WSPA (Jessica Spiegel)

Jessica Spiegel
Vice President, Northwest Region

September 5, 2025

Sent via email to: Surabhi.Subedi@ecy.wa.gov

Washington State Department of Ecology
Attn: Surabhi Subedi, Environmental Planner
P.O. Box 47600
Olympia, WA 98504-7600

Re: Comments on Draft Revisions to WAC 173-441 and WAC 173-446 (Cap-and-Invest Program & Linkage Rulemaking)

Dear Surabhi,

The Western States Petroleum Association (WSPA) appreciates the opportunity to provide feedback on the rulemaking revising Chapters 173-441 and 173-446 WAC, intended to enable linkage of Washington's Cap-and-Invest program with the existing linked carbon market programs in California and Quebec, known as the Western Climate Initiative (WCI). WSPA represents refineries and other covered fuel suppliers that are central to Washington's economy, energy security, and workforce, and which are directly impacted by the Climate Commitment Act.

WSPA remains supportive of the long-term success of Washington's Cap-and-Invest program and recognizes the importance of eventual linkage with the Western Climate Initiative. To ensure linkage delivers benefits for Washington as well as other WCI members, the priority must be confirming that the program's design elements function effectively as a durable market over time.

WSPA strongly supports the Department of Ecology maintaining in-house modeling and analytical capabilities to evaluate the design of the Cap-and-Trade program. This includes both visionary assessments and pragmatic analysis of critical factors such as actual electric vehicle adoption rates, electricity system readiness, and the pace of decarbonization technology deployment. Grounding program design in these realities will help identify where adjustments may be needed to ensure long-term market sustainability and success. To this end, WSPA supported legislation last session that provided Ecology with the tools to carry out this important work.

As part of that important work, and outlined in our 2024 submission, we continue to urge a comprehensive economic assessment of linkage impacts. Such an analysis should evaluate:

- Potential impacts on energy-intensive, trade-exposed industries (EITEs), fuel suppliers, and small businesses.
- Consumer price effects from allowance price trajectories in a larger market.
- Risks of reduced competitiveness and unintended leakage of jobs or revenues.

WSPA has commissioned an economic study by NERA Consultants to assess the impact of potential linkage between the WA Cap-and-Invest Program with California/Quebec programs under the Western Climate Initiative (WCI), provided in Appendix A. This study should not be a substitute for independent work by Ecology to assess the impact of its program but can serve to provide additional perspective to such work.

It is important to note from this study that prices in a linked program are predicted to converge at the ceiling price in the 2030s, and any cost reductions for Washington's program due to linkage appear to be short-lived. These results iterate the importance of key design features, such as emission caps, that align with a feasible pace of emissions reductions and rate of deployment of infrastructure and associated low/no-carbon technologies.

Market Readiness and Stability

Draft amendments under WAC 173-446 move toward harmonization with California and Québec by codifying the new auction purchase limits for covered entities to 25% and clarifying corporate association group rules, which are important enablers for linkage. We also note the updated price ceiling and containment reserve provisions per HB 1975 (2025), which provides some temporary relief that will be important if Washington's program is not linked before settlement of the program's first compliance period in 2027. It is worth highlighting CARB's required steps for linkage include:

- An analysis by CARB staff of program compatibility for linkage;
- Executing a linkage agreement between jurisdictions;
- CARB request to the Governor's office to make SB 1018 findings;
- Governor's SB 1018 findings;
- Completion of a formal rulemaking process with Board adoption of regulation amendments to enable the acceptance of compliance instruments from Washington; and
- Linkage readiness report (if requested).

Reference: Program Linkage | California Air Resources Board

Given these steps, it may be a period of time before Washington can link with California. As a further step to prepare for potential linkage, we further recommend Ecology considers long term and transparent mechanisms to address price volatility and prevent unnecessary leakage of allowance revenues to other jurisdictions.

We support Ecology's recognition in WAC 173-446 of the need to distinguish provisions applying to linked versus unlinked needs. Further to ensuring the program if linked is well-functioning, we recommend that Ecology establish formal monitoring and review mechanisms – modeled on California's Cap-and-Trade program reviews – to periodically assess program impacts, market stability, and harmonization.

Defer Requirement for the Reporting of Complexity Weighted Barrel

WSPA requests that Ecology defer the requirement in WAC 173-441 (Table 050-1) to post 2030 for refineries (NAICS 324110) to report Complexity-Weighted Barrels (CWB) beginning with the first emissions year after a refinery's first turnaround after 2022. Ecology doesn't have WA-specific CWB factors and a refining benchmark . As a result, submission of CWB data will not be used in the calculation of allowance allocations. Because of this, CWB data will only be submitted because the current rule requires to do it. There is no additional use or benefit of that data.

This is an expensive requirement to install high accuracy meters that would only be required for CWB reporting and not provide any further benefit for refinery operations.

It worth note that California Air Resources Board (CARB) is actively evaluating a move to a technology-agnostic "liquid hydrocarbon fuel" benchmark and may phase out CWB after vintage 2030 allowance distribution. Pending CARB's final direction and Washington's linkage decisions, we request that Ecology pause the CWB-after-turnaround provision and, in the interim, require only the first two bullets, namely facility level Subpart MM report as reported under 40 C.F.R. Part 98 and barrels of crude oil and intermediate products received from off-site that are processed at the facility.

For the above reasons, WSPA requests a delay that would allow time for decision-making on the need for the data based on other Department of Ecology policy.

Reporting Integrity and Missing Data Substitution

As a second point of detail regarding WAC 173-441 revisions, WSPA notes specific concerns regarding the methodology for missing-data substitution. Proposed revisions to WAC 173-441-050(8)(h) introduce a tiered missing-data substitution system based on capture rates (<80%, 80–90%, ≥90%).

While we support the goal of ensuring robust data capture, we are concerned about the misalignment with EPA's 40 CFR 98 that requires parameter-specific substitution based on adjacent quality-assured values, or the best available estimate. Ecology's "highest historic value" approach departs significantly, requiring facilities to maintain two separate systems of records.

In addition to unnecessary double-bookkeeping, requiring the use of highest historical value creates the risk of inflating production data and skewing EITE allowance allocation and undermining fairness. The use of highest historical value does not improve accuracy compared to EPA's approach and may bias results upward in variable operations.

As a further detail, there is ambiguity in the term "data year." We anticipate you mean the previous calendar year, but this could be interpreted as the previous 12-month period. It will be important to clarify what is intended by this terminology in any final update to rule language.

Conclusion

WSPA appreciates the progress that has been made by Ecology to progress rulemaking to enable linkage but note that important fundamentals that have significant implications to Washington's economy and citizens remain pending. It remains important to address these gaps, whether linkage occurs or not. Maintaining flexibility for Washington Cap-and-Invest given the uncertainty with the timing of linkage, and the different directions it could take, are of vital importance to the program.

We appreciate Ecology's consideration of these comments and remain committed to continued engagement.

Sincerely,

Jessica Spiegel
Vice President, Northwest Region

WSPA

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Assessing Impact of Linkage of Washington State's Greenhouse Gas "Cap and Invest" Program to California and Quebec Programs

Prepared for:
Western States Petroleum Association

15 July 2025

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1. Introduction

As part of the Washington Climate Commitment Act, the State's Senate Bill SB 5126 (2021) established a greenhouse gas (GHG) Cap-and-Invest program that was implemented by the Washington State Department of Ecology beginning in 2023.[1] In 2021, the Western States Petroleum Association (WSPA) retained NERA Economic Consulting to develop a model that represents the Washington state economy using its N_{ew}ERA modeling system and to use it to develop estimates of its economic impact and benefits of adding provisions for greater flexibility into the bill.[2] This report presents updated and more detailed results for one specific form of such flexibility: establishing linkage between Washington's and the Western Climate Initiative's (WCI) climate program which comprises existing market-based programs of California and Quebec. It further updates the model to include additional complementary measures such as the Washington Clean Fuel Standard (CFS) and the Advanced Clean Cars II (ACC II) and Advanced Clean Trucks (ACT) programs that were not yet established policy in Washington at the time of the previous study.

For Washington, the allowance budget modeled was based on the Washington Department of Ecology's allowance budget for entities covered under the cap and invest program. The suite of complementary measures in Washington modeled included those noted above as well as the Clean Energy Transformation Act (CETA) which was already in place at the time of the previous modeling work. For California, the allowance budget modeled was based on a target of a 48% reduction in GHG emissions by 2030 compared to 1990 levels (and an 85% reduction below 1990 levels by 2045).[3] A suite of complementary measures in California was also modeled which include the Low Carbon Fuels Standard (LCFS), Renewable Portfolio Standard (RPS), energy efficiency programs as well as existing electric vehicle mandates which include the Advanced Clean Trucks (ACT) and Advanced Clean Cars II (ACC II).[4]

Two scenarios were modeled to assess compliance costs for the Washington economy. The first scenario assumes linkage of the Washington and WCI climate programs. The second scenario assumes that Washington will achieve its emissions reduction target without WCI linkage. Both scenarios incorporate existing program measures including the declining allowance budgets, price containment flexible mechanisms, and complementary policies for both Washington and the WCI climate program. Some of the key research insights are presented below.

- Under both the linked and unlinked scenarios, the carbon price for Washington hits the ceiling price of $109 in 2029 and remains at the ceiling price thereafter.

[1] https://app.leg.wa.gov/billsummary?billnumber=5126&year=2021

[2] The modeling approach used in this study is similar to the NERA study "Assessing Value of Adding Flexibility to Washington State's Greenhouse Gas "Cap and Invest" Program", June 2022.

[3] California Public Workshop: Potential Amendments to the Cap-and-Trade Regulation, July 10, 2024. https://ww2.arb.ca.gov/sites/default/files/cap-and-trade/meetings/nc_CapTradeWorkshop_July1024.pdf.

[4] Further details on the complementary measures modeled for California are described in Section 3D below.

- In the linked scenario, the carbon price in 2026 for Washington, are influenced by California program's initial banked allowances and containment reserves available at certain allowance price trigger points (known as "speed bumps"). However, in the unlinked scenario, Washington only has a limited availability of Allowance Price Containment Reserve (APCR) allowances to help maintain the carbon price at lower tiers and mitigate economic and compliance costs. Thus, in the unlinked scenario, Washington's ACPR provides limited flexibility compared to the WCI program.
- The economic costs in Washington are primarily driven by the Clean Vehicles Program, particularly in the short-run during which there exists an accelerated turnover of conventional internal combustion engine vehicles to zero-emissions vehicles. To achieve the clean vehicles deployment target of about 12% of the total stock in 2026 and 42% by 2035, the share of new internal combustion engine (ICE) vehicles of the total stock decreased by about 26% in 2026 and 54% by 2035 relative to a business-as-usual outlook. As a result of the decrease in the number of ICE vehicles in the modeled scenarios, Washington households forego vehicle services and consumption resulting in an increase in the compliance costs to meet the emissions target and complementary policies.
- In the linked scenario, the allowance prices are projected to increase to about \$85/MT CO_2 in 2026, reach the ceiling price of \$109/MT CO_2 in 2029 and rise to \$146/MT CO_2 by 2035, to achieve the state's emissions goals. In the unlinked scenario, the allowance prices are projected to increase to about \$94/MT CO_2 in 2026, reach the ceiling price of \$109/MT CO_2 in 2029 and rise to \$146/MT CO_2 by 2035. In both linked and unlinked scenarios, the carbon price paths are identical from 2029 onwards, with the carbon prices at the ceiling price trajectory and require the sale of price ceiling units (PCUs). The quantity of ceiling price allowances needed in the unlinked scenario is much greater than in the linked scenario because of implied carbon price trajectory differences in the absence of the speed bumps and ceiling price flexible mechanisms in the unlinked scenario.
    - In the linked scenario, Washington is projected to be a net importer of permits. Washington faces economic costs as a buyer of WCI allowances in the linked scenario. However, those economic costs do not offset the economic costs required to meet the target under the unlinked scenario.
- The economic costs to Washington households in both scenarios are bounded by the ceiling price trajectory. In the linked scenario, the compliance cost is projected to be lower in the first two compliance periods than in the unlinked scenario to the extent that California's initial banked allowances and allowance price containment reserve allowances can be used to lower the carbon prices.
    - The annual costs per household in Washington is projected to be about \$1,530 in 2026, \$1,640 in 2029 and \$1,670 on average from 2026 to 2035 in the linked scenario.[5]
    - The annual costs per household in Washington is projected to be about \$1,560 in 2026, \$1,660 in 2029 and \$1,690 on average from 2026 to 2035 in the unlinked scenario.

[5] All values are denominated in 2023 dollars, unless otherwise stated.

    - The overall economic compliance costs are similar in both scenarios because the carbon price paths are nearly identical, bounded by the ceiling price.

- Motor gasoline compliance costs in the linked scenario are projected to be about $0.78 per gallon in 2026, $1.05 per gallon in 2029 and about $1.14 per gallon on average from 2026 to 2035. In the unlinked scenario, the motor gasoline compliance costs are similar to the linked scenario because these compliance costs are primarily driven by the carbon price and clean fuel standard in Washington.
- Diesel compliance costs in the linked scenario are projected to be about $0.89 per gallon in 2026, $1.19 per gallon in 2029 and about $1.30 per gallon on average from 2026 to 2035. In the unlinked scenario, the diesel compliance costs are similar to the linked scenario because the compliance costs are primarily driven by the carbon price and clean fuel standard in Washington.

The results for the two scenarios, which are both bounded by the cost containment measures are presented in Table 1 and Table 2 below.[6]

Table 1: Summary of Key Results (Existing program With WCI Linkage)

	2026	**2029**	**2032**	**2035**	**Average (2026-2035)**
Loss in Annual Consumption per Household (2023$/HH)[7]	$1,530	$1,640	$1,800	$1,710	$1,670
Cost of Compliance of Motor Gasoline (2023$/gal)	$0.78	$1.05	$1.27	$1.45	$1.14
Cost of Compliance of Diesel (2023$/gal)	$0.89	$1.19	$1.45	$1.66	$1.30
Loss in Output of Energy Intensive Sectors (%)[8]	4.3%	6.0%	5.1%	4.4%	4.9%
Allowance Price (2023$/MT CO_2)	$85	$109	$126	$146	$117
Ceiling Price (2023$/MT CO_2)	$94	$109	$126	$146	$119

[6] Table 6 in Section 4 presents the projected allowance prices and compliance costs in the absence of the speed bumps and ceiling price, as cost containment measures.

[7] This metric measures the impacts to an average Washington household's annual personal consumption expenditure (in terms of current spending).

[8] This metric measures the change in quantity of production of the aggregate energy-intensive sector (which comprises pulp and paper, chemicals, glass, cement, iron and steel, alumina, aluminum, and mining).

Table 2: Summary of Key Results (Existing program Without WCI Linkage)

	2026	2029	2032	2035	Average (2026-2035)
Loss in Annual Consumption per Household (2023$/HH)	$1,560	$1,660	$1,820	$1,730	$1,690
Cost of Compliance of Motor Gasoline (2023$/gal)	$0.83	$1.03	$1.25	$1.43	$1.14
Cost of Compliance of Diesel (2023$/gal)	$0.95	$1.17	$1.43	$1.63	$1.29
Loss in Output of Energy Intensive Sectors (%)	4.56%	6.17%	5.29%	4.53%	5.14%
Allowance Price (2023$/MT CO_2)	$94	$109	$127	$146	$119
Ceiling Price (2023$/MT CO_2)	$94	$109	$127	$146	$119

2. Overview of Study Methodology

The N_{ew}ERA model is a U.S. economy-wide integrated energy and economic modeling framework with regional disaggregation that integrates a capacity expansion and economic dispatch model of the U.S. electricity sector with a dynamic computable general equilibrium model of the U.S. economy that accounts for production, consumption, and investment decisions across regions and economic sectors. The model includes household decisions that affect overall energy use and related emissions from combustion of fossil fuels and industrial process emissions.

The N_{ew}ERA modeling system includes 14 types of existing electric generating technologies. New technology types that the model can build, in addition to existing types, include advanced coal with carbon capture and storage (CCS), natural gas combined cycle with CCS, offshore wind, onshore wind with storage, and photovoltaic solar with storage. The model includes two different types of vehicles - internal combustion engine vehicles (ICEs) and battery-operated Electric vehicles (BEVs) as well as biofuel representation for the gasoline and the diesel markets. The modeling framework assesses the economic impacts from policies by accounting for important sectoral and regional interactions that take place in the economy in addition to the direct costs or other effects of the policy.

The N_{ew}ERA model used for this study represents Washington and California as separate regions. This disaggregation allows the model to simulate region specific policies, especially when modeling the Western Climate Initiative (WCI) program. Quebec's program is represented by a marginal abatement cost curve in the model. The model includes five energy (coal, natural gas, crude oil, petroleum products, and electric) sectors and seven non-energy (agriculture, energy-intensive sectors, services, motor vehicle manufacturing, other manufacturing, commercial trucking, and commercial

transportation) sectors.[9] The analysis baseline was calibrated to the projections published by the Energy Information Administration (EIA) as defined in its Annual Energy Outlook 2023 (AEO 2023) Reference Case.[10]

For this study, two scenarios were modeled – a scenario that links Washington's program with the WCI program with existing programs and a scenario in which there is no linkage with existing programs. A third scenario, an unbounded scenario, was also simulated without the speed bumps and ceiling price. The resulting carbon price from this scenario was not capped by the ceiling price.

For Washington, its CO_2 emissions budget[11] was developed using the greenhouse gas (GHG) allowance budget trajectory specified in the Department of Ecology's revised preliminary regulatory analyses of the Climate Commitment Act Program[12] and multiplying the trajectory with a GHG to CO_2 emissions ratio for 2023.[13] A certain amount of allowances in the form of offsets and APCR set-asides were also developed based on the information specified in the Revised Preliminary Regulatory Analyses document.[14] The APCR allowances were placed into two separate tiers and were made available at defined trigger prices.[15] No-cost allowance allocations are made to the energy intensive trade exposed (EITE) sectors, electric utilities, and natural gas utilities.[16] Similar to the development of Washington's CO_2 emissions budget, the no-cost GHG allowances are also scaled down to represent CO_2 allowance allocations using the 2023 GHG to CO_2 emissions ratios for these entities.[17] Allowances are assumed to be purchased at the model's projected allowance price rather than at the estimated average purchase price specified in the Revised Preliminary Regulatory Analyses document.[18]

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[9] The model treats biomass as a carbon-neutral fuel source. It additionally does not include net-zero emission technologies which if deployed would reduce the projected impacts.

[10] U.S. Department of Energy, Annual Energy Outlook 2023, available at https://www.eia.gov/outlooks/aeo/.

[11] The NewERA model only represents CO_2 emissions.

[12] "Cap excluding all reserves (MTCO2e)" in Table 88: Primary analysis volumes by year, Revised Preliminary Regulatory Analyses, Climate Commitment Act Program, Department of Ecology, State of Washington, available at https://apps.ecology.wa.gov/publications/documents/2202019.pdf at p. 195. ("Revised Preliminary Regulatory Analyses document").

[13] The GHG to CO_2 emissions ratio was estimated to be 88.5% using 2023 emissions data from Washington State's GHG Reporting Program Publication, available at https://data.wa.gov/Natural-Resources-Environment/GHG-Reporting-Program-Publication/idhm-59de/data.

[14] *See* Section 2.3.6: Offsets and Section 6.4.8: Number of allowances to the APCR of the Revised Preliminary Regulatory Analyses document.

[15] "APCR1 trigger price ($) and APCR2 trigger price ($)" in Table 87: Primary analysis prices by year, Revised Preliminary Regulatory Analyses document at p. 194.

[16] *See* Section 2.5.3: Allocation of no cost allowances of Revised Preliminary Regulatory Analyses document for a description of how the amount of no-cost allowances were determined and their consignment to help reduce rates.

[17] 97% for EITEs, 88% for electric utilities and 1.9% for natural gas utilities based on data for 2023 from Washington State's GHG Reporting Program Publication, available at https://data.wa.gov/Natural-Resources-Environment/GHG-Reporting-Program-Publication/idhm-59de/data.

[18] "Allowance price ($)" in Table 87: Primary analysis prices by year, Revised Preliminary Regulatory Analyses document at p. 194.

The auction revenues from the sale of allowances are assumed to be deposited into the Climate Investment Account (comprised of the Climate Commitment Account and Natural Climate Solutions Account), the Air Quality and Health Disparities Improvement Account and the Carbon Emissions Reduction Account. The auction revenues that are deposited into the Climate Commitment Account as well as the revenues deposited into the Air Quality and Health Disparities Improvement Account are assumed to be returned in a lumpsum manner to the Washington households in this study. The auction revenues deposited into the Natural Climate Solutions Account are used to subsidize the output of the water and sewage utilities sector and the fishing and the forestry sector in the N_{ew}ERA model. The auction revenues deposited into the Carbon Emissions Reduction Account are used to subsidize electric vehicles and commercial transportation in the N_{ew}ERA model. Additionally in all the scenarios, we also incorporate a suite of complementary measures in Washington which include the Clean Fuel Standard (CFS), the Clean Energy Transformation Act (CETA) as well as the existing electric vehicle mandates for Washington (which include the Clean Vehicles Program and the Advanced Clean Trucks (ACT) regulation).[19]

For California, the allowance budget modeled is based on the accelerated target of a 48% reduction in GHG emissions by 2030 compared to 1990 levels (and an 85% reduction below 1990 levels by 2045) based on the 2022 Scoping Plan Update.[20] For Quebec, the allowance budget modeled is based on a target of a 37.5% reduction in GHG emissions from 1990 levels (by 2030). a long-term target of 87.5% reduction in GHG emissions by 2050 (below 1990 levels) with a goal to achieve carbon neutrality by 2050.[21] Similar to Washington, a certain number of allowances are made available as offsets and APCR set-asides at defined trigger prices for both California and Quebec. [22] It is assumed that for the WCI jurisdictions (California and Quebec), the revenue from the sale of the allowances at the auction are recycled in a lumpsum manner to households. Under the linked scenario, permit trading is allowed among California, Quebec, and Washington with transfer of permit revenues, whereas in the unlinked scenarios, trading is prohibited between the WCI jurisdictions and Washington. All scenarios incorporate a suite of complementary measures in California which include the Low Carbon Fuels Standard (LCFS), Renewable Portfolio Standard (RPS), energy efficiency programs as well as existing electric vehicle mandates (which include the Advanced Clean Cars II (ACC II). The modeling excludes

[19] A more detailed description of the modeling assumptions for California and Quebec and presented in Section 3. D below.

[20] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality, available at https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf at p. 116, The GHG allowance budget is converted to a CO_2 emissions budget using a GHG to CO_2 emissions ratio for 2022. The 2022 GHG to CO_2 emissions ratio for California was estimated to be 63% using data from California's current GHG emissions inventory (California Air Resources Board, Current California GHG Emission Inventory Data, available at https://ww2.arb.ca.gov/ghg-inventory-data).

[21] International Carbon Action Partnership, Canada - Québec Cap-and-Trade System, Emissions & Targets, available at https://icapcarbonaction.com/system/files/ets_pdfs/icap-etsmap-factsheet-73.pdf The GHG allowance budget is converted to a CO_2 emissions budget using a GHG to CO_2 emissions ratio for 2021. The 2021 GHG to CO_2 emissions ratio for Quebec was estimated to be 81% using data from Quebec's GHG emissions inventory (Government of Canada, Inventory of greenhouse gas emissions in Quebec, available at https://open.canada.ca/data/en/dataset/08fbecd2-2532-408a-b153-ab00bad3ff31).

[22] A more detailed description of the modeling assumptions for California and Quebec and presented in Section 3. D below.

the Advanced Clean Fleet (ACF) regulation since California withdrew its request for a waiver and authorization for the addition of the regulation to its emissions control program.[23]

3. Overview of N_{ew}ERA Modeling Framework and Modeling Assumptions

A. General Features of the N_{ew}ERA Framework

NERA's N_{ew}ERA model is an energy-economy modeling framework that integrates a bottom-up representation of the U.S. electricity sector with a top-down representation of the production, consumption, and investment decisions across the rest of the U.S, economy, including household decisions that affect overall energy use and related GHG emissions. The modeling framework assesses the economic impacts from policies by accounting for important sectoral and regional interactions that take place in the economy in addition to the direct costs or other effects of the policy.

The top-down portion of N_{ew}ERA is a forward-looking dynamic computable general equilibrium (CGE) model of the U.S. economy. It simulates all key economic interactions in the U.S. economy, including those among industries, households, and the government. Industries and households maximize profits and utility, respectively, with foresight about future economic conditions. The theoretical framework behind the model is based on the circular flow of goods, services, and payments in the economy—every economic transaction has a buyer and a seller whereby goods and services go from a seller to a buyer and payments for the goods and services goes from the buyer to the seller.

The CGE model is centered around the decisions of a representative household that characterizes the economic behavior of an average consumer. Households provide labor and capital to businesses, taxes to the government, and savings to the financial markets, while also consuming goods and services and receiving government subsidies. One of the decisions that households make with respect to services is how to meet personal transportation needs. In addition to deciding on the quantity of personal vehicle miles traveled (VMT), households in N_{ew}ERA choose between two different types of vehicles - internal combustion engine vehicles (ICEs) and battery-operated electric vehicles (BEVs). The household's vehicle choice depends upon the relative vehicle life-cycle cost differences and consumers' preferences for different vehicles.

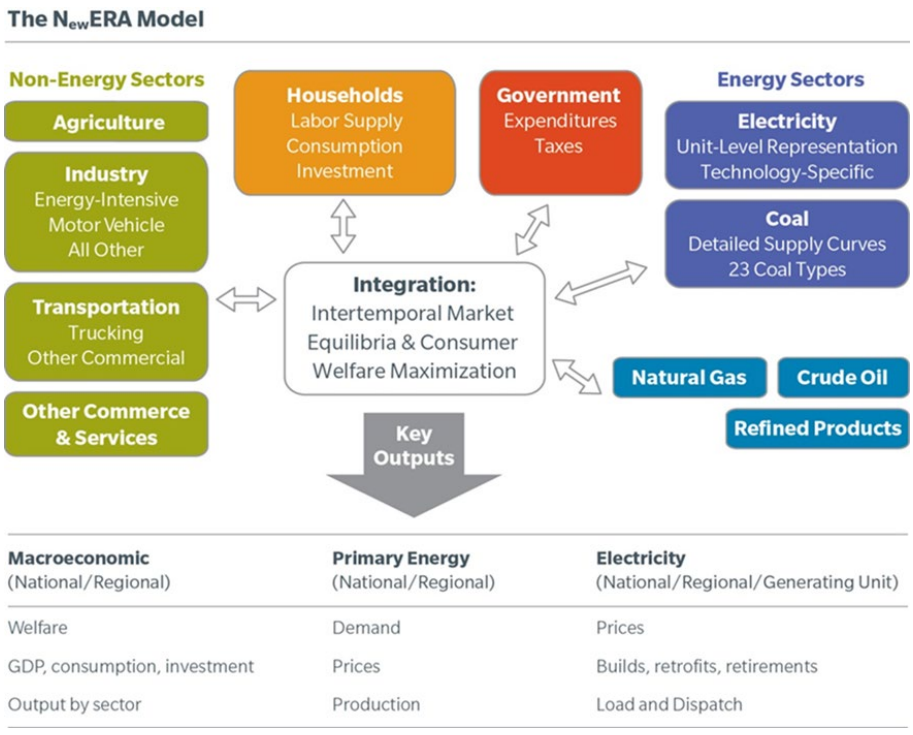
The economic sectors in the model, in aggregate, account for all the production and commercial activities of the economy. Each economic sector uses labor, capital, energy resources, other sector's outputs, and imported inputs to produce their own specific category of goods or services. Economic sectors pay their share of Federal Insurance Contributions Act (FICA) tax and health insurance, and corporate taxes to the government. Industries are both consumers and producers of capital for investment in the rest of the economy.

[23] California Air Resources Board, Advanced Clean Fleets, available at https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets; EPA Grants Waiver for California's Advanced Clean Cars II Regulations, https://www.epa.gov/newsreleases/epa-grants-waiver-californias-advanced-clean-cars-ii-regulations.

One of the sectors in N_{ew}ERA is the electricity sector. This sector is modeled in a bottom-up (i.e., technology-specific) manner that is fully integrated with the rest of the economy (which is simulated in the CGE framework described above). The model includes all existing electric generating units, while future capacity investment and economic retirement decisions are represented simultaneously with dispatch decisions. The model dispatches electricity to load duration curves. Long-term investment and retirement decisions and short-term unit dispatch decisions are projected by solving a dynamic, non-linear program with an objective function that minimizes the present value of total system costs, while complying with all system constraints, such as meeting demand, renewable portfolio standards, reserve margin requirements, emissions limits, transmission limits, clean energy standards, and other environmental and electric specific policy mandates.

The CGE portion of the N_{ew}ERA model also incorporates the government. In the model, the government collects revenues from taxes imposed on labor and capital. Revenues are used to pay for government services, which are held constant in every scenario. The model also holds overall government debt the same in all scenarios by either returning excess revenues to the consumers, or by increasing taxes. The rebates or revenue-raising actions may be performed on a lump-sum basis (e.g., by changing the standard deduction) or by altering tax rates. Unless otherwise stated, the model uses the lump-sum transfer assumption.

Figure 1: N_{ew}ERA Modeling System Representation



Within the circular flow of the above described macroeconomy, an equilibrium is found whereby demand for goods and services equals their supply, and investments are optimized for the long term. Thus, supply equals demand in all markets for all time periods. The model produces integrated projections of the energy sector and other economic activities for future years and estimates the

energy market and macroeconomic impacts of a potential policy by comparing projections of the future with and without the policy's requirements included in the model's input assumptions. Figure 1 provides a simplified representation of the key elements of the N_{ew}ERA modeling system.

B. Electric Sector Model

The N_{ew}ERA modeling system's electric sector model is a detailed bottom-up model of the electric and coal sectors. The model is fully dynamic and includes perfect foresight (under the assumption that future conditions are known). Thus, all decisions within the model are based on minimizing the present value of costs over the entire time horizon of the model while meeting all specified constraints, regarding demand, peak demand, emissions limits, transmission limits, RPS regulations, CES regulations, fuel availability and costs, new build limits and CCS retrofit build or retire requirements for coal units. The model set-up is intended to mimic decisions made by electric sector investors and system operators. In determining the least-cost method of satisfying specified constraints, the model determines the following:

- Investment decisions (*e.g.*, addition of retrofits, build new capacity, repower unit, add fuel switching capacity, or retire units)
- Unit operations decisions (*e.g.*, unit dispatch by fuel and technology and optimal power generation mix)

In the model, we represent over 17,000 electricity generating units in the United States. Larger coal units (greater than 200 MW) are individually represented in the model and smaller units are aggregated based on region, size, and existing controls for ease of computation. All other types of units are included in different regional aggregates based on their operating characteristics. Table 3 shows the existing generating technologies in the electric sector model.

Table 3: Existing Generating Technologies in the Electric Sector Model

Coal	Pumped Storage Hydroelectric
Natural Gas Combined Cycle	Biomass
Natural Gas Combustion Turbine	Geothermal
Gas/Oil Steam	Landfill Gas
Oil Combustion Turbine	Municipal Solid Waste
Onshore Wind	Solar Photovoltaic
Hydroelectric (Run-of-River)	Concentrated Solar Thermal

New technology types that the model can build, in addition to existing types, include advanced coal with carbon capture and storage (CCS), natural gas combined cycle with CCS, offshore wind, onshore

wind with storage, and photovoltaic solar with storage. Annual build limits can be specified to reflect real world constraints. The model can also accommodate joint build limits that apply to multiple new technology types.

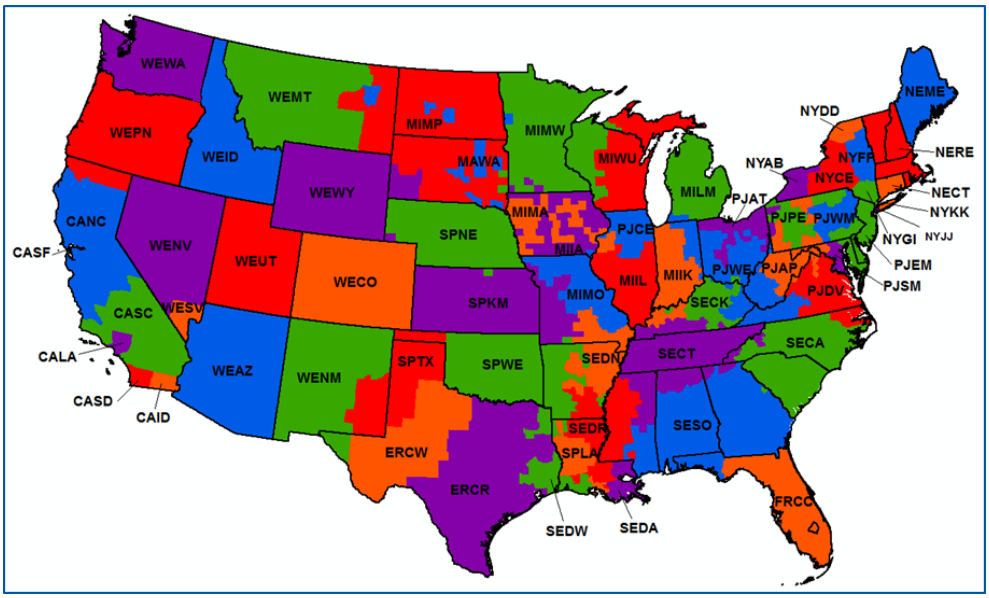
Each unit in the model has a certain number of actions it can take. For example, all units can retire, and most can undergo retrofits. Any publicly announced actions, such as planned retirements, planned retrofits (for existing units), or new units under construction can be specified. In the model, generating units are responsive to environmental limits specified in the model. These include emission limits (for SO_2, NO_X, Hg, and CO_2) that can be applied at the national, regional, state or unit level. The user can also specify allowance prices for emissions, emission rates (especially for toxics such as Hg), and heat rate levels that must be met by assets.

Similar to investment decisions, the operation of each unit in a given year depends on the policies in place (e.g., unit-level standards), electricity demand, and operating costs – especially energy prices. The model accounts for these conditions in determining dispatch decisions of each unit. On top of unit-level regulations, the model also considers system-wide operational issues such as environmental regulations, limits on the share of generation from intermittent resources, transmission limits, and operational reserve margin requirements in addition to annual reserve margin constraints.

To meet increasing electricity demand and reserve margin requirements over time, the electric sector must build new generating capacity. Future environmental regulations and forecasted energy prices influence decisions on technology type and location of assets. Policies will also likely affect retirement decisions – an asset will be retired if the model deems it uneconomic to keep that asset operating given future regulatory, technological, and economic constraints. All model decisions hence optimize over all current and future assumptions that may impact resource planning. For this analysis, Washington state was modeled as a separate region in the electricity sector model. The version of the electricity sector model employed for this analysis contains 64 U.S. electricity regions (and 11 Canadian electricity regions) as shown in Figure 2 with Washington state's electric system represented by the "WEWA" power pool in the model. [24]

[24] The NewERA electric sector model regions are based on the model regions in EPA's Integrated Planning Model (IPM) and are designed to be consistent with the configuration of the NERC assessment regions in the NERC Long-Term Reliability Assessments. (available at https://www.epa.gov/airmarkets/clean-air-markets-power-sector-modeling). The adjoining 11 Canadian electricity regions are not shown in the figure.

Figure 2: N_{ew}ERA Electric Sector Model – U.S. Regions



C. Macroeconomic Model

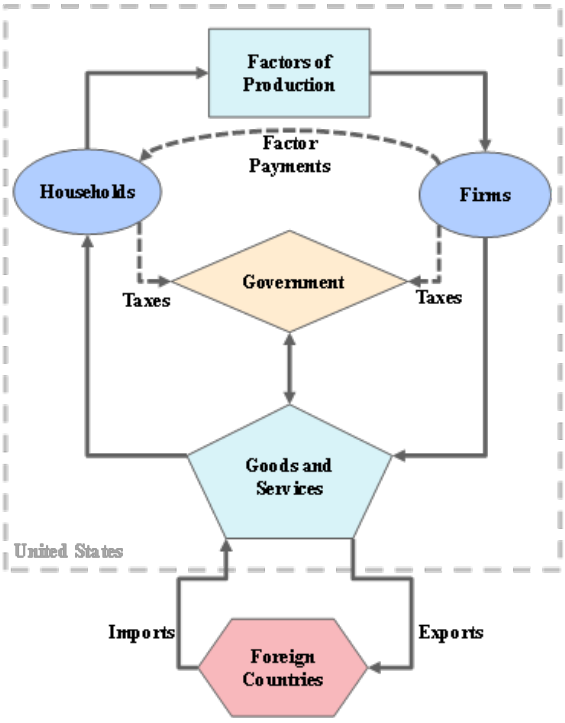
The N_{ew}ERA macroeconomic model is a forward-looking, dynamic, computable general equilibrium (CGE) model of the United States. The model simulates all economic interactions in the U.S. economy, including those among industry, households, and the government.

The N_{ew}ERA CGE framework uses a standard theoretical macroeconomic structure to capture the flow of goods and factors of production within the economy. A simplified version of these interdependent macroeconomic flows is shown in Figure 3. The model solution assumes an Arrow-Debreu general equilibrium. This general equilibrium is characterized by three principles: i) zero-profit, which states any economic activity must earn zero profit as the value of input equal the value of output; ii) market clearance, which states supply must equal demand for all positively priced goods; and iii) income balance, which states all agents' income must equal its factor endowments plus any net transfers received.

Accordingly, in the model, households supply factors of production, including labor and capital, to firms. Firms provide households with payments for the factors of production in return. Firm output is produced from a combination of production factors and intermediate inputs of goods and services supplied by other sectors of the economy (both domestic and foreign). Similarly, each firm's final output is either consumed within the United States or exported abroad. In addition to consuming goods and services, households can accumulate savings, which they provide to firms for investments in new production capacity. The government agent receives taxes from both households and firms, contributes to the production of goods and services, and purchases goods and services. Although the model assumes equilibrium, there exist capital flow within regions as they run deficits or surpluses. In aggregate, the value of firm output must equal the sum of its production inputs (zero-profit), the sum of regional commodities and factors of production must equal their demands (market clearance), and

household income must equal its factor endowments plus any tax revenue received (income balance). In the model framework, the cost of fuels such as gasoline and diesel account for the costs associated with the manufacturing and transportation of the fuels. The price to the consumer is dependent on the dynamics of the fuel markets, including but not limited to supply and demand conditions, plus any applicable taxes and fees.

Figure 3: Interdependent Economic Flows in N$_{ew}$ERA's Macroeconomic Model



D. Modeling Assumptions

Baseline Conditions

The N$_{ew}$ERA baseline for this analysis was calibrated to the projections published by the Energy Information Administration (EIA) as defined in its AEO 2023 Reference Case.[25] This baseline includes the effects of continuing implementation of energy and environmental regulations that have been promulgated (e.g., the Regional Greenhouse Gas Initiative (RGGI), the California GHG cap-and-trade program, federal vehicle fuel economy standards, federal appliance energy efficiency standards, and state renewable portfolio standards) including the Inflation Reduction Act (IRA). The current renewable portfolio standards (RPS) of each state are also represented in N$_{ew}$ERA's electricity sector baseline. The

[25] U.S. Energy Information Administration, Annual Energy Outlook 2023, available at https://www.eia.gov/outlooks/aeo/

RPS policy specifications are based on the Lawrence Berkeley National Laboratory's RPS Annual Status Update publication.[26]

Key assumptions drawn from the AEO 2023 Reference case include natural gas and crude oil prices, regional electricity demand, and total stock projections for different light-duty vehicle classes. Assumptions relating to the non-electric sector CO_2 emissions for Washington state were based on data from Washington State's Facility Greenhouse Gas Reporting Program[27] supplemented by data from the AEO 2023 Reference case. Assumptions relating to the non-electric CO_2 emissions for California were based on the reference case GHG emission projections for the Final 2022 Scoping Plan Update,[28] California's GHG emissions inventory[29] and supplemented by data from the AEO 2023 Reference case. Assumptions relating to non-electric sector CO_2 emissions for the rest of the U.S. are also drawn from the AEO 2023 Reference case. The technology cost assumptions for new fossil-fuel, nuclear and renewable electric generators are based on the EIA's AEO 2023 cost and performance characteristics estimates.[30]

Model Details Specific to This Study

The version of the macroeconomic model used in the analysis is produced by calibrating the N_{ew}ERA computational framework to reflect a specific set of baseline projections over the period across which the policy impacts are to be measured. This study projects the economic impacts for the period from 2023 through 2047 with estimates for every third year in that period.

The N_{ew}ERA model used for this study represents Washington, California, and Rest of the U.S. as three separate regions. The model also includes sectoral disaggregation tailored to match policy implementation and impact considerations. The version of the N_{ew}ERA model used in this analysis includes 12 economic sectors. Five of these are energy sectors, which include coal mining (COL), natural gas extraction and gathering (GAS), crude oil (CRU), petroleum refining (OIL), and the electricity sector (ELE). (The labels used to identify each sector in the model are indicated in parentheses.) The seven non-energy sectors[31] represented in this analysis are as follows:

- Agriculture (AGR)
- Commercial transportation other than trucking (TRN)

[26] Lawrence Berkeley National Laboratory, U.S. State Renewables Portfolio & Clean Electricity Standards: 2023 Status Update, available at https://emp.lbl.gov/publications/us-state-renewables-portfolio-clean

[27] Washington State's Facility Greenhouse Gas Reporting Program, available at https://ecology.wa.gov/air-climate/climate-commitment-act/cap-and-invest/emissions-reporting

[28] California Air Resources Board, 2022 Scoping Plan Documents, Final 2022 Scoping Plan Update and Appendices, available at https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents.

[29] California Air Resources Board, Current California GHG Emission Inventory Data, 2000-2022 GHG Inventory (2024 Edition), available at https://ww2.arb.ca.gov/ghg-inventory-data

[30] U.S. Energy Information Administration, Assumptions to the Annual Energy Outlook: Electricity Market Module, Table 3: Cost and performance characteristics of new central station electricity generating technologies, available at https://www.eia.gov/outlooks/aeo/assumptions/pdf/EMM_Assumptions.pdf at p.5.

[31] The non-energy manufacturing sub-sectors are aggregated to 3-digit NAICS code and are consistent with U.S. Energy Information Administration's (EIA) Manufacturing Energy Consumption Survey (MECS) sectors.

- Commercial trucking (TRK)
- Energy-intensive sectors (EIS)[32]
- Motor vehicle manufacturing (M_V)
- All other sectors (MAN)[33]
- Services (SRV)

In the transportation sector, household chose between two different types of vehicles – internal combustion engine vehicles (ICEs) and battery-operated electric vehicles (BEVs)[34] based on the relative vehicle life cycle cost differences and consumers' preferences for different vehicles. The model also includes biofuels that can be substituted for gasoline and diesel. Biofuels that can be substituted for gasoline includes imported sugar ethanol, corn ethanol, cellulosic ethanol, and biomass-to-liquid fuel (BTL), compressed natural gas (CNG). Likewise, for the diesel market we include bio-based diesel from waste grease and corn, CNG, and BTL diesel.

This study has been conducted to produce Washington, California and rest of the U.S. average energy and macroeconomic outcomes for two policy scenarios through 2047. In the first scenario, Washington's program is linked with the Western Climate Initiative (WCI) program with existing programs. All three regions (Washington, California, and Quebec) form a single allowance permit market and can sell and buy permits across regions. While in the no linkage scenario, the two programs do not trade permits with each other. Washington cannot use WCI allowances or containment reserve permits to offset its emissions and must rely on its own allowances. In these scenarios modeled, we assume full banking behavior.[35] As a sensitivity to these core scenarios, three other scenarios are also conducted to provide insights into the role of speed bumps and ceiling price, and plausible myopic on the part of businesses to use allowance in the short-run. The differences in the economic impact of the scenarios are characterized by comparing their projected changes for several model outputs that are commonly considered to be relevant measures of economic and energy market impact:

- Allowance permit prices
- Consumer welfare,
- U.S. gross domestic product,
- Household consumption,
- Economy-wide fuel consumption,
- Economy-wide electricity generation mix, and

[32] This comprises pulp and paper, chemicals, glass, cement, iron and steel, alumina, aluminum, and mining.

[33] This comprises construction, food, beverage, and tobacco products, fabricated metal products, machinery, computer and electronic products, transportation equipment, electrical equipment, appliances, and components, wood and furniture, plastics, and other manufacturing sectors.

[34] The BEV sales are inclusive of PHEVs for modeling purpose.

[35] For our analysis, we do not model the implication of holding limits that specify the maximum number of allowances that may be held be held for use or trade by a registered entity at any one time.

- Wholesale and retail fuel and electricity prices.

The model has the capability to report a variety of other modeling outputs of interest for each of the modeled scenarios. These include the mix of personal vehicles on the road (internal combustion vs. electric), and CO_2 emissions over time.

The following is a summary of the specific cap-and-trade elements for the different jurisdictions that were modeled for all the scenarios.

Washington Specific Assumptions[36]

For Washington, its CO_2 emissions budget was developed using the greenhouse gas (GHG) allowance budget trajectory specified in the Department of Ecology's revised preliminary regulatory analyses of the Climate Commitment Act Program[37] and multiplying the trajectory with a GHG to CO_2 emissions ratio for 2023.[38] The GHG allowance budget (excluding all reserves) equals 58.5 $MMTCO_2e$ in 2023 declining to about 5.5 $MMTCO_2e$ in 2047. Since the N_{ew}ERA model only represents CO_2 emissions, a CO_2-only emissions budget was developed by scaling the GHG allowance budget downward using the ratio of GHG emissions to CO_2 emissions for 2023. This ratio was developed using data from the GHG-Reporting-Program-Publication.[39] The corresponding total CO_2 emissions budget (excluding all reserves) equals 54.2 $MMTCO_2$ (51.8 $MMTCO_2$ of combustion emissions and 2.5 $MMTCO_2$ process emissions) in 2023 declining to about 7.3 $MMTCO_2$ (4.8 $MMTCO_2$ of combustion emissions and 2.4 $MMTCO_2$ process emissions) in 2047.[40]

Allowances equivalent to 5% of the total GHG allowance budget were aside in the APCR,[41] converted to equivalent CO_2 amounts using the GHG to CO_2 emissions ratio for 2023. Annual APCR allowance allocations equal about 2.8 $MMTCO_2$ in 2023 declining to about 0.3 $MMTCO_2$ in 2047. As per the

[36] The elements of Washington state's cap-and-invest program that were modeled by NERA are consistent with the provisions of the program per the Final Bill Report and the Fiscal Note Summary (available at https://lawfilesext.leg.wa.gov/biennium/2021-22/Pdf/Bill%20Reports/Senate/5126-S2.E%20SBR%20FBR%2021.pdf?q=20211115065505; https://fnspublic.ofm.wa.gov/FNSPublicSearch/GetPDF?packageID=63362).

[37] "Cap excluding all reserves (MTCO2e)" in Table 88: Primary analysis volumes by year, Revised Preliminary Regulatory Analyses, Climate Commitment Act Program, Department of Ecology, State of Washington, available at https://apps.ecology.wa.gov/publications/documents/2202019.pdf at p. 195. ("Revised Preliminary Regulatory Analyses document")

[38] The GHG to CO_2 emissions ratio was estimated to be 88.5% using 2023 emissions data from Washington State's GHG Reporting Program Publication, available at https://data.wa.gov/Natural-Resources-Environment/GHG-Reporting-Program-Publication/idhm-59de/data

[39] The GHG to CO_2 emissions ratio was estimated to be 88.5% using 2023 emissions data from Washington State's GHG Reporting Program Publication, available at https://data.wa.gov/Natural-Resources-Environment/GHG-Reporting-Program-Publication/idhm-59de/data

[40] The CO_2 allowance budget modeled includes process emissions in Washington; 2.5 $MMTCO_2$ in 2023 and staying relatively flat and equals 2.4 $MMTCO_2$ in 2047.

[41] Aside from the APCR, one-third of 1% of the allowance budget is placed in the VRERA (Voluntary Renewable Electricity Reserve Account) and 2% of the allowance budget into the ECR (Emissions Containment Reserve). *See* Section 2.5.2.5 of the Preliminary Regulatory Analyses document.

current proposed rules by Ecology, APCR allowances from 2023-2030 are assumed to be immediately placed into the APCR ("front-end loaded") at the beginning of 2023.[42] The APCR allowances were initially distributed equally between two tiers. The 2023 trigger prices for the two tiers at which these allowances were made available were $51.90 and $66.68. These prices will rise at 5% plus inflation annually. Floor and ceiling prices were $22.20 and $81.47 respectively in 2023 and also will rise at 5% plus inflation annually.[43]

The no-cost allowance allocated to EITEs, natural gas and electric utilities are calculated based on the baseline emissions of these sectors. [44] For EITEs, they are based on 100% of baseline emissions during the first compliance period,[45] 97% of baseline emissions during the second compliance period, 94% of baseline emissions during the third compliance period and for the subsequent periods.[46] For electric utilities, they are based on 100% of baseline emissions for periods through 2045 and zero thereafter.[47] For natural gas utilities, they are based on 93% of baseline emissions in 2023, decreasing by 7% each year through 2030, decreasing by 1.9% each year from 2032-2042, decreasing by 2.5% each year from 2043-2050.[48]. It was assumed that 100% of the no cost allowances allocated to electric utilities are applied to reduce the rates. For natural gas utilities, 65% of the allowances in 2023 would be consigned increasing to 5% per year to 100% consignment by 2030 with the revenues applied towards reducing natural gas prices for the benefit of ratepayers. It was assumed that 100% of the revenues from the no-cost allowances are applied towards subsidizing the output from these entities for EITEs. Specifically, the no-cost CO_2 allowance allocations to EITEs, electric utilities and natural gas utilities are calculated as follows:

- The no-cost GHG allowance allocations for 2023 to 2050 were calculated by multiplying the baseline GHG emissions with the allowance schedule specified for each of the sectors. The shares that the allowances allocated to each sector represent of the total are then calculated for each sector.
- The total no-cost GHG allowance allocations for 2023 to 2050 specified in the Preliminary Regulatory Analyses document[49] are distributed to the three sectors using shares calculated above.

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[42] Summary of market modeling and analysis of the proposed Cap and Invest Program, Washington State Climate Commitment Act, Department of Ecology, State of Washington, June 2022, available at https://ecology.wa.gov/getattachment/4ab74e30-d365-40f5-9e8f-528caa8610dc/202206CcaEconModel.pdf

[43] APCR1 trigger price ($), APCR2 trigger price ($), Price floor ($) and Price ceiling ($) in Table 87: Primary analysis prices by year, Revised Preliminary Regulatory Analyses document at p. 194. These prices are expressed in 2021$. The floor and ceiling prices when converted to 2023$, equal the floor and ceiling price assumptions in California (A floor price of $22.3/MMTCO$_2$ in 2023, rising annually at 5% plus inflation and a ceiling price of $81.5/MMTCO2 in 2023, rising annually at 5% plus inflation).

[44] *See* Table 21 of the Preliminary Regulatory Analyses document.

[45] The program specifies a total of seven compliance periods – from 2023 to 2050. *See* Department of Ecology, Washington's Cap-and-Invest Program, available at https://ecology.wa.gov/air-climate/climate-commitment-act/cap-and-invest.

[46] *See* Section 2.5.3 of the Preliminary Regulatory Analyses document.

[47] *See* Section 2.5.3 of the Preliminary Regulatory Analyses document.

[48] *See* Section 2.5.3 of the Preliminary Regulatory Analyses document.

[49] *See* Table 25 of the Preliminary Regulatory Analyses document.

- The GHG no-cost allowance allocations to EITEs, electric utilities and natural gas utilities are scaled down to CO_2 allowance allocations using the using the GHG to CO_2 emissions ratio for 2023 for the three sectors.[50] The total no-cost allowance allocations (in CO_2 terms) equal 20.4 $MMTCO_2$ in 2023 declining to 1.6 $MMTCO_2$ in 2047.

Offset credits that could be used to satisfy compliance obligations are specified as fixed percentages of the CO_2 allowance budget, calculated by subtracting the allowance set asides in the containment reserve and the no-cost allowances from the CO_2 emissions budget.[51] It was assumed that offsets would be available at a 15% discount to the estimated average auction purchase price as specified in the Revised Preliminary Regulatory Analyses document.[52] The offset credits (in terms of the CO_2 allowances) equal 2.7 $MMTCO_2$ in 2023 declining to 0.24 $MMTCO_2$ in 2047.

An estimate of the total CO_2 allowances available to be purchased at auction is obtained by subtracting the offset credits, the allowance set-asides in the containment reserve and the no-cost CO_2 allowance allocations from the CO_2 emissions budget. The total number of CO_2 allowances available for purchase equals 31.1 MMT CO_2 in 2023 declining to 3.8 MMT CO_2 in 2047. This estimate is then multiplied by the shares of the fiscal revenue deposited into each of the state investment accounts to calculate the CO_2 allowances that relate to each of the accounts (Climate Investment Account, Carbon Emissions Reduction Account, and the Air Quality and Health Disparities Improvement Account). The revenue from the auctioned CO_2 allowances that relate to each of these accounts is modeled as follows.

- The auction revenues that are deposited into the Climate Commitment Account (which equals 75% of the total revenues from the Climate Investment Account) as well as the revenues deposited into the Air Quality and Health Disparities Improvement Account are assumed to be returned in a lumpsum manner to the Washington households in this study.
- The auction revenues deposited into the Natural Climate Solutions Account (which equals 25% of the revenues from the Climate Investment Account) are used to subsidize the output of the water and sewage utilities sector and the fishing and the forestry sector.
- The auction revenues deposited into the Carbon Emissions Reduction Account are used to subsidize electric vehicles and commercial transportation.

The emissions from the following categories are stated to be from coverage across the entire duration of the program.[53]

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[50] The GHG to CO_2 ratio for EITEs, electric utilities and natural gas utilities are 97%, 88% and 1.9% respectively which are estimated using 2023 emissions data from Washington State's GHG Reporting Program Publication, available at https://data.wa.gov/Natural-Resources-Environment/GHG-Reporting-Program-Publication/idhm-59de/data.

[51] 8% during the first compliance period (2023-2026) and 6% thereafter. *See* Section 2.3.6: Offsets of the Revised Preliminary Regulatory Analyses document.

[52] *See* Section 2.5.4: Offsets of the Revised Preliminary Regulatory Analyses document.

[53] Washington State Legislature, RCW 70A.65.080, Program coverage (Effective January 1, 2025), available at https://app.leg.wa.gov/RCW/default.aspx?cite=70A.65.080.

- Aviation fuel combustion and watercraft fuels[54]
- Coal-fired electric generation[55]
- Biofuels that have 40 percent lower GHG emissions based on a full-life cycle analysis compared to petroleum fuels[56]
- Motor vehicle and special fuel used for agricultural purposes by a farm fuel user[57]
- National security facilities[58]
- Entities with GHG emissions lesser than 25,000 $MTCO_2e$[59]

Table 4 shows the model baseline CO_2, non-CO_2 and GHG emission projections without the existing complementary policies. The model baseline is only a starting point on which the cap-and-trade and other existing programs are simulated. Table 5 shows the GHG and CO_2 emissions allowance budget developed (including reserves) and the total no-cost CO_2 allowance allocations.[60]

[54] The emissions from these two categories to calculated to be about 86% of the total emissions from all the categories that constitute the N_{ew}ERA model's commercial transportation sector using data from Washington's state 1990-2018 GHG inventory (available at https://ecology.wa.gov/Air-Climate/Climate-change/Tracking-greenhouse-gases/Greenhouse-gas-reporting/Inventories).

[55] While the program exempts emissions from the two coal-fired units in Washington state (Centralia Units 1 and 2), this is not explicitly modeled in NewERA as Centralia Unit 1 retired in 2020 and Centralia Unit 2 is set to retire at the end of 2025.

[56] While the program exempts the emissions from the production of biofuels that have 40% lower GHG emissions based on a full-life cycle analysis compared to petroleum fuels (Sugar Ethanol, Cellulosic Ethanol, BTL diesel, Biodiesel, and CNG), NewERA does not account for the fuel use and direct emissions in the production of these fuels. These fuels are comingled with either diesel or gasoline and thus their emissions when combusted are accounted for at the tailpipe or at the demand point.

[57] We exempt about 53% of the petroleum emissions from the agriculture sector in Washington state.

[58] While the emissions from national security facilities in Washington state are exempted from coverage in Washington state's cap-and-invest program, this is not explicitly modeled in NewERA.

[59] To exempt emissions from these entities in our modeling, we rely on the 2018 Statistics of U.S. Businesses (SUSB) data tables for Washington state (available at https://www.census.gov/data/tables/2018/econ/susb/2018-susb-annual.html). Using this data, we calculate the percentage of firms in each of the four N_{ew}ERA sectors in Washington state - AGR, EIS, MAN, that are reported to have <10 employees. This is employed as a proxy to represent entities with GHG emissions lesser than 25,000 $MTCO_2e$. These percentages are then applied to the baseline CO_2 emissions from each of the four sectors in the N_{ew}ERA model to calculate the emission exemptions from these sectors. The exemption shares developed using this approach were obtained to be 83% for AGR, 52% for EIS, 78% for MAN, and 74% for the SRV sector.

[60] These are comprised of the no-cost CO_2 allowance allocations to emissions-intensive and trade-exposed entities (EITEs), electric utilities, and natural gas utilities.

Table 4: Baseline Total CO_2, Non-CO_2 and GHG Emission Projections

$MMTCO_{2e}$	2023	2026	2029	2032	2035	2038	2041	2044	2047
Residential CO_2	6.6	6.8	7.0	6.7	6.6	6.6	6.6	6.6	6.4
Commercial CO_2	3.9	4.0	4.1	4.0	3.9	3.9	3.9	4.0	3.9
Industrial CO_2	11.5	12.1	12.4	12.4	12.5	12.6	13.5	13.8	14.4
Transportation CO_2	43.8	44.3	44.6	44.0	43.8	43.4	45.1	45.4	44.2
Electric CO_2	10.8	11.8	14.1	15.0	15.0	16.6	19.3	19.0	16.2
Total CO_2	76.6	79.1	82.3	82.1	81.9	83.1	88.5	88.8	85.1
Covered CO_2	60.8	62.7	65.1	64.4	63.6	64.4	68.6	68.5	65.5
Non-Covered CO_2	15.8	16.4	17.2	17.7	18.3	18.7	19.9	20.4	19.6
Non-CO_2[61]	10.0	10.3	10.7	10.7	10.6	10.8	11.5	11.5	11.1
Total GHG[62]	86.6	89.4	93.0	92.8	92.5	93.9	100.0	100.4	96.2

Table 5: GHG, CO_2 Emissions Allowance Budget and No-Cost CO_2 Allowance Allocations[63]

	2023	2026	2029	2032	2035	2038	2041	2044	2047
GHG Emissions Allowance Budget[64] (MMT CO_2e)	63.1	48.9	34.6	27.3	23.4	19.5	15.7	11.0	5.9
CO_2 Emissions Allowance Budget[65] (MMT CO_2)	55.9	43.3	30.6	24.1	20.7	17.3	13.9	9.7	5.2
Total CO_2 No-Cost Allocations (MMT CO_2)	20.4	13.3	11.0	8.5	6.5	5.0	3.7	2.4	1.6

A suite of Washington specific complementary measures was also modeled for all the scenarios which include the following:

[61] The Non-CO_2 emissions in the baseline are estimated using the total CO_2 emissions in the baseline and the GHG to CO_2 emissions ratio for 2023 of 88.5%.

[62] The total GHG emissions equal the sum of the total CO_2 and non-CO_2 emissions.

[63] In the NewERA modeling, the allowance budget was held constant after 2045.

[64] Includes the allowances allocated to the APCR, VRERA and ECR that amount to about 7.33% of the total allowance budget.

[65] Excludes the allowances allocated to the APCR, VRERA and ECR, converted to CO_2 terms using the GHG to CO_2 ratio for 2023 and CO_2 process emissions in Washington that equal 2.5 $MMTCO_2$ in 2023 and staying relatively flat and equals 2.4 $MMTCO_2$ in 2047.

- **Clean Vehicles Program** – This requires all new, light-duty vehicles (LDV) sold in Washington to be zero emission vehicles (ZEVs) by 2035.[66] The mandate begins with model year 2026, affects about 35% of new passenger vehicle sales with auto manufacturers required to sell about 6-9% more ZEVs per year until they make up 100% of new sales starting in model year 2035. Given the extreme stringency and the required ramp up in the short run to meet the regulation, the current study relaxed the 2035 new sales to be 66% instead. For the NewERA modeling, the new vehicle sales target was converted to a stock target (about 41% by 2035) using a vehicle vintaging model.[67]
- **Advanced Clean Trucks (ACT)** – This requires truck manufacturers to sell an increasing number of zero-emission medium and heavy-duty vehicles in Washington beginning in model year 2025. [68] The new vehicle sales shares that need to be ZEVs varies by weight class: Class 2b-3 (55% by 2035), Class 4-8 (75% by 2035) and Class 7-8 (40% by 2032 and staying flat until 2035).[69] For the NewERA modeling, a new vehicle sales of 40% was applied only Class 7-8 trucks and was converted to a stock target (about 22% by 2047) using a vehicle vintaging model.
- **Washington Clean Fuel Standard (CFS)**[70] **–** The CFS requires fuel suppliers to reduce the carbon intensity of transportation fuels in Washington to 20% below 2017 levels by 2034. [71]. In addition to fuel credits, which producers and suppliers of low-carbon fuels (fuels with a carbon intensity below the standard for that year) can generate, capacity credits can also be generated by those who own low-carbon fueling stations installed after January 1, 2023. The crediting for zero-carbon vehicle infrastructure is based on the capacity of the low-carbon fueling infrastructure – DC fast charging and hydrogen refueling infrastructure.
- **Clean Energy Transformation Act (CETA) –** This requires than by 2045, all electricity used in Washington must come from clean energy sources.[72]

[66] Department of Ecology, State of Washington, "Washington adopts plan for transition to zero-emission vehicles," December 19, 2022, available at https://ecology.wa.gov/About-us/Who-we-are/News/2022/Dec-19-Clean-Vehicles-II-Adoption

[67] As a sensitivity run, the stock target was relaxed by delaying it a further 10 years, but the overall solution did not change in a significant way.

[68] Department of Ecology, State of Washington, "Electric trucks to join state's clean transportation future," April 6, 2023, available at https://ecology.wa.gov/blog/april-2023/electric-trucks-to-join-state-s-clean-transportati.

[69] Department of Ecology, State of Washington, Washington's clean truck regulations, December 12, 2024, available at https://wstc.wa.gov/wp-content/uploads/2024/12/2024-12-12-BP15-WashingtonsCleanTruckRegulations.pdf

[70] The modeling work for the Study was conducted prior to the signing of the bill (HB 1409) on May 17, 2025, that sets more ambitious targets for the state's Clean Fuel Standard.

[71] Department of Ecology, State of Washington, Clean Fuel Standard, available at https://ecology.wa.gov/air-climate/reducing-greenhouse-gas-emissions/clean-fuel-standard

[72] Department of Ecology, State of Washington, Chapter 173-444 WAC – Clean Energy Transformation Rule, available at https://ecology.wa.gov/regulations-permits/laws-rules-rulemaking/closed-rulemaking/wac-173-444

California Specific Assumptions[73]

For California, the GHG allowance budget modeled is based on the accelerated target of a 48% reduction in GHG emissions by 2030 compared to 1990 levels (and an 85% reduction below 1990 levels by 2045)[74] based on the 2022 Scoping Plan Update.[75] The GHG allowance budget is converted to a CO_2 emissions budget using a CO_2 to GHG emissions ratio for 2022.[76] The CO_2 allowance budget for California which declines from 231 $MMTCO_2$ in 2023 to 40.5 MMTCO2 in 2047.[77]

A certain number of GHG allowances were allocated to the APCR for budget years 2021 to 2030[78] which were then converted to CO_2 allowances using the 2022 GHG to CO_2 ratio. The APCR allowances are distributed equally between two intermediate tiers and a ceiling tier. The prices of the two intermediate tiers are set at one-half and three-fourths of the difference between the floor and ceiling prices.[79] The current price floor in California is \$22.2/$MMTCO_2$ in 2023[80] and rising annually at 5% plus inflation while the current price ceiling is \$81.5/$MMTCO_2$ in 2023[81] and rising annually at 5% plus inflation.[82]

In addition to the APCR allowance allocations described, the APCR allowances previously left unsold (referred to as APCR "Overhang") were made available as a starting bank. This amounts to about 147

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[73] *See* generally Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms (available at https://ww2.arb.ca.gov/resources/documents/cap-and-trade-regulation-unofficial-current-version); "USA – California Cap-and-Trade Program," ETS Detailed Information, International Carbon Action Partnership, Last Updated: 12 April 2021 (available at https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=45).

[74] 1990 GHG emissions for California equal 430.7 MMTCO2e based on data from California's GHG inventory, available at https://ww2.arb.ca.gov/ghg-inventory-data. It was assumed that the GHG allowance budget stays flat after 2045 for California.

[75] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality, available at https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf at p. 116.

[76] The 2022 GHG to CO_2 emissions ratio for California was estimated to be 63% using data from California's GHG emissions inventory (California Air Resources Board, Current California GHG Emission Inventory Data, available at https://ww2.arb.ca.gov/ghg-inventory-data).

[77] In the NewERA modeling, the allowance budget was held constant after 2045.

[78] Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms, Table 8-2, available at https://ww2.arb.ca.gov/resources/documents/cap-and-trade-regulation-unofficial-current-version.

[79] The prices of the two reserve tiers in 2023 were set at \$51.92/$MMTCO_2$ and \$66.71/$MMTCO_2$ (expressed in 2023\$). *See* California Air Resources Board, Cost Containment Information, available at https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/cost-containment-information

[80] California Cap-and-Trade Program and Québec Cap-and-Trade System, 2023 Annual Auction Reserve Price Notice, available at https://ww2.arb.ca.gov/sites/default/files/2022-12/nc-2023_annual_reserve_price_notice_joint_auction.pdf. The price floor also referred to as the annual auction reserve price is the minimum price at which allowances will be sold to auction participants in California.

[81] California Air Resources Board, Detailed Price Ceiling Sale Requirements and Instructions, California Cap-and-Trade Program, Updated January 6, 2023, available at https://ww2.arb.ca.gov/sites/default/files/cap-and-trade/pcs_requirements.pdf

[82] These prices are expressed in 2023\$.

$MMTCO_2$ of unsold allowances.[83] Offset credits that could be used to satisfy compliance obligations are specified as fixed percentages of the GHG allowance budget[84] and converted to CO_2 allowances using the 2022 GHG to CO_2 ratio. The number of offset credits equal 9.51 MMT CO_2 in 2023, rising to 12.32 MMT CO_2 in 2026 and then declining to 1.09 MMT CO_2 by 2047. For this study, it was assumed that revenue from the sale of allowances would be recycled back to households in a lumpsum manner.[85] Also, the emissions from aviation and marine fuel were exempted for the entire duration of the program.[86] The modeling also incorporated the allowances from California's cap-and-trade program that were banked (i.e., not used for compliance) during the first three compliance periods (2013-2020). This amounted to about 321 million allowances[87] which were then converted to CO_2 allowances using the 2022 GHG to CO_2 ratio.[88]

A suite of California specific complementary measures was also modeled for all the scenarios which includes the following.

- **Advanced Clean Cars I (ACC I)** GHG standards for model years (MY) 2017-2025 and **a 2% annual fuel improvement for MY 2026-2035** that applies to Light Duty Vehicles (LDV).[89]
- The **Advanced Clean Cars II (ACC II)** regulation which requires 100% of new LDV sales to be ZEVs by 2035 is also modeled.[90] The new vehicle sales target was used to estimate a stock target using a vehicle vintaging model.

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[83] This is equivalent to 234 $MMTCO_2$ of GHG vintage and non-vintage reserve allowances remaining unsold as of Q3 2024 and converted to CO_2 allowances using the 2022 GHG to CO_2 emissions ratio for California. *See* California Air Resources Board, Q3 2024 Compliance Report, released October 2023 available at https://ww2.arb.ca.gov/sites/default/files/2024-10/nc-2024_q3_complianceinstrumentreport.pdf

[84] 4% from 2021 to 2025, and 6% post 2025. *See* California Air Resources Board, California's Compliance Offset Program, Released October 27, 2021, available at https://ww2.arb.ca.gov/sites/default/files/2021-10/nc-forest_offset_faq_20211027.pdf

[85] This is generally more economically efficient than a policy to expend the revenues on specific projects (revenue from the sale of allowances in California are currently deposited to the California Credit Program, and the GHG Reduction Fund which are then used to help reduce electric and natural gas bills for ratepayers and support low-carbon transit, clean energy, building and industrial decarbonization projects). Additionally, the allocation of no-cost allowances to utilities, natural gas suppliers and industrial facilities (intended to protect consumers from rate increases) was not explicitly modeled for this study.

[86] This amounts to about 58% of the emissions from the TRN sector in the NewERA model.

[87] 2021 Annual Report of the Independent Emissions Market Advisory Committee, January 20, 2022, available at https://calepa.ca.gov/wp-content/uploads/sites/6/2022/01/2021-IEMAC-Annual-Report.a.pdf at p.4

[88] This amounts to about 201 MMT CO_2.

[89] This is consistent with the scenario modeling assumptions incorporated in the California Air Resources Board's modeling of the 2022 Scoping Plan. See Table C-1, Appendix C, AB197 Measure Analysis, 2022 Scoping Plan, California Air Resources Board, 2022 Scoping Plan, November 2022, available at https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-c-ab-197-measure-analysis.pdf

[90] California Air Resources Board, Advanced Clean Cars II, available at https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii

- The **Advanced Clean Trucks (ACT)** regulation that requires an increasing number of trucks sold in California from 2024 to 2035 to be zero-emission.[91] Similar to Washington, the mandate focuses on medium and heavy-duty vehicles from Class 2b to Class 8, varies by weight class and requires 55% of Class 2b-3, 75% of Class 4-8, and 75% of Class 7-8 tractor sales to be zero-emission vehicles by 2035.[92] The new vehicle sales target was converted to a stock target (about 55% by 2047) using a vehicle vintaging model.
- A **Renewable Portfolio Standard (RPS)** that requires 60% of electric retail sales to come from renewable resources by 2030 and senate bill 100 **(SB 100)** requiring 100% of electric retail sales to come from renewable and zero-carbon resources by 2045.[93]
- The updated **California's Low-Carbon Fuel Standard (LCFS)** that requires a 30% reduction in carbon intensity (CI) for the transportation average fuel by 2030 and 90% by 2045. (relative to 2010 levels). [94] The modeling of the California LCFS incorporated the LCFS credits that were banked (i.e., not used for compliance) as of Q4 2023. Cumulatively through Q4 2023, about 156 million MT of credits and 132 million MT of deficits have been generated amounting to about 24 million MT of banked LCFS credits.[95] Additionally, the LCFS provisions that relate to the maximum credit price in the Credit Clearance Market (CCM)[96] was also modeled. The LCFS regulation established the maximum credit price for credits acquired, purchased or transferred in the CCM at $200 in 2016 and adjusted by a Consumer Price Index (CPI) deflator for all years after 2016.[97]
- **Energy efficiency** targets for electricity and natural gas use in the residential, commercial and industrial sectors as well as the **phasing out of resource extraction** operations by 2045.[98]

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[91] California Air Resources Board, Advanced Clean Trucks Fact Sheet, available at https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet

[92] On January 15, 2025, California withdrew its request for a waiver and authorization to add the Advanced Clean Fleets (ACF) regulation to its emission control Program. *See* California Air Resources Board, Advanced Clean Fleets, available at https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets, The ACF would have required truck fleets in California to adopt an increasing percentage of ZEVs required 100% of fleet truck sales to be ZEVs by 2036.

[93] California Public Utilities Commission, Renewable Portfolio Standard (RPS) Program, available at https://www.cpuc.ca.gov/rps/

[94] California Air Resources Board, CARB updates the Low Carbon Fuel Standard to increase access to cleaner fuels and zero-emission transportation options, available at https://ww2.arb.ca.gov/news/carb-updates-low-carbon-fuel-standard-increase-access-cleaner-fuels-and-zero-emission.

[95] California Air Resources Board, 2023 LCFS Reporting Tool (LRT) Quarterly Data Summary, Report No. 4, April 30, 2024, available at https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/dashboard/quarterlysummary/Q4%202023%20Data%20Summary.pdf

[96] The CCM provides market certainty with regards to maximum compliance costs, incentivizes investment and production of low-CI fuels and reduces the probability of credit shortfalls and spikes.

[97] California Air Resources Board, 2023 LCFS Credit Clearance Market, available at https://ww2.arb.ca.gov/resources/documents/lcfs-credit-clearance-market

[98] These measures are generally consistent with the scenario modeling assumptions incorporated in the California Air Resources Board's modeling of the 2022 Scoping Plan. See Table C-1, Appendix C, AB197 Measure Analysis, 2022

Quebec Specific Assumptions[99]

For Quebec, the emissions budget modeled in N_{ew}ERA was based on a 2030 GHG emissions target of 37.5% (below 1990 levels), a long-term target of 87.5% reduction in GHG emissions by 2050 (below 1990 levels) with a goal to achieve carbon neutrality by 2050. The GHG allowance budget is converted to a CO_2 emissions budget using a GHG to CO_2 emissions ratio for 2021.[100] The CO_2 allowance budget for Quebec declines from 54.6 $MMTCO_2$ in 2023 to 13.8 $MMTCO_2$ in 2047.[101] Offset credits that could be used to satisfy compliance obligations were specified as fixed percentages of the annual emissions budget [102] and equal 4.3 MMT CO_2 in 2023 declining to 1.1 MMT CO_2 by 2047.

A total of 4% of the annual emissions budget were set aside in an APCR, which equals 2.2 MMT CO_2 in 2023 declining to 0.55 MMT CO_2 in 2047. Similar to California, these APCR allowances are distributed equally between two intermediate tiers and a ceiling tier. Further, they are also made available at the same trigger prices as in California. In addition to the APCR allowance allocations described, the APCR allowances previously left unsold in Quebec (referred to as APCR "Overhang") are transferred to the price ceiling and made available at the ceiling price. This amounts to about 31.2 $MMTCO_2$ of unsold allowances.[103]

Since the N_{ew}ERA model does not explicitly include Quebec as a separate region, reductions that could be attained from the non-electric sector in Quebec were modeled through a marginal abatement cost curve (MAC) which specify different abatement quantities and associated carbon prices. The MAC curve for Quebec was developed by comparing its non-electric emissions intensity with those of U.S. states. The N_{ew}ERA model was then run for those U.S. states whose non-electric emissions intensity matched most closely with that in Quebec using different carbon prices imposed on the non-electric sectors to obtain the associated quantity of emissions abatement. No reductions were assumed to come from the electricity sector.

Scoping Plan, California Air Resources Board, 2022 Scoping Plan, November 2022, available at https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-c-ab-197-measure-analysis.pdf

[99] "Technical Overview", Quebec cap-and-trade system for greenhouse gas emission allowances (C&T) (available at https://www.environnement.gouv.qc.ca/changements/carbone/documents-spede/technical-overview.pdf) ; Canada – Quebec Cap-and-Trade Program," ETS Detailed Information, International Carbon Action Partnership, Last Updated: 12 April 2021 (available at https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=73).

[100] The 2021 GHG to CO_2 emissions ratio for Quebec was estimated to be 81% using data from Quebec's GHG emissions inventory (Government of Canada, Inventory of greenhouse gas emissions in Quebec, available at https://open.canada.ca/data/en/dataset/08fbecd2-2532-408a-b153-ab00bad3ff31).

[101] In the NewERA modeling, the allowance budget was held constant after 2045.

[102] Up to 8% of each entity's compliance obligation. *See* Government of Quebec, Ministry of the Environment, the Fight against Climate Change, Wildlife and Parks, Carbon Market, Offset Credits, available at https://www.environnement.gouv.qc.ca/changements/carbone/credits-compensatoires/index-en.htm

[103] This is equivalent to 38.5 $MMTCO_2$ of GHG vintage and non-vintage reserve allowances remaining unsold as of Q3 2024 and converted to CO_2 allowances using the 2021 GHG to CO_2 emissions ratio for Quebec. *See* California Air Resources Board, Q3 2024 Compliance Report, released October 2023 available at https://ww2.arb.ca.gov/sites/default/files/2024-10/nc-2024_q3_complianceinstrumentreport.pdf

4. Cost of Compliance Sensitivity: Unbounded and Myopic Foresight

Speed bumps and ceiling prices are cost containment measures that form part of the existing program measures in Washington and California. These measures function as a backstop and prevent allowance prices from rising too high while meeting the carbon emissions reduction target. In the absence of the speed bumps and the ceiling price, the stringency of the emission reduction target and the complementary policies will dictate the carbon price trajectory. In the absence of the cost containment measures, allowances prices are projected to rise to \$227/MT CO_2 in 2026 to \$353/MT CO_2 by 2035 leading to much higher compliance costs than in the scenarios where the cost containment measures are in place as presented in Table 6.

Table 6: Summary of Key Results (Unbounded Case Without WCI Linkage)

	2026	2029	2032	2035	Average (2026-2035)
Loss in Annual Consumption per Household (2023$/HH)	$2,500	$2,460	$2,730	$2,600	$2,570
Cost of Compliance of Motor Gasoline (2023$/gal)	$1.90	$2.21	$2.40	$2.52	$2.26
Cost of Compliance of Diesel (2023$/gal)	$2.16	$2.52	$2.89	$3.34	$2.73
Loss in Output of Energy Intensive Sectors (%)	13.1%	13.9%	14.7%	14.1%	13.9%
Allowance Price (2023$/MT CO_2)	$227	$266	$305	$353	$288

Under a cap-and-trade program construct with increasing stringency, such as the WCI and Washington programs, allowances would be banked for future use to mitigate future compliance costs that would arise from higher allowance prices. This is expected to occur under a fully forward looking or perfect foresight model behavior whereby the model solution is optimal over the entire time horizon. However, under a myopic viewpoint behavior, businesses would use banked allowances and ceiling price permits (albeit at a higher cost) in the short-run to minimize short-run compliance costs. Under this myopic behavior with WCI linkage, the allowance price rises slowly to hit the ceiling price by 2035 only, as shown in Table 7. Hence, the cost of compliance is lower compared to the linked scenario, as presented in Table 1 (for the linked scenario that assumes perfect foresight behavior).

Table 7: Summary of Key Results (Plausible Myopic Case With WCI Linkage)

	2026	2029	2032	2035	Average (2026-2035)
Loss in Annual Consumption per Household (2023$/HH)	$1,380	$1,580	$1,730	$1,660	$1,590
Cost of Compliance of Motor Gasoline (2023$/gal)	$0.64	$1.00	$1.21	$1.45	$1.08
Cost of Compliance of Diesel (2023$/gal)	$0.73	$1.14	$1.38	$1.66	$1.23
Loss in Output of Energy Intensive Sectors (%)	3.82%	6.10%	5.07%	4.38%	4.84%
Allowance Price (2023$/MT CO_2)	$67	$102	$118	$146	$108

In a scenario with that assumes myopic behavior without WCI linkage, Washington does not have short-run flexibility of using banked permits or containment reserves, so the impacts of a myopic viewpoint are less muted as shown in Table 8. The allowance price reaches the ceiling price by 2029, similar to the results presented in Table 2 (for the unlinked scenario that assumes perfect foresight behavior).

Table 8: Summary of Key Results (Plausible Myopic Case Without WCI Linkage)

	2026	2029	2032	2035	Average (2026-2035)
Loss in Annual Consumption per Household (2023$/HH)	$1,480	$1,640	$1,810	$1,720	$1,660
Cost of Compliance of Motor Gasoline (2023$/gal)	$0.70	$1.03	$1.25	$1.43	$1.10
Cost of Compliance of Diesel (2023$/gal)	$0.80	$1.17	$1.43	$1.63	$1.26
Loss in Output of Energy Intensive Sectors (%)	4.29%	6.15%	5.31%	4.53%	5.07%
Allowance Price (2023$/MT CO_2)	$77	$109	$126	$146	$115

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