

The Road to Reducing Mobile Emissions is Paved with Inclusive Innovation

Achieving emission reductions from mobile sources and improving air quality are important and urgent issues that have long been top priorities of Western States Petroleum Association member companies.

Over the next twenty years, drastic changes to the world economy are expected to take place that will impact both the global energy landscape and the environment. With the world's economic middle class expected to increase from 3 billion to 5 billion as the world economy nearly doubles in that time, and with global energy needs expected to rise by 25%, a significant portion due to mobile sources, developing innovative solutions is now more important than ever.

In order to reduce emissions and improve air quality in the quickest and most cost-effective manner, WSPA believes all innovative technologies and pathways should be considered to achieve these shared goals.

While fossil fuels will continue to play a prominent role in meeting the world's growing energy demands, the oil and gas industry is committed to developing and bringing to market diverse energy sources that are efficient and beneficial to our shared goal of reducing global emissions while also improving air quality.

Billion of Gallons produced annually

Valero Energy is one of the largest ethanol producers in the nation with more than 14 plants and annual production capacity of 1.73 billion gallons. **ExxonMobil** has invested more than \$300 million on biofuels research over the past decade and is working to turn algae into low-emission transportation fuel. And in 2019, **Shell** blended more than 2.64 billion gallons of biofuels into their products worldwide.



BIOFUELS

Biofuels are a renewable energy source created from biomass to produce liquid transportation fuels such as ethanol, an alcohol fuel made from the sugars found in corn, sorghum and barley, and biodiesel, which is made from vegetable oils, fats and greases. Biofuels can significantly reduce CO₂ emissions from transport.



RENEWABLE DIESEL

Renewable diesel is a non-fossil fuel source of energy that is made from renewable and sustainable biomass such as natural fats, and vegetable and cooking oils. Renewable diesel complements conventional transportation fuels and can even be used as a standalone product in diesel engines.

675m Gallons

to be produced by Valero by 2021

Valero Energy, the world's second largest renewable diesel producer, plans to expand production from 275 million gallons per year in 2018 to 675 million gallons per year by late 2021. In 2017, **Chevron** began distributing diesel fuel containing 6-20% renewable diesel from its California fuel terminals, and in 2018, they began to sell renewable diesel to commercial customers. **Phillips 66** has partnered on two renewable diesel production facilities in Nevada which they expect to produce renewable diesel fuel for markets in the western U.S. and Canada.

30%

of electricity generation is fueled by natural gas

California Resources Corporation is the largest natural gas producer in California, where 30 percent of electricity generation is fueled by natural gas. **ExxonMobil** is one of the largest natural gas producers in the world and a leader in liquefied natural gas technology.



NATURAL GAS

Emitting up to 50% less CO2, natural gas plays an important role in reducing global emissions. This fossil fuel is often used as an energy source for heating, cooking, electricity generation and transportation.



FUEL CELL TECHNOLOGY

Fuel cell technology generates clean electricity from hydrogen that can be used to power everything from buildings to vehicles. An efficient form of energy, fuel cell technology produces no CO2 or other harmful emissions with the only by-products being electricity, heat and water.

Partnering to Advance Fuel Cell Technology

Shell has four hydrogen filling stations in California and has partnered with Toyota, with the support of the State of California, to further develop its hydrogen refueling network. And **ExxonMobil** has partnerships in place with carbon capture technology companies to evaluate ways to scale this promising technology and research how fuel cells might play a role in reducing the costs of carbon capture.