

Greenhouse Gases (GHG) Emissions Calculation for King Saud University Main Campus (2025)

QS - Environmental sustainability - ES7 Emissions Efficiency

By

**The Higher Committee of Environmental Sustainability and
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Scope and Methodology:

Greenhouse gas emissions are calculated based on International GHG Protocol Corporate Accounting and Reporting Standard for all GHG emissions related activities within KSU campus in Riyadh Saudi Arabia as CO₂e (carbon dioxide equivalent). This includes calculating:

- **Scope 1: Direct emissions**
- **Scope 2: Indirect emissions**

The total emissions will be the summation of Scope 1 and Scope 2 emissions in tonnes (tCO₂e) for the last full reporting year. The following calculations are made for KSU main campus in Riyadh Saudi Arabia for the year 2025.

GHG Emissions Calculations:

Scope 1 emissions (Direct Emissions):

Direct emissions cover the Greenhouse Gas (GHG) emissions that the university makes *directly* within campus including:

1) Emissions from transportation within campus:

The estimated annual number of trips (cars entering and leaving KSU campus) according to operation and maintenance department at KSU for year 2025 is 9,532,353 trips. These trips include trips made by students, faculty, employees, and visitors to campus academic, businesses, and commercial buildings.

- Estimated annual number of car trips: 9,532,353 trips
- Estimated distance per trip: 8 km/trip
- Average petrol cars emission factor: 0.180 kg CO₂e/km

Activity data = 9,532,353 trips × 8 km/trip = **76,258,824 km annually**

Using formula for Calculate CO₂e:

$$\text{CO}_2\text{e} = \text{Activity Data} \times \text{Emission Factor}$$

$\text{CO}_2\text{e} = 76,258,824 \text{ km} \times 0.180 \text{ kg CO}_2\text{e/km} =$	13,726.59 tonnes CO₂e
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2) Emissions from running boiler due to burning of deasil fuel:

According to operation and maintenance department, KSU campus uses deasil fuel to run boilers inside campus as following:

- Litter of annual deasil fuel consumption in campus: 5,250,000 L
- Emission factor: 2.68 kg CO₂e/L

Using formula for Calculate CO₂e:

$$\text{CO}_2\text{e} = \text{Activity Data} \times \text{Emission Factor}$$

$\text{CO}_2\text{e} = 5,443,000 \text{ L} \times 2.68 \text{ kg CO}_2\text{e/L} =$	14,070 tonnes CO₂e
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3) Emissions from running chillers due to using liquefied petroleum gas (LPG)

According to operation and maintenance department, KSU campus uses LGP to run chillers inside campus as following:

- Litter of Annual LPG consumption in campus: 747,816 L
- Emission factor: 1.51 kg CO₂e/L

Using formula for Calculate CO₂e:

$$\text{CO}_2\text{e} = \text{Activity Data} \times \text{Emission Factor}$$

$\text{CO}_2\text{e} = 625,241 \text{ L} \times 1.51 \text{ kg CO}_2\text{e/L} =$	1,229.20 tonnes CO₂e
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Total Scope 1 = 13,726.59 + 14,070 + 1,229.20 = 28,925.79 tonnes CO₂e

Scope 2 emissions (Indirect Emissions):

Indirect emissions are the emissions the university makes *indirectly* including electricity usage for cooling, heating, and all other electivity uses in building and streets within campus.

- Electricity usage for 2024: 708,468,697.06 kWh
- Saudi Arabia grid emission factor (latest IEA data): 0.56 kg CO₂e/kWh (location-based method)

Using formula for Calculate CO₂e:

$$\text{CO}_2\text{e} = \text{Activity Data} \times \text{Emission Factor}$$

$\text{CO}_2\text{e} = 755,974,949.38 \text{ kWh} \times 0.56 \text{ kg CO}_2\text{e/kWh} =$	396,742.47 tonnes CO₂e
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Total Scope 2 = 396,742.47 tonnes CO₂e

Total GHG Emissions for KSU campus in 2025 as CO_{2e} is:

425,668.26 tonnes CO_{2e}

Summary of CO_{2e} Emissions of KSU Campus in Year 2025:

Scope	Source	CO _{2e} (tonnes)
1	Vehicles	13,726.59
1	Diesel (boiler)	14,070.00
1	LPG (chillers)	1,129.20
1	Total Scope 1	28,925.79
2	Electricity	396,742.47
2	Total Scope 2	396,742.47
Total CO_{2e}		425,668.26 tonnes

Conclusion

The 2025 Greenhouse Gas (GHG) inventory for the KSU Riyadh campus demonstrates a significant downward trend in environmental impact, driven by a multi-faceted sustainability strategy. The university achieved **a 5.2% reduction in emissions in 2025 compared to 2024, contributing to a cumulative 11% reduction since 2023**. These results are primarily attributed to a substantial decrease in electricity, gas, and oil consumption across campus operations.

To further accelerate this decarbonization, KSU has also expanded its green areas and tree planting by 10%. This initiative utilizes a circular water management system—irrigating these areas with on-campus treated sewage effluent—which actively enhances carbon sequestration while preserving freshwater resources. Together, these efforts underscore KSU’s proactive alignment with Saudi Vision 2030 and the Saudi Green Initiative, reinforcing our commitment to a sustainable, low-carbon future.

Comparison of CO₂e Emissions of KSU Campus of years

2023, 2024, 2025:

CO ₂ e Emissions at KSU Campus in Riyadh (tonnes)		
Year	Total CO ₂ e Emissions (tonnes)	Reduction from Year 2023 (%)
2023	478,621.34	-
2024	453,366.50	5.28
2025	425,668.26	11.06

