activity.

Potable water for personnel needs to be met from the drinking water network in the region and/or purchased from the market.

Domestic wastewater emerging from personnel needs will be treated in the package waste water treatment plant.

Emission

Dust emissions will emerge due to Construction activities. Dust emissions will be reduced by paying attention to working conditions. Dust will be blocked and will be kept to a minimum level by regularly moisturizing working fields, roads and topsoil of excavation works. Stabilized roads will be irrigated continuously in order to obstruct dust emissions.

Electrical energy will be used for heating purposes, fuel will not be used. Exhaust examinations of Construction machines and equipment used in the construction phase will take place within the required time period.

Noise

During construction activities, noise is expected to be formed due to construction machinery. Construction activities will take place mostly during the day time and noise limits will be kept at below allowed limits. Workers on site, and visitors during the construction period will be provided with PPE, Personal Protective Equipment, including ear plugs. As part of ESIA, Acoustic Report Study has been performed in order for identifying potential noise level to be occurred during construction phase. As a result of acoustic report study, it is concluded that noise level during construction will not exceed legal noise limit values at the nearest sensitive recipient.

Flora - Fauna

Complete loss of vegetation cover or break up vegetation cover due to other small buildings and roads are expected during construction phase. During construction, the possible effects on wildlife are habitat loss and break up the habitats.

In addition, plant unit design values will be determined to keep noise levels to a minimum level. Therefore, the flora fauna is not negatively affected by the noise arising from the project.

In order to prevent or to minimize the effects to the project site, the route will be via existing roads as much as possible and preservation of natural areas outside of the project area as much as possible. Excavation wastes will not be stored in the edges of the stream. BERN Convention and CITES Convention provisions are also to be observed.

B. Operation Phase

Solid Waste, Hazardous and Special Waste and Soil Pollution

Waste likely to occur within the scope of the project will be accumulated in closed sealed containers separately from other wastes and relevant provisions of "Solid Waste Control Regulation" being published and enacted in the Official Gazette dated 14/03/1991 and no. 20814.

Solid wastes possible to be recycled will be accumulated separately and will be used again accordingly.

Treatment sludge coming out of package waste water treatment facility is in non-dangerous nature and they will be disposed of together with other solid wastes.

Sludge coming out of industrial wastewater treatment facility will be stored in containers and will be dispatched to the licensed facilities capable of disposing such type of wastes by trucks.

Medical waste in very little amount will occur as a result of medical interventions in infirmary. These wastes will be disposed pursuant to "Medical Wastes Control Regulation" published in the Official Gazette dated 22/07/2005 and no. 25883.

Waste batteries and accumulators arising from activities during operation phase as in construction phase of the project will be collected and reviewed pursuant to "Waste Batteries and Accumulators Control Regulation" published in the Official Gazette dated 31/08/2004 and no. 25569.

Waste oil formation is not expected since maintenance works of vehicles and machines within the scope of the project are not performed on the project site. Replacements will be performed within the scope of the project according to "Waste Oil Control Regulations" without causing contamination in potential urgent requirements.

Hazardous wastes likely to occur within the scope of the project will be obtained by licensed firms and will be dispatched to the facilities accepting hazardous waste. Waste oils requiring disposal during operation and maintenance activities will be disposed of licensed firms. "Hazardous Wastes Control Regulation" published and enacted in the Official Gazette dated 14/03/2005 and no. 25755 will be complied with during operation phase. Comes within the scope of CCPP project switchyard transformers and capacitors to be used in the insulation material and/or power generation systems, the national and international restrictions about Persistent Organic Pollutants, PCT (polychlorinated terphenyls), PCB (polychlorinated biphenyls) and asbestos will be complied.

Wastewater

Water for ACWA Power Kırıkkale NGCCPP will be used for two purposes as process and domestic purpose.

Process water to be used in the power plant will be supplied from caisson wells to be opened in the vicinity of Kızılırmak River. Water supplied from caisson wells will be used in closed-cycle cooling system technology so that minimum blowdown discharge will be happen.

Likewise, domestic waters to be used within the scope of the facility will be supplied from caisson wells to be opened in the vicinity of Kızılırmak River. After implementing the required treatment procedures, these waste waters will be reused as much as possible. Discharging of wastewater to the Kızılırmak River will be as per allowed limits and conditions.

Emission

Material storage in open area will not be performed within the scope of the project. Transportation and storage of residuals of combustion and generation causing dust will not be performed within the scope of the project. Roads will be regularly cleaned for inside of the facility and all kinds of measures will be taken against dusting and roads will be covered with concrete materials for inside of the facility. No particle material will be created in emissions occurred due to combustion of natural gas in the facility.

Primarily NO_x and CO emissions will occur as flue gas as a result of combustions of natural gas in the facility. Since the power plant will burn only natural gas, sulphur oxides (SO_x) and particle material (PM) emissions will be in negligible level. For the operation phase, air dispersion modeling study was performed. As a result of the model study, it is concluded that, annual and hourly NO₂ emissions from ACWA Power Kırıkkale NGCCPP will not contributed more than 25% of the applicable ambient air quality standards at residential areas located at the area of effect.

According to UNFCCC (United Nations Framework Convention on Climate Change), there are six greenhouse gases which are listed below;

- Carbon Dioxide (CO₂)
- Methane (CH₄)
- Nitrous Oxide (N₂O)
- Perfluorocarbons (PFCs)
- Hydrofluorocarbons (HFCs)
- Sulphur Hexafluoride (SF₆)

In Natural Gas Combined Cycle Power Plants, the main impact on climate change is CO₂ emissions.

Estimated CO₂-equivalent emission value which will be produced due to combustion of natural gas in ACWA Kırıkkale NGCCPP is given below;

CO₂ Emission Factor* : 2.693 CO₂ ton/ fuel ton (for CO₂)
(*IFC Carbon Emission Estimator Tool, 12.02.2014)
Natural Gas Consumption Amount : 896,250 ton/year
(Density of natural gas is considered as 0.717 kg/m³)
CO₂-equivalent Emission Amount : 2,454,334 ton/year (CO₂ + CH₄ + N₂O)

Turkish total CO₂ emission produced for public electricity and heat production is determined as 278,330,840 ton/year (National Greenhouse Gas Index 1990-2009). According to data, ACWA Kırıkkale NGCCPP contributes only 0.8% to the Turkey's CO₂ emission rate in energy sector.

Noise

The units which cause noise (Gas turbines, steam turbine, generator and etc.) will be installed indoor. Acoustic Report Study has been performed in order for identifying noise level to be occurred when the facility is in operation. As a result of acoustic report study, it is concluded that noise level during operation will not exceed legal noise limit values at the nearest sensitive recipient.

Flora - Fauna

The measures to be taken over possible impacts over terrestrial and aquatic flora/fauna during construction phase of the project will be duly adhered to in operation phase of the facility as well.

There are no endangered, endemic, rare, extinct species or habitat within the facility area. It will be duly considered that outside borders of the facility will not be exceeded during operation phase as in construction phase in order not to destruct natural vegetation structure.

For flora and fauna in the operation phase of the project, the most important pollutants are known as NO and NO₂ derives from the project. Since NO and NO₂ concentration values do not exceed the limit values, that is not expected to have a negative impact on the flora and fauna.

Section IV. 3. Description of Social Impact and Mitigation Measures

Employment

During the construction phase there will be an average of 500 employees throughout construction and commissioning phases. The total construction period is planned to be approximately 30 months.

In order to be used during construction activities, a construction camp will be built in the project area and all technical and social infrastructure needs of the staff such as dining hall, kitchen, locker space, shower, toilet, sink, storage, administrative and technical offices will be located within the construction site.

During the operation phase of the ACWA Power Kırıkkale Natural Gas Combined Cycle Power Plant approximately 60 staff will be employed.

The project will most likely provide job opportunities to local people, so the regional economy will be affected positively.

On the other hand some of the necessary materials, equipment and workers needed in the construction and operation phase will most likely be purchased from local sources. The project will also bring economic benefits to the closed by villages and communities such as to restaurants, gas stations, hotels and building apartments, local food market, etc. Meaning that, regional economy will be affected indirectly positively

Property

As per new updated information available to the project company most of the area belongs to governmental treasury but there is a small private ownership area. This area will be expropriate by direct negotiation and other legal procedures according to expropriate law in forced.

Access to the power plant project area will be provided via a rural road connected to the existing highway. After acquiring electricity generation license for the power plant, access road will be projected and according to range of extensions, land owners will be identified. In case of any expropriation need, Turkish regulations and international requirements will be followed as a procedure.

Power plant project area does not enter into any residential area. Since no residential properties exist within the project footprint, no activity leading to resettlement is anticipated. Therefore resettlement action plan was not prepared.

Above information is summarized at below tables;

Table 12. The Mitigation and Monitoring Program of Construction Phase

The Parameter to be Monitored	The Relevant Activity	The Mitigating Precaution	The Duration of the Monitoring	The Curator
The Historical, Cultural, and Archeological Assets	In case that any cultural and archeological asset is encountered within the scope of the land preparation and excavation works, the closest Museum Directorate or the Directorate of the Commission of the Protection of the Cultural and Natural Assets	The immediate stopping of the excavation works, and their continuation under the scrutiny of the relevant institution and/or with its permission,	During the land preparation and the excavation procedures	- The Contractor Firm, - Museum Directorate, - Protection Commission Directorate
The Scraping of the Vegetative Earth	Taking the vegetative earth over the surface earth by scraping it in accordance with its characteristics	The storage of the vegetative earth taken by scraping, without mixing it with the excavation earth in order for it not to lose its characteristics and to use it in the landscape works,	During the land preparation and the excavation procedures	-The Contractor Firm
Excavation Works	How are the scraping and the excavation procedures performed, the use and/or the storage of the excavation materials in a way not to damage the environment	<ul style="list-style-type: none"> - In order to prevent the dust clouds during the scraping and the excavation procedures, performing watering by watering truck, - The use of the materials obtained from the excavation procedures in filling procedures, - The storage of the excess excavation materials without damaging the surrounding land in accordance with the standards specified in the Control Regulations of the Excavation Earth, Construction and Wreckage Wastes in the area which Kılıçlar Municipality showed, IFC and EBRD guidelines and international best practices 	During the land preparation and the excavation procedures	-The Contractor Firm
Air Emissions	Land Works	<ul style="list-style-type: none"> - Performing the loading and the unloading works without making any scattering during the land works, - covering loading trucks to prevent dust emissions. - Improving the roads used when necessary, - Watering the roads used with watering trucks in order to reduce and minimize the dust clouds on the roads during the carrying of the materials, - Holding the upper parts of the materials at 10 % humidity in order to prevent the dust clouds on the roads during the carrying of the materials, - Complying with the provisions specified in the Industrial Air Pollution Control Regulation(IAPCR), IFC and EBRD guidelines and international best practices 	During the construction procedures	-The Contractor Firm
Vehicle Emissions	All work machinery and equipments to be used in all construction activities beginning from the vehicle organization phase	<ul style="list-style-type: none"> - Performing the regular routine maintenance of all the vehicles to be used, - Performing the regular exhaust emission measurements of all the vehicles to be used, - Complying with the relevant provisions of the Regulations with regard to the Control of the Emissions of the Exhaust Gases Arising from the Motorized Land Vehicles Driven in the Traffic, IFC and EBRD guidelines and international best practices 	During the construction procedures	-The Contractor Firm
The Security of the Floor	Land preparation and construction works	Taking the projected security and the drainage precautions in order to provide the security of the floor specified in the Geological/Geotechnical Reports on which the development plan is based	During the construction procedures	-The Contractor Firm

ACWA POWER KIRIKKALE NATURAL GAS COMBINED CYCLE POWER PLANT PROJECT
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The Parameter to be Monitored	The Relevant Activity	The Mitigating Precaution	The Duration of the Monitoring	The Curator
Waste water	The use of water having the household characteristic The use of water in the ready concrete facility	<ul style="list-style-type: none"> - The prevention of throwing wastes in a not controlled way into the surface water resources, - The use of the washing waste waters going out of the ready concrete facility in the washing procedures again in the concrete facility and/or as additive water after it is precipitated in the sedimentation pool, - The discharge of the household waste waters with their decontamination in the package waste water decontamination facility and with the compliance with the limit values, - Complying with the relevant provisions of the Control Regulations of the Water Pollution and with the minimum limit values, IFC and EBRD guidelines and international best practices 	During the construction procedures	-The Contractor Firm
Solid Wastes	Creation of the household wastes Construction and excavation wastes	<ul style="list-style-type: none"> - The accumulation of the household wastes which will occur as a result of meeting the requirements of the personnel in covered leak proof cases separated from other wastes, their collection in certain periods by the municipality and their disposals, - Complying with the relevant provisions of the Control Regulations of the Solid Wastes, IFC and EBRD guidelines and international best practices - The separate collection of the recyclable and/or the transformable materials, their reuse and/or their delivery to the licensed recycling facilities, - Conducting the analyses of the precipitated sludge and its disposal in accordance with the results of the analyses 	During the construction procedures	-The Contractor Firm
Package Wastes	Personnel requirements and construction procedures	<ul style="list-style-type: none"> - The separate collection of the Package Wastes which will arise within the scope of the construction activities from other wastes, the disposal of the collected wastes by delivering them to licensed firms, - Preventing them from mixing with other wastes, and preventing their disposal with the household wastes, - Preventing their throws into the environment in a not controlled fashion, - Complying with the relevant provisions of the Control Regulations of the Packages and the Package Wastes, IFC and EBRD guidelines and international best practices 	During the construction procedures	-The Contractor Firm
Vegetative Waste Oils	Meeting the dining requirements of the personnel	<ul style="list-style-type: none"> - The separate collection of the wastes which will arise while meeting the requirements of the personnel in leak proof cases, and the disposal of the collected wastes by delivering them to licensed firms, - Preventing their throws into the environment in a not controlled fashion, - Complying with the relevant provisions of the Control Regulations of the Vegetative Waste Oils, IFC and EBRD guidelines and international best practices 	During the construction procedures	-The Contractor Firm
Waste Oils	All procedures to be performed in all construction activities beginning from the land organization phase and the work machinery and equipments to be used in those activities	<ul style="list-style-type: none"> - Conducting the analyses of all waste oils and motor oils by the authorized laboratories which will arise from all kinds of machinery and vehicles to be used within the scope of the construction activities, and their delivery to the licensed firms in order to dispose them in the Recycling and/or Disposal Facilities in accordance with the results of the analyses, - Complying with the relevant provisions of the Control Regulations of the 	During the construction procedures	-The Contractor Firm

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The Parameter to be Monitored	The Relevant Activity	The Mitigating Precaution	The Duration of the Monitoring	The Curator
		Waste Oils, IFC and EBRD guidelines and international best practices		
The tires which completed their lives	The work machinery and equipments to be used in construction activities beginning from the land organization phase	<ul style="list-style-type: none"> - Delivering the tires which completed their lives of the vehicles to be used during the construction works to the licensed disposal facilities, - Complying with the relevant provisions of the Control Regulations of the Tires, IFC and EBRD guidelines and international best practices Which Completed Their Lives, 	During the construction procedures	-The Contractor Firm
Waste Batteries and Accumulator	All procedures to be performed in all construction activities beginning from the land organization phase and the work machinery and equipments to be used in those activities	<ul style="list-style-type: none"> - Transporting the waste batteries of the vehicles to be used during the construction works to the collection points or to the temporary storage areas, - The separate collection of all kinds of waste cells within the framework of the provisions of the regulations, - Sending the collected waste cells to the firms which have the License of Collecting the Waste Cells, - Complying with the relevant provisions of the Control Regulations of the Waste Cells and Batteries, IFC and EBRD guidelines and international best practices 	During the construction procedures	-The Contractor Firm
Medicinal Wastes	Personnel Requirements	<ul style="list-style-type: none"> - The medicinal wastes arising from the personnel who will work in the construction phase will be collected separately from other wastes and in special cases, - The collected medicinal wastes will be disposed of by signing a medicinal waste disposal agreement with the relevant municipality, - Complying with the relevant provisions of the Control Regulations of the Medicinal Wastes, IFC and EBRD guidelines and international best practices 	During the construction procedures	-The Contractor Firm
Noise	All procedures to be performed in all construction activities beginning from the land organization phase and the work machinery and equipments to be used in those activities	<ul style="list-style-type: none"> - Performing the regular maintenance of the equipments to be used in the construction works, - Complying with the relevant provisions of the Regulations of the Evaluation and the Management of the Environmental Noise, IFC and EBRD guidelines and international best practices 	During the construction procedures	-The Contractor Firm
Flora Fauna	All construction activities beginning from the land organization phase	<ul style="list-style-type: none"> - Laying out the vegetative earth again scraped for the preparation of the land during construction activities and vegetating it in compliance with the natural vegetation, - Preventing the hunting of the personnel during construction works, 	During the construction procedures	-The Contractor Firm
Agricultural Areas	Transportation to the area of activity Excavation procedures	<ul style="list-style-type: none"> - The clouds of dust will be prevented by watering the gravel roads by watering trucks in order to prevent the agricultural lands around the road used during the transportation to the area of the activity be affected negatively. - During excavation works, the damages to the existing agricultural lands in the region will be prevented by taking the precautions preventing the clouds of dust (such as watering by the watering trucks). 	During the construction procedures	-The Contractor Firm
Forest Areas	All construction activities beginning from the land organization phase	<ul style="list-style-type: none"> - Before the activity, the necessary permissions from Kırıkkale Forest Operation Chairmanship will be obtained, - No excess excavation materials will be poured into the forest areas. 	During the construction procedures	-The Contractor Firm
Meeting the Personnel Requirements	Housing, Infrastructure requirements	<ul style="list-style-type: none"> - The staff who will be employed in the project will be first selected from the persons who reside in the settlements in the project area and its surroundings. In that case, if the staff coming from close settlements require to reside in their 	During the construction procedures	-The Contractor Firm

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NON-TECHNICAL SUMMARY

The Parameter to be Monitored	The Relevant Activity	The Mitigating Precaution	The Duration of the Monitoring	The Curator
		own houses and/or if it is suitable in terms of operational activities, service vehicles may be used for transportation, - The establishment of the temporary construction camp for the personnel who will come from outside, - Meeting all kinds of infrastructure requirements of the employed personnel by the social facilities to be constructed in the construction areas,		
Work Health and Security	All construction activities beginning from the land organization phase	- Working in accordance with the provisions of the Regulations of the Health and the Security in the Construction Works within the scope of the construction works	During the construction procedures	-The Contractor Firm
Transportation	All construction activities beginning from the land organization phase	- Complying with the tonnage limitations during the transportation of the materials, - Complying with the relevant provisions of the Land Ways Traffic Act, IFC and EBRD guidelines and international best practices	During the construction procedures	-The Contractor Firm

Table 13. The Mitigation and Monitoring Program of Operational Phase

The Parameter to be Monitored	The Relevant Activity	The Mitigating Precaution	The Duration of the Monitoring	The Curator
Air Emissions	The smokestack gases arising from the burning of the natural gas for the production of the electricity energy	<ul style="list-style-type: none"> - Performing continuous measurements during the operation of the power plant, - Ambient air quality measurements in every 2 years by authorized laboratory - Holding the emission values below the limit values in the regulations, - Using dry burners producing low NOx, - Complying with the relevant provisions of the Regulations of Large Combustion Facilities and Regulation of Industrial Source Air Pollution Control, IFC and EBRD guidelines and international best practices 	During operation	<ul style="list-style-type: none"> - ACWA Power - Provincial Directorates of Environment and Urbanization
Waste water	Household waste waters Process waste waters	<ul style="list-style-type: none"> - Discharging the waste waters after decontaminating them in the Waste Water Decontamination Facility arising during the operation of the power plant, - Discharging the household waste waters after decontaminating them in the Package Waste Water Decontamination Facility - Wastewater will be sampled and analyzed by authorized laboratory according to wastewater category and the report of the analysis will be submitted to the Ministry. - Complying with the relevant provisions of the Regulations of Water Pollution Control, IFC and EBRD guidelines and international best practices 	During operation	<ul style="list-style-type: none"> - ACWA Power - Provincial Environment and Urbanization Directorates
Solid Wastes / Dangerous Wastes	Household solid wastes Solid wastes arising from repairs and maintenances of the operations Sludge of the decontamination facility	<ul style="list-style-type: none"> - The accumulation of the household wastes which will occur as a result of meeting the requirements of the personnel in covered leak proof cases separated from other wastes, their collection in certain periods by the municipality and their disposals, - Complying with the relevant provisions of the Control Regulations of the Solid Wastes, IFC and EBRD guidelines and international best practices - The separate collection of the recyclable and/or the transformable materials, their reuse and/or their delivery to the licensed recycling facilities, - Conducting the analyses of the precipitated sludge and its disposal in accordance with the results of the analyses, 	During operation	<ul style="list-style-type: none"> - ACWA Power
Packing Wastes	Personnel requirements and operating activities	<ul style="list-style-type: none"> - Ensuring that Packing Wastes that will come into existence within scope of Operating Activities are collected separately from other wastes, ensuring collected wastes are disposed of by giving them to licensed firms. - Preventing them to be mixed up with other wastes, preventing them from being disposed of with domestic wastes, - Preventing them from being thrown away to environment uncontrollably, - Abiding by the relevant provisions of Directive on Control of Packing and Packing Wastes, IFC and EBRD guidelines and international best practices 	During operation	<ul style="list-style-type: none"> - ACWA Power
Waste Oils	Engineering vehicles and equipments at operation stage.	<ul style="list-style-type: none"> - To deliver waste oils and motor oils that will come into existence due to all kinds of machines and equipments to be used within scope of operating activities to licensed firms in order to ensure that they are analyzed by Authorized laboratories and disposed of in Recycling and/or Disposal facilities in accordance with results of analysis, - Abiding by the relevant provisions of Directive on Waste Oil Control, IFC and EBRD guidelines and international best practices 	During operation	<ul style="list-style-type: none"> - ACWA Power - Provincial Directorates of Environment and Urbanization
	Engineering vehicles and	- To provide that waste accumulators to come into existence due to vehicles to be used		<ul style="list-style-type: none"> - ACWA Power

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Waste Batteries and Accumulators	equipments at operation stage.	during operating stage are taken away to collecting points or to temporary storage areas, - To provide that all kinds of waste batteries to come into existence within scope of operating activities are collected separately within frame of provisions of directives, - To ensure that collected waste batteries are delivered to firms having Waste Battery Collection License. - To abide by relevant provisions of Directive on control of Waste Battery and Accumulators	During operation	- Provincial Directorates of Environment and Urbanization
Noise	Engineering vehicles and equipments at operation stage.	- Getting equipments to be used during operation maintained regularly, - Abiding by the relevant provisions of Directive on Evaluation and Management of Environmental Noise and ensuring limit values, IFC and EBRD guidelines and international best practices	During operation	- ACWA Power - Provincial Directorates of Environment and Urbanization

Table 14. The Mitigation and Monitoring Program of the Decommissioning Phase

The Parameter to be Monitored	The Relevant Activity	The Mitigating Precaution	The Duration of the Monitoring	The Curator
Air Emissions	Land Works	<ul style="list-style-type: none"> - Performing the loading and the unloading works without making any scattering during the land works, - covering loading trucks to prevent dust emissions. - Improving the roads used when necessary, - Watering the roads used with watering trucks in order to reduce and minimize the dust clouds on the roads during the carrying of the materials, - Holding the upper parts of the materials at 10 % humidity in order to prevent the dust clouds on the roads during the carrying of the materials, - Complying with the provisions specified in the Industrial Air Pollution Control Regulation(IAPCR), IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
Vehicle Emissions	All work machinery and equipments to be used in all decommissioning activities beginning from the vehicle organization phase	<ul style="list-style-type: none"> - Performing the regular routine maintenance of all the vehicles to be used, - Performing the regular exhaust emission measurements of all the vehicles to be used, - Complying with the relevant provisions of the Regulations with regard to the Control of the Emissions of the Exhaust Gases Arising from the Motorized Land Vehicles Driven in the Traffic, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
Waste water	<p>The use of water having the household characteristic</p> <p>The use of water in the ready concrete facility</p>	<ul style="list-style-type: none"> - The prevention of throwing wastes in a not controlled way into the surface water resources, - The use of the washing waste waters going out of the ready concrete facility in the washing procedures again in the concrete facility and/or as additive water after it is precipitated in the sedimentation pool, - The discharge of the household waste waters with their decontamination in the package waste water decontamination facility and with the compliance with the limit values, - Complying with the relevant provisions of the Control Regulations of the Water Pollution and with the minimum limit values, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
Solid Wastes	Creation of the household wastes	<ul style="list-style-type: none"> - The accumulation of the household wastes which will occur as a result of meeting the requirements of the personnel in covered leak proof cases separated from other wastes, their collection in certain periods by the municipality and their disposals, - Complying with the relevant provisions of the Control Regulations of the Solid Wastes, IFC and EBRD guidelines and international best practices - The separate collection of the recyclable and/or the transformable materials, their reuse and/or their delivery to the licensed recycling facilities, - Conducting the analyses of the precipitated sludge and its disposal in accordance with the results of the analyses 	During the decommissioning procedures	-The Contractor Firm
Package Wastes	Personnel needs and decommissioning procedures	<ul style="list-style-type: none"> - The separate collection of the Package Wastes which will arise within the scope of the decommissioning activities from other wastes, the disposal of the collected wastes by delivering them to licensed firms, - Preventing them from mixing with other wastes, and preventing their disposal with the household wastes, - Preventing their throws into the environment in a not controlled fashion, - Complying with the relevant provisions of the Control Regulations of the Packages and the Package Wastes, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm

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Vegetative Waste Oils	Meeting the dining requirements of the personnel	<ul style="list-style-type: none"> - The separate collection of the wastes which will arise while meeting the requirements of the personnel in leak proof cases, and the disposal of the collected wastes by delivering them to licensed firms, - Preventing their throws into the environment in a not controlled fashion, - Complying with the relevant provisions of the Control Regulations of the Vegetative Waste Oils, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
Waste Oils	All procedures to be performed in all decommissioning activities The work machinery and equipments to be used in those activities	<ul style="list-style-type: none"> - Conducting the analyses of all waste oils and motor oils by the authorized laboratories which will arise from all kinds of machinery and vehicles to be used within the scope of the decommissioning activities, and their delivery to the licensed firms in order to dispose them in the Recycling and/or Disposal Facilities in accordance with the results of the analyses, - Complying with the relevant provisions of the Control Regulations of the Waste Oils, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
The tires which completed their lives	The work machinery and equipments to be used in decommissioning activities beginning from the land organization phase	<ul style="list-style-type: none"> - Delivering the tires which completed their lives of the vehicles to be used during the decommissioning works to the licensed disposal facilities, - Complying with the relevant provisions of the Control Regulations of the Tires Which Completed Their Lives, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
Waste Batteries and Accumulator	All procedures to be performed in all decommissioning activities The work machinery and equipments to be used in those activities	<ul style="list-style-type: none"> - Transporting the waste batteries of the vehicles to be used during the decommissioning works to the collection points or to the temporary storage areas, - The separate collection of all kinds of waste cells within the framework of the provisions of the regulations, - Sending the collected waste cells to the firms which have the License of Collecting the Waste Cells, - Complying with the relevant provisions of the Control Regulations of the Waste Cells and Batteries, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
Medicinal Wastes	Personnel Requirements	<ul style="list-style-type: none"> - The medicinal wastes arising from the personnel who will work in the decommissioning phase will be collected separately from other wastes and in special cases, - The collected medicinal wastes will be disposed of by signing a medicinal waste disposal agreement with the relevant municipality, - Complying with the relevant provisions of the Control Regulations of the Medicinal Wastes, 	During the decommissioning procedures	-The Contractor Firm
Noise	All procedures to be performed in all decommissioning	<ul style="list-style-type: none"> - Performing the regular maintenance of the equipments to be used in the decommissioning works, - Complying with the relevant provisions of the Regulations of the Evaluation and the Management of the Environmental Noise, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
Meeting the Personnel Needs	Housing, Infrastructure requirements	<ul style="list-style-type: none"> - The staff who will be employed in the project will be first selected from the persons who reside in the settlements in the project area and its surroundings. In that case, if the staff coming from close settlements require to reside in their own houses and/or if it is suitable in terms of operational activities, service vehicles may be used for transportation, - The establishment of the temporary decommissioning camp for the personnel who will come from outside, - Meeting all kinds of infrastructure requirements of the employed personnel by the social facilities to be constructed in the decommissioning areas, 	During the decommissioning procedures	-The Contractor Firm
Work Health and Security	All decommissioning activities	<ul style="list-style-type: none"> - Working in accordance with the provisions of the Regulations of the Health and the Security in the decommissioning Works within the scope of the decommissioning works 	During the decommissioning procedures	-The Contractor Firm

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Transportation	All decommissioning activities	<ul style="list-style-type: none"> - Complying with the tonnage limitations during the transportation of the materials, - Complying with the relevant provisions of the Land Ways Traffic Act, IFC and EBRD guidelines and international best practices 	During the decommissioning procedures	-The Contractor Firm
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