UNIVERSITY OF RICHMOND

2018 Climate Action Plan Update

OFFICE FOR SUSTAINABILITY

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Executive Summary

In 2007, University of Richmond (UR) signed onto the the American College and University Presidents' Climate Commitment, pledging to become carbon neutral by 2050. Three years later, UR published its first Climate Action Plan, a framework that committed the university to reduce its greenhouse gas (GHG) emissions 30% below 2009 levels by 2020 and 65% by 2035, on its way toward eliminating net carbon emissions.

This Progress Report and GHG Inventory will explain UR's emission calculation methodologies, provide a detailed analysis of the inventory, and document UR's current GHG current footprint.

The University completed its first GHG audit in FY2009. The findings of that audit provide the baseline data that the University uses to measure emission reduction progress. As of 2018, the University has reduced its emissions 8,992 mtCO2e, 21% below 2009 levels. To meet carbon neutrality, current projections indicate that additional reductions totaling 34,003 mtCO2e are needed. The University is committed to reducing GHG emissions and energy use across campus. In addition to emissions reductions, the Climate Action Plan articulated goals for embedding sustainability into the curricular and co-curricular aspects of a Richmond education. Those aims are now incorporated into the University of Richmond Sustainability Plan, which launched in 2019.

University of Richmond's Climate Action Plan aims to provide the UR community and its partners with a transparent roadmap of specific strategies for how the University will meet its GHG emission reduction targets. The Climate Action Plan will continue to be updated as needed, to incorporate new and innovative ideas and technologies.

Emissions by Source

The table and figure below summarize current GHG emissions across various sectors of the University. Strategies to reduce GHG emissions are outlined in the University's Climate Action Plan.

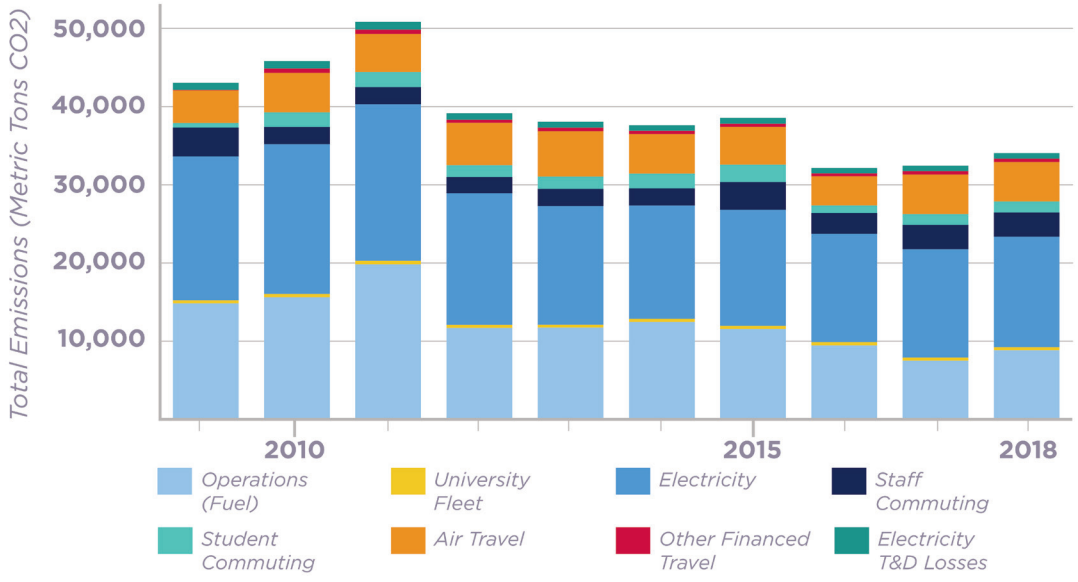


Figure 1: Stacked bar graph of GHG emissions by source from 2009-2018

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Operations (Fuel)	18,013	19,301	16,098	17,660	14,831	15,611	19,832	11,689	11,720	12,467	11,562	9,449	7,498	8,826
Transport	331	383	377	400	391	428	462	386	366	383	392	417	400	396
Electricity	18,668	19,897	19,660	20,295	18,415	19,157	20,004	16,854	15,186	14,493	14,848	13,861	13,861	14,137
Indirect (Commuting / Travel)	9,652	9,919	10,072	10,020	9,377	10,586	10,499	10,180	10,739	10,230	11,703	8,392	10,631	10,644
Total	46,665	46,499	46,207	48,375	43,015	45,782	50,796	39,110	38,011	37,572	38,504	32,119	32,390	34,003

Figure 2: Table of GHG emissions by source from 2005-2018

Emissions by Scope

UR's largest contributor to overall net emissions is Scope 2 emissions, which account for the impacts of indirect, purchased electricity and renewable energy. Since 2009, Scope 2 has consistently accounted for approximately 40 percent of UR's total net emissions. In 2018, 42 percent of overall emissions were attributed to Scope 2. Scope 3 emissions contributed the second most (31%) while Scope 1 emissions contributed the remainder (27%). Both Scope 1 and 2 emissions have decreased since 2009, by 39% and 23% percent, respectively, while Scope 3 emissions have increased by 14% percent. Some of that increase may be due to better accounting methods, rather than more indirect emissions. Figures 3 and 4 below report UR's 2018 GHG emissions and energy consumption by scope from 2009-2018.

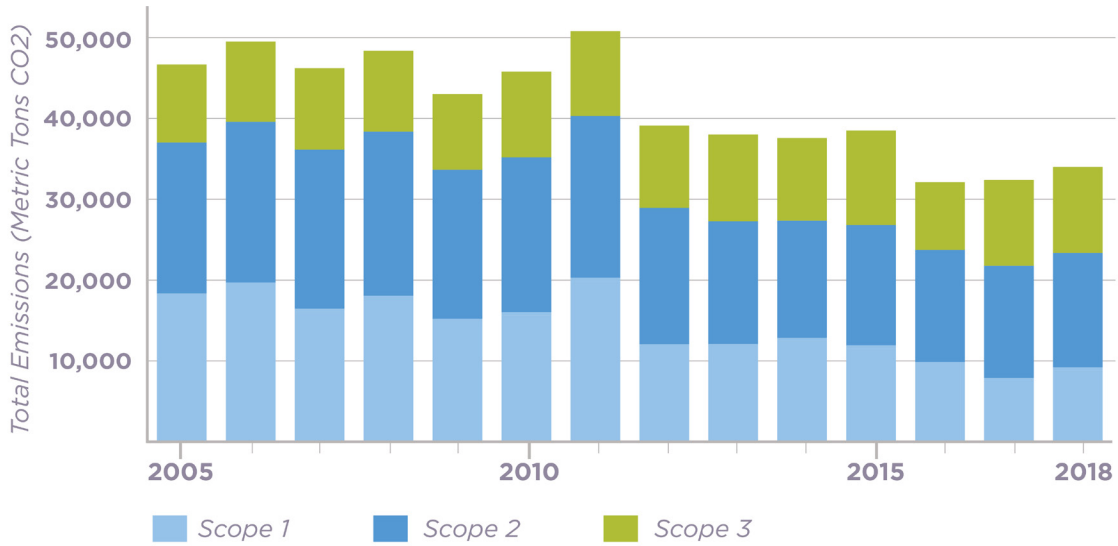


Figure 3: Stacked bar chart of GHG emissions by scope from 2005-2018

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Scope 1	18,345	19,684	16,475	18,059	15,222	16,039	20,293	12,075	12,086	12,850	11,953	9,866	7,899	9,222
Scope 2	18,668	19,897	19,660	20,295	18,415	19,157	20,004	16,854	15,186	14,493	14,848	13,861	13,861	14,137
Scope 3	9,652	9,919	10,072	10,020	9,377	10,586	10,499	10,180	10,739	10,230	11,703	8,392	10,631	10,644
Total	46,665	46,499	46,207	48,375	43,015	45,782	50,796	39,110	38,011	37,572	38,504	32,119	32,390	34,003

Figure 4: Table of GHG emissions by scope from 2015-2018

Inventory Methodology

The FY2018 GHG Inventory was developed using the web-based Sustainability Indicator Management and Analysis Platform (SIMAP) developed by the University of New Hampshire. The following methodologies are in accordance with the recommendations of the Second Nature Climate Commitment guidelines.

Inventory Boundary

The University of Richmond (UR) emissions include any emissions related to the routine functional operation of the University and its assets. This includes all major emission sources on campus including purchased electricity, energy usage in the maintenance of campus, transportation, and operations on the University campus.

SIMAP calculates GHG emissions from activities that produce carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and refrigerants. Emissions of CH4, N2O, and refrigerants are converted to metric tons of carbon dioxide equivalent (mtCO2e) using Global Warming Potentials (GWPs) provided by the Intergovernmental Panel on Climate Change's Assessment Reports. This allows UR to calculate a total carbon emissions Inventory for the University.

GHG Emission Sources

UR's GHG emissions are generated from four main sources: Electricity, Fuel, Transportation, and University Operations. Fuel includes natural gas, distillate oil, and propane used on campus. Transportation includes direct emissions from University-owned or operated vehicles used, as well as indirect emissions from student, faculty, and staff commuting, University-supported travel, and study abroad. University Operations includes emissions related to solid waste, wastewater, and refrigerants.

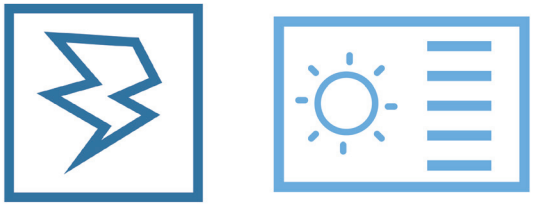
Based on GHG accounting protocols and standards, these emission sources are grouped into three "scopes."

Scope 1 refers to any GHG emissions that are a direct result of operations owned or controlled by the University, such as the natural gas used in the Steam Plant.

Scope 2 refers to indirect GHG emissions created by activities within the organizational boundaries of the institution, but which occur at sources owned or controlled by a separate entity. This is purchased electricity and our on-campus solar facility.

Lastly, scope 3 refers to all other indirect emissions included in UR's GHG Inventory for which accurate reporting methods exist, such as commuting, directly financed travel, and waste emissions. Source categories are based only on UR's reported SIMAP data.

Scope 1 GHG Source Categories: Direct Emissions
1. On-campus stationary combustion
Natural gas, distillate oil (#1-4), LPG (propane)
2. Mobile combustion
University Gasoline and Diesel Fleet vehicles



Scope 2 GHG Source Categories: Indirect Emissions
1. Purchased Electricity
2. Renewable Energy Certificates

Scope 3 GHG Source Categories: Other Indirect Emissions
1. Student, Faculty, Staff Commuting
2. Air Travel
3. Other Financed Travel
4. Waste Generated in Operations
5. Electricity Transmission and Distribution Losses

Data Collection

Data input to SIMAP is sourced from a variety of University personnel and sources. Institutional data is maintained by Institutional Effectiveness. Fuel and electricity consumption is metered or bill-derived, and records are held by University Facilities. Direct transportation fuel consumption data is maintained by Transportation and via a survey issued by Institutional Effectiveness. Directly financed outsourced travel is provided by Procurement. Study abroad travel data is provided by the Office for International Education. Data regarding paper purchased is provided by both Purchasing and Ricoh. Solid waste and wastewater information is provided by University Facilities. Finally, composted waste is reported by Dining Services.

Fuel

UR generates most of its heating through steam created by gas-fired boilers in a central steam plant. Historically, the fuel mix decision was based on an "all in" cost of using three fuels – oil, natural gas, and coal – to meet energy demands. Since adopting the Climate Action Plan in 2010, the university responded to active student involvement and a changing domestic energy landscape with a shift from a coal-dominant to a natural gas-dominant mix in 2012.

Today, natural gas is the primary fuel for the steam plant that heats many buildings on campus. The decision to utilize this mixture was motivated by student activism and a reduction in Scope 1 GHG emissions, as well as the competitive nature of natural gas prices since 2011. Buildings on campus also use a central energy management system to control and optimize heating, ventilation and air conditioning, and residence halls feature energy-efficient laundry machines that reduce energy and water usage.

In 2018, on-site energy generation accounted for 8,826 mtCO2e.

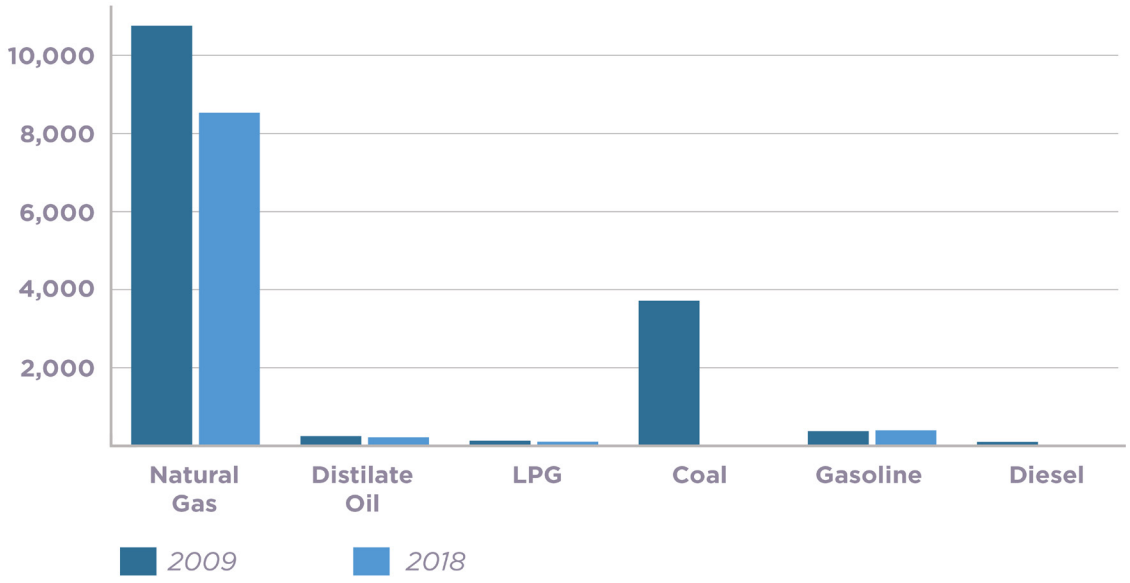


Figure 5: Bar graph of GHG emissions by fuel source in 2009 and 2018

Electricity

The University of Richmond uses approximately 41,000 megawatt hours (MWh) of electricity each year. According to the initial GHG emissions inventory, in 2018 purchased electricity produced 14,137 mtCO2e.

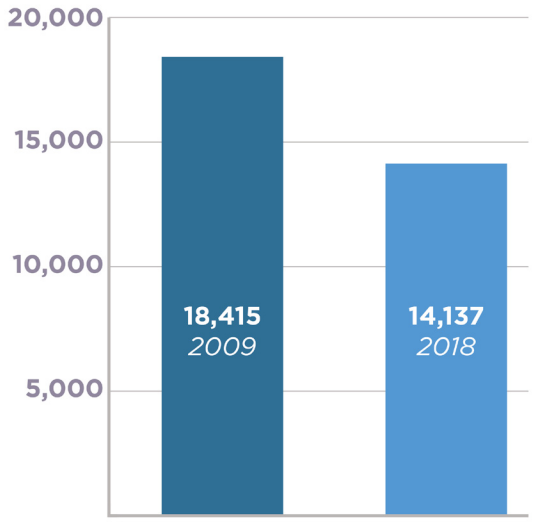
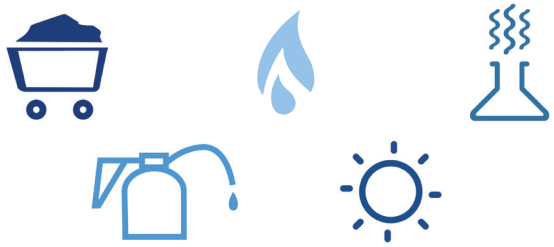
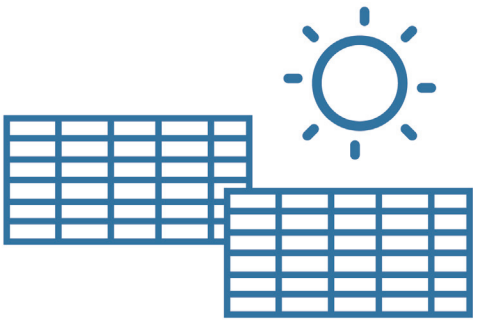


Figure 6: Bar graph of GHG emissions from electricity in 2009 and 2018.



The University purchases electricity from Dominion Virginia Power, which uses a combination of coal, natural gas, nuclear, oil, and renewable energy sources. Purchased electricity is used primarily for lighting, running electronic equipment, and powering campus chiller units.



The University also has a 205 kW solar array on the roof of the Weinstein Center for Recreation. In 2018, it produced 275 MWh behind the meter, which reduced the campus's overall electricity needs. Since 2013, University of Richmond has purchased Creen-e certified Renewable Energy Certificates (REC) to reduce our emissions. The University purchased 3,851 RECs in 2018.

In October of 2018, University of Richmond announced a power purchase agreement with developer sPower for a 20 MW solar facility, which will make UR the first institution of higher education in the southeast to account for 100% of its electricity needs with renewable energy. Set to be completed in 2020, Richmond Spider Solar will consist of 47,000 solar PV panels over 130 acres and will match all of the University's electricity demand.

Transportation

According to the U.S. Energy Information Association (EIA), transportation was responsible for emitting over two billion mtCO2e in 2007. Most university campuses face automobile traffic and parking problems, and UR is no exception. Thus, UR has developed campaigns and incentives to promote sustainable commuting options for faculty, staff and students to reach their destinations in ways other than single occupancy vehicles. In 2018, transportation accounted for 9,957 mtCO2e.

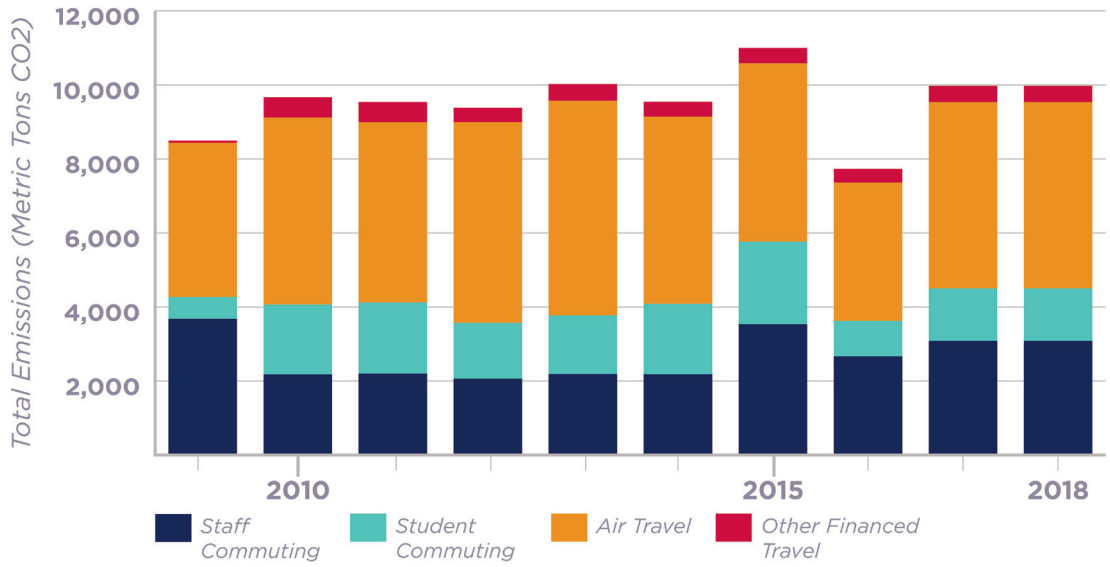
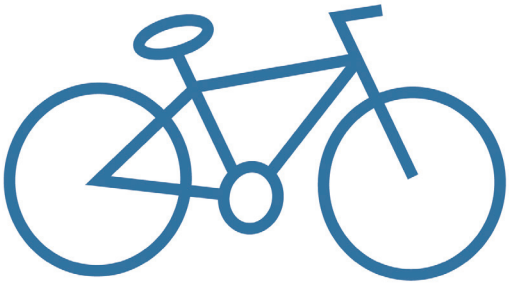


Figure 7: Stacked bar graph of GHG emissions by transportation source from 2009 to 2018

One advantage UR has is that 93.2% of its full-time undergraduate student body lives on campus, thus reducing the GHG emissions created by commuting. However, because of UR's location and lack of sidewalks and bike paths leading off campus, it is difficult for resident students to get to stores or entertainment locales without a personal vehicle.

To provide alternative options, UR has collaborated with the Greater Richmond Transportation Company (GRTC), to offer free bus passes to all students, faculty, and staff as an option for commuters and campus residents.

Carpooling is promoted at UR. Carpool participants receive preferred parking spaces. UR works with GRTC to promote Ridefinders, a service to connect potential carpool members, and the car-sharing company Zipcar to provide student the opportunity to make automobile reservations. UR also offers preferred parking spaces for hybrids and other vehicles that are more fuel-efficient and produce low levels of emissions. There are currently 5 electric vehicle charging stations on campus, with three more slated for installation in the upcoming year.

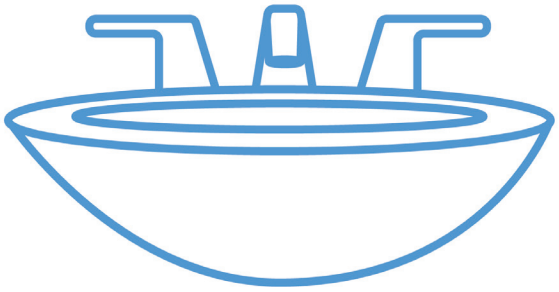


To facilitate bicycling on campus, UR created an on-campus bike-share program called Green Bikes. This program provides 50 bikes to the University community to be used on an honor system, by all students, faculty, and staff to use to travel between various campus locations, along with several new bike racks. GRTC buses are equipped with bicycle racks to encourage commuters to cycle between home and the transit stations In addition to the free Green Bike Program, mountain bikes have been purchased and added to the Outdoor Adventure Recreation equipment check-out inventory. These bikes allow students, faculty, and staff to travel off campus and take advantage of the surrounding city and areas via bike for a nominal fee of $5/day.

The University owns 49 utility carts and three Segway electric personal transporters. Twenty of the carts are powered by alternative fuels: six are propane-fueled, while 14 are electric. To encourage optimal operating efficiency, the landscaping department holds a quarterly tire inflation competition.

University Operations

In terms of operational initiatives, UR incorporates several initiatives aimed at reducing the amount of waste and wastewater generated.



Multiple water conservation strategies have become standard practice, including low-flow toilets, low-flow shower heads, pint-flush urinals, sink aerators, and Energy Star ice machines and washers.

The University adheres to weather-informed irrigation and prioritizes the planting of drought tolerant and native species in new plantings. In irrigation practices, UR has reduced its total water use per unit of vegetated ground 12% since 2009.

Key areas of opportunity for UR to improve include decreasing consumption of potable water and improving wastewater management. Onsite treatment of wastewater for use in utilities and landscaping in particular, would make a considerable impact.

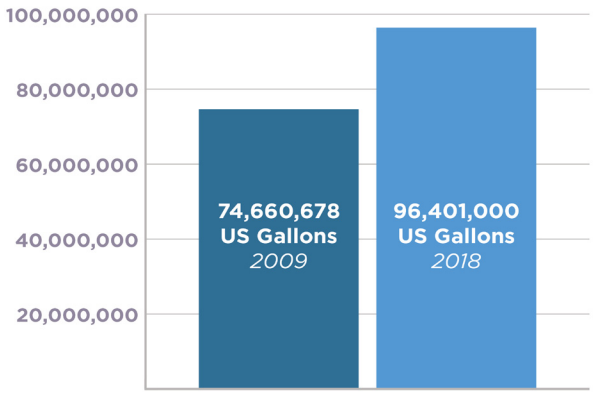


Figure 8: Bar graph of wastewater use at University of Richmond in 2009 and 2018