# Total Greenhouse Gas Calculation for NUST H-12 Campus.

The total carbon emissions for NUST were calculated using the GHG protocol guidelines. Where country-specific emission factors were unavailable, in the context of Pakistan, the standard emission factors provided in the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories were used. Tier 1 level assessment was performed on the acquired data.

## Year Wise GHG Emission Calculation:

- **2019**

| Scopes | GHG Emission Source | Calculated Emissions tCO2e |
|---|---|---|
| Scope 1 | Natural Gas Consumption | 387.19 |
| | Fuel Consumption by University Owned Fleet | 792.18 |
| | Fuel Consumption by Generators | 19.26 |
| Scope 2 | Total Electricity Consumption | 7000.51 |
| Scope 3 | Wastewater Treatment | 3249 |
| | Wastewater Treatment from MBR | 0.0113 |
| | Annual Waste Generation | 160 |
| | Other Solid Waste Generation | 87.84 |
| | Paper Waste | 223.70 |
| | Food Waste | 0.61 |
| | Plastic Waste | 0.15 |
| | Amount of Renewable Energy Installed/produced within campus | 0.09 |
| Total Emissions | | 11920.54 |

The data for the natural gas consumption was incomplete. As the data related to total natural gas consumption for residential areas was unavailable from January-June.

## ➢ 2020

| Scopes | GHG Emission Source | Calculated Emissions tCO2e |
|---|---|---|
| Scope 1 | Natural Gas Consumption | 1036.08 |
| | Fuel Consumption by University Owned Fleet | 624.46 |
| | Fuel Consumption by Generators | 9.17388 |
| Scope 2 | Total Electricity Consumption | 5538.38 |
| Scope 3 | Wastewater Treatment | 3249 |
| | Wastewater Treatment from MBR | 0.00188 |
| | Annual Waste Generation | 115 |
| | Other Solid Waste Generation | 39.27 |
| | Paper Waste | 99.8205 |
| | Food Waste | 0.06346 |
| | Plastic Waste | 0.0687 |
| | Amount of Renewable Energy Installed/produced within campus | 0.40443 |
| Total Emissions | | 10711.7 |

## ➢ 2021

| Scopes | GHG Emission Source | Calculated Emissions tCO2e |
|---|---|---|
| Scope 1 | Natural Gas Consumption | 1276.26 |
| | Fuel Consumption by University Owned Fleet | 747.59 |
| | Fuel Consumption by Generators | 13.94 |
| Scope 2 | Total Electricity Consumption | 6143.90 |
| Scope 3 | Wastewater Treatment | 3249 |
| | Wastewater Treatment from MBR | 0.00281 |
| | Annual Waste Generation | 180 |
| | Other Solid Waste Generation | 39.27 |
| | Paper Waste | 99.82 |
| | Food Waste | 0.27 |
| | Plastic Waste | 0.07 |
| | Amount of Renewable Energy Installed/produced within campus | 0.78 |
| Total Emissions | | 11750.90 |

## ➢ 2022

| Scopes | GHG Emission Source | Calculated Emissions tCO2e |
|---|---|---|
| Scope 1 | Natural Gas Consumption | 798.91 |
| | Fuel Consumption by University Owned Fleet | 837.40 |
| | Fuel Consumption by Generators | 250.86 |
| Scope 2 | Total Electricity Consumption | 5938.62 |
| Scope 3 | Wastewater Treatment | 3249 |
| | Wastewater Treatment from MBR | 0.01 |
| | Annual Waste Generation | 120 |
| | Other Solid Waste Generation | 87.84 |
| | Paper Waste | 223.70 |
| | Food Waste | 0.61 |
| | Plastic Waste | 0.15 |
| | Amount of Renewable Energy Installed/produced within campus | 0.81 |
| Total Emissions | | 11507.92 |

For the total natural gas consumption data of residential area was unavailable from August-December. Likewise, the data for annual waste generation was available only till August.

## ➢ 2023

| Scopes | GHG Emission Source | Calculated Emissions tCO2e |
|---|---|---|
| Scope 1 | Natural gas consumption | 2021 |
| | Fuel Consumption by University Owned Fleet (Petrol) | 434.7685616 |
| | Fuel Consumption by University Owned Fleet (Diesel) | 225.3993293 |
| | Fuel Consumption by Generators (Diesel) | 197.34 |
| Scope 2 | Total Electricity Consumption | 4695.72 |
| Scope 3 | Wastewater Treatment | 3753.58 |
| | Wastewater Treatment from MBR | 0.011928 |
| | Annual Waste Generation | 135 |
| | Other Solid Waste Generation | 97.89 |
| | Paper Waste | 241.7957 |
| | Food Waste | 0.657791 |
| | Plastic Waste | 0.165972 |
| Total Emissions | | 11803.32928 |

- **2024**

| Scopes | GHG Emission Source | Calculated Emissions tCO2e |
|---|---|---|
| **Scope 1** | **Natural gas consumption** | 958.10 |
| | **Fuel Consumption by University Owned Fleet (Petrol)** | 40.09 |
| | **Fuel Consumption by University Owned Fleet (Diesel)** | 164.07 |
| | **Fuel Consumption by Generators (Diesel)** | 20.68 |
| **Scope 2** | **Total Electricity Consumption** | 6080.11 |
| **Scope 3** | **Wastewater Treatment** | 3235.58 |
| | **Wastewater Treatment from MBR** | 0.15 |
| | **Annual Waste Generation** | 119.70 |
| | **Other Solid Waste Generation** | 97.89 |
| | **Paper Waste** | 205.52 |
| | **Food Waste** | 0.58 |
| **Total Emissions** | | 10922.67 |