



Biodiesel Use by Washington State Agencies

January through December 2020

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REPORT HIGHLIGHTS

- During 2020, biodiesel purchased by state agencies, including universities, totaled over 1.7 million gallons, or 9.5% of the fuel purchased to run diesel vehicles, vessels and equipment, and fire boilers to heat and power facilities. This is a 2.6% improvement from last year, when the biodiesel use was 6.9%.
- Washington State Ferries (WSF) is the largest state agency consumer of diesel, accounting for 81% of all purchases. WSF purchased 1,448,102 gallons of biodiesel during 2020, 21% more than was purchased in 2019. WSF averaged 9.8% biodiesel, up from 6.4% in 2019. B10, which contains 10% biodiesel, was introduced to the fleet in July 2019, and by October 2019 was the standard fuel for all vessels.
- Beyond maritime operations, the Washington State Department of Transportation (WSDOT) was the state's second largest purchaser of diesel, accounting for 12% of all purchases. WSDOT purchased 282,960 gallons of biodiesel during 2020, with an average blend level of 12.6% biodiesel. This level was down from 12.9% in 2019, and was the lowest since 2013.
- Other agencies, including all six universities, purchased diesel during the year, accounting for the remaining 7% of fuel purchases. As universities are not required to procure fuel under the state's Master Contracts, their total diesel consumption may not be accurately accounted for in this report.
- The state departments of Corrections, Social and Health Services, Natural Resources, and Fish and Wildlife, along with the University of Washington, were the only other agencies to purchase biodiesel. Their combined procurement of 13,814 gallons of biodiesel accounted for less than 1% of total fuel purchases.

BACKGROUND

This report covers January 1 through December 31, 2020, and focuses on bulk fuel purchased through state fuel contracts and on the open market to operate diesel-powered vessels, vehicles, and equipment.

The term "biodiesel" means pure biodiesel unless clearly indicated otherwise. Biodiesel blends are specified by the capital letter "B" followed by the percentage of biodiesel. For example, B5 contains 5% biodiesel and 95% diesel. In tables and charts, biodiesel is expressed in B100 gallons. To avoid confusion, the term "fuel" is used to indicate a combination of all forms of diesel, including biodiesel.

As a part of the state's efforts to reduce emissions and dependence on foreign oil, and stimulate local production and use of biodiesel, state law has mandated that agencies use biodiesel-blended fuels to operate diesel-powered vessels, vehicles and construction equipment since 2009. Under current law, WSF is to use a minimum blend of B5 in all vessels as long as the price of B5 or B10 does not exceed the price of petroleum diesel by 5%. All other state agencies are to use a minimum blend of B20 on an annualized basis ([RCW 43.19.642](#)).

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This policy is reinforced by procurement rules codified under [WAC 194-28](#), which directs state agencies to use biofuels and electricity, to the extent practicable, for publicly-owned vessels, vehicles and construction equipment. These rules reinforce the criteria cited in RCW 43.19.642 and highlight compliance expectations for the 16 agencies and universities with the highest levels of gasoline and diesel consumption. In addition, [Executive Order 20-01](#) directs agencies to reduce emissions of greenhouse gases and other toxins by procuring lower-emission options when “cost-effective and workable solutions are available.”

Per [RCW 43.19.646](#), the Washington State Department of Enterprise Services (DES) is to collaborate with key state agency stakeholders to compile and analyze the use of biodiesel fuel by state agencies as required by [RCW 43.19.642](#), and report findings and recommendations to the Governor and Legislature in an electronic format. For nine years, these reports were required every six months. In 2016, the Legislature changed the frequency of the report to an annual requirement.

Previous reports attempted to determine whether diesel and biodiesel procurement by agencies was intended for transportation purposes, facility energy needs, or both. Given the expanding policy framework around public sector use of fossil fuels, this report now includes all procurement of diesel-related fuels.

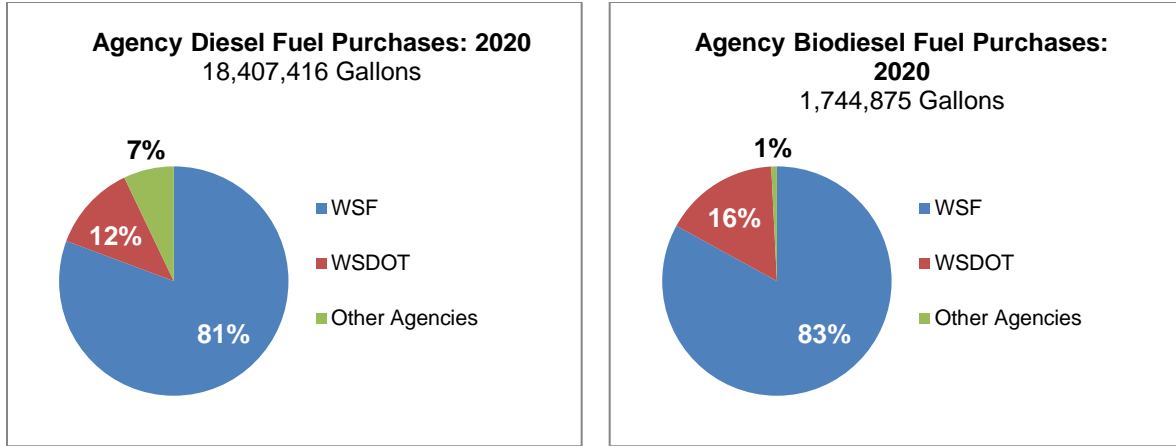
Renewable diesel is a fuel made from the same biogenic feedstocks as biodiesel that is refined to be chemically equivalent to petroleum diesel. The University of Washington (UW) was the only agency to procure both renewable diesel and blends of renewable diesel and biodiesel. UW’s motor pool purchases beginning in the fourth quarter of 2019 were the first by an agency. Renewable diesel is well-known for reducing emissions and is consistent with the policy goals cited above. If agencies choose to purchase renewable in the future, it will be considered “biodiesel” for the purposes of this report.

STATE BIODIESEL PURCHASES

State agencies are required to purchase bulk fuel through state fuel contracts that cover gasoline, heating oil, and diesel (including biodiesel). Many cities, counties, school districts, higher education institutions, and transit systems also use the contracts. In 2020, state agencies and universities purchased 16.6 million gallons of diesel fuel, including 1.7 million gallons of biodiesel.

As the largest consumer of diesel among state agencies, WSF accounted for 81% of fuel purchases, including 83% of biodiesel purchases. WSDOT accounted for another 12% of fuel purchases, including 16% of biodiesel purchases. Other agencies and universities accounted for the balance of 7% of fuel purchases, including 1% of biodiesel purchases.

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State Ferries Use

WSF purchased 1,448,102 gallons of biodiesel during 2020. This is a 21% increase from the 1,200,837 gallons purchased in 2019. Overall, WSF purchases averaged 9.8% biodiesel for 2020, up from 6.4 % for 2019.

State Ferries Biodiesel Purchases: 2009 to 2020

| Year | Diesel Gallons | Biodiesel Gallons | Total Gallons | Biodiesel % |
|------|----------------|-------------------|---------------|-------------|
| 2020 | 13,403,109 | 1,448,102 | 14,851,211 | 9.8% |
| 2019 | 17,633,816 | 1,200,837 | 18,834,653 | 6.4% |
| 2018 | 17,806,078 | 843,467 | 18,649,545 | 4.5% |
| 2017 | 17,976,949 | 882,214 | 18,859,163 | 4.7% |
| 2016 | 17,799,290 | 807,807 | 18,607,097 | 4.3% |
| 2015 | 16,687,482 | 691,580 | 17,379,062 | 4.0% |
| 2014 | 16,480,334 | 715,653 | 17,195,987 | 4.2% |
| 2013 | 16,701,761 | 687,741 | 17,389,502 | 4.0% |
| 2012 | 16,749,738 | 485,537 | 17,235,275 | 2.8% |
| 2011 | 17,107,676 | 468,837 | 17,576,513 | 2.7% |
| 2010 | 16,915,217 | 221,421 | 17,136,638 | 1.3% |
| 2009 | 16,733,093 | 101,939 | 16,835,032 | 0.6% |

WSF's progress using biodiesel has occurred in stages. WSF began using B5 for vessels fueled by truck from the Harbor Island truck facility in Seattle in 2009. Vessels fueled by truck from Anacortes began using B5 in 2011. Installation of infrastructure for in-line biodiesel blending at the Seattle Harbor Island dock facility was completed in early 2013.

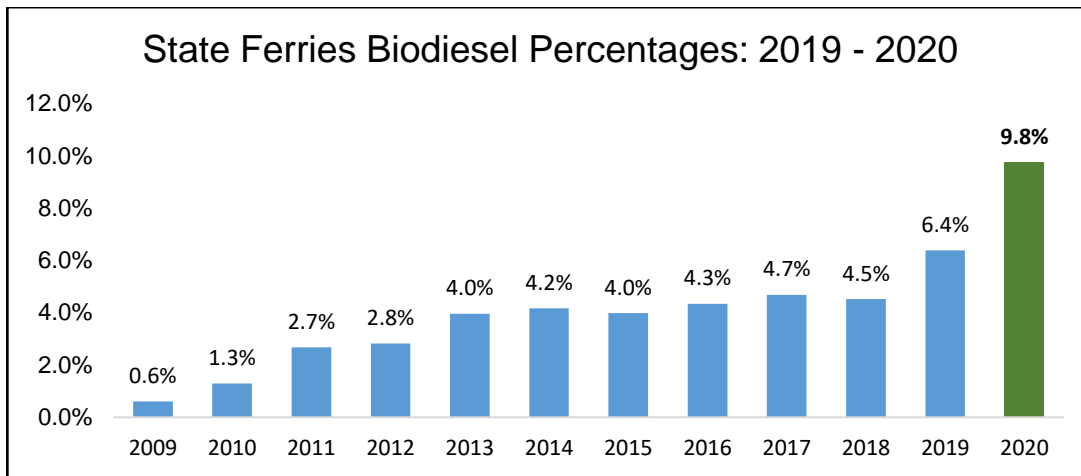
After completing a pilot test in 2018 that found no negative impacts of B10 on vessel equipment, performance, and maintenance, WSF implemented fleet-wide use of B10 in July 2019. Use of a self-propelled bunkering vessel to deliver B10 via vessel-to-vessel delivery was pilot tested in October 2019 at Pier 15 in Seattle. After successful testing, vessel-to-vessel fuel delivery started at the Kingston Terminal in November 2019, expanded to the Bremerton Terminal in January 2020, and the Bainbridge Island Terminal in June 2020. Pilot testing of vessel-to-vessel delivery at the Vashon Island Terminal also occurred in 2020.

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All delivery locations received biodiesel fuel during 2020, with every location averaging at least 9% biodiesel. Notably, five terminals (Bainbridge, Fauntleroy, Port Townsend, Point Defiance, and Vashon) received exclusively B10. Fuel at the Anacortes Terminal, which accounted for 21% of all fuel delivered during this period (the highest percentage of any delivery location), averaged 9.9% biodiesel. Fuel deliveries to the Friday Harbor Terminal averaged 9%, the lowest biodiesel percentage of any delivery location.

WSF uses Portland, Ore., as a reference city for biodiesel prices. For 2020, the price of Portland B5 was, on average, 1.2% lower than diesel and the price of Portland B10 was, on average, 0.9% lower than diesel.

In 2020, lubricating oil for the Detroit Diesel Series 60 diesel engine, an engine used widely throughout the fleet as a prime mover for vessel service generators, experienced excessive fuel oil dilution. The oil dilution issue was correlated with the July 2019 fleet-wide transition from B5 to B10. WSF conducted testing and confirmed that B10 was not a causal factor. WSF reported no other biodiesel-related quality or performance concerns in 2020.



Land Sector Use

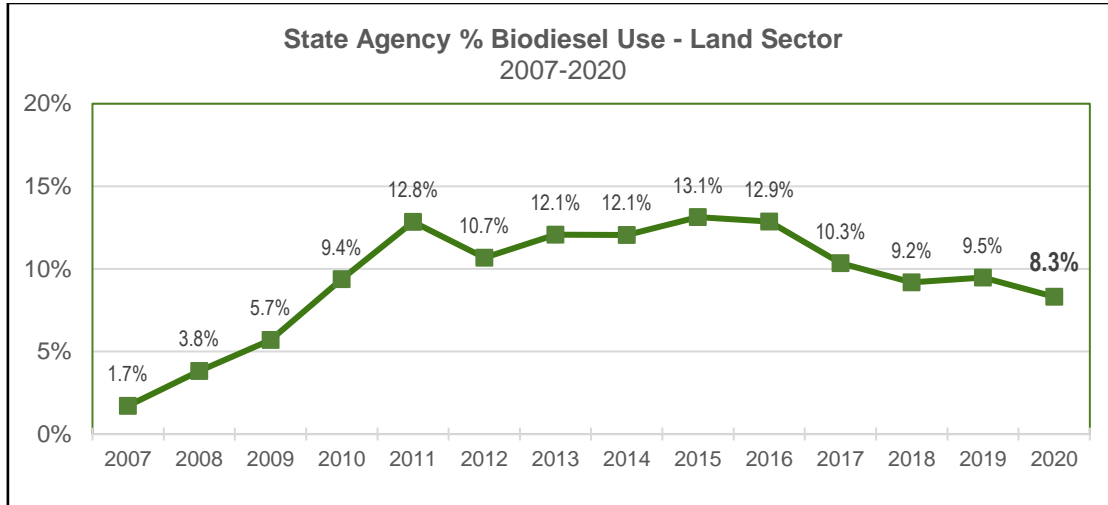
Agency purchases of biodiesel for non-marine uses totaled 296,774 gallons in 2020, about 8.3% of total diesel purchases, down from 9.5% in 2019. WSDOT is the largest single user other than WSF, purchasing 2.2 million gallons of fuel in 2020. Biodiesel comprised 12.6% of WSDOT purchases, down from 12.9% in 2019.

Land Sector Biodiesel Purchases: 2020

| Agency | Diesel Gallons | Biodiesel Gallons | Total Gallons | Biodiesel % |
|----------------|------------------|-------------------|------------------|-------------|
| WSDOT | 1,966,508 | 282,960 | 2,249,468 | 12.6% |
| Other Agencies | 1,292,924 | 13,814 | 1,306,737 | 1.1% |
| Total | 3,259,432 | 296,774 | 3,556,205 | 8.3% |

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Of the 18 other agencies and universities only Corrections, Social and Health Services, Natural Resources, Fish and Wildlife, and University of Washington purchased biodiesel during the year.



WSDOT Regional Purchases

WSDOT maintains a statewide network of 105 diesel fueling sites that serves the majority of the state’s diesel-powered vehicles and equipment. Of those sites, 11 do not receive biodiesel due to cold winter temperatures and low fuel turn-over (no fuel use for four to six months, or longer). All remaining sites received some amount of biodiesel during the year.

Since 2012, WSDOT’s efforts to achieve a B20 blend level on an annualized basis have been hampered by older tanks that fail to meet EPA guidance regarding materials compatibility. These tanks are limited to B20, so lower-level winter blends cannot be balanced by blends above B20 in the summer months. WSDOT has replaced tanks at ten sites since 2015, and estimates \$121 million is needed to replace the 38 remaining tanks with B20 limitations. The agency has requested \$10 million for the 2021-23 biennium to replace the highest priority, single-walled tanks at White Pass and Morton.

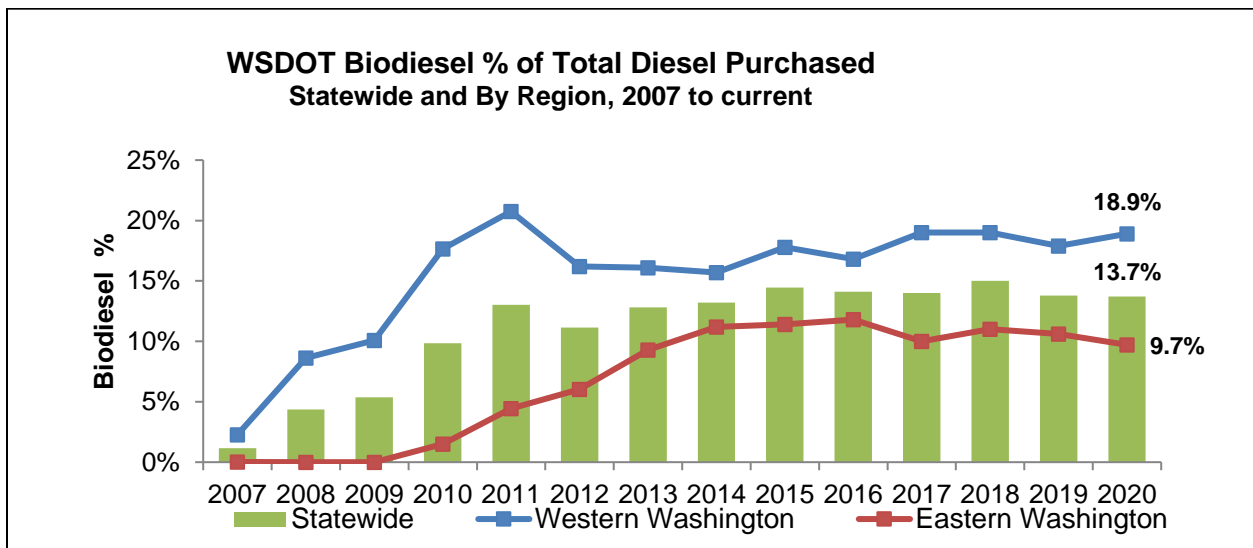
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| WSDOT Fueling Site Purchases by Region: 2020 (diesel-only tanks omitted as of 2016) | | | | |
|--|-----------------------|--------------------------|----------------------|--------------------|
| WSDOT Region | Diesel Gallons | Biodiesel Gallons | Total Gallons | Biodiesel % |
| Westside | 729,849 | 170,155 | 900,004 | 18.9% |
| • Olympic | 245,554 | 65,196 | 310,750 | 21% |
| • Southwest | 173,272 | 38,975 | 212,247 | 18.4% |
| • Northwest | 310,996 | 66,011 | 377,007 | 17.5% |
| Eastside | 1,048,370 | 112,805 | 1,161,175 | 9.7% |
| • North Central | 277,375 | 27,115 | 304,490 | 8.9% |
| • Eastern | 344,815 | 42,739 | 387,554 | 11.0% |
| • South Central | 426,181 | 42,950 | 469,131 | 9.2% |
| Total | 1,778,219 | 282,960 | 2,061,179 | 13.7% |

On the west side of the state, WSDOT has 48 sites in three regions of aggregated counties. Seven of these sites did not receive biodiesel. Overall biodiesel use in west side sites eligible for biodiesel rose a percentage to 18.9% from 17.9% in 2019. The Northwest region saw the highest level of biodiesel use, however lagged behind in biodiesel percentage due to inconsistent vendor deliveries.

The Olympic region’s biodiesel volume followed closely but with a higher biodiesel blend. The Southwest region purchased considerably less total fuel but was comparable to the overall blend percentage for western Washington.

On the east side, WSDOT has 57 sites in three regions of aggregated counties. Four of these sites did not receive biodiesel. Overall biodiesel use in east side sites eligible for biodiesel fell to 9.7% from 10.6% in 2019. Eastern and South Central regions received about the same amount of biodiesel. North Central Region received considerably less biodiesel and their overall diesel purchases were lower compared to the other two regions. Biodiesel blends were similar for all three regions. Inconsistent vendor deliveries continued to be a problem.



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FUEL QUALITY

The Washington State Department of Agriculture (WSDA) monitors the quality of diesel and biodiesel fuels as part of the state's Motor Fuel Quality Program. During 2020, WSDA submitted 66 diesel and biodiesel blend fuel samples to a contracted laboratory to test compliance with American Society for Testing and Materials (ASTM) quality standards. Samples were obtained from fuel terminals, retail outlets, and state and local government fueling sites. They included 59 diesel samples, and seven B20 samples. The diesel samples included 41 samples from pumps with the added label "may contain up to 5% biodiesel." Twelve of these samples contained biodiesel.

Test results continued to show problems with diesel meeting flash point specifications, though there has been continued improvement over prior years. Of the five samples that did not meet ASTM specifications, four failed to meet flash point specifications. Flash point failures do not affect engine performance but can be an indicator of contamination. These failures are often caused by contamination with small amounts of gasoline usually attributed to tank management in transport trucks or design flaws with underground storage tank systems. WSDA issued one notice of correction for selling diesel fuel that did not meet specifications. All B20 and B99 fuel samples met ASTM specifications. All terminal testing results passed.

Overall, WSDA did not identify any significant quality issues with biodiesel fuels during this reporting period. WSDA reported that it is increasingly hard for its inspectors to find retail stations offering fuels with more than 5% biodiesel.

STATE CONTRACTING

DES has four Master Contracts that provide multiple types of fuel products and are utilized by numerous purchasers across the state. Contracts must provide agencies with biodiesel that is primarily produced in-state, or from in-state feedstocks.

Bulk Fuel (#00311) provides bulk fuel and will-call fuel deliveries for products such as gasoline, diesel and biodiesel. There are five contractors servicing eight regions across the state: Associated Petroleum Products (APP), Christensen (dba RE Powell), PetroCard, Wilcox & Flagel, and Coleman Oil. This contract is currently being rebid, as the current term ends on December 31, 2021.

Marine Refueling Services (#05718) provides diesel and biodiesel blends to WSF via pier-to-vessel, truck-to-vessel and vessel-to-vessel transfers at multiple locations. The contractor is Maxum Petroleum. The current term ends December 15, 2021, with automatic one-year extensions available through 2028.

Over the Water Marine Refueling (Keller Ferry) (#07613) provides diesel and biodiesel blends to WSF for the Keller Ferry on the Columbia River between Ferry and Clark counties. The contractor is Connell Oil. The current term ends on January 13, 2022, with extensions available through 2024.

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RECOMMENDATIONS

Department of Enterprise Services

The Department of Enterprise Services has ensured the below recommendations are included in the new Fuel Contract that will be effective January 1, 2022.

- Revise and/or rebid contracts as needed to provide competitively priced biodiesel and other alternative fuel products, such as renewable diesel.
- Establish, and require contractors to use standardized nomenclature to reduce confusion and errors in reporting, including types and uses of fuels (e.g., vehicles, facilities), customer names, and delivery locations.
- Ensure there is no price differential between Diesel, B5, and B10 to incentivize purchasers to purchase B10 as their default.
- Ensure fuel purchasers and contractors understand the distinction between co-refined diesel and renewable diesel as agencies are required to monitor their greenhouse gas emissions and need accurate carbon accounting.

State Ferries

- Continue to address any gaps in delivery of biodiesel blends by ensuring fuel contractors fulfill the terms of their contracts.

Department of Transportation

- Continue to address any gaps in delivery of biodiesel blends by ensuring fuel contractors fulfill the terms of their contracts.
- Increase biodiesel blend levels in certain WSDOT tanks that received less biodiesel in 2020 than similar tanks in the vicinity, especially those in areas with moderate temperatures that handle relatively high volumes of fuel. These include Bellingham, Mount Vernon, Monroe, Arlington and Oakesdale.
- Seek legislative appropriations to replace key older WSDOT fuel tanks so those locations are able to store higher levels of biodiesel blends.
- Use biodiesel blends to meet facility heating needs at locations with consistent fuel turnover, including Port Angeles and Issaquah. Blends up to B40 are safe for use in diesel-fueled boilers.

Other Agencies

- Work through the Alternative Fuels & Vehicles Technical Advisory Group jointly administered by Commerce and WSU's Energy Program to substantially increase biodiesel use by universities and agencies other than WSDOT and WSF. Specific opportunities are listed below.

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- UW and WSU purchased substantial volumes of diesel for campus power plant operations in Seattle and Pullman, respectively. Both could readily increase their use of biodiesel blends.
- Corrections purchased diesel for 10 facilities, but biodiesel blends at only two: Cedar Creek (25%) and the Washington Corrections Center in Shelton (5%). In addition to substantially increasing the biodiesel blend level at Shelton, other corrections centers purchasing a significant amount of diesel on a regular basis that could be using biodiesel blends include Larch, Airway Heights, Monroe, and the Washington State Penitentiary in Walla Walla.
- Fish & Wildlife's diesel purchases were primarily for their Lacey headquarters. The agency could consider biodiesel for their Aberdeen facility.
- Natural Resources procured biodiesel blends for both Forks (16%) and Loomis (11%). DNR purchased diesel for two other sites, but the only one well-suited for biodiesel based on consistent fuel use and volumes is Yacolt.
- Social & Health Services purchased diesel for seven facilities, but no biodiesel. The best opportunities to increase agency biodiesel use based on consistent fuel consumption and volumes would be the Fircrest Residential Habilitation Center in Shoreline, and the Consolidated Support Services building in Medical Lake.
- Parks & Recreation purchased diesel for 13 facilities, but no biodiesel. Most locations used very modest levels of fuel, but there are three others that based on consistent fuel consumption and volumes would be candidates for biodiesel: Fort Flagler, Deception Pass, and Spanaway Lake.
- Prior biodiesel reports attempted to quantify diesel use by Pierce County ferries servicing the McNeil Island Corrections Center. Given that this ferry also calls at other locations, and that a relatively low volume of fuel was being consumed to meet DOC's specific needs, an estimate is no longer included in this report.

These recommendations have been shared with each respective agency for consideration and implementation. DES thanks the following contributors for their assistance in providing this annual report.

CONTRIBUTORS

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