Title

Air Quality Impacts of Proposed Changes to Oregon’s Clean Fuels

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Air Quality Impacts of Proposed Changes to Oregon's Clean Fuels

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Issue

The Oregon Department of Environmental Quality (DEQ) is considering an extension of its Clean Fuels Program (CFP) to 2035, as well as a more ambitious target. The CFP sets a declining target for the average carbon intensity of transportation fuels, measured across their full life cycle.

UC Davis researchers modeled air quality impacts of two proposed compliance scenarios, compared to a business-as-usual (BAU) scenario, by first simulating the on-road emissions from Oregon's evolving vehicle fleet through 2035 using the EPA MOVES model, then modeling the behavior of those criteria pollutants in the atmosphere, using the UCD-CIT model, and finally the EPA BenMAP model to estimate health impacts.

Key Findings

Extending the CFP and increasing the target is likely to improve air quality. Virtually all fuels and technologies that are incentivized under the CFP produce fewer air pollutant emissions than the petroleum fuels they displace.

Air quality benefits are greatest in the areas with the most vehicle activity. Most of the state's population, and truck traffic, are located around the I-5 corridor in Western Oregon.

The modeled scenarios result in around 12 fewer deaths per year from air pollution. The majority of health benefits were obtained from reductions in particulate matter (PM) emissions. About half of the health risk reduction comes from reduced tailpipe emissions, the other half from reducing precursors to secondary particulate matter, material that form from chemical reactions between pollutants in the air.

The improved air quality is expected to reduce total health impact damages by $80-90 million per year. This is based on the value of a statistical life and reflects the health burden typically associated with air quality changes of this magnitude.

Replacement of internal combustion engine vehicles with zero-emission ones provides most of the health benefit. Zero-emission vehicles (ZEVs, predominantly battery electric vehicles) produce no tailpipe emissions and have typically lower life-cycle pollutant emissions than conventional ones. The CFP expansion supports the transition to a ZEV-dominated fleet, though the majority of vehicles are still conventional in 2035.

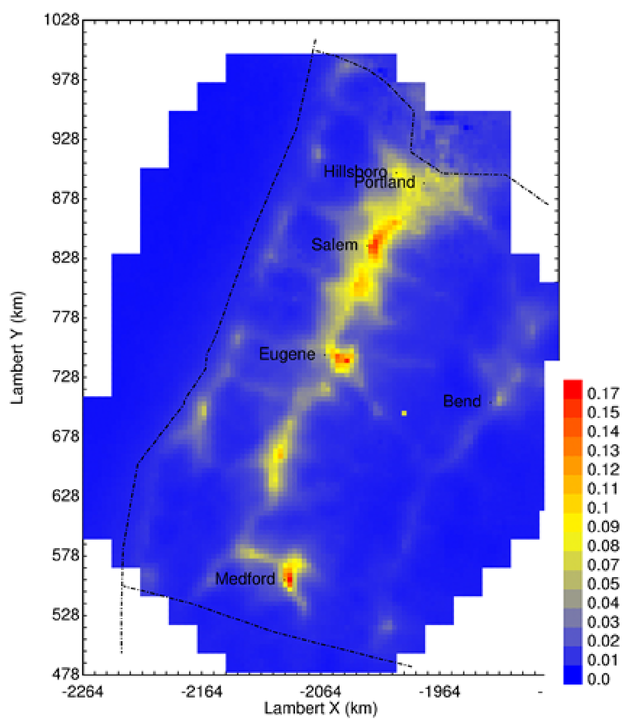

Figure 1. PM Concentration Benefits, in µg/m3 from Scenario A compared to Business-as-Usual.

Table 1. Air Quality Impacts of Proposed Scenarios (Note: Mortality and monetized health impacts from PM2.5 exposure in the scenarios modeled in this study.)

Year	Scenario	PM 2.5 Mortality	Mortality per 1 million people	Economic Value $/million
2035	Business as Usual Scenario - All Emission Sources	608.04	242.46	$ 4,326.00
2035	Business as Usual Scenario - Transportation Only	52.23	20.83	$ 363.80
2035	Scenario A Benefits (25% CFP Target)	12.12	4.83	$ 83.40
2035	Scenario B Benefits (37% CFP Target)	12.56	5.01	$ 87.80

By 2035, biomass-based diesel fuels provide little air quality benefit. Biomass-based diesel, including biodiesel and renewable diesel, reduce PM and other pollutant emissions in older diesel engines, but modern (2010 model year or later) diesel vehicles are required to employ exhaust treatment systems that largely reduce harmful PM emissions.

More research is needed to understand the distribution of health impacts across the population. Communities with a high proportion of lower-income, black, indigenous, and people of color residents are more likely to be exposed to emissions from transportation, and so reductions from cleaner fuels and vehicles would be expected to reduce this disparity, but further research is needed to confirm this result.

Policy Implications

The proposed expansion of Oregon's CFP is likely to result in significant air quality benefits. Both compliance scenarios showed significant decreases in premature mortality. While disease burdens were not explicitly modeled, it is very likely they would decline, too. This aligns with the findings from many previous studies on vehicle emissions. Future work by DEQ and the Oregon Health Authority will confirm this.

Additional current-technology biofuels provide carbon reduction benefits, but their potential to improve air quality declines over time. TheThe analysis performed in this project focuses on air quality impacts in 2035, and evaluates two discrete changes in the transportation system: expansion of ZEVs in one scenario and the addition of expanded biofuels in the other. This approach may overlook near-term air quality benefits that accrue from biofuels in older engines, as well as the expectation that real-world compliance with the expanded CFP would be accomplished through a broad portfolio of fuels and technologies.

More research is needed to understand any biofuel production impacts on Oregon's air quality, as well as EV charging effects on electrical grid emissions. In most cases, emissions from the production of transportation fuels present significantly less public health risk than emissions from the consumption of such fuels (except for hydrogen and battery ZEVs), but these production-related emissions were not considered in this study.

High-resolution modeling of air quality impacts requires a high level of expertise and computational capacity. As jurisdictions seek to meet their climate policy targets, analyses like the one presented here will be needed to fully understand public health impacts. More resources and research tools are needed to support effective, evidence-based decision making.

This policy brief was based o n the report Murphy, Colin W, Michael J. Kleeman, Yiting Li, and Guihua Wang. "Modeling Expected Air Quality Impacts of Oregon's Proposed Expanded Clean Fuels Program." Research Report. UC Davis Institute of Transportation Studies, April 26, 2022. Available at: https://escholarship.org/uc/item/6pz348mc

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