



# **Biodiesel Use by Washington State Agencies**

January through December 2018

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### **REPORT HIGHLIGHTS**

- During 2018, biodiesel purchased by state agencies under the state fuel contracts totaled almost 1.2 million gallons. This is the sixth year in a row that state agency biodiesel purchases topped 1 million gallons.
- Washington State Ferries (WSF) is the largest state agency consumer of diesel fuel. WSF purchased 843,467 gallons of biodiesel during 2018, which is almost 39,000 gallons less than purchased in 2017. The decrease in consumption was due in part to active efforts to decrease fuel consumption and to vessel breakdowns, which resulted in smaller vessels being used or reduced service. WSF averaged 4.5 percent biodiesel in 2018, down from 4.7 percent in 2017. B5, which contains 5 percent biodiesel, is the standard fuel for the fleet.
- Beyond WSF operations, other departments in the Washington State Department of Transportation (WSDOT) were the state's second largest purchaser of diesel fuel. WSDOT purchased 333,700 gallons of pure biodiesel (B100) during 2018, down at least 30,000 gallons from the amounts purchased in 2015, 2016, and 2017. Biodiesel made up 19 percent of total diesel fuel purchased in Western Washington and 11 percent in Eastern Washington. Statewide, WSDOT averaged 15 percent biodiesel, up 0.50 percent from 2017. Eleven WSDOT sites do not receive any biodiesel due to cold winter temperatures and low fuel turnover. These sites accounted for 168,000 gallons of the diesel delivered during 2018.
- Other agencies and higher education institutions accounted for bulk purchases of roughly 12,000 gallons.

### **BACKGROUND**

This report covers January 1 through December 31, 2018, and focuses on bulk fuel purchased through state fuel delivery contracts to operate diesel-powered vessels, vehicles, and equipment. The term "biodiesel" means pure biodiesel (B100) unless clearly indicated otherwise. Biodiesel blends are specified by the capital letter "B" followed by a value representing the volume percentage of biodiesel, such as B5 and B20. Therefore, B5 contains 5 percent biodiesel and 95 percent diesel. In tables and charts, biodiesel is expressed in B100 gallons.

As a part of the state's efforts to reduce its dependence on foreign oil, reduce emissions, and stimulate local production and use of biodiesel, state law has mandated that state 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 of B5 in all vessels as long as the price does not exceed the price of petroleum diesel by 5 percent. All other state agencies are to use a minimum of B20 to operate diesel vessels, vehicles, and construction equipment (see [RCW 43.19.642](#) and [WAC 194-28](#)).

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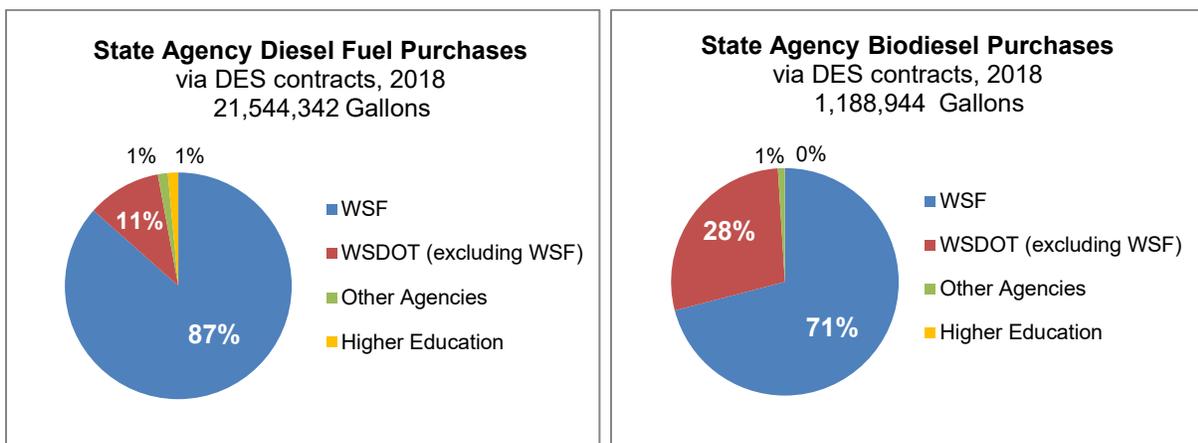
State law ([RCW 43.19.646](#)) requires the Department of Enterprise Services (DES) to compile and analyze the use of biodiesel fuel by state agencies and report its findings and recommendations to the Governor and Legislature in an electronic format. For nine years, these reports were required every six months. In 2016, the Legislature amended [RCW 43.19.642](#) changing the frequency of the report to be an annual requirement. DES collaborates with key state agency stakeholders to prepare the report.

### STATE BIODIESEL PURCHASES

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

In 2018, state agencies and higher education institutions purchased 21.5 million gallons of diesel fuel through state fuel contracts, including about 1.2 million gallons of biodiesel. Since the biodiesel use requirements were enacted, state agency purchases have increased significantly. They topped 1 million gallons for the sixth year in a row in 2018.

As the largest consumer of diesel fuel among state agencies, WSDOT accounted for 98 percent of the diesel fuel and 99 percent of the biodiesel purchased during 2018. Of those purchases, WSF alone accounted for 87 percent of the diesel and 71 percent of the biodiesel. Other purchases made by state agencies for diesel-powered vehicles and equipment made up 2 percent of total diesel fuel purchased and 1 percent of the biodiesel purchased under state contracts.



### WASHINGTON STATE FERRIES (WSF) BIODIESEL USE

- WSF purchased 843,467 gallons of biodiesel during 2018. This is a 4.4 percent decrease from the 882,214 gallons purchased during 2017. Total fuel purchased during the period decreased about 1.1 percent, due in part to vessel breakdowns and active WSF efforts to reduce fuel consumption. Overall, WSF purchases averaged 4.5 percent biodiesel for 2018, down from 4.7 percent for 2017.

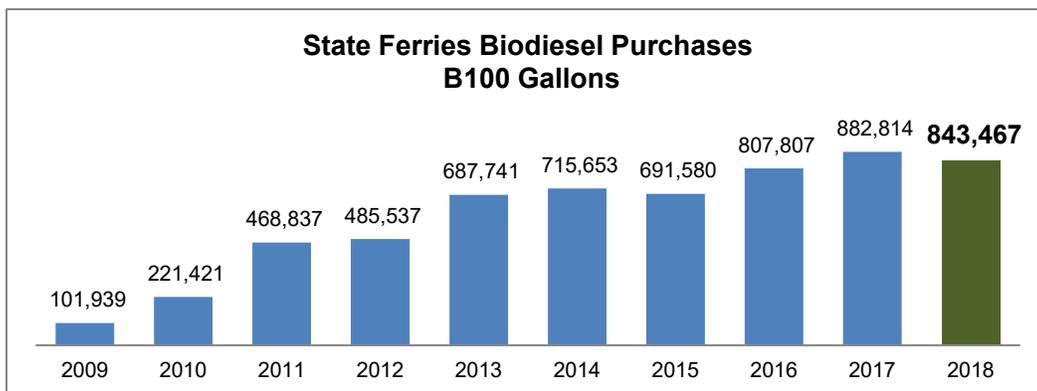
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- WSF’s progress using biodiesel has occurred in stages, corresponding with the **Washington State Ferries Biodiesel Use: 2009 to 2018**

| Year        | Diesel Gallons | Biodiesel Gallons | Total Gallons | Biodiesel % |
|-------------|----------------|-------------------|---------------|-------------|
| <b>2018</b> | 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%        |

availability of in-line blended B5 fuel. 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 blending at the Seattle Harbor Island dock facility was completed in early 2013.

- During 2018, all delivery locations received B5 fuel, with 9 of the 11 locations averaging at least 4.1 percent biodiesel. Notably, fuel at the Seattle Dock Facility, which accounted for over 39 percent of all fuel delivered during this period, averaged 5.1 percent biodiesel, while fuel deliveries to Anacortes and Friday Harbor averaged 2.1 and 3.8 percent biodiesel, respectively.
- Through mid-December 2018, WSF used Seattle as a reference city for B5 prices. On average, the price of Seattle B5 during this period exceeded diesel by 1.3 percent. Following the execution of a new contract on December 14, 2018, WSF now uses Portland, Oregon as a reference city for B5 prices. For the remainder of 2018, the price of Portland B5 was, on average, lower than diesel by 2.3 percent.
- WSF completed a one-year pilot program to assess the impact of B10 on vessel equipment, performance, and maintenance requirements. WSF used one of its largest vessels, the M/V Tacoma, and the test resulted in no negative impacts to the vessel.



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- WSF reported no biodiesel-related quality or performance issues during the period.

**LAND SECTOR USE**

State agency purchases of biodiesel for use in vehicles and equipment totaled 346,000 gallons in 2018, about 15,000 gallons less than what was purchased the previous year. Overall, state agency biodiesel purchases averaged 12 percent of total diesel fuel purchased under the state fuel contract.

In the land sector, WSDOT is the largest single purchaser of diesel fuel. In 2018, WSDOT purchased 2.3 million gallons of diesel fuel, accounting for 11 percent of all diesel fuel and 28 percent of all biodiesel purchased by state agencies under the state fuel contract.

WSDOT maintains a comprehensive statewide network of fueling stations that serves the majority of the state’s diesel-powered vehicles and equipment. Of the 14 other agencies purchasing diesel fuel under the state contract, only four purchased more than 30,000 gallons of bulk fuel during the period – the departments of Corrections, Natural Resources, Fish and Wildlife, and Social and Health Services.

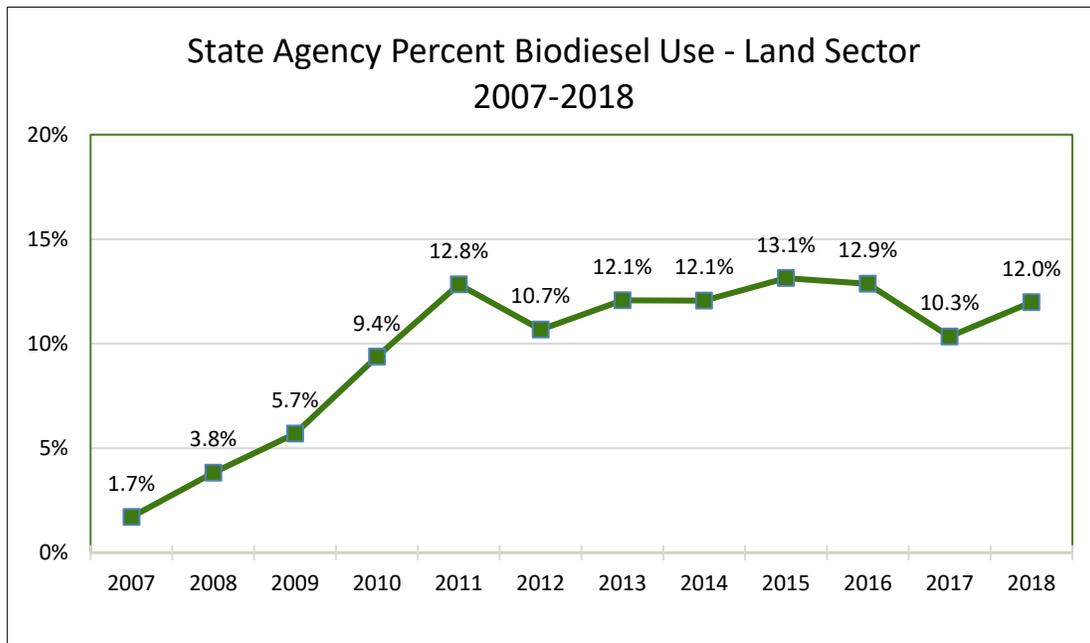
Among the 11 higher education institutions purchasing diesel fuel off the state contract, Washington State University was the largest purchaser, accounting for 56 percent of the fuel purchased for diesel-powered vehicles and equipment. Biodiesel was not purchased by any higher education institution.

**State Agency Biodiesel Purchases (Land Sector): 2018**

| <b>Agency</b>    | <b>Diesel Gallons</b> | <b>Biodiesel Gallons</b> | <b>Total Gallons</b> | <b>Biodiesel %</b> |
|------------------|-----------------------|--------------------------|----------------------|--------------------|
| WSDOT            | 1,936,677             | 333,700                  | 2,270,377            | 14.7%              |
| Other Agencies   | 280,863               | 11,777                   | 292,640              | 4.0%               |
| Higher Education | 320,080               | 0                        | 320,080              | 0.0%               |
| <b>Total</b>     | <b>2,537,620</b>      | <b>345,477</b>           | <b>2,883,097</b>     | <b>12.0%</b>       |

On a percentage basis, the biodiesel content of diesel fuel purchased by state agencies for use in vehicles and equipment has averaged above 10 percent for the last seven years. Prior to 2011, a lack of availability in Eastern Washington limited efforts to use biodiesel fuels.

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**DETAILS ON WSDOT PURCHASES AND USE**

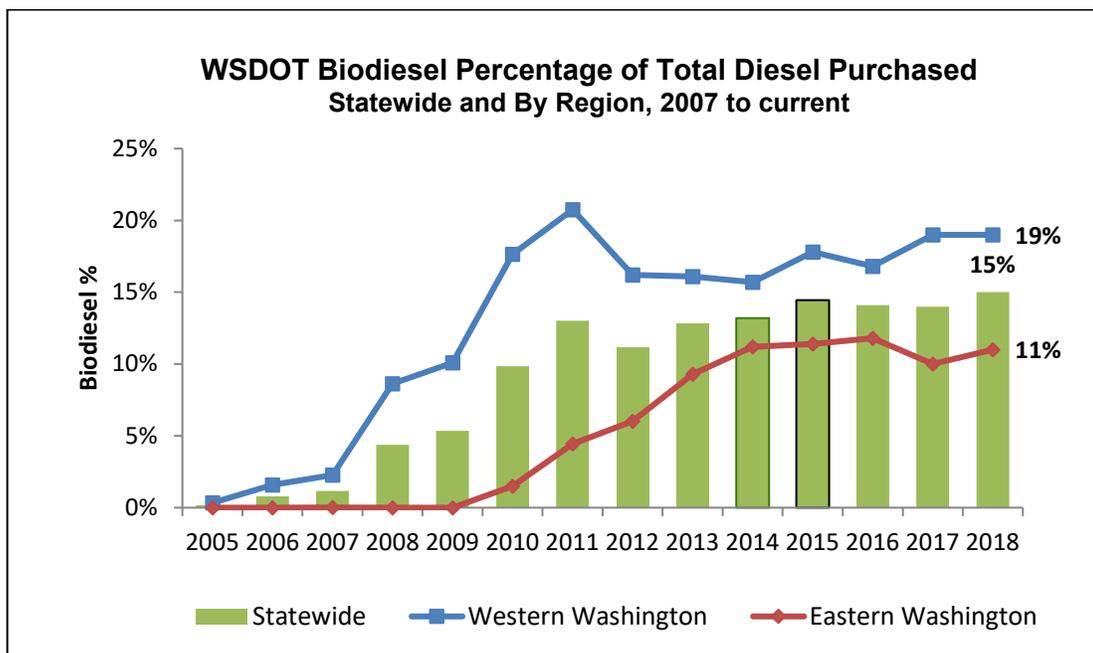
- The drop in WSDOT biodiesel purchases during 2018 is due to availability of biodiesel from vendors, primarily in eastern Washington. Overall, WSDOT’s total biodiesel purchases in 2018 were down 8 percent, while total fuel purchased was down 12 percent from 2017. As a result, biodiesel compared to the total diesel volume was up slightly, rising from 14.2 percent to 14.7 percent.
  - WSDOT had 41 fuel sites with biodiesel fuel available in Western Washington. About 85 percent of the deliveries to these sites were B20, 1 percent were blends of B20 to B25, 1 percent were B15, and the remainder primarily B10. Vendors experienced availability and delivery issues – delivering diesel only instead of the ordered biodiesel blend on four dates impacting three sites.
  - WSDOT had 53 fuel sites with biodiesel fuel available in Eastern Washington. About 32 percent of the deliveries to these sites were B20, 2 percent were between B10 and B20, 20 percent were B10, 36 percent were less than B10, less than 1 percent were greater than B20, and 10 percent were diesel only deliveries. Vendors experienced availability and dispatching issues with half of the diesel only deliveries and delivered diesel instead of the ordered biodiesel blend. Other diesel only deliveries were made during the fall when the WSDOT fuel sites were transitioning to colder weather blends. Total biodiesel purchases for Eastern Washington sites dropped 6 percent as compared to 2017.

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| <b>WSDOT Biodiesel Purchases by Region: 2018</b> |                  |                   |                  |              |
|--|------------------|-------------------|------------------|--------------|
| Region   | Diesel Gallons   | Biodiesel Gallons | Total Gallons    | Biodiesel %  |
| Westside   | 828,131          | 190,817           | 1,018,948        | 18.7%        |
| Eastside   | 1,108,546        | 142,883           | 1,251,429        | 11.4%        |
| <b>Statewide Total</b>                           | <b>1,936,677</b> | <b>333,700</b>    | <b>2,270,377</b> | <b>14.7%</b> |

*Note: Excludes 11 sites with no biodiesel delivery.*

- After a review of EPA regulations, May 2012 published guidance, and biodiesel-handling guidelines on materials compatibility, the department determined that its diesel fuel tanks must be replaced to meet certification requirements to store biodiesel blends above B20.
- WSDOT’s experience with biodiesel fuels and testing of biodiesel blends up to B90 has demonstrated the importance of: (1) managing biodiesel concentration based on climate and conditions; and (2) limiting biodiesel at sites with low fuel turnover. Currently, WSDOT has 11 sites that are not feasible for biodiesel use because they are in areas that experience cold winter temperatures and have low fuel turn-over (no fuel use for periods of four to six months or longer).
- WSDOT continued to employ best practices for using biodiesel. Operational issues included: (1) replacing fuel dispenser filters at twice the previous rate; (2) using a more porous filter to minimize filter failure; and (3) cleaning tanks at a higher frequency. WSDOT continues to experience higher rates of fuel injector and filter failure, which may be attributable to biodiesel use.



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WSDOT biodiesel purchases have averaged above 15 percent for seven years in Western Washington and topped 10 percent for the past five years in Eastern Washington. Before 2011 and again in 2018, the lack of biodiesel availability from contractors serving Eastern Washington limited WSDOT's efforts to use biodiesel fuels in that region.

### **FUEL QUALITY**

The Washington State Department of Agriculture (WSDA) monitors the quality of diesel and biodiesel used by state agencies as part of the state's Motor Fuel Quality Program. During 2018, WSDA submitted 112 diesel and biodiesel blend fuel samples to a contracted laboratory to test compliance with ASTM (formerly known as American Society for Testing and Materials) quality standards. Samples were obtained from fuel terminals, retail outlets, and state and local government fueling sites. They included 88 diesel samples, 22 B20 samples, and 2 B99 samples. The diesel samples included 36 samples from pumps with the added label "may contain up to 5 percent biodiesel." Eleven of these samples contained biodiesel. In addition to dispenser testing, terminal samples were taken including, 13 diesel and 6 B99 samples.

Test results continued to show problems with diesel fuel meeting flash point specifications. Of the 14 samples that did not meet ASTM specifications, 12 samples (86 percent) 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 the tank management of transport trucks or design flaws with underground storage tank systems. WSDA issued 14 notices 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 harder and harder for its inspectors to find retail stations offering fuels with more than 5 percent biodiesel.

### **STATE CONTRACTING**

DES has three Master Contracts that provide multiple types of fuel products and are utilized by numerous purchasers across the state. The following is a list of the Master Contracts including unique provisions of each contract:

- **Bulk Fuel (#00311)** – provides bulk fuel and will-call fuel deliveries for products such as gasoline, diesel (clear and dyed), and biodiesel
  - There are five (5) Contractors awarded for eight regions across the state. The Contractors are Associated Petroleum Products (APP), RE Powell, PetroCard, Wilcox & Flagel and Coleman Oil.

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- The current term ends on May 20, 2021
- Biodiesel provisions include:
  - Made from any feedstock so long as it meets ASTM specifications
  - Contractors must provide state agencies with biodiesel that is at least 51 percent from in-state sources
- In 2016, purchasers were interested in the availability of renewable diesel and sought changes in the contract that would address emergencies and lower administrative transaction costs. Based on this need, DES rebid the Bulk Fuels Contract but the procurement was cancelled in September 2018. DES is exploring additional procurement strategies to address purchaser needs and meet state priorities for lower carbon emissions.
- **Pier 15 (Seattle Dock Facility) (#00414)** – provides diesel and B5 to Washington State Ferries (WSF) – via Pier-to-Vessel
  - This is a sole source contract with Maxum Petroleum Co.
  - The current term ends September 4, 2021, with extensions available through 2024
  - Biodiesel provisions include:
    - Biodiesel can be made from any feedstock so long as it meets ASTM specifications
    - Contractors must provide state agencies with biodiesel that is at least 51 percent from in-state sources
- **Marine Refueling Services (#05718)** – provides diesel and B5 to B20 blends to Washington State Ferries (WSF) via Pier-to-Vessel, Truck-to-Vessel and Vessel-to-Vessel
  - The contractor is Maxum Petroleum Co.
  - The current term ends December 15, 2020, with extensions available through 2028
  - Biodiesel provisions include:
    - Biodiesel can be made from any feedstock so long as it meets ASTM specifications
    - Contractors must provide state agencies with biodiesel that is at least 51 percent from in-state sources

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- **Over the Water Marine Refueling (Keller Ferry) (#07613)** – provides diesel and a B5 biodiesel blend to Washington State Ferries (WSF) for the Keller Ferry run
  - The contractor is Connell Oil
  - The current term ends on January 13, 2022, with extensions available through 2024
  - Biodiesel provisions include:
    - Biodiesel can be made from any feedstock so long as it meets ASTM specifications
    - Contractors must provide state agencies with biodiesel that is at least 51 percent from in-state sources

### **OTHER ACTIVITIES RELATED TO BIODIESEL USE BY STATE AGENCIES**

The interagency Alternative Fuels and Vehicles Technical Advisory Group met six times in 2018, with much of the group's focus on transportation electrification. The group includes the 12 agencies and 4 universities that collectively represent more than 98 percent of state agency fuel use, as well as the 65 local governments now covered by similar annual reporting requirements. The group's objective is to facilitate implementation of state policy, including the alternative fuel and vehicle procurement rules adopted in May 2013 ([WAC 194-28](#)) and October 2016 ([WAC 194-29](#)) for state and local governments, respectively.

### **RECOMMENDATIONS/ACTION ITEMS**

- Address gaps in delivery of biodiesel blends throughout the state by ensuring fuel contractors fulfill the terms of their contracts.
- Revise and/or rebid contracts as needed to provide competitively priced biodiesel and other alternative fuel products.
- Review and/or rebid WSF fuel contracts to ensure availability of B10.
- Determine whether WSDOT's previous operational concerns regarding increased replacement of filters is still a concern, or simply regarded as a new best management practice, and if injector failure is actually due to biodiesel use.

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