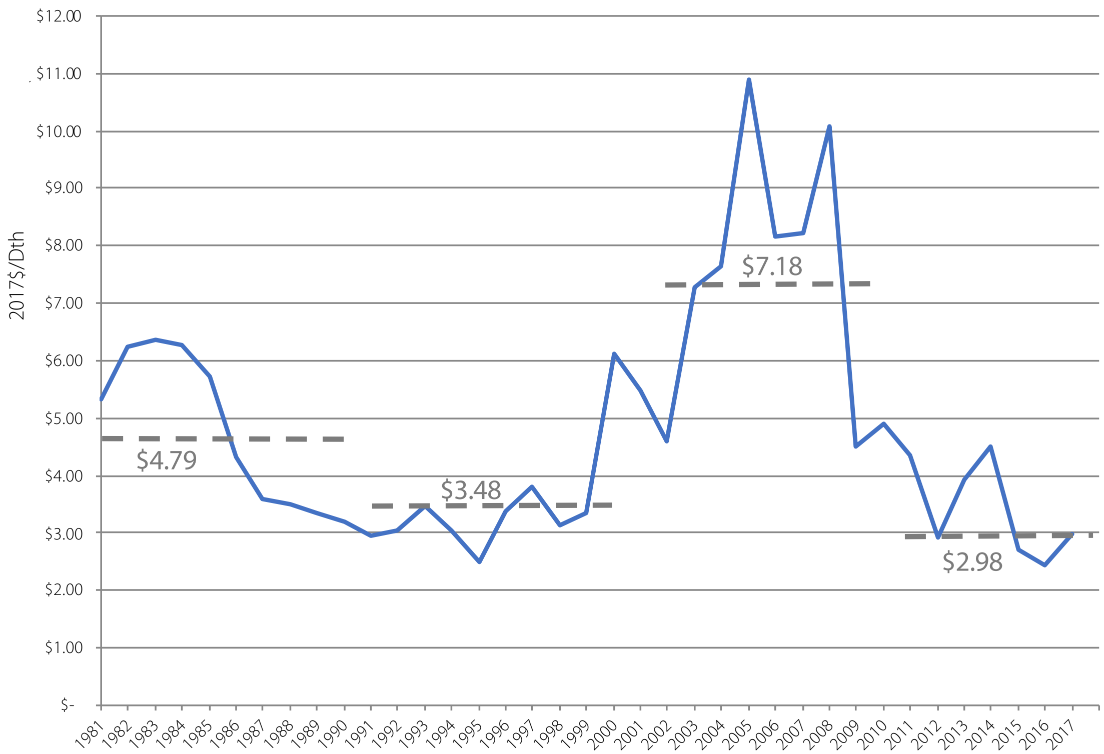
2018 GAS OUTLOOK • COMMODITY PRICES

KEY FINDINGS

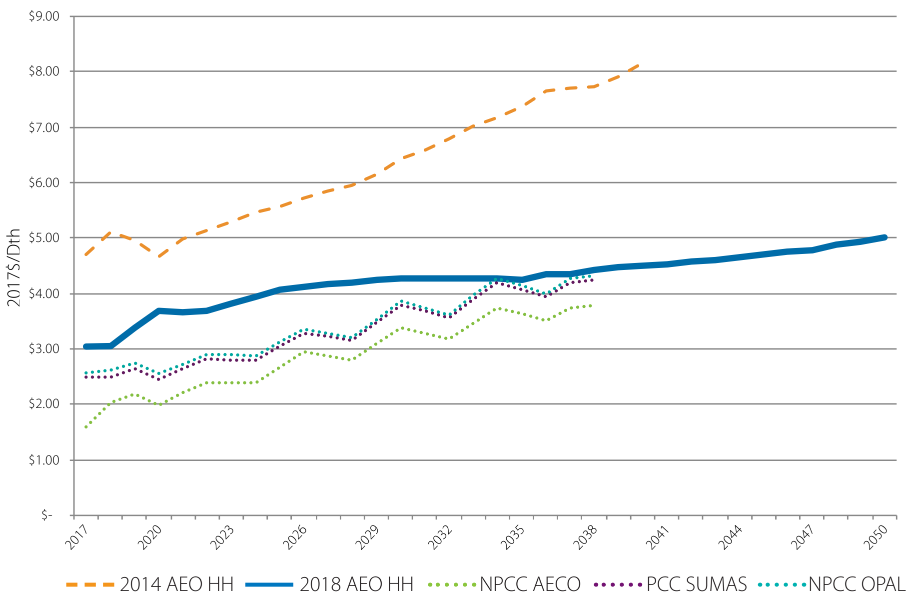
The commodity cost of natural gas has plummeted with the surge in supply over the last decade, saving regional consumers across all economic sectors hundreds of millions of dollars. Commodity prices are expected to remain stable over the long-run, though infrastructure constraints may periodically cause short-lived price volatility. The price of natural gas is advantageous relative to other transportation fuels.

FIGURE P1. Historic Natural Gas Prices



Source: U.S. EIA Natural Gas Wellhead Prices at Henry Hub. (Henry Hub is a trading point in Louisiana that serves as a benchmark for North American natural gas pricing.)

FIGURE P2. Natural Gas Price Forecast Comparisons



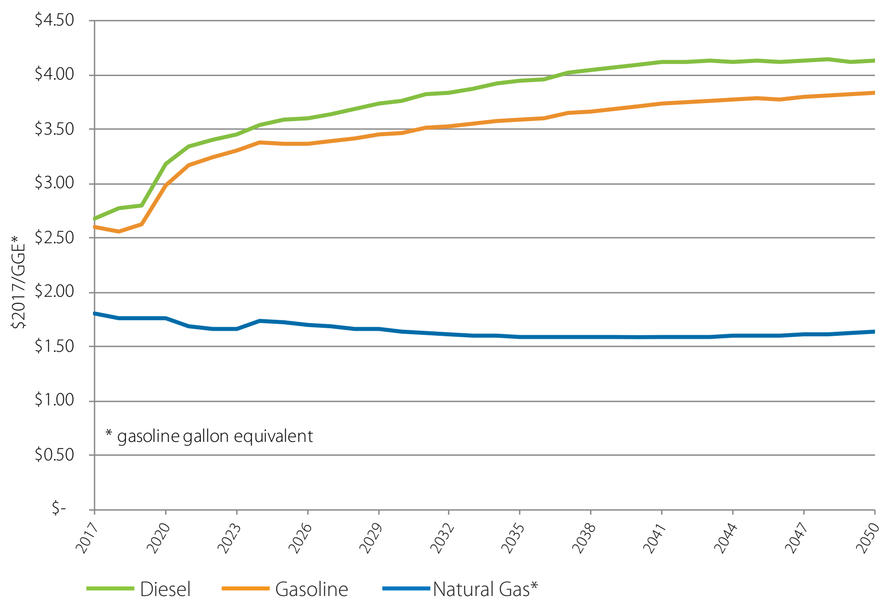
Source: EIA 2014/2018 Annual Energy Outlook; NPCC 7th Power Plan Midterm Assessment (2017)

NOTES: The EIA's Annual Energy Outlook (AEO) price forecast has significantly declined and flattened over the last five years, indicating the existence of and an ongoing expectation for robust natural gas supplies throughout the forecast period.

The Northwest Power and Conservation Council (NPCC) forecasts natural gas prices at trading hubs where the Pacific Northwest sources the gas it uses: AECO and Sumas for natural gas originating in Alberta and British Columbia, and Opal for gas produced in the U.S. Rocky Mountain states of Colorado, Utah and Wyoming.

The price of natural gas coming from the supply areas upon which the Pacific Northwest relies is typically lower than the North American benchmark at the Henry Hub.

FIGURE P3. Transportation Fuel Price Forecast



Source: EIA 2018 Annual Energy Outlook, Table A3 - Energy Prices by Sector and Source

NOTE: Forecast prices for transportation fuels include the commodity cost and all costs associated with delivery to the station (transport, distribution) and dispensing to the vehicle (i.e. pumping). According to the EIA, prices for natural gas as a transportation fuel decline over the forecast period because: 1) In the near term, prices reflect mostly compressed natural gas (CNG) purchased and delivered by utilities (higher commodity cost), and at a higher capital cost per unit of fuel dispensed (smaller stations with lower utilization). 2) Over time, it is expected that more heavy-duty vehicles (freight carriers and marine vessels) will transition to liquefied natural gas (LNG) purchased directly from the spot or futures markets (lower commodity cost) and dispensed through stations with greater economies of scale (lower capital costs per unit of fuel dispensed). Refer to the EIA's Natural Gas Markets Module assumptions document for more detail: https://www.eia.gov/outlooks/aeo/assumptions/pdf/natgas.pdf

NGVs: Economically and Environmentally Beneficial

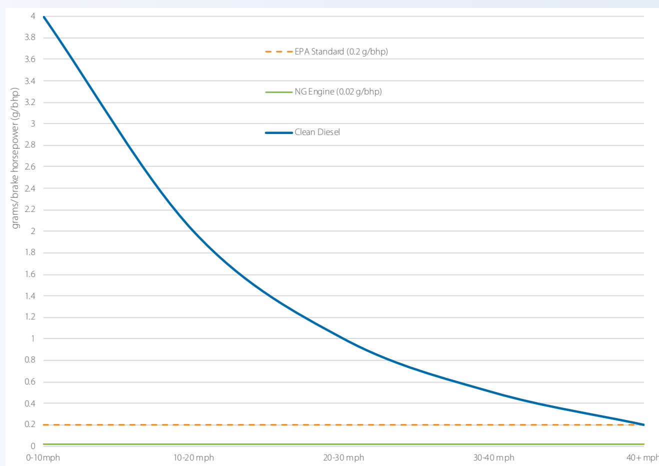
As illustrated in the previous section of this report (Figure P3), natural gas promises to deliver substantial economic value now and in the future relative to other transportation fuels. Natural gas engines also produce superior environmental performance (e.g., reduced greenhouse gas emissions) compared to gasoline and diesel engines. This is especially true for production of such pollutants as nitrous and sulfur oxides (NOx, SOx), which can cause serious health issues.

For instance, contemporary natural gas engines operate well below the EPA threshold for NOx emissions of 0.2 grams/brake horsepower (0.2g/bhp), even while idling. The newest diesel engine technologies only achieve the EPA standard when operating at about 40 miles per hour or more (see chart below). Given the stop-and-go driving patterns typical in urban areas, heavy trucks and buses operating with diesel engines consistently exceed the EPA threshold, often in areas where the most vulnerable populations live.

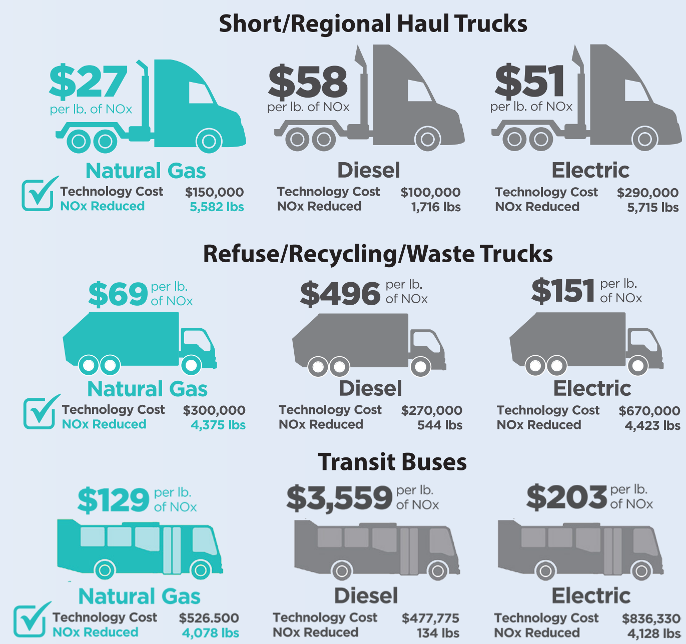
In addition to exceptional environmental performance, natural gas engine technologies are the most cost-effective means of reducing the criteria pollutant emissions from medium and heavy duty vehicles that typically operate in urban areas.

To promote the benefits of natural gas vehicles (NGVs), the Northwest Gas Association launched the Northwest Alliance for Clean Transportation (NW Alliance) in April of 2018. With a singular focus on advocating for increased use of natural gas in the region's transportation sector, the NW Alliance is primed to amplify and renew enthusiasm for NGVs in the Pacific Northwest. Attracting more than two dozen members in its first year, the Alliance has immediately become an impact player in alternative fuel conversations around the region. As the Alliance grows, so too will its ability to tell the story of how natural gas is an economic solution to our region's air quality issues. For more information, visit www.nwalliance.net.

NOX Emissions by Speed



Source: Created by NWGA using data from California Air Resources Board: "In-Use Emissions Technology Assessment" (2014)



*Emission comparisons are based on results using Argonne National Laboratory's HDVEC tool (https://afleet-web.es.anl.gov/hdv-emissions-calculator/) and include modeling of new low-NOx natural gas engines and the diesel in-use emissions option.

Infographic Courtesy of NGVAmerica