ETİ BAKIR CO.

CARBON AND WATER FOOTPRINTS REPORT

2022

ETİ BAKIR

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INTRODUCTION

Copper dates back minimum 10,000 years. Copper has distinct physical and chemical properties like electrical conductivity, thermal conductivity, corrosion resistance, malleability, etc. and these properties make copper a very critical raw material for quality of life and sustainable economic growth. About 70% of copper is used in electrical applications throughout the world. Copper is an excellent conductor of electricity, second only to valuable metals, and used in all electrical systems from power generation to transmission and distribution networks. Copper is considered worldwide to be the key raw material to have a reliable and safe supply of power in addition to efficient energy.

AREAS OF USE

BUILDINGS

- Electrical installations
- Solar power heating
- Air-conditioners
- Water, gas and motor-powered instrumentsx

ELECTRICAL SYSTEMS

- Renewable generation plants
- Transmission and distribution systems
- Submarine and underground cabling systems
- Network storage systems

TRANSPORTATION

- Railways (Electrified lines - Catenary)
- Automotive installations
- Batteries
- Electric car motors

OTHER

- Telecommunication
- Electronic instruments
- Agriculture
- Interior Design

Copper is produced from two sources: copper ore as the primary source of copper and scrap copper as the secondary source of copper. Copper industry includes copper mines, smelter plants, refineries, recycling plants and the manufacturers of semi-finished goods. The copper sector makes vital contribution to the national economies of both developed and developing countries and directly employs more than 1 million people worldwide

1. ABOUT REPORT

This report provides detailed and comprehensive presentation of greenhouse gas emissions and water consumption resulting from copper production in the process from ore to cathodic copper during the operations of Eti Bakır and its 9 plants. In addition, information about the other production sectors of Eti Bakır is provided.

With regard to carbon footprint, Scope 1 and Scope 2 have been taken into consideration and Scope 3 has been excluded in this report prepared based on the measurement of the operations of the plants for the year 2022 as in the other industrial companies in the world. All the data collected in this report has been prepared in line with the principles of compliance with Greenhouse Gas Protocol issued by the World Resources Institute and of consistency, transparency and accuracy.

Water scarcity, climate change, population growth, technological development, urbanisation and changes in consumption habits put strain on water resources.

All these developments have made it necessary to follow water resources via an analytical method in mining activities in order to minimise the environmental impact. Eti Bakır has pioneered water footprint calculation among the mining companies in Türkiye and targets reducing water footprint data for the protection of water resources. In the report, where total blue and grey water footprint is calculated, ISO 14046 Water Footprint standard is followed.

2. ABOUT ETİ BAKIR

Eti Bakır is the only integrated company having production range from ore to final product in copper mining in Türkiye and meets about 20% of national demand with 70,000 tonnes of cathode copper produced yearly. Eti Bakır was purcased from the Privatisation Administration in 2004 and began to operate within Cengiz Holding and adds 750 million dollars every year to reduce current account deficit.

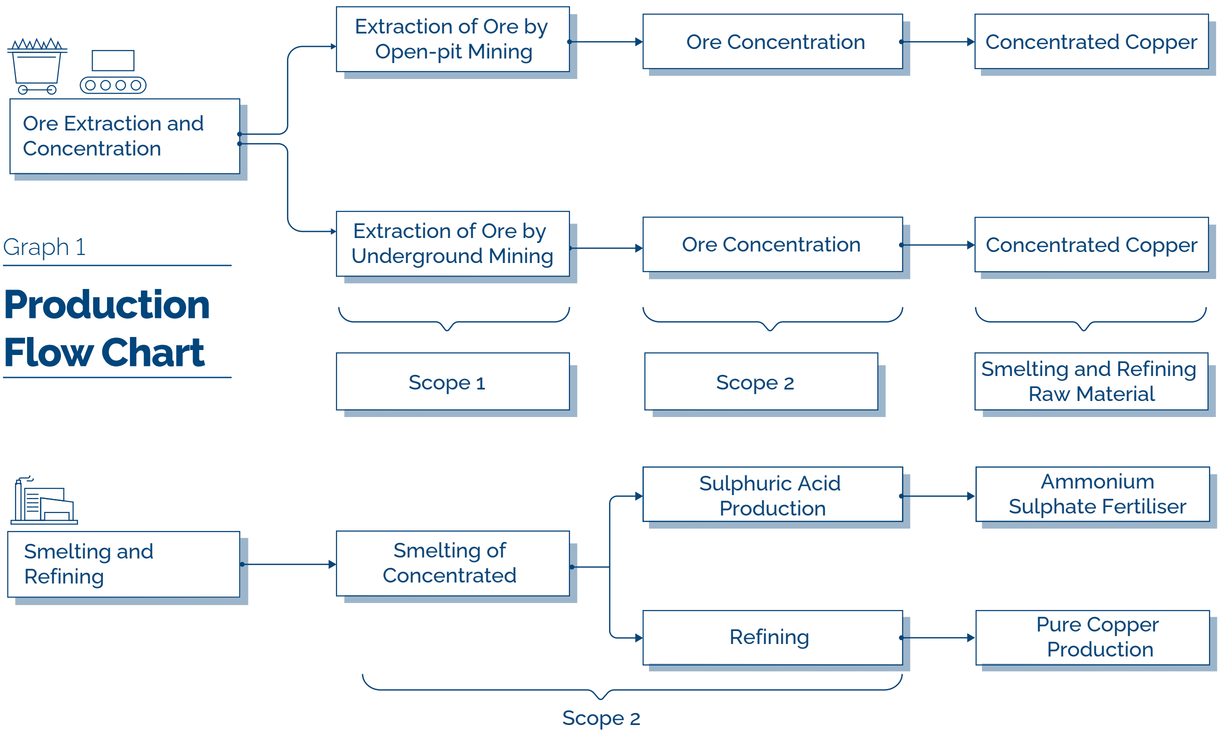
6 of the 9 plants of Eti Bakır are mining copper ore through underground or open-pit mining and situated within the provincial borders of Kastamonu, Giresun, Artvin (two plants), Siirt and Adıyaman. The copper ores extracted and concentrated at these mining plants are enriched at Samsun smelter and electrolysis plant and 99.99% pure cathode copper is achieved.

Ammonium sulphate fertiliser is also produced at this plant.

In addition, a plant in İzmir produces antimony ore through underground mining and a plant in Mardin extracts phosphate rock through open-pit mining and produces DAP fertiliser and recovers metal.

Run-of-mine ore is mined and there are plants with basic processes like crushing and screening, milling, flotation and filtration in all copper mines and the copper concentrated produced as a result of these processes is sent to Samsun smelter plant.

Eti Bakır, meets about 20% of national demand with 70,000 tonnes of cathode copper produced yearly.

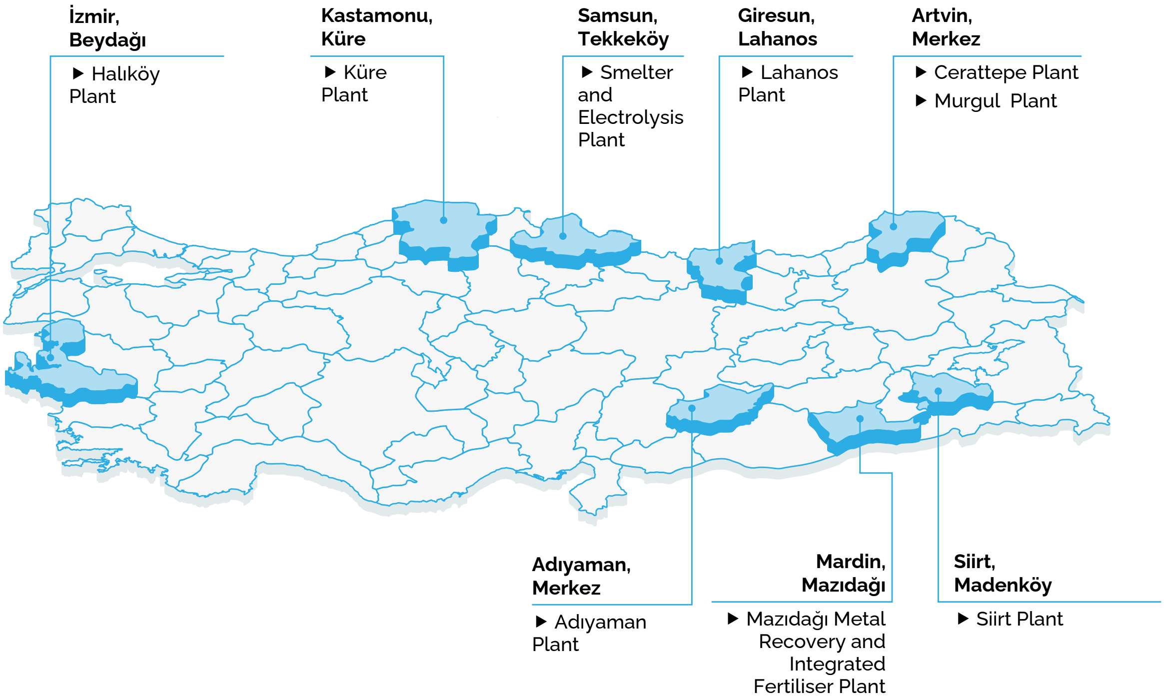


Graph 1

Production Flow Chart

Graph 2

Our Plants



Number of Plants	Run-of-mine Copper	Antimony Ore	Run-of-mine Phosphate
9	6.9 million tonnes	9,122 tonnes	1 million tonnes

Table 1

Plants Affiliated to Eti Bakır

Plant	Processed Product	Product
Kastamonu Küre	Run-of-mine copper	Concentrated copper Concentrated pyrite
Giresun Lahanos	Run-of-mine copper	Concentrated copper
Artvin Cerattepe	Run-of-mine copper	Run-of-mine copper
Artvin Murgul	Run-of-mine copper	Concentrated copper Concentrated pyrite
Siirt	Run-of-mine copper	Concentrated copper
Adıyaman	Run-of-mine copper	Concentrated copper
Samsun	Concentrated copper Silica sand Ammonia (anhydrous) Sulphuric acid (98%)	Cathode copper (99.99%) Valuable metal deposits (Anode sludge) Sulphuric acid (98%) Ammonium sulphate Oxygen (gas) Oxygen (liquid) Nitrogen (gas) Nitrogen (liquid) Argon (liquid)
İzmir Halıköy	Raw antimony ore	Concentrated antimony
Mardin Mazıdağı	Concentrated phosphate Pyrite - DAP Fertiliser	Cathode copper Cobalt carbonate Zinc carbonate Iron cake

3. ETİ BAKIR ENVIRONMENTAL MANAGEMENT SYSTEM AND CLIMATE PROGRAMME

All Eti Bakır plants have been based on a foundation consisting of plans for aligning the existing environmental infrastructure standard and continuously adapting it to the changing national and global conditions. This foundation relies on a fundamental philosophy formulated as "write down what you do / do what you write down".

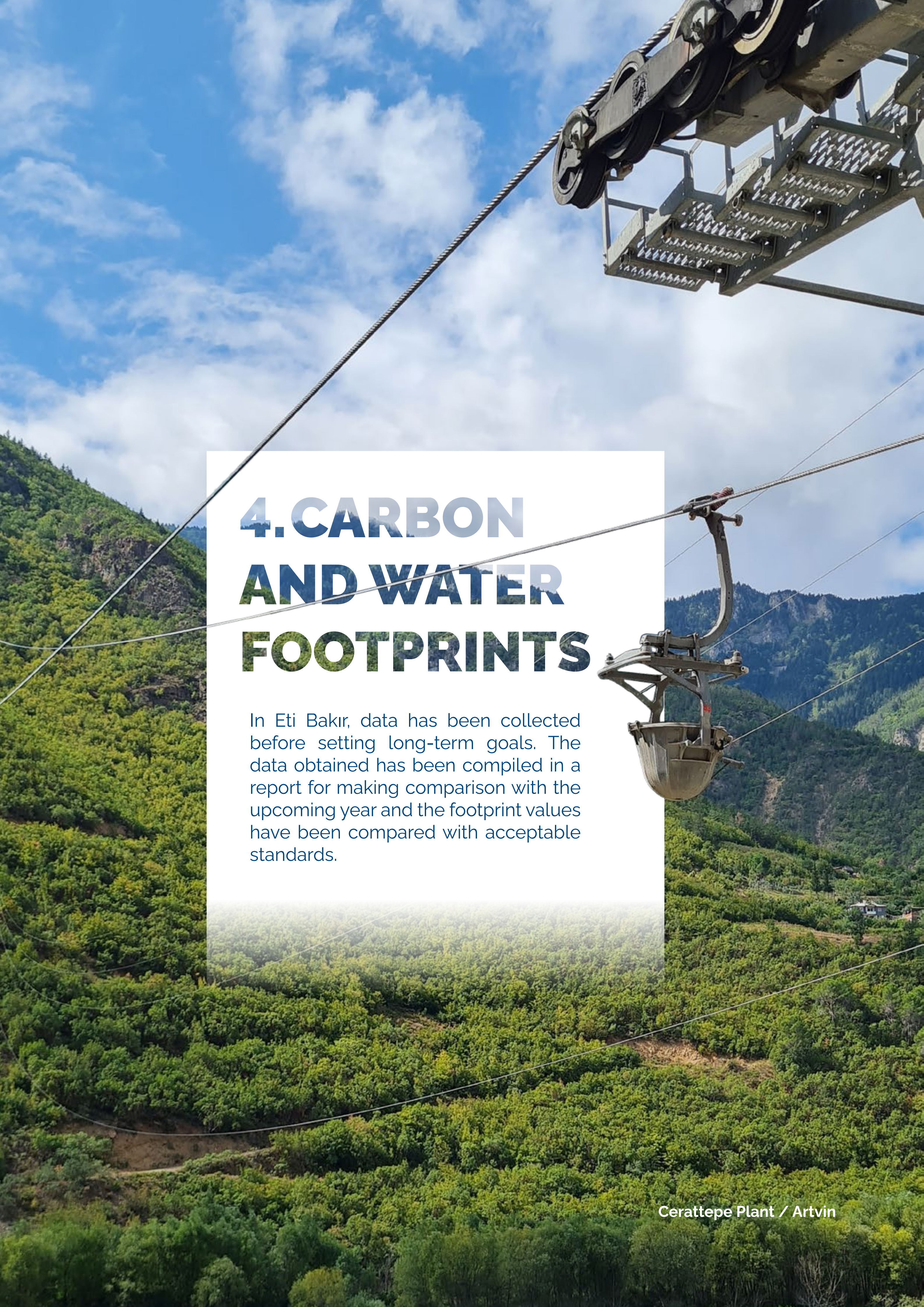
Employees from all tiers from top to down focus on the goals of the company by pursuing the proven methods at all Eti Bakır plants. To this end, the plans that are published and continuously updated are used.

In Eti Bakır, it is believed that **"the more the management system is strengthened, the more the recognised climate programmes are supported".**

In addition to the plans given on the opposite, new plans are developed according to the requirements. **The Environmental Management System** maintained by Eti Bakır is not just composed of environmental values. The topics of the environmental management system are assessed together in addition to the points taken as basis by the World Bank and the other umbrella organisations.

Labour Management Plan

1) Sub-contractor Management Plan
2) Supply Chain Management Plan
3) Annual Training Plan
4) Occupational Health and Management Plan
5) Public Health and Safety Management Plan
6) Security Management Plan
7) Camp Site Management Plan
8) Closure Rehabilitation Plan
9) Air Quality Management Plan
10) Noise Management Plan
11) Tailings Storage Management Plan
12) Waste Management Plan
13) Wastewater Management Plan
14) Soil Management Plan
15) Spill Response Management Plan
16) Chemicals Management Plan
17) Resource Efficiency Management Plan
18) Emergency Preparedness and Management Response Plan
19) Traffic Management Plan
20) Transport of Hazardous Substances Management Plan
21) Recruitment and Grievance Management Plan
22) Social Investment Management Plan
23) Biodiversity Management Plan
24) Water Management Plan
25) Stakeholder Participation Plan
26) Carbon Footprint Management
27) Water Footprint Management



4. CARBON AND WATER FOOTPRINTS

In Eti Bakır, data has been collected before setting long-term goals. The data obtained has been compiled in a report for making comparison with the upcoming year and the footprint values have been compared with acceptable standards.

Cerattepe Plant / Artvin

4.1. CARBON FOOTPRINT

The greenhouse gas emissions resulting from the operations of the plants have been calculated in two categories under TS EN ISO 14064, namely "Scope 1 Direct Greenhouse Gas Emission" resulting from the combustion of fossil fuels to supply power, heat and/or steam needed by the plants and "Scope 2 Indirect Greenhouse Gas Emission" associated with the consumption of energy resulting from the use of purchased electricity, heat and steam. "Scope 3 Other Indirect Greenhouse Gas Emissions" have not been evaluated. The greenhouse gas emissions resulting from the consumption of fossil fuels like diesel, natural gas, LNG, coal, etc. used for the energy requirement have been calculated within the frame of Scope 1 and the emissions resulting from the use of purchased electricity and not being under direct responsibility have been calculated within the frame of Scope 2 at the mining plants within Eti Bakır Co.

The Scope 1 emissions at all Eti Bakır plants were 275,695 tonnes in 2022. The Scope 2 emissions were 307,429 tonnes in the same year.

Scope 1 Total Emission

275,695 tonnes

Scope 2 Total Emission

307,429 tonnes

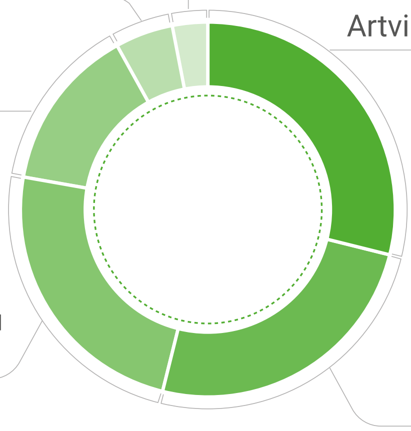
Table 2

Scope 1 and Scope 2 Emissions from the Use of Diesel, Natural Gas and Electricity by the Plants

	SCOPE 1 (t/CO2)			SCOPE 2 (t/CO2)	SCOPE 1+2 (t/CO2)
Name of Plant	**Diesel**	**Natural Gas**	**Total**	**Electricity**	**TOTAL**
İzmir Halıköy Plant	114	0	114	912	1,026
Kastamonu Küre Plant	9,247	325	10,082	41,190	51,272
Samsun Smelter and Electrolysis P.	1,525	16,231	17,756	63,330	81,086
Giresun Lahanos Plant	1,428	0	1,428	3,542	4,970
Artvin Murgul Plant	11,898	0	11,898	41,443	53,341
Artvin Cerattepe Plant	1,929	0	1,929	1,152	3,081
Adıyaman Plant	5,892	0	5,892	14,272	20,164
Siirt Madenköy Plant	10,214	0	10,214	28,407	38,621
Mazıdağı Metal Recovery and Integrated Fertiliser Plants	12,866	203,516	216,382	113,181	329,563
TOTAL	**55,113**	**220,072**	**275,695**	**307,429**	**583,124**

Graph 3

Scope 1 Emissions by the Plants Producing Copper Ore



The total CO2 emission by Eti Bakır for copper production is 253,560 tonnes. 23% (Scope 1) of this emission results from diesel and natural gas. And 77% (Scope 2) results from the use of electricity. 70,000 tonnes of cathodic copper (99.99% pure) were produced in 2022.

The carbon dioxide emission per kg of cathodic copper is 3.62 kg before carbon sinks. This is lowered down to 3.16 kg following the carbon dioxide absorbed in the carbon sinks.

This value includes the whole process of the production, concentration and refining of ore in the mines.

The average emission value of Codelco, Freeport-McMoran, Glencore, BHP and Southern Copper is 3.7 kg. Diesel and electricity are the basic supplies of energy used at Eti Bakır plants.

Also, coal and LNG are used for heating the social facilities and offices within the plants. In 2022, 13,259 tonnes of diesel, 461,128,140 kWh of electricity, 7,727,658 m^3 of natural gas, 117.2 tonnes of LNG and 424.2 tonnes of coal were consumed.

Table 3

Diesel and Electricity Consumption of Mining Plants
(t/kWh)

Name of Plant	Diesel Consumption (t)	Electricity Consumption (kWh)
İzmir Halıköy Plant	35.8	2,163,915
Kastamonu Küre Plant	2,902.1	97,782,934
Samsun Smelter and Electrolysis Plant	478.7	150,341,588
Giresun Lahanos Plant	448.1	8,408,427
Artvin Murgul Plant	3,734.3	98,381,613
Artvin Cerattepe Plant	605.5	2,734,700
Adıyaman Plant	1,849.1	33,880,114
Siirt Plant	3,205.5	67,434,850
TOTAL	**13,259.1**	**461,128,140**

4.2. WATER FOOTPRINT

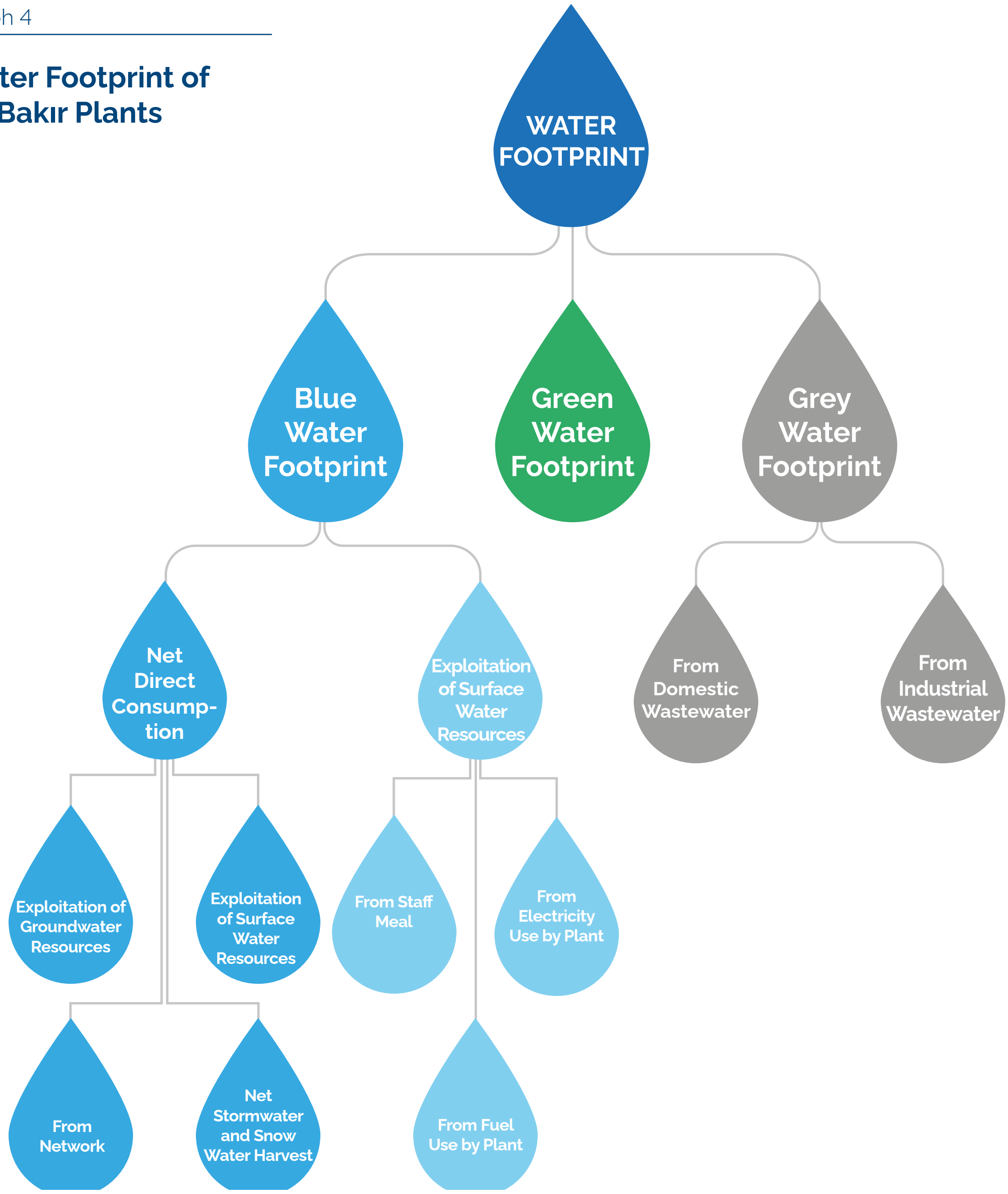
The Water Footprint Network Method (Hoekstra et al. 2011) has been used for the calculation of water footprint. The components presented on the Figure below have been taken into consideration for the calculation of water footprint. So;

water footprint network

Water footprint = Blue water footprint + Green water footprint + Grey water footprint

Graph 4

Water Footprint of Eti Bakır Plants



Water is used in all production processes including the extraction of ore, the concentration of ore by flotation method and achieving 99.99% purity at Samsun smelter plant during the production of cathodic copper from ore to final product at Eti Bakır plants. The goal here is the recovery of water in the first place. The process water collected in the waste storage facilities built is reused. Footprint occurs at different rates at Eti Bakır plants following the use of water with maximum efficiency. Included among the factors causing this can be climate, ore structure, grade and production method.

Only extraction of ore is carried out at Artvin Cerattep Plant. Therefore, water consumption is highly low. Artvin Murgul Plant is an open-pit mine. The average water footprint value is 40.9 at the three plants, the primary sources of ore, of Eti Bakır located in Adıyaman, Kastamonu and Siirt.

Table 4

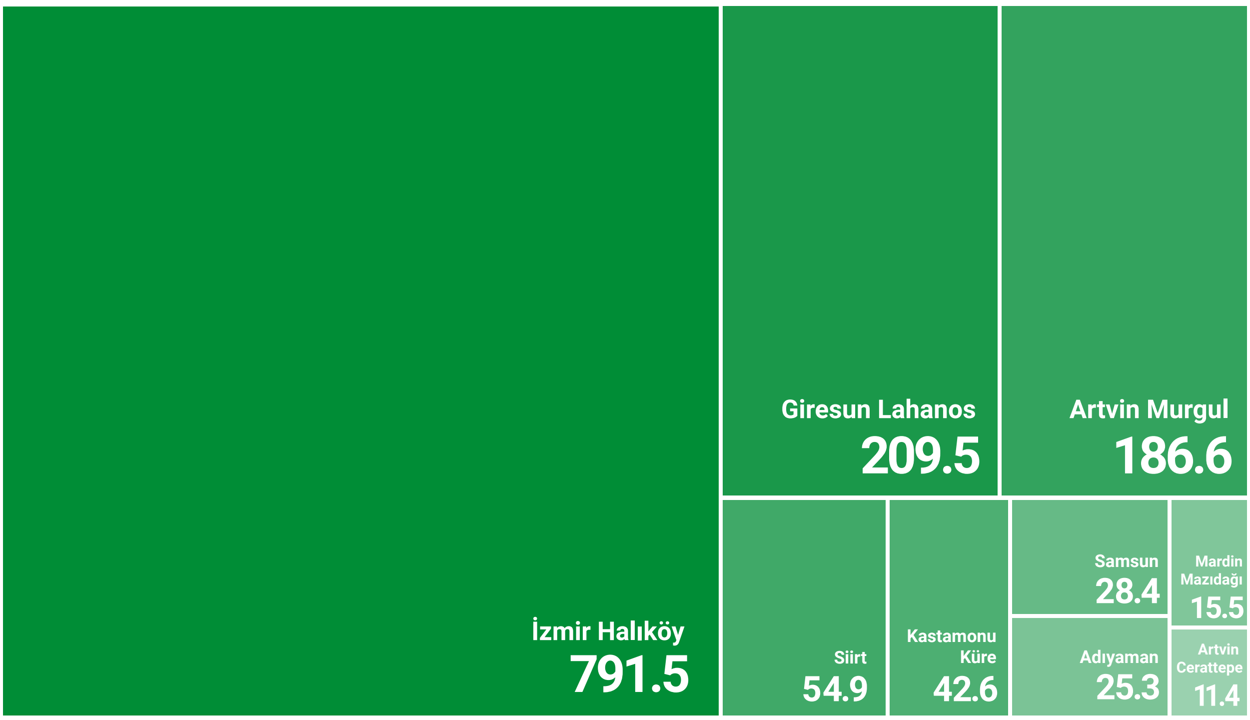
Water Footprints of the Affiliated Plants of Eti Bakır

(m^3 water/t)

İşletme	Blue Water Footprint	Grey Water Footprint	Total Water Footprint
Adıyaman	6.7	18.6	25.3
Artvin - Cerattepe	3.6	7.8	11.4
Artvin - Murgul	134.3	52.2	186.6
Giresun Lahanos	113.3	96.1	209.5
Kastamonu - Küre	38.8	3.8	42.6
Samsun	19.2	9.2	28.4
Siirt	34.9	20.0	54.9
İzmir - Halıköy	444.8	346.7	791.5
Mardin - Mazıdağı	12.9	2.6	15.5

Graph 5

Total Water Footprint of Plants (m^3 water/t)



5 OVERVIEW OF SUSTAINABLE MINING

Küre Plant / Kastamonu

5.1. ZERO WASTE MANAGEMENT

Eti Bakır was granted right to obtain the Ministry of Environment, Urbanisation and Climate Change Certificate of Zero Waste in 2020 and in this process, has made important achievements in waste management at all of its plants.

Eti Bakır has strictly carried out zero waste management and separation at source activities and contributes to the national economy through efficient zero waste management, applying waste recovery and recycling methods.

The table below gives the amount of saving from recycling materials collected from Eti Bakır plants as part of zero waste.

Our motto is **“Future is in waste”.**

Table 5

Saving Values

	Petroleum (l)	Energy (kWh)	Storage Area (m³)	Greenhouse Gas (kg)	Trees saves (number)
Adıyaman	704	3,121	2	87	6
Cerattepe	5,607	12,414	4	88	7
Halıköy	1,451	4,668	0	85	6
Samsun	2,410	23,035	16	877	70
Mazıdağı	87,994	286,864	171	6,111	374
Murgul	16,287	38,836	18	391	11
Siirt	2,785	12,345	8	345	25
Küre	3,369	44,201	25	1,637	152
Lahanos	391	4,157	3	155	14
Total	**120,295**	**426,520**	**245**	**9,690**	**659**

5.2. REHABILITATION IN MUCK SITES

Eti Bakır, which pioneers zero carbon in the mining sector and spends efforts to reduce carbon footprint by 10% in the next five years, has made investments in the reduction of carbon and water footprints in addition to mining technologies, infrastructure and R & D innovations in the past 20 years.

Special flora has been investigated for soil improvement in the mining sites under an 18-month R & D project executed by Eti Bakır, a proponent of important projects for the environment-friendly rehabilitation of the mining sites, in collaboration with Artvin Çoruh University with the support of the Scientific and Technological Research Council of Türkiye (TÜBİTAK) Department of Technology and Innovation Support Programmes (TEYDEB) The project, unprecedented in the Turkish mining sector, has proved that the results of the studies conducted with castor bean, sunflower, poplar and birch trees most improve the soil.

5.3.KAI-ZEN

Eti Bakır Mazıdağı Metal Recovery and Integrated Fertiliser Plants launched the "Lean Production" management system based on the continuous improvement of organisations to be able to better meet the requirements in the operational processes of the plants in 2020.

This process was adopted by all Eti Bakır plants by 2023.

The plants adopting kaizen, continuous improvement, a Lean Production tool, make this focal point of all operational processes and set goals for their employees to develop project.

In Eti Bakır's holistic approach to improvement as part of kaizen process, the focus is on the saving of energy, material, machinery and equipment and labour, as well as 5S, reduction of environmental impacts, and the increase of occupational safety measures and employee satisfaction.

600 improvement works were performed in 2022 as part of kaisen practices by which the best practices and efficiency are targeted in production.

These works led to the saving of 1,491,274 kWh electricity corresponding to the amount of consumption by 497 households per year, and of 4,350,067 m3 standard m3 of natural gas corresponding to the amount of consumption by 2,900 households per year, and of 661,993 m^3 of water corresponding to the amount of consumption by 2,043 households per year, and of 242,010 litres of diesel corresponding to the amount of fuel enough to allow travelling 2,636 times the distance between the two farthest points in Türkiye.

As a result of all savings and the other improvements made, 29,064 tonnes of greenhouse gas emission were avoided in 2022 at Eti Bakır Mazıdağı Plant. Thanks to this, greenhouse gas that can be absorbed by 45,249 broad leaved trees with trunk having diameter of 20 cm was avoided.

Mazıdağı Metal Recovery and Integrated Fertiliser Plants / Mardin

5.4. CARBON SINKS

TREE PLANTING

Tree planting activities are carried out at different times within the sites of Eti Bakır plants. New greeneries are created by planting local tree species as well as trees that have proved to be most adapted to the soil as a result of investigations as part of the closure of mines reaching end of their life, in particular, and the improvement of the area. These new tree communities (stands) are of great importance in terms of the relationship between sustainable environment and forests.

Trees, in order to continue their biological activities, capture carbon dioxide from the atmosphere and release oxygen through photosynthesis and store carbon they capture during this process in their tissues throughout their life. Therefore, trees (and thus forests) are one of the most important carbon dioxide sinks for greenhouse gases.

The carbon dioxide emissions absorbed by trees vary depending on the physical properties of the tree like species, age, diameter and height.

The dry weight of the part of the tree above ground (biomass) should first be calculated so as to be able to determine the amount of carbon stored by the tree in its trunk.

As a result of the calculations, data has been collected about the tree planting activities of Eti Bakır plants and the carbon dioxide emissions corresponding to the total carbon stored in the tree planting sites have been calculated roughly.

When calculating the amounts of emission, the coefficients specific to tree species have been extracted from the report prepared by the U.S. Department of Agriculture (USDA) and containing the coefficients determined for several tree species through measurements.

Tree planting activities by the mining plants have been given special importance in the past 10 years. There are approximately 70,000 trees planted approximately 11 years ago at Artvin Murgul plant, one with the biggest carbon dioxide sink, and the amount of carbon stored by these trees so far is equal to about 33,600 tonnes carbon dioxide.

The second biggest sink is at Kastamonu Küre plant. About 24,500 tonnes of carbon dioxide have been captured by a stand of 450,000 coniferous and broad leaved trees aged 11 years in average. These plants are followed by Samsun, Siirt and İzmir Halıköy plants in order.

More greenhouse gases to be captured by the newly planted trees

It is foreseen that the trees planted in the past few years at the new mining plants will increase capture of greenhouse gases in the upcoming years. Approximately 350,000 and 53,5000 new trees have been planted at Siirt Plant and Mardin Mazıdağı Metal Recovery and Integrated Fertiliser Plants respectively in the past three years. 60,956 tonnes of the captured carbon dioxide were by the planted trees in 2022.

Number of Trees at Plants and their Properties and Carbon Dioxide Emissions Stored by These Trees

TOTAL NUMBER OF TREES **1,949,279** trees

TOTAL CO_2 Emission **60,956** t

İZMİR / HALIKÖY

CONIFEROUS

Umbrella Pine **230** individuals

Age: 48
Diameter: 20 cm
CO_2 Emission: 40.9 t

Calabrian Pine **1,766** individuals

Age: 38
Diameter: 20 cm
CO_2 Emission: 314.2 t

SAMSUN

BROAD LEAVED

Broad leaved **30,000** individuals

Age: 27
Diameter: 2.5 cm
CO_2 Emission: 13,377.9 t

KASTAMONU / KÜRE

MIXED

Scots pine, Acacia, Maple, Common Ash, Cotoneaster, Horse Chestnut **450,000** individuals

Age: 11
Diameter: 11.5 cm
CO_2 Emission: 24,497.50 t

ARTVİN / CERATTEPE

BROAD LEAVED

Acacia, Chestnut, Juniper **2,000** individuals

Age: 4
Diameter: 2 cm
CO_2 Emission: 2.3 t

ARTVİN / MURGUL

BROAD LEAVED

Acacia **98,000** individuals

Age: 5
Diameter: 2.5 cm
CO_2 Emission: 187.7 t

MIXED

Acacia, Pine **614,000** individuals

Age: 11
Diameter: 11.5 cm
CO_2 Emission: 33,425.4 t

ADIYAMAN

CONIFEROUS

Pine **3,650** individuals

Age: 4
Diameter: 2 cm
CO_2 Emission: 4.7 t

Fruit tree, Lemon, Cypress **355** individuals

Age: 2
Diameter: 1.5 cm
CO_2 Emission: 0.7 t

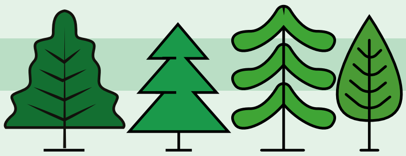
GİRESUN / LAHANOS

BROAD LEAVED

Alder, Acacia, Willow **100** individuals

Age: 4
Diameter: 2 cm
CO_2 Emission: 0.1 t

SİİRT



CONIFEROUS

Pine — **200,550** individuals

Age: 5
Diameter: 3 cm
CO_2 Emission: 615.6 t

BROAD LEAVED

Acacia — **500,000** individuals

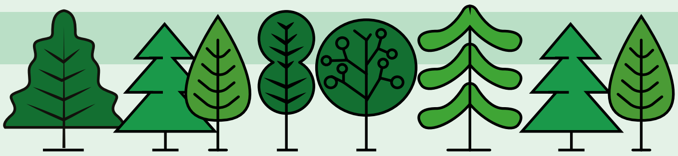
Age: 5
Diameter: 5 cm
CO_2 Emission: 5,512.3 t

CONIFEROUS

Umbrella Pine — **1,250** individuals

Age: 1
Diameter: 2 cm
CO_2 Emission: 1.6 tn

MARDİN / MAZIDAĞI



BROAD LEAVED

Acacia — **500,000** individuals

Age: 5
Diameter: 5 cm
CO_2 Emission: 5,512.3 t

Wild Pistacia (Pistacia) — **110,000** individuals

Age: 1
Diameter: 1 cm
CO_2 Emission: 2.3 t

Almond — **3,000** individuals

Age: 2
Diameter: 1 cm
CO_2 Emission: 0.6 t

Tulip Tree, Oriental Plane Tree, Maple, Willow, Crape Myrtle, etc. — **101** individuals

Age: 6
Diameter: 3 cm
CO_2 Emission: 11,7 t

Oriental Plane Tree, Mulberry — **70** individuals

Age: 3
Diameter: 7 cm
CO_2 Emission: 1.8 t

CONIFEROUS

Umbrella Pine — **1,250** individuals

Age: 1
Diameter: 2 cm
CO_2 Emission: 1.6 t

Calabrian Pine-European Black Pine — **280** individuals

Age: 4
Diameter: 13 cm
CO_2 Emission: 19.8 t

Cedar — **12,000** individuals

Age: 1
Diameter: 1 cm
CO_2 Emission: 3.5 t

Calabrian Pine — **17,000** individuals

Age: 1
Diameter: 1 cm
CO_2 Emission: 5 t

Pine — **3,870** individuals

Age: 4
Diameter: 6 cm
CO_2 Emission: 52.4 t

Cedar species — **57** individuals

Age: 5
Diameter: 13 cm
CO_2 Emission: 4 t

POWER GENERATION

Murgul Hydroelectric Power Plant (HEPP)

Power generation from renewable resources at power plants built in industrial areas are also considered to be one of the important sinks. The Murgul Hydroelectric Power Plant (HEPP) constructed across the Kabaca Creek and operated by Eti Bakır has an installed capacity of 4.7 MW. The power plant generated 48,424,24 kWh electricity and provided emission sink equal to 20,398 tonnes of carbon dioxide.

Mazıdağı Thermal Power Plant

Power is generated by a natural gas fuelled gas motor at the plant and it is used for some processes within the plant. The amount of power generated by gas motor at the plant was 68,996,258 kWh in 2022.

The company captured 29,064 tonnes of carbon dioxide through power generation.

5.5. SEED BANK

Eti Bakır conducts studies for the conservation of endemic seeds in the fields where its plants are established. The seeds collected are delivered to Türkiye Seed Gene Bank affiliated to the Ministry of Agriculture and Forestry. The seeds collected at the plants so far include these:

Endemic/Important Flora Species Identified	Conservation Measures Taken	Image of Plant
Symphytum sylvaticum Boiss	Seed Pick-up	
Iris lazica Albov	Introduction	
Lonicera japonica Thunb	Seed Pick-up	

Endemic/Important Flora Species Identified	Conservation Measures Taken	Image of Plant
Digitalis lamarckii Ivanina	Seed Pick-up	
Paronychia carica Chaudri var. stipulata	Seed Pick-up	
Verbascum stenostachyum Hub.-Mor.	Seed Pick-up	
Onosma taurica Pallas ex Willd. var. brevifolia D.C.	Seed Pick-up	
Saponaria prostrata Willd. Subsp. prostrata	Seed Pick-up	
Astragalus lycius Boiss	Seed Pick-up	
Carduus nutans L. subsp. trojanus	Seed Pick-up	

Endemic/Important Flora Species Identified	Conservation Measures Taken	Image of Plant
Jurinea pontica Hausskn. & Freyn	Seed Pick-up	
Linaria corifolia Desf.	Seed Pick-up	
Verbascum stenostachyum Hub.-Mor.	Seed Pick-up	
Origanum sipyleum L.	Seed Pick-up	
Asperula lilaciflora Boiss. subsp. phrygia (Bornm.) Schönb.-Tem.	Seed Pick-up	
Iris schachtii Markgr	Introduction	
Ferulago humİlis Boiss.	Seed Pick-up	

Endemic/Important Flora Species Identified	Conservation Measures Taken	Image of Plant
Campanula lyrata subsp. lyrata	Seed Pick-up	
Stachys tmolea Boiss.	Seed Pick-up	
Fritillaria bithynica Baker	Introduction	
Cyclamen hederifolium Aiton	Introduction	
Crocus candidus E.D.Clarke	Introduction	
Jurinea pontica Hausskn. & Freyn ex Hausskn	Seed Pick-up	
Alyssum caespitosum Bieb.	Seed Pick-up	

Endemic/Important Flora Species Identified	Conservation Measures Taken	Image of Plant
Asyneuma limonifolium (L.) Janchen subsp. pestalozzae (Boiss.) Dambolt	Seed Pick-up	
Euphorbia falcata L. subsp. macrostegia (Bornm.) O. Schwarz	Seed Pick-up	
Nepeta viscida Boiss.	Seed Pick-up	
Verbascum parviflorum Lam.	Seed Pick-up	

5.6. NEW INVESTMENTS

Eti Bakır aims to increase the number of sinks through technology and R & D investments in order to reduce greenhouse gas emissions and has embarked on investments in renewable energy resources, as well. Eti Bakır plans, within this scope, to complete by 2024 its solar power plant investments with an installed capacity of 100 MW in the fields close to the areas where the plants are located.

Eti Bakır's new investment in fertiliser in the Samsun Smelter and Electrolysis Plant site is under construction and Eti Bakır aims to ensure that the sulphuric acid generated in the process is gained by the economy through this investment worth TRY 1.5 billion . The plant has a production capacity of 250 thousand tonnes of DAP fertiliser per year and it will allow using the sulphuric acid generated from cathode copper production and the ammonium sulphate from the flue gas treatment system. The plant is planned to be completed by 2025.

5.7. ENVIRONMENTAL INSPECTORS

Eti Bakır zeroes in on human and the environment and raises awareness among students through education for sustainable future. Eti Bakır maintains its educational project, the Environmental Inspectors, within this scope and reached 1,500 students in 45 schools in 2022. The educational campaign contains topics of environmental sensitivity, energy efficiency, recycling and waste management and as part of it, "Collection of Waste Batteries" campaign is conducted. The company collected more than 25 kg of batteries in 2022 and while continuing educating without break 225 Environmental Inspectors selected among the students, it aims to reach new schools every year.

6. GENERAL ASSESSMENT AND GOALS

Eti Bakır has implemented several projects in the mining sector and zeroes in on human and the environment. Eti Bakır aims to ensure that the best production is gained by the economy in the most efficient and environmentally-sensitive way and continues its efforts to reduce carbon and water footprints. Eti Bakır anticipates that it will achieve its goals rapidly with industrial facilities as well as the solar power plants planned to be constructed and intends to reduce carbon and water footprints by 10% in five years

Reduction targeted in carbon and water footprints in five years

10%

7. METHODOLOGY AND ADDITIONAL INFORMATION

7.1. CARBON FOOTPRINT

Scope 1: Greenhouse gases arising from the use of fossil fuels in production (Direct greenhouse gas emission).

Scope 2: Greenhouse gas resulting from the use of fuels consumed for the indirect generation of power (Indirect greenhouse emission).

Carbon dioxide (CO_2) is the main greenhouse gas among the ones resulting from the combustion of fuels at the plants within the frame of Scope 1. Although some amount of methane (CH_4) and nitrous acid (N_2O) emission occurs together with CO_2, these have a very little share in overall greenhouse gases. For example, CO_2 constitutes more than 99.99% of greenhouse gases resulting from the combustion of diesel (for diesel, emission factors are $EFCO_2$ = 74.1 t/TJ, $EFCH_4$ = 0.003 t/TJ and EFN_2O in order).

Therefore, the CH4 and N2O emissions have not been included in the calculations within the scope of this study since they will not change the level of total emission on basis of plants. The carbon dioxide emission has been calculated according to the following formula within the scope of the study:

CO_2 emission (t/year) = Fuel consumption (TJ/year) x Emission factor (kg CO_2/TJ)

The net calorific value (NCV) of fuel must be known so as to be able to find mass fuel consumption on thermal value basis (TJ). The NVC (TJ/Gg) and the emission factors (kg emission/TJ) used for the calculations are extracted from the methodology in Scope 2 included in the Communique on the Monitoring and Reporting of Greenhouse Gas Emissions and IPCC 2006 Manual and covering the grid electricity used by the plants.

The emission factor specific to Türkiye has been used for the calculation of these emissions and the following operational data and methodology have been applied to find this factor: The latest figures given in the website of the International Energy Agency (IEA) for greenhouse gas emissions in Türkiye are 2021 figures *(https://www.iea.org/countries/turkiye).* So, total CO_2 emission resulting from the generation of power in Türkiye is 141 million tonnes.

The Republic of Türkiye Energy Market Regulatory Authority (EMRA) reports the total national power generation as 334,723.1 GWh. CO_2 emission per unit power generation has been calculated as 0.421 kg CO_2/kWh by using the two figures. The latest emission factor specific to Türkiye has been used for the calculation of Scope 2 emissions.

7.2. WATER FOOTPRINT

Blue water footprint: The total volume of the surface water and groundwater resources, i.e. freshwater resources, required for the production of a commodity and are freshwater resources.

Green water footprint: The total stormwater used for the production of a commodity. The stormwater taken into consideration for green water footprint is that stored in soil or for a certain period, above ground. This item has not been taken into consideration for the calculation of footprint at Eti Bakır plants.

Grey water footprint: It is a pollution indicator and represents the amount of freshwater used for the avoidance or reduction of pollution load according to the current water quality standards.

Different approaches are adopted for the calculation of water footprint. The calculation employing ISO 14046 (ISO, 2014) Water Footprint Standard is the most common among these. ISO 14046 is an international standard defining the principles, requirements and guidelines for the assessment and reporting of water footprints. It is applied to products, methods and organisations based on the lifecyle assessments (LCA). Water Footprint Network Method (Hoekstra vd. 2011), another approach, will be used within the scope of this study since it is more commen and will be more appropriate for mining activities. The components presented on the Figure below will be taken into consideration for the calculation of water footprint. So, it is seen that controlled water rise can be achieved with:

Table 7

Activity-related Virtual Water Amounts

Natural Gas (m³/l)	9.251
Fuel oil (l/l)	30.75- 62.50
Diesel (l/l)	2.81 – 5.62
Petrol for Transportation (km/l)	0,16 – 0, 33
Diesel for Transportation (km/l)	0.18 – 0.26
Electricity (MWh/l)	1,800
Food (meal/l)	4756.88
LNG (kg/l)	2.60
Coal (kg/l)	1.09

Water footprint = Blue water footprint + Green water footprint + Grey water footprint

Blue water footprint calculation has two components. The first one is the actual water consumption, by which the water used for production is calculated directly. During the production, a plant may supply the water it needs from rivers or still water bodies (lake, dam, reservoir) in the vicinity of the plant as well as groundwater resources or mains, where it is close to residential areas. In addition, the plant may supply water through stormwater harvest in waste storage areas and storage areas intended for reuse within the plant. For the calculation of net stormwater harvest, the net harvest should be calculated by taking account of evaporation. The second component in blue water footprint calculation is the virtual water consumption.

Virtual water refers to the water used for the production and processing of items and services consumed during production. That's to say, virtual water consumption is indirect use. For example, the water used for the preparation of food for staff employed in the production process is a sub-component of virtual water. The water used for the supply until the plant of the electricity consumed at the plant and the fuel consumed by machinery is another sub-component of virtual water.

For the calculation of virtual water consumption, the number of personnel employed at the plants and the annual fuel and electricity consumption have been taken into consideration and thus virtual water use has been calculated.

Rainfall:

To calculated the volume of rainfall over sedimentation tanks and waste facility:

$V_{rainfall}$ **(mL/year) = 0.01 x R x YA**

R, rainfall amount measured in the reporting period (mm).
YA, surface area in ha of storage facility.

Evaporation:

Evaporation is calculated using the formula below.

.$V_{evaporation} = 0,01 \times S_{evaporation} \times Pan_{evaporation} \times f$

$S_{evaporation}$, is the average surface area (ha) of the surface where evaporation will be calculated.

$Pan_{evaporation}$, is the value of the pan evaporation rates (2000 mm/year) measured during the reporting period. It will be extracted from the Meteorological Office data for the relevant region.

f is the correction factor for pan evaporation measurements. A rate of 0.75 will be used.

For the calculation of grey water footprint, the domestic wastewater generated by staff and the industrial wastewater resulting from the process have been evaluated separately and the necessary amount of dilution for minimising the prints of the wastewater generated by the plants in receiving bodies have been determined individually.

For the calculation of grey water footprint;

(Wastewater flow rate x Pollution concentration of discharged wastewater) – (Flow rate of raw clean water generating wastewater x Pollution concentration of raw water) gives the load of the pollution from the plant that results from production.

Water grey footprint amount has been found by dividing the calculated load by the Environmental Quality Standards (EQS) value, the permitted pollution concentration for class 1 water of Water Quality Classification as included in the Regulation on Surface Water Quality.

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