



GÜLİPEK



CARBON FOOTPRINT REPORT

2019

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1. INTRODUCTION

The climate change depending on the global warming, which is considered to be the most important environmental problem of our century, and the human impact regarding this problem have been scientifically proven (Özer, 2012). As the global warming, which has become one of the most important global problems of our world, threatens the life on the earth and becomes inevitable, the countries of the world have started to take some measures in this regard. One of them, the United Nations Framework Convention on Climate Change, and the Kyoto Protocol for the reduction of the contractual greenhouse gas emissions have been signed. In accordance with this agreement that has been also signed by Turkey, the countries have committed to reduce their greenhouse gas emissions by 5% compared to 1990. Depending on the agreement and protocols signed, a number of standards have been brought regulating the calculation and trade of the greenhouse gas emissions. PAS 2050 standard used in the product carbon footprint calculation and ISO 14064 standard used in the carbon footprint calculation of institutions are the most preferred of them. In the greenhouse gas emission calculations, three comprehensive calculations have been made for the relationships of the activities directly affecting the greenhouse gas emission of the institution in order to obtain the healthiest and most detailed results, activities arising from the service or product purchases that the institution performs in order to continue its activities and activities that are effective in the greenhouse gas emissions while carrying out the activities of the institution. It is important to take the calendar year or fiscal year as a basis in corporate carbon footprint calculation in terms of providing a healthier and more accurate calculation. Therefore, 2019 has been accepted as the base year and the calculations have been made according to this year.

2. TARGETS OF PROJECT

This report, which summarizes the greenhouse gases inventories of Gülipek A.Ş., is the first step for the measures intended to take the greenhouse gases arising from the activities under control. The stages of realizations of the production and energy flow planning go hand in hand are the most important step in combating the climate change and are one of the most important ammunition of Gülipek A.Ş. One of its main mottos of Gülipek A.Ş. is to "... made sustainable and livable environmental production."

When looking at the medium and long term results of the studies carried out by the İTÜ Eurasia Institute of Earth Sciences with the support of UNDP (United Nations Development

Program), TUBITAK and State Planning Organization; it reveals the changes that the Climate Change will cause in Bursa's temperature and precipitation regimes. When looking at the medium-bad scenario studies, it is stated that the average summer temperatures will increase by 3-4 °C and precipitation will decrease by 10% on average. In the studies conducted intended to reduce the energy and carbon density of the city, Gülipek A.Ş. proves with this study that it wants to take an active role. In this context, the carbon emission has been calculated and evaluated, and what could be the reduction methods have been examined.

In this report of Gülipek A.Ş., which consists of spinning, weaving and dyeing factories, only the greenhouse gas emission calculation in the dyeing factory has been made. Determining the cumulative effect of the total greenhouse gas emitted as a result of the activities is among the company's targets by calculating the greenhouse gas emission of other facilities within the company in the following years. The project targets are

- To take the corrective measures for Bursa air quality values,
- To reach detailed and accurate information about the greenhouse gas emissions,
- To make the greenhouse gas emissions measurable and to take the measures by calculating the greenhouse gas emissions, and
- To use the information obtained from Gülipek A.Ş. in the sustainability report.

3. OBJECTIVE, DATA AND METHODOLOGY

The carbon footprint refers to the amount of greenhouse gas emissions for a firm or a product. The carbon footprint covers all of the climate related emissions (CRE). Carbon dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydrofluoride carbons (HFCs), Perfluoro carbons (PFCs) and Sulfur hexane fluoride (SF₆) gases are the gases which are stated in the Kyoto protocol that they made greenhouse effect, cause environmental pollution and global warming and come into sight as a result of the human activities (Anonim, 1998b; Albayrak ve ark., 2014).

Gülipek A.Ş. has evaluated the greenhouse gas emissions that cause emissions as a result of direct use of the direct greenhouse gases while carrying out its production activities and has classified as Scope 1. The greenhouse gas emission occurred during the use of electricity taken from outside while carrying-out the production activity has been evaluated as indirect greenhouse gas emission and classified as Scope 2. The greenhouse gas emissions that occur during the supply of those products and services due to the products and services we have received during the activity have been evaluated as other indirect greenhouse gas emissions and

classified as Scope 3. Within the scope of these three classifications, the targets have been set about the measures that can be taken by evaluating the emission results. The calculations have been given in kilograms/ton equivalent to carbon (CO₂e) in all units in a single denominator in a way to include all greenhouse gases used at the factory and by converting the units according to the GHG protocol.

Gülipek A.Ş. uses natural gas, electricity and diesel as energy sources. In addition to this, it realizes different energy consumption in the transportation forms such as product transportation, business trips, air travels. The calculations made have been realized by benefiting from the data collection, calculation, reporting and reference value tables specified in the Intergovernmental Panel on Climate Change IPCC guidelines according to the calculation groups specified in the GHG Protocol with the methods specified in ISO 14064-1 series guidelines and specifications by taking into account all contributing factors, energy and carbon footprints. The GHG Protocol is the most widely used international accounting standard by the governments and companies to understand, identify and manage the greenhouse gas emissions. The main and ancillary activities that support the production made and cause the greenhouse gas formation and their scopes have been specified below.

Figure.1 Greenhouse Gas Emission Score Scopes

SCOPE 1	SCOPE 2	SCOPE 3
<ol style="list-style-type: none"> 1. USE OF NATURAL GAS 2. USE OF GENERATOR ENGINE 3. USE OF THE FORKLIFT MOTOR 4. USE OF COMPANY VEHICLES, GASOLINE AND ENGINE 	<ol style="list-style-type: none"> 1. ELECTRICITY CONSUMPTION 	<ol style="list-style-type: none"> 1. THE USE OF GASOLINE AND ENGINE AT THE WASTE DISPOSAL PHASE 2. BUSINESS TRAVEL USE OF GASOLINE AND ENGINE 3. PRODUCT SHIPMENT (USE OF GASOLINE AND ENGINE) 4. LEAK EMISSION 5. AIR CONDITIONING 6. AIR CONDITIONERS

4. CARBON FOOTPRINT PROJECT WORK RESULTS

4.1. Data Collection and Data Quality

As the first step of the whole project, a training, information and team determination meeting has been held, in which participation was mandatory by the senior management and to which all senior managers attended. In the meeting in which the team revealed with the relevant department managers of the factory, the data has been provided to be hundred percent reliable. The team formed has decided about which data are necessary and requested these data and data proofs in writing from the department managers, technical units and companies from which service is taken. The data covers a period of 12 months. The assessment made covers the period passing from January 2019 to December 2019 in order to determine the amount of emission belonging to a one-year period. Therefore, the base year is taken as 2019. The reference year selection has been determined by considering the factors such as data availability and quality, and important administrative changes. The data are subject to the official records and data quality is good, consistent and convincing.

The data have been provided from external institutions (e.g. electricity and natural gas distribution companies) for corporate-scale carbon inventories and relevant institution administrations have provided support at all levels in this regard. After the completion and verification of the data, the inventories that will serve as a source for the whole study and the subsequent road map have been created. The data targeted to be collected to create an institutional emission inventory have been given in Figure 1. When the relevant figure is examined, in addition to the main emission items, the factors that take place in scope 3 and do not affect the production activity exactly but increase the greenhouse gas effect of the factory have been included. While creating data inventories of the waste disposal, business travels and other transport-related emissions from these factors; these have been based on data obtained from the organizations such as flight information, vehicle tracking system, contracted fuel station and Turkish Airlines. In the product shipment account, only the shipments that Gülipek A.Ş. covers the shipment fee have been accepted. In line with this acceptance, the calculations have been made by taking data on the distance traveled by the transport vehicles and the amount of fuel at this distance.

As the sources that emit HFC gas such as refrigerators and water dispensers do not have data reliability, they have not been included in the calculation.

4.2. Carbon Footprint Calculation Methods and Terms

For the greenhouse gas calculations taken place within Gülipek A.Ş. boundaries, the IPCC, Level-1 and Level-2 (TIER-1 and TIER-2) methodology have been taken as basis. Accordingly, the following formula and variables have been used in the calculations according to the types of the Scope-1, Scope-2 and Scope-3 greenhouse gas sources.

$$\text{Emission (ton CO}_2\text{)} = \text{Activity Data} * \text{Emission Factor} * \text{Oxidation Factor}$$

$$\text{Emission Factor} = \text{EmissionCO}_2 + \text{EmissionCH}_4 + \text{EmissionN}_2\text{O} + \dots$$

Regarding the emission sources in which the different formulas and variables have been used, the information has been given below in the sections where the corporate greenhouse gas inventories are detailed. The greenhouse gases and global warming potentials specified in the Kyoto Protocol and that are required to be included in the greenhouse gas inventories are as follows.

GWP (Global Warming Potential): A factor for defining the mass-based radiant force effect in terms of the equivalent carbon dioxide for a specified greenhouse gas over a given time period (GWP).

CO₂e (Carbon dioxide equivalent): A unit used to compare the radiant power of a greenhouse gas with the carbon dioxide.

Table 1. Greenhouse Gases and GP Values According to Ipcc and Kyoto Protocol

Greenhouse Gases	Chemical Formula	Residence time in the atmosphere (Years)	Global Warming Effect* (CO ₂ e)
Carbon dioxide	CO ₂	5-200	1
Methane	CH ₄	12	25
Diazote monoxide	N ₂ O	114	298
Perfluorocarbons	PFCs	50.000** ³	6.500-9.200
Hydro fluorocarbons	HFCs	226** ⁴	140-11.700
Sulfur hexafluoride	SF ₆	3.200	23.900

*: Time dependent. For details: http://en.wikipedia.org/wiki/Greenhouse_gas#Atmospheric_lifetime

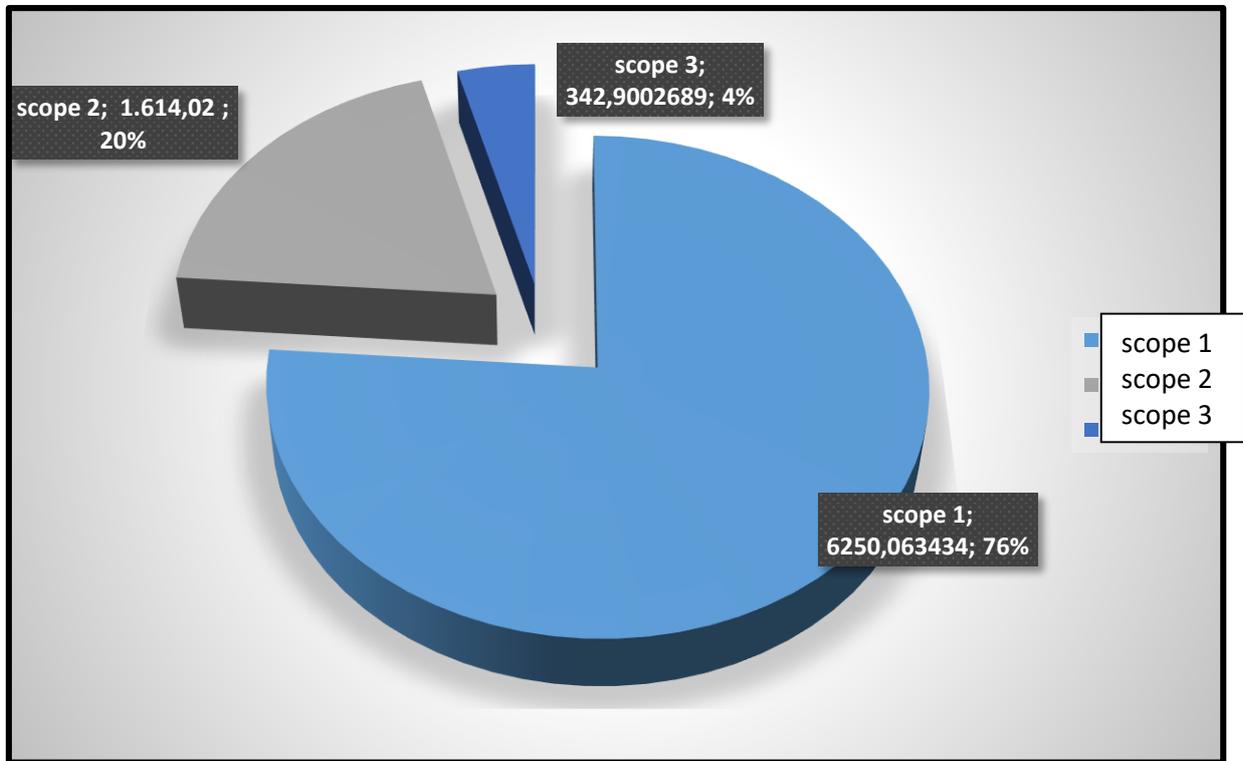
** : The highest values for this group of greenhouse gases have been shown.

(Source: 3 EPA, <http://epa.gov/climatechange/ghgemissions/gases/fgases.html>

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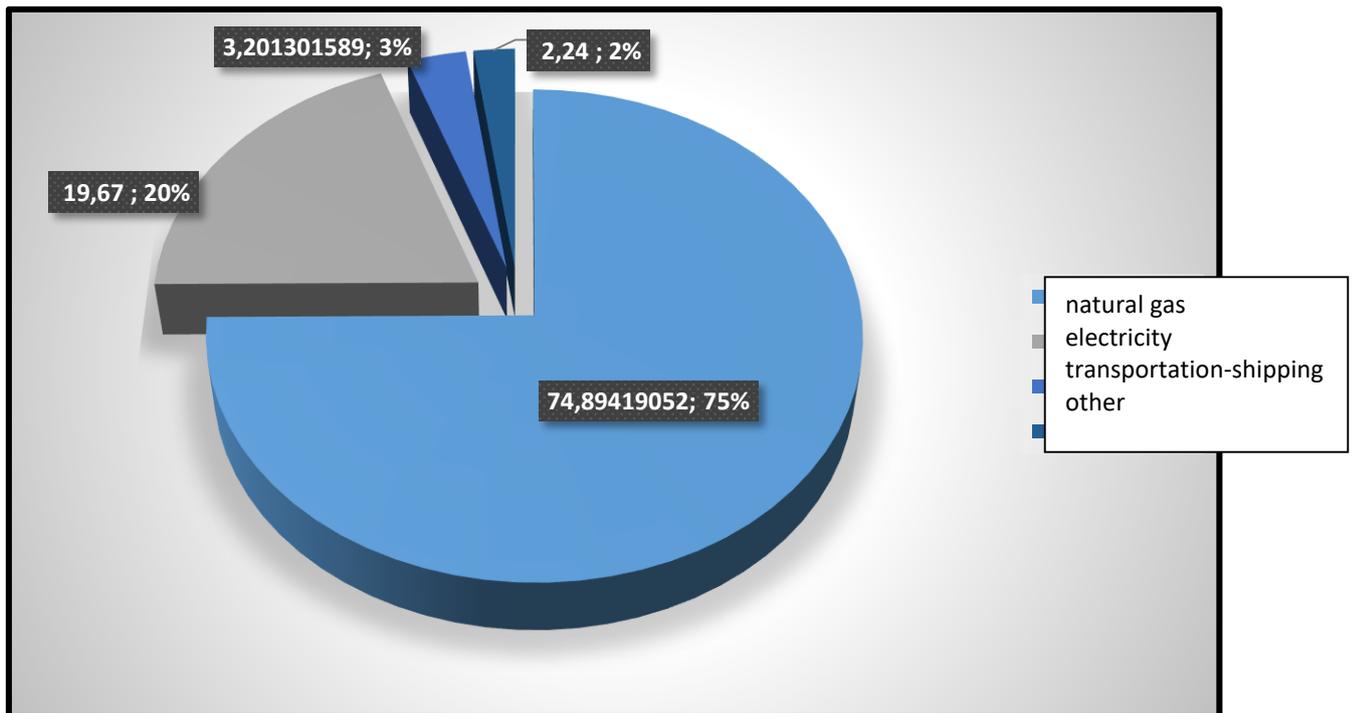
4.3 Whole Carbon Footprint

The carbon emission arising as a result of all the main and auxiliary calculated activities used while the production is made within Gülipek A.Ş. is 8.206.986434 tons CO_{2e}. this amount is equivalent to the annual carbon emissions of 728 citizens in Turkey (3.6 tons / year). The distribution of the carbon emission in the company according to the scopes has been given in Figure 2. When looking at the distribution, it has been determined that the highest greenhouse gas emission is in scope 1 with 76% rate. While the electricity use taking place in Scope 2 constitutes the second highest greenhouse gas emission, the sum of all the other factors taking place in scope 3 is far from the data found in scope 1 and scope 2.



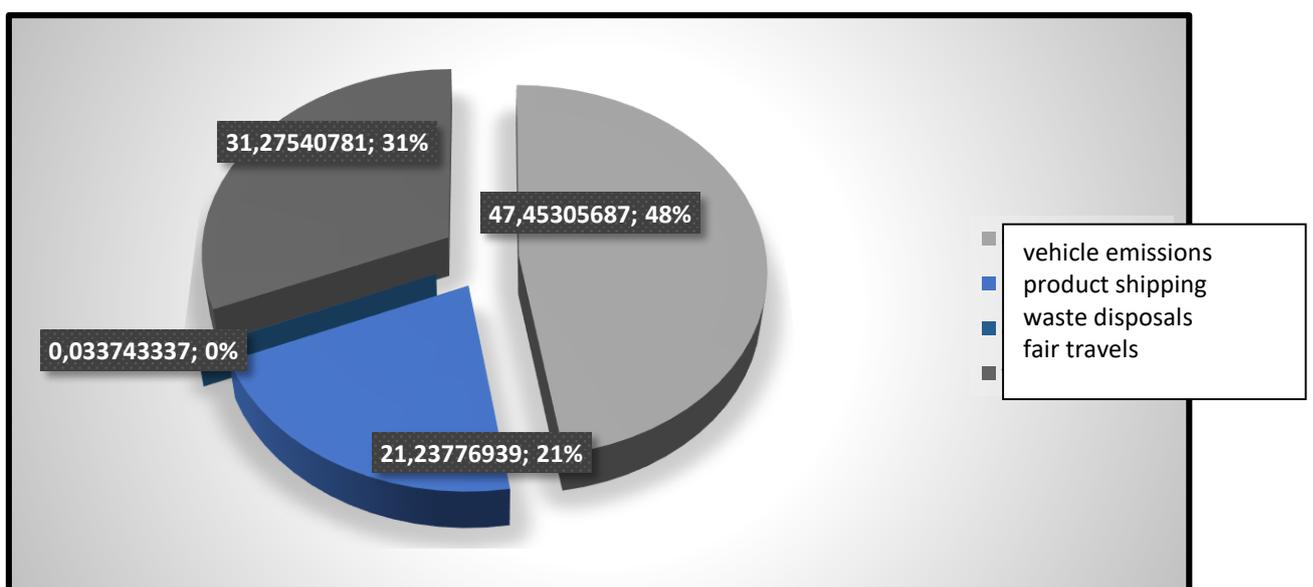
Graphic 1. Quantitative carbon emission distribution according to 2019 scopes

When going into the details of the scopes, As given in Graphic 2, of the carbon emissions generated in Gülipek A.Ş., 74.89% is from natural gas, 19.67% from electricity use and 20% from transportation and shipment; 2.24% of it comes into sight as a result of other activities. Since the carbon emissions are come into sight with the energy consumption, this issue is also linked to the electricity, fuel and energy costs. Reducing the CO_{2e} emissions also means reducing the energy costs for the firm.



Graphic 2. Percentage distribution of the year 2019 carbon emissions according to the activities

If the transportation and shipment emissions are examined in a separate item, it has been determined that most of the emissions are caused from the air travels and Istanbul round-trip customer visits. The upstream emissions and certain emissions called the RFI-factor (RFI = Radiative Forcing Index means that CO₂ emissions in the stratosphere have a higher impact than those at ground level) arising from the air travel have been included in the air travel emission calculation. The proportional distribution of the carbon emission calculated for transportation and shipment is as in Graphic 3.



Graphic 3. Percentage distribution of the transportation-shipment carbon emissions for the year 2019

As it can be understood from the Graphic 3, the highest transport-shipment emissions are the emissions arising from the vehicle travel with 47.45%. This is followed by 31.28% of the air travels and 21% of the greenhouse gas emissions as a result of the product shipment.

While the carbon emission values resulting from the air travels, product transportation and waste disposal shipment are evaluated in scope 3, the emission emissions resulting from the vehicle travels are evaluated as scope 1.

4.4 Relative Carbon Footprint

The carbon footprint per product is 3.13096 tons of CO₂e for Gülipek A.Ş. including scope 1, 2 and 3. This data has been calculated based on the production amount in 2019. The water dispensers, refrigerators and welding electrodes have not been included in the carbon emission calculation made, since clear data could not be reached.

5. RECOMMENDATIONS

The companies are at the center of the political battle to combat with the climate change and to create low-carbon economies as per their growing economic strength and the central role they play in climate change. As taken place in the 2030 targeted Environmental Order Plans prepared for Bursa, the city is already experiencing the effects of climate change under the increased concreting, loss of green space, extremely serious air/water/soil pollution and unplanned population growth and industrialization threatens. The extreme and unexpected climate events, overflows and floods and heat waves have become commonplace and tested the preparedness of the cities for these disasters.

The main purpose of calculating and reporting the greenhouse gas inventories is to pave the way for low carbon emissions by implementing the mitigation strategies. In this context, at least in the short term, it is a correct approach to take place the areas that can be controlled and intervened in the inventory.

Gülipek A.Ş. has a general level of energy consumption and a carbon emission of advanced manufacturers. Among Gülipek A.Ş. group companies, only the carbon emission calculation of the dyehouse factory has been made. The carbon emission calculations of other factories can

be calculated and reported in the future. However, since both yarn and weaving factories are newly established factories, they have been organized more efficiently in terms of the energy efficiency and productive manufacturing efficiency. This also reveals the fact that it is organized more efficiently in terms of the energy efficiency and productive manufacturing efficiency, where the carbon emissions will be lower.

The management evaluates the options to minimize the energy consumption in the dyehouse factory, sets the annual targets and checks these targets in 6-month periods and ensures the compliance with the targets. The technical personnel are aware of the issue and they, including the technicians coming from outside, are consulted by Gülipek A.Ş. to assess the potential possibilities intended to reduce the energy consumption for the boiler. This demonstrates Gülipek A.Ş. management's professional and performance-oriented approach. The carbon account made reveals that the current situation should be protected and strengthening the reduction of energy consumption and associated carbon emissions by Gülipek A.Ş. should be encouraged. When the carbon emission rates are examined, it is predicted that the improvements to be made in the activities included in scope 3 (excluding the fair travels) will not be very effective in reducing the carbon emission but the amount of carbon emission released into the atmosphere will decrease as a result of the reduction of the energy use such as natural gas and electricity, which cause large carbon emissions. Some measures that can improve the energy efficiency have been suggested in the sections below.

As stated in the energy efficiency continuous improvement management process, reducing the CO₂ emissions is a key element. Generally, more efficient devices can show a higher investment cost but costs decrease as these products are used. The relevant personnel should be allowed to explore the alternatives that may require higher investment but return in the short term. A team that can be set up for the energy recovery constantly informs the management about adapting them to the factory by following new technologies and developments.

The greenhouse gas emission resulting from the transportation-shipment operations is calculated by measuring the emission amount generated by the burning of the fuel used in the vehicles. The factors purchased and/or of which fee is undertaken by the factory are included in this calculation. Therefore, while calculating the product transportation carbon, only the shipment fee covered by Gülipek A.Ş. has been included in this account. While making the customer agreements in order to reduce the amount of the transportation-shipment carbon emission, the agreements in which the shipment is not covered by Gülipek A.Ş. should be made.

At the same time, the company vehicles cover a very significant part of the transportation-carbon account with 47.45% (See Figure 4). To reduce this emission amount

- The company vehicles should be replaced with the electric vehicles or vehicles that consume less fuel,
- When determining the route, shorter trips made by employees together should be preferred,
- To improve aero dynamics, the trucks with the air deflector devices (air cutters) (if the trucks travel over 50 km/h) should be installed,
- The air of the tires should be checked regularly, (the air below one bar leads to 30% more rolling friction of the wheel. This also means 5% extra fuel consumption. What's more, lower pressure than recommended causes more wear on tires),
- The fuel efficient engine oil (if available) should be used instead of the conventional fuel oil (The use of this type of oil saves fuel consumption by 5%),
- The trainings should be provided to the drivers regarding the efficient driving. (If the use of a gas-efficient car is fulfilled by the drivers, 10-20% can be saved).

Awareness increasing is a key element for the energy savings and associated carbon emission reduction. In this context, it is required to

- Ensure the transition to low energy lighting,
- Close the computer screens of the employees unnecessarily,
- Make the training on the energy efficiency and carbon emission problems. (Hamburg & Istanbul, 21st of December 2009)

The highest value in the carbon emission calculation is in the natural gas consumption with a rate of 74.84%. In order to ensure the natural gas energy efficiency and reduce the carbon emissions, reducing the natural gas consumption at the rate of 10% takes place among the targets for the year 2020. In this context, it is required to

- Renew the boiler burner,
- Provide the completion of the insulation of hot water pipelines with jackets,
- Turn to the electric heater instead of the natural gas heater in the dressing rooms,
- Ensure the removal of the KTM washing machine due to the excessive steam consumption.

The second highest emission factor in the carbon calculation is electricity consumption. Gülipek A.Ş. has a target to reduce its electricity consumption by 13% in 2020. Decreasing in the consumption of electrical energy at this value will cause serious reductions in the carbon account. The measures that can be taken to achieve this goal are as follows:

- The air leaks in the facility should be eliminated,
- The process improvement studies should be done,
- The burners should be replaced with the energy friendly burners,
- The valve jackets should be renewed,
- The usage efficiency should be increased in the Stenter Machines,
- The isolation of all steam and hot water installations should be done,
- The degasser pump should be changed,
- It should be ensured that the correct production rate is increased (1%) at the first time.

6. GREENHOUSE GAS HOLDING OR REMOVING ACTIVITIES

UNFCCC (1992) defines the carbon sink as “it means any process, activity or mechanism that removes a greenhouse gas, an aerosol or a precursor substance involved in the generation of a greenhouse gas from the atmosphere”. There are two important sink areas in the earth; these are terrestrial areas and oceans. The sinks that humans can directly affect are forests. New carbon sinks are established with the afforestation works. Although the establishment of carbon sinks and the preservation of existing sinks bring the financial burden to the institutions as much as the carbon trade, this appears before us as a measure that will be preferred since it will reduce the greenhouse gas emissions at a global level. Çepel (2003) has stated that a well-developed 100-year-old beech tree absorbs 1.200 m³ of CO₂ and binds it as 6 tons of carbon.

Gülipek A.Ş. will carry out the afforestation activities in 2020 to reduce the carbon emissions and the amounts of reduction will be included in the year 2020 Carbon Footprint Report.

RESOURCES

Greenhouse Gas Protocol web page; <http://www.ghgprotocol.org/standards/corporate-standard>

TUİK (Turkish Statistical Institute) website, its link:
http://www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=1590

Ministry of Development, Socio-Economic Development Ranking Survey of Provinces and Regions (SEGE-2011), its link:
<http://www.kalkinma.gov.tr/Lists/Yaynlar/Attachments/548/SEGE-2011.pdf>

Bursa Provincial Environmental Status Report 2014, link:
http://www.csb.gov.tr/db/ced/editorodosya/bursa_icdr2014.pdf

Department of Housing and Urban Development, City Planning Branch Directorate, Climate, Natural Building Sector Bursa Air Pollution and Quality Report

TUİK, Bursa with Selected Indicators 2013
<http://www.tuik.gov.tr/ilGostergeleri/iller/BURSA.pdf>

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<http://www.btso.org.tr/?page=databank/publication.asp&id=58&qpage=&qorder=>

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http://www.enerji.gov.tr/File/?path=ROOT/1/Documents/E%C4%B0GM%20Periyodik%20Rapor/2013_Yili_Enerji_Istatistikleri_Raporu.pdf

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Ministry

Bursagaz Activity Report 2017, 2018 and the data sent by the institution

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Uludağ Elektrik Dağıtım A.Ş

Turkish Airlines

Bursa Metropolitan Municipality

TUİK

SİMPET

BURSAGAZ