Final Regulatory Analyses:

Including the:

- Final Cost-Benefit Analysis
- Least-Burdensome Alternative Analysis
- Administrative Procedure Act Determinations
- Regulatory Fairness Act Compliance

Chapter 173-424 WAC – Clean Fuels Program Rule

Chapter 173-455 – Air Quality Fee Rule

By

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For the

Air Quality Program

Washington State Department of Ecology

Olympia, Washington

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Department of Ecology's Regional Offices

Map of Counties Served

Southwest Region 360-407-6300	Northwest Region 206-594-0000	Central Region 509-575-2490	Eastern Region 509-329-3400

Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	P.O. Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	P.O. Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	P.O. Box 46700 Olympia, WA 98504	360-407-6000

Final Regulatory Analyses

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Air Quality Program
Washington State Department of Ecology
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DEPARTMENT OF
ECOLOGY
State of Washington

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Abbreviations

APA	Administrative Procedure Act
CARB	California Air Resources Board
CBA	Cost-Benefit Analysis
CNG	Compressed natural gas
CO_2e	Carbon dioxide equivalent
EPA	US Environmental Protection Agency
GGE	Gasoline gallon equivalent
GHG	Greenhouse gas
iLUC	Indirect Land Use Conversion
LBA	Least Burdensome Alternative Analysis
LNG	Liquefied natural gas
MT	Metric ton
OR-DEQ	Oregon Department of Environmental Quality
PM2.5	Fine particulate matter
RCW	Revised Code of Washington
RFA	Regulatory Fairness Act
SCC	Social Cost of Carbon
VSL	Value of a Statistical Life
WAC	Washington Administrative Code
ZEV	Zero emission vehicle

Executive Summary

This report presents the determinations made by the Washington State Department of Ecology as required under Chapters 34.05 RCW and 19.85 RCW, for the adopted Clean Fuels Program Rule (Chapter 173-424 WAC, the "rule") and adopted amendments to the Air Quality Fee Rule (Chapter 173-455 WAC, the "fee rule"). This includes the:

- Final Cost-Benefit Analysis (CBA)
- Least-Burdensome Alternative Analysis (LBA)
- Administrative Procedure Act Determinations
- Regulatory Fairness Act Compliance

The Washington Administrative Procedure Act (APA; RCW 34.05.328(1)(d)) requires Ecology to evaluate significant legislative rules to "determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the law being implemented." Chapters 1 – 5 of this document describe that determination.

The APA also requires Ecology to "determine, after considering alternative versions of the rule…that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives" of the governing and authorizing statutes. Chapter 6 of this document describes that determination.

The APA also requires Ecology to make several other determinations (RCW 34.05.328(1)(a) – (c) and (f) – (h)) about the rule, including authorization, need, context, and coordination. Appendix A of this document provides the documentation for these determinations.

The Washington Regulatory Fairness Act (RFA; Chapter 19.85 RCW) requires Ecology to evaluate the relative impact of rules that impose costs on businesses in an industry. It compares the relative compliance costs for small businesses to those of the largest businesses affected. Chapter 7 of this document documents that analysis, when applicable.

All determinations are based on the best available information at the time of publication. We received feedback on the Preliminary Regulatory Analyses for this rulemaking, and have incorporated related information into this document.

The adopted Clean Fuels Program Rule (the "rule"), establishes:

- Definitions specific to the Clean Fuels Program.
- Applicability and exemptions for fuels.
- General requirements for regulated parties, opt-in entities, and credit aggregators.
- Identification of first fuel reporting entities, subsequent reporting entities, and credit or deficit generators, for:
    - Liquid fuels.
    - Gaseous fuels.

    - Electricity.
    - The backstop aggregator.
- Registration requirements.
- Recordkeeping requirements.
- Reporting requirements.
- Credit and deficit generation procedures.
- Credit transaction procedures.
- Required calculation methods for credits and deficits.
- How compliance must be demonstrated.
- A credit clearance market.
- Advance credit procedures.
- Credit generation methods for zero-emission vehicle (ZEV) infrastructure.
- Carbon intensity calculations and procedures.
- Authority to suspend, revoke, or modify accounts, carbon intensities, or credits.
- Public disclosure requirements.
- Emergency deferral procedures in the event of a fuels shortage.
- Forecast deferral procedures.
- Validation and verification requirements.

Amendments to the fee rule:

- Set the procedure for determining Clean Fuels Program fees based on workload.

Costs and Benefits

We identified the following present value costs and benefits of the adopted rule through 2038.

Table 1: Total estimated present value costs and benefits

Type of Cost or Benefit	Low Estimate	High Estimate
Emissions reduction and credit, net costs	**$3,450,609,364**	**$3,450,609,364**
Reporting, direct costs	**$243,248,621**	**$243,248,621**
Total quantifiable costs	**$3,693,857,984**	**$3,693,857,984**
GHG emissions reduction benefits, SCC	**$1,143,707,092**	**$1,143,707,092**
PM2.5 emissions reduction benefits, mortality	**$1,506,425,617**	**$3,180,231,858**
PM2.5 emissions reduction benefits, morbidity	**$698,005,608**	**$770,213,084**
Total quantifiable benefits	**$3,348,138,317**	**$5,094,152,035**

We also identified the following benefits, discussed qualitatively or partially quantified (see Chapter 4 for more detail):

- Values not reflected in the SCC. These include some aspects of:
    - Health impacts.
    - Agricultural losses.
    - Impacts to oceans.
    - Impacts to forests.
    - Wildfires.
    - Ecosystem services, including recreation opportunities.
    - Productivity.
    - Water and flooding.
    - Transportation.
    - Energy disruptions.
    - Catastrophic impacts and tipping points.
    - Inter- and intra-regional conflict
- Based on a per-capita average for the United States, **wildfires cost Washingtonians between $1.6 billion and $8.0 billion annually.**
- Working forestland losses:
    - **30 percent more severe burning** in commercial timber forests.
    - **91.3 percent value loss** of managed timber lands, accounting for salvage value.
- Wildfire preparedness and response. **In 2020:**
    - **$20 million** in aviation readiness and support.
    - **$12.5 million** in state-funded response to wildfires.

    - **$20 million** damage losses to utilities.
    - **$15 million** damage losses to state agency infrastructure.
    - **$10 million** damage losses to other government infrastructure.
- High-heat event impacts. The **2021 heat dome event** resulted in:
    - At least **$1.45 billion** in lost lives.
    - A **70-fold increase in people seeking emergency care**. An average high heat event-related healthcare visit costs over $12,000.
    - Agriculture losses:
        - Raspberries: 30 percent loss.
        - Cherries: 10 percent loss.
        - Blueberries: $85 million loss.
        - Wheat: 6-fold to 34-fold increases in the share of wheat in "poor" or "very poor" condition.
    - Shellfish losses:
        - **Seeded oysters: 40 percent losses** of seeded oysters.
        - **Human illness: 56 percent increase in vibriosis** cases.
        - **Oysters: 5 to 30 percent** oyster mortality.

Flood damages

A recent study by the Center for Western Weather and Water Extremes, at the University of California San Diego, modeled the impacts of various climate change scenarios on atmospheric rivers (long, flowing regions of the atmosphere that carry water vapor) impacting western states. Using flood insurance data, the study estimated county-level increases in annual costs of flood damage, through 2090, due to the contribution of climate change to the frequency, duration, and magnitude of atmospheric rivers.

- Flood damage due to climate change-induced impacts to atmospheric rivers in western Washington (per county):
    - **$10 million to $100 million per year** increases in most Puget Sound-adjacent counties.
    - Over **$100 million per year increases** in Snohomish, King, and Lewis counties.
    - This is at least a doubling of annual flood damage costs in Western Washington, compared to costs in the 1990s.
- Flood damage due to climate-change-induced impacts to atmospheric rivers in eastern Washington (per county):

    - **$1 million per year increases in most eastern Washington counties**, with some counties incurring up to $10 million more per year.
    - This is up to a doubling of annual costs for most eastern Washington counties.
    - For Pend Oreille, Spokane, Whitman, Columbia, and Asotin counties, this is between two and four times the size of flood damage costs in the 1990s.

Environmental justice improvements

Quantified and qualitative benefits are likely to be more focused for overburdened populations, in terms of avoided climate change impacts and avoided direct health impacts (see section 4.3.3 for more detail):

- Reduced effects of PM2.5 on populations living and working near high-traffic roadways and in wildfire smoke-prone areas. These are also areas with higher existing health disparities across multiple variables.
- In Washington about **1 in 7 (900,000) people live within 1/4 mile of heavy traffic roadways**. These people breathe more air pollution from diesel and gasoline exhaust.
- People with an **underlying health condition** like asthma or heart disease, may be especially sensitive to traffic-related air pollution, as are **children and adults age 65 and older**.
- Traffic air pollution is linked to **adverse birth outcomes such as low birth weight and premature births**.
- Even when wildfire smoke is ubiquitous, it impacts overburdened communities more severely, as they may not have good **access to air filtration or non-emergency healthcare**, and may **need to spend more time outside during high heat events that often coincide**, since they may have limited access to air conditioning and other cooling options.
- Reduced heat-related mortality. In short, heat deaths are more likely to occur among overburdened communities whose historically lower resource access puts them more at risk of being in one or more of the categories below. And particularly during a time of high numbers of people living unsheltered or without consistent shelter, climate change is poised to harm or kill the most vulnerable among us. A study of heat deaths found **strong relationships between higher likelihood of heat-related death and**:
    - Lower income.
    - Living near less shade and more impervious or paved surfaces.
    - Being unsheltered or having inadequate housing.
    - Less education.
    - Living alone.
    - Being elderly.

- Lacking transportation.
- Lacking recreational spaces.
- Job or income insecurity.

Conclusion

We conclude, based on a reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the adopted rule, as compared to the baseline, that the benefits of the adopted rule are greater than the costs.

Least-Burdensome Alternative

We considered the following alternative rule content, and did not include it in the adopted rule for the reasons discussed in each subsection below.

- Residential electric vehicle charging: Allocating a larger portion of the credits for residential electric vehicle charging to electric vehicle manufacturers.
- Reductions in carbon intensity: Reducing the carbon intensity standard incrementally after 2034.
- Additional crediting: Incorporating refinery investment credits and carbon capture and sequestration.
- Indirect land use conversion value: Using Oregon's indirect land use conversion value for corn ethanol.
- Tier 2 pathways: Including Tier 2 pathways at the start of the program.
- Fees: Not charging fees to all program participants, or allocating fee shares differently.
- Compliance years: Making 2023 a full compliance year.
- GREET model: Using the most recent version of the Argonne GREET model.
- Verification: Including third party verification at the start of the program.

After considering alternatives to the rule's contents, within the context of the goals and objectives of the authorizing statute, we determined that the adopted rule represents the least-burdensome alternative of possible rule contents meeting the goals and objectives.

Regulatory Fairness Act

The analyses required under the RFA, and their inclusion in a Small Business Economic Impact Statement, are based on whether the rule would impose compliance costs on small businesses. A rule is otherwise exempt from these analyses under RCW 19.85.025(4).

Based on available information, we did not identify any small businesses that are likely to have deficits under the rule. These known transportation fuel suppliers and electric utilities include only:

- Large businesses themselves, or part of larger businesses, averaging 8,857 employees.
- Publicly owned entities.

However, we do not have full information concerning all potential entities incurring any kind of direct compliance cost under the rule. Specifically, we do not have comprehensive information about all potential credit generators that could opt into the program.

While we may be able to make some assumptions about opt-in entities, we cannot be certain of all their attributes, and about whether any are small businesses. Due to uncertainty about the employment attributes of opt-in entities, we chose to complete the analyses required under the RFA, to fully understand potential disproportion in the impacts of the rule.

Opt-in entities will incur compliance costs related to registration and reporting. We note, however, that opt-in entities are not likely to opt in unless they expect a private net benefit, i.e., the costs they incur complying with the rule's registration and reporting requirements are outweighed by the benefits of generating and selling credits.

As the RFA requires analyses specifically related to employment impacts and price or output impacts (as they play into revenue and profits), we also determined this analysis would be the most appropriate space to discuss additional modeling performed to fully understand the potential impacts of the rule.

Determination

We conclude that no small businesses are likely to incur net compliance costs under the adopted rule, as they are likely to participate only if they expect a net benefit. Therefore, Ecology is not required, under the RFA, to include all legal and feasible elements in the rule to mitigate disproportionate costs on small businesses. Note, however, that we have voluntarily completed the additional analyses and considerations required under the RFA.

Price and employment impacts

We also present price and employment impacts resulting from the rule (modeled as the "Accelerated Reduction scenario" which aligns with the rule):

Table 2: Policy impacts of Accelerated Reduction scenario on consumer fuel prices, 2020$/GGE

Year	Consumer Gasoline	Consumer Diesel
2023	**0.007**	**(0.016)**
2024	**0.017**	**(0.006)**
2025	**0.036**	**0.014**
2026	**0.056**	**0.034**
2027	**0.076**	**0.054**
2028	**0.105**	**0.083**
2029	**0.134**	**0.113**
2030	**0.164**	**0.142**
2031	**0.193**	**0.171**
2032	**0.193**	**0.171**
2033	**0.193**	**0.170**
2034	**0.389**	**0.368**
2035	**0.389**	**0.367**
2036	**0.389**	**0.366**

Year	Consumer Gasoline	Consumer Diesel
2037	**0.005**	**0.005**
2038	**0.005**	**0.005**

(Source: BRG)

Table 3: Overall employment impacts

Year	Indirect	Induced	Direct	Total Net
2023	**15**	**7**	**-5**	**17**
2024	**17**	**8**	**-5**	**20**
2025	**18**	**8**	**-4**	**22**
2026	**20**	**9**	**-4**	**25**
2027	**23**	**10**	**-3**	**30**
2028	**25**	**11**	**-2**	**34**
2029	**27**	**12**	**-2**	**37**
2030	**31**	**14**	**-1**	**44**
2031	**36**	**16**	**1**	**53**
2032	**44**	**20**	**3**	**67**
2033	**56**	**25**	**7**	**88**
2034	**54**	**24**	**6**	**84**
2035	**71**	**31**	**11**	**113**
2036	**92**	**41**	**21**	**154**
2037	**1**	**1**	**0**	**2**
2038	**2**	**1**	**1**	**4**

(Source: BRG)

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Chapter 1: Background and Introduction

1.1 Introduction

This report presents the determinations made by the Washington State Department of Ecology as required under Chapters 34.05 RCW and 19.85 RCW, for the adopted Clean Fuels Program Rule (Chapter 173-424 WAC, the "rule") and adopted amendments to the Air Quality Fee Rule (Chapter 173-455 WAC, the "fee rule"). This includes the:

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All determinations are based on the best available information at the time of publication. We received feedback on the Preliminary Regulatory Analyses for this rulemaking, and have incorporated related information into this document.

1.1.1 Background – the Clean Fuel Standard law

The Clean Fuel Standard will curb carbon pollution from transportation, which accounts for almost 45 percent of greenhouse gas emissions in Washington.[2]

[2] Washington's greenhouse gas inventory. https://ecology.wa.gov/Air-Climate/Climate-change/Tracking-greenhouse-gases/GHG-inventories

By creating a market-based system of incentives aimed at reducing the carbon intensity of transportation fuels, the Clean Fuel Standard will cut statewide greenhouse gas emissions and stimulate economic development in low carbon fuel production.

California, Oregon, and British Columbia have adopted their own clean fuel standards. In Washington, the Clean Fuel Standard will work beside the Climate Commitment Act to target the largest source of emissions in Washington.

The Transportation Fuel – Clean Fuels Program law (Chapter 70A.535 RCW) creates requirements for fuel suppliers that are designed to reduce the carbon intensity of transportation fuels to 20 percent below 2017 levels by 2038. There are several ways for fuel suppliers to achieve these reductions, including:

- Producing and/or blending low-carbon biofuels into the fuel they sell.
- Purchasing credits generated by low-carbon fuel providers, including electric vehicle charging providers.

Ex-Ante Economic Analysis

As part of the Transportation Fuel – Clean Fuels Program law, the legislature directed us to hire an independent contractor to analyze "the best estimate or range in probable costs or cost savings attributable to the clean fuels program per gallon of gasoline and per gallon of diesel." Berkeley Research Group ("BRG") was contracted to perform the analysis.[3]

1.2 Summary of the adopted rule

The adopted Clean Fuels Program Rule ("rule") establishes:

- Definitions specific to the Clean Fuels Program.
- Applicability and exemptions for fuels.
- General requirements for regulated parties, opt-in entities, and credit aggregators.
- Identification of first fuel reporting entities, subsequent reporting entities, and credit or deficit generators, for:
    - Liquid fuels.
    - Gaseous fuels.
    - Electricity.
    - The backstop aggregator.
- Registration requirements.
- Recordkeeping requirements.

[3] BRG Energy & Climate, 2022. Washington Department of Ecology Clean Fuel Standard Cost Benefit Analysis Report. May 12, 2022. https://ecology.wa.gov/DOE/files/22/22790fe6-fc3a-414d-b3ba-036af0975258.pdf

- Reporting requirements.
- Credit and deficit generation procedures.
- Credit transaction procedures.
- Required calculation methods for credits and deficits.
- How compliance must be demonstrated.
- A credit clearance market.
- Advance credit procedures.
- Credit generation methods for zero-emission vehicle (ZEV) infrastructure.
- Carbon intensity calculations and procedures.
- Authority to suspend, revoke, or modify accounts, carbon intensities, or credits.
- Public disclosure requirements.
- Emergency deferral procedures in the event of a fuels shortage.
- Forecast deferral procedures.
- Validation and verification requirements.
- Amendments to the fee rule:
- Set the procedure for determining Clean Fuels Program fees based on workload.

1.3 Reasons for the rule

In May 2021, the governor signed the Transportation Fuels – Clean Fuels Program law directing Ecology to adopt rules to reduce the carbon intensity of transportation fuels by 20 percent below 2017 levels by 2038. The Transportation Fuel – Clean Fuels Program law (Chapter 70A.535 RCW) intends to reduce emissions of greenhouse gases and conventional air pollutants, and support the use of innovative clean fuel technologies.

The adopted rule sets the specific requirements to implement the Clean Fuels Program law, although some elements of the rule are specifically established in the law.

1.4 Document organization

The remainder of this document is organized in the following chapters:

- **Baseline and the adopted rule (Chapter 2):** Description and comparison of the baseline (what would occur in the absence of the rule) and the rule requirements.
- **Likely costs of the adopted rule (Chapter 3):** Analysis of the types and sizes of costs we expect impacted entities to incur as a result of the rule.

- **Likely benefits of the adopted rule (Chapter 4):** Analysis of the types and sizes of benefits we expect to result from the rule.
- **Cost-benefit comparison and conclusions (Chapter 5):** Discussion of the complete implications of the CBA.
- **Least-Burdensome Alternative Analysis (Chapter 6):** Analysis of considered alternatives to the contents of the rule.
- **Regulatory Fairness Act Compliance (Chapter 7):** When applicable. Comparison of compliance costs for small and large businesses; mitigation; impact on jobs.
- **APA Determinations (Appendix A):** RCW 34.05.328 determinations not discussed in chapters 5 and 6.

Chapter 2: Baseline and Adopted Rule

2.1 Introduction

We analyzed the impacts of the adopted rule, within the context of all existing requirements (federal and state laws and rules). This context for comparison is called the baseline, and reflects the most likely regulatory circumstances that entities would face if the rule was not adopted. It is discussed in Section 2.2, below.

2.2 Baseline

The baseline for our analyses generally consists of existing rules and laws, and their requirements. This is what allows us to make a consistent comparison between the state of the world with and without the adopted rule.

For this analysis, the baseline includes:

- Chapter 70A.535 RCW, Transportation Fuel – Clean Fuels Program.
    - This is the authorizing statute for this rulemaking, with the following intent and direction:
        - RCW 70A.535.005: "Therefore, it is the intent of the legislature to support the deployment of clean transportation fuel technologies through a carefully designed program that reduces the carbon intensity of fuel used in Washington, in order to:

            (a) Reduce levels of conventional air pollutants from diesel and gasoline that are harmful to public health;

            (b) Reduce greenhouse gas emissions associated with transportation fuels, which are the state's largest source of greenhouse gas emissions; and

            (c) Create jobs and spur economic development based on innovative clean fuel technologies."
        - RCW 70A.535.020(1): "The department shall adopt rules that establish standards that reduce carbon intensity in transportation fuels used in Washington. The standards established by the rules must be based on the carbon intensity of gasoline and gasoline substitutes and the carbon intensity of diesel and diesel substitutes. The standards:

            (a) Must reduce the overall, aggregate carbon intensity of transportation fuels used in Washington;

            (b) May only require carbon intensity reductions at the aggregate level of all transportation fuels and may not require a reduction in

carbon intensity to be achieved by any individual type of transportation fuel;

(c) Must assign a compliance obligation to fuels whose carbon intensity exceeds the standards adopted by the department, consistent with the requirements of RCW 70A.535.030; and

(d) Must assign credits that can be used to satisfy or offset compliance obligations to fuels whose carbon intensity is below the standards adopted by the department and that elect to participate in the program, consistent with the requirements of RCW 70A.535.030."

- In addition to direction and requirements specific to sections of the rule (discussed in sections below), the statute sets some general requirements for the rule, addressing harmonization with other clean fuel programs:
  - RCW 70A.535.030(1)(a)(ii): "Consider carbon intensity calculations for transportation fuels developed by national laboratories or used by similar programs in other states."
  - RCW 70A.535.030(1)(b)(ii): "Measure greenhouse gas emissions associated with electricity and hydrogen based on a mix of generation resources specific to each electric utility participating in the clean fuels program. The department may apply an asset-controlling supplier emission factor certified or approved by a similar program to reduce the greenhouse gas emissions associated with transportation fuels in another state."
  - RCW 70A.535.030(1)(d): "To the extent practicable, rules adopted by the department may allow data requested of utilities to be submitted in a form and manner consistent with other required state or federal data submissions"
  - RCW 70A.535.030(8)(c)(i): "The department shall set a maximum price for credits in a credit clearance market, consistent with states that have adopted similar clean fuels programs, not to exceed $200 in 2018 dollars for 2023."
  - RCW 70A.535.060(1): "Except where otherwise provided in this chapter, the department shall seek to adopt rules that are harmonized with the regulatory standards, exemptions, reporting obligations, and other clean fuels program compliance requirements and methods for credit generation of other states that:

    (a) Have adopted low carbon fuel standards or similar greenhouse gas emissions requirements applicable specifically to transportation fuels; and

(b)(i) Supply, or have the potential to supply, significant quantities of transportation fuel to Washington markets; or

(ii) To which Washington supplies, or has the potential to supply, significant quantities of transportation fuel."

- The statute also allows Ecology to adopt fees related to the Clean Fuels Program (RCW 70A.535.130): "The department may require that persons that are required or elect to register or report under this chapter pay a fee."

- Chapter 70A.30 RCW, Motor Vehicle Emission Standards.
  - The associated rulemaking for Chapter 173-423 WAC is currently (as of this writing, November 2022) in the proposal phase of rulemaking – i.e., Ecology has proposed the rule and provided a public comment period. The authorizing statute explicitly adopts California motor vehicle emission standards (Title 13, California Code of Regulations) and directs Ecology to implement them by rule.
  - The California Air Resources Board (CARB) has adopted the Advanced Clean Cars II rule, which will result in 100 percent of new light duty vehicles sold in the state being zero emissions starting in 2035.
- Chapter 70A.45 RCW, Limiting Greenhouse Gas Emissions.
  - Includes greenhouse gas (GHG) emissions reduction requirements for 2030, 2040, and 2050.
- Chapter 173-455 WAC, Air Quality Fee Rule.
  - Sets all current air quality related fees.

For discussion of alternative baselines, see Appendix B.

2.2.1 Separability of regulatory baseline and adopted rule

Ecology typically considers rule provisions required by statute as part of the baseline and discretionary provisions as part of the adopted rule. In some cases, however, it is difficult to conceptually and analytically separate the baseline from discretionary elements of the rule. In this analysis, Ecology included some of the rule requirements as explicitly part of the baseline, while it analyzed others as discretionary provisions. When this is the case, the actual impacts of the implementation details Ecology chose to adopt are not separable from the impacts of the overall program directed by the baseline statute. To avoid underestimating costs in these cases, we estimated the costs and benefits accounting for individual elements of the baseline only wherever they were identifiably separable from the adopted rule.

2.3 Adopted rule

The adopted rule establishes:

- Definitions specific to the Clean Fuels Program.

- Applicability and exemptions for fuels.
- General requirements for regulated parties, opt-in entities, and credit aggregators.
- Identification of first fuel reporting entities, subsequent reporting entities, and credit or deficit generators, for:
    - Liquid fuels.
    - Gaseous fuels.
    - Electricity.
    - The backstop aggregator.
- Registration requirements.
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- Credit generation methods for zero-emission vehicle (ZEV) infrastructure.
- Carbon intensity calculations and procedures.
- Authority to suspend, revoke, or modify accounts, carbon intensities, or credits.
- Public disclosure requirements.
- Emergency deferral procedures in the event of a fuels shortage.
- Forecast deferral procedures.
- Validation and verification requirements.
- Amendments to the fee rule:
- Set the procedure for determining Clean Fuels Program fees based on workload.

2.3.1 Definitions

Baseline

The baseline includes definitions in the statute and those in related rules. The authorizing statute (RCW 70A.535.010) includes the following definitions, including consistency with other greenhouse gas (GHG) related laws:

- Carbon dioxide equivalents.
- Carbon intensity.
- Clean fuels program.
- Cost.
- Credit.
- Deficit.
- Department.
- Electric utility.
- Greenhouse gas.
- Military tactical vehicle.
- Motor vehicle.
- Price.
- Regulated party.
- Tactical support equipment.
- Transportation fuel.

Adopted

The adopted rule includes over 150 definitions specific to the rule, including baseline definitions. These definitions are necessary for clear and consistent implementation of the law and rule.

Expected impact

Definitions in and of themselves do not have any impact. Their content may generate costs and benefits in the section(s) of the rule in which they are used. Any associated costs and benefits are discussed in subsequent sections of this document.

2.3.2 Applicability and exemptions

Baseline

The authorizing statute (RCW 70A.535.020) directs Ecology to "adopt rules that establish standards that reduce carbon intensity in transportation fuels used in Washington." It also sets requirements for those standards and the program:

- Reducing overall carbon intensity of transportation fuels used in Washington.
- Requiring carbon intensity reductions at the overall level of all transportation fuels (not reductions in carbon intensity of any individual type of fuel).

- Assigning a compliance obligation to fuels whose carbon intensity exceeds the adopted standards.
- Assigning credits that can be used to satisfy or offset compliance obligations to fuels whose carbon intensity is below the adopted standards, that elect to participate in the program.
- Allowing regulated parties that generate deficits to reconcile the deficits by obtaining and retiring credits.
- Allowing regulated parties and credit generators to generate credits for fuels used as substitutes or alternatives for gasoline or diesel.
- Giving opportunities to trade credits.
- Allowing carryover of small deficits without penalty.

The authorizing statute also specifies exemptions from the rule (RCW 70A.535.040):

- Fuels used in volumes below thresholds adopted by Ecology.
- Fuels used for the propulsion of all aircraft, vessels, and railroad locomotives.
- Fuels used for the operation of military tactical vehicles and tactical support equipment.

Under this baseline, some transportation fuels are exempt until January 1, 2028, during which time they are eligible to generate credits:

- Special fuel used off-road in vehicles used primarily to transport logs.
- Dyed special fuel used in vehicles that are:
    - Not designed primarily to transport persons or property.
    - Not designed to be primarily operated on highways,
    - Used primarily for construction work including, but not limited to, mining and timber harvest operations.
    - Dyed special fuel used for agricultural purposes exempt from the state's Fuel Tax Act (Chapter 82.38 RCW).

Adopted

The adopted rule applies to:

- Any transportation fuel (as defined in the rule), that is sold, supplied, or offered for sale in Washington, in quantities greater than 360,000 gallons.
- Any fuel reporting entity (as defined in the rule) responsible for reporting a transportation fuel in a calendar year.

The following types of transportation fuel are regulated under the adopted rule:

- Gasoline.
- Diesel or diesel fuel.

- Fossil compressed natural gas ("Fossil CNG"), fossil liquefied natural gas ("Fossil LNG"), or fossil liquefied compressed natural gas ("Fossil L-CNG).
- Compressed or liquefied hydrogen ("hydrogen").
- A fuel blend containing greater than 10 percent ethanol by volume.
- A fuel blend containing biomass-based diesel.
- Denatured fuel ethanol ("E100").
- Neat biomass-based diesel ("B100" or "R100").
- Fossil LPG or propane.
- Other liquid or non-liquid transportation fuels as determined by Ecology.

The rule also includes fuels that may generate credits if a fuel provider opts into the Clean Fuels Program:

- Electricity.
- Biogenic compressed natural gas ("Bio-CNG").
- Biogenic liquefied natural gas ("Bio-LNG").
- Biogenic liquefied compressed natural gas ("Bio-L-CNG").
- Alternative jet fuel.
- Renewable propane or renewable LPG.

Finally, the rule includes tables of carbon intensity benchmarks for:

- Gasoline and gasoline substitutes.
- Diesel and diesel substitutes.
- Carbon intensity benchmarks for transportation fuels intended for use in multi-fuel vehicles.

The rule also includes exemptions that are identical to the baseline. It adds documentation requirements for exempt fuels, including:

- Establishing that the fuel was sold through a dedicated source or single supplier to use in one of the specified motor vehicles listed as exempt.
- Documentation for each fuel transaction, if the fuel is not sold through a dedicated source.

Expected impact

We expect the adopted rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.
- Benefits of credit sale revenues to credit holders.

- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The applicability of the rule interacts with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

Many elements of the rule are consistent with clean fuels programs in Oregon and California. This meets statutory requirements, and provides consistency for entities complying with multiple programs.

2.3.3 General requirements

Baseline

Under the authorizing statute (RCW 70A.535.070):

- Each producer or importer of any amount of a transportation fuel that is ineligible to generate credits must register with the department.
- Electric vehicle manufacturers and producers, importers, distributors, users, and retailers of transportation fuels that are eligible to generate credits must register with the department if they elect to participate in the clean fuels program.
- Other entities must register with the department to generate credits from other activities that support the GHG emissions reduction associated with transportation in Washington.
- Ecology may require fuel suppliers that opt to participate in the program to submit documentation assigning compliance responsibility for covered fuels.
- Ecology may require periodic reporting. To the extent practicable, the rules must establish reporting procedures and timelines that are consistent with similar programs in other states by similar parties.

Adopted

Under the adopted rule, regulated parties (regulated fuel producers or importers) are required to:

- Register.
- Keep records.
- Report quarterly and annually.
- Comply with the Clean Fuel Standard for:
    - Gasoline and gasoline substitutes.
    - Diesel fuel and diesel fuel substitutes.

Opt-in fuel reporting entities are required to:

- Register.
- Keep records.
- Report quarterly and annually.

To opt out, opt-in fuel reporting entities are required to:

- Provide Ecology a 90-day notice of intent to opt-out and a proposed effective opt-out date.
- Submit any outstanding quarterly fuel transactions and a final annual compliance report.
- Identify in the 90-day notice any actions to be taken to eliminate any remaining deficits by the effective opt-out date.

Finally, the rule requires credit aggregators to:

- Register.
- Keep records.
- Report quarterly and annually.

Expected impact

We do not expect this section to generate costs or benefits beyond the benefit of providing a single location for parties to identify their requirements under the rule. Costs and benefits associated with registration, recordkeeping, and reporting are addressed in separate sections.

We analyze compliance with the Clean Fuel Standard as part of the overall costs and benefits of the rule.

We expect the rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.
- Benefits of credit sale revenues to credit holders.
- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The general requirements of the rule interact with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

2.3.4 Reporting entities and credit or deficit generators

Baseline

The authorizing statute (RCW 70A.535.070(3)) requires that each transaction transferring ownership of transportation fuels for which clean fuels program participation is mandated must be accompanied by documentation. The documentation must assign compliance responsibility for the fuels, including associated credits. It also allows Ecology to require documentation

assigning compliance responsibility associated with fuels for which parties have opted into the program.

Adopted

The adopted rule sets requirements for transfer of fuel reporting, and of credit and deficit generating status. It also establishes designation of:

- First fuel reporting entities.
- Any subsequent fuel reporting entities.
- Credit or deficit generators for fuels.

Liquid fuels

First fuel reporting entities for liquid fuels are the producer or importer of the liquid fossil fuel. For liquid fuels that are blended alternative and fossil fuels, the first fuel reporting entity is:

- The producer or importer of alternative fuels for the alternative fuel component.
- The producer or importer of liquid fossil fuels for the fossil fuel component.

When transferring ownership of a given amount of liquid fuel, entities are able to simultaneously transfer status as a credit or deficit generator, or retain status as a credit or deficit generator. The rule sets the conditions for each scenario, and limits the transfer of credit or deficit generator status to three calendar quarters. Finally, the rule specifies conditions for designation of fuel exporters.

Gaseous fuels

First fuel reporting entities are designated under the rule as follows:

- The first fuel reporting entity for gaseous renewable fuels is the producer or importer of biomethane or renewable propane.
- For fossil CNG, LNG, L-CNG, and propane, the first fuel reporting entity is the entity that owns the fueling equipment through which the fossil fuel is dispensed to motor vehicles for transportation use.
- The first fuel reporting entity for fossil propane or hydrogen used in forklifts is the forklift fleet owner.
- The first fuel reporting entity for hydrogen is the entity that owns the fueling supply equipment through which hydrogen fuel is dispensed to motor vehicles for transportation use.
- For renewable hydrogen, including the renewable portion of any blend with fossil fuel-derived hydrogen, the first fuel reporting entity is the producer or importer of the renewable hydrogen.

Two entities are able to agree by written contract to transfer designation. The rule specifies the conditions for this.

Electricity

The rule establishes how credits are generated for electricity when used as a transportation fuel. To receive credits, an entity is required to:

- Establish an account in the Online System;
- Comply with registration, recordkeeping, and reporting requirements.

The rule details entities that are eligible to generate credits for electricity:

- Used to charge an electric vehicle at non-residential locations.
- Used to power transit buses, ferry vessels, or fixed guideway vehicles such as light rail systems, streetcars, or aerial tram.
- Used as transportation fuel supplied to electric forklifts.
- Supplied to electric transport refrigeration units.
- Supplied to electric cargo handling equipment.
- Supplied to ocean-going vessels.
- Used to charge an electric vehicle at a residence.

Under the rule, if an electric utility does not register or designate an aggregator, then the backstop aggregator is eligible to claim any base credits that the utility could have generated for the following year. If a backstop aggregator does not register, then the electric vehicle manufacturer is eligible to claim the base credits associated with the electric vehicles that the backstop aggregator could have generated for the following year.

Additionally, any entity is eligible to generate incremental credits for improvements in carbon intensity of electricity used for residential EV charging.

Finally, the rule sets requirements for a backstop aggregator. A backstop aggregator is required to:

- Be an organization exempt from federal taxation under section 501(c)(3) of the U.S. Internal Revenue Code.
- Complete annual independent financial audits.
- Submit an application to Ecology, including but not limited to the organization's mission, experience and expertise, plan for promoting transportation electrification, revenue plans, financial controls, and audit and 501(c)(3) documentation.

The backstop aggregator designated by Ecology is required to submit a report that summarizes the previous year's activity.

Expected impact

We expect the rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.
- Benefits of credit sale revenues to credit holders.

- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The rule's requirements for reporting entities and credit or deficit generators interact with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

Many elements of the rule are consistent with clean fuels programs in Oregon and California. This meets statutory requirements, and provides consistency for entities complying with multiple programs.

2.3.5 Registration requirements

Baseline

Under the baseline statute (RCW 70A.535.070), each producer or importer of any amount of a transportation fuel that is ineligible to generate credits must register with Ecology. Electric vehicle manufacturers and producers, importers, distributors, users, and retailers of transportation fuels that are eligible to generate credits must register if they elect to participate in the program. Other persons must register to generate credits from other activities that support the reduction of GHG emissions associated with transportation in Washington.

Adopted

Under the adopted rule, the following entities need to apply to register for Clean Fuels Program participation:

- Entities required to report.
- Entities opting in.
- Credit aggregators.

Written, signed registration applications need to be uploaded to the WA-FRS, with contents specified in the rule. The rule also specifies requirements for modification or cancellation of registration.

The Washington Alternative Fuel Portal handles the registration of fuel production facilities, and supports fuel pathway applications, certifications, and verifications. The rule sets out eligibility and requirements for fuel producers who intend to be a fuel pathway applicant.

Expected impact

We expect these elements of the rule to result in registration costs, as well as the benefits of comprehensive information about entities participating in the Clean Fuels Program. Registration costs will likely underlie (and be distributed across) willingness to pay for credits and willingness to accept payment for credits. They will therefore be reflected in credit prices, and we do not estimate them separately in this analysis. Moreover, the baseline statute requires all participating entities to register, and the rule provides a straightforward means of doing so through online portals using known information.

2.3.6 Recordkeeping requirements

Baseline

There is no baseline specific to recordkeeping requirements, although recordkeeping inherently underlies other documentation and reporting requirements.

Adopted

The adopted rule specifies that the following records must be kept for at least ten years:

- Product transfer documents.
- Copies of all data and reports submitted to Ecology.
- Records related to each fuel transaction.
- Records used for each credit transaction.
- Records used for compliance credit and deficit calculations.
- Records related to obtaining a carbon intensity.
- Records used to establish that feedstocks are specified source feedstocks.
- Records related to third-party verification, if required.
- Records related to fuel supplying equipment registration.
- Chain of custody evidence for produced fuel imported into Washington.
- As applicable, attestations regarding environmental attributes associated with book-and-claim accounting for biomethane used as transportation fuel or for hydrogen production.

The rule also specifies documentation requirements for:

- Fuel transfers reported in Washington Fuel Reporting System.
- Transactions of clear and blended gasoline and diesel below the rack where the fuel is not destined for export.
- Credit Transactions.

Additionally, all regulated fuels held in bulk storage in Washington on January 1, 2023, are subject to the program and regulated parties need to report that fuel as their initial inventory.

Finally, the rule requires entities responsible for obtaining third-party verification of their data to complete and retain a written monitoring plan for review by a verifier or Ecology.

Expected impact

We do not expect the recordkeeping requirements in the rule to generate significant costs, as records may be kept electronically and largely reflect documentation likely to be generated as part of regular operations and supply chain management. However, these requirements

generate the benefit of having verifiable information about past registration, transfers, transactions, and other activities affecting compliance with the Clean Fuels Program.

2.3.7 Reporting requirements

Baseline

Under the baseline (RCW 70A.535.070), Ecology may adopt rules requiring periodic reporting by persons associated with the supply chains of transportation fuels participating in the program. The statute requires these reporting requirements and timelines to be consistent with similar programs in other states.

Adopted

The adopted rule establishes reporting deadlines for quarterly reports, as well as specific reporting requirements for each transportation fuel.

Expected impact

We expect the rule to result in reporting costs as well as benefits of timely and consistent information about Clean Fuels Program participants and activities.

2.3.8 Credit and deficit generation

Baseline

The authorizing statute (RCW 70A.535.020) directs Ecology to "adopt rules that establish standards that reduce carbon intensity in transportation fuels used in Washington." It also sets requirements for those standards and the program:

- Reducing overall carbon intensity of transportation fuels used in Washington.
- Requiring carbon intensity reductions at the level of all transportation fuels (not reductions in carbon intensity of any individual type of fuel).
- Assigning a compliance obligation to fuels whose carbon intensity exceeds the adopted standards.
- Assigning credits that can be used to satisfy or offset compliance obligations to fuels whose carbon intensity is below the adopted standards, that elect to participate in the program.
- Allowing regulated parties that generate deficits to reconcile the deficits by obtaining and retiring credits.
- Allowing regulated parties and credit generators to generate credits for fuels used as substitutes or alternatives for gasoline or diesel.
- Giving opportunities to trade credits.
- Allowing carryover of small deficits without penalty.

The statute also requires Ecology to regularly monitor the availability of fuels needed for compliance with the Clean Fuels Program, as well as calculate the monthly volume-weighted average price of credits.

Adopted

The adopted rule requires regulated parties, credit generators, and aggregators to use a carbon intensity approved by Ecology for calculating credits and/or deficits. The rule also sets out procedures for carbon intensity calculation, and defines annual compliance periods. Annual compliance periods are January 1 through December 31 of each year, except the initial compliance period is January 1, 2023, through December 31, 2024.

The rule defines when a clean fuel credit or deficit is generated. It requires credits to be retired in sufficient numbers to meet compliance obligations, according to a retirement hierarchy.

Expected impact

We expect the rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.
- Benefits of credit sale revenues to credit holders.
- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The credit and deficit generation requirements of the rule interact with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

2.3.9 Credit transactions

Baseline

The authorizing statute (RCW 70A.535.030) requires Ecology's rule to include, "provisions allowing for the achievement of limits on the greenhouse gas emissions intensity of transportation fuels to be achieved by any combination of credit generating activities capable of meeting such standards."

It also requires Ecology's rule to include:

- Methods for assigning compliance obligations and methods for tracking tradable credits.
- Mechanisms that allow credits to be traded and to be banked for future compliance periods.
- Procedures for verifying the validity of credits and deficits generated under the clean fuels program.
- Mechanisms to elect to participate in the clean fuels program for persons associated with the supply chains of transportation fuels that are eligible to generate credits.

- Mechanisms for persons associated with the supply chains of transportation fuels that are used for purposes that are exempt from the clean fuels program compliance obligations including, but not limited to, fuels used by aircraft, vessels, railroad locomotives, and other exempt fuels to elect to participate in the program.
- Mechanisms that allow for the assignment of credits to an electric utility for electricity used within its utility service area, at minimum, for residential electric vehicle charging or fueling.
- Cost containment mechanisms.

Adopted

The adopted rule specifies requirements for credit transactions. Regulated parties, credit generators, and aggregators are able to:

- Retain credits without expiration within the CFP in compliance with this division.
- Acquire or transfer credits from or to other regulated parties, credit generators, and aggregators that are registered.

They are not able to:

- Use credits that have not been generated in compliance with this chapter.
- Borrow or use anticipated credits from future projected or planned carbon intensity reductions, except as approved by Ecology under WAC 173-424-550.

The rule details requirements for credit transfers between registered parties, using an online Credit Transfer Form, and also details prohibited credit transfers.

Expected impact

We expect the rule's credit transaction requirements to result in incremental transaction costs that would be reflected in entities' willingness to pay for credits. We therefore do not analyze this cost separately, as it is not additive with credit purchase costs. The rule will also result in benefits of clear and consistent processes and documentation of credit transactions, facilitated by the Credit Transfer Form, that benefits not only the efficient functioning of the Clean Fuels Program, but also benefits both credit buyers and sellers by reducing transaction risks using clear allowed actions, prohibited actions, and responsibilities.

2.3.10 Calculation methods

Baseline

In RCW 70A.535.030, the authorizing statute requires Ecology's rule to include at least: "Standards for greenhouse gas emissions attributable to the transportation fuels throughout their life cycles, including but not limited to emissions from the production, storage, transportation, and combustion of transportation fuels and from changes in land use associated with transportation fuels and any permanent greenhouse gas sequestration activities."

The statute allows the rule to:

- "Include provisions to address the efficiency of a fuel as used in a powertrain as compared to a reference fuel."
- "Consider carbon intensity calculations for transportation fuels developed by national laboratories or used by similar programs in other states."
- "Consider changes in land use and any permanent greenhouse gas sequestration activities associated with the production of any type of transportation fuel."

The statute also specifies that the rule must:

- "Neutrally consider the life-cycle emissions associated with transportation fuels with respect to the political jurisdiction in which the fuels originated and may not discriminate against fuels on the basis of having originated in another state or jurisdiction."
- "Measure greenhouse gas emissions associated with electricity and hydrogen based on a mix of generation resources specific to each electric utility participating in the clean fuels program."
- "Include mechanisms for certifying electricity that has a carbon intensity of zero."
- "Allow the generation of credits associated with electricity with a carbon intensity lower than that of standard adopted by the department. The department may not require electricity to have a carbon intensity of zero in order to be eligible to generate credits from use as a transportation fuel."
- "Include procedures for setting and adjusting the amounts of greenhouse gas emissions per unit of fuel energy that is assigned to transportation fuels."

The authorizing statute also allows Ecology to determine that if it is necessary for purposes of accurately measuring greenhouse gas emissions associated with transportation fuels or supplied electricity, Ecology may:

- Require transportation fuel suppliers to submit additional data or information.
- Require electric utilities participating in the clean fuels program to submit additional data or information.

Adopted

The adopted rule details:

- Fuels to include in credit and deficit calculation.
- Exempt fuels.
- Voluntary inclusion.
- Procedures for exported and imported fuels.
- Procedures for alternative jet fuel.

It includes credit and deficit calculation methods for:

- General credit or deficit calculation.
- Fixed guideway vehicles and electric forklifts.
- Residential electric vehicle charging.
- Incremental Credits.

Expected impact

We expect the rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.
- Benefits of credit sale revenues to credit holders.
- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The calculation methods in the rule interact with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

2.3.11 Demonstrating compliance

Baseline

The baseline for demonstrating compliance overlaps with the baselines for reporting, compliance obligations, and other sections of the rule specifying requirements related to each element of demonstrating compliance. The authorizing statute (RCW 70A.535.030) also specifies that:

- "A regulated party that has a net deficit balance after the close of a credit clearance market:
    - Must carry over the remaining deficits into the next compliance period; and
    - May not be subject to interest greater than five percent, penalties, or assertions of noncompliance that accrue based on the carryover of deficits under this subsection."
- "If a regulated party has been required to participate as a purchaser in two consecutive credit clearance markets and continues to have a net deficit balance after the close of the second consecutive credit clearance market, the department shall complete, no later than two months after the close of the second credit clearance market, an analysis of the root cause of an inability of the regulated party to retire the remaining deficits. The department may recommend and implement any remedy that the department determines is necessary to address the root cause identified in the analysis including, but not limited to, issuing a deferral, provided that the remedy implemented does not:
    - Require a regulated party to purchase credits for an amount that exceeds the maximum price for credits in the most recent credit clearance market; or

- Compel a person to sell credits."

Adopted

The adopted rule defines how compliance is demonstrated, through annual compliance reports. The rule specifies how a regulated party's credit balance is calculated, and includes provisions for carrying forward small deficits, acquiring carryback credits, and handling non-small deficits.

Expected impact

We expect the rule to result in annual reporting costs as well as benefits of timely and comprehensive demonstration of compliance.

2.3.12 Credit clearance market

Baseline

The authorizing statue (RCW 70A.535.030) requires Ecology's rule to include:

> "A credit clearance market for any compliance period in which at least one regulated party reports that the regulated party has a net deficit balance at the end of the compliance period, after retirement of all credits held by the regulated party, that is greater than a small deficit. A regulated party described by this subsection is required to participate in the credit clearance market.
>
> If a regulated party has a small deficit at the end of a compliance period, the regulated party shall notify the department that it will achieve compliance with the clean fuels program during the compliance period by either: Participating in a credit clearance market or carrying forward the small deficit."

It requires Ecology to:

- Allow any regulated party, credit generator, or credit aggregator that holds excess credits at the end of the compliance period to voluntarily participate in the credit clearance market as a seller by pledging a specified number of credits for sale in the market.
- Require each regulated party participating in the credit clearance market as purchaser of credits to:
  - Have retired all credits in the regulated party's possession prior to participating in the credit clearance market.
  - Purchase the specified number of the total pledged credits that the department has determined are that regulated party's pro rata share of the pledged credits.
- Require all sellers to:
  - Agree to sell pledged credits at a price no higher than a maximum price for credits.
  - Accept all offers to purchase pledged credits at the maximum price for credits.

    - Agree to withhold any pledged credits from sale in any transaction outside of the credit clearance market until the end of the credit clearance market, or if no credit clearance market is held in a given year, then until the date on which the department announces it will not be held.

- Set a maximum price for credits in a credit clearance market, consistent with states that have adopted similar clean fuels programs, not to exceed $200 in 2018 dollars for 2023.
    - For 2024 and subsequent years, the maximum price may exceed $200 in 2018 dollars, but only to the extent that a greater maximum price for credits is necessary to annually adjust for inflation, beginning on January 1, 2024, pursuant to the increase, if any, from the preceding calendar year in the consumer price index for all urban consumers, west region (all items), as published by the bureau of labor statistics of the United States department of labor.

Finally, the authorizing statue specifies that:

- A regulated party that has a net deficit balance after the close of a credit clearance market:
    - Must carry over the remaining deficits into the next compliance period.
    - May not be subject to interest greater than five percent, penalties, or assertions of noncompliance that accrue based on the carryover of deficits.
- If a regulated party has been required to participate as a purchaser in two consecutive credit clearance markets and continues to have a net deficit balance after the close of the second consecutive credit clearance market, the department shall complete, no later than two months after the close of the second credit clearance market, an analysis of the root cause of an inability of the regulated party to retire the remaining deficits. Ecology may recommend and implement any remedy that the department determines is necessary to address the root cause identified in the analysis including, but not limited to, issuing a deferral, provided that the remedy implemented does not:
    - Require a regulated party to purchase credits for an amount that exceeds the maximum price for credits in the most recent credit clearance market.
    - Compel a person to sell credits.
- If credits sold in a credit clearance market are subsequently invalidated as a result of fraud or any other form of noncompliance on the part of the generator of the credit, the department may not pursue civil penalties against, or require credit replacement by, the regulated party that purchased the credits unless the regulated party was a party to the fraud or other form of noncompliance.
- Ecology may not disclose the deficit balances or pro rata share purchase requirements of a regulated party that participates in the credit clearance market.

Chapter 70A.535 RCW gives Ecology authority to designate an entity to aggregate and use unclaimed credits associated with persons that elect not to participate in the clean fuels program.

Adopted

The adopted rule establishes the credit clearance market with specific implementation:

- If a regulated party owes more than the allowed small deficit, it must enter and purchase its pro-rata share of credits in the credit clearance market.
- The credit clearance market is separate from the normal year-round market opportunities for parties to engage in credit transactions.
- Ecology will consider a regulated party in compliance with WAC 173-424-500 if it acquires its pro-rata obligation in the credit clearance market and retires that number of credits within 30 days of the end of the credit clearance market.

Per the authorizing statute, the rule sets a maximum price for the credit clearance market:

- $200 in 2018 US dollars per credit for the markets held upon the submission of the annual reports for compliance year 2023.
- For markets held upon submission of annual reports in 2023/2024 and thereafter Ecology shall adjust the maximum price for the credit clearance market annually for inflation at the end of each January using the inflation rate as provided by the last twelve months of data from the US Bureau of Labor Statistics West Region Consumer Price Index for All Urban Consumers for All Items. The formula for that adjustment is as follows: maximum price = [Last year's maximum price] * (1 + [CPI-U West]). Ecology will publish the new maximum price on its webpage each year.

The rule further defines timing and qualifications for the credit clearance market:

- The credit clearance market will operate from June 1 to July 31.
- Regulated parties must acquire their pro-rata share of the credits in the credit clearance market.
- A regulated party may only use credits acquired in the credit clearance market to retire them against its unmet compliance obligation from the prior year.
- To qualify for compliance through the credit clearance market, the regulated party in question must have:
    - Retired all credits in its possession.
    - Have an unmet compliance obligation for the prior year that has been reported to Ecology through submission of its annual report in the WFRS.

It also sets requirements for selling credits in the credit clearance market:

- On the first Monday in April each year, Ecology shall issue a call to all eligible registered parties in the WFRS to pledge credits into the credit clearance market, or will issue a notification that it will not hold a credit clearance market that year. Registered parties are eligible to sell credits in the clearance market if they will have excess credits upon the submission of their annual report. Parties wanting to pledge credits into the credit

clearance market will notify Ecology by April 30. Ecology will announce if a clearance market will occur by May 15.

- In order to participate in the credit clearance market, sellers must:
    - Agree that they will sell their credits for no higher than the maximum price as published by Ecology for that year;
    - Agree to withhold any pledged credits from sale in any transaction outside of the credit clearance market until the end of the credit clearance market on July 31, or if no clearance market is held in a given year, then on the date which Ecology announces it will not be held;
    - Not reject an offer to purchase the credits at the maximum price for that year as published by Ecology, unless the seller has already sold or agreed to sell those pledged credits to another regulated party participating in the credit clearance market; and
    - Agree to replace any credits that the seller pledges into the clearance market if those credits are later found to be invalid by Ecology due to fraud or non-compliance by the generator of the credit, unless the buyer of the credits was a party to that fraud or non-compliance.

The rule specifies how Ecology will operate the credit clearance market, including:

- Informing each regulated party that failed to meet its annual compliance obligation of its pro-rata share of the credits pledged into the credit clearance market.
- Calculation of pro-rata shares.
- Actions required after the close of the credit clearance market, including:
- Amending annual compliance reports.
- Carry-over of unmet deficits plus five percent.
- Root cause analysis for regulated parties that have been required to participate in two consecutive credit clearance markets, and deferral or development of remedies.

Expected impact

We expect the rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.
- Benefits of credit sale revenues to credit holders.
- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The credit clearance market interacts with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

2.3.13 Advance credits

Baseline

The authorizing statute (RCW 70A.535.050) allows Ecology to allow generation of credits from, "activities that support the reduction of greenhouse gas emissions associated with transportation in Washington," including:

- Carbon capture and sequestration projects,
- Investments and activities that support deployment of machinery and equipment used to produce gaseous and liquid fuels from non-fossil feedstocks, and derivatives thereof;
- The fueling of battery or fuel cell electric vehicles by a commercial, nonprofit, or public entity that is not an electric utility, which may include, but is not limited to, the fueling of vehicles using electricity certified by the department to have a carbon intensity of zero; and
- The use of smart vehicle charging technology that results in the fueling of an electric vehicle during times when the carbon intensity of grid electricity is comparatively low.

The authorizing statute also requires the rule to, "allow the generation of credits based on capacity for zero emission vehicle refueling infrastructure, including DC fast charging infrastructure and hydrogen refueling infrastructure."

The authorizing statute requires the rule to, "allow the generation of credits from state transportation investments funded in an omnibus transportation appropriations act for activities and projects that reduce greenhouse gas emissions and decarbonize the transportation sector." It also allows the rule to, "establish limits for the number of credits that may be earned each year by persons participating in the program for some or all" of these activities.

Adopted

The adopted rule specifies requirements for advance crediting. Advance credits are, "used to decarbonize the transportation sector."

- Eligibility to generate Advance Credits:
    - Washington Department of Transportation or other public entities that are implementing state transportation investment projects and programs to be funded through an omnibus transportation appropriation act may apply for advance credit, provided that:
        - The projects and program reduce greenhouse gas emissions and decarbonize the transportation sector.
        - The projects and programs are eligible to generate regular credits.
        - Entities including but not limited to:

- Political subdivisions or municipal corporations of the State of Washington
- Tribes
- School Districts
- Companies under contract to provide services to a political subdivision of the State of Washington or a Washington School District may apply if the political subdivision endorses the application, and the vehicles covered by the application are intended to provide contracted services to the public.

  - These entities may apply to earn advance credits for the purchase and use of the following types of investments:
    - Medium and heavy duty vehicles and infrastructure.
    - Light-duty vehicles and infrastructure if they are part of an organization's plan to fully electrify its light-duty fleet within a 15-year time period.
    - Electrification of the state ferry fleet.
    - Public transit infrastructure.
    - Other types of investments that Ecology may identify to incentivize effective GHG emissions reduction activities that can normally generate credit through the clean fuels program.

- Applications for Advance Credits:
  - Applications for advance crediting will be accepted by Ecology at least once per year from entities eligible to apply under section (2). Ecology will notify stakeholders when applications will be accepted and will provide application materials and guidance about how it will process and consider applications.
  - Applicants must supply the following information to Ecology:
    - A letter describing the activities or purchases that they want to receive advance crediting for, and the estimated timeframes for when those projects and programs will be put into useful service.
    - A detailed estimate of the potential credit generation from the investment projects or programs that they want to receive advance crediting for.
    - A detailed monitoring mechanism to ensure the accuracy of the credit generation from the investment projects or programs until it has exited the payback period.
    - Information on the location of the investment projects and programs and all materials and energy inputs and emissions that is used to estimate the potential credit generation.

        - A proposed number of credits to be advanced for each vehicle.
        - An attestation that the applicant will remain the owner or lessee of the credit generating units through the implementation of the investment projects and programs until the vehicle has paid back the advance credits, or that, if the credit generating unit is sold prior to the end of the payback period, that the applicant will buy and retire credits against the remaining unearned amount.
    - Ecology may request additional documentation from an applicant prior to making a decision on the application. Not submitting the requested documentation, can be reason to deny the application without prejudice.

- Approval of Advance Credits. If Ecology determines that an application for advance credits meets requirements, then Ecology will negotiate an agreement with the applicant to issue advance credits consistent with this rule and based on all of the following considerations and requirements:
    - A clear and objective milestone for issuing advance credits that represents when the credit generating unit implemented through the investment projects and program covered by the application are placed into useful service to generate credits;
    - The total number of credits being advanced;
    - The length of the payback period, which must be at least one year longer than the number of years of credits that will be advanced;
    - An attestation from the applicant that it understands that the advanced credits must represent real reductions and that if the activity covered by the agreement does not generate sufficient credits within the payback period that it is responsible for retiring a sufficient number of credits to make up the difference. The attestation must also include a statement that the applicant understands that it is responsible for making up the difference in credits if it sells or relocates covered credit generating units outside of Washington.
    - An attestation from the applicant that it will ensure that actual credits from the investment project or program are not generated from other credit generating units until the credits have been paid back.
- Issuance of Advance Credits:
    - Ecology will issue advance credits to the applicant only after the vehicles or equipment are placed into useful service as agreed to under section (4) of this rule;
    - Credits will only be issued to the applicant named in the agreement; and
    - Ecology may advance no more than six years of credits for any single investment project or program.

- Payback Period:
    - The payback period for the investment project or program will be specified in the agreement between Ecology and the applicant, except that the payback period may not exceed nine years. The payback period must be at least one year longer than the number of years of credits advanced to the applicant.
    - In the event that the number of advance credits was not realized during the payback period, the recipient is responsible for acquiring and retiring sufficient credits to ensure the environmental integrity of the program.
    - If the ownership of an investment project or program is transferred to another entity prior to the close of the payback period, the applicant is responsible for retiring credits against the volume of advanced credits that has not yet been covered by actual credit generation.
- Reporting Requirements:
    - Must file quarterly reports to Ecology showing the amount of credit generating activities into the investment project or program covered by the agreement; and
    - May not generate additional credits for that project until the advance credits are paid back using credit generated from that project or other banked credits. Ecology and the applicant will monitor the amount of credits that would have been generated to determine when an equal number of credits has been generated to the number of credits advanced.
- Overall limitation on advance credits:
    - Ecology may not issue more advance credits in any one calendar year than an amount equal to five percent of the total number of deficits generated in the prior compliance year. In considering applications under this section, Ecology will process applications based on the criteria Ecology develops in consultation with the Washington Department of Transportation towards meeting the goals of the clean fuels program.

Expected impact

We expect the rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.
- Benefits of credit sale revenues to credit holders.
- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The advance credit requirements interact with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

Many elements of the rule are consistent with clean fuels programs in Oregon and California. This meets statutory requirements, and provides consistency for entities complying with multiple programs.

2.3.14 Credit generation for zero emission vehicle infrastructure

Baseline

The authorizing statute (RCW 70A.535.050) allows Ecology to allow generation of credits from, "activities that support the reduction of greenhouse gas emissions associated with transportation in Washington," including:

- Carbon capture and sequestration projects,
- Investments and activities that support deployment of machinery and equipment used to produce gaseous and liquid fuels from non-fossil feedstocks, and derivatives thereof;
- The fueling of battery or fuel cell electric vehicles by a commercial, nonprofit, or public entity that is not an electric utility, which may include, but is not limited to, the fueling of vehicles using electricity certified by the department to have a carbon intensity of zero; and
- The use of smart vehicle charging technology that results in the fueling of an electric vehicle during times when the carbon intensity of grid electricity is comparatively low.

The authorizing statute also requires the rule to, "allow the generation of credits based on capacity for zero emission vehicle refueling infrastructure, including DC fast charging infrastructure and hydrogen refueling infrastructure."

The authorizing statute requires the rule to, "allow the generation of credits from state transportation investments funded in an omnibus transportation appropriations act for activities and projects that reduce greenhouse gas emissions and decarbonize the transportation sector." It also allows the rule to, "establish limits for the number of credits that may be earned each year by persons participating in the program for some or all" of these activities.

Adopted

The adopted rule includes requirements for generating and calculating credits for zero emission vehicle fueling infrastructure pathways, including:

- Hydrogen Refueling Infrastructure Pathways.
- DC Fast Charging Infrastructure Pathways.

Expected impact

We expect the rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.
- Benefits of credit sale revenues to credit holders.

- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The requirements for credit generation for ZEV infrastructure interact with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

2.3.15 Carbon intensity

Baseline

The authorizing statute (RCW 70A.535.020) directs Ecology to "adopt rules that establish standards that reduce carbon intensity in transportation fuels used in Washington." It also sets requirements for those standards and the program:

- Reducing overall carbon intensity of transportation fuels used in Washington.
- Requiring carbon intensity reductions at the level of all transportation fuels (not reductions in carbon intensity of any individual type of fuel).
- Assigning a compliance obligation to fuels whose carbon intensity exceeds the adopted standards.
- Assigning credits that can be used to satisfy or offset compliance obligations to fuels whose carbon intensity is below the adopted standards, that elect to participate in the program.
- Allowing regulated parties that generate deficits to reconcile the deficits by obtaining and retiring credits.
- Allowing regulated parties and credit generators to generate credits for fuels used as substitutes or alternatives for gasoline or diesel.
- Giving opportunities to trade credits.
- Allowing carryover of small deficits without penalty.

The statute also requires Ecology to regularly monitor the availability of fuels needed for compliance with the clean fuels program, as well as calculate the monthly volume-weighted average price of credits.

It also requires Ecology's rule to, "reduce the greenhouse gas emissions attributable to each unit of the fuels to 20 percent below 2017 levels by 2038 based on the following schedule:"

- No more than 0.5 percent each year in 2023 and 2024.
- No more than an additional one percent each year beginning in 2025 through 2027.
- No more than an additional 1.5 percent each year beginning in 2028 through 2031.
- No change in 2032 and 2033.

The program must start no later than January 1, 2023.

The authorizing statute also specifies that:

- (6) Beginning with the program year beginning in calendar year 2028, the department may not increase the carbon intensity reductions required by the applicable clean fuels program standard adopted by the department under subsection (5) of this section beyond a 10 percent reduction in carbon intensity until the department demonstrates that the following have occurred:
    - At least a 15 percent net increase in the volume of in-state liquid biofuel production and the use of feedstocks grown or produced within the state relative to the start of the program.
    - At least one new or expanded biofuel production facility representing an increase in production capacity or producing, in total, in excess of 60,000,000 gallons of biofuels per year has or have received after July 1, 2021, all necessary siting, operating, and environmental permits post all timely and applicable appeals. As part of the threshold of 60,000,000 gallons of biofuel under this subsection, at least one new facility producing at least 10,000,000 gallons per year must have received all necessary siting, operating, and environmental permits. Timely and applicable appeals must be determined by the attorney general's office.
- Beginning with the program year beginning in calendar year 2031, the department may not increase the carbon intensity reductions required by the applicable clean fuels program standard adopted by the department under subsection (5) of this section beyond a 10 percent reduction in carbon intensity until the:
    - Joint legislative audit and review committee report required in RCW 70A.535.140 has been completed.
    - 2033 regular legislative session has adjourned, in order to allow an opportunity for the legislature to amend the requirements of this chapter in light of the report required in (a) of this subsection.

In RCW 70A.535.030, the authorizing statute requires Ecology's rule to include at least: "Standards for greenhouse gas emissions attributable to the transportation fuels throughout their life cycles, including but not limited to emissions from the production, storage, transportation, and combustion of transportation fuels and from changes in land use associated with transportation fuels and any permanent greenhouse gas sequestration activities."

The statute allows the rule to:

- "Include provisions to address the efficiency of a fuel as used in a powertrain as compared to a reference fuel."
- "Consider carbon intensity calculations for transportation fuels developed by national laboratories or used by similar programs in other states."
- "Consider changes in land use and any permanent greenhouse gas sequestration activities associated with the production of any type of transportation fuel."

The statute also specifies that the rule must:

- "Neutrally consider the life-cycle emissions associated with transportation fuels with respect to the political jurisdiction in which the fuels originated and may not discriminate against fuels on the basis of having originated in another state or jurisdiction."
- "Measure greenhouse gas emissions associated with electricity and hydrogen based on a mix of generation resources specific to each electric utility participating in the clean fuels program."
- "Include mechanisms for certifying electricity that has a carbon intensity of zero."
- "Allow the generation of credits associated with electricity with a carbon intensity lower than that of standard adopted by the department. The department may not require electricity to have a carbon intensity of zero in order to be eligible to generate credits from use as a transportation fuel."
- "Include procedures for setting and adjusting the amounts of greenhouse gas emissions per unit of fuel energy that is assigned to transportation fuels."

The authorizing statute also allows Ecology to determine that it is necessary for purposes of accurately measuring greenhouse gas emissions associated with transportation fuels or supplied electricity:

- Ecology may require transportation fuel suppliers to submit additional data or information.
- Ecology may require electric utilities participating in the clean fuels program to submit additional data or information.

Adopted

The adopted rule specifies how carbon intensities for fuels must be calculated:

- Using the Washington-modified Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation model (WA-GREET 3.0) (November 28, 2022) or another model that Ecology determines to be equivalent or superior to WA-GREET 3.0. WA-GREET 3.0 was derived from CA-GREET 3.0 model (August 13, 2018), and will be posted on Ecology's website https://www.ecology.wa.gov. CA-GREET 3.0 includes contributions from the Oil Production Greenhouse Gas Estimator (OPGEE 2.0) model (for emissions from crude extraction) and Global Trade Analysis Project (GTAP-BIO) model together with the Agro-Ecological Zone Emissions Factor (AEZ-EF) model for land use change (LUC).
- If a reporting entity wishes to use a modified or different life cycle carbon intensity model, it must be approved by Ecology in advance of an application.

The rule requires Ecology to review carbon intensities used in the Clean Fuels Program every three years, or sooner if Ecology determines that new information becomes available that warrants an earlier review.

It also lists the required statewide average carbon intensities that regulated parties, credit generators and aggregators must use, as well as carbon intensities for established fuel pathways certified by CARB or OR-DEQ, adjusted for consistency with WA-GREET 3.0.

The rule allows flexibility if it is not possible to identify an applicable carbon intensity using the above methods, subject to Ecology approval of the application, or for specified source feedstocks.

It also specifies a process for fuel producers to apply to obtain a carbon intensity for their transportation fuels, by submitting an application, and requirements for measurement accuracy and missing data.

The rule specifies the process and application requirements for energy economy ratio-adjusted carbon intensity applications. Eligibility for application submittal includes:

- Vehicle owners or operators eligible to generate credits for their vehicles.
- Manufacturers of vehicles eligible to generate credits may make a joint application with an owner or operator of their vehicles based in Washington.
- A single, joint application may be submitted on behalf of, and combining data from, any combination of multiple vehicle owners, operators, and manufacturers.

Applications made under the rule need to be for electric vehicles capable of full normal operation using energy from onboard batteries or fuel cells.

Finally, the rule includes requirements for determining the carbon intensity of electricity, using:

- A utility-specific electricity mix.
- Statewide electricity mix.
- Unspecified electricity.
- On-site renewable electricity generation.
- Offsite renewable electricity.
- Carbon intensity of renewable electricity.
- Utility Renewable Electricity Products and Power Purchase Agreements.

Expected impact

For new pathways, we expect the rule to result in costs of demonstrating and submitting all required information for application and approval of a carbon intensity. The private party costs (outside of Ecology costs) of this process would be distributed and contribute to willingness to pay, or willingness to accept, for credits. These costs would be reflected in credit purchase costs. We therefore do not estimate these costs separately from the overall costs and benefits of the Clean Fuels Program.

We expect the rule to result in:

- Compliance costs of reducing carbon intensity or purchasing credits for deficit holders.

- Benefits of credit sale revenues to credit holders.
- Environmental, health, and environmental justice benefits associated with reductions in GHG emissions and criteria pollutants.

The carbon intensity requirements interact with other elements of the rule to generate these expected costs and benefits, and we analyze the costs (Chapter 3) and benefits (Chapter 4) of the Clean Fuels Program as a whole.

2.3.16 Authority to suspend, revoke, or modify

Baseline

Under the authorizing statute (RCW 70A.535.020):

- "If credits sold in a credit clearance market are subsequently invalidated as a result of fraud or any other form of noncompliance on the part of the generator of the credit, the department may not pursue civil penalties against, or require credit replacement by, the regulated party that purchased the credits unless the regulated party was a party to the fraud or other form of noncompliance."

Adopted

The adopted rule sets criteria for suspension, revocation, or modification of accounts and credits. Ecology is able to take action if:

- Any of the information used to generate or support the approved carbon intensity was incorrect, including if material information was omitted or the process changed following the submission of the carbon intensity application.
- Any material information submitted in connection with the approved carbon intensity or a credit transaction was incorrect.
- Fuel reported under a given pathway was produced or transported in a manner that varies in any way from the methods set forth in any corresponding pathway application documents such that the variance would meet the threshold to be material information.
- Fuel transaction data or other data reported into the Washington Fuels Reporting System ("WFRS") and used to calculate credits and deficits was incorrect or omitted material information.
- Credits or deficits were generated or transferred in violation of any provision of this Chapter or in violation of other laws, statutes, or regulations.
- A party obligated to provide records under this chapter refused to provide such records or failed to do so within the required timeframe for documenting credit transactions.
- Failure to submit a verification statement when it is required.
- An adverse verification statement.

- A party obligated to provide records associated with credit revenue spending under this chapter refused to provide such records or failed to do so within the required timeframe.

In response, Ecology can:

- Suspend, restrict, modify, or revoke an account in the WFRS, or take one combination of two or more such actions.
- Modify or delete an approved carbon intensity.
- Restrict, suspend, or invalidate credits.
- Recalculate the deficits in a regulated party's WFRS account.

Finally, the rule defines the process that Ecology and affected parties must follow in the event of potential suspension, revocation, or modification.

Expected impact

In the event the provisions of this part of the rule are triggered, it could result in potential additional compliance costs or a reduction in benefits, depending on the circumstance. We note, however, that these net costs are not necessarily higher than they would have been if compliance processes had been sufficiently followed in the first place. These provisions help to ensure efficient functioning of the Clean Fuels Program, and ensure GHG emissions reductions achieved are accurately reflected.

2.3.17 Public disclosure

Baseline

The authorizing statute (RCW 70A.535.070) specifies the confidentiality of records and information, through reference to RCW 70A.15.2510. The referenced statute describes confidentiality of records and information:

> "Whenever any records or other information, other than ambient air quality data or emission data, furnished to or obtained by the department of ecology or the board of any authority under this chapter, relate to processes or production unique to the owner or operator, or is likely to affect adversely the competitive position of such owner or operator if released to the public or to a competitor, and the owner or operator of such processes or production so certifies, such records or information shall be only for the confidential use of the department of ecology or board. Nothing herein shall be construed to prevent the use of records or information by the department of ecology or board in compiling or publishing analyses or summaries relating to the general condition of the outdoor atmosphere: PROVIDED, That such analyses or summaries do not reveal any information otherwise confidential under the provisions of this section: PROVIDED FURTHER, That emission data furnished to or obtained by the department of ecology or board shall be correlated with applicable emission limitations and other

control measures and shall be available for public inspection during normal business hours at offices of the department of ecology or board."

In RCW 70A.535.020, the authorizing statute specifies that Ecology will post the formula for the monthly volume-weighted average price of credits, results, and data used for the calculation, on Ecology's website. It also specifies that, "data posted on the department's website under this section may not include any individually identifiable information or information that would constitute a trade secret."

Finally, the authorizing statute requires Ecology to annually post a report on its website including:

- The program-wide number of credits and deficits generated by entities participating in the clean fuels program;
- The volumes of each transportation fuel and average price per credit used to comply with the requirements of the clean fuels program;
- The best estimate or range in probable costs or cost savings attributable to the clean fuels program per gallon of gasoline and per gallon of diesel, as determined by an independent consultant whose services the department has contracted. The estimate or range in probable costs or cost savings from the independent consultant must be announced in a press release to the news media at the time that the report under this subsection (1) is posted to the department's website, and must be simultaneously reported to the transportation committees of the house of representatives and the senate;
- The total greenhouse gas emissions reductions attributable to the clean fuels program isolated from the greenhouse gas emissions reductions attributable to other state and national programs on the same fuels; and
- The range in the probable cost per ton of greenhouse gas emissions reductions attributable to fuels supported by the clean fuels program, taking into account the information above.

Adopted

Under the adopted rule, Ecology is required to keep the following information publicly available on its website:

- List of Ecology-approved registered parties.
- All information submitted as application materials in the WFRS that are not identified as trade secrets or confidential business information are subject to public disclosure pursuant to Washington Public Records Act (Chapter 42.56 RCW).
- Monthly credit trading activity report. Ecology must post on its webpage, by no later than the last day of the month immediately following the month for which the calculation is completed, a credit trading activity report that:
- Summarizes the overall credit transfer information for the:

- Most recent month.
- Previous three months.
- Previous three quarters.
- Previous compliance periods.

Ecology must publish on its website:

- The total number of credits transferred.
- The number of transfers.
- The number of parties making transfers.
- The formula Ecology used to calculate the volume-weighted average price of that month's transfers, exclusive of transactions that fall two standard deviations outside of the mean credit price for the month or that are transferred without a price.

The rule requires Ecology to post a quarterly data summary on its webpage, including:

- An overall data summary of credit and deficit generation for the most recent quarter and all prior quarters; and
- Information on the contribution of credit generation by different fuel types.

Ecology is also required to annually post:

- The average cost or cost-savings per gallon of gasoline, per gallon of diesel, or any other fuel types, and the formulas used to calculate such costs or cost-savings.
- The total greenhouse gas emissions reductions.
- Utility Reports.

Expected impact

The rule's requirements for public disclosure, in conjunction with protections of confidential information under the authorizing statute, provide transparency in the Clean Fuels Program without divulging confidential information that could be damaging to businesses. Associated costs will fall on Ecology as part of administering the program, and we do not expect private costs as a result of this section of the rule.

2.3.18 Emergency deferral

Baseline

Under RCW 70A.535.120, the Ecology Director may issue an order declaring an emergency deferral of compliance with the carbon intensity standard. The statute sets criteria and the process for this declaration, including:

- Determination in consultation with the Governor's Office and the Department of Commerce.

- Extreme and unusual circumstances exist that prevent the distribution of an adequate supply of renewable fuels needed for regulated parties to comply with the clean fuels program taking into consideration all available methods of obtaining sufficient credits to comply with the standard.
- The extreme and unusual circumstances are the result of a natural disaster, an act of God, a significant supply chain disruption or production facility equipment failure, or another event that could not reasonably have been foreseen or prevented and not the lack of prudent planning on the part of the suppliers of the fuels to the state.
- It is in the public interest to grant the deferral such as when a deferral is necessary to meet projected temporary shortfalls in the supply of the renewable fuel in the state and that other methods of obtaining compliance credits are unavailable to compensate for the shortage of renewable fuel supply.

Deferral is permitted only if:

- The deferral applies only for the shortest time necessary to address the extreme and unusual circumstances.
- The deferral is effective for the shortest practicable time period the director of the department determines necessary to permit the correction of the extreme and unusual circumstances.
- The director has given public notice of a proposed deferral.

The baseline statute also set out information that must be specified in the deferral, and process for termination of the deferral.

Finally, the statute allows Ecology to issue a full or partial deferral for one calendar quarter of a person's obligation to furnish credits for compliance if it finds that the person is unable to comply with the requirements of this chapter due to reasons beyond the person's reasonable control.

Adopted

The adopted rule sets criteria and requirements for emergency deferrals in line with the authorizing statute, with added detail for making the determination of fuel shortage relative to the amount of the fuel needed for regulated parties to comply.

Expected impact

If declared, an emergency deferral would reduce costs of compliance with the rule, but would also delay reduction in emissions of GHGs. As an emergency deferral would reflect circumstances that could make compliance with the program highly expensive or impossible, it is likely that the compliance costs or costs to consumers avoided by the emergency deferral would be large enough to mitigate lost benefits of GHG emissions reductions.

2.3.19 Forecast deferral

Baseline

Under the authorizing statute (RCW 70A.535.100), the Department of Commerce must develop a periodic fuel supply forecast, projecting the availability of fuels necessary for compliance with Clean Fuels Program requirements. The Department of Commerce must then identify whether sufficient credits will be available. The authorizing statute (RCW 70A.535.110) sets criteria and content for a forecast deferral, issued if the fuel supply forecast projects that the amount of credits that will be available during the forecast compliance period will be less than 100 percent of the credits projected to be necessary for regulated parties to comply with the scheduled applicable clean fuels program standard adopted by the Department of Ecology for the forecast compliance period.

The order declaring a forecast deferral must specify:

- The duration of the forecast deferral.
- The types of fuel to which the forecast deferral applies.
- Which of the following methods the department has selected for deferring compliance with the scheduled applicable clean fuels program standard during the forecast deferral:
    - Temporarily adjusting the scheduled applicable clean fuels program standard to a standard identified in the order that better reflects the forecast availability of credits during the forecast compliance period and requiring regulated parties to comply with the temporary standard.
    - Requiring regulated parties to comply only with the clean fuels program standard applicable during the compliance period prior to the forecast compliance period.
    - Suspending deficit accrual for part or all of the forecast deferral period.

It also specifies the process for implementing the forecast deferral, including other or additional actions to be taken, and notification requirements.

Adopted

The adopted rule includes requirements for forecast deferral consistent with the baseline.

Expected impact

The rule does not vary significantly from the baseline, other than providing additional clarity. We note, also, that if declared, a forecast deferral would reduce costs of compliance with the rule, but would also delay reduction in emissions of GHGs. As a forecast deferral would reflect circumstances that could make compliance with the program highly expensive due to insufficient credits, or limit the fuel supply available to Washington resulting in high fuel costs, it is likely that the costs avoided by the forecast deferral would be large enough to mitigate lost benefits of GHG emissions reductions.

2.3.20 Validation and verification

Baseline

The authorizing statute (RCW 70A.535.030) requires the adopted rule to include, "procedures for verifying the validity of credits and deficits generated under the clean fuels program."

Adopted

Under the adopted rule:

- For fuel pathways that have been certified by CARB or OR-DEQ and approved by Ecology, the regulated party must submit the periodic third party verification reports submitted to and approved by CARB or OR-DEQ.
- Ecology may require third party verification, as necessary, to validate and verify the carbon intensity of fuel pathways.

Expected impact

For entities using fuel pathways approved by CARB or OR-DEQ, we do not expect the rule to result in significant costs from the additional effort of submitting existing verification reports to Ecology. Verification costs could be incurred if additional verification is required by Ecology, to validate the carbon intensity of other fuel pathways. Verification results in benefits of accurate functioning of the Clean Fuels Program, so reductions in emissions of GHGs are accurately reflected and achieved.

2.3.21 Determining fees

Baseline

The existing Air Quality Fee Rule (Chapter 173-455 WAC; "fee rule") does not include fees related to the Clean Fuels Program.

The authorizing statute (RCW 70A.535.130) allows Ecology to require covered or opt-in entities in the Clean Fuels Program to pay a fee. Ecology must adopt rules to establish the process to set fees, and the fees must be based on the costs of developing and administering the program.

Adopted

The adopted amendments to the fee rule establish fee determination for the Clean Fuels Program. Fees are based on the costs of administering the program.

Each biennium, Ecology, along with the Department of Commerce, will conduct a workload analysis and develop a budget for administration of the Clean Fuels Program, projecting resource requirements. Fees will be allocated across credit and deficit generators:

- For fees assessed in 2023, Ecology may collect a participation fee only. Ecology must allocate the participation fee as follows:
    - 95 percent of the annual budget is to be paid by deficit generators
    - 5 percent of the annual budget is to be paid by credit generators.
- For fees assessed in and after 2024, Ecology may collect both a participation fee and a deficit generation fee.

- The participation fee must equal 5 percent of the annual budget, and Ecology must split the fee equally amongst deficit and credit generators.
- The deficit generation fee must equal 95 percent of the annual budget, and Ecology must allocate the fee based on the number of deficits generated by an entity.

In 2023, Ecology will prepare an annual budget that reflects the estimated cost of administering the Clean Fuels Program, post the budget and participation fee to its website, and provide a 30-day public comment period.

For 2024 and subsequent years, Ecology will prepare a biennial workload analysis and budget that reflects the estimated cost of administering the Clean Fuels Program. Ecology will then post the draft workload analysis, budget, fees, and list of deficit generators, and provide a 30-day public comment period.

Expected impact

The amendments to the fee rule will result in total costs of fees that are equal to the costs of administering the program. The administration of the program facilitates compliance with the authorizing statute and the Clean Fuels rule, and in that reflects the total value of services provided. While the rule amendments set only the process for setting fees, and we do not yet know what those fees will be, their costs will equal the benefits of services provided. We therefore do not expect a net cost or benefit to the adopted fee rule amendments, beyond the benefit of ensuring program function.

Chapter 3: Likely Costs of the Adopted Rule

3.1 Introduction

We analyzed the likely costs associated with the adopted rule, as compared to the baseline. The rule and the baseline are discussed in detail in Chapter 2 of this document.

3.2 Cost discussion

The adopted rule establishes:

- Definitions specific to the Clean Fuels Program.
- Applicability and exemptions for fuels.
- General requirements for regulated parties, opt-in entities, and credit aggregators.
- Identification of first fuel reporting entities, subsequent reporting entities, and credit or deficit generators, for:
    - Liquid fuels.
    - Gaseous fuels.
    - Electricity.
    - The backstop aggregator.
- Registration requirements.
- Recordkeeping requirements.
- Reporting requirements.
- Credit and deficit generation procedures.
- Credit transaction procedures.
- Required calculation methods for credits and deficits.
- How compliance must be demonstrated.
- A credit clearance market.
- Advance credit procedures.
- Credit generation methods for zero-emission vehicle (ZEV) infrastructure.
- Carbon intensity calculations and procedures.
- Authority to suspend, revoke, or modify accounts, carbon intensities, or credits.
- Public disclosure requirements.
- Emergency deferral procedures in the event of a fuels shortage.

- Forecast deferral procedures.
- Validation and verification requirements.

Amendments to the fee rule:

- Set the procedure for determining Clean Fuels Program fees based on workload.

3.2.1 Definitions

Definitions in and of themselves do not have any impact. Their content may generate costs in the section(s) of the rule in which they are used. Any associated costs and benefits are discussed in subsequent sections of this document.

3.2.2 Applicability and exemptions

We expect the rule to result in compliance costs of reducing carbon intensity or purchasing credits for deficit holders. Because the applicability of the rule interacts with other elements of the rule to generate these expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.3 General requirements

We do not expect this section to generate costs. Costs associated with registration, recordkeeping, and reporting are addressed in separate sections.

We analyze compliance with the Clean Fuel Standard as part of the overall costs of the rule. We expect the rule to result in compliance costs of reducing carbon intensity or purchasing credits for deficit holders. Because the general requirements of the rule interact with other elements of the rule to generate these expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.4 Reporting entities and credit or deficit generators

We expect these elements of the rule to inform allocation of costs across entities reporting or generating credits or deficits. We expect the rule to result in compliance costs of reducing carbon intensity or purchasing credits for deficit holders. Because the requirements for credit and deficit generators interact with other elements of the rule to generate these expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.5 Registration requirements

We expect these elements of the rule to result in registration costs. Registration costs will likely underlie (and be distributed across) willingness to pay for credits and willingness to accept payment for credits. They will therefore be reflected in credit prices, and we do not estimate them separately in this analysis. Moreover, the baseline statute requires all participating entities to register, and the rule provides a straightforward means of doing so through online

portals using known information. We do not expect a significant incremental cost of the rule relative to the baseline.

3.2.6 Recordkeeping requirements

We do not expect the recordkeeping requirements in the rule to generate significant costs, as records may be kept electronically and largely reflect documentation likely to be generated as part of regular operations and supply chain management.

3.2.7 Reporting requirements

We expect the rule to result in reporting costs. These costs are estimated below, in section 3.4.

3.2.8 Credit and deficit generation

We expect the rule to result in compliance costs of reducing carbon intensity or purchasing credits for deficit holders. Because the credit and deficit generation requirements interact with other elements of the rule to generate these expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.9 Credit transactions

We expect the rule's credit transaction requirements to result in incremental transaction costs that would be reflected in entities' willingness to pay for credits. We therefore do not analyze this cost separately, as it is not additive with credit purchase costs.

3.2.10 Calculation methods

We expect the rule to result in compliance costs of reducing carbon intensity or purchasing credits for deficit holders. Because the calculation methods in the rule interact with other elements of the rule to generate these expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.11 Demonstrating compliance

We expect the rule to result in annual reporting costs. We estimate these costs as part of overall reporting costs below, in section 3.4.

3.2.12 Credit clearance market

We expect the rule to result in compliance costs of reducing carbon intensity or purchasing credits for deficit holders. Because the structure and functions of the credit clearance market interact with other elements of the rule to generate these expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.13 Advance credits

We expect the rule to result in compliance costs of reducing carbon intensity or purchasing credits for deficit holders. The costs of acquiring advance credits are transaction costs that will inform entities' willingness to accept payment for credits. We therefore do not estimate these costs separately, as they are not additive to overall costs of the program. Because the advance credit requirements in the rule interact with other elements of the rule to generate expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.14 Credit generation for zero emission vehicle infrastructure

We expect the rule to result in compliance costs of reducing carbon intensity or purchasing credits for deficit holders. Because the requirements around credit generation for zero emission vehicle infrastructure interact with other elements of the rule to generate these expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.15 Carbon intensity

For new pathways, we expect the rule to result in costs of demonstrating and submitting all required information for application and approval of a carbon intensity. The private party costs (outside of Ecology costs) of this process would be distributed and contribute to willingness to pay, or willingness to accept, for credits. These costs would be reflected in credit purchase costs. We therefore do not estimate these costs separately from the overall costs and benefits of the Clean Fuels Program. We expect the rule to result in costs of reducing carbon intensity or purchasing credits for deficit holders. Because the carbon intensity requirements in the rule interact with other elements of the rule to generate these expected costs, we analyze the costs of the Clean Fuels Program as a whole.

3.2.16 Authority to suspend, revoke, or modify

In the event the provisions of this part of the rule are triggered, it could result in potential additional compliance costs or a reduction in benefits, depending on the circumstance. We note, however, that these costs are not necessarily higher than they would have been if compliance processes had been sufficiently followed in the first place.

3.2.17 Public disclosure

The rule's requirements for public disclosure, in conjunction with protections of confidential information under the authorizing statute, provide transparency in the Clean Fuels Program without divulging confidential information that could be damaging to businesses. Associated costs fall on Ecology as part of administering the program, and we do not expect private costs as a result of this section of the rule.

3.2.18 Emergency deferral

If declared, an emergency deferral would reduce costs of compliance with the rule, but would also delay reduction in emissions of GHGs. As an emergency deferral would reflect circumstances that could make compliance with the program highly expensive or impossible, it is likely that the compliance costs avoided by the emergency deferral would be large enough to mitigate lost benefits of GHG emissions reductions.

3.2.19 Forecast deferral

The rule does not vary significantly from the baseline, other than providing additional clarity. We note, also, that if declared, a forecast deferral would reduce costs of compliance with the rule, but would also delay reduction in emissions of GHGs. As a forecast deferral would reflect circumstances that could make compliance with the program highly expensive due to insufficient credits, or could limit the fuel supply available to Washington resulting in high fuel costs, it is likely that the costs avoided by the forecast deferral would be large enough to mitigate lost benefits of GHG emissions reductions.

3.2.20 Validation and verification

For entities using fuel pathways approved by CARB or OR-DEQ, we do not expect the rule to result in significant costs from the additional effort of submitting existing verification reports to Ecology. Verification costs could be incurred if additional verification is required by Ecology, to validate the carbon intensity of other fuel pathways.

3.2.21 Determining fees

The amendments to the fee rule result in total costs of fees that are equal to the costs of administering the program. The administration of the program facilitates compliance with the authorizing statute and the rule, and in that reflects the total value of services provided. While the rule amendments set only the process for setting fees, and we do not yet know what those fees will be, their costs will equal the benefits of services provided. We therefore do not expect a net cost or benefit to the fee rule amendments, beyond the benefit of ensuring program function.

3.3 Costs of the Clean Fuels Program

We estimated costs associated with the Clean Fuels Program based on an analysis performed by Berkeley Research Group (“BRG”) in compliance with the authorizing statute (Chapter

70A.535 RCW).[4] The BRG analysis estimated the costs and benefits of the Clean Fuels Program.[5] The baseline for the BRG analysis is the same as for this Final Regulatory Analysis. The report presented costs per gallon of gas and diesel, and we converted these to overall costs using supporting modeling data provided by BRG.[6]

The BRG analysis focused on two scenarios:

- Least cost: A least-cost approach to achieving the required 20 percent reduction by 2038, for entities required to comply. This scenario does not correspond to the rule.
- Accelerated reduction: A least cost approach to achieving the required 20 percent reduction by 2034, reducing average carbon intensity by a full 10 percent in 2034. The Accelerated Reduction scenario aligns with the requirements of the adopted rule.

Under the Accelerated Reduction scenario, BRG found the following costs per gallon equivalent of transportation fuels.

Table 4: Impacts of Accelerated Reduction scenario on consumer fuel prices, 2020$/GGE

Year	Consumer Gasoline	Consumer Diesel
2023	**0.007**	**(0.016)**
2024	**0.017**	**(0.006)**
2025	**0.036**	**0.014**
2026	**0.056**	**0.034**
2027	**0.076**	**0.054**
2028	**0.105**	**0.083**
2029	**0.134**	**0.113**
2030	**0.164**	**0.142**
2031	**0.193**	**0.171**
2032	**0.193**	**0.171**
2033	**0.193**	**0.170**
2034	**0.389**	**0.368**
2035	**0.389**	**0.367**
2036	**0.389**	**0.366**
2037	**0.005**	**0.005**
2038	**0.005**	**0.005**

(Source: BRG)

[4] BRG Energy & Climate, 2022. Washington Department of Ecology Clean Fuel Standard Cost Benefit Analysis Report. May 12, 2022. https://ecology.wa.gov/DOE/files/22/22790fe6-fc3a-414d-b3ba-036af0975258.pdf

[5] Our analysis relies on the BRG analysis for its inputs, and that analysis was performed for a baseline CI standard of gasoline from 98.59 gCO_2e/MJ. The rule includes a standard of 98.85 gCO_2e/MJ, which is 0.26 percent higher. While we do not have the ability to re-calculate BRG's VISION modeling using this updated CI – which would update fuel volumes as well as costs or cost-savings for different fuels – we identified that with all else held equal, a 0.26 percent increase in costs associated with gasoline would increase total present value net costs by up to $0.01 billion. This difference would not affect the conclusions of this analysis.

[6] Results from VISION model run for Accelerated Reduction scenario. Spreadsheet, May 2022.

Table 5: Impacts of Accelerated Reduction scenario on non-consumer fuel prices, 2020$/GGE

Year	Unblended Gasoline	Ethanol	Renewable Naphtha	Electricity	Fossil Diesel	Biodiesel	Renewable Diesel	Hydrogen	CNG	RNG	Propane	Renewable Propane
2023	**0.045**	**(0.430)**	**(0.658)**	**(1.833)**	**0.031**	**(0.869)**	**(0.951)**	**0.504**	**(0.368)**	**(0.634)**	**(0.459)**	**(0.686)**
2024	**0.055**	**(0.420)**	**(0.648)**	**(1.840)**	**0.041**	**(0.859)**	**(0.941)**	**(0.728)**	**(0.359)**	**(0.624)**	**(0.449)**	**(0.676)**
2025	**0.075**	**(0.401)**	**(0.629)**	**(1.837)**	**0.061**	**(0.839)**	**(0.921)**	**(0.708)**	**(0.339)**	**(0.604)**	**(0.429)**	**(0.657)**
2026	**0.094**	**(0.381)**	**(0.609)**	**(1.835)**	**0.081**	**(0.819)**	**(0.901)**	**(0.688)**	**(0.319)**	**(0.584)**	**(0.410)**	**(0.637)**
2027	**0.114**	**(0.361)**	**(0.589)**	**(1.832)**	**0.101**	**(0.799)**	**(0.881)**	**(0.668)**	**(0.299)**	**(0.564)**	**(0.390)**	**(0.617)**
2028	**0.143**	**(0.332)**	**(0.560)**	**(1.819)**	**0.131**	**(0.770)**	**(0.851)**	**(1.879)**	**(0.269)**	**(0.534)**	**(0.360)**	**(0.587)**
2029	**0.173**	**(0.303)**	**(0.531)**	**(1.806)**	**0.160**	**(0.740)**	**(0.821)**	**(1.850)**	**(0.239)**	**(0.504)**	**(0.330)**	**(0.557)**
2030	**0.202**	**(0.273)**	**(0.501)**	**(1.794)**	**0.190**	**(0.710)**	**(0.791)**	**(1.820)**	**(0.209)**	**(0.474)**	**(0.300)**	**(0.527)**
2031	**0.231**	**(0.244)**	**(0.472)**	**(1.764)**	**0.220**	**(0.680)**	**(0.762)**	**(1.790)**	**(0.180)**	**(0.445)**	**(0.270)**	**(0.497)**
2032	**0.231**	**(0.244)**	**(0.472)**	**(1.764)**	**0.220**	**(0.680)**	**(0.762)**	**(1.790)**	**(0.180)**	**(0.445)**	**(0.270)**	**(0.497)**
2033	**0.231**	**(0.244)**	**(0.472)**	**(1.764)**	**0.220**	**(0.680)**	**(0.762)**	**(1.790)**	**(0.180)**	**(0.445)**	**(0.270)**	**(0.497)**
2034	**0.427**	**(0.048)**	**(0.276)**	**(1.568)**	**0.419**	**(0.481)**	**(0.563)**	**(1.591)**	**0.019**	**(0.246)**	**(0.072)**	**(0.299)**
2035	**0.427**	**(0.048)**	**(0.276)**	**(1.568)**	**0.419**	**(0.481)**	**(0.563)**	**(1.591)**	**0.019**	**(0.246)**	**(0.072)**	**(0.299)**
2036	**0.427**	**(0.048)**	**(0.276)**	**(1.568)**	**0.419**	**(0.481)**	**(0.563)**	**(1.591)**	**0.019**	**(0.246)**	**(0.072)**	**(0.299)**
2037	**0.005**	**(0.001)**	**(0.004)**	**(0.020)**	**0.005**	**(0.006)**	**(0.007)**	**(0.020)**	**0.000**	**(0.003)**	**(0.001)**	**(0.004)**
2038	**0.005**	**(0.001)**	**(0.004)**	**(0.020)**	**0.005**	**(0.006)**	**(0.007)**	**(0.020)**	**0.000**	**(0.003)**	**(0.001)**	**(0.004)**

(Source: BRG)

Calculations

We multiplied these values by the fuel volumes modeled by BRG, and estimated the following total costs, cost savings, and net costs in each year of the program. A negative net cost reflects a net benefit.[7]

Table 6: Total costs by year, billions, 2020$

Year	Costs	Cost Savings	Net Costs
2023	**$0.15**	**$0.33**	**($0.18)**
2024	**$0.18**	**$0.33**	**($0.15)**
2025	**$0.25**	**$0.34**	**($0.09)**
2026	**$0.32**	**$0.34**	**($0.03)**
2027	**$0.38**	**$0.35**	**$0.03**
2028	**$0.47**	**$0.36**	**$0.11**
2029	**$0.56**	**$0.38**	**$0.18**
2030	**$0.64**	**$0.21**	**$0.42**
2031	**$0.71**	**$0.20**	**$0.51**
2032	**$0.68**	**$0.20**	**$0.49**
2033	**$0.65**	**$0.19**	**$0.46**
2034	**$1.15**	**$0.12**	**$1.03**
2035	**$1.06**	**$0.12**	**$0.94**
2036	**$1.01**	**$0.08**	**$0.93**
2037	**$0.01**	**$0.00**	**$0.01**
2038	**$0.01**	**$0.00**	**$0.01**

Ecology's Regulatory Analyses reflect streams of costs and benefits in present values. A present value reflects future values in current value, reflecting the opportunity cost of having funds later versus now. The table below summarizes the total present value costs, cost-savings, and net costs likely generated by the rule.[8]

Table 7: Total present value costs and cost-savings, billions, 2020$

Total Present Value Costs	Total Present Value Cost-Savings	Total Present Value Net Costs
$6.52	**$3.07**	**$3.45**

[7] We include cost savings here in Chapter 3, as part of identifying net costs related to credit purchases and emissions reductions. Alternatively, they could be discussed in Chapter 4, as an isolated benefit, leaving only positive costs in Chapter 3. We chose to discuss both costs and cost savings here, as part of overall costs, since this is consistent with how costs were addressed in the BRG analysis. This organizational structure also reduces potential confusion, as not all fuel types consistently incur costs or cost savings across all years, and total costs also depend on the variable volumes of different fuels consumed in each year.

[8] The current long-run average discount rate (social rate of time preference) is 0.9 percent. This is the average real return on inflation-indexed US Treasury I bonds (https://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm). To maintain consistent discount rates across this analysis, however, we used a 2.5 percent real discount rate to align with the discount rate used in benefits calculations, based on available unit estimates of SCC. Real discount rates do not add inflation, to consistently reflect purchasing power in current dollars.

3.4 Reporting costs

We estimated reporting costs using CARB's estimated recordkeeping and reporting costs for the California Low Carbon Fuel Standard. CARB estimated annual costs of $216,658 per reporting entity (converted to 2020-dollars). We identified 26 transportation fuel suppliers potentially required to comply with the rule. If all 26 of these suppliers incur reporting costs, they would pay a total of $5.6 million per year. We also identified up to 60 electric utilities in Washington, which would collectively incur a total of $13.0 million per year in reporting costs.

Ecology's Regulatory Analyses reflect streams of costs and benefits in present values. A present value reflects future values in current value, reflecting the opportunity cost of having funds later versus now. The table below summarizes the total present value reporting costs estimated for the rule.[9]

Table 8: Total present value costs of reporting, billions, 2020$

Fuel Supplier Costs	Electric Utility Costs	Total Present Value Costs
$0.01	**$0.01**	**$0.02**

[9] Ibid.

Chapter 4: Likely Benefits of the Adopted Rule

4.1 Introduction

We analyzed the likely benefits associated with the adopted rule, as compared to the baseline. The rule and the baseline are discussed in detail in Chapter 2 of this document.

4.2 Benefits discussion

The adopted rule establishes:

- Definitions specific to the Clean Fuels Program.
- Applicability and exemptions for fuels.
- General requirements for regulated parties, opt-in entities, and credit aggregators.
- Identification of first fuel reporting entities, subsequent reporting entities, and credit or deficit generators, for:
    - Liquid fuels.
    - Gaseous fuels.
    - Electricity.
    - The backstop aggregator.
- Registration requirements.
- Recordkeeping requirements.
- Reporting requirements.
- Credit and deficit generation procedures.
- Credit transaction procedures.
- Required calculation methods for credits and deficits.
- How compliance must be demonstrated.
- A credit clearance market.
- Advance credit procedures.
- Credit generation methods for zero-emission vehicle (ZEV) infrastructure.
- Carbon intensity calculations and procedures.
- Authority to suspend, revoke, or modify accounts, carbon intensities, or credits.
- Public disclosure requirements.
- Emergency deferral procedures in the event of a fuels shortage.

- Forecast deferral procedures.
- Validation and verification requirements.

Amendments to the fee rule:

- Set the procedure for determining Clean Fuels Program fees based on workload.

4.2.1 Definitions

Definitions in and of themselves do not have any impact. Their content may generate benefits in the section(s) of the rule in which they are used. Any associated benefits are discussed in subsequent sections of this document.

4.2.2 Applicability and exemptions

We expect the rule to result in benefits of credit sale revenues to credit holders. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the applicability of the rule interacts with other elements of the rule to generate these expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

Many elements of the rule are consistent with clean fuels programs in Oregon and/or California. This not only meets statutory requirements, but also provides consistency for entities complying with multiple programs.

4.2.3 General requirements

We do not expect the general requirements section of the rule to generate benefits beyond the benefit of providing a single location for parties to identify their requirements under the rule. Benefits associated with registration, recordkeeping, and reporting are addressed in separate sections.

We expect the rule to result in benefits of credit sale revenues to credit holders. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the general requirements of the rule interact with other elements of the rule to generate these expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

4.2.4 Reporting entities and credit or deficit generators

We expect these elements of the rule to inform allocation of benefits across entities reporting or generating credits or deficits. We expect the rule to result in benefits of credit sale revenues to credit holders. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the requirements for credit and deficit generators interact with other elements of the

rule to generate these expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

Many elements of the rule are consistent with clean fuels programs in Oregon and/or California. This not only meets statutory requirements, but also provides consistency for entities complying with multiple programs.

4.2.5 Registration requirements

We expect these elements of the rule to result in benefits of comprehensive information about entities participating in the Clean Fuels Program. As the baseline statute requires all participating entities to register, and the rule provides a straightforward means of doing so through online portals using known information, we expect this incremental benefit to be minimal.

4.2.6 Recordkeeping requirements

We expect the recordkeeping requirements in the rule to generate the benefit of having verifiable information about past registration, transfers, transactions, and other activities affecting compliance with the Clean Fuels Program.

4.2.7 Reporting requirements

We expect the rule to result in benefits of timely and consistent information about Clean Fuels Program participants and activities. This ensures program accuracy in reducing GHG emissions.

4.2.8 Credit and deficit generation

We expect the rule to result in benefits of credit sale revenues to credit holders. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the credit and deficit generation requirements interact with other elements of the rule to generate these expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

4.2.9 Credit transactions

We expect the rule to result in benefits of clear and consistent processes and documentation of credit transactions, facilitated by the Credit Transfer Form in the Washington Fuels Reporting System (WFRS). This will benefit not only the efficient functioning of the Clean Fuels Program, but will also benefit both credit buyers and sellers by reducing transaction risks using clear allowed actions, prohibited actions, and responsibilities.

4.2.10 Calculation methods

We expect the rule to result in benefits of credit sale revenues to credit holders. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the calculation methods in the rule interact with other elements of the rule to generate these expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

4.2.11 Demonstrating compliance

We expect the rule to result in benefits of timely and comprehensive demonstration of compliance.

4.2.12 Credit clearance market

We expect the rule to result in benefits of credit sale revenues to credit holders. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the structure and functions of the credit clearance market interact with other elements of the rule to generate these expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

4.2.13 Advance credits

We expect the rule to result in benefits of credit sale revenues to credit holders. Advance credits contribute to the credit supply, as well as incentivizing the decarbonization of the transportation sector. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the advance credit requirements in the rule interact with other elements of the rule to generate expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

4.2.14 Credit generation for zero emission vehicle infrastructure

We expect the rule to result in benefits of credit sale revenues to credit holders. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the requirements around credit generation for zero emission vehicle infrastructure interact with other elements of the rule to generate expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

4.2.15 Carbon intensity

We expect the rule to result in benefits of credit sale revenues to credit holders. We also expect the rule to result in environmental, health, and environmental justice benefits associated with overall reductions in GHG emissions and criteria pollutants. Because the carbon intensity

requirements in the rule interact with other elements of the rule to generate these expected benefits, we analyze the benefits of the Clean Fuels Program as a whole.

4.2.16 Authority to suspend, revoke, or modify

In the event the provisions of this part of the rule are triggered, it could result in potential additional compliance costs or a reduction in benefits, depending on the circumstance. We note, however, that these net costs are not necessarily higher than they would have been if compliance processes had been sufficiently followed in the first place. These provisions help to ensure efficient functioning of the Clean Fuels Program, and ensure GHG emissions reductions achieved are accurately reflected.

4.2.17 Public disclosure

The rule's requirements for public disclosure, in conjunction with protections of confidential information under the authorizing statute, provide transparency in the Clean Fuels Program without divulging confidential information that could be damaging to businesses.

4.2.18 Emergency deferral

If declared, an emergency deferral would reduce costs of compliance with the rule, but would also delay reduction in emissions of GHGs. As an emergency deferral would reflect circumstances that could make compliance with the program highly expensive or impossible, it is likely that the compliance costs or costs to consumers avoided by the emergency deferral would be large enough to mitigate lost benefits of GHG emissions reductions.

4.2.19 Forecast deferral

The rule does not vary significantly from the baseline, other than providing additional clarity. We note, also, that if declared, a forecast deferral would reduce costs of compliance with the rule, but would also delay reduction in emissions of GHGs. As a forecast deferral would reflect circumstances that could make compliance with the program highly expensive due to insufficient credits, or limit the fuel supply available to Washington resulting in high fuel costs, it is likely that the costs avoided by the forecast deferral would be large enough to mitigate lost benefits of GHG emissions reductions.

4.2.20 Validation and verification

Additional verification, when required, results in benefits of accurate functioning of the Clean Fuels Program, so reductions in emissions of GHGs are accurately reflected and achieved.

4.2.21 Determining fees

The adopted amendments to the fee rule result in total costs of fees that are equal to the costs of administering the program. The administration of the program facilitates compliance with

the authorizing statute and the rule, and in that reflects the total value of services provided. While the rule amendments set only the process for setting fees, and we do not yet know what those fees will be, their costs will equal the benefits of services provided. We therefore do not expect a net cost or benefit to the fee rule amendments, beyond the benefit of ensuring program function.

4.3 Benefits of the Clean Fuels Program

4.3.1 Benefits of reduced greenhouse gas emissions

4.3.1.1 Fully quantifiable benefits of reduced greenhouse gas emissions

We estimated benefits associated with the Clean Fuels Program based on an analysis performed by BRG Energy and Climate ("BRG") in compliance with the authorizing statute (Chapter 70A.535 RCW).[10]

The BRG analysis focused on two scenarios:

- Least cost: A least cost approach to achieving the required 20 percent reduction by 2038. This scenario does not reflect the requirements of the adopted rule.
- Accelerated reduction: A least cost approach to achieving the required 20 percent reduction by 2034, reducing average carbon intensity by a full 10 percent in 2034. The Accelerated Reduction scenario aligns with the requirements of the adopted rule.

BRG provided Ecology with underlying emissions estimates for the baseline and Accelerated Reduction scenarios. The table below summarizes total emissions under each scenario, and the estimated reduction in emissions under Accelerated Reduction, which corresponds to the expected impacts of the rule.

[10] BRG Energy & Climate, 2022. Washington Department of Ecology Clean Fuel Standard Cost Benefit Analysis Report. May 12, 2022. https://ecology.wa.gov/DOE/files/22/22790fe6-fc3a-414d-b3ba-036af0975258.pdf Supplementary modeling results spreadsheets.

Table 9: Estimated emissions, metric tons (MT) CO_2e

Year	Baseline Emissions ($MTCO_2e$)	Emissions Under Adopted Rule ($MTCO_2e$)	Emissions reduction ($MTCO_2e$)
2023	**53,244,334**	**52,143,389**	**1,100,946**
2024	**52,847,980**	**51,747,451**	**1,100,529**
2025	**52,283,585**	**51,157,481**	**1,126,104**
2026	**51,484,522**	**50,357,558**	**1,126,964**
2027	**50,545,648**	**49,417,267**	**1,128,381**
2028	**49,508,709**	**48,378,761**	**1,129,948**
2029	**48,400,660**	**47,268,708**	**1,131,952**
2030	**47,167,462**	**46,033,430**	**1,134,031**
2031	**45,821,586**	**44,685,190**	**1,136,396**
2032	**44,231,012**	**43,091,704**	**1,139,308**
2033	**42,369,363**	**41,226,925**	**1,142,438**
2034	**40,148,794**	**39,003,245**	**1,145,548**
2035	**37,360,033**	**36,211,238**	**1,148,795**
2036	**34,706,906**	**33,971,810**	**735,096**
2037	**32,211,265**	**32,183,796**	**27,468**
2038	**29,884,107**	**29,856,123**	**27,985**

(Source: BRG)

Calculations

To calculate the avoided social costs of cumulative emissions reductions in each year, we used the above table, and multiplied the emissions reduction in each year by the Social Cost of Carbon (SCC) for that year.[11]

[11] Interagency Working Group on Social Cost of Greenhouse Gases, 2021. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990. United States Government.
Note that in November 2022, the US Environmental Protection Agency published new draft SCC values, reflecting updated methodology, climate science, and economic modeling. See https://www.epa.gov/system/files/documents/2022-11/epa_scghg_report_draft_0.pdf. The updated SCC values for a 2.5 percent discount rate begin at $125 per $MTCO_2e$ emitted in 2023, rising to $167 by 2038. The report also presents SCC values for 2.0 percent and 1.5 percent, beginning at $204 and $351, respectively. For consistency, and because these draft values are not yet final, we have maintained a 2.5 percent discount rate throughout this analysis. Of the final Interagency Working Group discount rates, this 2.5 percent rate is the closest to the current long-run, risk-free rate of return based on US Treasury I Bonds (currently a 0.89 percent historic average). If final values were available for a lower discount rate that more closely matched the long-run, risk-free rate of return, we would use those SCC values and employ that discount rate throughout this analysis.

Table 10: Cumulative avoided Social Cost of Carbon

Year	Emissions Reduction Compared to Baseline ($MTCO_2e$)	SCC (2020$)	Total Benefit (2020$)
2023	**1,100,946**	**$80.34**	**$88,449,974**
2024	**1,100,529**	**$81.65**	**$89,858,226**
2025	**1,126,104**	**$82.95**	**$93,410,308**
2026	**1,126,964**	**$84.26**	**$94,958,021**
2027	**1,128,381**	**$85.56**	**$96,544,312**
2028	**1,129,948**	**$86.87**	**$98,158,557**
2029	**1,131,952**	**$88.18**	**$99,815,542**
2030	**1,134,031**	**$89.48**	**$101,473,118**
2031	**1,136,396**	**$90.84**	**$103,230,246**
2032	**1,139,308**	**$92.21**	**$105,055,551**
2033	**1,142,438**	**$93.57**	**$106,897,935**
2034	**1,145,548**	**$94.93**	**$108,746,888**
2035	**1,148,795**	**$96.30**	**$110,628,958**
2036	**735,096**	**$97.66**	**$71,789,487**
2037	**27,468**	**$99.02**	**$2,719,912**
2038	**27,985**	**$100.39**	**$2,809,396**

Ecology's Regulatory Analyses reflect streams of costs and benefits in present values. A present value reflects future values in current value, reflecting the opportunity cost of having funds later versus now. The total present value benefits of avoided SCC likely generated by the rule is estimated to be **$1.14 billion**.[12]

4.3.1.2 Values not included in the SCC

While the SCC includes values of economic activity and some health impacts, it is not all-inclusive. Estimates exclude the values of other impacts of climate change, which affect quality of life as well as economic activity. Values not included in SCC estimates include:

- Health:
  - Respiratory illness
  - Lyme disease
  - Death, injuries, and illnesses from omitted natural disaster and migration
  - Water, food, sanitation, shelter
- Agriculture:
  - Weeds, pests, pathogens
  - Food price spikes
  - Heat and precipitation extremes

[12] The current long-run average discount rate (social rate of time preference) is 0.9 percent. This is the average real return on inflation-indexed US Treasury I bonds. To maintain consistent discount rates across this analysis, however, we used a 2.5 percent real discount rate to align with the discount rate used in benefits calculations, based on available unit estimates of benefits. Real discount rates do not add inflation, to consistently reflect purchasing power in current dollars.

- Oceans:
    - Acidification, temperature, and extreme weather impacts on fisheries, extinction, reefs
    - Storm surge interaction with sea level rise
- Forests:
    - Pest infestations
    - Pathogens
    - Species invasion and migration
    - Flooding and soil erosion
- Wildfire:
    - Burned acreage
    - Public health
    - Property losses
    - Fire management costs
- Ecosystems:
    - Biodiversity
    - Habitat
    - Species extinction
    - Outdoor recreation and tourism
    - Ecosystem services
    - Rising value of ecosystems due to increased scarcity
    - Accelerated decline due to mass migration
- Productivity and economic growth:
    - Labor productivity and supply, public health
    - Infrastructure impacts from severe events
    - Diversion of resources to climate adaptation
- Water:
    - Availability and competing needs
    - Flooding
- Transportation:
    - Changes to land and ocean transportation
- Energy:
    - Energy supply disruptions
- Catastrophic impacts and tipping points:
    - Rapid sea level rise
    - Methane releases from permafrost
    - Damages at very high temperatures
    - Unknown catastrophic events
- Inter- and intra-regional conflict:
    - National security
    - Increased violent conflicts

Wildfires

Climate change and land-use change are projected to make wildfires more frequent and intense, with a global increase of extreme fires of up to 14 percent by 2030, 30 percent by the end of 2050 and 50 percent by the end of the century, according to a recent report by the UN Environment Programme.[13] The report notes, "the true cost of wildfires – financial, social, and environmental – extends for days, weeks, and even years after the flames subside." It also recommends developing an understanding of full wildfire costs, noting that, "One assessment estimated the annualized economic burden from wildfire for the United States to be between $71.1 billion to $347.8 billion." That corresponds to **$216 to $1,056 per every person in the country each year**, on average. Based on the 7.615 million population of Washington[14], this equals **between $1.6 billion and $8.0 billion every year**, on average, but this range is likely higher in the western states, since we experience a larger proportion of wildfires than the country in general.

Washington is particularly vulnerable to wildfire losses, not only from direct fire impacts to valuable natural spaces (as we saw in the over 600 thousand acres of Washington burned by just the large and highly significant wildfires in 2021) and human landscapes (as we saw in 2020's devastation of 85 percent of Malden and Pine City), but also from secondary impacts to forestlands, wildlife and habitat, soil erosion, and stream and river quality and temperature. Wildfires are also a risk to businesses, both private and governmental, as illustrated by our state's working forests.

In 2018, researchers found that **commercial timber forests can burn 30 percent more severely** than managed federal forestlands.[15] A study of the impact of the 2020 Labor Day wildfires in Oregon found that nearly a million acres of burned managed forest lands would have generated end products worth $30 billion, but could generate only $2.6 billion in salvage harvests.[16] That reflects a **91.3 percent value loss of managed timber lands**. The same study found that private forest owners represent 64 percent of that salvage value.

In 2020, the Washington Department of Natural Resources spent an estimated **$20 million on aviation readiness and support** for large fires.[17] That same year they incurred **direct costs of over $12.5 million** responding to wildfire incidents in 2020, and estimated additional damages of:[18]

- **$20 million** to utilities.
- **$15 million** to state agency infrastructure.

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[13] United Nations Environment Programme, 2022. Spreading like Wildfire – The Rising Threat of Extraordinary Landscape Fires. A UNEP Rapid Response Assessment. Nairobi.
[14] US Census Bureau, 2022. QuickFacts: Washington. https://www.census.gov/quickfacts/WA
[15] Zald, HSJ and C Dunn, 2018. Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape. Ecological Applications (2018). DOI: 10.1002/eap.1710.
[16] Oregon Forest Resources Institute, 2021. Economic Impacts to Oregon's Forest Sector – 2020 Labor Day Fires. September 2021.
[17] WA Department of Natural Resources, 2020. Impacts and Costs of Wildfire Season 2020. Presentation to the Senate Agriculture, Water, Natural Resources, and Parks. December 2, 2020.
[18] Ibid.

- **$10 million** to other government infrastructure.

Wildfires also cause hazardous air quality in broad regions, impacting rural as well as densely populated areas.

Heat impacts

Lessons learned from the extreme northwest heat wave of 2021 include assessment that climate change may result in more heat-related deaths than previously estimated. The 2021 heat dome that brought record-breaking temperatures to the Pacific Northwest and British Columbia, resulted in 138 heat-related deaths in Washington, making it the deadliest weather event in state history.[19] Using the risk-based value of avoiding 100 percent risk of death (called "mortality risk valuation" or the "value of statistical life (VSL)", though it is not the value of any individual's life, and is statistically extrapolated from individuals' willingness to accept fatality risks for a premium) as used by the US EPA,[20] each of these deaths resulted in losses to society of $10.5 million in current dollars, **and the heat dome resulted in at least $1.45 billion in lost lives during just one event**. Extreme heat events are forecast to happen more frequently and be more severe due to climate change.

In addition to fatal events, the US CDC assessed heat-related visits to emergency departments during the heat dome event. They found a nearly 70-fold increase in people seeking emergency care at the peak of the heat event.[21] Particularly in times of overburdened or overwhelmed medical resources (as we have seen during the COVID-19 pandemic), this size of increased demand for urgent medical care could result in catastrophic delays and increased illness or death. **The average cost of a single healthcare visit related to a high heat event is $12,544.**[22]

Ongoing drought and the 2021 heat dome also affected harvests:

- At least **30 percent impact to raspberries**: The overall Whatcom County raspberry harvest fell 30 to 40 percent, with individual growers experiencing losses between 15 and 75 percent.[23]

[19] WA Department of Health, 2021. Heat Wave 2021. https://doh.wa.gov/emergencies/be-prepared-be-safe/severe-weather-and-natural-disasters/hot-weather-safety/heat-wave-2021

[20] US Environmental Protection Agency, 2022. Mortality Risk Valuation. https://www.epa.gov/environmental-economics/mortality-risk-valuation

[21] Schramm, PJ, A Vaidyanathan, L Radhakrishnan, A Gates, K Harnett, and P Breysse, 2021. Heat-Related Emergency Department Visits During the Northwestern Heat Wave — United States, June 2021. US Centers for Disease Control and Prevention. Weekly 70(90), pp. 1020-2021. July 23, 2021. https://www.cdc.gov/mmwr/volumes/70/wr/mm7029e1.htm

[22] Knowlton, K, M Rotkin-Ellman, L Geballe, W Max, and GM Solomon, 2011. Six Climate Change-Related Events in the United States Accounted for About $14 Billion in Lost Lives and Health Costs. Health Affairs 30(11), pp. 2167-2176. DOI: 10.1377/hlthaff.2011.0229. Based on total healthcare expenditures of $740 million (2011-dollars) across 760,000 individual encounters with the healthcare system, updated for inflation to 2022-dollars.

[23] Bratt, C, 2021. June 'heat dome' cut raspberry volume 30%. Lynden Tribune. December 10, 2021.

- At least **ten percent impact to cherries**: The overall cherry harvest, largely in the Yakima Valley, fell at least 10 percent.[24]
- **$85 million impact to blueberries**: The Washington Blueberry Commission estimated $85 million in yield loss and quality impacts.[25]
- Wheat harvests:
    - A **34-fold increase in the share of "poor" or "very poor" condition spring wheat.**[26]
    - A **6-fold increase in the share of "poor" or "very poor" condition winter wheat**.[27]
- Shellfish harvests:
    - **40 percent losses of seeded oysters.**[28]
    - A **56 percent increase in vibriosis cases**.[29] Vibriosis is an illness in humans caused by shellfish contaminated with Vibrio bacteria, which are naturally occurring but present in high concentrations in warmer temperatures.[30]
    - **5 – 30 percent oyster mortality** in the Salish Sea.[31]
    - Higher losses among shellfish species in smaller, sheltered waters, and those that live nearer the surface, such as cockles.[32]

Flood damages

A recent study by the Center for Western Weather and Water Extremes, at the University of California San Diego, modeled the impacts of various climate change scenarios on atmospheric rivers (long, flowing regions of the atmosphere that carry water vapor) impacting western states.[33] Using flood insurance data, the study estimated county-level increases in annual costs

[24] Zhou, A, 2021. Western lawmakers seek more federal aid for farmers, ranchers hurt by extreme heat, drought. Seattle Times. July 27, 2021.
[25] Ibid.
[26] Ingwersen, J, 2021. 'Wither away and die:' US Pacific Northwest heat wave bakes wheat, fruit crops. Reuters. July 12, 2021.
[27] Ibid.
[28] Hagenbuch, B, 2021. In hot water: Heat dome recovery looks bleak for small-scale shellfish farms. National Fisherman. August 17, 2021.
[29] Ibid.
[30] https://www.cdc.gov/vibrio/faq.html
[31] Royal, T, 2022. Heat dome found to be deadly for some shellfish species, but not for others. Northwest Treaty Tribes. January 10, 2022.
[32] Ibid.
[33] Corringham, TW, J McCarchy, T Shulgina, A Gershunov, DR Cayan, and FM Ralph, 2022. Climate change contributions to future atmospheric river flood damages in the western United States. Nature Scientific Reports 12:13747. https://doi.org/10.1038/s41598-022-15474-2

of flood damage, through 2090, due to the contribution of climate change to frequency, duration, and magnitude of atmospheric rivers.

For most counties around Puget Sound, this forecasted increase in costs is between $10 million and $100 million each year (per county) compared to what they spent in the 1990s, while for Snohomish, King, and Lewis counties, the forecasted increase in costs is over $100 million per year (per county). This is at least a doubling of annual flood damage costs in western Washington.

The east side of the state is largely forecasted to incur an additional up to $1 million each year, with some counties incurring up to $10 million more annually (per county). This is up to a doubling of annual costs for most eastern Washington counties, except for Pend Oreille, Spokane, Whitman, Columbia, and Asotin counties, where the increase in flood damage costs is forecasted to be between two and four times as high as it was in the 1990s.

4.3.1.3 Basis for the use of the SCC

To estimate the benefits of avoiding a metric ton of GHG emissions, Ecology uses the Social Cost of Carbon (SCC). The SCC is an estimate of the global costs resulting from climate change associated with one additional metric ton of GHG emissions.

Many estimates of the social cost of carbon exist, each carrying its own assumptions regarding elements such as (but not limited to):

- The trajectory of worldwide emissions.
- Expected development and growth rates.
- The rate at which we discount the future.
- How much we value impacts that do not occur locally.

We (as well as the federal Interagency Working Group (IWG) that developed the SCC cited in this analysis) acknowledge the limitations of any quantitative estimate of the SCC. IWG states in its original analysis:

> "As noted, any estimate of the SCC must be taken as provisional and subject to further refinement (and possibly significant change) in accordance with evolving scientific, economic, and ethical understandings. During the course of our modeling, it became apparent that there are several areas in particular need of additional exploration and research. These caveats, and additional observations in the following section, are necessary to consider when interpreting and applying the SCC estimates."[34]

The workgroup follows up in the technical update:

[34] Interagency Working Group on Social Cost of Carbon, 2010. Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866. February 2010. United States Government. http://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf

> "The 2010 interagency SCC TSD [technical support document] discusses a number of important limitations for which additional research is needed. In particular, the document highlights the need to improve the quantification of both non-catastrophic and catastrophic damages, the treatment of adaptation and technological change, and the way in which inter-regional and inter-sectoral linkages are modeled. While the new version of the models discussed above offer some improvements in these areas, further work remains warranted. The 2010 TSD also discusses the need to more carefully assess the implications of risk aversion for SCC estimation as well as the inability to perfectly substitute between climate and non-climate goods at higher temperature increases, both of which have implications for the discount rate used."[35]

We note that these issues, among others, exist for all SCC estimates, and indicate neither specific overestimation nor specific underestimation in overall estimates when all of the variables and assumptions are considered. For example, estimates require development in valuing catastrophic endpoints, which might indicate underestimation, but estimates also require development in how they include adaptation, which might indicate overestimation.

Uncertainty is common in economic value estimates, and is tied to not only the certainty of the inputs and assumptions, but to the number of inputs dealt with. Understandably, models of climate change and their interrelationship with economic models and assumptions – with the sheer number of variables involved – carry greater uncertainty. We chose to use the SCC developed by the federal Interagency Working Group on Social Cost of Carbon estimate because it attempts to broadly deal with some of these uncertainties, because it was developed by a wide range of federal experts, and because we wanted to use the estimate that uses the inputs most closely resembling those typically made in Ecology analyses in discounting social values.[36]

In 2021, the federal government issued new interim values for the Social Cost of Carbon (SCC).[37] These included median values estimated using three discount rates, as well as a set of values reflecting highly damaging scenarios. Ecology uses estimates for the 2.5 percent discount rate.

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[35] Interagency Working Group on Social Cost of Carbon, 2013. Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866. May 2013. United States Government.

[36] We note that the federal SCC was called into question by a federal district court in 2022 (*Louisiana v. Biden*, Federal District Court for the District of Louisiana, Case No. 2:21-CV-01074. Memorandum Decision, 2/11/2022). This decision was subsequently stayed by the 5th Circuit Court. The three-judge panel stated, "We conclude the standing inquiry shows the Government Defendants' likelihood of success on the merits in this appeal, and the other factors, including the public interest, favor granting a stay of the injunction." (*Louisiana v. Biden*, United States Court of Appeals for the Fifth Circuit, Case No. 22-30087. Document: 00516220740. Filed: 03/01/2022).

[37] Interagency Working Group on Social Cost of Greenhouse Gases, 2021. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990. United States Government. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

Table 11: Social Cost of Carbon (2022$)

Year	Median SCC at 5% Discount Rate	Median SCC at 3% Discount Rate	Median SCC at 2.5% Discount Rate	95th Percentile SCC at 3% Discount Rate
2021	**$16.13**	**$56.93**	**$85.17**	**$168.96**
2022	**$16.68**	**$58.12**	**$86.63**	**$172.88**
2023	**$17.22**	**$59.31**	**$88.08**	**$176.79**
2024	**$17.77**	**$60.50**	**$89.54**	**$180.70**
2025	**$18.31**	**$61.69**	**$90.99**	**$184.61**
2026	**$18.86**	**$62.88**	**$92.45**	**$188.53**
2027	**$19.40**	**$64.07**	**$93.90**	**$192.44**
2028	**$19.95**	**$65.26**	**$95.36**	**$196.35**
2029	**$20.49**	**$66.45**	**$96.81**	**$200.26**
2030	**$21.03**	**$67.64**	**$98.27**	**$204.17**
2031	**$21.58**	**$68.83**	**$99.72**	**$208.09**
2032	**$22.23**	**$70.11**	**$101.24**	**$212.35**
2033	**$22.88**	**$71.38**	**$102.76**	**$216.61**
2034	**$23.53**	**$72.66**	**$104.28**	**$220.87**
2035	**$24.18**	**$73.93**	**$105.80**	**$225.13**
2036	**$24.83**	**$75.21**	**$107.32**	**$229.39**
2037	**$25.48**	**$76.48**	**$108.84**	**$233.66**
2038	**$26.13**	**$77.76**	**$110.36**	**$237.92**
2039	**$26.78**	**$79.03**	**$111.88**	**$242.18**
2040	**$27.43**	**$80.31**	**$113.40**	**$246.44**
2041	**$28.08**	**$81.58**	**$114.92**	**$250.70**
2042	**$28.80**	**$82.86**	**$116.41**	**$254.60**
2043	**$29.52**	**$84.14**	**$117.90**	**$258.50**
2044	**$30.24**	**$85.42**	**$119.38**	**$262.40**
2045	**$30.96**	**$86.69**	**$120.87**	**$266.30**
2046	**$31.68**	**$87.97**	**$122.36**	**$270.20**
2047	**$32.40**	**$89.25**	**$123.85**	**$274.10**
2048	**$33.12**	**$90.52**	**$125.34**	**$278.00**
2049	**$33.84**	**$91.80**	**$126.83**	**$281.90**
2050	**$34.56**	**$93.08**	**$128.32**	**$285.80**

Global emissions context

Comments received on past rulemaking analyses involving the SCC expressed concern that global emissions contribution was not an appropriate measure of the benefits of a rule. We believe, however, that while it is not possible to specify the local benefits to climate change resulting from control of local emissions, it is appropriate to acknowledge that local emissions contribute to the global pool of GHGs that cause global impacts, including local impacts directly and indirectly through:

- International markets.
- Multinational businesses and supply chains.
- Trade.

These impacts affect local ecology, people, industry, agriculture, and infrastructure. Establishing a direct 100-percent relationship between local emissions and local impacts is inherently impossible. This is precisely why Ecology and other government agencies have chosen to represent the costs of GHG emissions and the benefits of reducing them on a global scale.[38] This approach is consistent with our analytic practices and the requirements of the APA for cost and benefit analysis (RCW 34.05.328).

For typical costs and benefits, Ecology uses Washington State-only values, but GHG emissions are unique, and require a broader approach to valuation, especially as it applies to the co-externality impacts of carbon emissions. Ecology believes the use of a global SCC is the appropriate carbon cost to use in analyses, because of the unique nature of carbon and climate change. This has been reaffirmed at the federal level multiple times:

- The IWG addresses global SCC twofold in its interim 2021 Technical Support Document:[39]

> "First, the IWG found previously and is restating here that a global perspective is essential for SC-GHG estimates because climate impacts occurring outside U.S. borders can directly and indirectly affect the welfare of U.S. citizens and residents. Thus, U.S. interests are affected by the climate impacts that occur outside U.S. borders. Examples of affected interests include: direct effects on U.S. citizens and assets located abroad, international trade, tourism, and spillover pathways such as economic and political destabilization and global migration. In addition, assessing the benefits of U.S. GHG mitigation activities requires consideration of how those actions may affect mitigation activities by other countries, as those international mitigation actions will provide a benefit to U.S. citizens and residents by mitigating climate impacts that affect U.S. citizens and residents.
>
> Second, the IWG found previously and is restating here that the use of the social rate of return on capital to discount the future benefits of reducing GHG emissions inappropriately underestimates the impacts of climate change for the purposes of estimating the SC-GHG (see Section 3.1 [of the TSD]). Consistent with the findings of the National Academies (2017) and the economic literature, the IWG continues to conclude that the consumption rate of interest is the theoretically appropriate discount rate in an intergenerational context (IWG 2010, 2013, 2016). The IWG

[38] For clarity and consistency, both global costs and benefits are included, where all costs are incurred locally or by entities that operate locally but are located in other states or countries. This means if costs estimated in Chapter 3 are incurred by a facility owned by a firm headquartered outside of Washington, those costs are included in the Cost-Benefit Analysis.

[39] Interagency Working Group on Social Cost of Greenhouse Gases, 2021. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990. United States Government. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

recommends that discount rate uncertainty and relevant aspects of intergenerational ethical considerations be accounted for in selecting future discount rates."

- The IWG previously addressed global SCC (as well as OMB guidance), and stated in its 2015 revised Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis:[40]

> "Under current OMB guidance contained in Circular A-4, analysis of economically significant proposed and final regulations from the domestic perspective is required, while analysis from the international perspective is optional. However, the climate change problem is highly unusual in at least two respects. First, it involves a global externality: emissions of most greenhouse gases contribute to damages around the world even when they are emitted in the United States. Consequently, to address the global nature of the problem, the SCC must incorporate the full (global) damages caused by GHG emissions. Second, climate change presents a problem that the United States alone cannot solve. Even if the United States were to reduce its greenhouse gas emissions to zero, that step would be far from enough to avoid substantial climate change. Other countries would also need to take action to reduce emissions if significant changes in the global climate are to be avoided. Emphasizing the need for a global solution to a global problem, the United States has been actively involved in seeking international agreements to reduce emissions and in encouraging other nations, including emerging major economies, to take significant steps to reduce emissions. When these considerations are taken as a whole, the interagency group concluded that a global measure of the benefits from reducing U.S. emissions is preferable."

- The 2015 Technical Support Document refers back to the 2010 Technical Support Document – Social Cost of Carbon for Regulatory Impact Analysis for further discussion, including the topic of whether it is permissible under law:[41]

> "As a matter of law, consideration of both global and domestic values is generally permissible; the relevant statutory provisions are usually ambiguous and allow selection of either measure.[6] [Footnote 6: It is true that federal statutes are presumed not to have extraterritorial effect, in part to ensure that the laws of the United States respect the interests of foreign sovereigns. But use of a global measure for the SCC does not give

[40] Interagency Working Group on Social Cost of Carbon, 2015. Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866. May 2013. United States Government. May 2013, revised July 2015.

[41] Interagency Working Group on Social Cost of Carbon, 2010. Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866. February 2010. United States Government.

extraterritorial effect to federal law and hence does not intrude on such interests.]"

- The 2010 TSD addresses scaling of global benefits of reducing global GHG emissions, and states, "It is recognized that [scaling to domestic (US) SCC is] approximate, provisional, and highly speculative. There is no a priori reason why domestic benefits should be a constant fraction of net global damages over time." The same is true for any output-based scaling to state, region, county, or other geographic level.
- The IWG responded to comments in support of global SCC:[42]

  "A number of commenters supported the IWG's decision to base the SCC estimates on global damages. Commenters explained that climate change is a global commons problem because carbon pollution does not remain within one country's borders, and that the use of global damages in the SCC is consistent with the economic theory of the commons. One commenter further stated that if damage estimates are limited to only those within each country's borders, any actions based on those estimates would lead to a collective failure to optimally mitigate GHG emissions. Another commenter referred to the importance of this effect by stating that the consideration of global damages in domestic rulemaking can be based on an expectation of reciprocity from other countries. Several commenters stressed the importance of the use of global SCC estimates as a tool in international negotiations. Finally, some commenters offered other reasons for considering damages in regions outside of the United States, including liability, national security concerns, trade-related "spillover effects", and the principle in international environmental law of reducing cross-border harm."

  Response

  "The IWG agrees that a focus on global SCC estimates in RIAs is appropriate. As discussed in the 2010 TSD, the IWG determined that a global measure of SCC is appropriate in this context because emissions of most greenhouse gases contribute to damages around the world and the world's economies are now highly interconnected. To reflect the global nature of the problem, the SCC incorporates the full damages caused by CO_2 emissions and we expect other governments to consider the global consequences of their greenhouse gas emissions when setting their own domestic policies.

  The IWG also agrees that if all countries acted independently to set policies based only on the domestic costs and benefits of carbon emissions, it would lead to an economically inefficient level of emissions reductions

[42] Interagency Working Group on Social Cost of Carbon, 2015. Response to Comments: Social Cost of Carbon for Regulatory Impact Analysis. July 2015. United States Government.

which could be harmful to all countries, including the United States, because each country would be underestimating the full value of its own reductions. This is a classic public goods problem because each country's reductions benefit everyone else and no country can be excluded from enjoying the benefits of other countries' reductions, even if it provides no reductions itself. In this situation, the only way to achieve an economically efficient level of emissions reductions is for countries to cooperate in providing mutually beneficial reductions beyond the level that would be justified only by their own domestic benefits. By adopting a global estimate of the SCC, the U.S. government can signal its leadership in this effort. In reference to the public good nature of mitigation and its role in foreign relations, thirteen prominent academics noted that these "are compelling reasons to focus on a global SCC" in a recent article on the SCC (Pizer et al., 2014). In addition, as noted by commenters, there is no bright line between domestic and global damages. Adverse impacts on other countries can have spillover effects on the United States, particularly in the areas of national security, international trade, public health and humanitarian concerns."

- In its response to public comments, the IWG also responded to concerns regarding domestic damages: [43]

  "A number of commenters suggested that the use of global damages creates a mismatch between estimates of costs and benefits in agency RIAs. Use of a global rather than domestic SCC may overstate the net benefits to the United States of reducing emissions, because global benefits are compared to domestic costs. A policy that appears cost-justified from a global perspective may not be from a purely domestic U.S. perspective. Therefore, these commenters suggest that a global SCC is only appropriate when the analysis considers global costs and benefits in the context of a global carbon mitigation program.

  Other commenters indicated that the IWG should update and report domestic climate damages separately from global estimates for several reasons, including the public's right to know the domestic benefits of domestic regulatory actions. A few comments stated that the IWG should more clearly articulate that the SCC includes global damages, which they felt was particularly unclear in the 2013 TSD.

  Finally, commenters also addressed the provisional range of domestic damages that was presented in the 2010 TSD. Several comments stated that the range discussed in the 2010 TSD for the domestic SCC was too high. Two commenters suggested a range for the domestic share of total

[43] Interagency Working Group on Social Cost of Carbon, 2015. Response to Comments: Social Cost of Carbon for Regulatory Impact Analysis. July 2015. United States Government.

global damages of 6 to 8.7 percent based on a paper by Nordhaus (2011). One commenter stated that the methods used to estimate the domestic damages as 7 to 23 percent of global damages is too speculative for quantification of the SCC.

Response

As stated in the prior section, GHG emissions in the United States will have impacts abroad, some of which may, in turn, affect the United States. For this reason, a purely domestic measure is likely to understate actual impacts to the United States. Also, as stated above, the IWG believes that accounting for global benefits can encourage reciprocal action by other nations, leading ultimately to international cooperation that increases both global and U.S. net benefits relative to what could be achieved if each nation considered only its own domestic costs and benefits when determining its climate policies.

Further, as explained in the 2010 TSD, from a technical perspective, the development of a domestic SCC was greatly complicated by the relatively few region-or country-specific estimates of the SCC in the literature, and impacts beyond our borders have spillover effects on the United States, particularly in the areas of national security, international trade, and public health. As a result, it was only possible to include an "approximate, provisional, and highly speculative" range of 7 to 23 percent for the share of domestic benefits in the 2010 TSD. This range was based on two strands of evidence: direct domestic estimates resulting from the FUND model, and an alternative approach under which the fraction of GDP lost due to climate change is assumed to be similar across countries. We note that the estimated U.S. share of global damages based on the Nordhaus (2011) study cited by several commenters largely falls within the provisional range offered in the 2010 TSD.

In conclusion, the IWG believes that the only way to achieve an efficient allocation of resources for emissions reduction on a global basis is for all countries to base their policies on global estimates of damages and will therefore continue to recommend the use of global SCC estimates in regulatory impact analyses. The IWG will also continue to review developments in the literature, including more robust methodologies for estimating SCC values based on purely domestic damages, and explore ways to better inform the public of the full range of carbon impacts, both global and domestic."

- On August 8th, 2016, the US Court of Appeals for the Seventh Circuit issued a ruling supporting not only the use of SCC, but the use of global SCC values:[44]

> "AHRI and Zero Zone next contend that DOE arbitrarily considered the *global* benefits to the environment but only considered the *national* costs. They emphasize that the EPCA only concerns "national energy and water conservation." 42 U.S.C. § 6295(o)(2)(B)(i)(VI). In the New Standards Rule, DOE did not let this submission go unanswered. It explained that climate change "involves a global externality," meaning that carbon released in the United States affects the climate of the entire world. 79 Fed. Reg. at 17,779. According to DOE, national energy conservation has global effects, and, therefore, those global effects are an appropriate consideration when looking at a national policy. *Id.* Further, AHRI and Zero Zone point to no global costs that should have been considered alongside these benefits. Therefore, DOE acted reasonably when it compared global benefits to national costs."

- On July 15, 2020, the US District Court in the Northern District of California ruled to reinstate a 2016 US Bureau of Land Management Waste Prevention Rule that had been rolled back in 2018 based on an "interim domestic social cost of methane" that resulted in significantly lower estimates of benefits than had been found during the 2016 rulemaking. The Court found the 2018 rescission to be arbitrary and capricious, stating:[45]

> "The analysis ignores impacts on 8 million United States citizens living abroad, including thousands of United States military personnel; billions of dollars of physical assets owned by United States companies abroad; United States companies impacted by their trading partners and suppliers abroad; and global migration and geopolitical security."

The discussion above concerning the application of the global SCC to valuation of domestic US GHG emissions reduction benefits applies equally to the application of the global SCC to the benefits of GHG emissions reductions in Washington. Washington's economy is tied to the world economy through trade, international supply chains, and local employment by international firms.

- Washington exported an estimated $69.9 billion in goods and $28.8 billion in services in 2018.[46]

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[44] Zero Zone, Inc., et al. v. United States Department of Energy, et al., Nos. 14-2147, 14-2159, & 14-2334. Argued September 30, 2015 — Decided August 8, 2016.

[45] State of California and Sierra Club, et al. v. David Bernhardt, et al., Case No. 4:18-cv-05712-YGR, Consolidated case, Re: Dkt. Nos. 108, 109, 123, 125, 126, 127. US District Court, Northern District of California. Decided July 15, 2020.

[46] Delaney, P, 2020. How Washington's Economy Benefits from Trade and Investment. Business Roundtable. https://s3.amazonaws.com/brt.org/BRT_General_Trade_WA_2020.pdf

- International trade, including exports and imports, supported 940,800 Washington jobs in 2018.[47]
- 140,600 people in Washington are directly employed by US affiliates of foreign multinational companies.[48]

As with the US economy as a whole, Washington is impacted directly and indirectly by economic disruptions outside the state.[49, 50]

In 2017, authors at Carbon Brief addressed criticisms of the global SCC[51], noting:

- Scaling of global SCC to sub regions or populations:
    - Was rejected by the U.S. Seventh Circuit Court of Appeals.[52]
    - Is not appropriate for global problems. For a global problem like climate change, consideration of local effects only is untenable, stating, "It's worth asking what would happen if the US were to ignore global effects. If other countries were to follow suit, then a large proportion of global climate impacts would be ignored, falling between the cracks."
    - Contradicts ethical arguments in favor of considering irreversible impacts of climate change like species extinction in other regions.
- While arguments have been made to use higher discount rates for the SCC, such as a 7 percent rate consistent with past federal government practice and internal corporate rates of return, there are valid arguments in favor of much lower or zero discount rates:
    - Accounting for the various uncertainties surrounding estimates of the SCC would increase the SCC value by 70 percent to 420 percent over current estimates.[53]

[47] Ibid.
[48] US Bureau of Economic Analysis, 2020. Activities of U.S. Affiliates of Foreign Multinational Enterprises, 2018. https://www.bea.gov/sites/default/files/2020-11/imne1120.pdf
[49] For example, during 2014-2015 disruptions to west coast port services, Washington lost nearly $770 million in economic activity, and over $550 million in exports were not shipped, despite $153 million shifting to air transportation. https://www.joc.com/port-news/longshoreman-labor/international-longshore-and-warehouse-union/us-west-coast-congestion-cost-washington-770-million-study-says_20160222.html
[50] During the significant worldwide disruption caused by the COVID-19 pandemic, Washingtonians encountered inconsistencies in product availability, and higher or uncertain prices due to worldwide disruptions to supply chains. https://www.whitehouse.gov/cea/written-materials/2021/04/12/pandemic-prices-assessing-inflation-in-the-months-and-years-ahead/
[51] CarbonBrief, 2017. Q & A: The social cost of carbon. February 14, 2017. https://www.carbonbrief.org/qa-social-cost-carbon
[52] *Zero Zone, Inc., et al. v. United States Department of Energy, et al.*, Nos. 14-2147, 14-2159, & 14-2334. Argued September 30, 2015 — Decided August 8, 2016. http://media.ca7.uscourts.gov/cgi-bin/rssExec.pl?Submit=Display&Path=Y2016/D08-08/C:14-2159:J:Ripple:aut:T:fnOp:N:1807496:S:0
[53] van den Bergh, J and W Botzen, 2014. A lower bound to the social cost of CO2 emissions. Nature Clim Change 4, 253–258 (2014). https://doi.org/10.1038/nclimate2135

- The federal SCC was ruled "reasonable and the best available measure to determine the environmental cost of CO_2" in 2016.[54]

In 2021, a group of prominent economists published arguments in favor of the global SCC, particularly as compared to a cost-based or cost-effectiveness approach to policy analysis that does not reflect the benefits of reduced or avoided climate change.[55] The authors argue that in contrast to more limited scope approaches, "the SCC inherently builds in the notion of reciprocity among countries because it reflects the global damages of emissions. A future in which all countries seek to guide domestic policy by using the SCC can lead to progress on addressing climate change in a globally efficient and least-cost way."

That same year, using an empirical approach involving risk-free real rates of return on assets – consistent with Ecology's approach to discount rates – economists at University of California Santa Barbara and University of Chicago argued for a maximum discount rate of 2 percent based on current trajectories.[56] The authors also noted the discount rate appears to have entered a phase of decline over time (following a downward trend since about 1985), which could support arguments for using a diminishing discount rate.

We note that the federal SCC was called into question by a federal district court in 2022.[57] This decision was subsequently stayed by the Fifth Circuit Court of Appeals.[58] The Fifth Circuit stated, "We conclude the standing inquiry shows the Government Defendants' likelihood of success on the merits in this appeal, and the other factors, including the public interest, favor granting a stay of the injunction." This ruling indicates that the Louisiana District Court's injunction was unwarranted and issued in error. The U.S. District Court for the Eastern District of Missouri denied a similar challenge to the SCC. Also, the claims brought in these legal challenges focused in part on statutory and regulatory structures for federal rulemaking that do not apply to Ecology's rulemaking processes.

[54] *In the Matter of the Further Investigation into Environmental and Socioeconomic Costs under Minnesota Statutes Section 216B.2422, Subdivision 3*. State of Minnesota Office of Administrative Hearings. For the Public Utilities Commission. OAH 80-2500-31888. MPUC E-999/CI-14-643. https://mn.gov/oah/assets/2500-31888-environmental-socioeconomic-costs-carbon-report_tcm19-222628.pdf

[55] Aldy, JE, MJ Kotchen, RN Stavins, and JH Stock, 2021. Keep climate policy focused on the social cost of carbon. Science, Vol. 373, Issue 6557. 20 August 2021.

[56] Carleton, T and M Greenstone, 2021. Updating the United States Government's Social Cost of Carbon. University of Chicago, Becker Friedman Institute for Economics Working Paper No. 2021-04. November 12, 2021. https://ssrn.com/abstract=3764255 or http://dx.doi.org/10.2139/ssrn.3764255

[57] *Louisiana v. Biden*, Federal District Court for the District of Louisiana, Case No. 2:21-CV-01074. Memorandum Decision, 2/11/2022

[58] *Louisiana v. Biden*, United States Court of Appeals for the Fifth Circuit, Case No. 22-30087. Document: 00516220740. Filed: 03/01/2022.

4.3.2 Mortality benefits of reduced fine particulate emissions

BRG[59] estimated that reductions in emissions of fine particulate matter (PM2.5) as a result of the rule, as compared to the baseline, could result in avoided cumulative mortality risk valued at between $1.8 billion and $3.8 billion in 2038. The authors did not, however, develop corresponding estimates for interim years. Using the implied rate of decline in GHG emissions estimated in section 4.1, above, we estimated the following values of reduced mortality in each year of the Clean Fuels Program.

Table 12: Scaled avoided PM2.5-related mortality value

Year	Share of 2038 Cumulative Reduction	Avoided Mortality Value (Billions of 2020$, Low)	Avoided Mortality Value (Billions of 2020$, High)
2023	**0.07**	**$0.13**	**$0.27**
2024	**0.07**	**$0.13**	**$0.27**
2025	**0.07**	**$0.13**	**$0.28**
2026	**0.07**	**$0.13**	**$0.28**
2027	**0.07**	**$0.13**	**$0.28**
2028	**0.07**	**$0.13**	**$0.28**
2029	**0.07**	**$0.13**	**$0.28**
2030	**0.07**	**$0.13**	**$0.28**
2031	**0.07**	**$0.13**	**$0.28**
2032	**0.07**	**$0.13**	**$0.28**
2033	**0.07**	**$0.13**	**$0.28**
2034	**0.07**	**$0.13**	**$0.28**
2035	**0.07**	**$0.13**	**$0.28**
2036	**0.05**	**$0.09**	**$0.18**
2037	**0.002**	**$0.003**	**$0.007**
2038	**0.002**	**$0.003**	**$0.007**

Using the same discount rate of 2.5 percent, as in other cost and benefit estimates, we calculated a present value of avoided PM2.5-related mortality of **between $1.5 billion and $3.2 billion**.

4.3.3 Environmental justice benefits

Wildfires and air quality

As noted in Section 4.3.1, **wildfires accounted for 25 – 50 percent of fine particulate matter** in

[59] BRG Energy & Climate, 2022. Washington Department of Ecology Clean Fuel Standard Cost Benefit Analysis Report. May 12, 2022. https://ecology.wa.gov/DOE/files/22/22790fe6-fc3a-414d-b3ba-036af0975258.pdf

the US in recent years, with **higher levels in the western states**,[60] and are expected to increase in frequency and severity. Even when wildfire smoke is ubiquitous, it impacts overburdened communities more severely, as they may not have good access to air filtration or non-emergency healthcare, and may need to spend more time outside during high heat events that often coincide, since they may have limited access to air conditioning and other cooling options. They are also more likely to reside in areas that absorb more heat and retain it longer, due to reduced greenspace and tree canopy, proximity to industrial activity, and more paved area.[61]

Heat-related mortality

The **heat-related death risk also disproportionately affects overburdened communities.** A study in British Columbia found that heat deaths in the greater Vancouver area were **strongly tied to individuals' "material and social deprivation" as well as age, sex, and neighborhood greenness**,[62] meaning that deaths were more likely to occur in populations that:

- Had lower incomes.
- Had less shade and more impervious or paved surfaces.
- Were unsheltered or had inadequate housing.
- Had less education.
- Lived alone.
- Were elderly.
- Lacked transportation.
- Lacked recreational spaces.
- Experienced more job or income insecurity.

In short, heat deaths are more likely to occur among overburdened communities whose historically lower resource access puts them more at risk of being in one or more of the categories above. And particularly during a time of high numbers of people living unsheltered or without consistent shelter, climate change is poised to harm or kill the most vulnerable among us.

Other pollutants

[60] Burke, M, A Driscoll, S Heft-Neal, J Xue, J Burney, and M Wara, 2020. The changing risk and burden of wildfire in the United States. PNAS 118(2). https://doi.org/10.1073/pnas.2011048118

[61] King County, 2021. Results of heat mapping project show inequitable impact of hotter summers. https://kingcounty.gov/elected/executive/constantine/news/release/2021/June/23-heat-mapping-results.aspx. Results: https://www.arcgis.com/apps/webappviewer/index.html?id=84709c65c08a40bbb47d0723ef1c797a&extent=-13604644.7965%2C6019787.1095%2C-13561266.7829%2C6046616.5065%2C102100

[62] Henderson, SB, KE McLean, MJ Lee, and T Kosatsky, 2022. Analysis of community deaths during the catastrophic 2021 heat dome. Environmental Epidemiology (2022) 6:e189. DOI: 10.1097/EE9.0000000000000189.

Overburdened communities tend to be located in areas that expose them to higher historic or current pollutants. Whether in their homes, outdoors, at school, or at work, overburdened populations are more likely to interact with air emissions from vehicles or heavy-duty vehicles, contaminated nonpotable and even potable waters, or soils and shorelines contaminated by historical activities or land uses. This means if covered parties reduce or offset GHG emissions in ways that also reduce other emissions (note that this is part of the regulatory baseline and adopted rule's definition of providing direct benefits to the state), the rule will provide additional benefits to those populations.

Changes in transportation fuels and infrastructure will also particularly benefit overburdened populations. The Washington State Department of Transportation notes:[63]

- In Washington about 1 in 7 (900,000) people live within 1/4 mile of heavy traffic roadways. These people breathe more air pollution from diesel and gasoline exhaust.
- People with an underlying health condition like asthma or heart disease, may be especially sensitive to traffic-related air pollution, as are children and adults age 65 and older.
- Traffic air pollution is linked to adverse birth outcomes such as low birth weight and premature births.

Environmental health disparities mapping

The Washington State Department of Health Environmental Health Disparities map[64] evaluates environmental health risk factors in communities, using a model adapted from CalEnviroScreen — a cumulative environmental impacts assessment mapping tool developed by CalEPA and used in California. The model estimates a cumulative environmental health impact score for each census tract reflecting pollutant exposures and factors that affect people's vulnerability to environmental pollution. The model is based on a conceptual formula of risk being the product of threat and vulnerability, where threat and vulnerability are based on several indicators.

Threat is represented by indicators that account for pollution burden, which is a combination of environmental effects and environmental exposures in communities. Environmental effects include indicators that account for adverse environmental quality generally, even when population contact with an environmental hazard is unknown or uncertain. Environmental exposures include the levels of certain pollutants that populations come into contact with.

Vulnerability is represented by indicators of socioeconomic factors and sensitive populations for which there is clear evidence that they may affect susceptibility or vulnerability to an increased pollution burden. Indicators in socioeconomic factors measure population characteristics that modify the pollution burden itself. Sensitive populations refer to those who are at greater risk due to intrinsic biological vulnerability to environmental stressors.

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[63] WA Department of Health, 2022. Traffic Air Pollution Data. https://doh.wa.gov/data-statistical-reports/washington-tracking-network-wtn/traffic-air-pollution

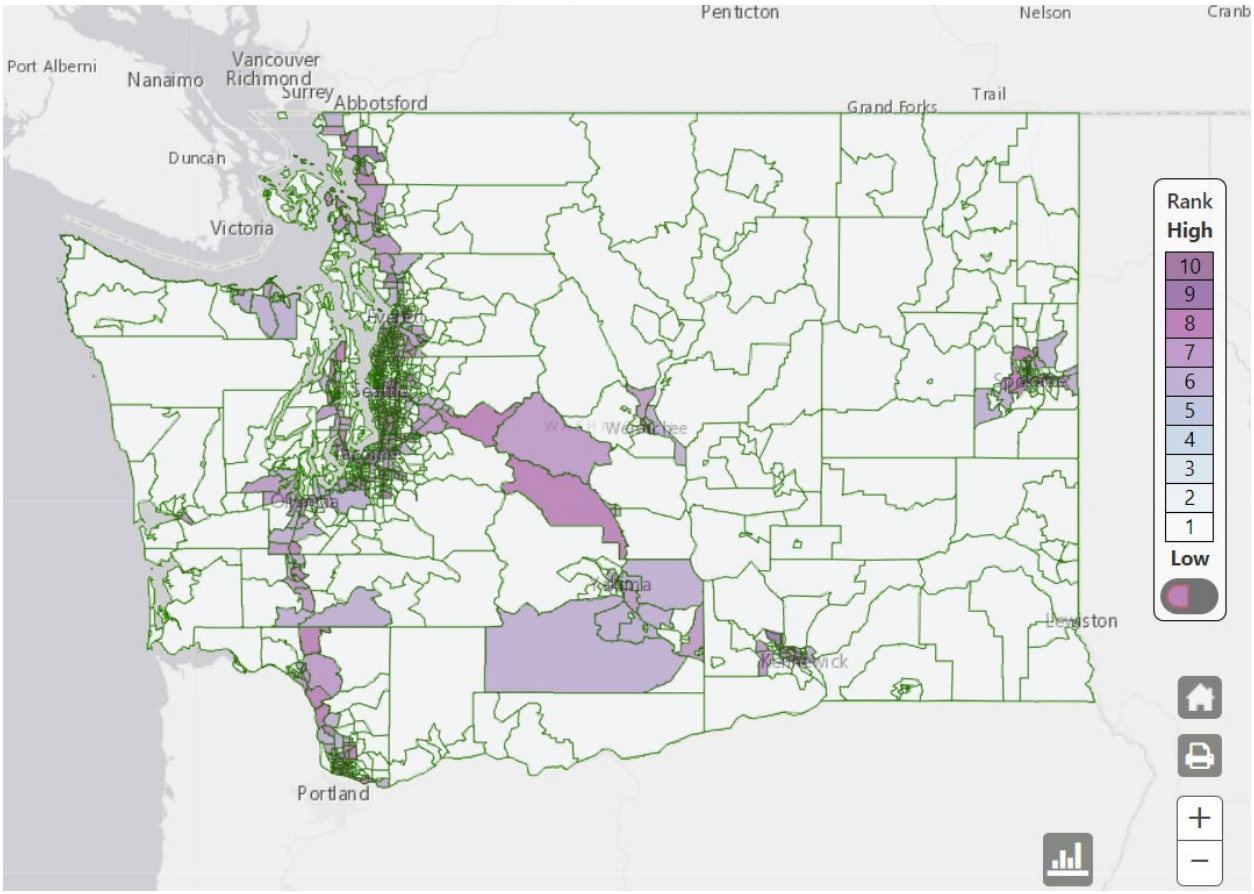
[64] WA Department of Health, 2022a. Washington Tracking Network, Environmental Health Disparities Map. https://fortress.wa.gov/doh/wtnibl/WTNIBL/

The rankings help to compare health and social factors that may contribute to disparities in a community. Rankings should not be interpreted as absolute values. Instead, the relationships within and between map layers help to identify where the adopted rule will generate benefits with greater focus on overburdened communities. A higher rank generally reflects a higher combined threat and vulnerability to the depicted variable.

Populations living near high-traffic roadways

The Health Disparities map identifies areas across the state that live near highways. Many of them are in urban areas around Puget Sound, but others are along interstate or state highways to the south and east.

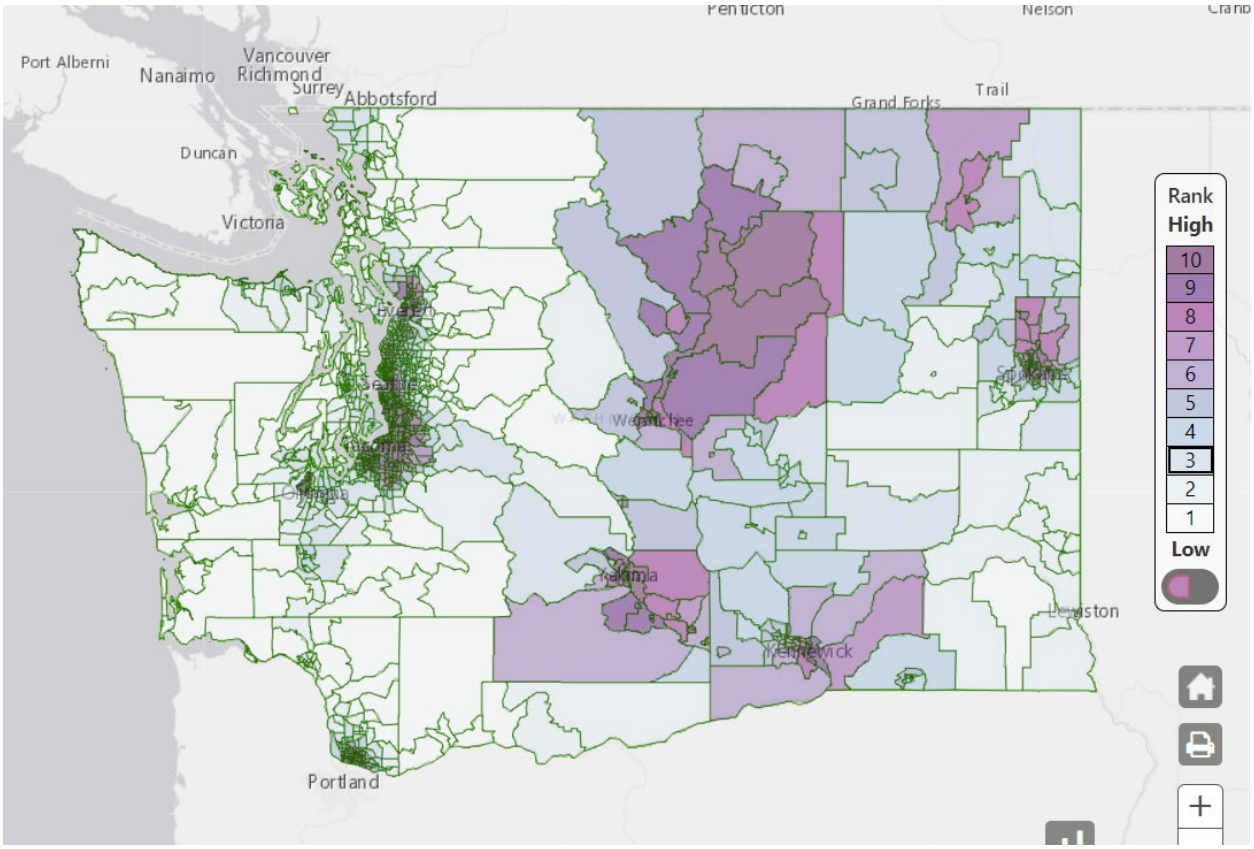
Figure 1: Health disparity rankings of populations living near high-traffic roadways.[65].



[65] From University of Washington Department of Environmental & Occupational Health Sciences, 2019. Washington Environmental Health Disparities Map: technical report. Seattle; 2019: "This indicator uses 2017 census block population estimates from the Washington State Office of Financial Management and 2017 roadway traffic density data from the Washington State Department of Transportation in the form of estimated annual average daily traffic volumes (AADT). This indicator displays the percentage of population exposed to busy roadways within each census tract. The AADT is adjusted by the road segment length and the total road length includes roads within 150 meters of a census tract boundary. The exposure zone used in this indicator is defined as

These populations overlap in many ways with areas that experience high levels of fine particulate matter. This is particularly true for areas along the Interstate 5 corridor near Puget Sound, and Interstate 82 through Yakima. Other areas that see high particulate matter are those frequently impacted by wildfires, particularly in the northeast portion of Washington and around Yakima and Kennewick.

Figure 2: Populations with high risk associated with fine particulate matter.[66]

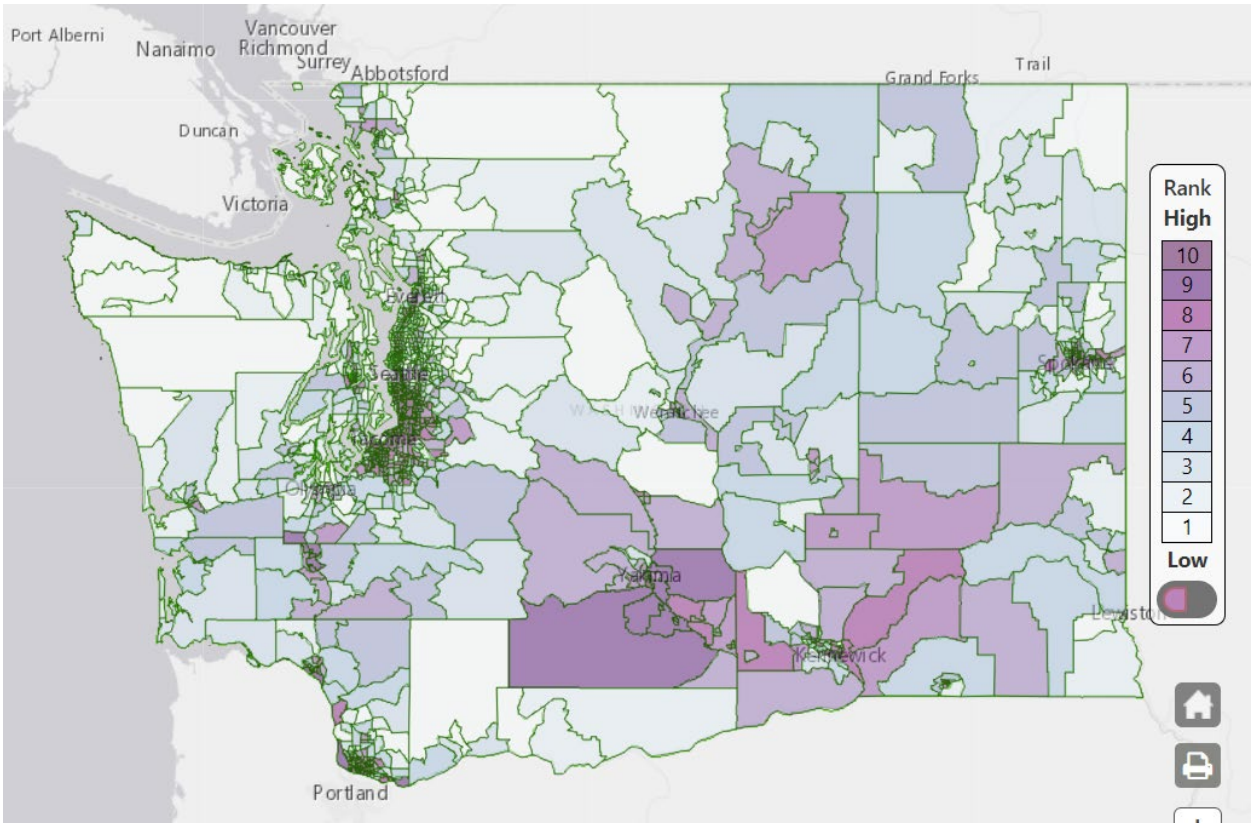


the area within 600 meters of a roadway (i.e., 300 meters on either side of the roadway). The population exposed per census block within a tract was summed in order to get the exposed population within each census tract."

[66] From University of Washington Department of Environmental & Occupational Health Sciences, 2019. Washington Environmental Health Disparities Map: technical report. Seattle; 2019: "This indicator uses the three-year mean concentration of daily maximum 8-hour rolling averaged ozone for 2009-2011 from AIRPACT. AIRPACT provides data that averages daily max ozone level for three years within 12km x 12km grid cells. Daily maximum ozone concentrations were calculated by using inverse distance weighting from the center of each 12km x 12km grid cell to model the average ozone concentration at the census block level. The block-level ozone concentrations were then averaged for all blocks within a census tract."

There are many measures of environmental health disparities, and the Health Disparities Map combines them into an overall ranking for each census tract in the state. We note that Health Disparities rankings overlap significantly with areas near roadways and/or with high fine particulate matter.

Figure 3: Environmental Health Disparities rankings[67]



4.3.4 Morbidity benefits of ancillary pollutants

The US EPA has used various values to reflect the damages caused by a metric ton of particulate matter (including mortality and morbidity values; overlaps with estimates underlying avoided mortality values), volatile organic compounds, and nitrogen oxides. Similar to our uncertainty about how often the rule will result in reduced emissions of each of these pollutants, we cannot be certain about the relationship between their emissions and GHG emissions in all cases. This relationship will vary by technology, fuels, and processes. But we can connect some of the

[67] From University of Washington Department of Environmental & Occupational Health Sciences, 2019. Washington Environmental Health Disparities Map: technical report. Seattle; 2019: "The ranking provides a common scale to compare various issues at the community level and to assess the cumulative impact of the indicators across communities. The use of rankings also allows health information to be displayed for each community, while protecting confidentiality in communities with small numbers. The IBL tool does not show the actual numeric difference between each rank. The ranks only show that there is a difference, not how much. Because the final composite scores are ranked by deciles, the resulting rankings shown on the map range from 1 (least impacted) to 10 (most impacted)."

values available to us[68], to illustrate how important reductions in these pollutants are, and multiply them by the emissions reductions modeled by BRG.[69] And these damages are more likely to occur in overburdened communities, so reducing them will generate benefits more focused in those communities.[70]

Table 13: Value of damages from select criteria pollutants as reported in EPA rulemakings

Criteria Pollutant	Damages per Metric Ton in Current Dollars	Equivalent Mortality Risk (based on Value of a Statistical Life)
$PM_{2.5}$	**$1.74 – 1.92 million**	**16 – 18 percent or 1 in 6**
Volatile Organic Compounds (VOCs)	**$1,347 - 1,468**	**0.01 percent or 1 in 10,000**
Nitrogen Oxides (NOx)	**$5,624 – 6,111**	**0.005 percent or 1 in 20,000**

[68] ICF International (2014). California's Low Carbon Fuel Standard: Compliance Outlook & Economic Impacts. In turn, this cites specifically:

- US Environmental Protection Agency (2010). Diesel Emissions Quantifier Health Benefits Methodology, EPA, EPA-420-B-10-034, August 2010.
- US Environmental Protection Agency and National Highway Traffic Safety Administration (2011). Draft Joint Technical Support Document: Proposed Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, EPA-420-D-11-901, November 2011.

[69] BRG Energy & Climate, 2022. Washington Department of Ecology Clean Fuel Standard Cost Benefit Analysis Report. May 12, 2022. https://ecology.wa.gov/DOE/files/22/22790fe6-fc3a-414d-b3ba-036af0975258.pdf Underlying VISION modeling outputs. Spreadsheets.

[70] During the public comment period for this rulemaking, industry comments indicated that biofuels reduce emissions of criteria pollutants, even at higher blend levels. Similarly, they indicated that prices at the pump for higher ethanol blends also provide opportunities for cost-savings (or mitigation of cost increases) for individuals and businesses. To the extent that alternative fuels contribute to more options for emissions reductions and cost-competitiveness, they help to reduce the suite of criteria pollutants associated with transportation emissions.

Table 14: Fine particulate matter (PM2.5) emissions, metric tons (MT) of PM2.5

Year	Adopted Rule (Accelerated Reduction) (MT PM2.5)	Baseline (MT PM2.5)	Difference (MT PM2.5)
2023	**1,103**	**1,136**	**32.50**
2024	**1,099**	**1,131**	**32.50**
2025	**1,088**	**1,123**	**35.72**
2026	**1,076**	**1,112**	**35.66**
2027	**1,063**	**1,098**	**35.61**
2028	**1,050**	**1,085**	**35.59**
2029	**1,037**	**1,073**	**35.59**
2030	**1,025**	**1,061**	**35.60**
2031	**1,014**	**1,049**	**35.63**
2032	**1,002**	**1,037**	**35.68**
2033	**990**	**1,026**	**35.74**
2034	**979**	**1,015**	**35.83**
2035	**967**	**1,003**	**35.93**
2036	**977**	**992**	**14.38**
2037	**978**	**982**	**3.70**
2038	**969**	**973**	**3.89**

Multiplying each year's PM2.5 emissions reduction by the value of avoided emissions results in a present value benefit of **between $698 million and $770 million** over the course of the Clean Fuels Program through 2038. These benefits reflect morbidity costs (costs of nonfatal illness resulting from PM2.5 exposure).

4.4 Reporting benefits

We expect the rule to result in benefits of timely and consistent information about Clean Fuels Program participants and activities. Timely and consistent information allows for ongoing support of an accurate and efficient Clean Fuels Program. This, in turn, assures the program results in real emissions reductions consistent with statutory goals, as well as rapid identification of potential concerns or necessary intervention (e.g., to maintain an affordable market-based system that achieves statutory goals while allowing transportation fuel suppliers and other market participants flexibility in how to comply).

Chapter 5: Cost-Benefit Comparison and Conclusions

5.1 Summary of costs and benefits of the adopted rule

We estimated the following quantifiable costs and benefits resulting from the adopted rule. These costs and benefits are considered in conjunction with partially quantifiable or qualitative costs and benefits also discussed in this section.

- Carbon intensity reduction and credit costs/benefits.
- Reporting costs.
- GHG emissions reduction benefits.
- PM2.5 emissions reduction benefits (mortality and morbidity).

The present values of the impacts above are summarized in the table below.

Table 15: Total estimated present value costs and benefits

Type of Cost or Benefit	Low Estimate	High Estimate
Emissions reduction and credit, net costs	**$3,450,609,364**	**$3,450,609,364**
Reporting, direct costs	**$243,248,621**	**$243,248,621**
Total quantifiable costs	**$3,693,857,984**	**$3,693,857,984**
GHG emissions reduction benefits, SCC	**$1,143,707,092**	**$1,143,707,092**
PM2.5 emissions reduction benefits, mortality	**$1,506,425,617**	**$3,180,231,858**
PM2.5 emissions reduction benefits, morbidity	**$698,005,608**	**$770,213,084**
Total quantifiable benefits	**$3,348,138,317**	**$5,094,152,035**

We also identified the following benefits, discussed qualitatively or partially quantified (see Chapter 4 for more detail):

- Values not reflected in the SCC. These include some aspects of:
    - Health impacts.
    - Agricultural losses.
    - Impacts to oceans.
    - Impacts to forests.
    - Wildfires.
    - Ecosystem services.
    - Productivity.
    - Water and flooding.
    - Transportation.

    - Energy disruptions.
    - Catastrophic impacts and tipping points.
    - Inter- and intra-regional conflict
- Based on a per-capita average for the United States, **wildfires cost Washingtonians between $1.6 billion and $8.0 billion annually.**
- Working forestland losses:
    - **30 percent more severe burning** in commercial timber forests.
    - **91.3 percent value loss** of managed timber lands, accounting for salvage value.
- Wildfire preparedness and response. **In 2020:**
    - **$20 million** in aviation readiness and support.
    - **$12.5 million** in state-funded response to wildfires.
    - **$20 million** damage losses to utilities.
    - **$15 million** damage losses to state agency infrastructure.
    - **$10 million** damage losses to other government infrastructure.
- High-heat event impacts. The **2021 heat dome event** resulted in:
    - At least **$1.45 billion** in lost lives.
    - A **70-fold increase in people seeking emergency care**. An average high heat event-related healthcare visit costs over $12,000.
    - Agriculture losses:
        - **Raspberries: 30 percent loss.**
        - **Cherries: 10 percent loss.**
        - **Blueberries: $85 million loss.**
        - Wheat: 6-fold to 34-fold increases in the share of **wheat in "poor" or "very poor" condition.**
    - Shellfish losses:
        - **Seeded oysters: 40 percent losses** of seeded oysters.
        - **Human illness: 56 percent increase in vibriosis** cases.
        - **Oysters: 5 to 30 percent** oyster mortality.

Flood damages

- Flood damage due to climate change-induced impacts to atmospheric rivers in western Washington (per county):

    - $10 million to $100 million per year increases in most Puget Sound-adjacent counties.
    - Over $100 million per year increases in Snohomish, King, and Lewis counties.
    - This is at least a doubling of annual flood damage costs in Western Washington, compared to costs in the 1990s.
- Flood damage due to climate change-induced impacts to atmospheric rivers in eastern Washington (per county)
    - $1 million per year increases in most eastern Washington counties, with some counties incurring up to $10 million more per year.
    - This is up to a doubling of annual costs for most eastern Washington counties.
    - For Pend Oreille, Spokane, Whitman, Columbia, and Asotin counties, this is between two and four times as flood damage costs in the 1990s.

Environmental justice improvements

Quantified and qualitative benefits are likely to be more focused for overburdened populations, in terms of avoided climate change impacts and avoided direct health impacts (see section 4.3.3 for more detail):

- Reduced effects of PM2.5 on populations living and working near high-traffic roadways and in wildfire smoke-prone areas. These are also areas with higher existing health disparities across multiple variables.
- In Washington about **1 in 7 (900,000) people live within 1/4 mile of heavy traffic roadways**. These people breathe more air pollution from diesel and gasoline exhaust.
- People with an **underlying health condition** like asthma or heart disease, may be especially sensitive to traffic-related air pollution, as are **children and adults age 65 and older**.
- Traffic air pollution is linked to **adverse birth outcomes such as low birth weight and premature births**.
- Even when wildfire smoke is ubiquitous, it impacts overburdened communities more severely, as they may not have good **access to air filtration or non-emergency healthcare**, and may **need to spend more time outside during high heat events that often coincide**, since they may have limited access to air conditioning and other cooling options.
- Reduced heat-related mortality. In short, heat deaths are more likely to occur among overburdened communities whose historically lower resource access puts them more at risk of being in one or more of the categories below. And particularly during a time of high numbers of people living unsheltered or without consistent shelter, climate change is poised to harm or kill the most vulnerable among us. A study of heat deaths found **strong relationships between higher likelihood of heat-related death and**:

- Lower income.
- Living near less shade and more impervious or paved surfaces.
- Being unsheltered or having inadequate housing.
- Less education.
- Living alone.
- Being elderly.
- Lacking transportation.
- Lacking recreational spaces.
- Job or income insecurity.

5.2 Conclusion

We conclude, based on a reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the adopted rule, as compared to the baseline, that the benefits of the adopted rule are greater than the costs. Similarly, we expect the benefits of the adopted amendments to the fee rule to exceed its costs.

Chapter 6: Least-Burdensome Alternative Analysis

6.1 Introduction

RCW 34.05.328(1)(c) requires Ecology to "…[d]etermine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection." The referenced subsections are:

(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements;

(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule;

(c) Provide notification in the notice of proposed rulemaking under RCW 34.05.320 that a preliminary cost-benefit analysis is available. The preliminary cost-benefit analysis must fulfill the requirements of the cost-benefit analysis under (d) of this subsection. If the agency files a supplemental notice under RCW 34.05.340, the supplemental notice must include notification that a revised preliminary cost-benefit analysis is available. A final cost-benefit analysis must be available when the rule is adopted under RCW 34.05.360;

(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented.

In other words, to be able to adopt the rule, we are required to determine that the contents of the rule are the least burdensome set of requirements that achieve the goals and objectives of the authorizing statute(s).

We assessed alternative rule contents, and determined whether they met the goals and objectives of the authorizing statute(s). Of those that would meet the goals and objectives, we determined whether those chosen for inclusion in the adopted rule were the least burdensome to those required to comply with them.

6.2 Goals and objectives of the authorizing statute

The authorizing statute for this rule is Chapter 70A.535 RCW, Transportation Fuel – Clean Fuels Program. Its goals include:

- Supporting the deployment of clean transportation fuel technologies through a carefully designed program that reduces the carbon intensity of fuel used in Washington.
- Reducing levels of conventional air pollutants from diesel and gasoline that are harmful to public health.

- Reducing greenhouse gas emissions associated with transportation fuels, which are the state's largest source of greenhouse gas emissions.
- Creating jobs and spurring economic development based on innovative clean fuel technologies.

The authorizing statute sets out to achieve these goals through objectives including specific requirements for Ecology's rule, including but not limited to:

- Reducing the overall carbon intensity of transportation fuels used in Washington.
- Requiring carbon intensity reductions at the level of all transportation fuels, and not by any individual type of transportation fuel.
- Assigning a compliance obligation to fuels whose carbon intensity exceeds the standards.
- Assigning credits that can be used to satisfy or offset compliance obligations to fuels whose carbon intensity is below the standards.
- Tracking volumes of credits and deficits, and credit prices.
- Reducing GHG emissions attributable to each unit of the fuels to 20 percent below 2017 levels by 2038 based on the following schedule in the statute:
- No more than 0.5 percent each year in 2023 and 2024.
- No more than an additional one percent each year beginning in 2025 through 2027.
- No more than an additional 1.5 percent each year beginning in 2028 through 2031.
- No change in 2032 and 2033.
- Harmonization with the regulatory standards, exemptions, reporting obligations, and other clean fuels program compliance requirements and methods for credit generation of other states that:
    - Have adopted low carbon fuel standards or similar greenhouse gas emissions requirements applicable specifically to transportation fuels.
    - Supply, or have the potential to supply, significant quantities of transportation fuel to Washington markets.
    - To which Washington supplies, or has the potential to supply, significant quantities of transportation fuel.

6.3 Alternatives considered and why they were excluded

We considered the following alternative rule content, and did not include it in the adopted rule for the reasons discussed in each subsection below.

- Residential electric vehicle charging: Allocating a larger portion of the credits for residential electric vehicle charging to electric vehicle manufacturers.

- Reductions in carbon intensity: Reducing the carbon intensity standard incrementally after 2034.
- Additional crediting: Incorporating refinery investment credits and carbon capture and sequestration.
- Indirect land use conversion value: Using Oregon's indirect land use conversion value for corn ethanol.
- Tier 2 pathways: Including Tier 2 pathways at the start of the program.
- Fees: Not charging fees to all program participants, or different allocation of fees.
- Compliance years: Making 2023 a full compliance year.
- GREET model: Using the most recent version of the Argonne GREET model.
- Verification: Including third party verification at the start of the program.

6.3.1 Residential electric vehicle charging

Ecology considered allocating up to half of the credits allocated for residential electric vehicle charging to electric vehicle manufacturers. This would not have met the goals and objectives of the authorizing statute. Utilities are closer to the fuel lifecycle than electric vehicle manufacturers, and therefore able to directly provide low-carbon fuel as is the intent of the statute. Allocating the majority of credits to them better achieves transparency goals, as well as increasing the likelihood of creating local jobs and development. Electric utilities are also better positioned than electric vehicle manufacturers to invest credit revenue in transportation electrification in disproportionately impacted communities, as the statute requires.

6.3.2 Reductions in carbon intensity

Ecology considered reducing the carbon intensity standard incrementally after 2034. This would not have met the goals and objectives of the authorizing statute as well or quickly as the adopted rule. By reducing carbon intensity earlier, there are significant additional benefits including a reduction in GHGs, fine particulate matter, and other criteria pollutants, since those reductions are maintained fully in subsequent years. While this alternative could have delayed some compliance costs, it also would have disproportionately reduced the degree to which the rule would have met the goals of the statute to reduce these impacts.

6.3.3 Additional crediting

Ecology considered incorporating refinery investment credits and carbon capture and sequestration in the rule. This would not have met the goals and objectives of the authorizing statute. Due to the resources available and timelines required by the authorizing statute, Ecology focused this first rulemaking on the necessary elements for the program to begin on January 1, 2023. Expanding the scope of the rulemaking could have impaired Ecology's ability to have a fully functioning program by the statutory deadline. Developing these additional rule

provisions would have involved considerable time and resources, based on input from other jurisdictions. Additional credit supply early in the program could also have jeopardized sufficient credit prices, jeopardizing the incentive to reduce emissions. This may, however, be addressed in future rulemakings. The protocols and procedures necessary for including carbon capture and sequestration activities require study and consultation to implement, and one of the ways Ecology is moving forward to do so is through the Agricultural & Forestry Carbon Capture and Sequestration Advisory Panel.

6.3.4 Indirect land use conversion value

Ecology considered using Oregon's indirect land use conversion value for corn ethanol. This would not have met the goals and objectives of the authorizing statute. Ecology examined multiple options for the indirect land use conversion value, and the resulting modeled value for corn ethanol. The rule incorporates California's value for corn ethanol (and the underlying indirect land use conversion value), since this value is within the range of estimates in the current scientific literature and was determined after expert analysis and a robust and thorough stakeholder engagement process.

Ecology is unable to do modeling to determine the indirect land use chance (iLUC) value for biofuels due to the time constraint to do such work. Thus, the decision is to choose among existing iLUC values in the CARB and OR-DEQ rules. Both CARB and OR-DEQ agree on the iLUC values for three biodiesel and renewable diesel feedstocks (soybean, canola, and palm) and two ethanol feedstocks (sorghum and sugarcane). However, they differ on the corn ethanol iLUC value. Ecology recognizes both the 2015 CARB and OR-DEQ iLUC values for corn ethanol are not based on the most current model and data. It is evident that the CARB modeling and determination used a robust and transparent stakeholder engagement process, and that provides a higher level of confidence. As a result, Ecology chose to use CARB's iLUC value for corn ethanol.

Ecology received very valuable detailed input towards the modeling of land use change impact of biofuels (especially corn and cover crops). We will benefit from comments and references provided during the public comment period in the planning and development of future work to assess the land use change impact of biofuels.

6.3.5 Tier 2 pathways

Ecology considered including Tier 2 pathways at the beginning of the program. This would not have met the goals and objectives of the authorizing statute, particularly regarding the Clean Fuels Program beginning on January 1, 2023. Under the rule, Ecology will accept Tier 2 fuel pathways that have been approved by CA and OR at the beginning of the program. Due to resource and time constraints, the process for acceptance of additional Tier 2 pathways would not have been complete in time for the statutory deadline.

6.3.6 Fees

Ecology considered not charging fees to all program participants. This would not have met the goals and objectives of the authorizing statute. Under the amendments to the fee rule, Ecology would charge a small participation fee for all program participants, and a separate deficit generation fee only to deficit generators. The authorizing statute gives Ecology authority to collect fees to cover the cost of program implementation and maintenance. Credit generators do, to a lesser extent, contribute to the overall costs of administering the Clean Fuels Program. However, Ecology expects to keep fees for credit generators low so they do not cause a barrier for voluntary participants by charging the higher fees to deficit generators only.

Ecology also initially proposed different shares of total fees charged to deficit and credit generators (80 percent and 20 percent, respectively). Based on input received during the public comment period, we determined that these proposed shares were likely to create significant enough disincentive for opting into the program and generating credits, that it would increase compliance burden by making credits more scarce and putting upward pressure on the credit price. The adopted rule, therefore, allocates these fees differently (95 percent and 5 percent) to reduce this disincentive, while maintaining consistency with statutory goals and objectives discussed above regarding credit generator contribution to program administration costs.

6.3.7 Compliance years

Ecology considered making 2023 a full compliance year. This would have imposed additional burden on covered entities, by imposing compliance obligations earlier and during a period in which covered entities would be adjusting to the new program, reporting system, and procedures.

6.3.8 GREET model

Ecology considered using the most recent version of the GREET model published by Argonne National Laboratory in the rule, rather than the most recent version of the CA-GREET model. This would have imposed additional burden on covered entities by creating inconsistencies with other states, and potentially resulting in additional effort and costs to resolve these inconsistencies or meet compliance requirements across multiple jurisdictions. It would also not have met the harmonization goals of the authorizing statute.

6.3.9 Verification

Ecology considered including third party verification at the start of the program. This would have imposed additional burden on covered entities (and Ecology, due to resource constraints) during initial program implementation. Other jurisdictions have added third party verification requirements in subsequent regulations, and Ecology may do so in a future rulemaking as well.

6.4 Conclusion

After considering alternatives to the adopted rule's contents, within the context of the goals and objectives of the authorizing statute, we determined that the adopted rule represents the least-burdensome alternative of possible rule contents meeting the goals and objectives.

Chapter 7: Regulatory Fairness Act Compliance

7.1 Introduction

The Regulatory Fairness Act (RFA; RCW 19.85.070) requires Ecology to perform a set of analyses and make certain determinations regarding the rule. This chapter presents the:

- Analysis of relative compliance cost burden.
- Consideration of lost sales or revenue.
- Cost-mitigating elements of the rule, if required.
- Small business and local government consultation.
- Industries likely impacted by the rule.
- Expected impact on jobs.

A small business is defined by the RFA as having 50 or fewer employees, at the highest ownership and operator level. Estimated compliance costs are determined as compared to the baseline (the regulatory environment in the absence of the rule, limited to existing federal and state requirements). Analyses under the RFA only apply to costs to "businesses in an industry" in Washington State. This means the impacts, for this part of our analyses, are not evaluated for government agencies.

7.2 Choice to develop Small Business Economic Impact Statement

The analyses required under the RFA, and their inclusion in a Small Business Economic Impact Statement, are based on whether the rule will impose compliance costs on small businesses. A rule is otherwise exempt from these analyses under RCW 19.85.025(4).

Based on available information, we did not identify any small businesses that would have deficits under the rule. These known transportation fuel suppliers and electric utilities include only:

- Large businesses themselves, or part of larger businesses, averaging 8,857 employees.
- Publicly owned entities.

However, we do not have full information concerning all potential entities incurring any kind of direct compliance cost under the rule. Specifically, we do not have comprehensive information about all potential credit generators that could opt into the program.

While we may be able to make some assumptions about opt-in entities, we cannot be certain of all their attributes, and about whether any are small businesses. Due to uncertainty about the employment attributes of opt-in entities, we chose to complete the analyses required under the RFA, to fully understand potential disproportion in the impacts of the rule.

Opt-in entities will incur compliance costs related to registration and reporting. We note, however, that opt-in entities are not likely to opt in unless they expect a private net benefit, i.e., the costs they incur complying with the rule's registration and reporting requirements are outweighed by the benefits of generating and selling credits.

As the RFA requires analyses specifically related to employment impacts and price or output impacts (as they play into revenue and profits), we also determined this analysis would be the most appropriate space to discuss additional modeling performed to fully understand the potential impacts of the rule.

7.3 Analysis of relative compliance cost burden

The average affected business likely to have a deficit under the rule employs approximately 8,857 people, and there are no likely small businesses in this group.

For potential opt-in entities, we do not have comprehensive knowledge of their attributes or the internal business decisions. We assume, however, that opt-in entities will only choose to participate based on a positive expected private net benefit (accounting for compliance costs and the benefits of selling credits).

Therefore, overall, we conclude that no small businesses is likely to incur net compliance costs under the rule. Therefore, Ecology is not required, under the RFA, to include all legal and feasible elements in the rule to mitigate disproportionate costs on small businesses. Note, however, that we have voluntarily completed the additional analyses and considerations required under the RFA (see section 7.2).

7.3 Loss of sales or revenue

Businesses that incur compliance costs under the rule could experience reduced sales or revenues if the rule significantly affects the prices of the goods they sell. The degree to which this could happen is strongly related to each business's production and pricing model (whether additional lump-sum costs would significantly affect marginal costs), as well as the specific attributes of the markets in which they sell goods, including the degree of influence each firm has on market prices, as well as the relative responsiveness of market demand to price changes.

BRG[71] estimated the following impacts to consumer prices, based on an assumed full pass-through of producer, wholesaler, or retailer costs to consumers.

Table 16: Policy impacts of Accelerated Reduction scenario on consumer fuel prices, 2020$/GGE[72]

[71] BRG Energy & Climate, 2022. Washington Department of Ecology Clean Fuel Standard Cost Benefit Analysis Report. May 12, 2022. https://ecology.wa.gov/DOE/files/22/22790fe6-fc3a-414d-b3ba-036af0975258.pdf

[72] The BRG analysis assumes that 100 percent of costs incurred by suppliers of gasoline and diesel would be passed through to consumers. This is a highly conservative assumption, implicitly assuming that consumers would not

Year	Consumer Gasoline	Consumer Diesel
2023	**0.007**	**(0.016)**
2024	**0.017**	**(0.006)**
2025	**0.036**	**0.014**
2026	**0.056**	**0.034**
2027	**0.076**	**0.054**
2028	**0.105**	**0.083**
2029	**0.134**	**0.113**
2030	**0.164**	**0.142**
2031	**0.193**	**0.171**
2032	**0.193**	**0.171**
2033	**0.193**	**0.170**
2034	**0.389**	**0.368**
2035	**0.389**	**0.367**
2036	**0.389**	**0.366**
2037	**0.005**	**0.005**
2038	**0.005**	**0.005**

(Source: BRG)

Based on supporting data provided by BRG, we identified that consumption of gasoline is expected to consistently decrease over the course of the Clean Fuels Program, while consumption of fossil diesel is expected to decrease through 2032, increasing through 2035, and decreasing again through 2038.

Considering only these impacts to fossil-based gasoline and diesel, decreases in output could outweigh increases in prices in some years, resulting in reduced revenues. Thanks to the flexibility of transportation fuel suppliers over time, however, this may not be the case. Suppliers could choose to change the types of fuel they supply and how fuels are blended, to mitigate or avoid negative impacts to fossil fuel revenues. Moreover, expanded electrification and alternative fuel production will support additional revenues to new entrants to the Washington transportation fuels sector, including utilities or businesses specializing in electric vehicle charging. A more diverse fuel supply will also insulate consumers against impacts to fossil fuel prices.

change their purchasing or driving behavior in response to any change in gasoline or diesel prices, and firms would not optimize production across multiple products. In reality, consumers with more alternative options available to them – such as alternative fuels, electric vehicles, shared transport and alternative transportation modes, or public transportation – would substitute away from fossil fuels first, followed by other consumers, depending on the magnitude of the price increase relative to the baseline price. This would, in turn, put downward pressure on the prices of these fuels, and prices would not increase by the full cost incurred by suppliers. The REMI E3+ dynamic macroeconomic model – a model of the entire Washington economy based on real-world data for market and consumer behaviors – indicates that, in a given year, a $1 billion cost to the petroleum fuel production industry (with no counterbalancing revenues to any other industry) would result in up to a 1.2 percent increase in motor vehicle fuel and lubricant prices, with impacts spread across other products, such as fuel oil. For illustration, if baseline prices were $5/gallon, this would be an increase of 6 cents.

7.4 Action taken to reduce small business impacts

The RFA (19.85.030(2) RCW) states that:

"Based upon the extent of disproportionate impact on small business identified in the statement prepared under RCW 19.85.040, the agency shall, where legal and feasible in meeting the stated objectives of the statutes upon which the rule is based, reduce the costs imposed by the rule on small businesses. The agency must consider, without limitation, each of the following methods of reducing the impact of the proposed rule on small businesses:

a) Reducing, modifying, or eliminating substantive regulatory requirements;

b) Simplifying, reducing, or eliminating recordkeeping and reporting requirements;

c) Reducing the frequency of inspections;

d) Delaying compliance timetables;

e) Reducing or modifying fine schedules for noncompliance; or

f) Any other mitigation techniques including those suggested by small businesses or small business advocates."

Based on the absence of small businesses among likely entities with deficits under the rule, and the absence of opt-in entities that are likely to incur net compliance costs (rather than a benefit), Ecology is not required to consider the above options or mitigate the likely nonexistent disproportionate costs. Nonetheless, we note that during development of the rule, Ecology considered alternative rule contents, and did not include the following elements in the rule because they would have imposed additional burden on covered parties (see Chapter 6 for discussion):[73]

- Compliance years: Making 2023 a full compliance year.
- GREET model: Using the most recent version of the Argonne GREET model.
- Verification: Including third party verification at the start of the program.

7.5 Small business and government involvement

We involved small businesses and local governments in its development of the rule, using:

- Stakeholder meetings held 10/6/21, 11/16/21, 1/27/22, 3/15/22, 4/13/22
- Stakeholder meeting notices and meeting materials, project updates, and rule announcement and proposal notices

[73] Note that the adopted rule also includes fee distribution percentages that differ from the distribution initially proposed by Ecology. While this is a redistribution, and does not change total fees, the change was prompted by concern that fees charged to credit generators could discourage program participation. In the event that fewer credit generators participated in the program, individual fees would increase and credit prices could rise. The adopted rule indirectly reduces potential burden in this way as well.

Attendance at stakeholder meetings included representation from the following, which includes representation of small businesses and local governments:

- Clean Fuels Alliance America
- Renewable Fuels Association
- Renewable Natural Gas Coalition
- Airlines for America
- Superior Court Judges Association
- Renewable Hydrogen Alliance
- Pacific Merchant Shipping Association
- NW Energy Coalition
- City of Tacoma
- Port of Seattle
- City of Seattle
- King County
- Port of Kalama

7.6 North American Industry Classification System (NAICS) codes of impacted industries

The rule likely impacts the following industries, with associated NAICS codes. NAICS definitions and industry hierarchies are discussed at https://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2017.

- 2211, Electric Power Generation, Transmission and Distribution
- 3241, Petroleum and Coal Products Manufacturing
- 3251, Basic Chemical Manufacturing
- 4247, Petroleum and Petroleum Products Merchant Wholesalers
- 4251, Wholesale Trade Agents and Brokers
- 4451, Grocery and Convenience Retailers
- 4471, Gasoline Stations
- 4921, Couriers and Express Delivery Services

The rule may also impose compliance costs[74] on businesses in the following industries that Ecology assumes are likely to opt into the Clean Fuels Program because they expect a net benefit from participation:

- Aviation fuels manufacturing (NAICS 324110)
- Electric vehicle charging companies (no current NAICS available)
- Electric vehicle manufacturers (NAICS 336110)
- Electric or hydrogen vehicle fleet owners (various possible NAICS)

7.7 Impact on jobs

BRG[75] estimated the following impacts to jobs resulting from the rule, as reflected in their corresponding Accelerated Reduction scenario.

Table 17: Petroleum jobs lost

Year	Indirect	Induced	Direct
2023	**27**	**11**	**18**
2024	**27**	**11**	**18**
2025	**27**	**11**	**18**
2026	**27**	**11**	**18**
2027	**27**	**11**	**18**
2028	**27**	**11**	**18**
2029	**27**	**11**	**18**
2030	**27**	**11**	**18**
2031	**27**	**11**	**18**
2032	**27**	**11**	**18**
2033	**27**	**11**	**18**
2034	**27**	**11**	**18**
2035	**27**	**11**	**18**
2036	**17**	**7**	**12**
2037	**0**	**0**	**0**
2038	**0**	**0**	**0**

(Source: BRG)

Table 18: Electrification jobs gained

Year	Indirect	Induced	Direct
2023	**41**	**18**	**12**
2024	**43**	**19**	**13**
2025	**45**	**20**	**14**

[74] The RFA considers only compliance costs imposed by the rule. Businesses other than those listed here may experience indirect or induced costs or benefits through changes in price levels.

[75] BRG Energy & Climate, 2022. Washington Department of Ecology Clean Fuel Standard Cost Benefit Analysis Report. May 12, 2022. https://ecology.wa.gov/DOE/files/22/22790fe6-fc3a-414d-b3ba-036af0975258.pdf

Year	Indirect	Induced	Direct
2026	**47**	**20**	**14**
2027	**49**	**22**	**15**
2028	**51**	**22**	**16**
2029	**54**	**24**	**16**
2030	**58**	**25**	**17**
2031	**62**	**27**	**19**
2032	**71**	**31**	**22**
2033	**82**	**36**	**25**
2034	**81**	**35**	**24**
2035	**98**	**43**	**30**
2036	**110**	**48**	**33**
2037	**2**	**1**	**1**
2038	**2**	**1**	**1**

(Source: BRG)

Table 19: Overall employment impacts

Year	Indirect	Induced	Direct	Total Net
2023	**15**	**7**	**-5**	**17**
2024	**17**	**8**	**-5**	**20**
2025	**18**	**8**	**-4**	**22**
2026	**20**	**9**	**-4**	**25**
2027	**23**	**10**	**-3**	**30**
2028	**25**	**11**	**-2**	**34**
2029	**27**	**12**	**-2**	**37**
2030	**31**	**14**	**-1**	**44**
2031	**36**	**16**	**1**	**53**
2032	**44**	**20**	**3**	**67**
2033	**56**	**25**	**7**	**88**
2034	**54**	**24**	**6**	**84**
2035	**71**	**31**	**11**	**113**
2036	**92**	**41**	**21**	**154**
2037	**1**	**1**	**0**	**2**
2038	**2**	**1**	**1**	**4**

(Source: BRG)

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Appendix A: Administrative Procedure Act (RCW 34.05.328) Determinations

A. RCW 34.05.328(1)(a) – Clearly state in detail the general goals and specific objectives of the statute that this rule implements.

See Chapter 6.

B. RCW 34.05.328(1)(b) –

1. Determine that the rule is needed to achieve the general goals and specific objectives of the statute.

See chapters 1 and 2.

2. Analyze alternatives to rulemaking and the consequences of not adopting this rule.

Chapter 70A.535 RCW requires Ecology to adopt rules that establish standards to reduce carbon intensity in transportation fuels used in Washington. Ecology needs to adopt this rule to define compliance obligations and requirements for the Clean Fuels Program, which will begin on January 1, 2023.

Please see the Least Burdensome Alternative Analysis, Chapter 6 of this document, for discussion of alternative rule content considered.

C. RCW 34.05.328(1)(c) - A preliminary cost-benefit analysis was made available.

When filing a rule proposal (CR-102) under RCW 34.05.320, Ecology provides notice that a preliminary cost-benefit analysis is available. At adoption (CR-103 filing) under RCW 34.05.360, Ecology provides notice of the availability of the final cost-benefit analysis.

D. RCW 34.05.328(1)(d) – Determine that probable benefits of this rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented.

See Chapters 1 – 5.

E. RCW 34.05.328 (1)(e) - Determine, after considering alternative versions of the analysis required under RCW 34.05.328 (b), (c) and (d) that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated in Chapter 6.

Please see Chapter 6.

F. RCW 34.05.328(1)(f) - Determine that the rule does not require those to whom it applies to take an action that violates requirements of another federal or state law.

This rule does not require covered parties to violate existing federal and state laws and rules. Ecology is harmonizing requirements with other states with clean fuels programs, as directed by the legislature.

G. RCW 34.05.328 (1)(g) - Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law.

The requirements in this rule apply to suppliers and consumers of certain transportation fuels that are sold, supplied, or offered for sale in Washington. This may apply to both private and public entities.

H. RCW 34.05.328 (1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter.

No

- If **yes**, the difference is justified because of the following:

  ☐ (i) A state statute explicitly allows Ecology to differ from federal standards.

  ☐ (ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated in Chapter 6.

I. RCW 34.05.328 (1)(i) – Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same subject matter.

In order to harmonize the rule with other existing clean fuels programs, Ecology is consulting regularly with the California Air Resources Board and the Oregon Department of Environmental Quality.

Appendix B: Alternative Scenarios

In Chapter 2, we discuss the baseline for this analysis:

- Chapter 70A.535 RCW, Transportation Fuel – Clean Fuels Program.
    - This is the authorizing statute for this rulemaking, with the following intent and direction:
        - RCW 70A.535.005: "Therefore, it is the intent of the legislature to support the deployment of clean transportation fuel technologies through a carefully designed program that reduces the carbon intensity of fuel used in Washington, in order to:

            (a) Reduce levels of conventional air pollutants from diesel and gasoline that are harmful to public health;

            (b) Reduce greenhouse gas emissions associated with transportation fuels, which are the state's largest source of greenhouse gas emissions; and

            (c) Create jobs and spur economic development based on innovative clean fuel technologies."
        - RCW 70A.535.020(1): "The department shall adopt rules that establish standards that reduce carbon intensity in transportation fuels used in Washington. The standards established by the rules must be based on the carbon intensity of gasoline and gasoline substitutes and the carbon intensity of diesel and diesel substitutes. The standards:

            (a) Must reduce the overall, aggregate carbon intensity of transportation fuels used in Washington;

            (b) May only require carbon intensity reductions at the aggregate level of all transportation fuels and may not require a reduction in carbon intensity to be achieved by any individual type of transportation fuel;

            (c) Must assign a compliance obligation to fuels whose carbon intensity exceeds the standards adopted by the department, consistent with the requirements of RCW 70A.535.030; and

            (d) Must assign credits that can be used to satisfy or offset compliance obligations to fuels whose carbon intensity is below the standards adopted by the department and that elect to participate in the program, consistent with the requirements of RCW 70A.535.030."
    - In addition to direction and requirements specific to sections of the rule (discussed in sections below), the statute sets some general requirements for the rule, addressing harmonization with other clean fuel programs:

- RCW 70A.535.030(1)(a)(ii): "Consider carbon intensity calculations for transportation fuels developed by national laboratories or used by similar programs in other states."
- RCW 70A.535.030(1)(b)(ii): "Measure greenhouse gas emissions associated with electricity and hydrogen based on a mix of generation resources specific to each electric utility participating in the clean fuels program. The department may apply an asset-controlling supplier emission factor certified or approved by a similar program to reduce the greenhouse gas emissions associated with transportation fuels in another state."
- RCW 70A.535.030(1)(d): "To the extent practicable, rules adopted by the department may allow data requested of utilities to be submitted in a form and manner consistent with other required state or federal data submissions"
- RCW 70A.535.030(8)(c)(i): "The department shall set a maximum price for credits in a credit clearance market, consistent with states that have adopted similar clean fuels programs, not to exceed $200 in 2018 dollars for 2023."
- RCW 70A.535.060(1): "Except where otherwise provided in this chapter, the department shall seek to adopt rules that are harmonized with the regulatory standards, exemptions, reporting obligations, and other clean fuels program compliance requirements and methods for credit generation of other states that:

  (a) Have adopted low carbon fuel standards or similar greenhouse gas emissions requirements applicable specifically to transportation fuels; and

  (b)(i) Supply, or have the potential to supply, significant quantities of transportation fuel to Washington markets; or

  (ii) To which Washington supplies, or has the potential to supply, significant quantities of transportation fuel."

  - The statute also allows Ecology to adopt fees related to the Clean Fuels Program (RCW 70A.535.130): "The department may require that persons that are required or elect to register or report under this chapter pay a fee."

- Chapter 70A.30 RCW, Motor Vehicle Emission Standards.
  - The associated rulemaking for Chapter 173-423 WAC is currently (as of this writing, November 2022) in the proposal phase of rulemaking – i.e., Ecology has proposed the rule and provided a public comment period. The authorizing statute explicitly adopts California motor vehicle emission standards (Title 13, California Code of Regulations) and directs Ecology to implement them by rule.

    - The California Air Resources Board (CARB) has adopted the Advanced Clean Cars II rule, which will result in 100 percent of new light duty vehicles sold in the state being zero emissions starting in 2035.
- Chapter 70A.45 RCW, Limiting Greenhouse Gas Emissions.
    - Includes greenhouse gas (GHG) emissions reduction requirements for 2030, 2040, and 2050.
- Chapter 173-455 WAC, Air Quality Fee Rule.
    - Sets all current air quality related fees.

BRG illustrative scenarios

We based our quantitative analysis on results of modeling from BRG that best aligned with the adopted rule and the explicit direction in the baseline. BRG also considered alternative scenarios:

- "Accelerated ZEV": All new passenger cars and light trucks sold in Washington are ZEVs by 2030.
- "Max Adoption": The maximum achievable reduction in carbon intensity for the vehicle fleet in Washington.

If the baseline included Accelerated ZEV, the costs of the rule would fall, since additional reductions in statewide transportation fuel carbon intensity would be easier to achieve given the higher and earlier proportion of ZEVs. Similarly, if the state were on a path toward Max Adoption due to factors outside of the rule, costs associated with the rule itself would be lower, but the overall costs of achieving the more ambitious carbon intensity reduction would be higher.

From a benefits perspective, a baseline including Accelerated ZEV would also reduce the benefits explicitly coming from the rule, since the ZEV trajectory would be making a larger contribution to the GHG emissions reductions. Since both costs and benefits would decrease proportionally, cumulative avoided GHG emissions benefits would still likely exceed costs.

From a benefits perspective, a baseline including the Max Adoption trajectory would have higher overall benefits, but due to various potential interactions between the rule and external factors (such as additional regulations including local/regional actions, technological innovation, and shifts in market demand in response to changes in relative fuel prices and availability of electrification infrastructure) the share of the total benefits coming from the rule could be higher or lower.

Complementary policies

While some policies are explicitly and specifically defined in statute, and were therefore able to be included in the baseline, our primary analysis does not include the Climate Commitment Act (CCA) and its Cap and Invest Program. The rulemaking directed by the CCA occurred on an overlapping timeline with this rulemaking. As such, we were not able to develop an analysis that included the CCA in the baseline, in the timeframe allowed for this rulemaking by statute.

As part of CCA rule development, however, Ecology assessed the potential contribution of complementary policies (including this adopted rule and ZEV requirements) to pressure on GHG emissions allowance prices in the Cap and Invest Program.[76] Modeling performed by Vivid Economics identified minor downward pressure on allowance market prices, as reflected in only minor potential impacts of complementary policies on CCA allowance prices. This stemmed from the fact that the regulations have overlapping requirements that apply to transportation fuel suppliers and large GHG emitters. We therefore expect only minor quantitative interaction in terms of compliance across this adopted rule and additional complementary policies not directed more specifically at the transportation fuels sector. We note, however, that based on the *downward* pressure on allowance prices identified during CCA development, each of the three complementary policies (CCA, ZEV/Clean Vehicles Program, and this Clean Fuel Standard rule) is likely to reduce compliance costs by creating incentives that work to reduce necessary compliance activity under other rules.

We also note that revenues from complementary market policies could significantly contribute to funding for projects or investments that would potentially generate credits under the adopted rule. This would reduce the direct costs of generating credits, putting downward pressure on credit prices and thus compliance costs.

[76] WA Department of Ecology, Vivid Economics, 2022. Washington State Climate Commitment Act Summary of market modeling and analysis of the proposed Cap and Invest Program. June 2022.