

## Appendix A – 2021 Sustainability Inventory

### Executive Summary

This Appendix presents key data snapshots from Sound Transit’s 2021 Annual Sustainability Progress Report and identifies resource use patterns compared to earlier years of performance. The report evaluates 2021 performance metrics, as well as performance data trends over multiple years.

In 2021, Sound Transit’s operations were recovering from, but still deeply affected by, the COVID-19 pandemic. The report illustrates clearly that transit ridership has only just begun to rebound. While some workers gradually returned to the office, the prevalence of remote and hybrid workplaces appears to be a durable trend moving forward.

Please note that any statements about resource use trends and metrics in this appendix are made in absolute terms unless explicitly stated otherwise; normalized trend analyses and metrics will be explicitly labeled as such. (i.e. greenhouse gas emissions *per* passenger miles traveled).

*The main takeaways from the year include:*

- Total ridership modestly increased in 2021 from the 2020 pandemic lows.
- Resource use increased across the board, as a result of increasing service levels and the opening of the Northgate Link Extension. Resource use increases were both absolute and normalized, as ridership levels have not returned to pre-pandemic levels.
- Total operational greenhouse gas (GHG) emissions decreased one percent from 2020 to 2021 despite the opening of the Northgate Link Extension and OMF East and associated increases in electricity use.
- *Key findings in resource use and efficiency include:* Ridership modestly increased in 2021 from the 2020 pandemic lows, with passenger miles traveled (PMT) across all modes increasing 3 percent from the prior year and unlinked passenger trips (“boardings”) increasing 12 percent. Agency vehicle revenue miles (VRM) increased by 8 percent in 2021. The disparity between the increases in PMT and boardings suggests that riders are taking a larger number of shorter trips in 2021.
- Corresponding with increased service levels, absolute (i.e. not normalized) resource use increased across the agency, with the exception of waste generation. Agency diesel consumption increased by slightly less than a percent from 2020 to 2021. Electricity for Link Light Rail traction power increased by 37 percent, reflecting increased service levels and the opening of the Northgate Link Extension in October of 2021. Facility natural gas and non-traction power electricity consumption increased by 15 percent and 20 percent respectively due in large part to greater seasonal temperature extremes.
- Agency energy use increased 6 percent from 2020 to 2021; absolute energy use was up 11 percent relative to the 2011 baseline. Overall increases in resource use were driven by increasing service levels, the opening of new facilities and weather conditions.
  - Absolute fleet energy use increased 3 percent from 2020 to 2021, which directionally mirrors the 8 percent increase in vehicle revenue miles operated from 2020 to 2021.

- Sounder commuter rail service increased energy consumption by 9 percent, Link light rail increased traction power consumption by 37 percent, and ST Express reduced energy consumption by 5 percent from 2020 to 2021.
- Meanwhile, absolute facility energy consumption increased 28 percent from 2020 to 2021, attributable in large part to new facilities opening.
- Water use increased by 17 percent from 2020 to 2021, due to a combination of warmer summer weather, leaks, and new facilities opening.
- Waste diversion from landfill increased from 31 percent in 2020 to 33 percent in 2021, which may be attributable to a gradual return of office workers to the central campus.

*Notes on Appendix A:* This document illustrates resource use trends over time from baseline years (2010 or 2011, depending on data) and the preceding inventory year, 2020. In the following graphs, solid bars indicate total emissions, resource use, and resource costs. The trend lines show the normalized resource, either per PMT or per VRM, over time.

## Ridership and Level of Service

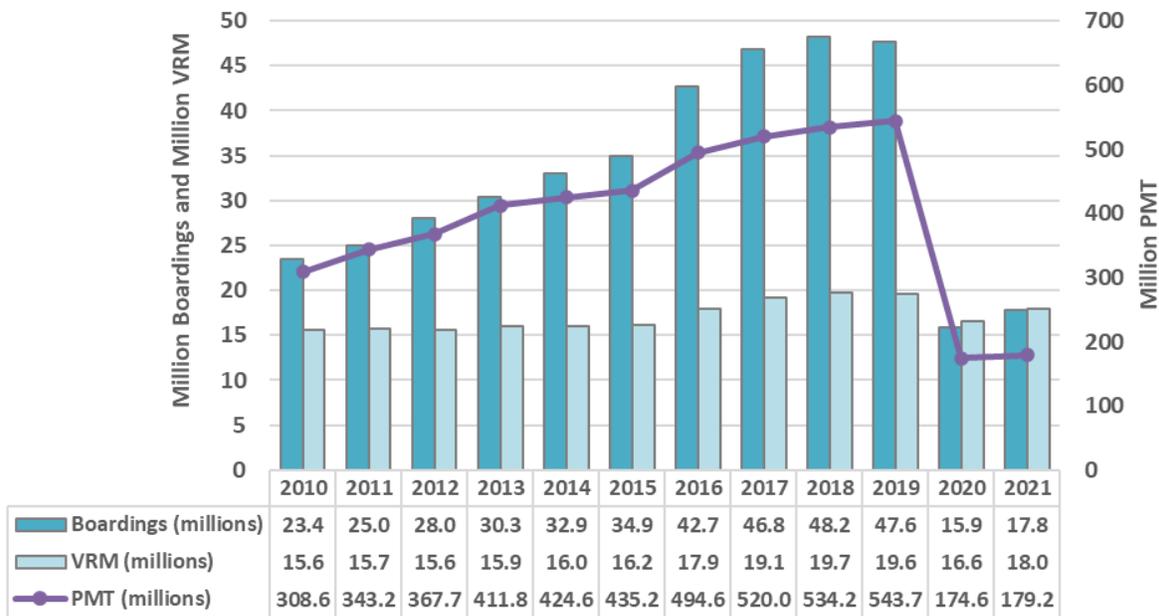
- Relative to 2010, ridership measured in boardings is down by 24 percent.
- Relative to 2010, vehicle revenue miles are up by 15 percent.
- From 2020 to 2021, boardings increased 12 percent, passenger miles traveled increased 3 percent and vehicle revenue miles increased 8 percent.

Ridership has important implications for resource use. As Sound Transit’s network expands, the agency anticipates total resource use will increase. In order to account for the growth of Sound Transit’s service network and meaningfully interpret resource efficiency trends over time, the Sustainability Inventory normalizes data by the level of service provided by the agency (vehicle revenue miles or VRM), the number of unlinked passenger trips (boardings or UPT) and the volume and distance of overall ridership (passenger miles traveled or PMT).

Boardings and PMT have generally increased year-over-year throughout the agency’s history. However, 2020 saw the agency’s first steep decline in ridership and all other metrics of resource use due to the COVID-19 pandemic. With the exception of Tacoma Link, VRM in 2020 fell significantly across all services, as did boardings.

In 2021, ridership and service levels modestly rose from the prior year but remain well below pre-COVID levels. Notably, the opening of the Northgate Link Extension in October of 2021 significantly boosted annual Link Light Rail ridership. Figure 1 below shows the trends of boardings, vehicle revenue miles, and passenger miles traveled since 2010.

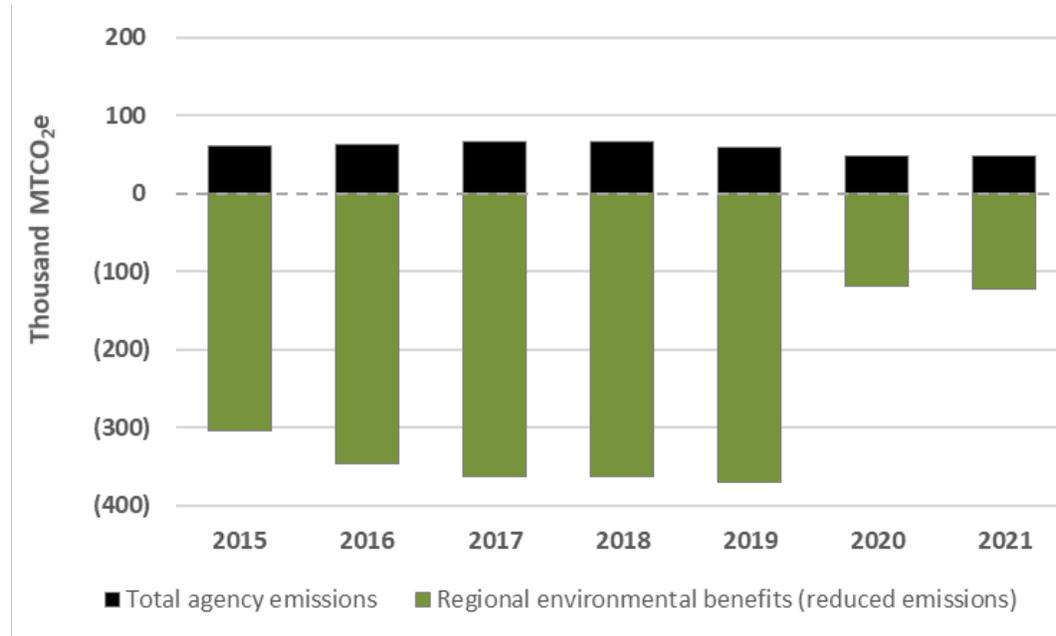
**Figure 1. Ridership, 2010-2021**



## Regional Environmental Benefit

Increased transit use reduces regional environmental impacts from passenger vehicles. As more people choose transit over driving, fuel consumption and greenhouse gas (GHG) emissions are reduced throughout the region. Avoided GHG emissions are a measure of the regional environmental benefit produced by transit. Sound Transit employs a 2018 methodology developed by APTA to account for emissions avoided due to transit ridership, measured in carbon dioxide equivalent (CO<sub>2</sub>e), as shown in Figure 2 and Table 1.

**Figure 2. Regional Greenhouse Gas Emissions (CO<sub>2</sub>e) Avoided by Sound Transit Services, 2015-2021**



As seen in Figure 2 above and Table 1 below, even though 2020 and 2021 experienced significantly lower ridership, Sound Transit services still displace more GHG emissions than they emit from operations. For every ton of GHG emissions Sound Transit emitted in 2021, the region avoided roughly 2.5 tons of emissions through the benefits of transit. The regional environmental benefits shown in green in Figure 2 include the benefits from people taking transit instead of driving (i.e. mode shift) and reduced emissions associated with denser land use patterns supported by transit. Prior to the pandemic-induced decline in ridership, these benefits were between five and six times the agency’s operational emissions, in black.

**Table 1. Regional Greenhouse Gas Emissions (CO<sub>2</sub>e) Avoided by Sound Transit Services, 2021**

Regional metric tons CO <sub>2</sub> e Reduced		
Mode Shift Benefits	Land-Use Benefits	Total Benefits
22,927	98,964	121,891
Avoided Emission Ratios - CO <sub>2</sub> e units reduced in the region per unit of CO <sub>2</sub> e from Sound Transit operations		
Mode Shift Benefits	Land-Use Benefits	Total Benefits
0.47	2.04	2.51

The definitions for each of the identified types of benefits are below:

- **Mode shift benefits** measure the reduced GHG emissions (amount avoided) resulting from shifting from one mode of transportation (i.e. single occupancy vehicle) to another (i.e. transit), measured on a PMT basis.
- **Land use change benefits** measure the reduced carbon emissions due to the denser land use patterns supported by transit systems.

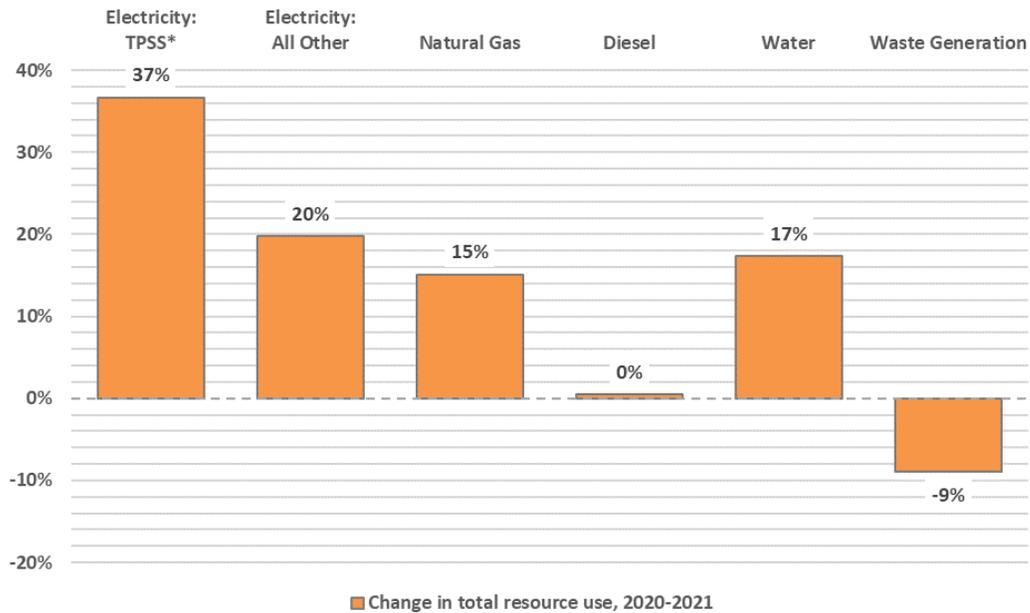
## Resource Use

Total agency resource use has generally increased over time, reflecting the expansion of the Sound Transit system. Most increases in resource use have been directly in line with increased service levels and increased use of revenue fleet vehicles.

In response to public health restrictions and diminished ridership demand during the COVID-19 pandemic, Sound Transit reduced service levels significantly in 2020. As a result, resource use declined across most metrics. As ridership and service levels rose in 2021, resource use rebounded. Additionally, the opening of new service and facilities with Northgate Link increased resource consumption. Figure 3 below shows the change in absolute resource use from 2020 to 2021.

- Absolute resource use for traction power electricity (i.e. Link light rail propulsion) increased 37% from 2020 to 2021, while facility electricity consumption increased 20 percent. Traction power electricity consumption has increased 218 percent since 2011, while facility electricity consumption has increased 37 percent during that time.
- Total agency diesel consumption remained flat from 2020 to 2021. Diesel consumption is down 10 percent relative to the 2011 baseline.
- Facility natural gas consumption increased 15 percent in absolute terms from 2020 to 2021. Heating degree days, a measure of how cold it was during the heating season, increased 8 percent from 2020 to 2021, and likely drove the increase in natural gas consumption. Facility natural gas consumption has increased 116 percent since 2011.
- Absolute water use increased by 17 percent from 2020 to 2021, which aligns with a 17 percent increase in cooling degree days from 2020 to 2021. Water use has increased 54 percent relative to the 2011 baseline.
- Absolute waste generation declined nine percent from 2020 to 2021. Waste generation in 2021 was down 22 percent relative to the 2011 baseline.

**Figure 3. Change in Absolute Resource Use, 2020-2021**



### Fleet Energy Use

- From 2020 to 2021, total fleet energy increased by 3 percent. Since 2011, total fleet energy use has grown by 6 percent.
- Per vehicle mile traveled, fleet energy has declined 5 percent since 2020 and 8 percent since 2011.
- Fleet energy use per PMT remained flat from 2020 to 2021, but is 103 percent greater than the 2011 baseline.

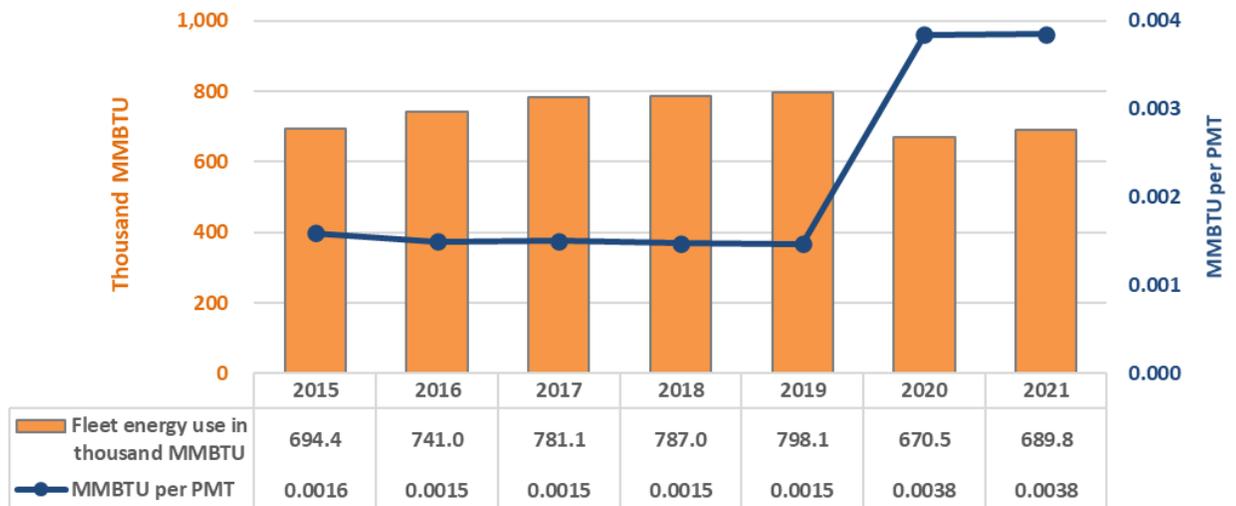
Prior to the COVID-19 pandemic, fleet energy use (in MMBTU) across Sound Transit’s three modes—ST Express bus, Sounder commuter rail, and Link light rail—had been increasing slowly over time as more service was provided. Service became more efficient per PMT as system ridership grew significantly faster than level of service (VRM). Despite substantial pre-pandemic increases in service, 2020 reversed prevailing revenue fleet resource consumption trends as ridership and service levels both declined, resulting in lower absolute energy use, but higher energy use per PMT. In 2021, absolute fleet energy use rebounded slightly, while energy use per PMT remained flat and energy use per VMT decreased.

- Traction power electricity use for Link light rail in 2021 grew 218 percent since 2011 and increased 37 percent from 2020 to 2021.
- Diesel fuel use for Sounder commuter rail in 2021 was up 9 percent from 2011 consumption levels and up 9 percent from 2020 levels.
  - In March of 2020, Sounder reduced service levels from 34 daily trips to 18 daily trips; service increased in September 2020 to 22 daily trips. Special event service (i.e. for sporting events) was suspended from March through the end of 2020. In September 2021, Sounder restored 2 additional daily trips, hitting 24 daily trips.
- Diesel fuel consumption for ST Express buses in 2021 was down 17 percent from 2011 levels and declined 3 percent from 2020 to 2021.

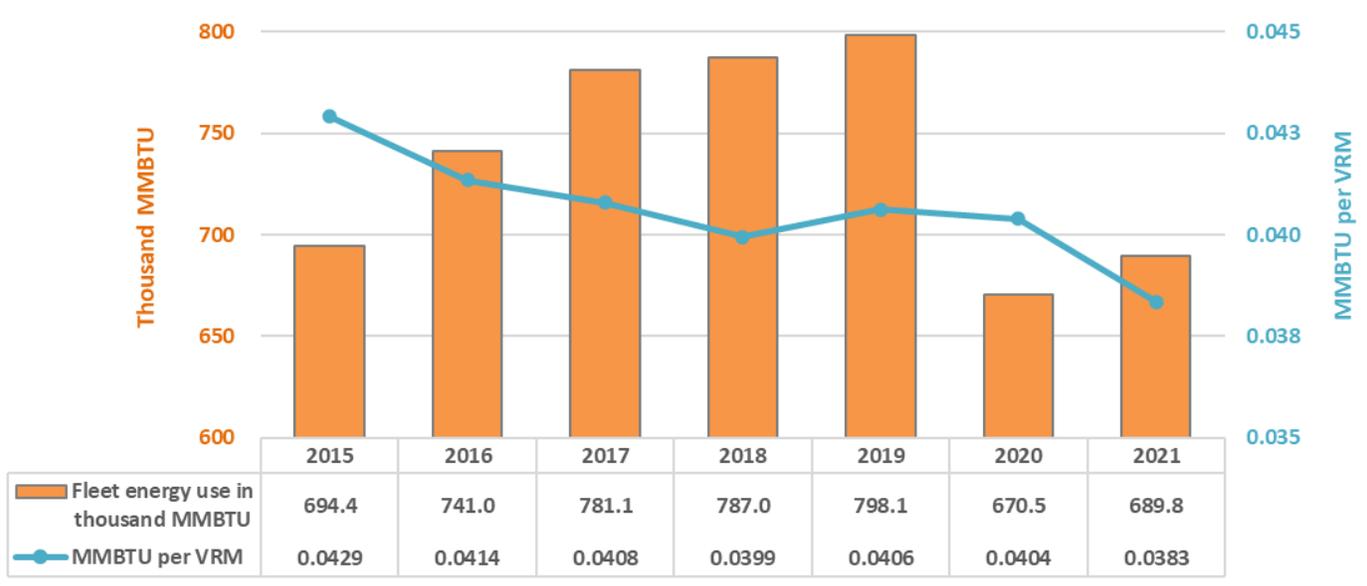
- The composition of the ST Express fuel mix has changed over time; compressed natural gas (CNG) used in ST Express buses has increased from 5.7 percent of total ST Express fleet energy consumption in 2011 to 12.8 percent in 2020. CNG as a share of ST Express fleet energy declined to 11.1 percent in 2021. The long-term increase in agency CNG use since 2011 is largely the result of a growing prevalence of CNG buses in the Pierce Transit operated portion of the ST Express fleet.
- While both diesel and CNG buses saw reduced energy consumption in 2021, CNG buses saw a 17 percent decline in energy consumption from 2020, while diesel buses saw only a 3 percent decline. A shortage of drivers in 2021 incentivized a reallocation of drivers from shorter range CNG buses to longer range diesel buses.
- Although using CNG instead of diesel fuel reduces total GHG emissions and most criteria air pollutant emissions, including particulate matter (PM) and NO<sub>x</sub>, CNG use does increase carbon monoxide (CO) emissions. (Air pollutants are discussed on pages A10-A14.)

Figure 4 and Figure 4 below show the trends in fleet energy use over time. Table 2 below shows the percent change in energy use from 2020 to 2021 per mode, as well as the percent change in efficiency (fuel use normalized by PMT for each mode).

**Figure 5. Revenue Fleet Energy Use (Normalized by PMT), 2015-2021**



**Figure 6. Revenue Fleet Energy Use (Normalized by VRM), 2015-2021**



**Table 2. Change in Energy Use by Mode, 2020-2021**

Mode	% Change in Total Energy Use	% Change in Energy Use per PMT	% Change in Energy Use per VRM
Sounder Commuter Rail (diesel)	+9%	+87%	+5%
ST Express Buses (diesel and CNG)	-5%	+19%	0%
Link light rail traction power (electricity)	+37%	-21%	-5%

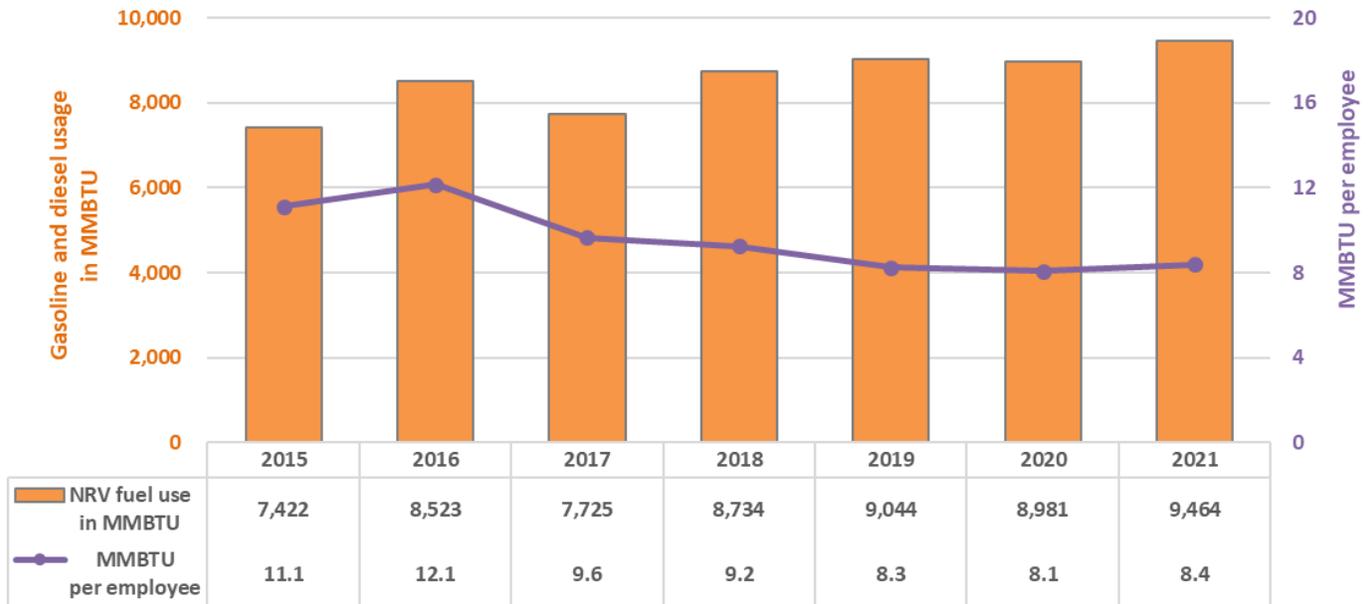
*Note: Mode energy use is normalized by PMT and VRM specific to each mode.*

### Non-Revenue Fleet Energy Use

- Since 2011, non-revenue fleet energy use has increased by 19 percent overall but decreased by 44 percent per employee.
- From 2020 to 2021, non-revenue fleet energy use increased by 5 percent while increasing by 4 percent per employee.

Energy use for the agency’s non-revenue fleet has remained relatively stable over time, with some fluctuations from year to year, as shown in Figure 6. Non-revenue fleet energy use was 19 percent higher in 2021 than in the 2011 baseline year. While the agency’s headcount has increased every year, contributing to more driving of NRV fleet vehicles, Sound Transit has also purchased more hybrid and fully electric vehicles, helping to reduce per-mile and per-employee energy use and air pollutant emissions. Prior to the COVID-19 pandemic, the agency encouraged employee use of carpooling or transit whenever feasible.

**Figure 7. Non-Revenue Fleet Energy Use, 2015-2021**



**Facility Energy Use**

- Total facility energy use was up 55 percent in 2021 from the 2011 baseline.
- From 2020 to 2021, total facility energy use increased by 28 percent.
- Facilities built before 2018 decreased energy consumption by 0.2 percent in 2021 relative to a 2018 baseline.\*

As the agency has brought additional stations and facilities online, facility energy use has generally increased. October 2021 saw the opening of the 4.3 mile Northgate Link Extension, which added the U District, Roosevelt, and Northgate stations to the Link network.

Although many Sound Transit facilities remained operational throughout the height of the COVID-19 pandemic, a large proportion of Sound Transit’s office staff have worked remotely since March 2020. Some office staff returned to office in a limited capacity during 2021, but generally, office utility consumption has remained lower than pre-pandemic levels. Service facilities like the Sounder Century Yard Operations Building, which saw less operational activity and energy consumption in 2020, experience a rebound in operational activity and energy consumption in 2021.

From 2020 to 2021, total facility electricity use increased 28 percent but varied substantially by line of business. Although electricity consumption is subject to external factors like weather and the growth of the network, Sound Transit continues to implement facility energy efficiency measures aimed to reduce agency electricity consumption.

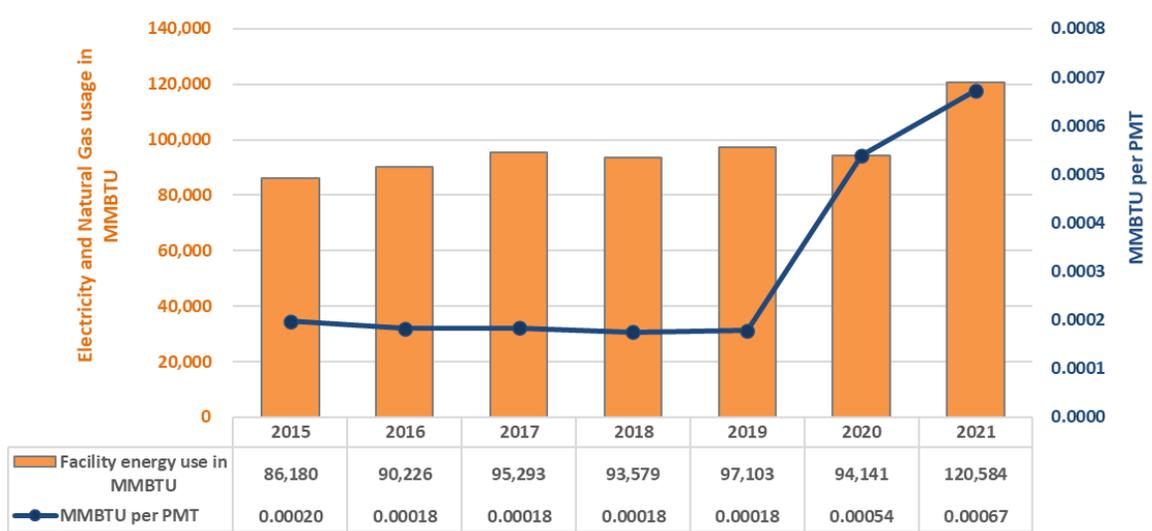
The substantial increase in facility energy consumption is at least partially attributable to an observed increase in heating degree days and cooling degree days from 2020 to 2021.

\* 2019 Sustainability Plan Key Performance Indicator

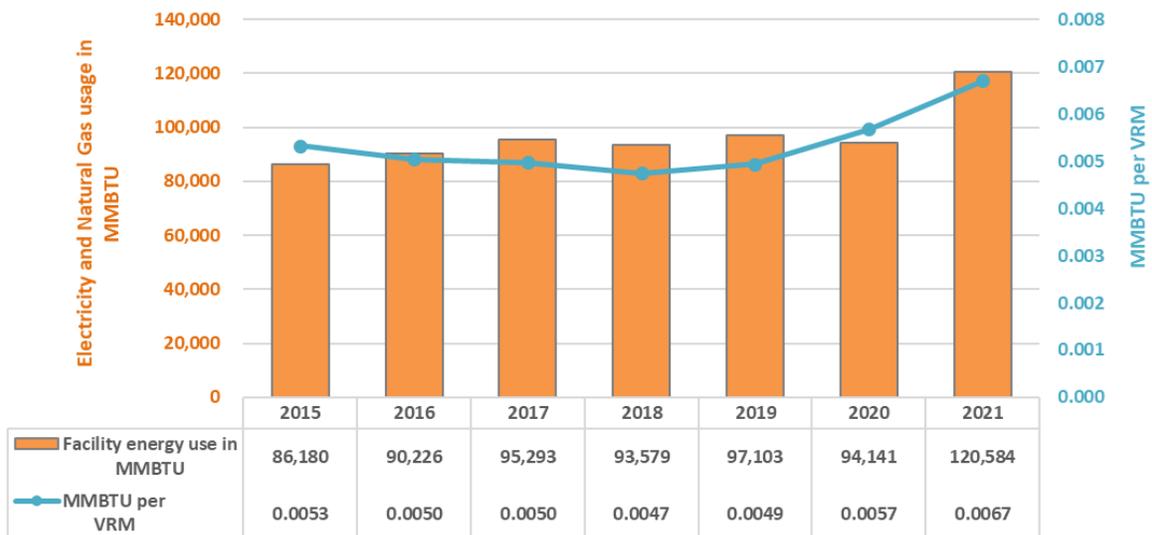
Notable electricity consumption trends include:

- Link light rail facilities increased electricity consumption by 29 percent, largely attributable to the opening of the three new stations of the Northgate Link Extension and the opening of OMF East, as well as increased operational activity in the Central Link OMF.
- Sounder facilities increased electricity consumption 21 percent from 2020 to 2021, as service levels rebounded from pandemic levels.
- Across owned and leased properties, Sound Transit administrative facilities decreased electricity consumption in 2021 by 2 percent.
- ST Express facilities increased electricity consumption by 9 percent, roughly returning to the pre-pandemic level.

**Figure 8. Facility Energy Use (Normalized by PMT), 2015-2021**



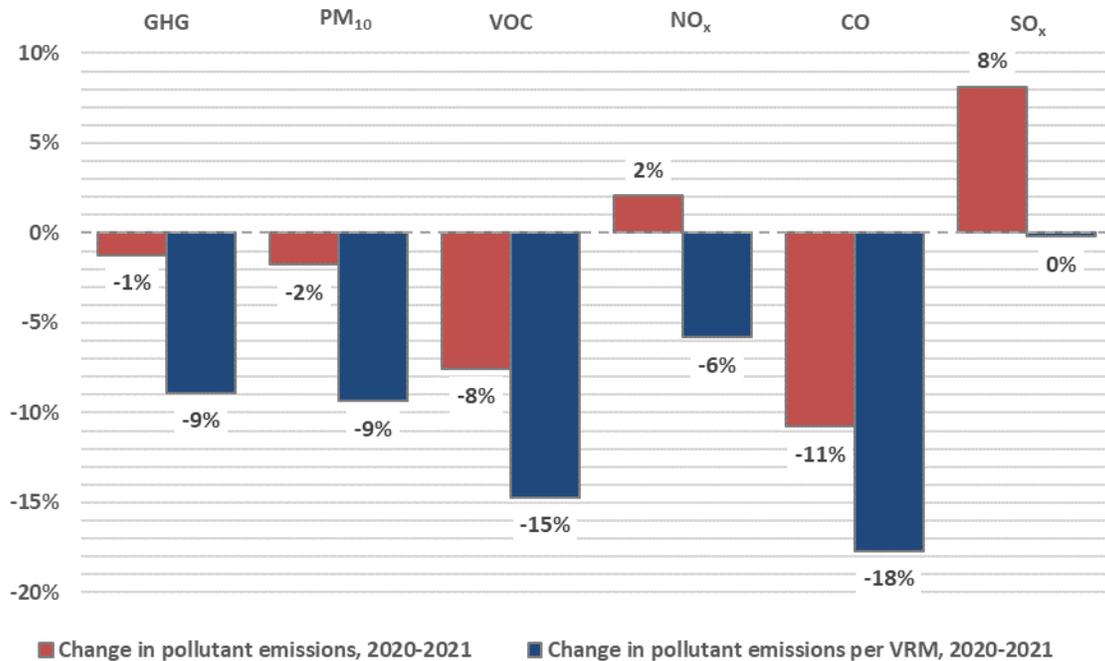
**Figure 9. Facility Energy Use (Normalized by VRM), 2015-2021**



## Air Pollutant Emissions

The sections below illustrate the trends in GHG emissions and criteria air pollutant emissions from Sound Transit vehicle and facility operations. Figure 9 below shows the total percent change and the change normalized per vehicle revenue mile by pollutant type from 2020 to 2021. As noted above, agency VRM increased by 15 percent from 2020 to 2021.

**Figure 10. Changes in Pollutant Emissions, 2020-2021; Change in Pollutant Emissions per VRM, 2020-2021**



## Greenhouse Gas Emissions

- Relative to the 2011 baseline, agency greenhouse gas (GHG) emissions are down 20 percent in 2021.
- From 2020 to 2021, agency GHG emissions decreased 1 percent, despite the opening of Northgate Link.
- Relative to 2018, agency GHG emissions are down 27 percent in 2021.\*

As Sound Transit service and ridership increased from 2011 to 2019, agency GHG emissions in metric tons CO<sub>2</sub> equivalent (MTCO<sub>2</sub>e) remained relatively stable in absolute terms and had been declining on a normalized basis. There were multiple factors that resulted in a drop in absolute agency GHG emissions and a spike in GHG emissions per PMT in 2020, as pictured in Figure 10; decreased services levels led to reduced fuel consumption, while the substantial drop in ridership drove ridership-normalized metrics upward. Absolute emissions and emissions normalized per PMT remained relatively flat from 2020 to 2021; emissions normalized per VRM continued a downward trajectory.

\* 2019 Sustainability Plan Key Performance Indicator

Figure 11. Agency GHG Emissions (Normalized by PMT), 2015-2021

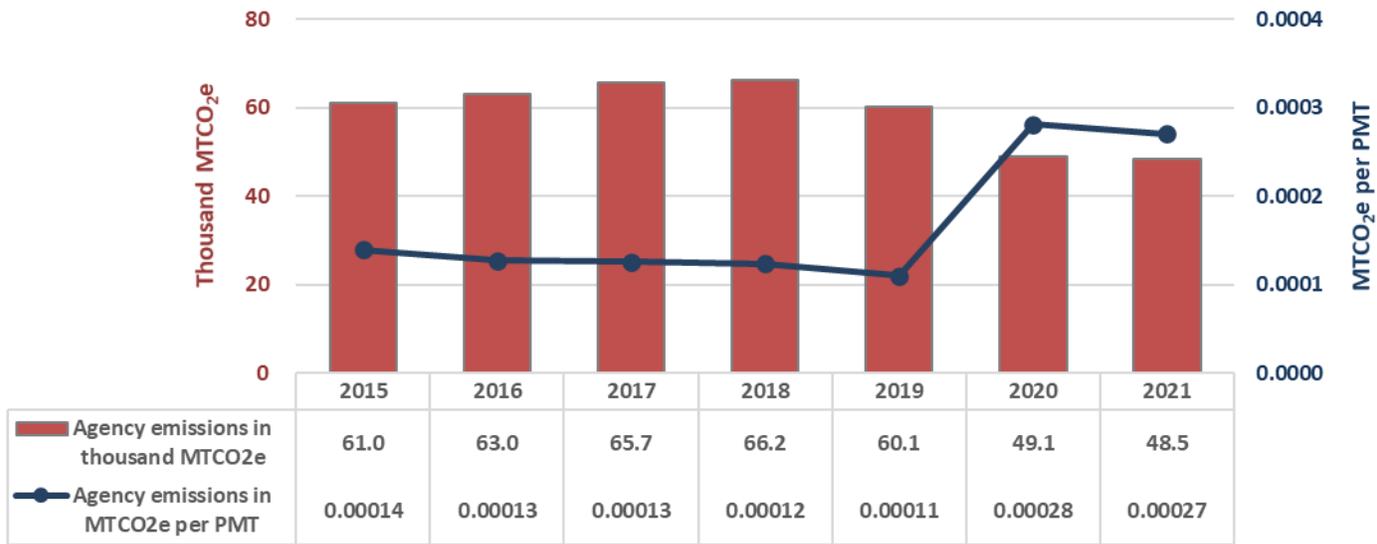
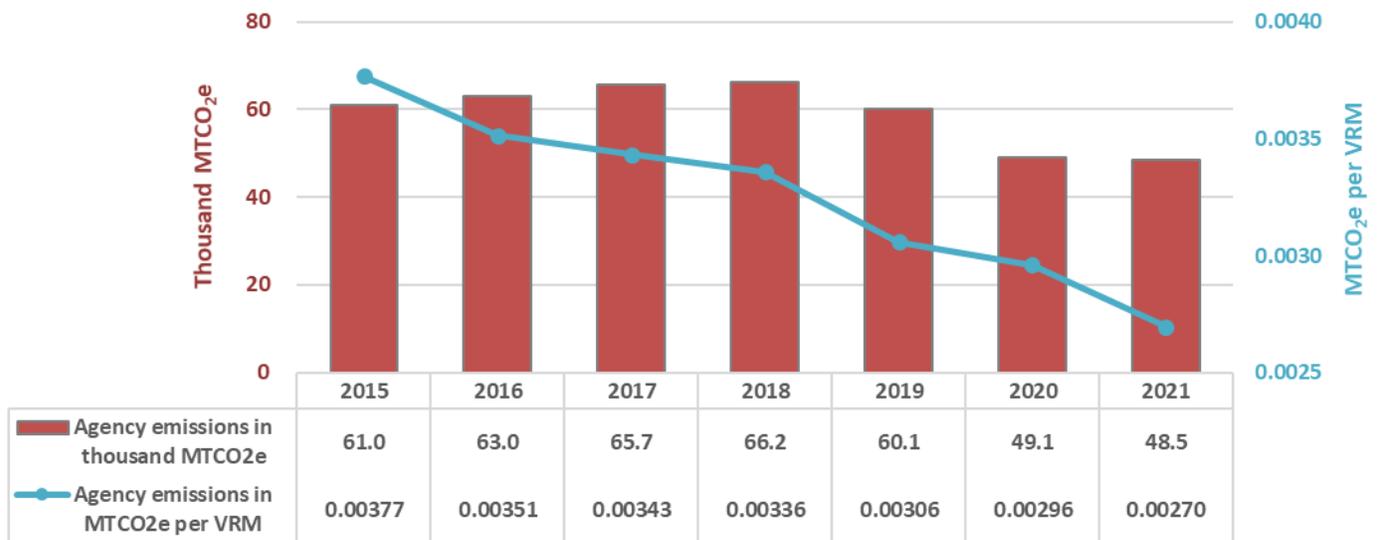
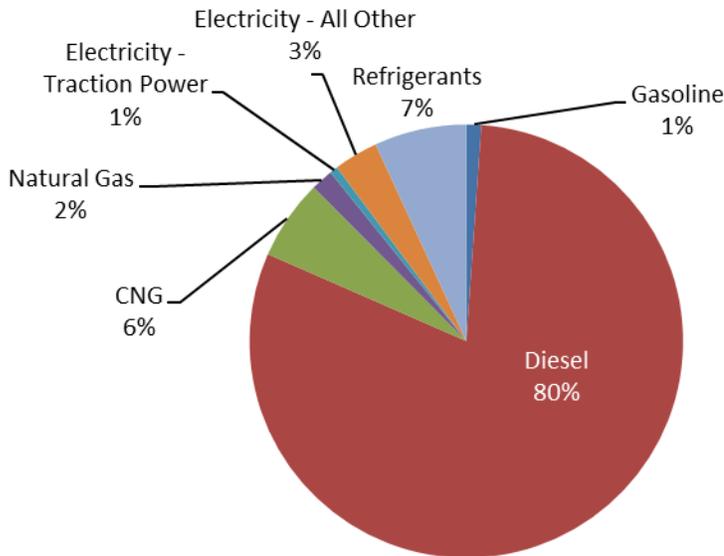


Figure 12. Agency GHG Emissions (Normalized by VRM), 2015-2021



**Figure 13. Greenhouse Gas Emissions by Energy Source, 2021**



**Criteria Air Pollutants**

**Table 3. Change in Criteria Air Pollutant Emissions**

Pollutant	Change 2011-2021 (Absolute)	Change 2020-2021 (Absolute)
PM <sub>10</sub>	-66%	-2%
VOCs	-71%	-8%
NO <sub>x</sub>	-46%	+2%
CO	-78%	-11%
SO <sub>x</sub>	+8%	+8%

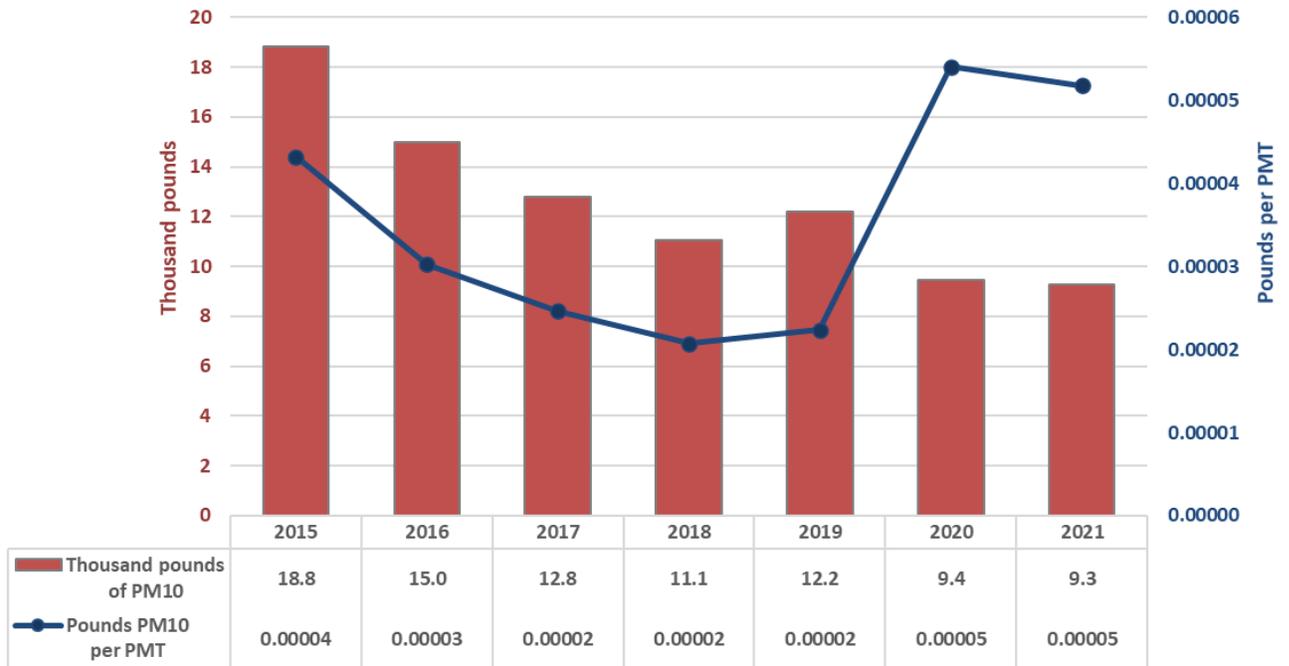
- The service levels of Sound Transit’s fossil fuel powered modes of transit moved in different directions from 2020 to 2021. VRM for ST Express Bus service decreased by 4.7 percent, while VRM for Sounder Commuter Rail increased 3.7 percent. As a result, the 2020-2021 changes in criteria air pollutants (CAPs) emissions were mixed. Particulate matter (PM<sub>10</sub>), volatile organic compounds (VOCs), and carbon monoxide (CO) decreased, while nitrogen oxides (NO<sub>x</sub>) and sulfur oxides (SO<sub>x</sub>) increased.
- From the 2011 baseline, CAP emissions have all decreased substantially, with the lone exception of SO<sub>x</sub>, which has seen greater interannual variability.

Sound Transit’s long-term reduction in CAP emissions has been driven in part by ST Express’s gradual shift from reliance on diesel buses to diesel-electric hybrids and CNG buses, as well as general improvements in emission controls. The agency has also upgraded all Sounder commuter rail engines to reduce air pollution.

The figures below show the absolute and normalized change in PM<sub>10</sub> and CO emissions since 2015. These criteria air pollutants are down 66 percent and 78 percent since 2011, respectively. From 2020 to 2021 CO emissions

decreased more so than any other CAP, due to improved emission controls on CNG buses, which characteristically emit greater volumes of CO. The noticeable drop in CO emissions starting in 2016 is primarily due to phasing out model year 2001 CNG buses.

**Figure 14. Particulate Matter (PM<sub>10</sub>) Emissions (Normalized by PMT), 2015-2021**



**Figure 15. Particulate Matter (PM<sub>10</sub>) Emissions (Normalized by VRM), 2015-2021**

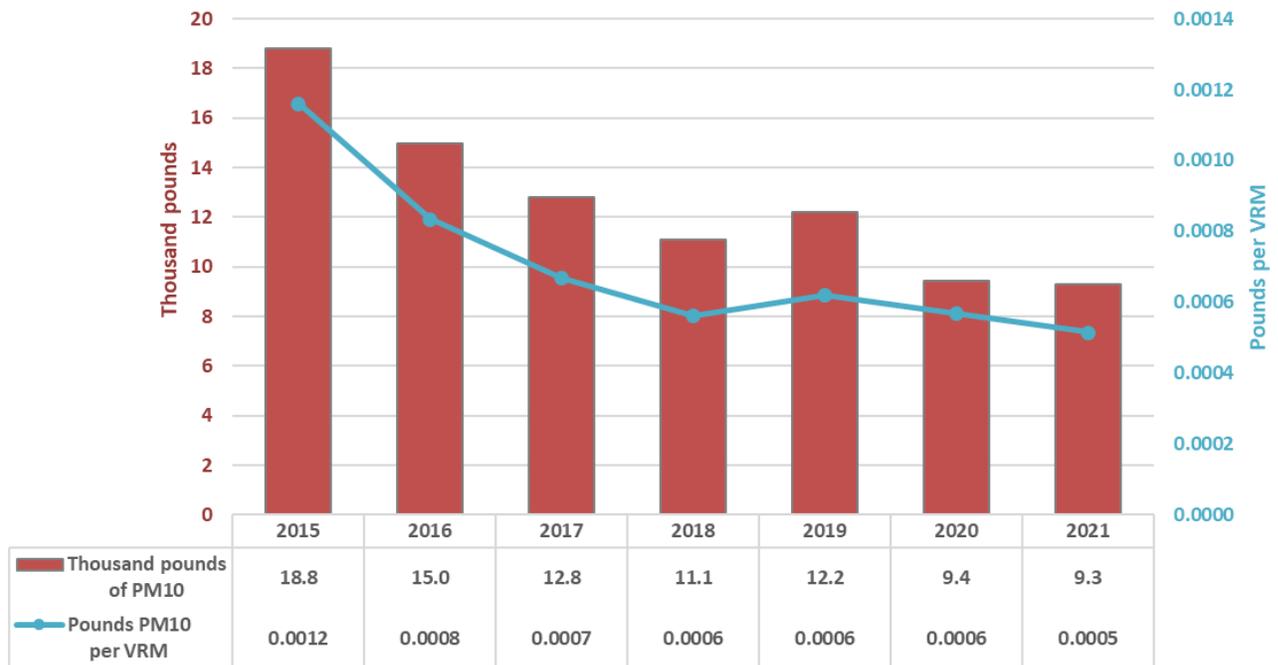


Figure 16. Carbon Monoxide (CO) Emissions (Normalized by PMT), 2015-2021

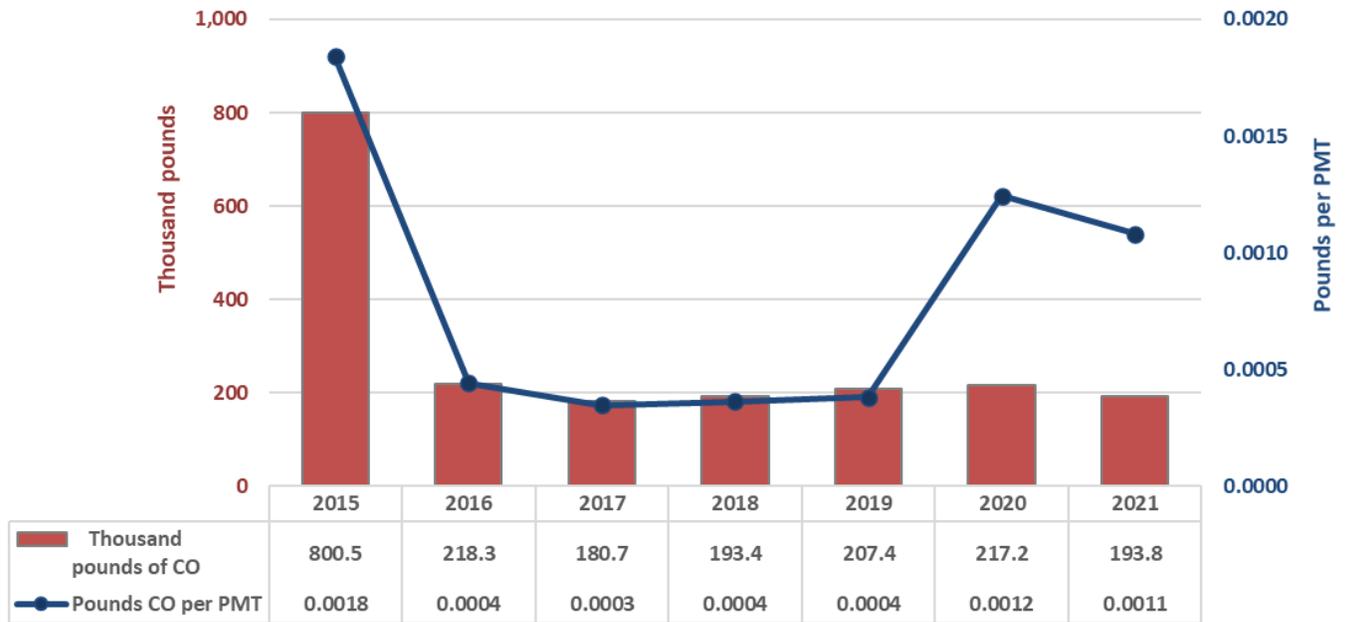
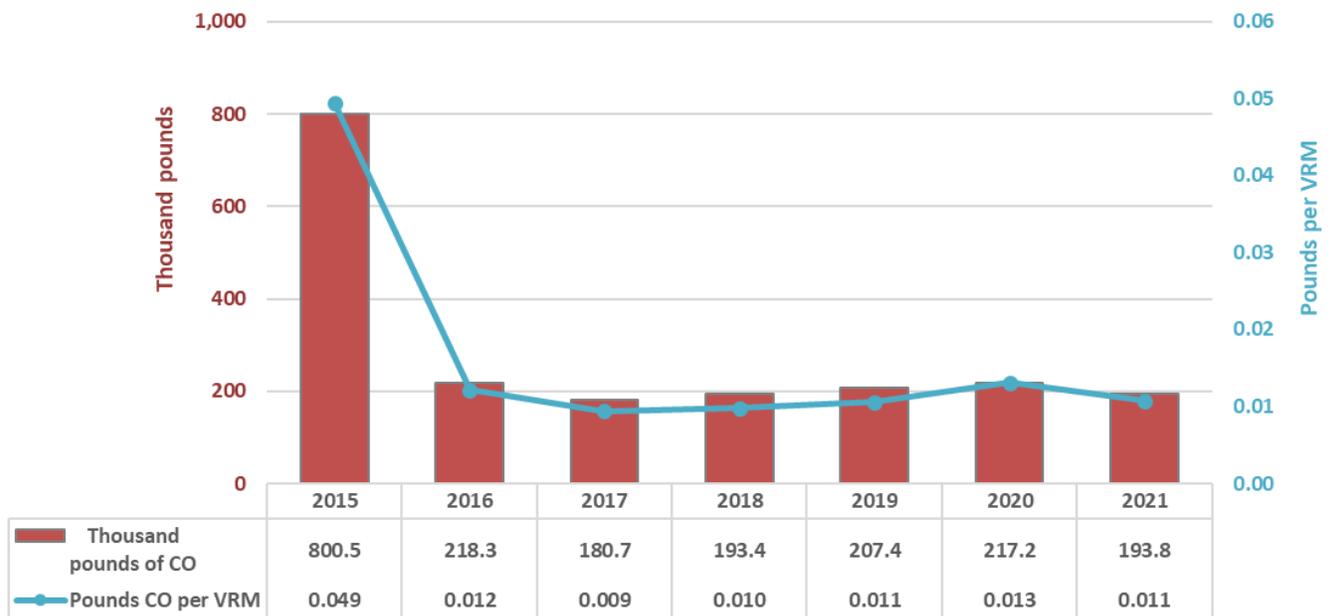


Figure 17. Carbon Monoxide (CO) Emissions (Normalized by VRM), 2015-2021

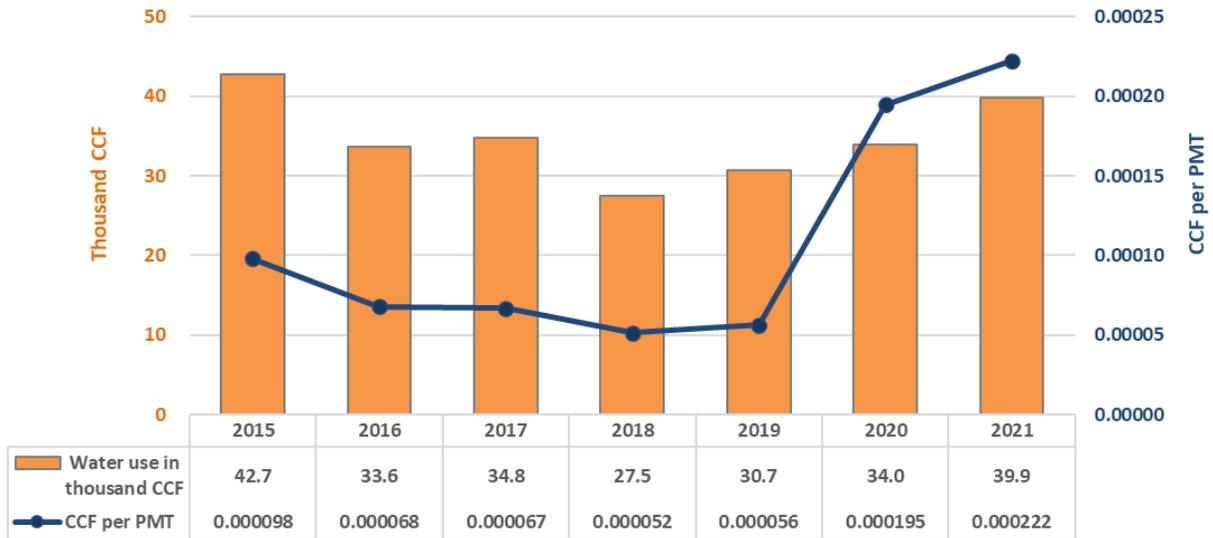


### Water Use

- Since 2010, water use has grown by 55 percent in total.
- From 2020 to 2021, water use increase by 17 percent in total.

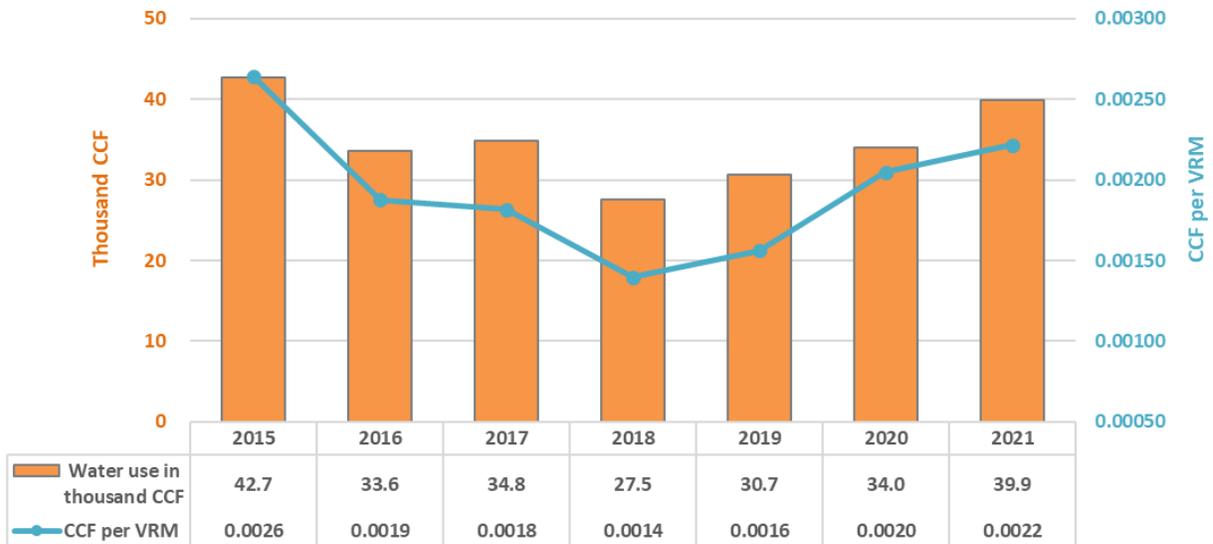
- Total agency water use is primarily driven by landscape irrigation and is therefore variable from year to year. Irrigation-related leak incidents, hotter weather, and the installation of landscaping features at new stations drove much of the additional water consumption observed in 2021.
- Changes in agency water consumption from the prior year varied across agency functions in 2021. Maintenance facilities increased water consumption 81 percent from the prior year, largely reflective of the opening of OMF-East. Customer facilities increased consumption 9 percent and administrative facilities reduced water consumption 23 percent.

**Figure 18. Water Use (Normalized by PMT), 2015-2021**



Note: 1 CCF equals 100 cubic feet, or 748 gallons

**Figure 19. Water Use (Normalized by VRM), 2015-2021**



## Waste Generation

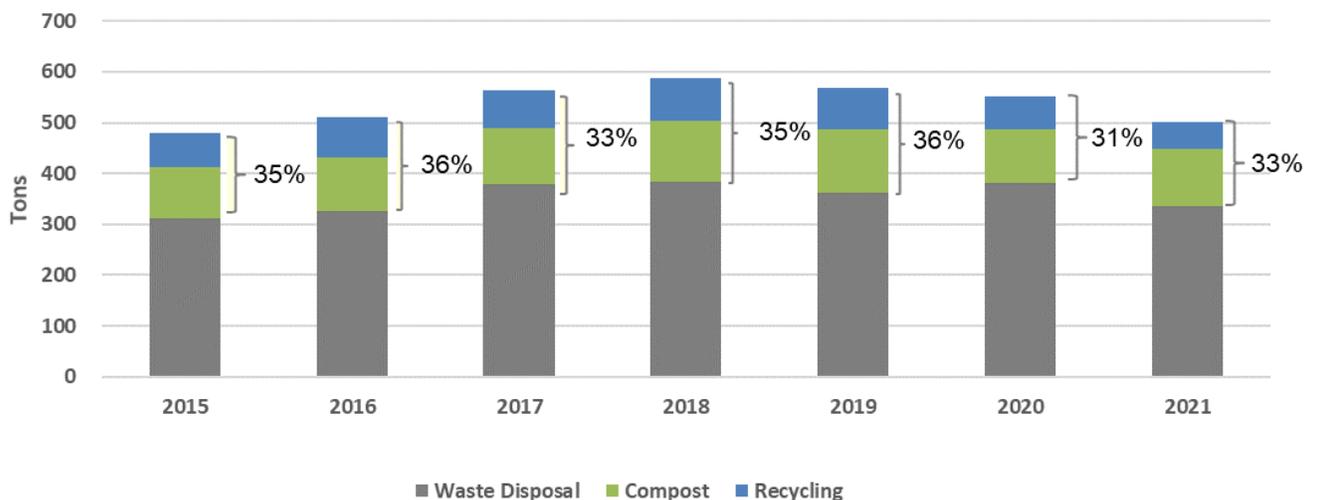
- Since 2010, waste generation has declined by 28 percent.
- From 2020 to 2021, waste generation decreased 9 percent.

While acknowledging substantial inter-annual variability, waste generation at Sound Transit facilities has declined 28 percent since 2010 as service and agency staff have increased. The total amount of garbage sent to landfill has declined 34 percent over the same timeframe, while the rate at which recyclables and compost have been diverted from the landfill has hovered between a low of 27 percent (2010) and a high of 39 percent (2014), achieving a diversion rate of 33 percent in 2021.

Since 2010, the agency has worked to improve solid waste diversion from landfill by enhancing employee recycling education and implementing paper towel composting in the restrooms at agency offices. In 2016, the disposal bins at the Central Link OMF facility were too small for the volume of garbage, leading to co-mingling of solid waste and recyclables, until bins were upgraded. This problem underscores the importance of ongoing assessment and education, as well as appropriate infrastructure, to support recycling and composting efforts. The COVID-19 pandemic resulted in a shift of the administrative staff in 2020 to remote work, which in turn decreased office recycling and composting volumes as a component of the total agency waste stream.

- Composting quantities in 2021 increased 6 percent from the prior year, while recycling quantities decreased 16 percent. The agency's total diversion rate during that period increased from 31 to 33 percent, as pictured in Figure 19 below.
- Waste diversion rates for central office facilities are substantially higher than for other facilities. As depicted in Table 4 below, the diversion rate from landfill for central office facilities remained in the 60-64% range prior to the COVID-19 pandemic but sank to 50% with the move of the administrative staff to remote working in 2020. In 2021, the central office diversion rate spiked to 72% as some staff returned to office.

**Figure 20. Waste Generation and Diversion, 2015-2021**



**Table 4. Waste Diversion Rates by Facility Type**

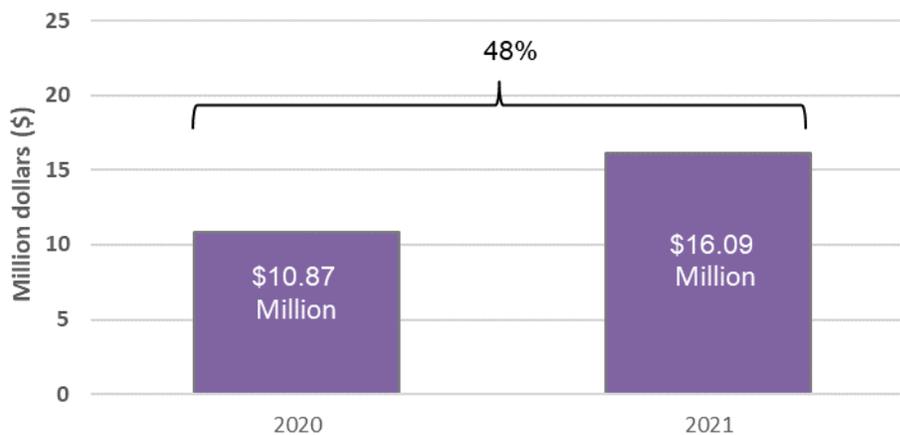
Year	Central Office	Other Facilities	Total
2015	64%	25%	35%
2016	66%	24%	36%
2017	61%	22%	33%
2018	60%	23%	35%
2019	61%	24%	36%
2020	50%	24%	31%
2021	72%	24%	33%

### Fuel and Utility Expenses

- Relative to 2010 levels, fuel costs for ST Express buses and Sounder commuter rail are down 7 percent.
- From 2020 to 2021, fuel costs increased by 64 percent.
- Since 2010, utility costs have increased by 199 percent.
- From 2020 to 2021, utility costs increased by 30 percent.

Resource costs across categories have generally trended upward since 2010. However, the COVID-19 pandemic in 2020 resulted in a substantial decrease in revenue vehicle fuel expenses and a more modest decline in facility resource expenditures due to lower consumption. In 2021, overall spending on fuel rebounded from the 2020 lows as a result of greater consumption and rising fuel prices. Figure 20 below shows the change in agency operating costs for fuel and utilities from 2020 to 2021. Vehicle revenue miles increased 8 percent in this period.

**Figure 21. Fuel and Utility Expenses, 2020-2021**



## Fuel Costs

- Fuel costs for ST Express buses and Sounder commuter rail have decreased by 7 percent since 2010 and increased by 64 percent from 2020 to 2021.
- Transit vehicle fuel use accounted for 58 percent of Sound Transit's fuel and utility expenses in 2021, up from 52 percent in 2020.
- In 2021, transit vehicle fuel expenses accounted for roughly 2.4 percent of Sound Transit's operating budget, up from 1.5 percent the prior year.

Figure 22. Sounder and ST Express Fuel Costs (Normalized by PMT), 2015-2021

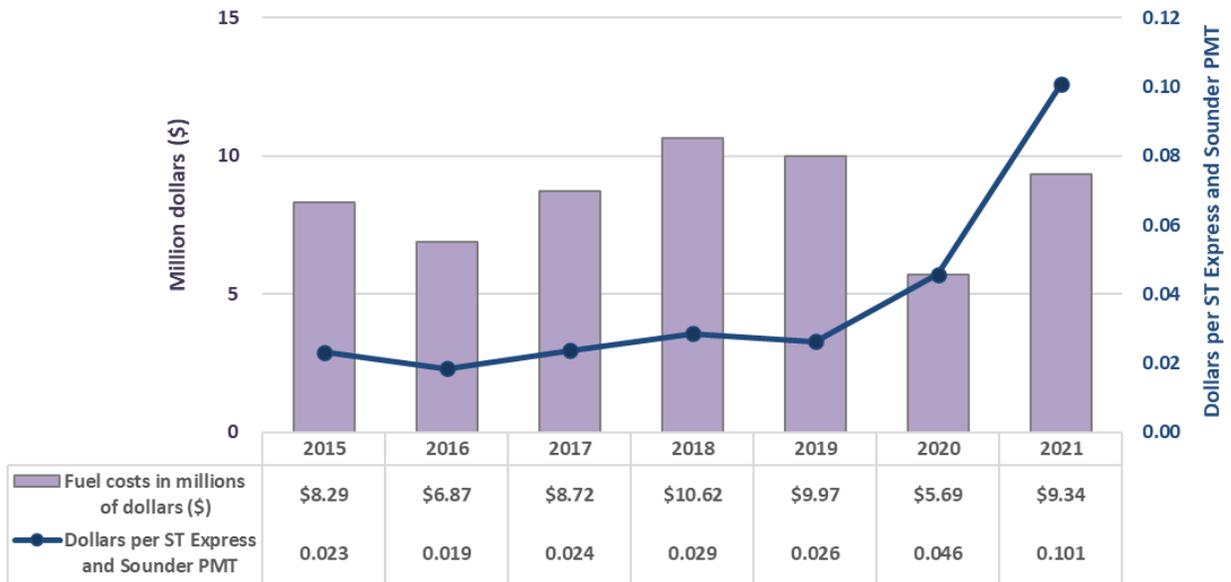
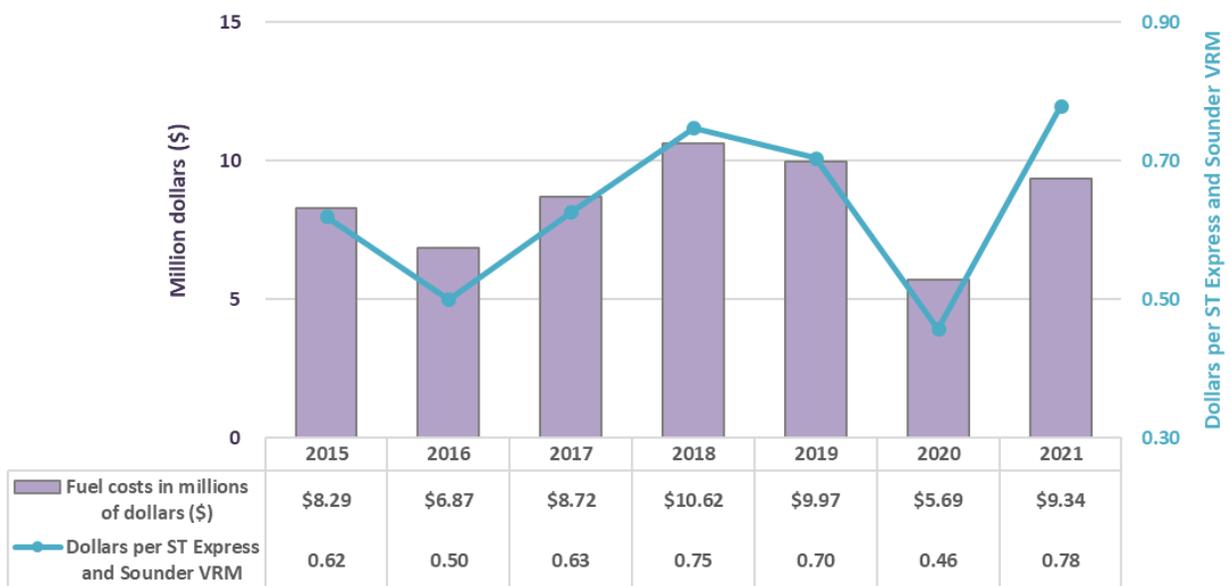


Figure 23. Sounder and ST Express Fuel Costs (Normalized by VRM), 2015-2021



### Other Utility Expenses

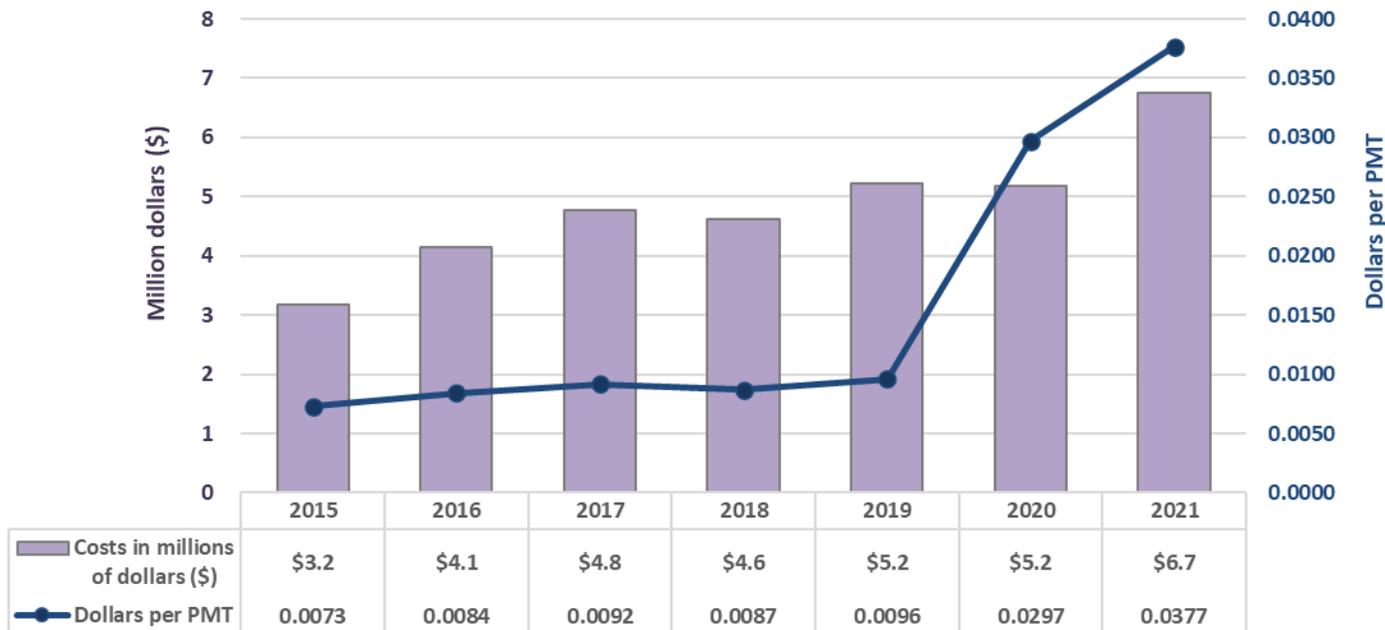
- Since 2010, utility costs have increased by 199 percent.
- Utility costs increased by 30 percent from 2020 to 2021.

**Table 5. Change in Utility Costs**

	Change 2010-2021 (Absolute)	Change 2020-2021 (Absolute)
Traction power electricity costs	+260%	+33%
Facility electricity costs	+188%	+31%
Facility natural gas costs	+133%	+28%
Water costs	+30%	+8%
Waste, recycling, and compost cost	+105%	-2%

Utility expenses for electricity, water, and waste have increased over time in line with usage trends. Figure 23 below shows the change in resource costs since 2015. Total facility electricity costs since 2010 have increased by 188 percent and waste costs have increased by 105 percent. Water costs have increased by 30 percent during that period but experience inter-annual volatility. The agency’s fuel expenses have fluctuated with the volatility in petroleum prices, while other resource costs have increased more steadily.

**Figure 24. Non-Vehicle Utility Costs (Normalized by PMT), 2015-2021**



*Note: Stormwater and sewer costs are not included.*

Figure 25. Non-Vehicle Utility Costs (Normalized by VRM), 2015-2021



## Appendix B – 2021 Sustainability costs and savings

The table below summarizes a sample of costs and savings from resource conservation projects completed as of the end of 2021. This data captures many significant monetary costs and savings. However, projects may have additional sustainability benefits that cannot be represented as financial savings – from reduced maintenance cycles to improved air quality.

Note that the savings figures below do not include labor and material cost savings related to improved operations and maintenance efficiency. Payback year estimates do reflect applicable grants and or rebates. Many projects with long payback periods still incur significant labor and material cost savings and reduce the frequency of maintenance.

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2021 SAVINGS	SAVINGS TO DATE, 2021	PAY-BACK YEAR	DESCRIPTION
<b>ST Express mid-day bus storage</b>	2008	\$0	\$70,797	\$2,128,414	2008	This program allows Pierce County buses to stay in Seattle until the afternoon commute to avoid driving back empty.
<b>Sounder automatic engine start-stop system</b>	2009	\$230,596	\$197,211	\$1,261,156	2013	This equipment was installed to shut down Sounder commuter rail engines when not in use, and reduces engine idling time by about 34 percent and significantly reduces air pollution.
<b>Sounder Lakewood-Seattle wayside power</b>	2010	\$490,000	\$99,701	\$1,015,175	2015	Electric wayside power units are used instead of the commuter rail locomotives' diesel engines to heat and power coach cars during layover, reducing diesel use and air pollutant emissions. Wayside units were installed in Tacoma in 2010 and were then moved to Lakewood in 2013, where more units were added.
<b>Sounder Everett-Seattle wayside power</b>	2011	\$315,000	\$7,127	\$250,331	2019	
<b>Central Link OMF sewer deduct meter</b>	2012	\$2,600	\$48,342	\$321,990	2012	This Central Link light rail Operations and Maintenance Facility meter reduces water costs by accounting for irrigation water that does not enter the wastewater stream.
<b>Union Station HVAC controls upgrade*</b>	2013	\$405,778	\$25,581	\$204,792	2022	The agency upgraded the controls for the Union Station Heating, Ventilation and Cooling (HVAC) system.
<b>Federal Way Transit Center garage lighting upgrades*</b>	2013	\$579,334	\$32,436	\$259,662	2023	Three transit facility garages were retrofitted for LED lighting. These locations included Federal Way Transit Center, Kent Sounder station and Auburn Sounder station.
<b>Kent Station garage lighting upgrades*</b>	2013	\$99,773	\$5,766	\$46,162	2022	
<b>Auburn Station garage lighting upgrades*</b>	2013	\$208,985	\$11,533	\$92,324	2023	

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2021 SAVINGS	SAVINGS TO DATE, 2021	PAY-BACK YEAR	DESCRIPTION
Angle Lake Station solar power	2016	N/A – Installed as part of Design Build project	\$1,503	\$7,751	N/A	14 KW solar array system on the Angle Lake Station platform canopy and 50 KW solar array system on the Angle Lake Garage pedestrian walkway. These solar panels were installed in the original design build contract for the facility.
Angle Lake Garage solar power	2016		\$2,069	\$18,251	N/A	
Kent Station lighting upgrades*	2017	\$169,849	\$10,210	\$48,616	2030	Kent, Sumner and Puyallup Stations were upgraded with LED lighting.
Sumner Station lighting upgrades*	2017	\$138,967	\$10,250	\$48,807	2027	
Puyallup Station lighting upgrades*	2017	\$169,849	\$10,622	\$50,578	2029	
OMF interior and exterior LED lighting and EMS controls upgrade*	2018	\$1,065,415	\$70,944	\$269,587	2026	The building control system was upgraded at the Operations and Maintenance Facility, which allows for improved building mechanical operations. The inefficient lighting was replaced with LED in the maintenance shop and exterior parking areas.
Mukilteo Parking Lot lighting upgrades	2018	\$13,150	\$3,558	\$12,770	2021	Parking lot lighting was retrofitted with LED lights near Mukilteo Station.
Issaquah Transit Center lighting upgrades*	2018	\$161,514	\$8,921	\$231,920	2035	Lighting was upgraded to LEDs at the Issaquah Transit Center, Mercer Island Park & Ride, and King St. Stations from parking garages and station platforms to area lighting.
Mercer Island Park and Ride lighting upgrades*	2018	\$191,424	\$8,402	\$29,810	2038	
King St. Station lighting upgrades*	2018	\$245,262	\$4,966	\$14,912	2066	
Sounder Yard solar power	2018	N/A - Installed as part of Design Build project	\$200	\$793	N/A	2.1 KW solar array system on the Sounder Yard facility. These solar panels were installed in the original design build contract for the facility.
Light Rail vehicles lighting upgrades	2019	\$137,022	\$16,837	\$47,789	2024	Interior lighting and headlights on Link Light Rail were upgraded to LED, which reduced lighting energy use by 45%. The project also improved visibility and reduced maintenance requirements for the lighting system.

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2021 SAVINGS	SAVINGS TO DATE, 2021	PAY-BACK YEAR	DESCRIPTION
Light Rail vehicles oil-less compressors	2019	\$650,100	\$32,034	\$82,937	2039	Compressors on 62 Link Light Rail vehicles were upgraded with oil-less compressors as part of their lifecycle replacement. The new compressors do not use any oil, reduce maintenance costs and improve reliability.
Edmonds Station Parking Lot lighting upgrades	2019	\$7,620	\$1,577	\$4,212	2022	Facilities retrofitted (24) 250 watt metal halide parking lot lights with 100 watt LED lights. The new lights use 60% less energy and require significantly less maintenance.
Angle Lake Garage irrigation controls	2020	\$1,903	\$214	\$375	2029	Installed smart irrigation controls at four locations.
Everett Sounder Station irrigation controls	2020	\$2,562	\$214	\$375	2026	
Issaquah Transit Center irrigation controls	2020	\$2,642	\$1,307	\$1,740	2022	
Mercer Island Park and Ride irrigation controls	2020	\$7,363	\$1,301	\$1,625	2026	
Lynnwood Warehouse lighting upgrades	2020	\$52,606	\$4,489	\$4,489	2028	
OMF East solar power	2021	N/A - Installed as part of Design Build project	\$10,159	\$10,159	N/A	100 KW solar array system on the OMF East roof. These solar panels were installed in the original design build contract for the facility.
Union Station Security Operations Center rooftop HVAC unit	2021	\$390,329	\$2,816	\$2,816	2038	Added a dedicated rooftop unit to the security operations center at Union Station, which operates 24/7. This part of Union Station previously served by the main building's HVAC, which can now be placed on a schedule that aligns with the main building occupancy schedule.
Angle Lake Garage irrigation controls phase 2	2021	\$5,160	\$693	\$693	2025	Installed flow sensor and master valve. Upgraded irrigation controller.

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2021 SAVINGS	SAVINGS TO DATE, 2021	PAY-BACK YEAR	DESCRIPTION
<b>Bonney Lake Park and Ride irrigation controls</b>	2021	\$5,926	\$360	\$360	2031	Upgraded master valves, flow sensors and controllers at four locations.
<b>Kent Garage irrigation controls</b>	2021	\$4,346	\$144	\$144	2031	
<b>Union Station irrigation controls</b>	2021	\$3,006	\$202	\$202	2026	
<b>Central OMF irrigation controls</b>	2021	\$11,000	\$549	\$549	2026	

\* Cost savings figures for projects implemented through an Energy Performance Contract (denoted with an \*) represent average, annualized savings based on the project's projected lifetime savings. These projects may ultimately achieve energy and cost savings in excess of the guaranteed amount.

## Appendix C – 2021 Key Performance Indicators

The table below presents the Key Performance Indicators (KPIs), as defined in the 2019 Sustainability Plan. The table also shows the KPIs in relation to their associated Priorities, Long-term goals and Short-term goals, per the Sustainability Plan. The KPIs reflect current progress compared to the 2019 Sustainability Plan's baseline year of 2018. Note that the KPIs below are a subset of the 2019 Sustainability Plan's metrics.

PRIORITY	LONG-TERM GOALS	APPLICABLE SHORT-TERM GOALS	KEY PERFORMANCE INDICATOR	2018 BASELINE VALUE	2021 VALUE AND/OR PERCENT CHANGE
People	Social equity addressed and implemented as an agency value	Contribute to a revolving loan fund for affordable housing revolving loan fund	# of dollars contributed to affordable housing revolving loan fund	Contributions began in 2019	\$4 million
		Build staff awareness and capacity to integrate equity into all business lines	% of staff trained in equity and inclusion	37% of staff trained	<ul style="list-style-type: none"> <li>• 88% of staff completed Equal Employment Opportunity Training</li> <li>• 59% of staff completed Implicit Bias Training</li> <li>• 20% of staff completed Inclusion Training</li> <li>• 10% of staff attended Organizational Equity Workshop</li> </ul>
		Meet or exceed workforce diversity goals for construction contractors Goals: <ul style="list-style-type: none"> <li>• 21% people of color</li> <li>• 12% women</li> <li>• 20% apprentices</li> </ul>	% of hours worked by diverse communities on ST job sites	<ul style="list-style-type: none"> <li>• 29% by people of color</li> <li>• 7% by women</li> <li>• 20% by apprentices</li> </ul>	<ul style="list-style-type: none"> <li>• 35% by people of color</li> <li>• 7% by women</li> <li>• 20% by apprentices</li> </ul>
	All staff champion sustainability	Certify key staff to green design and building management professional accreditations	# of staff trained to sustainable professional accreditations	<ul style="list-style-type: none"> <li>• 22 new Envision Sustainability Professionals</li> <li>• 17 new LEED Accredited Professionals</li> <li>• 5 other new sustainability certifications</li> </ul>	<ul style="list-style-type: none"> <li>• 49 Envision Sustainability Professionals</li> <li>• 18 LEED Accredited Professionals</li> <li>• 12 other new sustainability certifications</li> </ul>

PRIORITY	LONG-TERM GOALS	APPLICABLE SHORT-TERM GOALS	KEY PERFORMANCE INDICATOR	2018 BASELINE VALUE	2021 VALUE AND/OR PERCENT CHANGE
Planet	Achieve carbon free operations	Reduce greenhouse gas emissions by 10 percent	% change in greenhouse gas emissions	66,206 tonnes of CO <sub>2</sub> e	48,513 tonnes of CO <sub>2</sub> e; 27% reduction since 2018*
			% change in criteria air pollutants	<ul style="list-style-type: none"> <li>• Particulate Matter: 11,078 lbs</li> <li>• Volatile Organic Compounds: 15,485 lbs</li> <li>• NOx: 399,828 lbs</li> <li>• CO: 193,411 lbs</li> <li>• SOx: 9,986 lbs</li> </ul>	<ul style="list-style-type: none"> <li>• Particulate Matter: 9,277 lbs; 16% decrease since 2018*</li> <li>• Volatile Organic Compounds: 14,976 lbs; 3% increase since 2018*</li> <li>• NOx: 392,124 lbs; 2% decrease since 2018*</li> <li>• CO: 192,800 lbs; 0% decrease since 2018*</li> <li>• SOx: 8,734 lbs; 13% decrease since 2018*</li> </ul>
		Increase production from solar panels to 750 KW	# of kW of renewable energy production	<ul style="list-style-type: none"> <li>• 76,257 kWh produced</li> <li>• 2.1 KW installed</li> </ul>	153,511 kWh produced
		Purchase available cost-effective, carbon-free electricity	% change in renewable electricity procurement	84% electricity from clean and renewable sources	93% electricity from clean and renewable sources in 2021; 11% increase since 2018
		Decrease total energy use 5 percent for all facilities built before 2018	% of facility energy reduced	26,996437 KBtu	26,935,295 KBtu; 0% reduction since 2018*
	Enhance ecosystem functions	Achieve 100 percent environmental compliance (zero fineable violations)	# of fineable environmental compliance violations	Four	Zero
		Reduce total water use by 10 percent at all existing facilities and sites established before 2018	% change in agency water use	27,521 CCF used	39,870 CCF used; 45% increase since 2018

PRIORITY	LONG-TERM GOALS	APPLICABLE SHORT-TERM GOALS	KEY PERFORMANCE INDICATOR	2018 BASELINE VALUE	2021 VALUE AND/OR PERCENT CHANGE
Prosperity	Build resilience to climate change and natural or manmade disasters	Develop staff awareness of individual roles in emergency prepared	% of staff trained in emergency preparedness	Training began in 2019	<ul style="list-style-type: none"> <li>• 1,411 staff trained in COVID-19 Work Site Safety</li> <li>• 25 staff attended Safety Lunch and Learns</li> <li>• 449 staff trained in Non-Revenue Vehicle Safe Driving</li> <li>• 17 staff certified in First Aid/CPR/AED</li> </ul>
		Conduct a Climate Vulnerability Assessment as part of each major system capital expansion project	% of projects that include Climate Change Vulnerability Assessments	Assessments began in 2019	100% of eligible projects
	Maximize operational efficiency	Divert 50 percent of office waste to recycling or compost	% of waste diverted	35%	33%*
		Include green methods or features in at least 75 percent of all new agency procurements	% increase in # of and dollar value of procurements	<ul style="list-style-type: none"> <li>• 15% of new procurements</li> <li>• \$299M in value</li> </ul>	<ul style="list-style-type: none"> <li>• 65 procurements - 44% overall and a 193% increase since 2018</li> <li>• \$389M in value – 30% increase since 2018</li> </ul>

\* Key Performance Indicator was significantly impacted by reduced ridership, reduced resource use, and/or employee's working remotely due to the COVID-19 pandemic.