APPROVED by

Rector

Federal State Budgetary Educational Institution of Higher Education

"Altai State University"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ S.N. Bocharov

"\_\_\_" \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2023

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REPORT

ON GREENHOUSE GAS EMISSIONS

Federal State Budgetary Educational Institution of Higher Education "Altai State University"

for 2022

Barnaul, 2023

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# Introduction

This report was prepared by the Federal State Budgetary Educational Institution of Higher Education “Altai State University” (hereinafter referred to as AltSU).

The purpose of this report is to compile a register of greenhouse gas emissions of AltSU in accordance with the requirements of the legislation of the Russian Federation and international standards.

Reporting period: 01/01/2020 - 31/12/2020

Starting from 2022, AltSU annually discloses information about its climate activities as part of the greenhouse gas emissions reporting system.

# Description of the organization

*General information.*

|  |  |
| --- | --- |
| *Data* | *At the time of project development* |
| Full name of the organization | Federal State Budgetary Educational Institution of Higher Education "Altai State University" |
| Abbreviated name of the enterprise | FSBEI HE "AltSU" |
| INN (TIN) | 2225004738 |
| Registered at | 656049, Altai Krai, Barnaul, pr. Lenina, 61 |
| Operating address | 656049, Altai Krai, Barnaul, pr. Lenina, 61 |
| Head | Rector Bocharov Sergey Nikolaevich |
| Organizational and legal form according to OKOPF  (Russian National Classifier of Forms of Incorporation) | 75103 |
| RNNBO code (Russian National Nomenclature of Businesses and Organizations, OKOPF) | 02067818 |
| Form of ownership according to OKFS (Russian National Classifier of Ownership Forms) | 12 (federal property) |
| OKVED code  (Russian National Classifier of Types of Economic Activity) | 80.30.1 |

The main activity of the Federal State Budgetary Educational Institution of Higher Education “Altai State University” is the provision of services in the educational field and carrying out research work.

The institution includes educational and laboratory buildings, a library, a catering establishment, dormitories, and auxiliary unit (utility rooms).

The structural divisions of the institution are located at the following addresses:

- administrative building – pr. Lenina, 61;

- educational building “C” - pr. Sotsialisticheskiy, 68;

- educational building “K” – pr. Krasnoarmeysky, 90;

- educational building "A" - ul. Anatolia, 122;

- educational building “D” – ul. Dimitrova, 66;

- health complex – pr. Krasnoarmeysky, 90a;

- dining room - pr. Sotsialisticheskiy, 68a;

- vehicle garage - pr. Sotsialisticheskiy, 68;

- educational building "Ks" – pr. Komsomolsky, 100;

- campus (dormitories at the following addresses: ul. Krupskaya, 103; ul. 80 Guards Division, 2/3, ul. Polyarnaya, 34/1; ul. E. Alekseevoy, 6; ul. Chervonnaya, 5).

The institution does not have any waste storage and disposal sites in its ownership, possession or use on its balance sheet. The institution has only specially equipped areas and places for waste accumulation.

Electricity supply - centralized networks in Barnaul.

Heat supply - centralized networks in Barnaul.

Water supply and sanitation - centralized networks in Barnaul.

# Limits of compiling a greenhouse gas register

*Organizational boundaries.*

Taking into account the peculiarities of the functioning of AltSU and its divisions, to determine the boundaries of the organization and consolidate GHG emissions, a method based on operational management was chosen, which implies that the organization is responsible for all quantified GHG emissions from production facilities that it manages financially or operationally.

Based on this, the boundaries of AltSU for the purposes of compiling the GHG register included all organizations and divisions mentioned in Section 1.

*Operational boundaries.*

Determining operational boundaries involves identifying GHG emissions associated with the organization's activities and dividing them into the following categories:

* direct greenhouse gas emissions (Scope 1);
* energy indirect greenhouse gas emissions (Scope 2).

Other indirect greenhouse gas emissions (Scope 3) are not considered in this report due to the lack of necessary data for the preparation of the report.

Direct greenhouse gas emissions (Scope 1) of AltSU include:

* carbon dioxide (CO2) emissions from fuel combustion by mobile units.

Refrigerant emissions resulting from air conditioning leaks are not significant and, therefore, are not taken into account.

Table 1 shows the sources of direct emissions of all production facilities included within the boundaries of the organization, divided by category.

Table 1. Sources of direct emissions in 2020.

|  |  |  |
| --- | --- | --- |
| Organization | Category of GHG emission sources | |
| Combustion of fuel in mobile units | |
| Petrol | Diesel fuel |
| AltSU | + | + |

Energy indirect greenhouse gas emissions (Scope 2) are typical for most production facilities and are associated with the generation of heat and electricity received (imported) from outside for the organization’s own needs (see Table 2).

Table 2. Imported energy consumption in 2022.

|  |  |  |  |
| --- | --- | --- | --- |
| Energy consumer | Side energy consumption | | Comments |
| e/e | heat |
| AltSU | + | + | AltSU's electricity needs are provided only by the external network (suppliers are Barnaul Gorelektroset, JSC and Altaienergosbyt, JSC).  Thermal energy needs are provided only through the external network (supplier Barnaul Generation, JSC). |

Other indirect GHG emissions (Scope 3) are typical for all production divisions (facilities) of AltSU.

Other indirect emissions were not assessed in this report.

# Base year

2018 was chosen as the base year. Due to the fact that reliable source data for 2018 and subsequent years have been preserved and are available for identifying sources and calculating emissions.

# Methodology for quantifying greenhouse gas emissions

In accordance with the recommendations of the Intergovernmental Panel on Climate Change [[1]](#footnote-1), in most cases, a calculation method is used to quantify GHG emissions, based on the use of formulas of the following form:

*E = A \* EF,*

where *E* – greenhouse gas emissions;

*A* - data on any activity of the organization for the period under review, for example, on fuel combustion leading to greenhouse gas emissions (activity);

*EF* – emissions factor.

For direct and energy indirect emissions of greenhouse gases, a separate calculation of emissions is made for each type of gas in tons of CO2 equivalent, followed by summation.

Other indirect emissions were not assessed in this report.

# Results of compiling a register of greenhouse gases

The initial data for calculating direct greenhouse gas emissions (Scope 1) were accounting data, itinerary sheets, and data on accounting for fuel used.

The initial data for calculating direct greenhouse gas emissions (Scope 1) in the base year 2018 and reporting year 2022 are presented in Table 3.

Table 3 – Initial data for calculating direct greenhouse gas emissions (Scope 1).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Transport | | | | |
| Type of transport | Type of vehicle | Fuel type | Period | |
| 2018 | 2022 |
| Fuel consumption, t | Fuel consumption, t |
| Automobile transport | Сar | Gasoline AI-92 | 83 | 87.4 1 |
| Automobile transport | Сar | Gasoline AI-95 | 29 | 33.3 |
| Automobile transport | Сar | DT | 7.5 | 1.3 |
| Automobile transport | Cargo | Gasoline AI-92 | 3 | 5 |
| Automobile transport | Cargo | DT | 28 | 19.5 |
| Automobile transport | Passenger car | Gasoline AI-92 | 5 | 9.4 |
| Automobile transport | Passenger car | DT | 46.2 | 28.2 |

The calculation of direct greenhouse gas emissions (Scope 1) in the base year 2018 is presented in Table 4.

Table 4 – Calculation of direct greenhouse gas emissions (Scope 1) in the base year 2018

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Type of transport | Type of vehicle | Fuel type | Fuel consumption, t | Emission factor, tСО2/t | 2 emissions , t |
| Automobile transport | Car | Gasoline AI-92 | 83 | 3,026 | 251 |
| Automobile transport | Car | Gasoline AI-95 | 29 | 3,026 | 88 |
| Automobile transport | Car | Diesel fuel | 7.5 | 3.149 | 24 |
| Automobile transport | Cargo | Gasoline AI-92 | 3 | 3,026 | 9 |
| Automobile transport | Cargo | Diesel fuel | 28 | 3.149 | 88 |
| Automobile transport | Passenger car | Gasoline AI-92 | 5 | 3,026 | 15 |
| Automobile transport | Passenger car | Diesel fuel | 46.2 | 3.149 | 145 |
| Total: | | | | | 620 |

The calculation of direct greenhouse gas emissions (Scope 1) in 2022 is presented in Table 5.

Table 5 – Calculation of direct greenhouse gas emissions (Scope 1) in 2022

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Type of transport | Type of vehicle | Fuel type | Fuel consumption, t | Emission factor, tСО2/t | CO2 emissions, t |
| Automobile transport | Car | Gasoline AI-92 | 87.4 1 | 3,026 | 26 5 |
| Automobile transport | Car | Gasoline AI-95 | 33.3 | 3,026 | 101 |
| Automobile transport | Car | Diesel fuel | 1.3 | 3.149 | 4 |
| Automobile transport | Cargo | Gasoline AI-92 | 5 | 3,026 | 15 |
| Automobile transport | Cargo | Diesel fuel | 19.5 | 3.149 | 61 |
| Automobile transport | Passenger car | Gasoline AI-92 | 9.4 | 3,026 | 88 |
| Automobile transport | Passenger car | Diesel fuel | 19.3 | 3.149 | 61 |
| Total: | | | | | 59 5 |

The input data for calculating energy indirect greenhouse gas emissions (Scope 2) was accounting data provided by suppliers.

The initial data for calculating energy indirect greenhouse gas emissions (Scope 2) in the base year 2018 and the reporting year 2022 are presented in Table 6.

Table 6 - Initial data for calculating energy indirect greenhouse gas emissions (Scope 2) in the base year 2018 and reporting year 2022

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Electrical energy consumption | | Thermal energy consumption, Gcal |
| Barnaul Gorelektroset, JSC  MW/h | Altaienergosbyt, JSC MW/h |
| 2018 | 3528 | 49 | 13 127 |
| 2022 | 3371 | 37 | 14 475 |

Calculation of energy indirect greenhouse gas emissions (Scope 2) in the base year 2018 is presented in Table 7.

Calculation of energy indirect greenhouse gas emissions (Scope 2) in 2022 is presented in Table 8.

Table 7 - Calculation of energy indirect greenhouse gas emissions (Scope 2) in the base year 2018

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Calculation of emissions from electrical energy consumption | | | | | | | | | | | | | | |
| Year | Organization | Determination method | Period | Power system region | Facility energy consumption, MW/h | | Type of fuel | Fuel name | Unit of measurement | Fuel consumption for the period | Energy equivalent ce/t | CO 2 emission factor , tCO 2 /tce | Electricity generation, MWh | CO 2 emission, t |
| 2018 | Barnaul Gorelektroset, JSC | regional | year | Altai Krai | 3528 | | Solid fuels | Coal | ton | 1204.4592 | 925.02 | 2.77 | 3528 | 2,562 |
| Altaienergosbyt, JSC | regional | year | Altai Krai | 49 | | Solid fuels | Coal | ton | 16.8854 | 12.97 | 2.77 | 49 | 36 |
| Total electricity consumption: | | | | | | | | | | | | | | 2,598 |
| Calculation of emissions from thermal energy consumption | | | | | | | | | | | | | | |
| Year | Object name | Determination method | Period | Power system region | Energy consumption by the facility, Gcal | Type of fuel | | Fuel name | Unit of measurement | Fuel consumption for the period | Energy equivalent ce/t | CO 2 emission factor , tCO 2 /tce | Heat generation, Gcal | CO2 emission, t |
| 2018 | Barnaul Generation, JSC | general | year | Altai Krai | 13127 | Solid fuels | | Coal | ton | 2587.5 | 1,987.20 | 2.77 | 12500 | 13 36 7 |
| Liquid fuels | | Fuel oil | ton | 116.51541 | 159.63 | 2.27 | 627 |
| Total of thermal energy consumption | | | | | | | | | | | | | | 13 36 7 |
| Total Scope 2 for 2018: | | | | | | | | | | | | | | 15 965 |

Table 8 - Calculation of energy indirect greenhouse gas emissions (Scope 2) 2022

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Calculation of emissions from electrical energy consumption | | | | | | | | | | | | | | |
| Year | Organization | Determination method | Period | Power system region | Facility energy consumption, MW/h | | Type of fuel | Name fuel | Unit of measurement | Fuel consumption for the period | Energy equivalent ce/t | CO 2 emission factor , tCO 2 /tce | Electricity generation, MWh | CO2 emission, t |
| 2022 | Barnaul Gorelektroset, JSC | regional | year | Altai Krai | 3371 | | Solid fuels | Coal | ton | 987.16 | 758.14 | 2.77 | 2900 | 2441 |
| Altaienergosbyt, JSC | regional | year | Altai Krai | 37 | | Solid fuels | Coal | ton | 10.8832 | 8.36 | 2.77 | 32 | 27 |
| Total electricity consumption: | | | | | | | | | | | | | | 2468 |
| Calculation of emissions from thermal energy consumption | | | | | | | | | | | | | | |
| Year | Organization | Determination method | Period | Power system region | Energy consumption by the facility, Gcal | Type of fuel | | Fuel name | Unit of measurement | Fuel consumption for the period | Energy equivalent ce/t | CO 2 emission factor , tCO 2 /tce | Heat generation, Gcal | CO2 emission, t |
| 2022 | Barnaul Generation, JSC | general | year | Altai Krai | 14475 | Solid fuels | | Coal | ton | 2794.5 | 2,146.18 | 2.77 | 13500 | 1362 7 |
| Liquid fuels | | Fuel oil | ton | 187.394025 | 256.73 | 2.27 | 975 |
| Total from thermal energy consumption | | | | | | | | | | | | | | 13627 |
| Total Scope 2 for 2022: | | | | | | | | | | | | | | 16095 |

AltSU's greenhouse gas emissions report for 2022 showed that the total of direct and energy indirect emissions (Scope 1+2) amounted to 16,690 tons of CO2-eq. This is 105 t CO2-eq. higher than in the base year 2018, when emissions were 16,585 tons.

To identify the reasons for changes in the amount of emissions, an analysis of the main performance indicators of AltSU was carried out. As a result of the analysis, it was found that the main factors influencing the increase in emissions in 2022 compared to 2018 are:

1. The difference in temperature and duration of the heating season in winter. In 2022, the heating period was more intense and longer than in 2018. However, despite this, the university annually carries out measures to increase the energy efficiency of its buildings. Energy-efficient double-glazed windows were installed and heat leaks from the buildings were eliminated.

2. Reducing electricity consumption. The institution updated its material and technical base with more modern and energy-efficient equipment, which led to a reduction in electricity consumption.

Thus, the analysis showed that the change in greenhouse gas emissions of AltSU in 2022 compared to the base year 2018 is associated with the difference in temperature and duration of the heating season in the winter, while the measures taken significantly mitigated the results compared to 2018.

1. see Guidelines for National Greenhouse Gas Inventories, 2006 [www.ipcc-nggip.iges.or.jp/public/2006gl/](http://www.ipcc-nggip.iges.or.jp/public/2006gl/) [↑](#footnote-ref-1)