

Southern Oregon University Greenhouse Gas Inventory

Fiscal Year 2017



Report prepared by Sustainability at SOU, July 2018

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Introduction

Thirty years has passed since the United Nations convened the Intergovernmental Panel on Climate Change (IPCC) and the First Assessment Report was published detailing scientific evidence of anthropogenic climate change. In the decades since, 97 percent of climate scientists around the globe agree that climate change is real and that it is human-caused¹. The impacts of climate change are already manifesting around the world, including rising sea levels, more extreme weather events, and longer droughts and heat waves. Southern Oregon is experiencing climate change impacts such as reduced snow pack, larger and more frequent wildfires, and changes to seasonal streamflow.

Anthropogenic greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are extremely likely to have been the dominant cause of the observed warming since the mid-20th century.²

In the last decade, countless organizations, government agencies, and educational institutions have begun taking steps to proactively address climate change. In November 2016, hundreds of nations ratified the Paris Climate Agreement, an international climate agreement that is applicable to all countries. The agreement aims to keep global warming below 2 degrees Celsius, though it strives to limit warming to 1.5 degrees Celsius above pre-industrial levels, the level identified by scientists as necessary to avoid dangerous impacts to the world's climate.

As institutions of higher education, universities around the world have acknowledged their contribution to global greenhouse gas (GHG) emissions and the unique opportunity they possess to lead by example while educating future leaders in all industries about climate change and potential solutions. Southern Oregon University (SOU) has elected to take leadership on climate action, joining hundreds of other colleges and universities to sign Second Nature's Presidents' Climate Commitment. In signing this commitment, SOU resolves to take action by reducing GHG emissions and adapting to the impacts of climate change. Conducting annual GHG inventories, as prescribed by the Climate Commitment, is an integral step to understanding the university's carbon footprint, to identify opportunities for emissions reduction, and to track progress overtime.

SOU recognizes that taking action on climate change has many short term and long-term benefits to the campus and surrounding communities. Reducing air pollution, stabilizing energy costs, increasing energy independence, preventing waste, educating responsible global citizens, supporting the local community, and improving air quality are just a few of the many benefits.

To conduct this GHG inventory, SOU's Sustainability & Recycling office used the Sustainability Indicator Management & Analysis Platform (SIMAP) offered by the University of New Hampshire. SIMAP is a carbon and nitrogen accounting platform that is used to track and analyze greenhouse gas emissions. This is the

¹ Global Climate Change: Evidence. (2008, June 15). Retrieved July 14, 2018, from <http://climate.nasa.gov/evidence/>

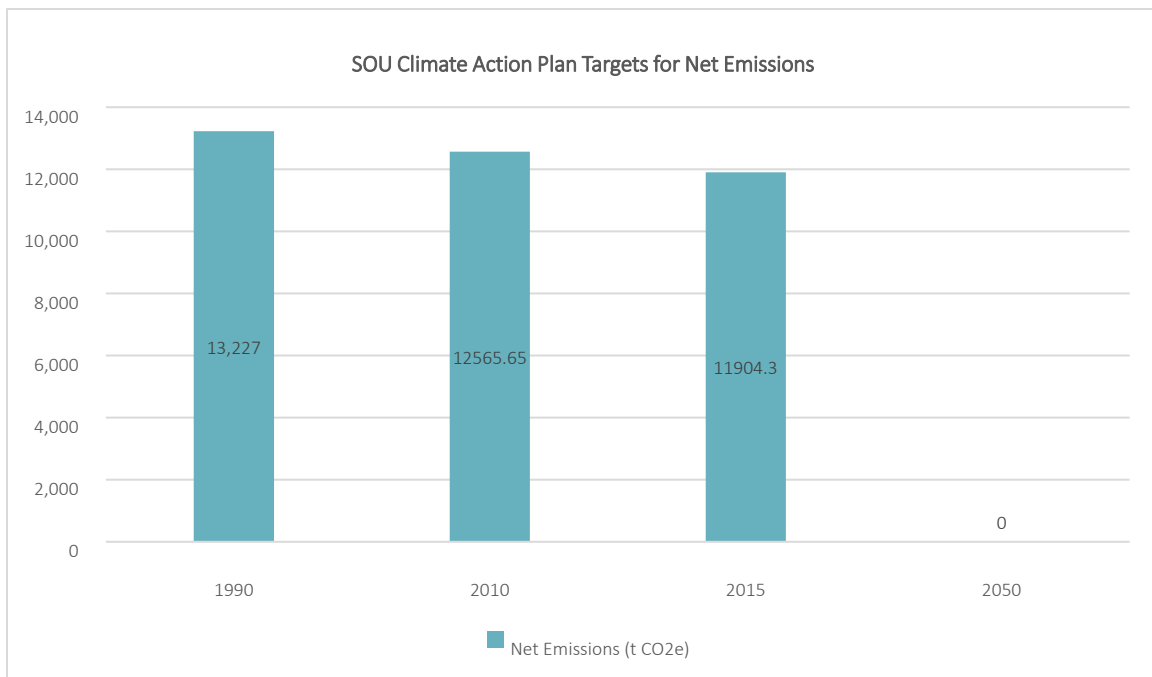
² IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

tool recommended and approved by Second Nature for use by colleges and universities to complete campus GHG inventories.

SOU's goals

In 2010, SOU adopted its inaugural Climate Action Plan, outlining specific GHG emission reduction goals. The current targets toward climate neutrality for SOU are:

- By 2010, arrest the growth of greenhouse gas emissions and begin to reduce emissions.
- By 2015, achieve greenhouse gas levels that are 5 percent below 1990 levels.
- By 2020, achieve greenhouse gas levels that are 10 percent below 1990 levels.
- **By 2050, achieve carbon neutrality.**



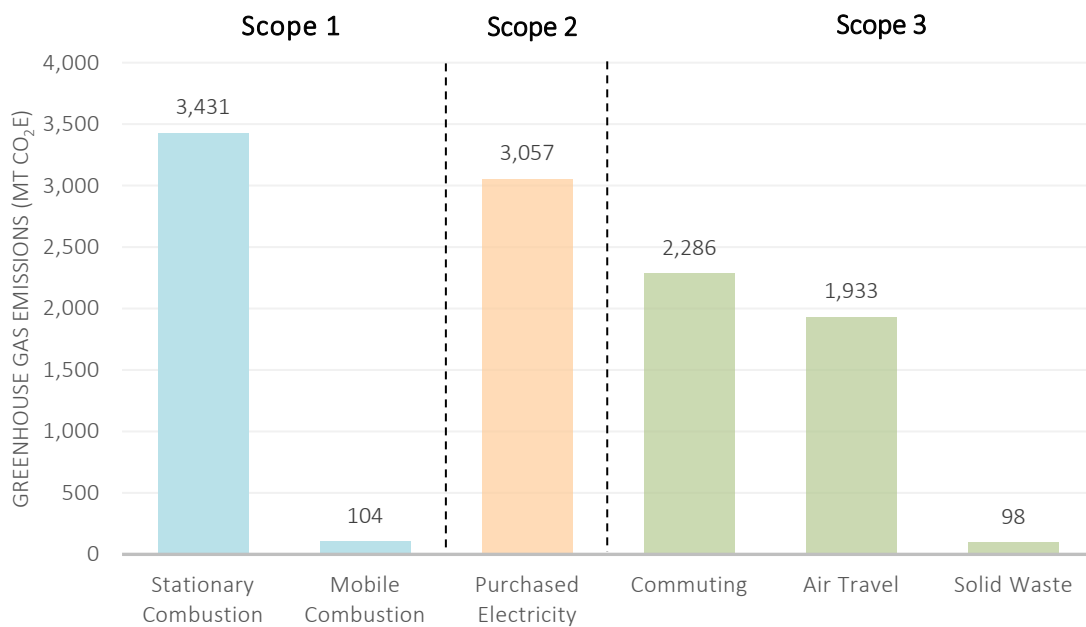
The Climate Action Plan also outlines scope-specific reduction goals:

- SOU proposes to reduce its **SCOPE 1** emissions from 4,470 t CO²e in FY2008 to 3,886 t CO²e in 2015.
- SOU proposes to reduce its **SCOPE 2** emissions from 4,780 t CO²e in FY2008 to 4,360 t CO²e in 2015.
- SOU proposes to reduce its **SCOPE 3** emissions from 3,997 t CO²e in FY2008 to 3,778 t CO²e in 2015.

Summary of Results

SOU's Scope 1 and Scope 2 emissions from onsite fuel combustion (stationary and mobile), fugitive emissions, and purchased electricity sources equal 6,591 MT CO₂e³. Figure 1 shows that Scope 1 and Scope 2 emissions are primarily attributed to electricity consumption and stationary combustion (natural gas consumption). In addition to Scope 1 and Scope 2 emissions, the Climate Commitment requires GHG reporting on a defined set of Scope 3 emissions sources (commute, air travel and solid waste). SOU's total Scope 3 emissions for this reporting period equal 4,317 MT CO₂e. The largest source of Scope 3 emissions is student and employee commute, followed by air travel, then solid waste.

Figure 1: Southern Oregon University's Greenhouse Gas Emissions (FY 2017)



Scope 1 and Scope 2 emissions yield 6,591 MT CO₂e. For sense of scale, this is equivalent to:⁴

- Annual emissions from 1,411 passenger vehicles.
- Annual emissions from the energy consumed by 712 homes.

Measured Scope 3 emissions yield 4,317 MT CO₂e. For sense of scale, this is equivalent to:

- Annual emissions from 10,580,882 miles driven by an average passenger vehicle.
- Annual emissions from the energy consumed by 466 homes.

³ See the Detailed Results and GHG Inventory Boundaries section of this report (page 5) for more detail on Scopes.

⁴ EPA Greenhouse Gas Equivalencies Calculator: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Detailed Results and GHG Inventory Boundaries

GHG inventory protocols classify emissions sources and activities as producing either direct or indirect GHG emissions. Direct emissions are those that stem from sources owned or controlled by a particular organization. Indirect emissions occur because of the organization's actions, but the direct source of emissions is controlled by a separate entity.

To distinguish direct from indirect emissions sources, three "Scopes" are defined for traditional GHG accounting and reporting purposes (World Resources Institute, The Greenhouse Gas Protocol).

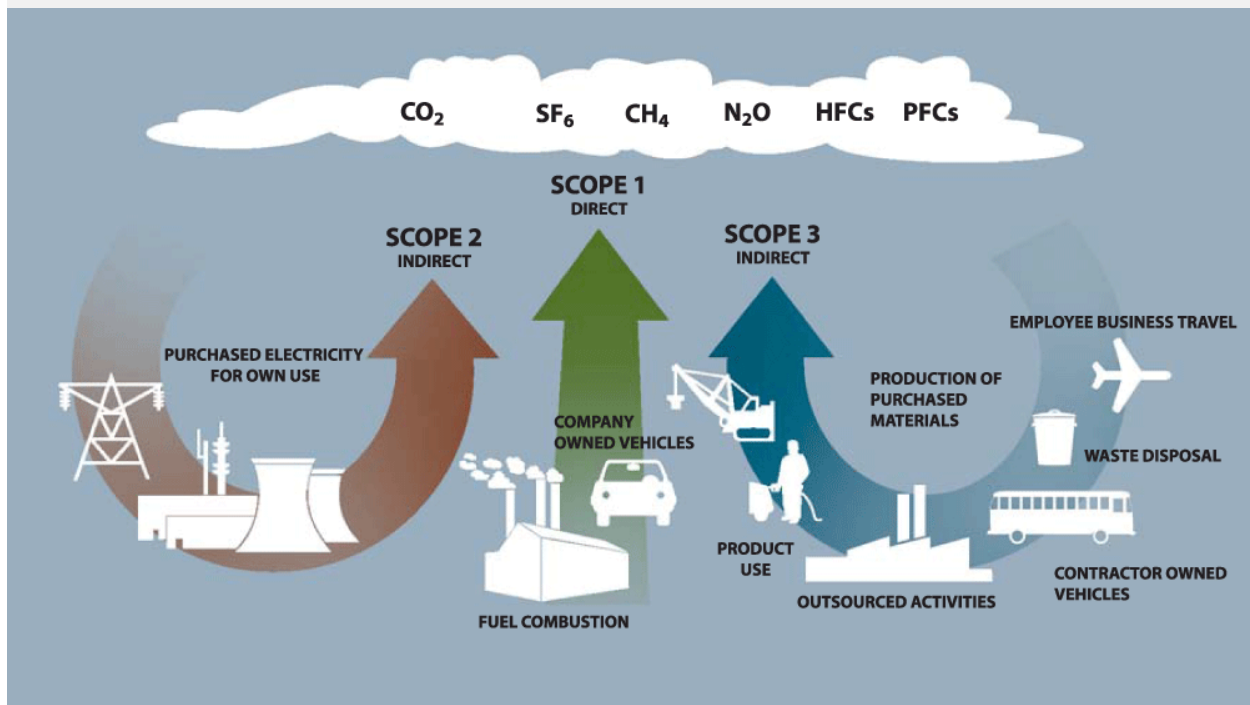
Scope 1 – Direct sources of GHG emissions that originate from owned equipment and facilities such as combustion of fuels or fugitive loss of refrigerants.

Scope 2 – Indirect emissions from purchased electricity, heat or steam.

Scope 3 – All other indirect sources of emissions that result from the institution's activities but occur from sources owned or controlled by another company, such as commute, air travel, solid waste disposal or supply chain.

Figure 2 illustrates the three Scopes of emissions. Scope 1 (direct) and Scope 2 (indirect) emissions must be reported for most protocols and registries, including Second Nature's Climate Commitment. Scope 3 emissions are indirect and usually considered optional when reporting emissions, but serve to clarify an organization's entire carbon footprint and illuminate the potential regulatory and financial risks an institution may face due to its carbon footprint. Second Nature's guidance asks for higher education to report Scope 3 emissions from air travel, commute and solid waste.

Figure 2: Greenhouse Gases and Accounting and Reporting Scopes



Source: WRI/WBCSD. *Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.*

The emissions sources included in this inventory by Scope category are as follows:

- **Scope 1:** stationary fuel combustion (e.g. natural gas, diesel, propane, etc.), mobile fuels (e.g. gasoline, diesel, propane, etc.) and fugitive refrigerants
- **Scope 2:** purchased electricity
- **Scope 3 (sources required by Second Nature Climate Commitment):** university-funded air travel, student and employee commute, solid waste disposal

Figure 3 is a summary table of emissions from all emissions sources included in this GHG inventory as well as a brief description of each emissions source.

This GHG inventory covers emissions from fiscal year 2017 that runs from July 1, 2016 until June 30, 2017. Data for the above emissions sources were collected for the following owned and leased facilities located within the state of Oregon: SOU's main campus in Ashland as well as the Higher Education Center in Medford.

There are various sources of emissions that are typically excluded from GHG inventories. They can be described as facility exclusions and emissions exclusions.

Emissions source exclusions for SOU and rationale:

- Fugitive refrigerants from vehicles. These emissions sources are assumed to be relatively small for SOU and there are no readily available data streams to support emissions calculations.
- Business travels other than air travel (e.g., bus, train and rental vehicles) as well as reimbursed miles for employee vehicles. These emissions sources are assumed to be relatively small for SOU and there are no readily available data streams to support emissions calculations.

Facility emissions source exclusions for SOU and rationale:

- None

This inventory considers all seven "Kyoto gases" including: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), nitrogen trifluoride (NF₃), and the groups of high global warming potential (GWP) gases, perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs). As SOU does not use PFCs, NF₃ or SF₆, these gases are not included. Overwhelmingly, the direct and indirect CO₂-equivalent (CO₂e) emissions are CO₂ from combustion of fossil fuels. The University of New Hampshire's Sustainability Indicator Management & Analysis Platform (SIMAP) was used to calculate all emissions in this analysis. More information about SIMAP is available in the Greenhouse Gas Accounting Tool section.

Figure 3: Detailed Description of SOU's FY2017 GHG Emissions, by Category

Scope	Emissions Category	GHG Emissions (MT CO ₂ e)	Description
Scope 1	Stationary Combustion	3,430.67	SOU used 64,458.02 MMBTU of natural gas in the Ashland and Medford facilities for space and water heating. Equipment used 490.20 gallons of propane.
	Mobile Combustion	104.24	In FY2017, fleet vehicles and other equipment used 95 gallons of B100 diesel, 1,412 gallons of B5 diesel, and 10,010.10 gallons of gasoline (E10).
	Fugitive Refrigerants	0	SOU does not have records of any lost refrigerant from equipment for FY2017.
Scope 1 Subtotal:		3,534.91	
Scope 2	Electricity	3,077.85	SOU used 12,311.92 MWh of electricity in its Ashland and Medford facilities in FY2017. The emissions presented in this inventory are calculated using the eGRID 2014 emission factors for the Northwest Power Pool (NWPP).
Scope 2 Subtotal:		3,077.85	
Scope 3	Commute	2,285.97	A commute survey was conducted as part of this inventory that provides SOU specific data on commute distance, commute days and mode of transportation.
	Air Travel	1,933.23	SOU spent \$567,611.45 on air travel in FY2017. SIMAP converts dollars spent on air travel to passenger miles, which is then used to calculate emissions ⁵ .
	Solid Waste	98.08	SOU disposed of 316.4 short tons of solid waste in FY2017 at Dry Creek Landfill. Although the landfill generates electricity with landfill gas, flaring of excess gas still occurs.
Second Nature Scope 3 Subtotal:		4,317.28	
Scope 3	T & D Losses	154.85	The transmission and distribution (T&D) of electricity is not 100% efficient. Nationally T&D losses average approximately 9%. These losses are applied to the quantity of electricity consumed by SOU in FY2017.
Additional Scope 3:		154.85	
Total Emissions (Scope 1-3):		11,084.89	

⁵ For more information on the methodology used to calculate air travel emissions see reference number 42 at <https://unhsimap.org/cmap/resources/references>.

Greenhouse Gas Accounting Tool

The inventory was completed by Southern Oregon University staff using the Sustainability Indicator Management and Analysis Platform (SIMAP) hosted by the University of New Hampshire Sustainability Institute (UNHSI). SIMAP is a new web-based platform for tracking, calculating, and managing campus' carbon and nitrogen footprints. SIMAP uses standard methodologies codified by the GHG Protocol Initiative and employed by corporations, the state of California, The Climate Registry, and other entities to account for greenhouse gas (GHG) emissions. These methodologies are currently the most accurate and widely accepted amongst policy makers. Inventories produced by SIMAP are compatible with current standards used to construct forthcoming cap-and-trade policy.² SIMAP is also a preferred tool for the Second Nature Carbon/ Climate Commitment.

This inventory follows the *Greenhouse Gas Protocol* developed by The World Resources Institute and the World Business Council on Sustainable Development as well as The Climate Registry's *General Reporting Protocol* and GHG inventory guidance provided by the Association for the Advancement of Sustainability in Higher Education (AASHE). The *General Reporting Protocol* only requires the reporting of emissions in Scopes 1 and 2 (as defined by the World Resources Institute), and the minimum reporting for Second Nature Climate Commitment signatories is to include Scope 1, Scope 2 and Scope 3 emissions sources that include business travel, solid waste, and commute.

All GHG emissions presented in this report are represented in metric tons of carbon dioxide equivalent (MT CO₂e). This measure includes all six greenhouse gases, which are converted to CO₂e based on their 100-year global warming potential (Figure 4). Global warming potential (GWP) indicates the magnitude of climate warming that a given amount of a greenhouse gas would cause relative to that of CO₂.

Figure 4: Global Warming Potential for Greenhouse Gases

Greenhouse Gas	Chemical Formula	Global Warming Potential
Carbon dioxide	CO ₂	1
Methane	CH ₄	25
Nitrous oxide	N ₂ O	298
Sulfur hexafluoride	SF ₆	22800
Hydrofluorocarbons	HFC	Range
Perfluorocarbons	PFC	Range

For additional information or questions regarding SOU's GHG inventory email sustainability@sou.edu