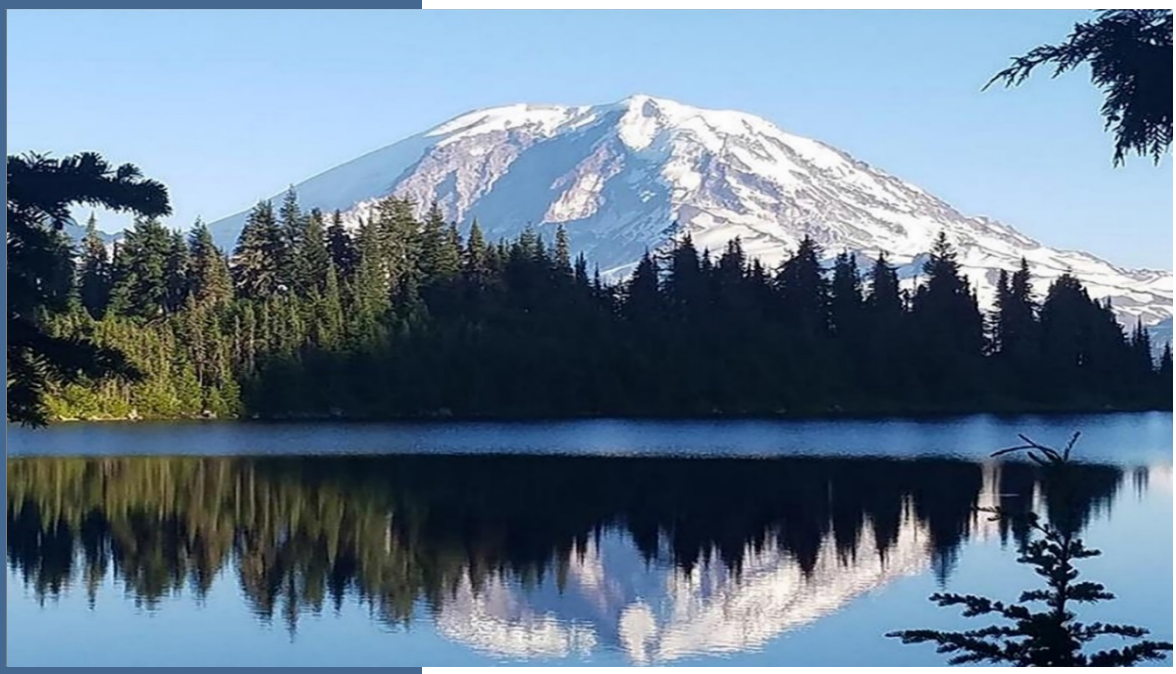

Reducing Greenhouse Gas Emissions In Washington State Government

Air Quality Program
Washington State Department of Ecology
Olympia, Washington

DEPARTMENT OF ECOLOGY
State of Washington

March 2021, Publication 20-02-022

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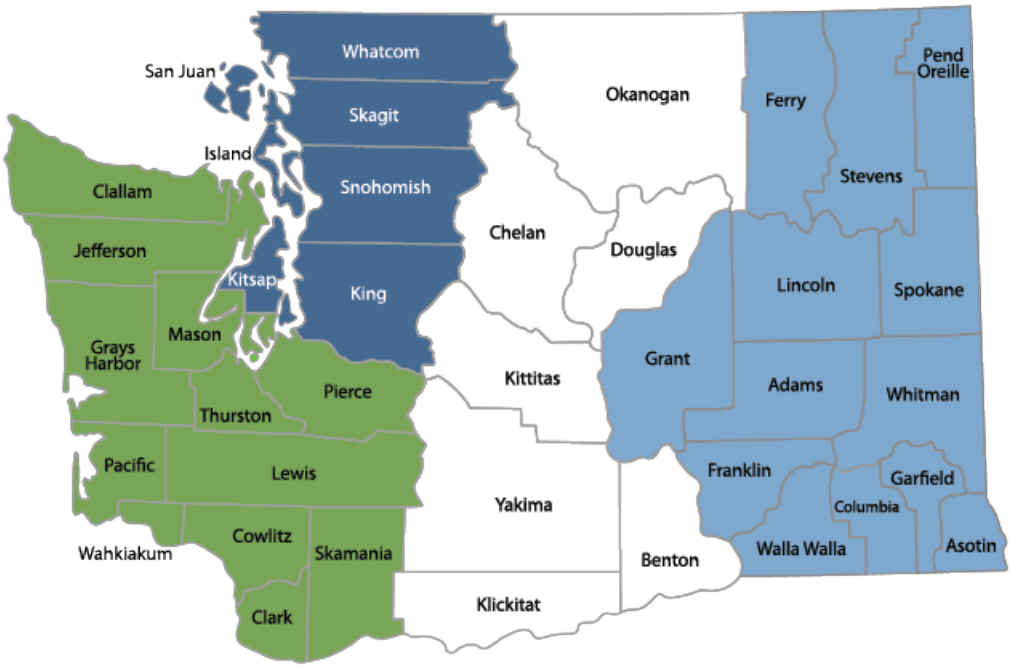
[1] www.ecology.wa.gov

Department of Ecology's Regional Offices

Map of Counties Served



Southwest Region 360-407-6300	Northwest Region 425-649-7000	Central Region 509-575-2490	Eastern Region 509-329-3400

Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	3190 160th Ave SE Bellevue, WA 98008	425-649-7000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

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DEPARTMENT OF
ECOLOGY
State of Washington

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Executive Summary

To address the threat climate change to our state, the Washington State Legislature established limits on greenhouse gases in 2008 and updated these limits in 2020. As part of the response to climate change, the Legislature required state agencies to reduce their greenhouse emissions and report on their progress every two years.

Greenhouse gas emissions from Washington State agencies represent about 1.0 percent of total state greenhouse gas emissions. However, state government is in a unique position to demonstrate leadership in reducing greenhouse gas emissions and combating climate change. This report provides information about greenhouse gas emissions by Washington State government through 2019. To meet the 2020 emissions limit of 805,000 metric tons, state government must collectively reduce emissions by about 7.5 percent. Meeting the 2020 limit is possible, and will be covered in the next biennial report, in 2022.

Greenhouse Gas Limits

In March 2020, the Washington State Legislature updated both the greenhouse gas limits and the mitigation reporting requirements with the passage of House Bill 2311 (RCW 70A.45.050). To meet the increasing threat of climate change, 2030 and 2040 now have specific emission limits. In addition, every year beyond 2020 now has more aggressive percent reductions requirements than the previous targets established in 2008. These new limits for greenhouse gases are:

- By 2020, reduce emissions to 805,000 metric tons or 15 percent below 2005 levels,
- By 2030, reduce emissions to 521,000 metric tons or 45 percent below 2005 levels,
- By 2040, reduce emissions to 284,000 metric tons or 70 percent below 2005 levels,
- By 2050, reduce emissions to 47,000 metric tons or 95 percent below 2005 levels; achieve net zero greenhouse gas emissions by state government as a whole.

We will assess these new requirements in the next biennial report in 2022.

Greenhouse Gas Inventory and Mitigation Reporting

Annual state agency greenhouse gas emissions data are required to be analyzed and summarized by Ecology and reported to the Governor and appropriate committees of the Senate and the House of Representatives by December 31st (RCW 70A.45.060).

Under the new 2020 mitigation reporting requirements (RCW 70A.45.050), agencies must also submit a report to Ecology and the State Efficiency and Environmental Performance (SEEP) office at the Washington Department of Commerce starting June 1, 2022 and each even-numbered year after that. These new mitigation reporting requirements include:

- emission reduction actions implemented during the previous two years,
- activities planned for the next two biennia to meet emission reduction targets,
- a long term strategy to meet the new emissions limits, updated as appropriate.

Ecology and Commerce will review the mitigation activities and compile them into a consolidated report for the appropriate committees of the legislature. This report is due December 1, 2022 and each even-numbered year after that.

Conclusion

This report analyzes state agency-reported greenhouse gas emissions data for 2018 and 2019. Collectively Washington state government is on track to meet the 2020 greenhouse gas emissions goal. Going forward, meeting the new greenhouse gas emissions limits and reporting requirements of RCW 70A.45.050 will require increased efforts by all participants.

Most of the greenhouse gas emissions from state agencies come from buildings (i.e., electricity and natural gas used for power and heat), transportation from state vehicles, and the Washington State ferry system.

Introduction

The State Agency greenhouse gas reporting program collects greenhouse gas emissions data from 23 reporting agencies that account for about 93 percent of the state agency 2005 baseline emissions. With the recent passage of House Bill 2311 (in 2020), state agencies must meet new emissions limits at new target years. Every two years, Ecology summarizes these data into a report to the governor and legislators.

RCW 70A.45.060(3) establishes the reporting requirements:

> By December 31st of each even-numbered year beginning in 2010, the department shall report to the governor and to the appropriate committees of the senate and house of representatives the total state agencies' emissions of greenhouse gases for 2005 and the preceding two years and actions taken to meet the emissions reduction targets.

The Washington State Agency greenhouse gas program will continue to evolve in response to regulatory changes or to greenhouse gas accounting changes as specified by the Intergovernmental Panel on Climate Change. RCW 70A.45.060(1) requires the Department of Ecology to develop "an emissions calculator to assist state agencies in estimating aggregate emissions." This calculator estimates emissions from major sources within state government operations, specifically building energy sources and fleets. Emission factors embedded in the calculator align with other greenhouse gas reporting programs in Ecology.

Sources of greenhouse gas emissions

State agencies reported on sources of greenhouse gas emissions directly under their operational control or that result from activities directly controlled by the state agency, including:

- Natural gas, electricity, and other fuels used in buildings and stationary equipment owned or operated by the state agency.
- Diesel, gas, and other fuels used in vehicles and equipment owned and operated by the state agency, including light and heavy duty on-road vehicles, non-road or off-road vehicles, ferries, boats, and aircraft.

Greenhouse gases included

State agencies reported on the three main greenhouse gases emitted from state agency activities:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)

Greenhouse gas inventories use a common metric, carbon dioxide equivalent (CO_2e) to report greenhouse gas emissions. For any quantity and type of greenhouse gas, CO_2e signifies the amount of carbon dioxide that would have the same global warming impact. The Global Warming Potential (GWP) is the factor used to convert all greenhouse gases to this common unit. Table 1 below describes the global warming potential related to each type of greenhouse gas.

In estimating greenhouse gas emissions for national or state inventories, both the EPA and Washington State comply with international greenhouse gas reporting standards under the United Nations Framework Convention on Climate Change (UNFCCC) and currently use the 100-year GWP values from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).[2]

Table 1: Global Warming Potentials[3]

Greenhouse Gas	GWP
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous Oxide (N_2O)	298

New Greenhouse Gas Emissions Limits

RCW 70A.45.040 requires Ecology to review with the Climate Impacts Group (CIG) at the University of Washington the science on human-caused climate change within eighteen months of the "next and each successive global or national assessment of climate change science." This review may require recommendations on "whether the greenhouse gas emissions reductions required under RCW 70A.45.020 need to be updated."

In 2019, Ecology reviewed several recent climate change reports:

- the 2018 Intergovernmental Panel on Climate Change Special Report, *Global Warming of 1.5°C* (SR15), [4]

[2] https://www.epa.gov/ghgemissions/understanding-global-warming-potentials
[3] Table A-267: IPCC AR4 Global Warming Potentials…
https://www.epa.gov/sites/production/files/2018-01/documents/2018_annex_6.pdf
[4] https://www.ipcc.ch/sr15/

- the 2018 *Fourth National Climate Assessment*, [5]
- the University of Washington CIG report on the consequences to Washington State of 1.5°C and 2°C of warming. [6]

To moderate the most damaging effects of climate change, these reports show the need for significant additional greenhouse gas reductions. Ecology published *Washington State Greenhouse Gas Reduction Limits,*[7] recommending strengthening the statutory greenhouse gas emissions limits, creating new interim milestones, and setting a carbon neutral target in addition to the emissions limit for 2050. Ecology's policy paper informed 2020 House Bill 2311 (RCW 70A.45.050), updating the greenhouse gas emissions limits and mitigation requirements for state agencies. By June 30th of each year, state agencies must complete a simplified calculator designed by Ecology to estimate greenhouse gas emissions associated with buildings and fleets.

State agency emissions limits in RCW 70A.45.050 are:

(i) By July 1, 2020, reduce overall emissions of greenhouse gases to 15 percent below 2005 levels or 805,000 metric tons by state government as a whole

(ii) By 2030, reduce greenhouse gas emissions to 45 percent below 2005 levels, or 521,000 metric tons by state government as a whole

(iii) By 2040, reduce greenhouse gas emissions 70 percent below 2005 levels, or 284,000 metric tons by state government as a whole and,

(iv) By 2050, reduce greenhouse gas emissions to 95 percent below 2005 levels, or 47,000 metric tons and achieve net zero greenhouse gas emissions by state government as a whole.

[5] https://nca2018.globalchange.gov/
[6] https://cig.uw.edu/resources/special-reports/no-time-to-waste/
[7] https://apps.ecology.wa.gov/publications/SummaryPages/1902031.html

New Greenhouse Gas Mitigation Reporting

In addition to annually reporting greenhouse gas emissions, state agencies must submit a report on mitigation activities implemented during the previous two years. The appendix includes a summary of each state agency's mitigation activities for 2018 and 2019.

Revised mitigation reporting requirements start June 1, 2022 and each even-numbered year after that. Agencies must report to Ecology and the State Efficiency and Environmental Performance office at the Department of Commerce:

- emission reduction actions implemented during the previous two years
- activities planned for the next two biennia to meet emission reduction targets
- the agency's long term strategy to meet the new emission reduction targets, updated as appropriate

Ecology and the State Efficiency and Environmental Performance office review the mitigation information from each agency. These mitigation reports are included in a consolidated report to the appropriate committees of the legislature. The due date for this legislative report is December 1, 2022 and each even-numbered year after that (RCW 70A.45.050 (3)). The legislative report for state agency greenhouse gas emissions data is due December 31st of each even numbered year (RCW 70A.45.060(3)).

Total State Agency Greenhouse Gas Emissions

Greenhouse gas emissions from Washington State agencies represent about 1 percent of total state greenhouse gas emissions. However, state government is in a unique position to lead in reducing greenhouse gas emissions and combating climate change. The 23 state agency reporters listed in Table 2 represent 93 percent of the state agency 2005 baseline emissions.

Table 2: State Agency Reporters

Agencies & Higher Education with estimated 2005 baseline >10,000 MT
Department of Transportation
University of Washington
Washington State University
Department of Corrections
Department of Social and Health Services
Washington State Patrol
Department of Enterprise Services
Central Washington University
Eastern Washington University
Western Washington University
Department of Fish and Wildlife
Seattle Community Colleges

Agencies & Higher Education with estimated 2005 baseline >10,000 MT
State Parks and Recreation Commission
Spokane Community College
The Evergreen State College
Department of Natural Resources
Agencies with estimated 2005 baseline > 5,000 MT
Department of Health
Liquor and Cannabis Board
Labor and Industries
Department of Veterans Affairs
Department of Ecology
Agencies not captured by threshold but which must report
Department of Agriculture
Department of Commerce

As of October 2020, only one of the state agencies listed in Table 2 has not reported its 2019 greenhouse gas emissions. For this agency, the most recent data reported are represented with a placeholder. As of July 2019, about half of reporting agencies have already met their 2020 target by reducing their greenhouse gas emissions 15 percent from their 2005 baseline (see appendix).

Reported data represents about 93 percent of state agency emissions. Adjusted to 100 percent, Figure 1 provides greenhouse gas emissions from state government as a whole. Currently, Washington state government is within 7.5 percent of the 2020 target of 805,000 metric tons.

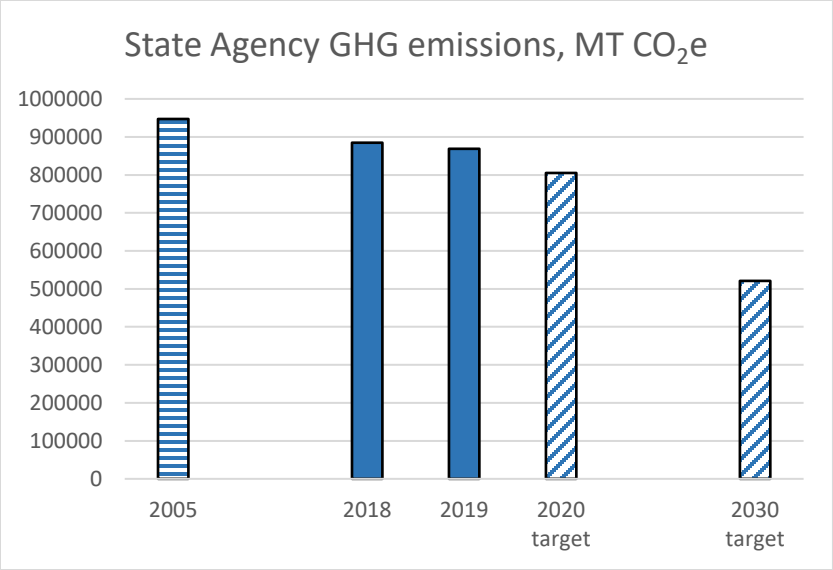

Figure 1: Collective state government greenhouse gas emissions:
2005 baseline; 2018 and 2019 reported emissions; 2020 target of 805,000 metric tons; 2030 target of 521,000 metric tons

Tracking greenhouse gas emissions from operations continues to be challenging for agencies that regularly experience campus growth and / or reductions. Another challenge is the COVID pandemic, which has had an as-yet unmeasured impact on greenhouse gas emissions, and will likely cause uncertainty into the future as agencies assess the feasibility of emissions reductions. As Figure 1 also shows, meeting the 2030 reduction target will be a significant challenge for state agencies.

As Figure 2 shows, stationary sources are the primary contributors of greenhouse gas emissions for state agencies. Stationary sources are typically emissions from buildings, including both scope 1 (natural gas) and scope 2 (electricity) emissions.[8] For a few state agencies, scope 1 mobile sources (transportation fuels) are significant, especially fleet emissions from the Washington State Patrol and emissions from the Washington State Department of Transportation ferry system.

[8] https://www.wri.org/resources/charts-graphs/operational-boundaries-ghg-emissions

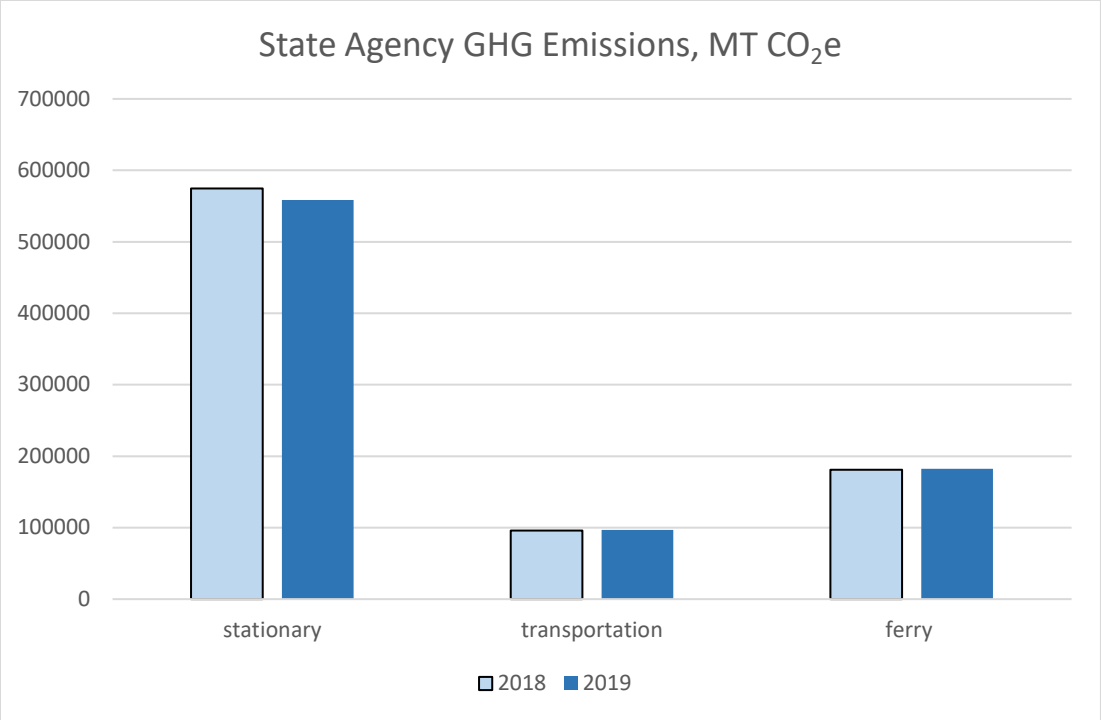

Figure 2: State Agency greenhouse gas emissions by sources

Greenhouse Gas Mitigation Summary

The SEEP Office at the Department of Commerce designed a mitigation template for state agencies to document their activities. These narratives describe greenhouse gas mitigation actions during 2018 and 2019, challenges encountered, and future planning strategies.

Challenges encountered by state agencies when pursuing mitigation activities centered on funding. Lack of funding for this work resulted in increased maintenance backlogs, inefficient systems and equipment, and high operating costs. Funding challenges also limited progress with fleet electrification since some agencies lack the charging capacity to convert more vehicles to electric. Other challenges included lack of staff resources, unclear statutory and grant funding requirements, limitations of existing technology (i.e. electric vehicle alternatives for heavy-duty vehicles), insufficient measurement (i.e. building-level metering), and challenges related to leased facilities.

State agencies are already planning to address new mitigation reporting requirements required in 2022. For example, the Department of Natural Resources has formed an internal greenhouse gas reductions task force to develop long-term strategies and support emissions reduction efforts. Other planned mitigation actions included developing and building zero energy facilities, developing agency policies and guidance, incorporating electric vehicle charging equipment with lease renewals, adopting new and more efficient technology and equipment, electrifying ferries, and evaluating telework as an option to shrink facility square footage.

For agencies with aging district heating systems or campus power plants, upgrading these systems will be critical to meeting future greenhouse gas limits. In 2019 the Department of

Enterprise Services completed the pre-design for a new high-efficiency central plant for the Capitol Campus. This Next Century Capitol Campus (NC3) project would replace the 100-year-old steam plant, reducing greenhouse gas emissions, improving resiliency, lowering operating costs, and putting the Capitol Campus on the path to meet statutory emissions limits. The University of Washington and Seattle Colleges also plan to upgrade central utility plants.

SEEP is working with state agencies to develop and implement guidance on low-carbon campuses. Sub-metering projects will help measure building energy use and establish efficiency performance baselines. The data will improve understanding of energy efficiency, thereby improving selection of target projects to reduce greenhouse gas emissions.

Recommendations

Most state agencies are doing an excellent job of mitigating their greenhouse gas emissions and are on target to meet their 2020 reduction targets. Natural gas and electricity used by buildings are the main sources of greenhouse gas emissions for state agencies. "Green" market electricity contracts are a significant opportunity for emissions reductions. This carbon neutral electricity source would also reduce mobile source emissions as agencies work to transition to electrified fleets. SEEP and Ecology will be working with state agencies to evaluate and compile recommendations to meet the stricter greenhouse gas limits. These strategies will be included in the 2022 report to the legislature.

Ecology is currently working to integrate the data from all greenhouse gas reporting programs: sector-based emissions, industrial emissions, and emissions from state government. This combined dataset could improve understanding of greenhouse gas emissions in Washington and the data relationship of the various reporting programs.

Conclusion

The state agency greenhouse gas reporting program emphasizes annual tracking of an agency's greenhouse gas emissions. The data analysis suggests nearly all state agencies are continuing to reduce their greenhouse gas emissions. The 2020 statutory target of 805,000 metric tons is achievable. However, all state agencies must continue to prioritize further emissions reductions to meet the new 2030 greenhouse gas limit of 45 percent below 2005 baseline levels or 521,000 metric tons collectively. RCW 70A.45.050 emphasizes the importance of mitigation planning and documentation. State agencies and SEEP continue to identify opportunities to reduce greenhouse gas emissions and to design carbon neutral campuses.

Appendix: Greenhouse Gas Inventory Reporters

This appendix provides the greenhouse gas profile for each of the 23 reporters, along with a brief summary of mitigation actions during the last two years, as submitted by each reporting agency. As of the drafting of this biennial report one agency has failed to submit its GHG inventory and / or mitigation narrative. In such cases, the data form the last reported annual inventory becomes the placeholder data with no mitigation narrative reported.

Each agency's greenhouse gas profile includes its 2020 and 2030 greenhouse gas target as a percent reduction of its 2005 baseline. In developing strategies to meet these targets, the SEEP office at the Washington State Department of Commerce is a critical asset to agencies.

Agriculture, Department of

The Department of Agriculture is a reporter due to the requirement that the following agencies report:

"Agencies not already captured but who must report under Alternative Fuel and Vehicle Extent Practicable rule"

Figure A1 indicates that the Department of Agriculture's GHG emissions are on a decreasing trend to 2019.

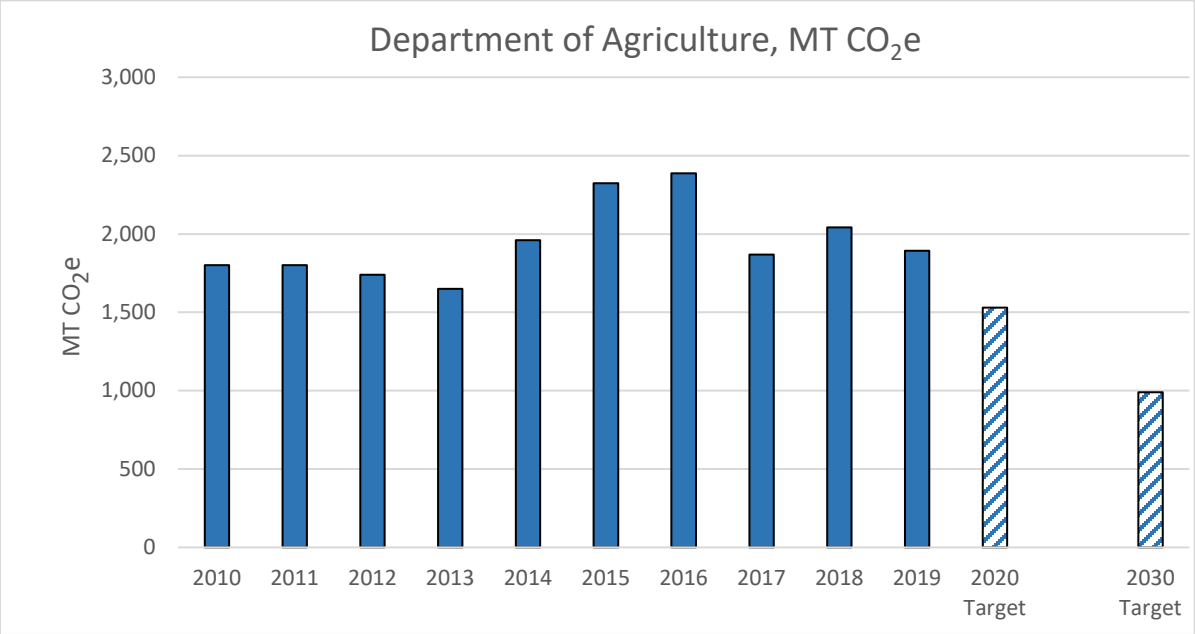

Figure A1. Department of Agriculture Greenhouse Gas Emissions Profile

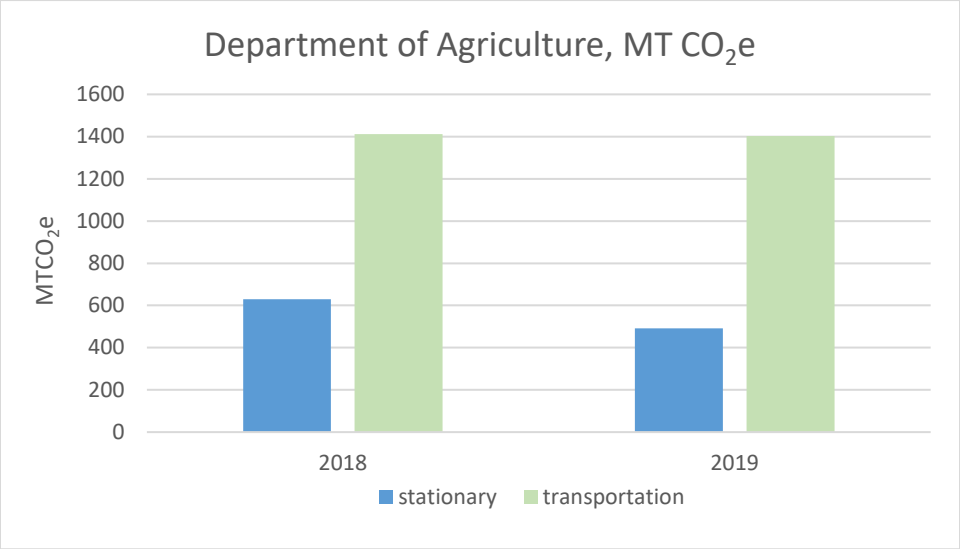

Figure A2. Department of Agriculture GHG sources: Stationary and Transportation
Total greenhouse gas emissions for this agency are relatively low, yet reduction opportunities may exist in transportation sources.

Agency GHG Mitigation Actions

During calendar years 2018 and 2019, the Department of Agriculture (WSDA) worked with the Department of Enterprise Services to have a dual-head electric vehicle charging station and 5 electric vehicle charging stations installed at the Tumwater facility.

WSDA also closed four facilities, relocating staff to their homes, saving energy and operating costs, and reducing emissions. WSDA also actively promoted Commute Trip Reduction and alternative commuting.

WSDA also worked with Department of Labor and Industries to start plans for a new lab facility that will be Zero Energy or Zero Energy-Capable.

Central Washington University

Figure A3 suggests a consistent greenhouse gas emissions pattern for Central Washington University. Universities usually experience operational growth changes that challenges meeting targets.

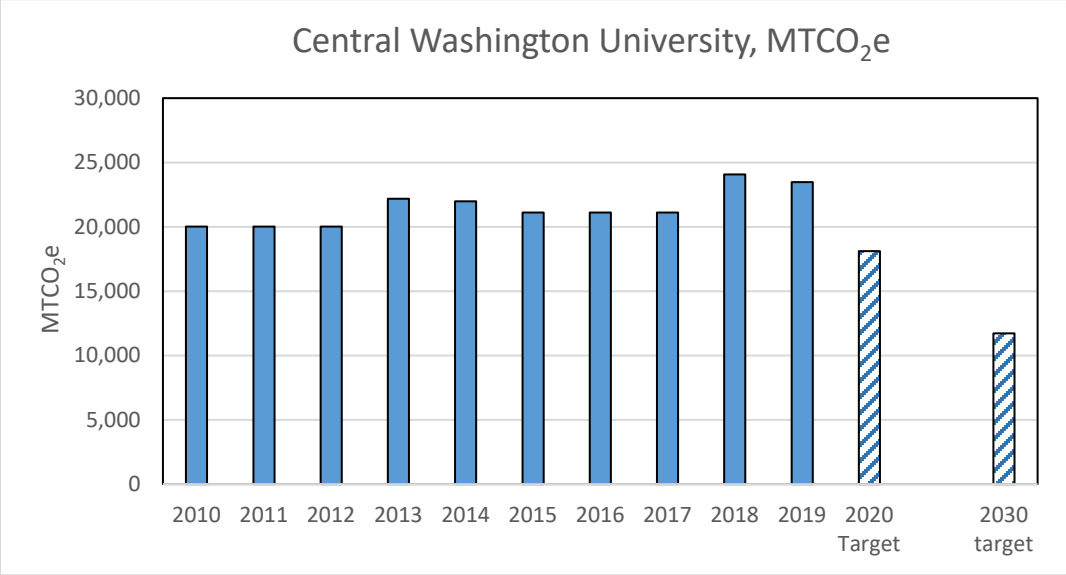

Figure A3. Central Washington University Greenhouse Gas Emissions Profile

As indicated in Figure A4, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

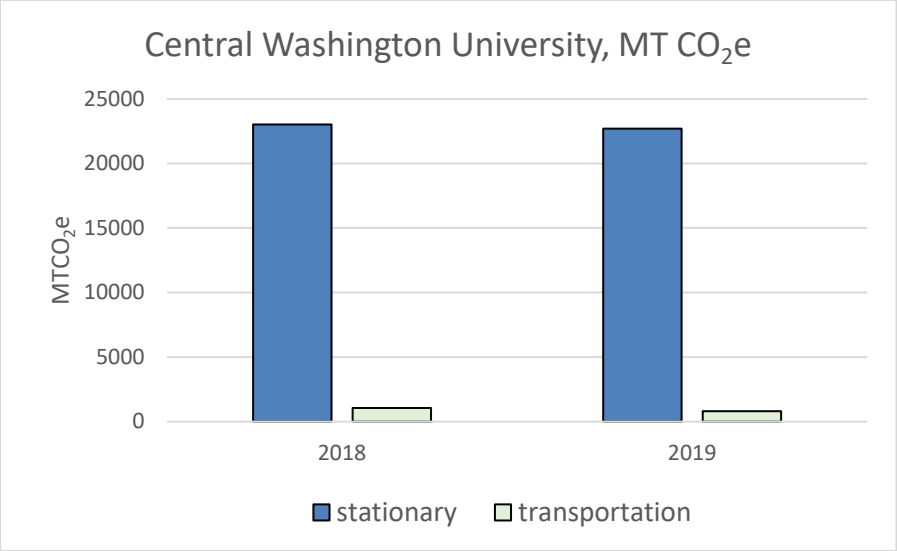

Figure A4. Central Washington University GHG Sources: Stationary and Transportation

Agency GHG Mitigation Actions

Central Washington University (CWU) is committed to reducing GHG emissions in line with the reduction targets specified in RCW 70A.45.050. In order to meet these goals, CWU undertook a series of mitigation activities during calendar years 2018 and 2019 and has mitigation activities planned for the next fiscal biennium to accelerate our efforts.

CWU's primary Scope 1 & 2 GHG contributors are stationary combustion (62.42%) and purchased electricity (32.57%). CWU added new boilers and LED fixtures to several locations around campus to increase efficiency and identified leaks to reduce energy loss. Additionally, GHG emissions reductions were embedded into CWU's institutional priorities and operations to a greater extent than ever before.

To meet future emissions reduction targets, CWU will continue to: identify upgrades and retrofits of campus buildings to conserve energy and improve efficiency of operations, introduce campus energy conservation outreach and education campaigns, and seek funding to upgrade the central heating and cooling plant to a low-carbon technology.

Community Colleges of Spokane

Figure A5 indicates that greenhouse gas emissions are decreasing at the Community Colleges of Spokane.

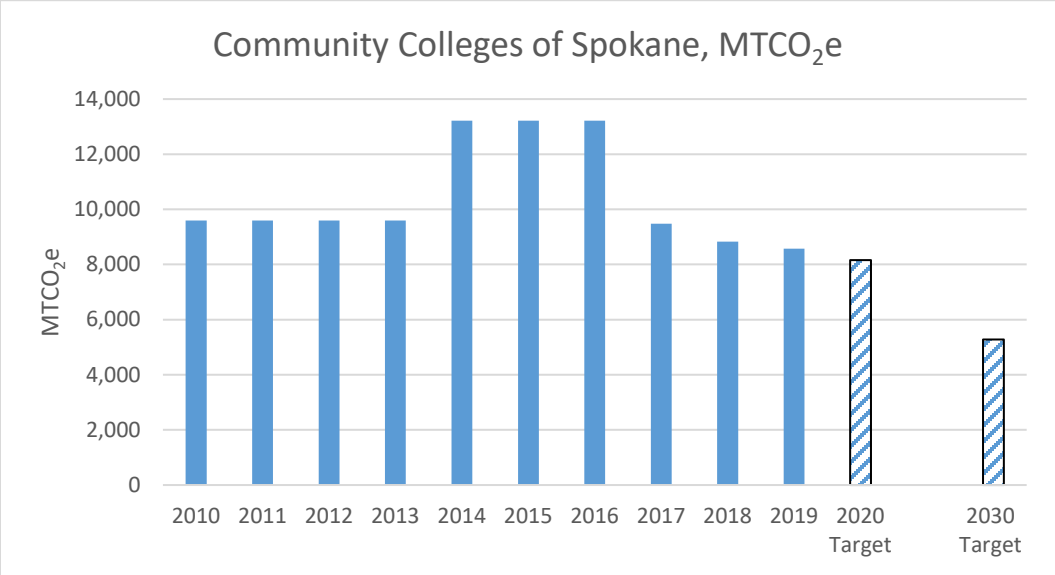

Figure A5. Community Colleges of Spokane Greenhouse Gas Emissions profile

As indicated below in Figure A6, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

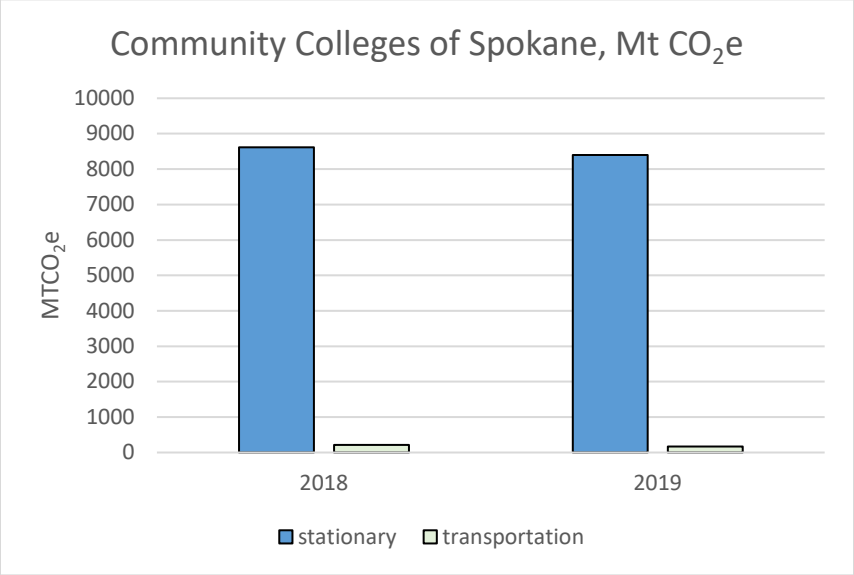

Figure A6. Community Colleges of Spokane GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

The Community Colleges of Spokane (CCS) has taken an active approach in resource conservation, greenhouse gas emissions, and strategic resource management planning. CCS has comprehensively mitigated greenhouse gas emissions by participating in the Avista Solar Select program, replacing and retrofitting aging HVAC units, and retrofitting large portions of campus to light emitting diode (LED) lighting, to name a few examples.

Further, the organization has developed a district-wide computer power management scheme to reduce the electrical demand of computers not in use. CCS hopes to achieve more mitigation projects in the near and long term futures, with the understanding that unknown funding and budgetary considerations due to COVID-19 will have a direct and consequential impact in realizing the completions of these projects.

Finally, our most recently completed building, the gymnasium at Spokane Falls Campus (completed in 2019), is LEED certified with the silver designation, demonstrating our commitment to reducing both resources and greenhouse gas emissions.

Corrections, Department of

Figure A7 indicates that the Department of Corrections greenhouse gas emissions are below their 2020 target and are well on their way towards the 2030 target.

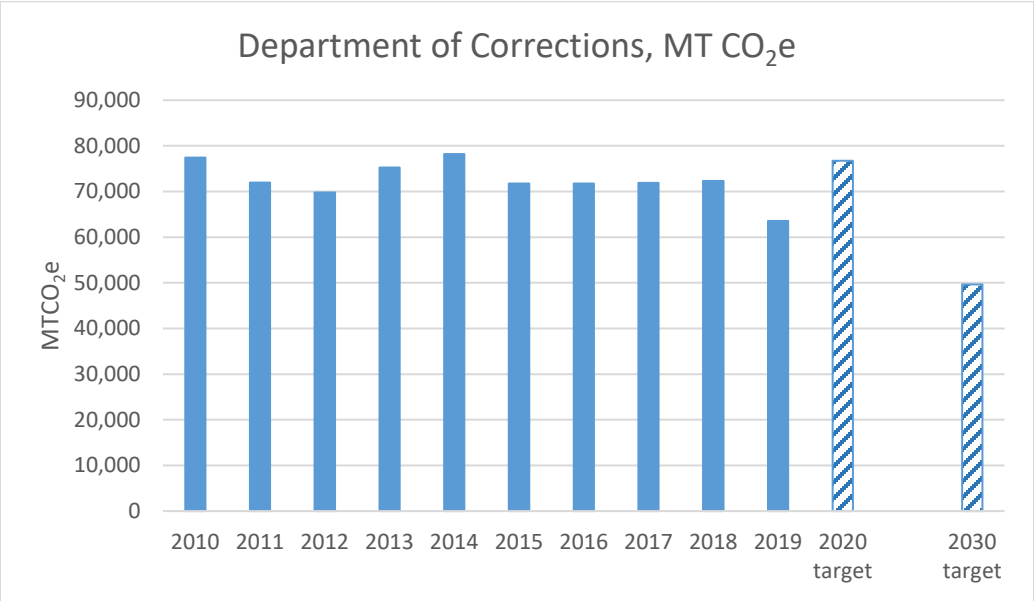

Figure A7. Department of Corrections Greenhouse Gas Emissions profile

As indicated in Figure A8, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation emissions.

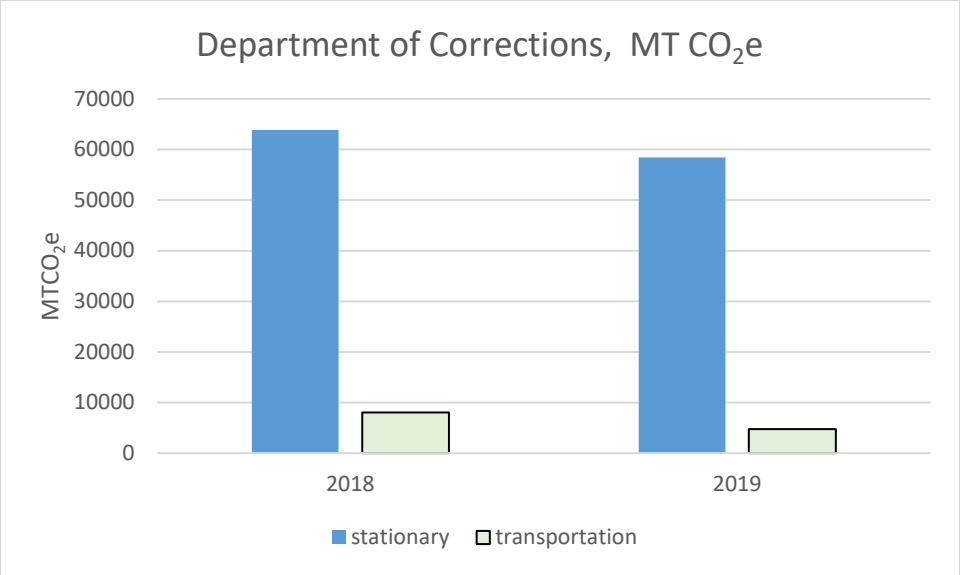

Figure A8. Department of Corrections GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

During the 2018-2019 reporting period, the Department of Corrections (DOC):

- Identified the Carbon Reduction Investment Budget[9] (CRIB) for the agency and committed to it in the Capital Planning and Development 10 Year Plan.
- Engaged in agency-wide coordination of GHG mitigations, measures, and planning efforts resulting in inter-divisional actions to identify challenges, opportunities, and solutions. For example:
    - Capital Planning and Development working together with Business Services on adoption of new software systems that will assist in GHG reporting.
    - Capital Planning and Development worked with the IT division to create and map an implementation strategy of enterprise wide Building Automation System (BAS) upgrades at all facilities.
    - Capital Planning and Development worked with the Prisons Division to test and adopt behavioral, equipment and standard changes that result in reduced energy consumption and GHG emissions.

DOC completed several facility projects including LED lighting and building automation upgrades, collaborating with Pacific Northwest National Laboratory to complete in-depth energy audits at the Washington State Penitentiary and Monroe Correctional Complex,

[9] CRIB is a program administered by SEEP to meet the requirement in Executive Order 20-01 that "Each year, each covered agency's reported GHG emissions shall be multiplied by an appropriate cost of carbon to calculate that agency's emissions-reduction and efficiency investment target. In each fiscal year, covered agencies shall 1) identify a portfolio of cost-effective investments (such as acquiring EVs, chargers, high-efficiency equipment, building retrofits) equal to or exceeding their target; and 2) either make those investments or commit to them for future years."

resulting in a statewide energy plan and targeted plans for energy conservation projects. DOC also invested in an asset planning software tool that incorporates sustainability and energy data collection that will help track, analyze, and report on costs and opportunities for facility maintenance and energy projects.

Ecology, Department of

Figure A9 indicates that the Department of Ecology greenhouse gas emissions are below their 2020 target.

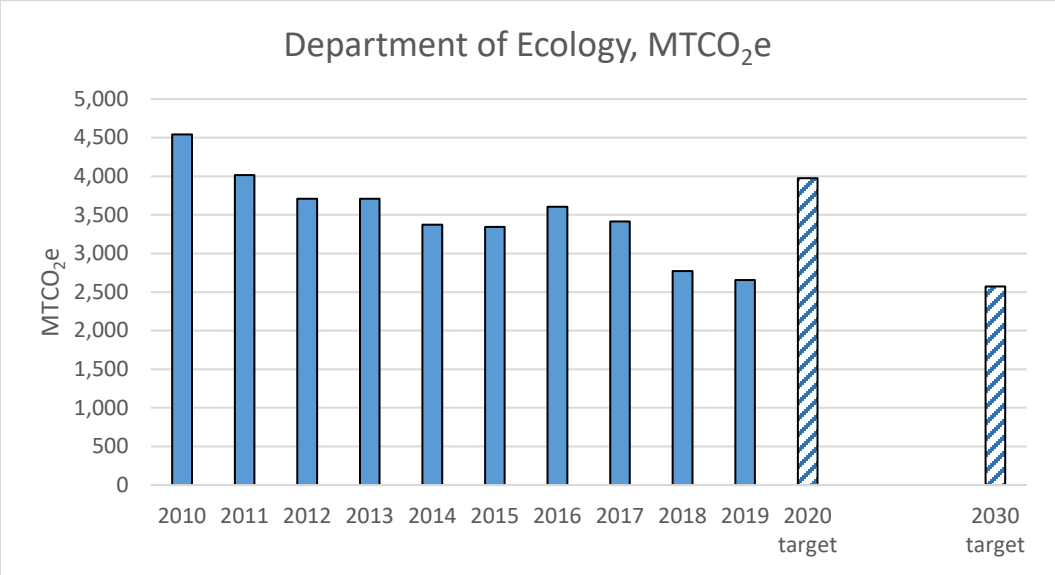

Figure A9. Department of Ecology Greenhouse Gas Emissions profile

As indicated in Figure A10, for the Department of Ecology, both stationary and transportation are important greenhouse gas emissions sources.

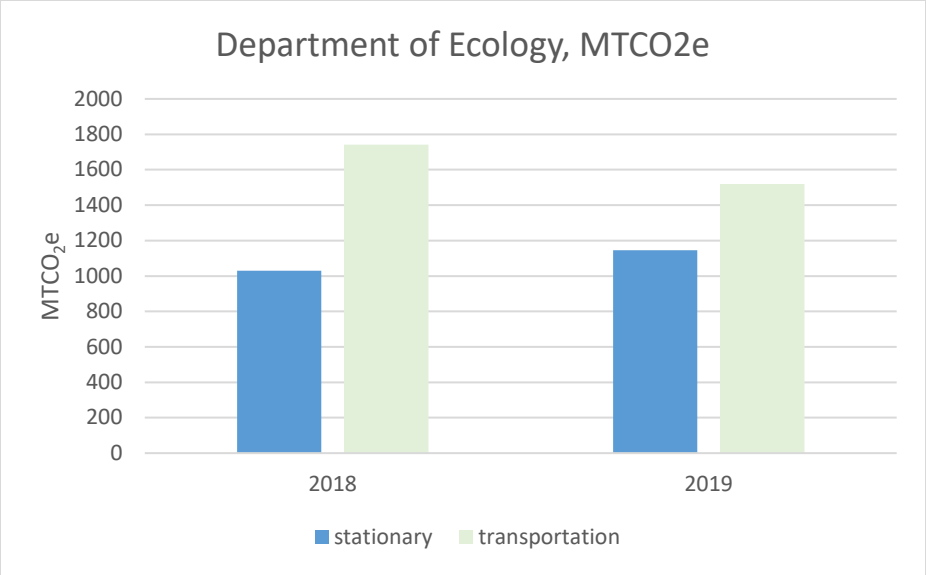

Figure A10. Department of Ecology GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions

During the 2018-2019 reporting period, Ecology completed a major LED lighting replacement project, managed by McKinstry, at the Lacey Headquarters facility. The project included two energy reduction measures:

1. Replacement of approximately 3360 Fluorescent and Incandescent light fixtures with LED fixtures
2. Replacement of approximately 262 Variable Air Volume box fan motors, capacitors and speed control devices with new more energy efficient models.

Ecology added EVs to the agency fleet, including eight EV charging stations at the Lacey Headquarters facility, two charging stations at the Richland Field Office, and one at the Vancouver Field Office.

Ecology committed to green electricity purchases through Avista Solar Select and PSE Green Direct.

Enterprise Services, Department of

Figure A11, indicates that the Department of Enterprise Services greenhouse gas emissions are below their 2020 target.

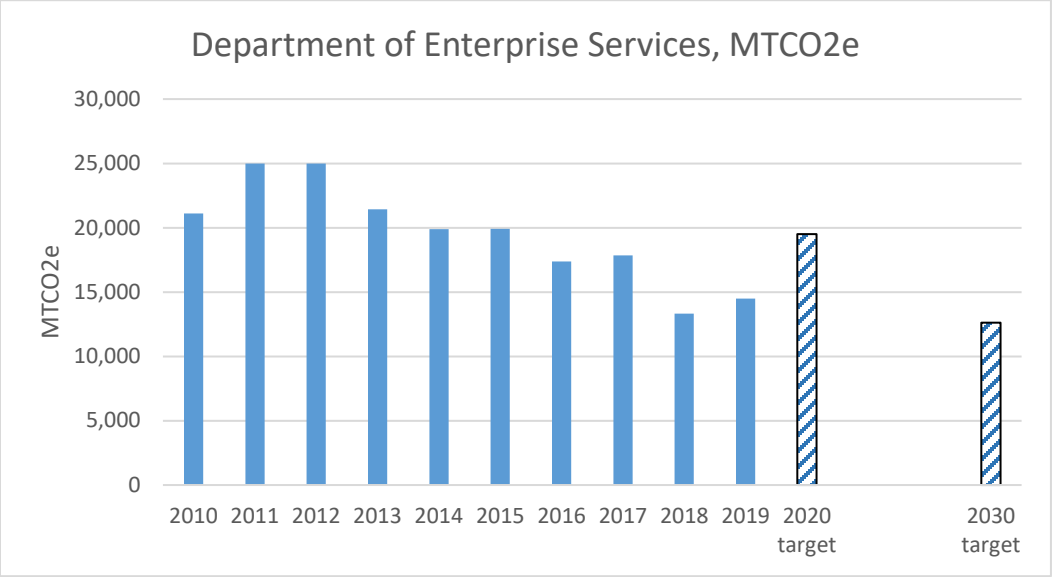

Figure A11. Department of Enterprise Services Greenhouse Gas Emissions profile

As indicated in Figure A12, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

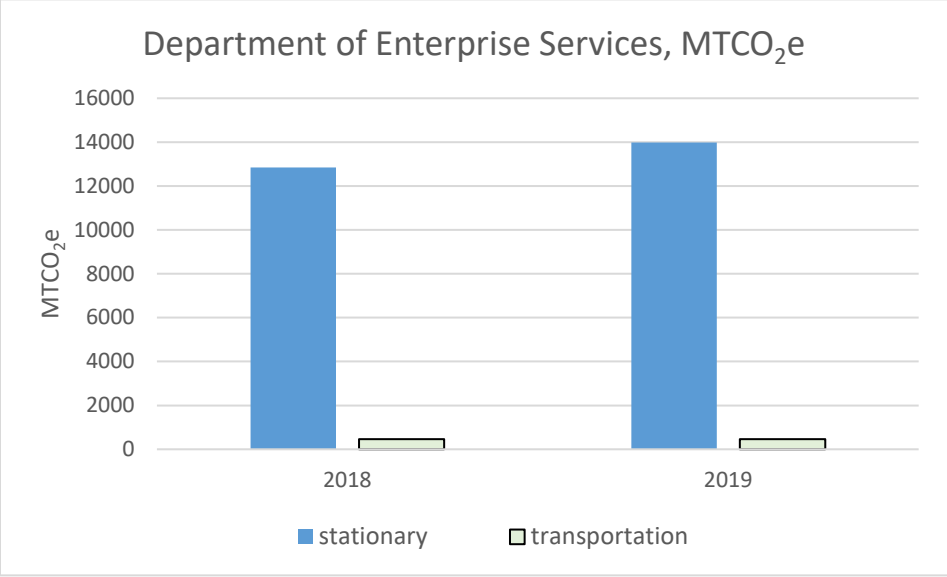

Figure A12. Department of Enterprise Services GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions

The Department of Enterprise Services (DES) has a 30-year history of making smart investments in energy efficiency and GHG emissions reductions.

Since 2006 DES has reduced its energy consumption in its facilities by over 40%. In 2018 DES met its 2050 GHG targets. The new targets established under ESHB 2311 raised the bar. Even with these more aggressive emission targets, DES has still managed to meet the 2030 GHG targets.

DES continues to support the Resource Conservation Management program to find operational savings, and uses Energy Savings Performance Contracting to invest in energy efficiency projects. DES has installed 340kW of solar photovoltaic arrays.

In 2019 DES completed the pre-design for a new high-efficiency central plant to heat and cool Capitol Campus buildings, the Next Century Capitol Campus (NC3). The NC3 project replaces the 100-year-old steam plant. Putting the Capitol Campus on the path to meet its statutory requirements for lowering the cost of government and reducing GHG emissions.

During the 2018-2019 reporting period, DES completed several facility projects including LED retrofits, whole building retrofits, installed a 170 kW solar photovoltaic system, provided leadership on fleet electrification (bringing total state agency EVs to more than 126 vehicles that have traveled more than 1.2 million miles!), and participated in PSE's Green Direct program. DES is also pursuing Zero Energy or Zero Energy-Capable for all facility pre-design projects.

Eastern Washington University

Figure A13 indicates that Eastern Washington's greenhouse gas emissions have decreased since 2017.

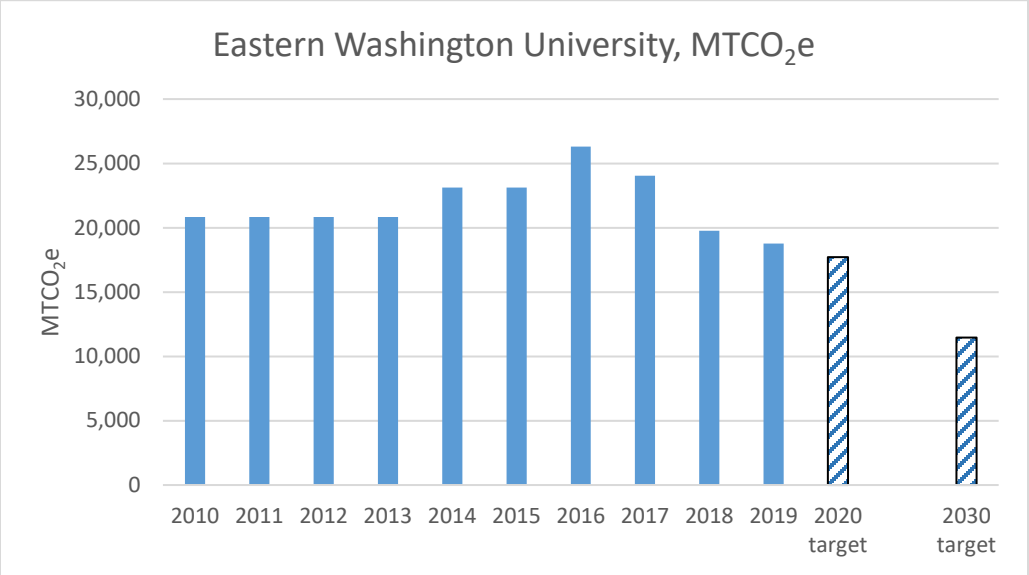

Figure A13. Eastern Washington University Greenhouse Gas Emissions profile

As indicated in Figure A14, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

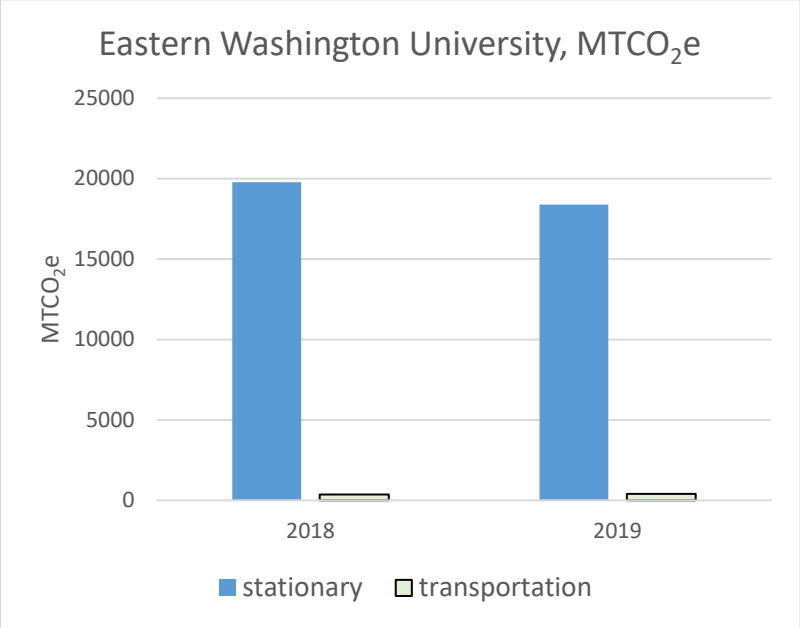

Figure A14. Eastern Washington University GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

- Retired some older, less efficient vehicles from fleet. Added hybrid vehicle for commuting to meetings off campus.
- Modernized central chillers to increase capacity while simultaneously reducing energy usage.
- Ongoing LED retrofitting across campus to reduce energy usage for lighting.
- Installed building sub-metering and software systems to track electricity, heating, cooling, water usage, and wastewater output to study ways to reduce building resource demands.
- Upgraded energy management systems in Sutton Hall and Science Building to reduce building energy use.
- Energy management systems/software upgrade to reduce campus energy use.

Fish and Wildlife, Department of

Figure A15 indicates that the Department of Fish and Wildlife greenhouse gas emissions will meet their 2020 reduction target.

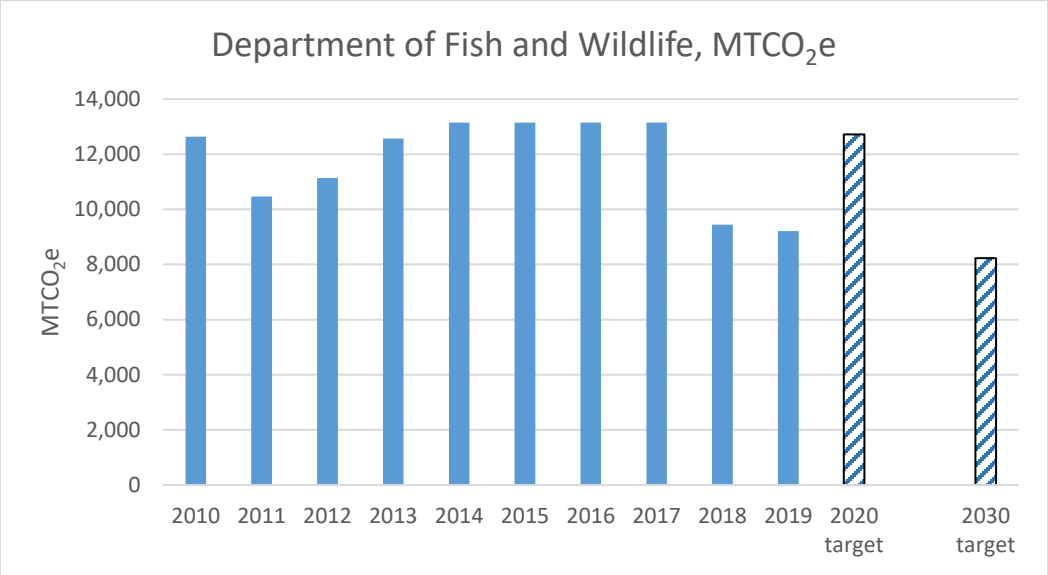

Figure A15. Department of Fish and Wildlife Greenhouse Gas Emissions profile

As indicated in Figure A16, most greenhouse gas emissions are from stationary sources as compared to transportation.

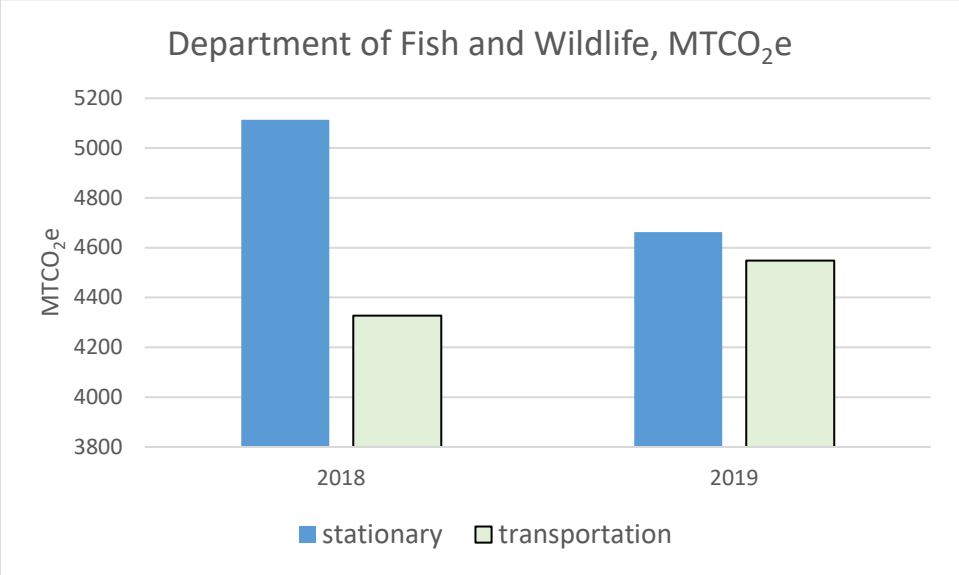

Figure A16. Department of Fish and Wildlife GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

During the 2018-2019 reporting period, the Department of Fish and Wildlife added some electric vehicles (EVs) to the agency fleet, installed LED lighting fixtures, and updated telework policies to reduce drive-alone commute miles. DFW continues to evaluate opportunities to allow more telework and reduce the agency's footprint.

Health, Department of

Figure A17 indicates that the Department of Health greenhouse gas emissions are below their 2020 target.

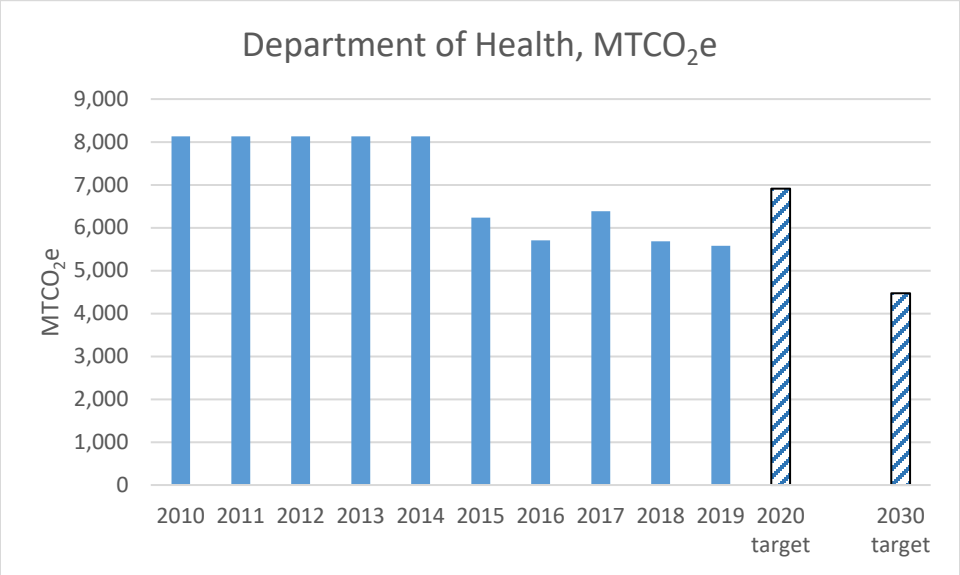

Figure A17: Department of Health Greenhouse Gas Emissions profile

As indicated in Figure A18, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

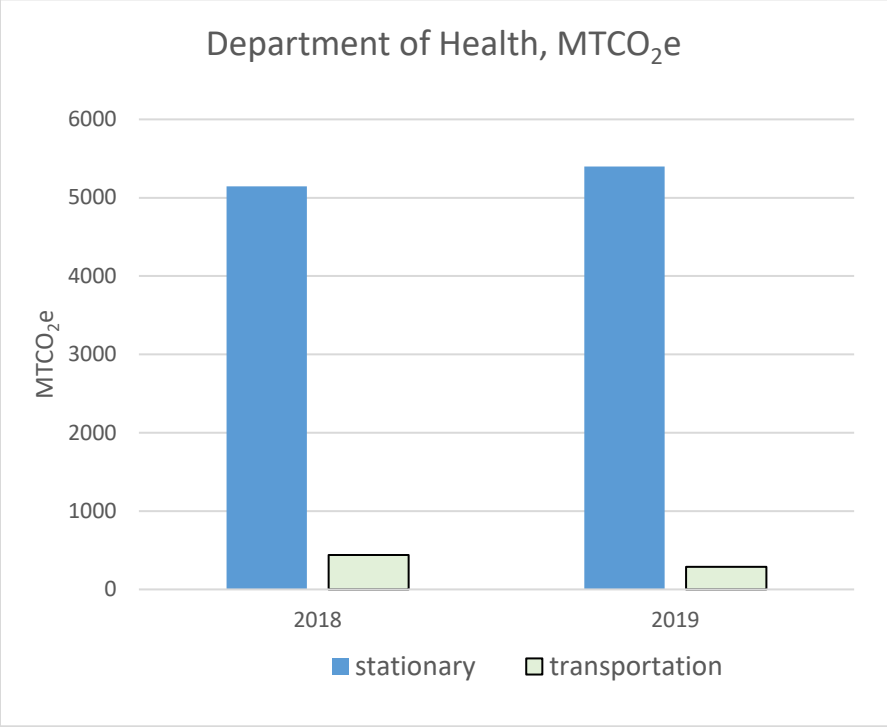

Figure A18. Department of Health GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

The Department of Health considers the environmental impact of the entire agency in many ways. DOH is always on the lookout for ways to reduce the physical space we occupy by encouraging telework, maximizing our space use through workplace modernization, and relinquishing leases where necessary to eliminate underutilized space. When DOH selects furnishings and finishes, preference is given to items with either a high recycled content or other positive environmental impact.

DOH strives to keep buildings as efficient as possible. We have updated our HVAC system, replaced lighting with LEDs with motion sensors, and sealed the windows and bricks. On hot days we lower all window shades to maximize cooling.

DOH strives to use our fleet efficiently which helps to increase the longevity of each vehicle and we give preference to hybrid or electric vehicles. DOH offers preferred parking to employees that carpool and continues to support CTR and incentives.

Our used office supply program allows employees the option of choosing previously used items instead of ordering new. Preference is given to recycled/reduced/reused office supplies.

During the 2018-2019 reporting period DOH completed several facility projects including LED lighting upgrades, replacing equipment and appliances with newer and more efficient models, and building envelope upgrades. DOH also reduced fuel use by improving vehicle utilization, encouraged telework and CTR, and committed to green electricity purchases through the PSE Green Direct program.

Labor and Industries, Department of

Figure A19 indicates that the Department of Labor and Industries greenhouse gas emissions have decreased in 2019 to below the 2020 target.

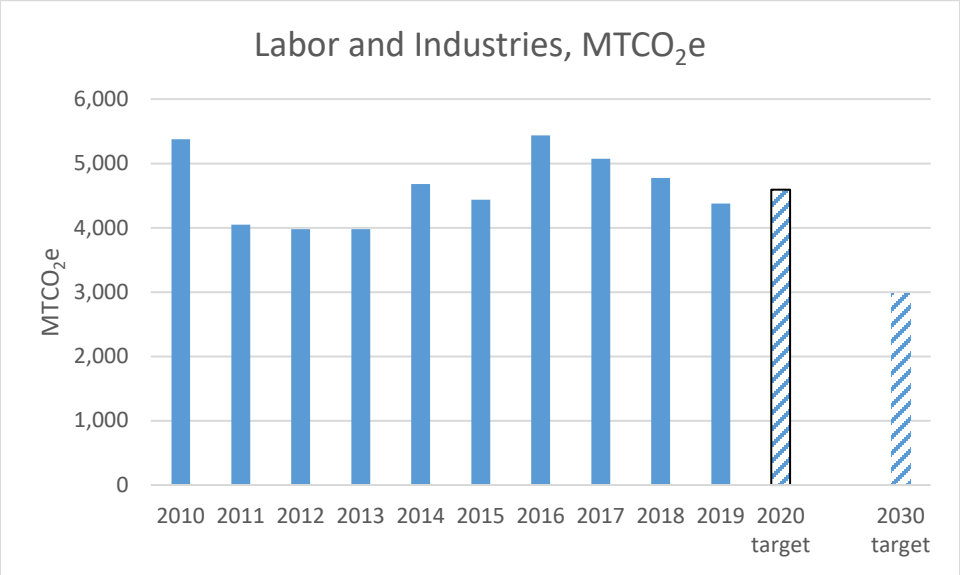

Figure A19. Department of Labor and Industries Greenhouse Gas Emissions profile

The data in figure A20 indicate that transportation is the most significant source of emissions in this agency.

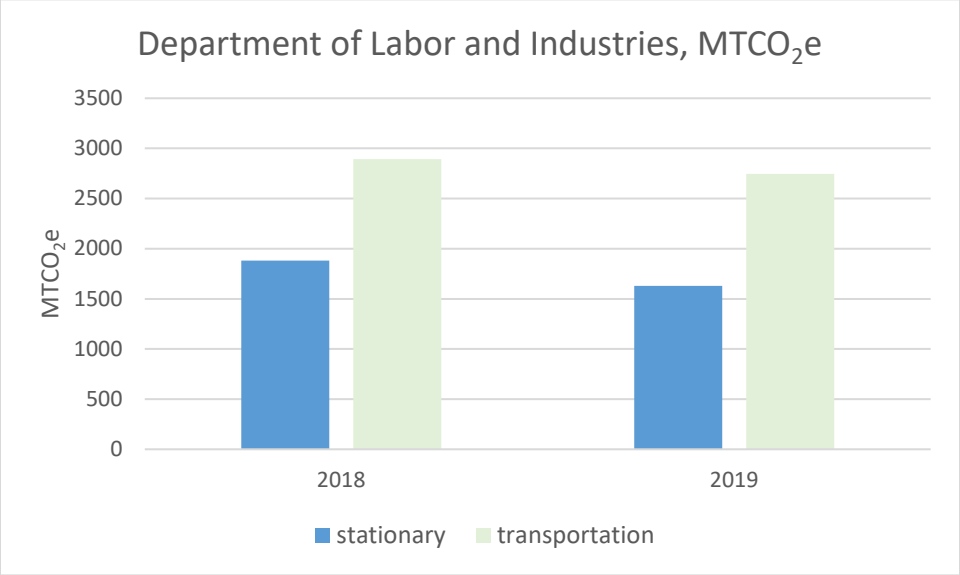

Figure A20. Department of Labor and Industries GHG sources: Stationary and Transportation Agency GHG Mitigation Actions.

The Department of Labor and Industries Headquarters building in Tumwater was designed and built in 1992 with energy efficiency in mind. It won the nationwide Energy User News Efficient Building Award presented by Johnson controls in 1994. LNI is also registered with the Olympic Region Clean Air Agency.

During the 2018-19 reporting period, LNI has continued working with the DES Energy Program and University Mechanical Corporation on an Investment Grade Audit (IGA) to replace many of the infrastructure components with energy efficient equipment in the Tumwater headquarters building.

Phase 1 of this project includes:

- Natural gas fired boilers replaced with heat pumps building chillers
- Domestic water pumps
- LED lighting pilot

These improvements are currently underway with a target completion of October 2020. LNI has a guaranteed expected savings of approximately 51,000 kW/year as well as over 20,000 therms. In addition, LNI is also ensuring setback temperatures are followed. They have replaced the building NAE controllers to allow for better efficiency and control, and is planning on additional phases of energy projects in the next biennium including upgrading or replacing current air handler equipment with energy efficient equipment as well as introducing renewable energy such as solar arrays on the roof and parking lots. The ultimate goal is to make upgrades that allow the Tumwater headquarters facility to achieve Zero Energy performance.

LNI has completed other facility projects to reduce emissions, including consulting with the DES RCM program, changing occupant behavior, and install more efficient appliances. LNI added additional EVs to the agency fleet, conducted employee training, and planned for future improvements including a new DOSH laboratory facility that is expected to meet Zero Energy or Zero Energy Capable standards.

Liquor and Cannabis Board

Figure A21 indicates significant greenhouse gas profile changes.

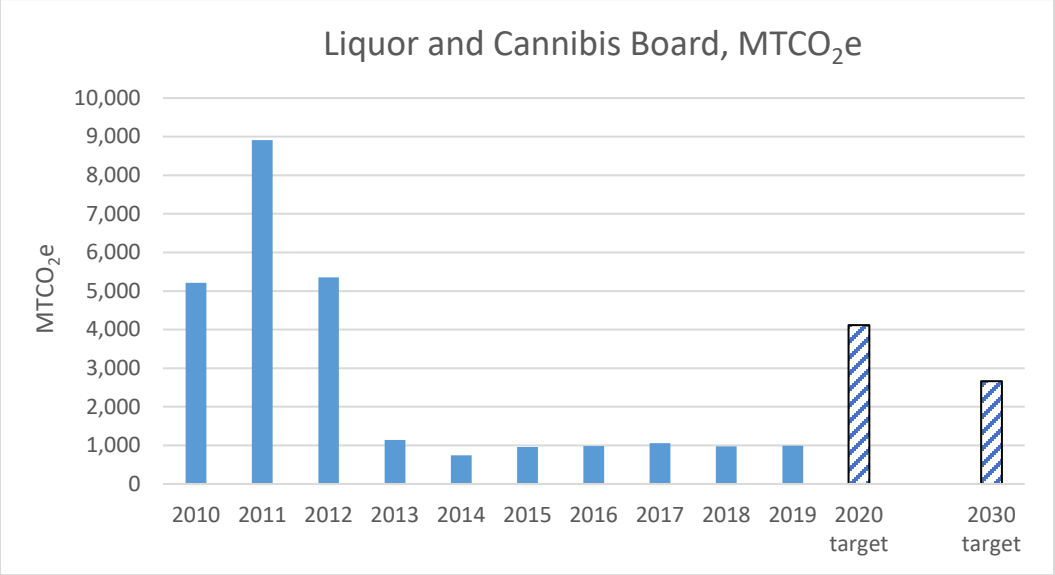

Figure A21. Liquor and Cannabis Board Greenhouse Gas Emissions profile

The data in figure A22 suggest a slight increase in transportation greenhouse gas emissions from 2018 to 2019

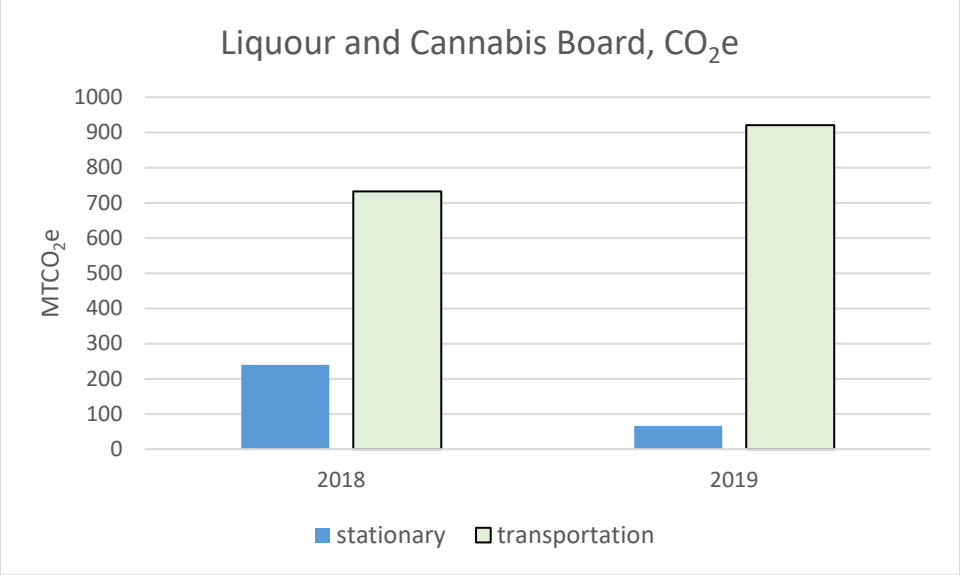

Figure A22. Liquor and Cannabis Board GHG Sources: Stationary and Transportation

Agency GHG Mitigation Actions.

During the 2018-2019 reporting period, LCB took several steps to reduce GHG emissions.

The lease on the LCB Headquarters facility in Olympia expired in March 2019. LCB worked with DES to secure a new building by July 2019. Proposals were requested at multiple levels meeting the minimum Leased Space Requirements, and the rate for meeting the current Washington State Energy Code, to assess the additional investment required to increase the energy efficiency of the building. A major component of this process was to reduce the agency's footprint and combine the Lacey Enforcement office into the new headquarters building. This resulted in an overall decrease of 5,000 square feet in the agency's footprint.

DES negotiated on behalf of LCB with Vine Street Properties for a new agency headquarters building in Olympia. During those negotiations, the agency stressed the need for an energy efficient building and the leasing company agreed to work with the agency to design the new facility. These requests are in line with the Modern Workplace Guidelines used by the state. The new facility was located in a preexisting building that required extensive remodel to meet LCB's needs. The top-to-bottom remodel allows the leasing company, with agency input, to select the most technologically efficient HVAC and interior lighting systems available. In addition, all the windows in the 5-story building were replaced with high efficiency UV reflective glass, which aids in lowering cooling costs during the hot months while adding enhanced natural light to the workspaces. Electric vehicle charging ports were installed to promote the use of electric vehicles by staff.

LCB also participated actively with SEEP and committed to CRIB investments at the headquarters facility over the next ten years. LCB incorporates supports telework and actively promotes CTR. LCB also incorporates emissions reductions in new employee training and orientations, monitors progress and reports results internally on a quarterly basis, and is transitioning to electronic records to reduce the space needed to store paper files and reduce printing.

Natural Resources, Department of

Figure A23 indicates that the 2020 greenhouse gas emissions target for the Department of Natural Resources may be a challenge.

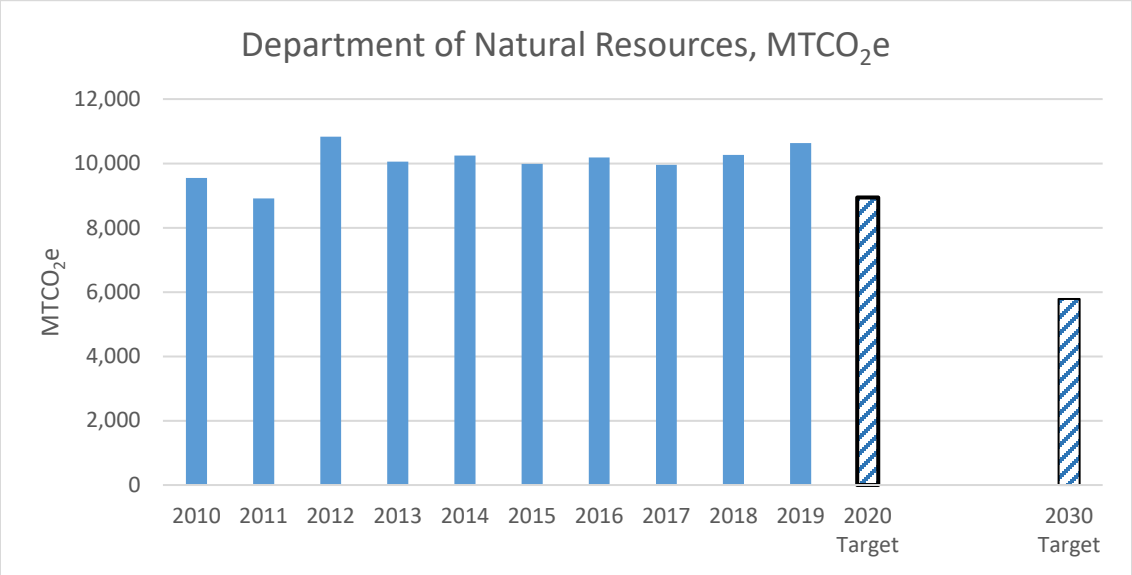

Figure A23. Department of Natural Resources Greenhouse Gas Emissions profile

As indicated in Figure A24, transportation is the most significant source of greenhouse gas emissions as compared to stationary sources.

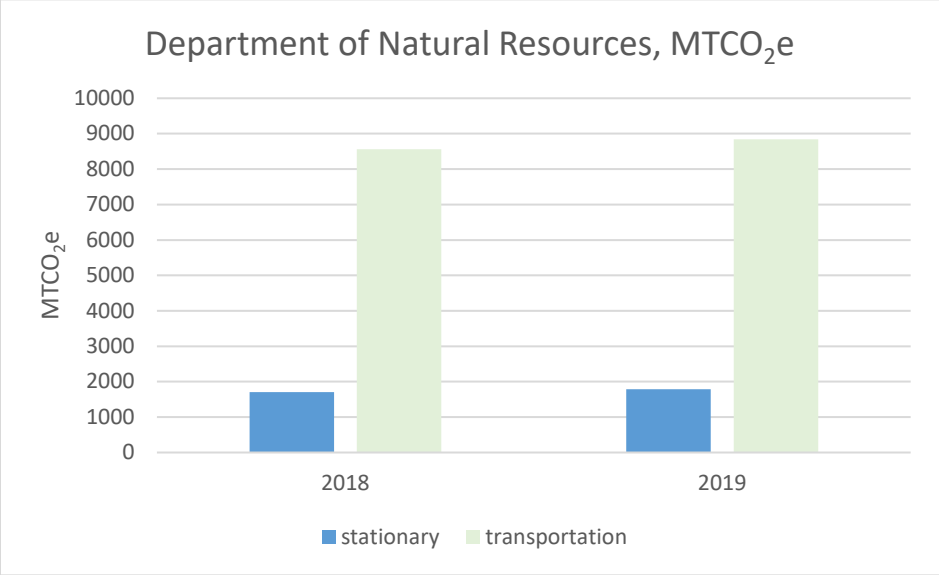

Figure A24. Department of Natural Resources GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

Emissions mitigation activities conducted by the Washington Department of Natural Resources (DNR) in the calendar years 2018 and 2019 focused on reducing GHG emissions related to the agency's facilities and fleet.

The facilities team collaborated with pre-qualified Energy Services Companies (ESCOs) to conduct numerous projects on existing work centers and headquarters buildings to reduce energy consumption. These projects include but are not limited to upgrades to LED lighting, HVAC controls, and utilities. Employees were encouraged to reduce personal energy consumption by identifying behaviors that caused unnecessary power usage (opening windows, leaving personal heaters on) and carpooling was promoted when safe.

DNR Fleet services added fully electric sedans to the fleet along with fuel efficient fire trucks. EV chargers are installed at facilities across the state and was made available for DNR fleet and personal vehicles belonging to staff. An ongoing effort is in place to replace fleet vehicles with fuel efficient models and to purchase biodiesel from WSDOT refueling stations when operationally efficient to do so.

Moving forward, DNR's internal GHG Reductions Task Force is focused on developing a strategy to reduce the agency's GHG footprint to meet the 2030 goal and long range planning for mitigation activities to meet the carbon neutral goal (2050).

Seattle Colleges

Figure A25 indicates that Seattle Colleges have met their 2020 and 2030 GHG reduction targets.

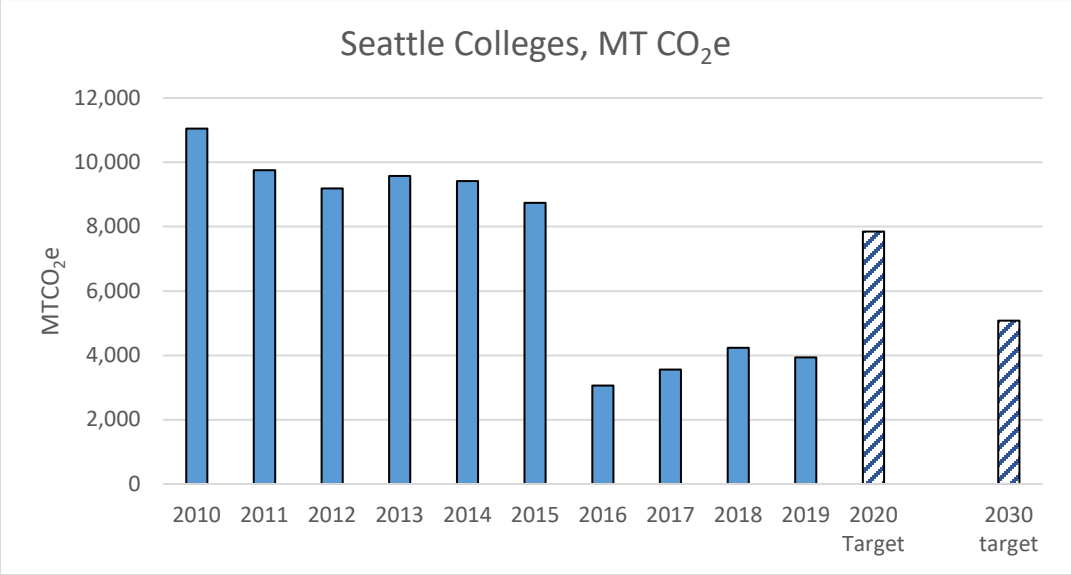

Figure A25. Seattle Colleges Greenhouse Gas Emissions profile

As indicated in Figure A26, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation. Seattle Community College are significantly below their 2020 GHG emissions target.

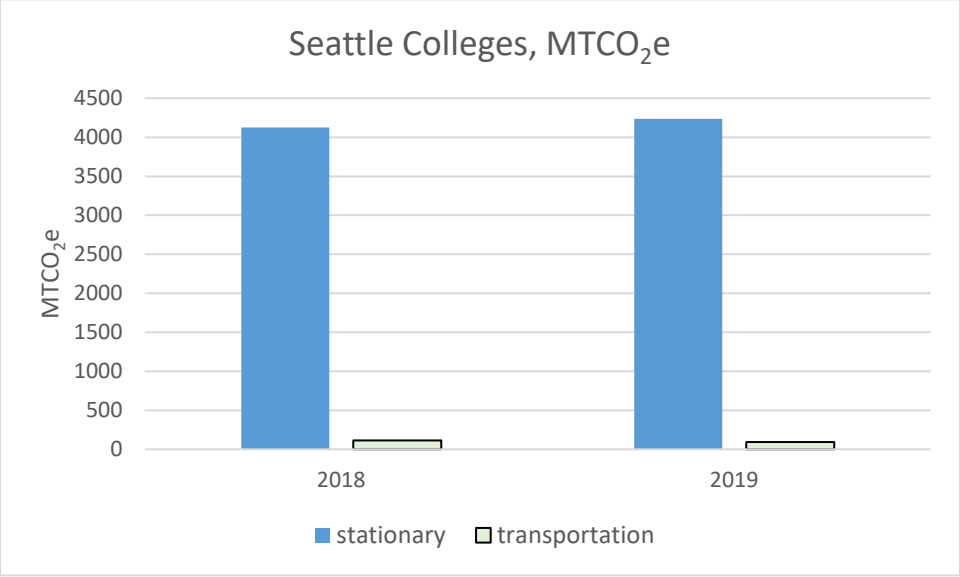

Figure A26. Seattle Colleges GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions

During the 2018-2019 reporting period Seattle Central completed a significant Energy Services Company (ESCO) project with McKinstry, which focused on LED lighting upgrades, a new photovoltaic solar system, and other energy efficiency upgrades. This is on the heels of other significant projects at Seattle Central, which included the 2016-2017 installation of a sophisticated energy management system to monitor utility usage in real-time, and to operate all buildings at maximum efficiency. Many Seattle Colleges buildings also participated in the City of Seattle Tune Up Accelerator program, voluntarily completing mandated Tune Ups early. These Tune Ups require buildings with more than 50,000 square feet of nonresidential space to identify and implement zero to low-investment energy-saving actions related to building operations and maintenance. We also installed 10 new EV charging stations in early 2018 across our district.

In addition to these facilities and EV charging projects, Seattle Colleges started incorporating sustainability and energy efficiency into new employee training and orientation, and is developing a Climate Action Plan to strategize for GHG reduction targets in 2030, 2040, and 2050.

Social and Health Services, Department of

Figure A27 indicates that the Department of Social and Health Services has met their 2020 reduction target.

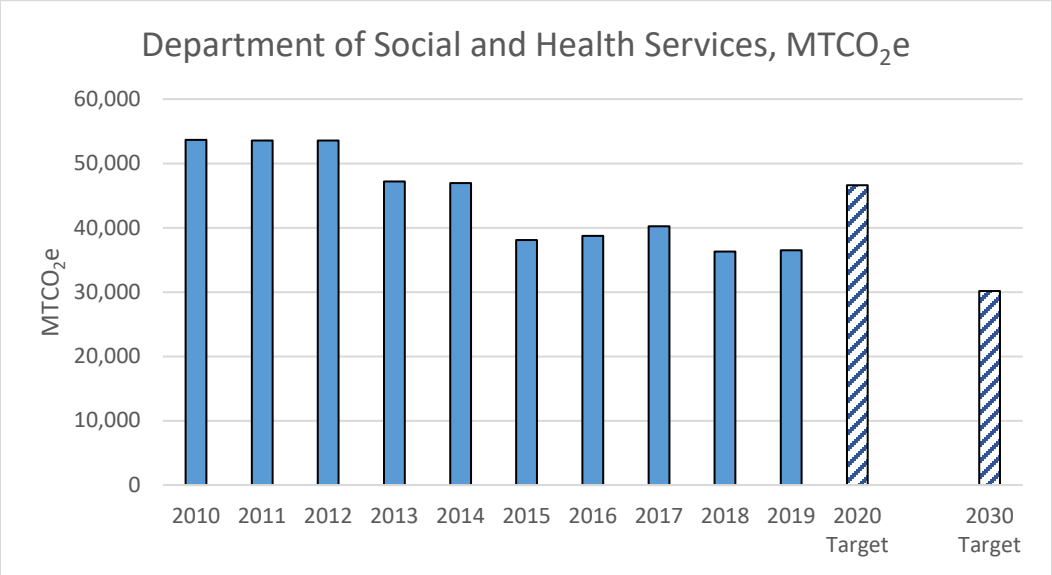

Figure A27. Department of Social and Health Services Greenhouse Gas Emissions profile

As indicated in Figure A28, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation. The Department of Social and Health Services has significantly reduced their greenhouse gas emissions and has already met their 2020 target.

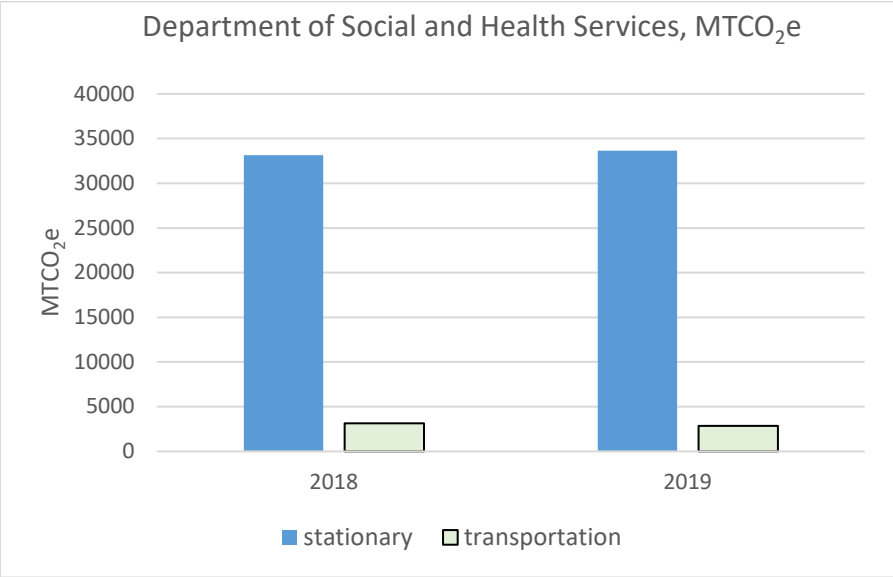

Figure A28. Department of Social and Health Services GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions:

During the 2018-2019 reporting period the Department of Social and Health Services (DSHS) completed several facility projects to support emissions reductions, improve energy efficiency, and add electric vehicle (EV) charging capacity:

- Installed 36 EV charging ports at 12 facilities
- Installed infrastructure for EV chargers at 3 facilities
- Light Emitting Diodes (LED) upgrades at 19 facilities representing 546,970 square feet
- Installed solar photovoltaic arrays at two facilities with a capacity of 36,000 kW each
- Added language to the Leased Facilities RFP (request for proposal) that allows DSHS to consider energy efficient features in side-by-side analysis
- Transferred ten campuses with a total of 654,000 square feet to the Department of Children Youth, and Families (DCYF)
- Completed the remodel of Birch Cottage at Green Hill School including the total replacement of the HVAC using a Department of Commerce energy efficiency grant
- Installed a new chiller at Green Hill School selecting an energy efficient unit
- Replaced existing security site lighting fixtures with LED fixtures at Green Hill School
- Installed energy efficient lighting fixtures and HVAC systems in the new Low Stimulation Area expansion at Orcas Cottage at the Child Study and Treatment Center
- Completed the renovation of ten wards at Western State Hospital utilizing energy efficient fixtures and systems where possible

DSHS has also signed up for the Avista Solar Select green energy program for Eastern State Hospital.

Moving forward, DSHS will continue to design for energy efficiency and reduced GHG emissions in capital-funded projects. DSHS is planning to include a solar array with the design of a new boiler plant at Eastern State Hospital, has Energy Services Company (ESCO) projects underway at two campuses, and is moving forward with several zero energy facility projects.

State Parks and Recreation Commission

Figure A29 indicates that State Parks and Recreation Commission has met their 2020 reduction target.

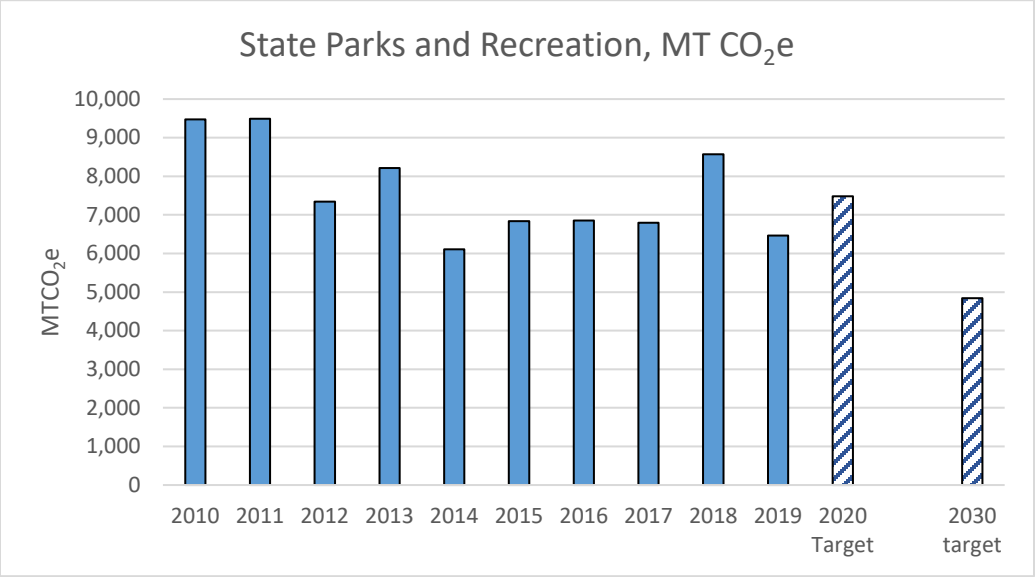

Figure A29. State Parks and Recreation Commission Greenhouse Gas Emissions profile

The data in figure A30 suggest that State Parks and Recreation have already met their 2020 greenhouse gas reduction target and continue to implement mitigation strategies.

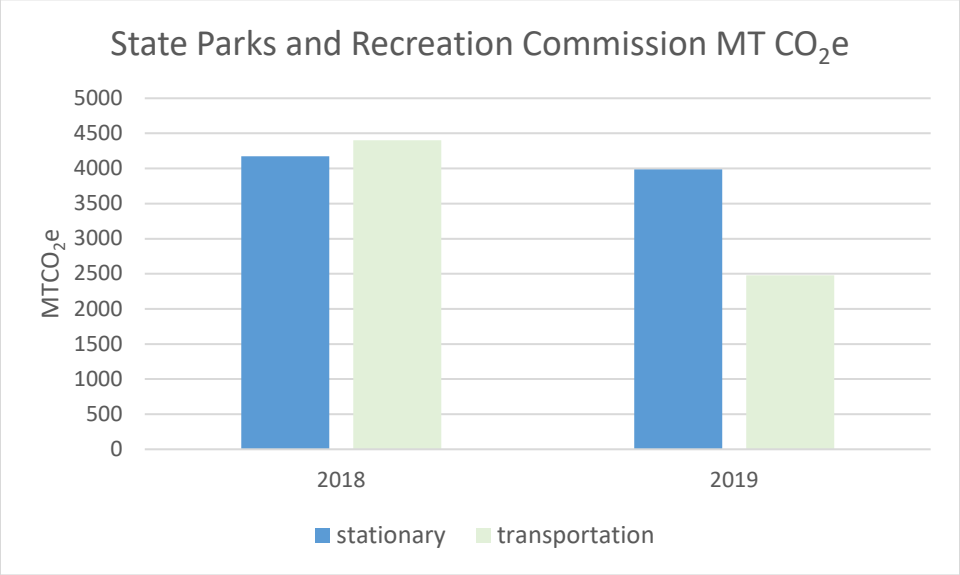

Figure A30. State Park and Recreation Commission GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions

In the 2018-2019 biennium, State Parks continued to make progress on reducing greenhouse gases by making a commitment to integrate green technologies into acquisitions and capital projects and to choose the most environmentally friendly options currently available, whenever possible. State Parks purchased electric and hybrid vehicles for their fleets and have built electric vehicle charging stations at many of their parks. Many of their buildings have been updated to include LED lighting, HVAC upgrades, and solar panels.

Washington State Patrol

Figure A31 indicates that Washington State Patrol has met its 2020 greenhouse gas emissions target.

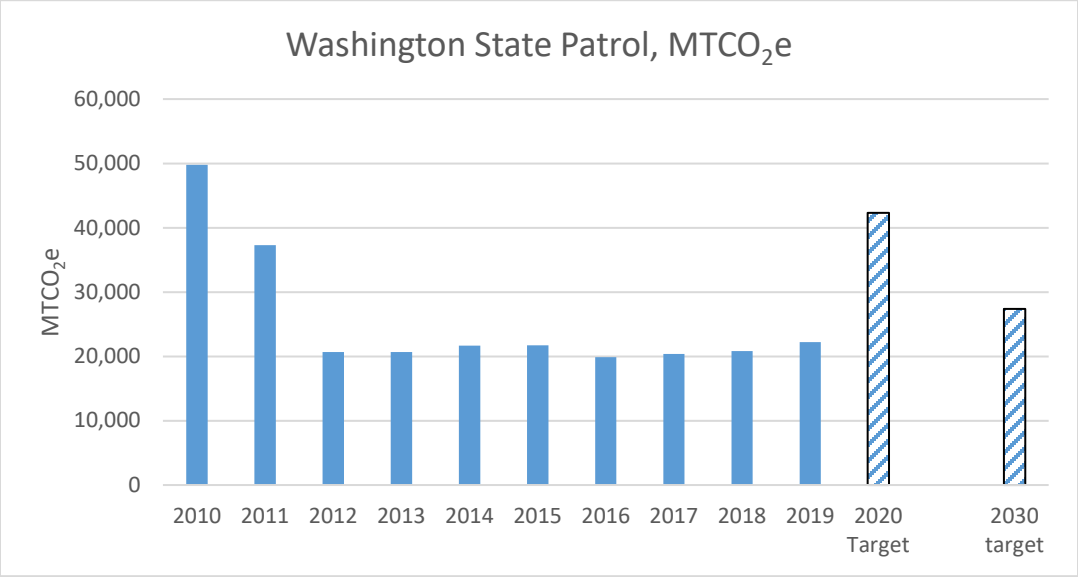

Figure A31. Washington State Patrol Greenhouse Gas Emissions profile

As indicated in Figure A32, transportation is the most significant source of greenhouse gas emissions as compared to stationary sources.

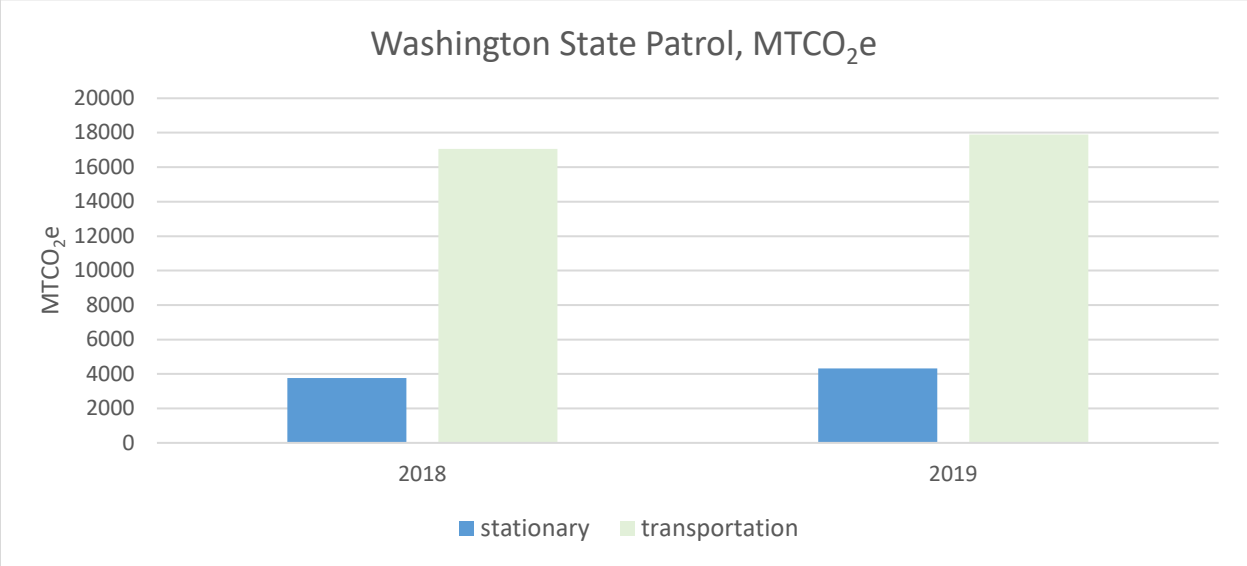

Figure A32. Washington State Patrol GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

WSP is committed in reducing greenhouse gas emissions. During the 2018-2019 reporting period, the agency made efforts in reducing emissions in the following areas:

- HVAC Systems – WSP replaced HVAC systems at four locations. Also, the agency replaced failing systems as well as completed system improvements and upgrades to current HVAC systems in 39 facilities.
- Lighting Improvements and Upgrades – The WSP completed lighting improvements and LED replacement upgrades at 42 WSP facilities.
- Miscellaneous Energy Improvements and Upgrades – The agency made a variety of energy improvements to six of the agency's facilities that included new hot water heaters, freezer compressors, and exhaust fans.

WSP has taken the following steps to reduce emissions from the agency fleet:

- Implemented a tracking system for compiling data on idle hours for patrol cars.
- Worked with agency leadership to reduce or eliminate vehicles idling while troopers are handling administrative tasks in the offices.
- WSP has purchased three Ford Interceptor Hybrid SUV pursuit vehicles.
- WSP acquired a Chevrolet Bolt plug-in electric vehicle, which will be up fitted with emergency equipment and used for parking enforcement on the Capitol Campus.
- WSP has made a decision that except for troopers assigned to traffic law enforcement or commercial truck enforcement, all future pursuit vehicles will be hybrid models. This includes ranks of sergeants and above, vessel and terminal security (VATS) troopers, Capital Campus troopers, and various non-field force divisions.

The Evergreen State College

Figure A33 indicates that The Evergreen State College has met its greenhouse gas emissions target.

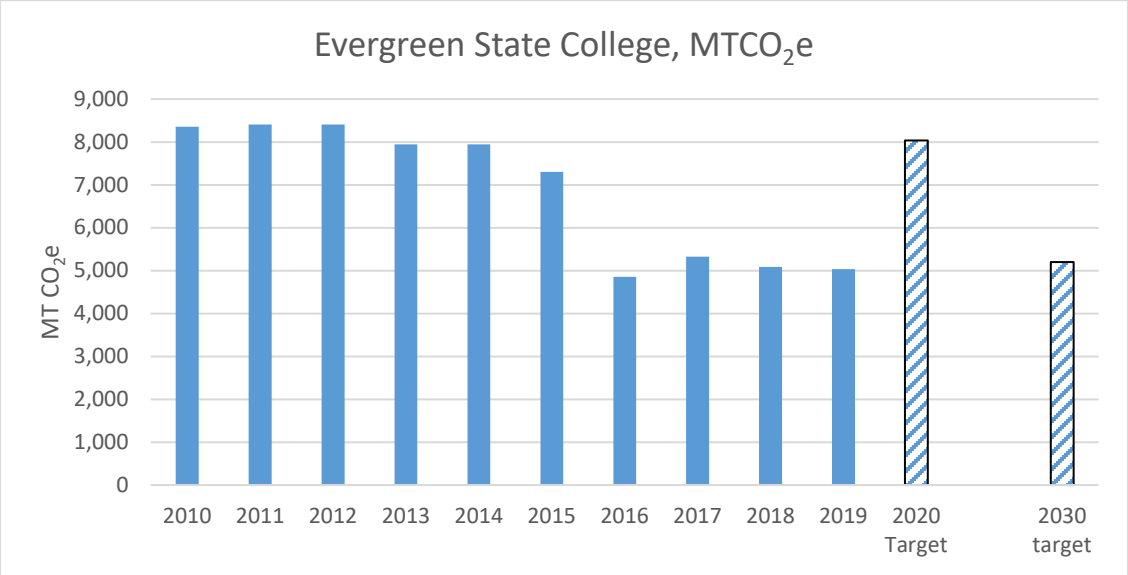

Figure A33. The Evergreen State College Greenhouse Gas Emissions profile

As indicated in Figure A34, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

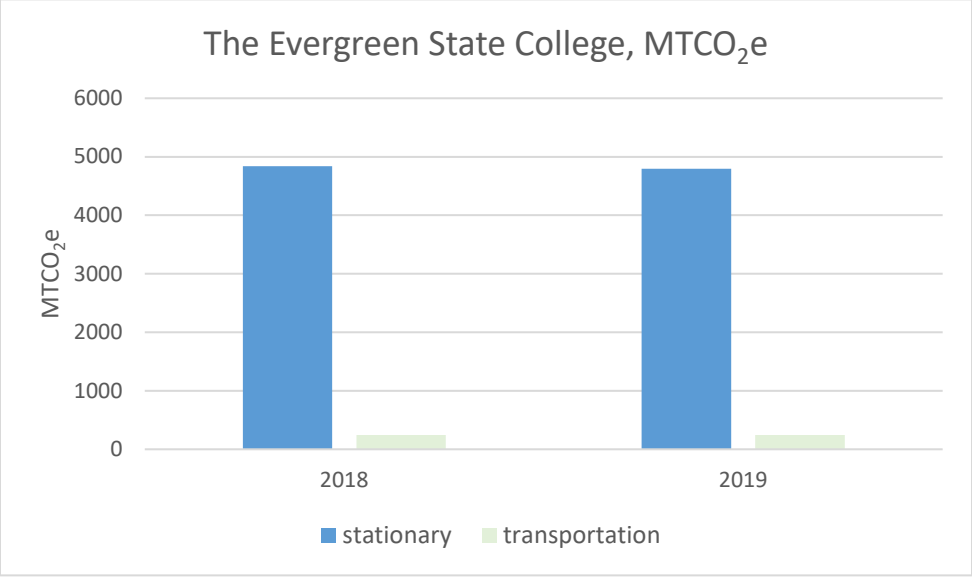

Figure A34. The Evergreen State College GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

Evergreen has been purchasing Renewable Energy Credits for 100% of purchased electricity from Puget Sound Energy since 2006. These purchases are supported by a student-initiated fee. The College has also been actively pursuing energy conservation projects. In the past two years, Evergreen has upgraded nearly all external lighting to LEDs, has been steadily changing over internal lighting from compact fluorescent lamps to LEDs, and has installed a 20 kW solar photovoltaic system on the College's Tacoma campus building.

The College also recently renovated Purce Hall on the Olympia campus to LEED Gold standards. (Certification is still in process.)

Mitigating emissions associated with space heating has been the College's greatest challenge. Evergreen is currently pursuing funding for an innovative planning process to help identify low-carbon, cost-effective alternatives to their aging natural gas district steam system.

Washington Department of Transportation

Figure A35 provides total greenhouse gas emissions for Department of Transportation.

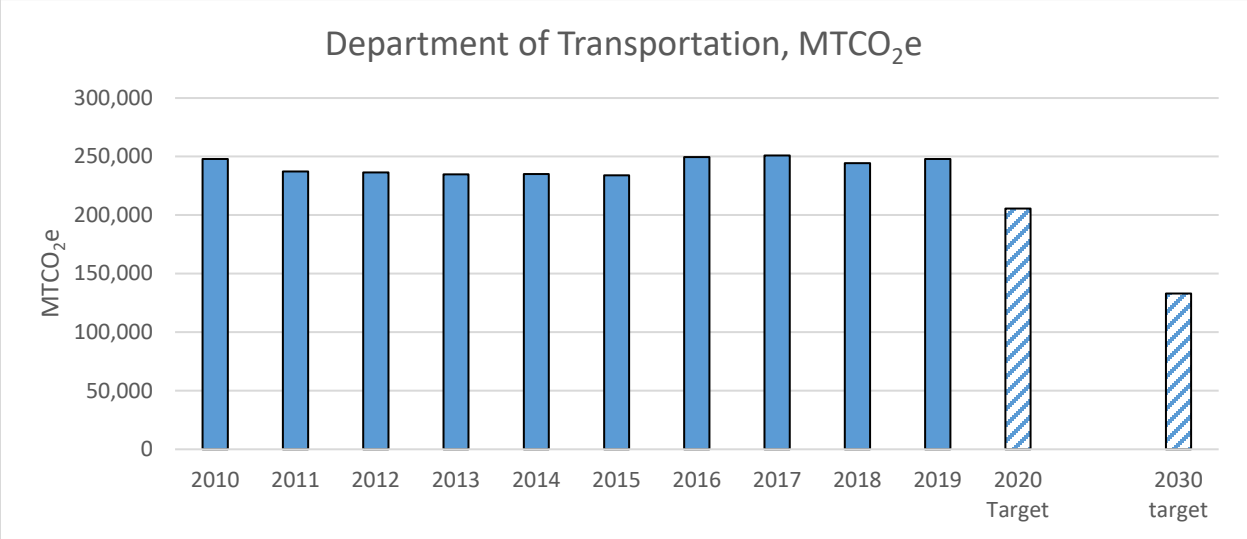

Figure A35. Department of Transportation Greenhouse Gas Emissions profile

WSDOT greenhouse gas emissions are dominated by emissions associated with the ferry system as illustrated in Figure A36.

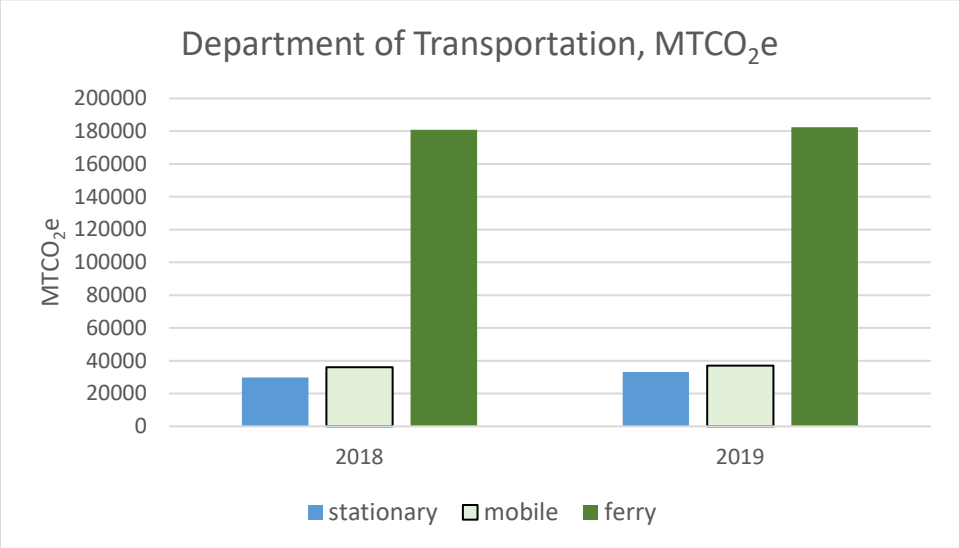

Figure A36. Department of Transportation GHG Sources: Stationary and Transportation

Agency GHG Mitigation Actions:

During the 2018-2019 reporting period, the Department of Transportation made significant progress with mitigation actions including:

State Ferries:

- Increased ferry vessel biodiesel use.
- Implemented speed guidelines to improve ferry vessel fuel efficiency.
- Progressed on ferry conversion to diesel-electric hybrid: awarded contract for vessel conversion design September 2019. Design to be completed summer 2020. Construction expected 2021-2022.
- Signed contract for new vessel to be built as diesel electric hybrid – design and engineering work underway. Delivery of first vessel in 2023 or 2024.
- Evaluated and implemented operational changes to reduce fuel use and improve efficiency

Fleet Vehicles:

- Continued using biodiesel
  - 2018 = 14.7%
  - 2019 = 13.8 % (lower due to availability from vendors and delivery issues).
- Continued to replace gasoline passenger vehicles with EVs
  - Offered "Nuts for Bolts" program – offices can voluntarily trade in a passenger vehicle before the end of its expected life for an all-electric Chevy Bolt. Traded in vehicles are then used by offices where an EV is not practical.
  - Negotiated VW grant agreement with Department of Ecology to purchase 20 EVs. In exchange, WSDOT will purchase and install charging infrastructure to support agency EVs.

Facilities

- In 2019, completed the $12 M state-wide energy efficiency retrofit ESCO project. This project retrofitted lighting, improved heating and cooling controls, added weatherization, and improved water efficiency in over 800 WSDOT buildings across the state.
- Started ferry terminal ESCO project (wrapping up in 2020) to upgrade interior and exterior lighting systems with LEDs, retrofit and replace existing plumbing fixtures with low-flow technology, and incorporate web-enabled thermostat controls. This project also includes installing solar panels on the Bainbridge terminal and replacing propane-fired heating equipment with heat pump technology at Eagle Harbor.
- Included Zero Energy performance as a project goal in Dayton remodel and Olympic Region design. Buildings will not be fully occupied until mid to late 2021
- Contracted with Avista through their Solar Select program to receive 100% renewable power for one eastern region account: 592,000 kWh in 2019, first year of contract.
- Contracted with PSE's Green Direct program to supply about 40% of agency's power from renewables. Expect project to come online in 2021.

- Completed 14 HVAC infrastructure replacement projects, replacing aging systems with modern energy efficient alternative systems.
- Completed two window replacement projects
- Increased internal coordination around facility efficiency efforts.

Highway Lighting

- Funded and completed investment grade audit for converting all highway lighting to LEDs and in-house lighting mapping to identify lights poles for removal. This will include about 26,000 lights across the state.

University of Washington

Figure A37 indicates that the University of Washington is reducing its greenhouse gas emissions towards meeting their 2020 reduction target.

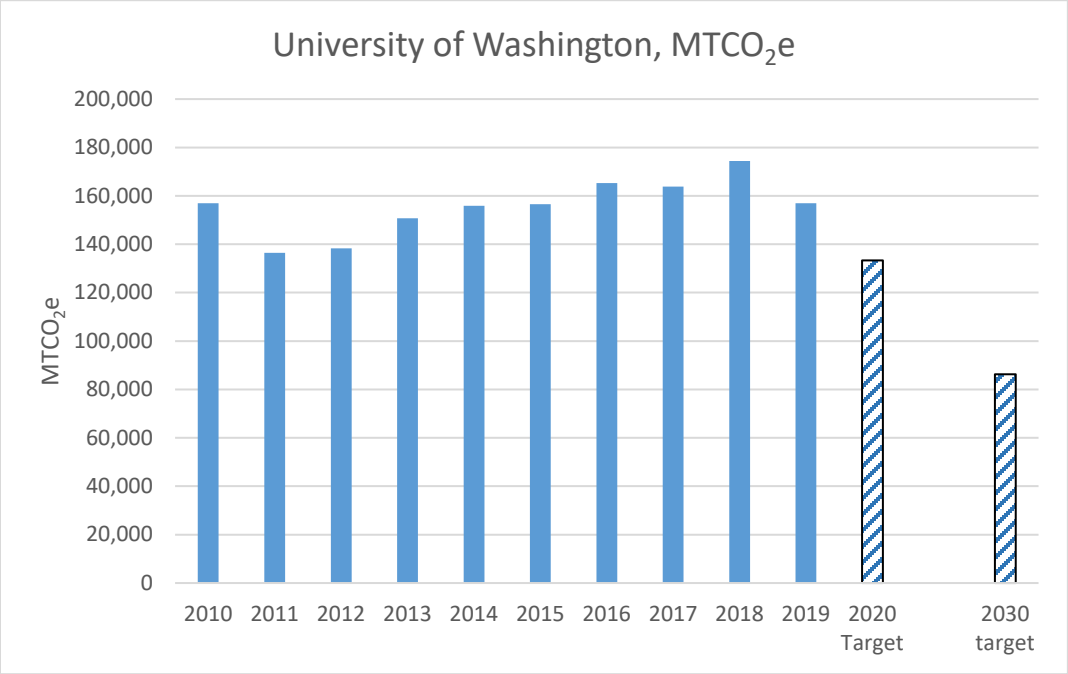

Figure A37. University of Washington Greenhouse Gas Emissions profile

As indicated in Figure A38, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

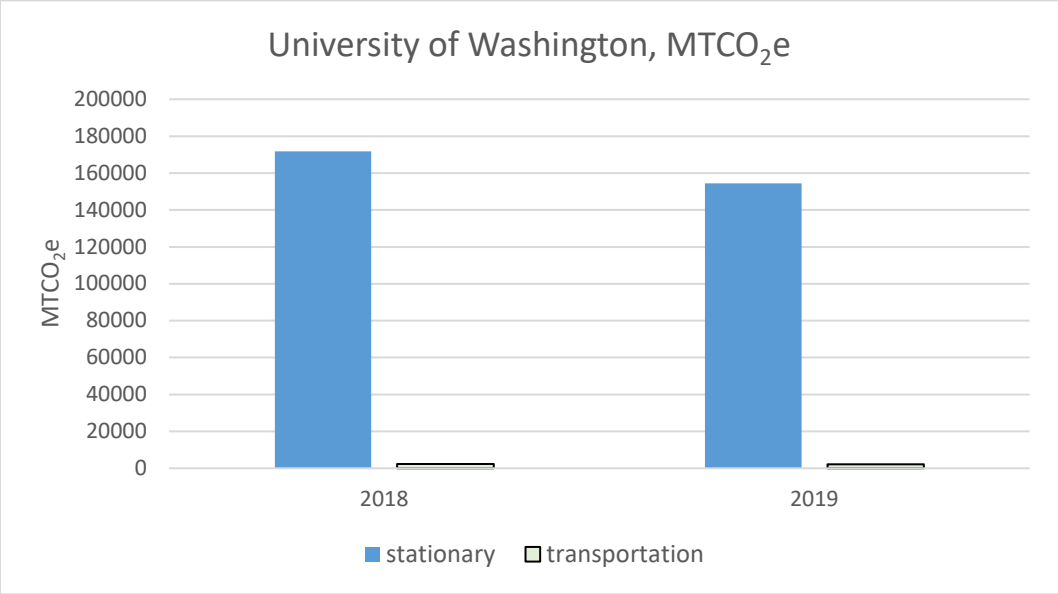

Figure A38. University of Washington GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

In calendar years 2018 and 2019, the University of Washington (UW) sought to reduce greenhouse gas (GHG) emissions through a variety of projects. GHG mitigation activities included: (1) the reduction of transportation-related emissions, (2) the improvement of energy conservation in existing building systems through refurbishment or renovation, (3) the construction of more energy efficient building systems in new constructions or major renovations, and (4) the installation of alternative building energy systems.

UW added renewable electricity generation on new construction, purchased renewable energy credits, and took part in utility green power programs. Photovoltaic systems were installed in the new Life Sciences building and on top of some dorm facilities. The UW Seattle Campus takes part in the Seattle City Light Greenup Charge program.

In 2019 UW implemented a Green Building Standards initiative with LEED Gold as the minimum for new projects.

UW sustainability efforts can be viewed at green.uw.edu.

Veterans Affairs, Department of

The greenhouse gas emissions profile in Figure A39 only includes reported inventory data to 2011 which is used as a placeholder thereafter.

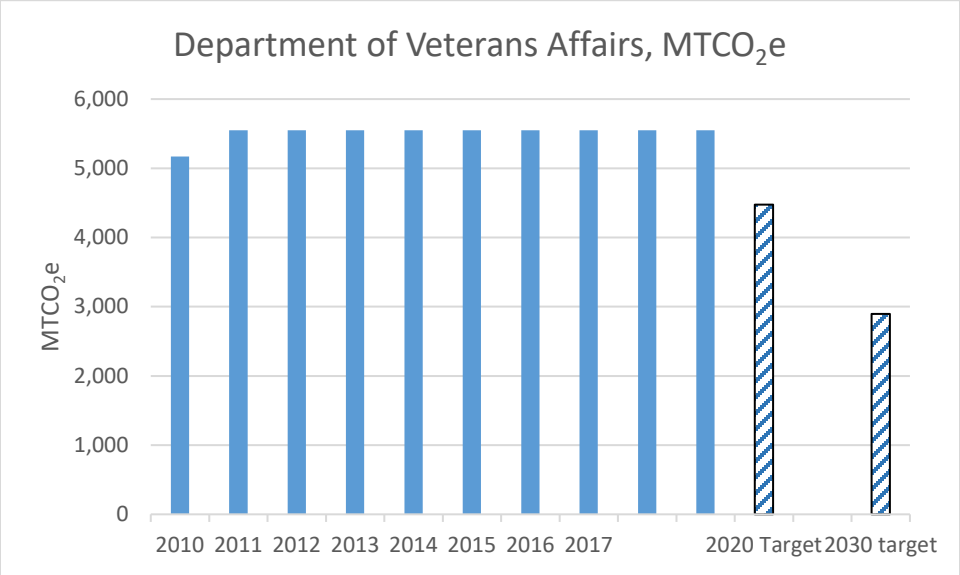

Figure A39. Department of Veterans Affairs Greenhouse Gas Emissions profile

Figure A40 indicates that stationary sources are the most significant source of greenhouse gas emissions.

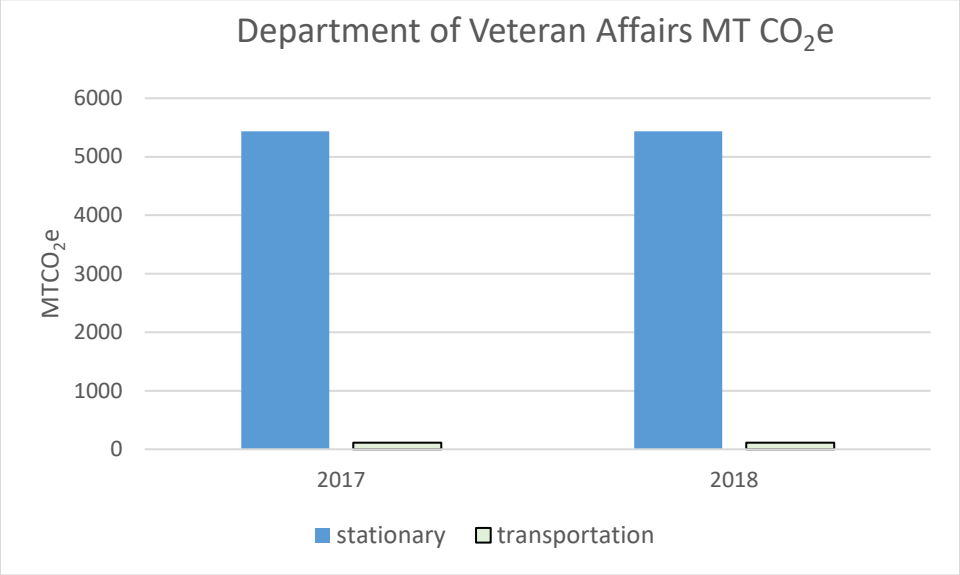

Figure A40. Department of Veterans Affairs GHG Sources: Stationary and Transportation

Agency GHG Mitigation Actions:
No greenhouse gas mitigation narrative provided.

Washington State University

Figure A41 indicates Washington State University may have challenges to meet its 2020 greenhouse gas emissions reduction target.

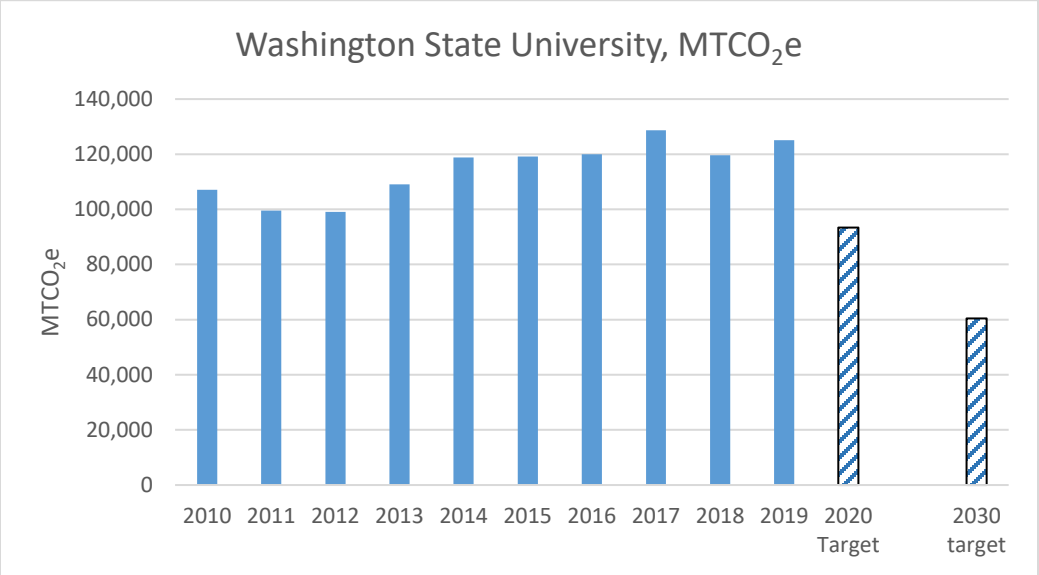

Figure A41. Washington State University Greenhouse Gas Emissions profile

As indicated in Figure A42, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

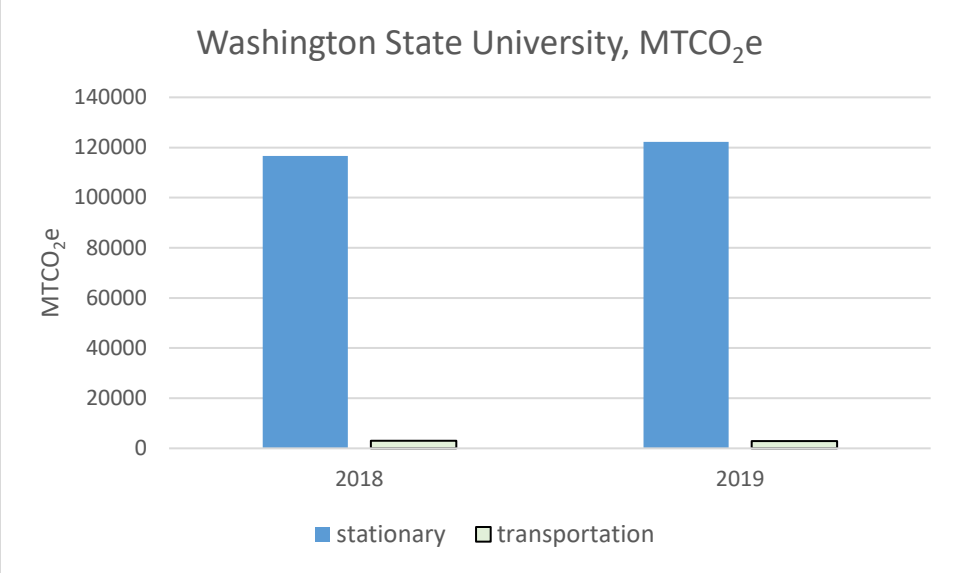

Figure A42. Washington State University GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions

The overall campus population and building space has increased since 2015. These increases are offset by implementation of strategies to reduce energy use and greenhouse gas (GHG) emissions. Changes in the Ecology calculator for scope 2 emission factors has lowered these emissions significantly. Washington State University's (WSU) two major GHG contributors are stationary combustion and purchased electricity. If WSU's utilities provider changed their power source profile, if funding were available to purchase green power renewable energy credits (electricity), carbon credits (boiler fuel) and/or building a new biofuels steam plant along with providing for the additional operating costs, WSU could meet its GHG reductions goals in 2020 and into the future

- As part of a Master Transportation Plan, WSU has made a considerable commitment to provide more mobility options. In February 2011, WSU contracted with Zimride to provide a social network for ridesharing. In August 2011, WSU launched a partnership with Zipcar to provide car sharing which continues to the present and WSU expects to add an eighth Zipcar in the near future. Pullman Transit ridership in 2017 reached over 1.35 million rides provided (of which the vast majority were students). Saveonenergy.com recently listed the nation's top Green Commuter cities. Pullman ranked first among medium sized cities for percentage of green commuters. The survey found that 36% of Pullman residents either bus, bike, walk or carpool to work. Pullman Transit currently operates five hybrid buses (with one on order) as part of its wider fleet. The hybrid buses improve fuel economy by ~ 60%. Moving forward, Pullman transit is pursuing grants to convert its fleet to total electric with the construction of a new bus charging station and new all electric vehicles. Vanpools operated every workday between WSU Pullman and Spokane (3 vans), Lewiston / Clarkston / Asotin (three vans), Moscow (one van) and Colfax (one van). The University has completed a Bicycle and Pedestrian Plan with the goal of transforming WSU Pullman into a friendlier and safer environment for active transportation. One of the driving factors for creating a Bike and Pedestrian Plan is the considerable success of the "Coug Bike" bike-sharing program.
- Energy Projects
  - Continue to re-lamp with LEDs
  - Added more cooling towers at the chiller plant to improve efficiency
  - Installation of variable frequency drives for energy savings
- Replace failed in-vessel composter with technology to decrease incinerator use
- Solar
  - WSU constructed a 75kW solar array at the WSU's Research and Technology Park. The array will provide energy to the facility with the excess being incorporated back into Avista's power grid
- Campus
  - WSU continues to operate one of the largest University composting operations in the United States.
  - It is estimated that the operation saves about 4000 metric tons of carbon emissions annually

- Completed construction of new LEED standard buildings: PACCAR (Gold, Public Safety Building (Silver Equivalent), Chief Joe Apartments Building E, F (LEED for Homes), Digital Classroom Building (Silver), Chief Joe Apartments Building B, C (LEED for Homes Equivalent), Elson S Floyd Cultural Center (Gold), WSU Everett NPSE (Gold).
- Green Fund projects
- Motor Pool:
  - Improved fleet fuel efficiency
  - 34 hybrids / electric alternative fuel vehicles
- CEREO (https://cereo.wsu.edu/)
  - The Center for Environmental Research, Education, and Outreach (CEREO) is a progressive network of more than 350 faculty, staff, students, and industry leaders working to resolve environmental issues through collaborative partnerships. Guided by a roster of distinguished scientists, CEREO seeks to apply innovative technologies and management tools to the ever-growing challenges of global climate change and environmental sustainability. Research varies from developing new bio-fuels to improving photovoltaic technology
- Current Research related to climate change at the Center for Atmospheric Research (http://lar.wsu.edu)

WSU made a significant reduction in its GHG emissions when the new campus steam plant became operational in 2005. However, this was also the baseline year for the State Agency GHG reporting program.

Western Washington University

Figure A43 indicates that the 2020 greenhouse gas reduction target is within reach for Western Washington University.

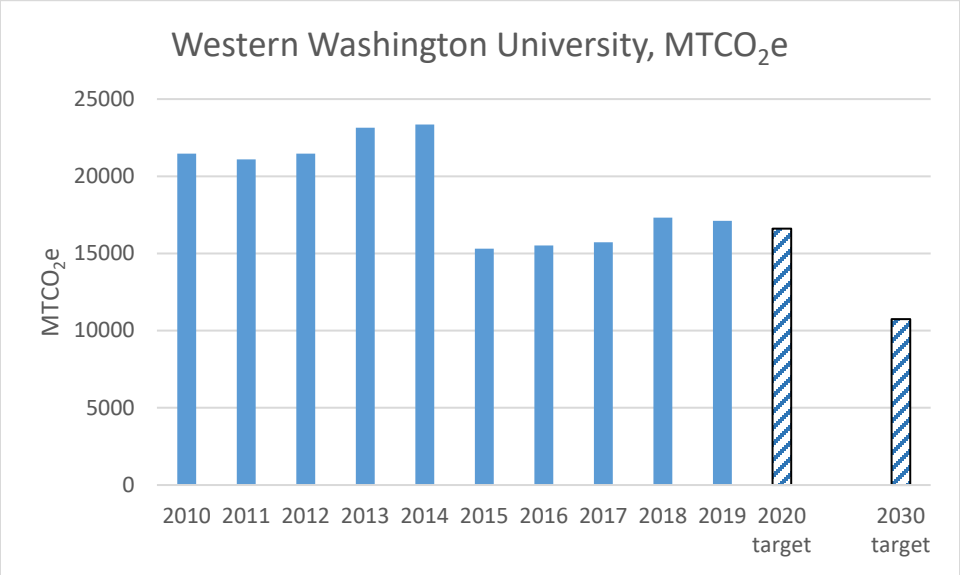

Figure A43. Western Washington University Greenhouse Gas Emissions profile

In Figure A44, stationary sources are the most significant contributors of greenhouse gas emissions as compared to transportation.

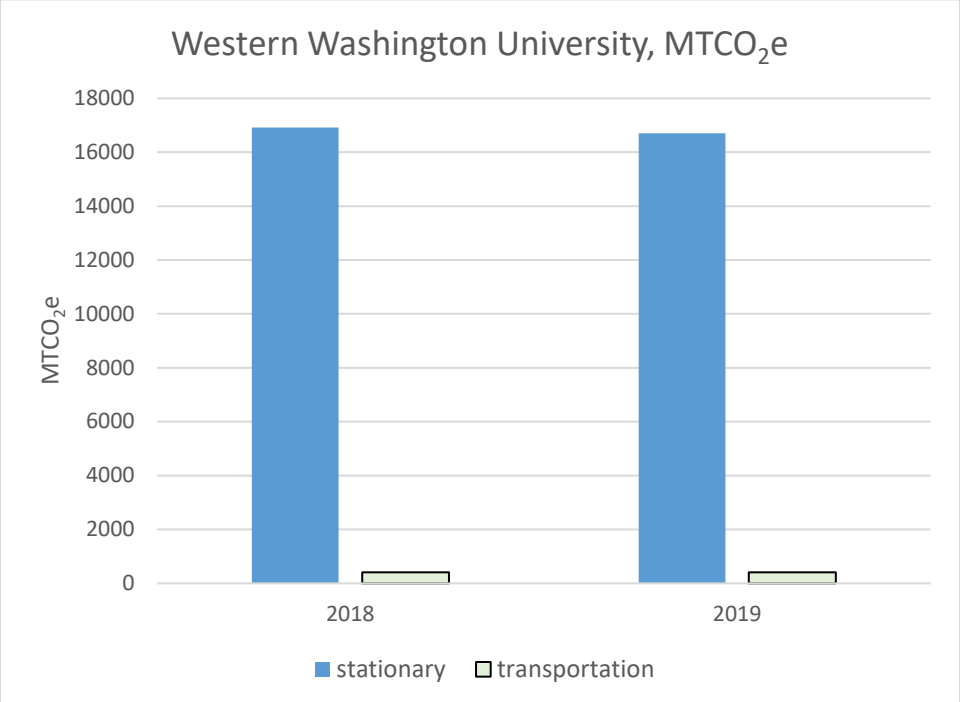

Figure A44. Western Washington University GHG sources: Stationary and Transportation

Agency GHG Mitigation Actions.

WWU leads regional and national peer institutions in all Sustainable Action Plan Key Performance Indicators. Energy use and cost trends continues to decline over the previous five-year period, despite new building loads such as Carver and MCC. Energy Cost Index (EUI)/sf/year is at a 5-year low.

Utility budget continues to benefit from low volatility and bearish pricing in the natural gas commodity market, higher gas volumes purchased on the monthly index and uniquely favorable price position last winter. Aggressive academic building scheduling continues to pay dividends in reduced electrical and steam consumption.

Rising annual water, sewer and storm water budget has stabilized relative to declining university usage trend. Facilities Management (FM) Revolving Energy Fund continues to be a strong vehicle for funding new stewardship projects. The "Living Laboratory" of students using WWU facilities for energy study is expanding. FM student employment is flourishing with private-source funding provided through the Institute for Energy Studies. See a full academic year of student use on the new Interactive Energy Dashboard in Environmental Studies:

https://energy.dudesolutions.com/BETA/?bbID=WWU1DASH