Greenhouse Gas Emissions Inventory Summary

2014 (FY) - 2019 (FY)

Updated January 2020
Purpose of Inventory

This inventory update is intended to provide insight into USC’s greenhouse gas management to date, and to guide future energy, program and infrastructure developments.

Current commitments* include:

Goal: Reduce Scope 1 and 2 combined greenhouse gas emissions per square foot by 20% from 2014 levels by 2020.

• Track and report greenhouse gas emissions
• Implement a Climate Action Plan

Definition of Scopes:

• Scope 1 Emissions: GHG resulting from burning fuel and using chemicals on campus.
• Scope 2 Emissions: GHG resulting from LADWP generating electricity used on campus.
• Scope 3 Emissions: GHG resulting from indirect sources like campus commuting, air travel, etc.

Summary

• Total Emissions (Scope 1, 2 and 3)
  • Absolute emissions dropped by 8%

• Scope 1 + 2 Emissions
  • Absolute emissions dropped by 16%
  • Scope 1 absolute emissions increased by 19%
  • Scope 2 absolute emissions dropped by 24%
    • LADWP’s carbon intensity dropped by 31%
    • USC improved its building energy efficiency by 11%
  • Normalized (per square foot) emissions dropped by 33%
    • USC’s goal is 20%

• Due to energy related improvements, the emissions allocation by scope has shifted.
  • Scope 1- 11% (2014) and 13% (2019)
  • Scope 2- 40% (2014) and 33% (2019)
  • Scope 3- 49% (2014) and 54% (2019)
2014 Greenhouse Gas Emissions
Adjusted Baseline*: ‘Market-Based’ Overview

<table>
<thead>
<tr>
<th>2019</th>
<th>Energy Consumption MMBtu</th>
<th>Kg CO₂</th>
<th>Kg CH₄</th>
<th>Kg N₂O</th>
<th>Metric Tons eCO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope 1</strong></td>
<td>602,410</td>
<td>32,318,259</td>
<td>3,033</td>
<td>420</td>
<td>33,255</td>
</tr>
<tr>
<td><strong>Scope 2</strong></td>
<td>865,459</td>
<td>127,730,617</td>
<td>-</td>
<td>-</td>
<td>127,731</td>
</tr>
<tr>
<td><strong>Scope 3</strong></td>
<td>1,387,052</td>
<td>151,681,763</td>
<td>127,808</td>
<td>6,096</td>
<td>156,694</td>
</tr>
<tr>
<td><strong>All Scopes</strong></td>
<td>2,854,920</td>
<td>311,730,640</td>
<td>130,841</td>
<td>6,516</td>
<td>317,679</td>
</tr>
</tbody>
</table>

The University of Southern California emitted 317,679 metric tons of carbon dioxide equivalent in adjusted baseline year 2014 (FY).

- Scope 1 - 11% of those emissions were “Scope 1” emissions, meaning they occur directly as a result of burning fuels or using chemicals on the USC campus.
- Scope 2 - Another 40% were “Scope 2” emissions; these result from generating the electricity used on campus.
- Scope 3 - The largest category of emissions—49% of the USC footprint—were the “Scope 3” emissions that are the indirect result of campus operations; for example, the emissions resulting from student, staff and faculty commuting, and from business travel.

*See explanation of adjustment at the end of the slide deck
### 2019 Greenhouse Gas Emissions

#### ‘Market-Based’ Overview

By 2019 (FY), USC’s total emissions had dropped 8% from the 2014 (FY) baseline to 292,463 metric tons carbon dioxide equivalent.

**Emissions Distribution by Scope:**
- **Scope 1**: 39,403
- **Scope 2**: 96,109
- **Scope 3**: 156,952

**2019 Energy Consumption**:
- **MMBtu**: 3,224,314
- **Kg CO₂**: 286,114,167
- **Kg CH₄**: 171,723
- **Kg N₂O**: 6,899

<table>
<thead>
<tr>
<th>Scope</th>
<th>Energy Consumption MMBtu</th>
<th>Kg CO₂</th>
<th>Kg CH₄</th>
<th>Kg N₂O</th>
<th>Metric Tons eCO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope 1</strong></td>
<td>731,814</td>
<td>39,189,919</td>
<td>3,644</td>
<td>408</td>
<td>39,403</td>
</tr>
<tr>
<td><strong>Scope 2</strong></td>
<td>941,876</td>
<td>96,108,716</td>
<td>-</td>
<td>-</td>
<td>96,109</td>
</tr>
<tr>
<td><strong>Scope 3</strong></td>
<td>1,550,625</td>
<td>150,815,532</td>
<td>168,079</td>
<td>6,491</td>
<td>156,952</td>
</tr>
<tr>
<td><strong>All Scopes</strong></td>
<td>3,224,314</td>
<td>286,114,167</td>
<td>171,723</td>
<td>6,899</td>
<td>292,463</td>
</tr>
</tbody>
</table>

**By 2019 (FY), USC’s total emissions had dropped 8% from the 2014 (FY) baseline to 292,463 metric tons carbon dioxide equivalent.**

- **Scope 1**: Emissions from the first scope increased from 11% to 13% as a percentage of the footprint and increased as an absolute number.
- **Scope 2**: Purchased electricity was still a large source of USC’s GHG footprint, though its proportion of the footprint dropped from 40% to 33% and the absolute numbers decreased.
- **Scope 3**: Indirect emissions from the campus were an even larger driver of GHG emissions for the university and overall held steady.
USC’s 2019 (FY) total emissions 8% drop from the 2014 baseline in detail.

- **Scope 1**: Emissions from the first scope held fairly constant, with a slight increase. A majority of the GHG in this scope is due to on-campus natural gas usage. Fleet vehicles and refrigerants emissions have been negligible.
- **Scope 2**: The largest contributor to GHG is from electricity used on-campus. This scope did see a dramatic decrease in carbon emissions, which was due to a combination of LA Department of Power and Water (LADWP) fuel mix improvements and energy efficiency at the building level.
- **Scope 3**: Indirect commuting emissions were a significant driver of GHG pollution, and directly financed air travel also played a large role. Commuting emissions for staff/faculty and students were nearly equal to each other. Emissions from on-campus energy use were relatively small (transmission + distribution), as was emissions from campus waste.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Energy Consumption MMBtu</th>
<th>Kg CO2</th>
<th>Kg CH4</th>
<th>Kg N2O</th>
<th>Metric Tons eCO2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas and Propane</td>
<td>710,053</td>
<td>37,648,161</td>
<td>3,366</td>
<td>67</td>
<td>37,752</td>
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<tr>
<td>Fleet</td>
<td>21,760</td>
<td>1,514,758</td>
<td>278</td>
<td>95</td>
<td>1,577</td>
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<tr>
<td>Fertilizer</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerants &amp; Chemicals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Scope 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchased Electricity</td>
<td>941,876</td>
<td>96,108,716</td>
<td></td>
<td></td>
<td>96,109</td>
</tr>
<tr>
<td><strong>Scope 3</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Faculty / Staff Commuting</td>
<td>580,280</td>
<td>42,157,306</td>
<td>8,149</td>
<td>2,750</td>
<td>43,180</td>
</tr>
<tr>
<td>Student Commuting</td>
<td>619,808</td>
<td>44,339,580</td>
<td>9,219</td>
<td>3,086</td>
<td>45,490</td>
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<tr>
<td>Directly Financed Air Travel</td>
<td>283,674</td>
<td>55,324,942</td>
<td>548</td>
<td>630</td>
<td>55,527</td>
</tr>
<tr>
<td>Other Directly Financed Travel</td>
<td>4,820</td>
<td>343,920</td>
<td>72</td>
<td>24</td>
<td>353</td>
</tr>
<tr>
<td>Solid Waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy T&amp;D Losses (Scope 2)*</td>
<td>62,042</td>
<td>8,649,784</td>
<td>150,090</td>
<td>3,752</td>
<td>8,650</td>
</tr>
</tbody>
</table>

* Transmission and Distribution losses from electrical usage reported in Scope 2.
**Scope 1 and 2 Emissions Trends: 2014-2019**

**Absolute**
Scope 1 and 2 emissions have dropped 16% in absolute terms from the 2014 (FY) to 2019 (FY).
- Scope 1 emissions have increased nearly 19%, as natural gas consumption has risen to support a 26% increase in campus added square footage.
- This increase has been offset, however, by a 24% decrease in Scope 2 emissions due to a drop in the carbon intensity of LADPW’s fuel mix used for generating electricity and energy efficiency efforts.

**Normalized**
USC has seen a drop of 33% in emissions-per-square-foot (i.e., emissions intensity) over five years.
- When normalized to account for campus growth, the Scope 1 and 2 emissions reduction was significant.
• Carbon Decrease- The decrease in USC’s carbon emissions is good news—it was accomplished through energy efficiency efforts combined with factors outside the University combined with efficiency efforts.

• LADWP- USC gets a vast majority of its power from LADWP, which has significantly decreased the proportion of fossil fuel it uses for generating electricity and increased renewable energy over the past several years, cutting the LADWP carbon intensity by 31% between 2014 (FY) and 2019 (FY).

• Energy Efficiency- Overall, there has been a decrease of 11% in energy intensity at USC. Absolute campus electricity consumption actually increased during this time period—though the rate of increase was lower than the rate of growth in square footage: 9% increased electricity consumption compared to 26% campus growth.
Comparisons of Normalized GHG Emissions

- USC compared to the average emission rates for the 412 institutions with data in the SIMAP database for 2018, the latest year for which a complete data set is available.

FTE = Full Time Equivalent
Comparisons of Normalized GHG Emissions

- Comparative estimates of Scope 2 emissions rely on national E-Grid emissions factors rather than the more customized emissions factors provided by USC’s electricity supplier that are used elsewhere in this analysis. This makes for more relevant comparisons.

Scope 1 & 2 Emissions per 1,000 GSF (MTCDE)
Comparisons of Normalized GHG Emissions

- Comparative estimates of Scope 2 emissions rely on national E-Grid emissions factors rather than the more customized emissions factors provided by USC’s electricity supplier that are used elsewhere in this analysis. This makes for more relevant comparisons.
Boundary/Baseline Adjustment

Previous inventories were completed in 2001 and 2009. Then a 2014 inventory included expanded reporting categories, establishing it as the new "baseline" for the university’s carbon emissions.

These previous baseline calculations included the AT&T Center—which is leased—along with all properties owned by USC, in its organizational boundaries; it did not, however, include USC’s numerous other leased properties which it operates.

To be more consistent, the 2018 GHG inventory made a change to these organizational boundaries, shifting to an "ownership" approach which excluded the AT&T Center. In 2019, new fleet data that had not been previously available was collected and included as well.

The result of this continued organizational evolution and methodological refinement is that the previously reported 2014 baseline figures required adjustment; the updated 2014 data, as well as those for intervening years, are included in this report.
Methodology

The University of Southern California operates two main campuses: the University Park Campus (UPC) and the Health Sciences Campus (HSC). The greenhouse gas emissions sources that have been included in this report include emissions sources from these campuses as well as other properties owned by the University. The approach to organizational boundaries, therefore, is an ownership or “equity share” approach. This, as noted previously, is a slight change from previous years’ reports.

The data for this inventory was provided from utility bills (LADWP for electricity, SoCalGas for natural gas), data from other facilities staff outside of the Energy Services office provided data for propane, gasoline for fleet vehicles, and fertilizer applied on campus, and reports run on square footage during late fall 2019. Emissions from refrigerants and chemicals were assumed to be “de minimus” (i.e. less than 5% of total emissions), there were no emissions this year.

Emissions for commuting and business travel were estimated/projected for the years 2015, 2016, 2017 and 2018 based on the rate of change in (Full-Time Equivalent) student enrollment from the 2014 baseline year (for student commuting); the rate of change in (Full-Time Equivalent) staff and faculty from the 2014 baseline year (for staff/faculty commuting, directly financed air travel, and directly financed other travel); and the (weighted) average rate of change in FTE’s of students, staff and faculty between 2016 and 2017 for the 2017 input of municipal solid waste sent to the landfill. For 2018, all Scope 3 “activity data” inputs were held constant; changes in values reflect only the changing carbon intensity rates for electricity, which in turn reflect the calculations for Commuter Rail commuting and Transmission and Distribution Losses for electricity. In 2019, however, activity data was collected from campus stakeholders for commuting miles traveled by each mode (auto, bus, commuter rail and light rail); for air miles traveled (based on itineraries in some cases, and a $-spent-to-passenger-miles conversion factor of 14.5 cents per mile, when purchase data was available and itinerary data was not); and waste data.

Emissions from USC Fleet was calculated through a combination of gallons of gasoline and mileage.

FTE figures used for benchmarking were drawn from IPEDS data, accessed from the USC Institutional Research site (http://oir.usc.edu/ipeds/); specifically, the “12-Month Enrollment” and “Human Resources” reports. Gross Square Footage data was supplied from USC.

The inventory results were calculated using a modified v9 of the University of New Hampshire’s Campus Carbon Calculator (formerly the Clean Air Cool Planet Calculator) - https://sustainableunh.unh.edu/calculator -a widely used tool for college and university greenhouse gas inventories in the U.S.