

Greenline Insights (Jonah Kurman-Faber)

Greenline Insights respectfully submits the attached issue brief as public comment on the proposed rule. Our brief uses our Allowance Market Simulator to compare projected allowance market outcomes for Washington operating as a standalone program against outcomes under linkage with California and Québec, over a 2027-2045 time period.

Modeling results suggest that linkage would deliver lower and more stable compliance costs for Washington while achieving equal or greater regional greenhouse gas reductions across the pooled market, compared to continued standalone programs. We support Ecology's efforts to finalize a linkage-ready rule and would welcome the opportunity to answer any questions about the analysis.

Respectfully submitted,
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ISSUE BRIEF

Modeled Effects of Linkage on Washington's Cap-and-Invest Program

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This memo is submitted as public comment on the Washington Department of Ecology's proposed Cap-and-Invest Program Updates and Linkage rule (CR-102). This analysis was made possible with support from Environmental Defense Fund. All methods, results, and conclusions are those of the study authors.

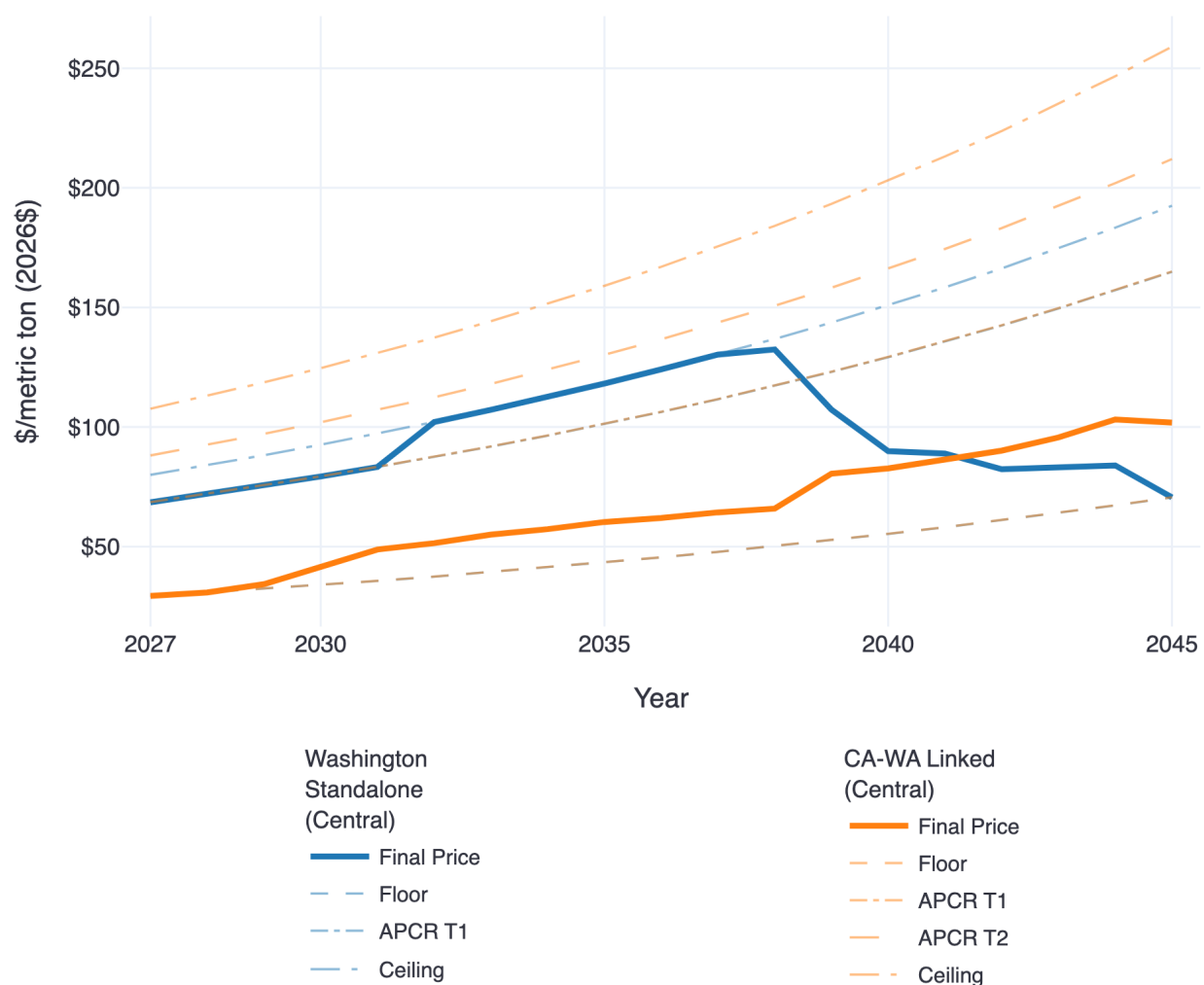
Executive Summary

This memo compares projected allowance market outcomes for Washington's Cap-and-Invest program operating as a standalone market against outcomes under linkage with California and Québec. Results are produced with Greenline Insights' Allowance Market Simulator using Washington program parameters certified against the proposed CR-102 rule and HB 1975. The comparison covers 2027 through 2045, the anticipated period of linked operation, with all values expressed in real 2026 dollars. Because projected covered emissions are the largest source of uncertainty in model results, each jurisdiction is modeled under three emissions trajectories: a central case comparison is presented first, followed by a sensitivity analysis across a full set of standalone and linked scenarios.

Under a central case, linkage lowers Washington allowance prices substantially. Operating alone, Washington's market clears at its reserve trigger and/or price ceiling through 2037, drawing on roughly 37 million metric tons CO₂e (MMT) of reserve and price ceiling supply over the study period. Under linkage, the market uses no cost-containment instruments in any year. Linked prices average approximately half the standalone level through the late 2030s, and about 32 percent lower over the full horizon.

This difference is driven primarily by Washington's access to the larger California-Québec market supply pool. Rather than relying on its own limited reserve and private bank, Washington entities draw on a shared allowance bank that peaks near 420 MMT at the end of 2027, importing a cumulative 68 MMT of allowances through 2045. Because prices are lower under linkage, in-state abatement from the program is lower, resulting in modestly higher emissions than a standalone program. In the pooled market, this is offset by additional abatement in lower-cost jurisdictions.

Figure 1. Auction-Clearing Allowance Prices, 2027-2045



These results represent a central case emissions scenario for Washington and California. We run a sensitivity analysis that includes upper, middle, and lower bound business-as-usual (BAU) covered emissions trajectories for Washington and California.

Across all nine linked program sensitivities, the market makes no material use of reserve or ceiling supply in any year, whereas every standalone scenario draws on cost-containment instruments in the near term regardless of Washington emissions assumptions. In some scenarios, including the central case, linked prices rise modestly above standalone prices late in the program as California's market tightens and the private bank is exhausted.

Scenario Development

This memo compares allowance market outcomes for Washington under standalone and linked central cases over 2027–2045. All prices are real 2026 dollars, and volumes are in million metric tons CO₂e (MMT). All scenarios are simulated from 2024 and standalone Washington scenarios reproduce observed 2025-2026 auction results before the study window opens in 2027.

The unlinked central case represents a standalone Washington market under parameters defined in Ecology’s proposed program updates, HB 1975, and other recent documentation. Covered BAU emissions follow the central of three demand trajectories, all of which are derived from Vivid Economics modeling data from 2022 and Energy Innovation’s Washington Energy Policy Simulator. The market operates under Washington’s own price containment parameters and reserve volumes, with detailed model parameters explained in the Methodology section.

The linked central case represents a linked program between Washington, California and Québec. California enters the linked market with its own central BAU emissions case. With the exception of some changes to the Allowance Price Containment Reserve (APCR) and price ceiling, most of Washington’s program parameters remain unchanged between the linked and unlinked scenarios, as Washington’s recent legislation and rulemaking commit the state to linkage-ready infrastructure whether or not linkage proceeds. The trigger prices for a price floor, Allowance Price Containment Reserve (APCR), and price ceiling unify, and allowances, reserves, and banked balances become fully fungible across the combined market. Because California is a substantially larger market, the pooled supply and balance governs the linked clearing price more than Washington’s own trends.

Projected covered emissions are the single largest source of model uncertainty. Because of this, each jurisdiction is bracketed into optimistic, central, and pessimistic demand cases. Washington is run standalone under each of its three cases, and the linked market is run as a full three-by-three grid, for nine total linked scenarios. Subsequent sections provide a detailed comparison of the standalone and linked central cases, followed by a discussion on the full set of sensitivity scenarios.

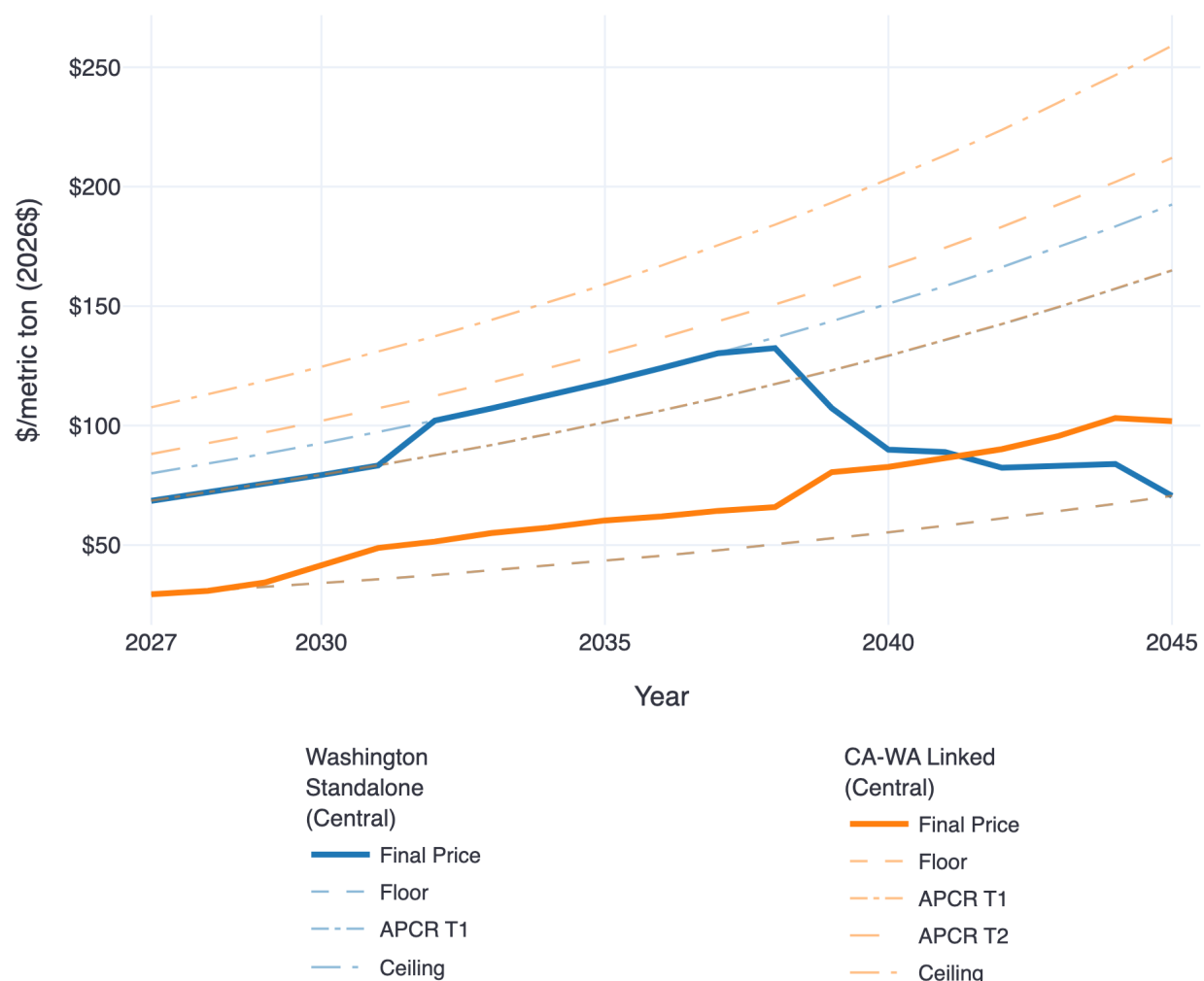
Central Case Results

Allowance Prices

Operating alone, our central case finds that Washington’s market spends most of the next two decades at APCR and price ceiling trigger levels. The market clears at the APCR Tier 1 trigger price from 2027 through 2031, drawing down the reserve each year. When the reserve exhausts in 2032, the price moves directly to the price ceiling, and the market remains ceiling-bound from 2032 through 2037. In the late 2030s, as the pace of Washington’s cap decline slows and emissions reductions from complementary policies catch up to the cap, the market begins to clear below its

rails, reaching the price floor by 2045. Linked, the joint market lifts gradually and increasingly off of the price floor through 2045 as the pooled allowance bank in California depletes and allowance budgets tighten. At no point in 2027-2045 does the central linked scenario draw on reserves or issue ceiling units.

Figure 2. Auction-Clearing Allowance Prices, 2027-2045



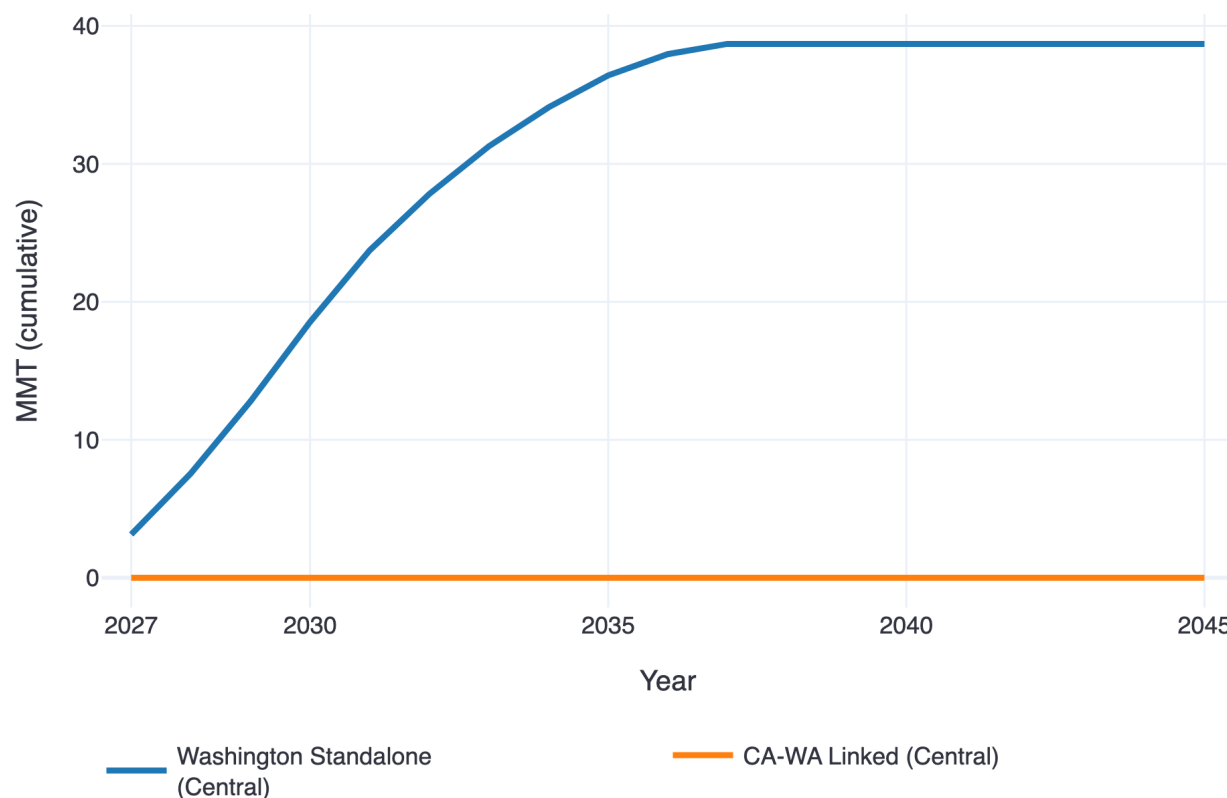
Notably, the directional comparison reverses at the end of the horizon. From 2042 onwards, the linked scenario price exceeds the unlinked scenario, by growing amounts that reach roughly a \$31 differential in 2045. These mechanics are driven by differences in late-stage emissions projections, as California is projected to experience a tighter market in the end-years of its program relative to Washington. We note this dynamic for completeness but caution against emphasis, as results over two decades out depend almost entirely on business-as-usual emissions assumptions with higher degrees of uncertainty. The sensitivity analysis section demonstrates the range of outcomes that may occur in later years.

Cost Containment Instruments

The two scenarios diverge in their use of cost-containment units, as reserve sales and price ceiling units draw down only when allowance demand exceeds ordinary allowance supply beyond price-responsive emissions reductions. Unlinked, Washington sells its entire reserve and issues an additional 12 MMT in price ceiling units through 2037. In total, the unlinked market requires roughly 37 MMT of cost-containment supply over the full study period.

Linked, these quantities fall to zero. No reserve sales occur in any year of linkage, nor are any price ceiling units issued, because the pooled market's allowance budget and existing private bank are sufficient to cover emissions demand, while still requiring a level of abatement that pulls clearing prices off the price floor.

Figure 3. Cumulative Cost Containment Units Sold, 2027-2045

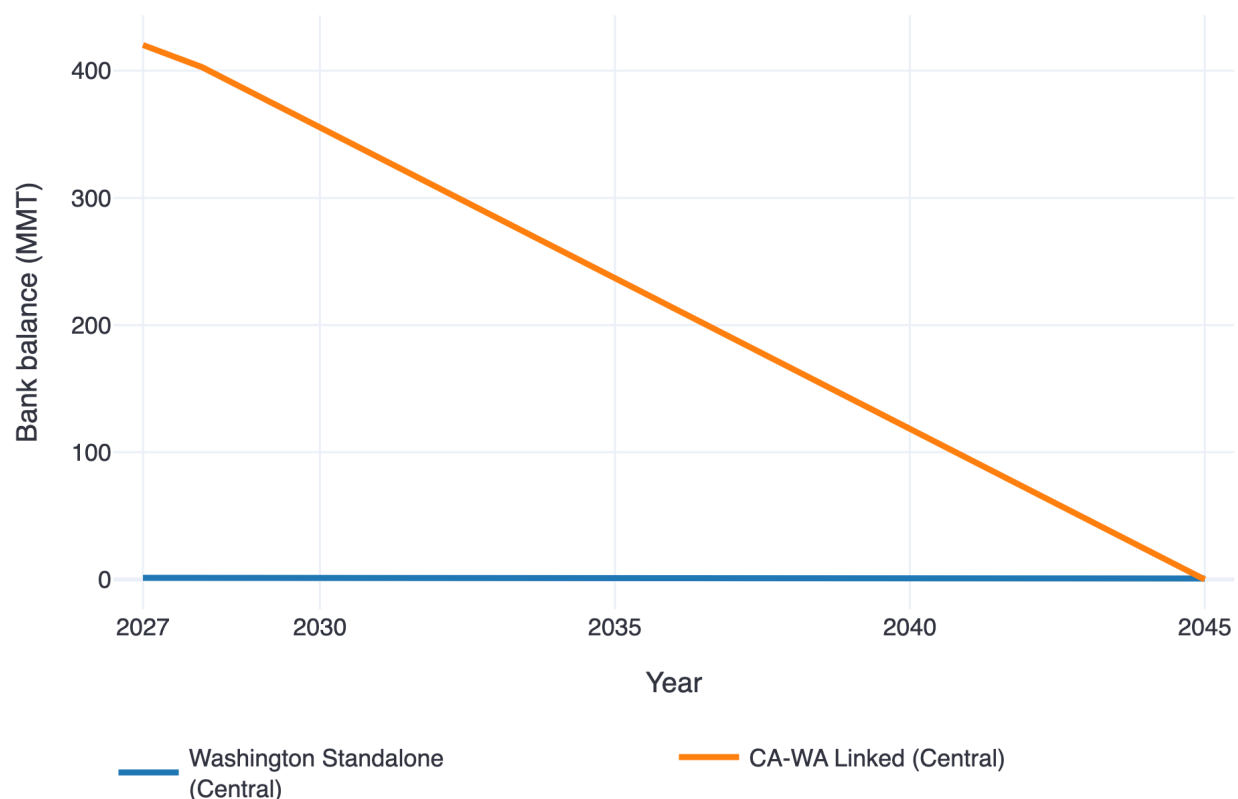


Notably, the AMS releases less reserves from 2024-2026 than real-world data suggests, because the model logic only draws cost-containment supply to cover a measurable compliance gap, rather than reflect anticipatory purchase behavior. This may cause timing differences in APCR draws from 2027 onwards, however long-term cumulative volumes are expected to converge with reality.

Banking and Interstate Allowance Flows

As a standalone program, Washington begins 2027 with negligible amounts of banked allowances. This is a contributor to why Washington's central case remains at APCR or ceiling trigger prices through 2037, as there are no banked allowances to draw from to cover short-term supply-demand gaps. When linked, Washington's compliance entities gain access to the pooled supply and bank from California-Québec, which reaches a peak of roughly 420 MMT at the end of 2027. This bank is drawn down steadily thereafter. This pooled bank is one of the strongest influences in lowering Washington's allowance prices, as it introduces a large liquid supply that is fully fungible for meeting Washington's short- and medium-term supply gaps.

Figure 4. Banked Allowance Balance, 2027-2045



Under a linked program, Washington entities are net importers of allowances in every year through 2041, net importing a cumulative 68 MMT through 2045. Net imports average 3.6 MMT per year, reaching a peak of 8 MMT in 2030, which narrows and slightly reverses to net exports by the mid-2040s. The central linked case constitutes a “tighter” pooled allowance budget than each jurisdiction remaining unlinked, since Washington would avoid triggering, releasing, and retiring an additional 37 MMT of cost-containment units above the baseline allowance budget.

Covered Emissions

The two scenarios produce different Washington emissions trajectories from the same business-as-usual emissions demand. In-state covered emissions are correspondingly slightly higher under linkage (543 MMT cumulative over the study period) relative to a standalone program (512 MMT), or an average of 1.6 MMT higher emissions per year. The joint market's total emissions remain governed by the combined caps and banks of all participating jurisdictions.

Abatement relocates to where it is cheapest in the pooled market rather than disappearing, and as such Washington's higher in-state emissions are matched by additional abatement elsewhere in the linked system. Washington's ~31 MMT increase in cumulative emissions due to linkage is in fact counterbalanced by a 76 MMT decrease in cumulative emissions in California. Thus, linkage results in roughly 45 MMT lower cumulative emissions across Washington and California, compared to continued standalone programs.¹

Sensitivity Analysis

The central case comparison of this memo rests on assumed future BAU covered emissions, which is the largest source of uncertainty on allowance market results. This section tests the effects of linkage under alternative emissions scenarios. Each state carries three demand trajectories, which results in three distinct standalone Washington scenarios and nine total linked scenarios. See the Methodology section for further detail on how each emissions trajectory is constructed.

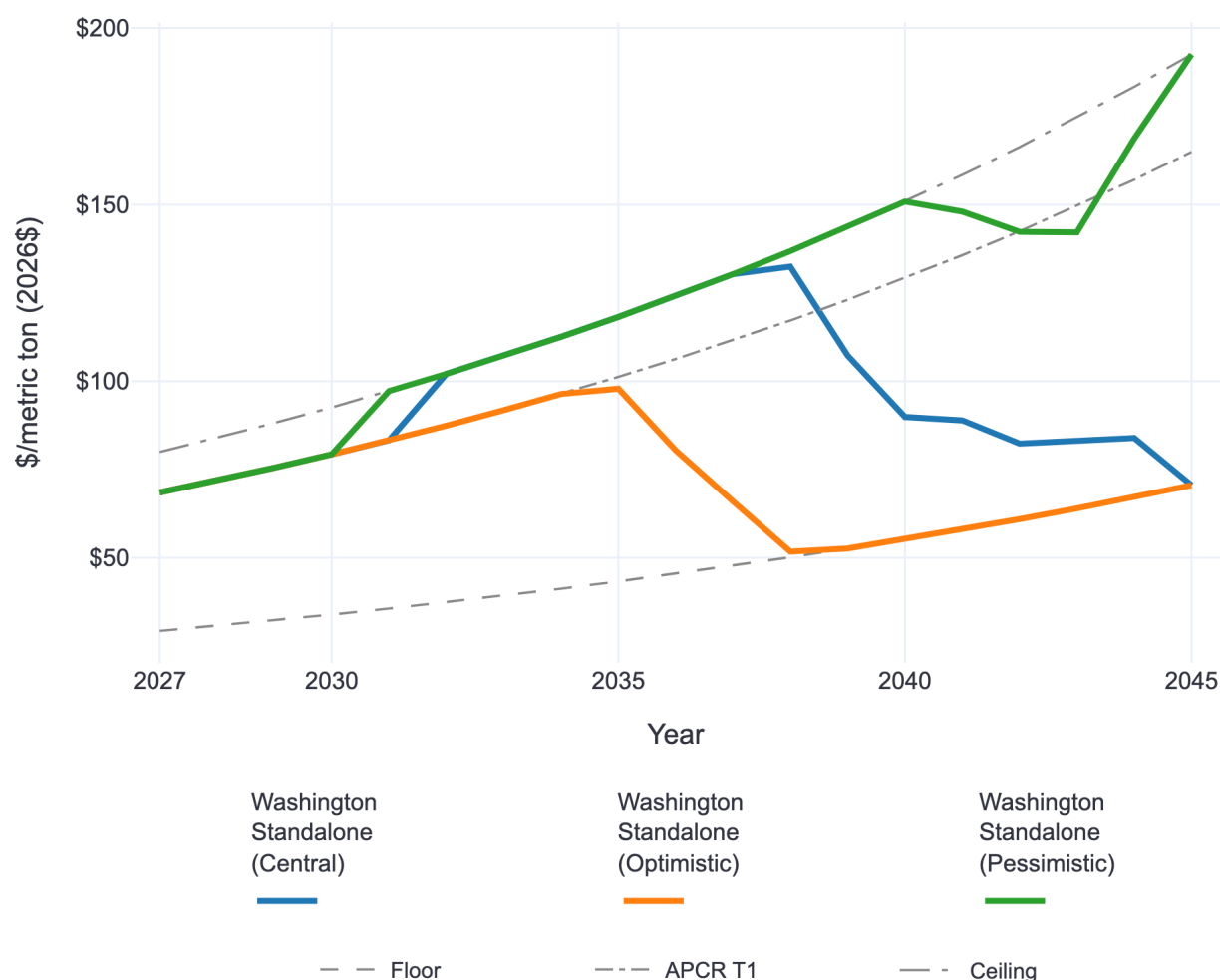
Washington Standalone Scenarios

The three standalone Washington cases share an identical near-term price path, pinned to the reserve rails through the end of the decade, as near-term supply and demand balances remain constrained. The paths diverge in the 2030s, as optimistic cases remain at APCR trigger prices before falling to the price floor.

By comparison, the pessimistic case increases to the price ceiling and remains there largely through 2045. Under standalone scenarios, the demand assumption determines the severity and duration of the program's supply constraint.

¹ This phenomenon is corroborated by recent literature. [Resources for the Future's](#) linkage analysis reaches the same conclusion, projecting Washington's emissions rising 8-14 MMT by 2045 against a California decline of roughly 65 MMT. Ecology's [Linkage Criteria Findings](#) similarly concluded that linkage would achieve greater regional emissions reductions at lower total cost.

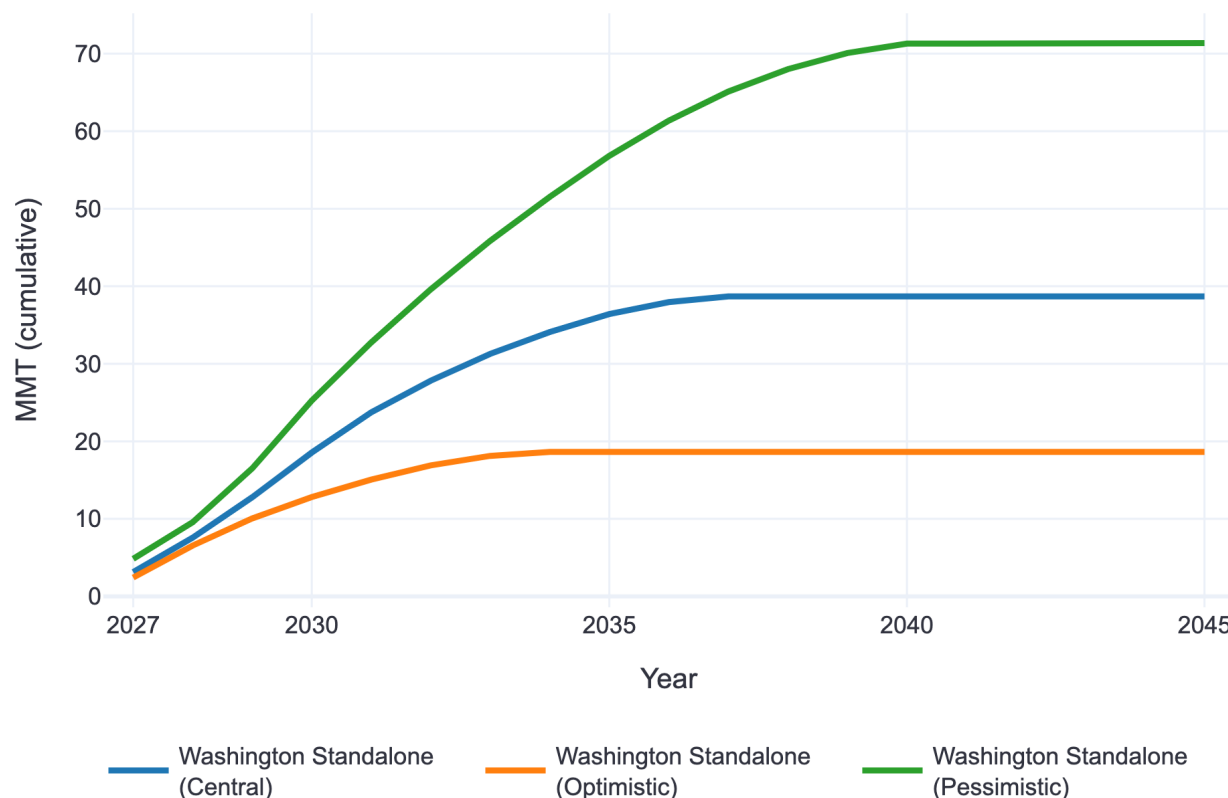
Figure 5. Auction-Clearing Allowance Prices, Washington Standalone Sensitivity Analysis



Cumulative use of cost-containment instruments follows a similar pattern. In each case the market draws on its reserve, and in tighter cases, on price ceiling units, with volumes rising through the late 2020s before leveling off as the demand and cap converge. Because a gap between emissions demand and allowance supply persists through 2030 in every demand case, every standalone scenario draws on the reserve in the near term.

As noted in the Central Case Results section, these APCR and ceiling draws are best understood as cumulative values. The AMS underestimates APCR purchases in the 2024-2026 period relative to real-world auction data, as the model does not reflect forward-looking behavior and calculates APCR purchases based on remaining supply-demand gaps after program-induced abatement occurs.

Figure 6. Cost-Containment Units Drawn, Washington Standalone Sensitivity Analysis



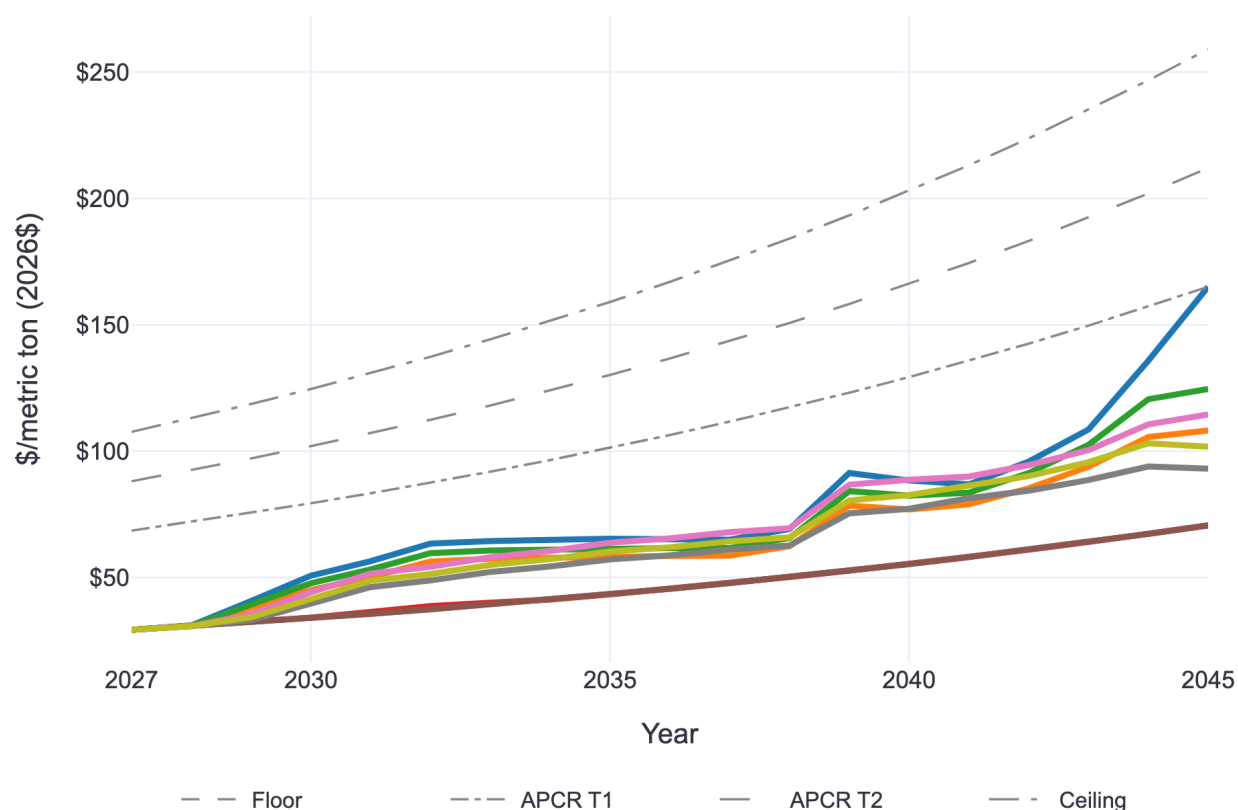
These dynamics are driven entirely by varying BAU covered emissions trajectories. Resulting emissions due to the cap-and-invest program end up converging towards a binding cap trajectory in later years, with the exception of the optimistic scenario which falls and remains below the cap in later years, resulting in small amounts of oversupply toward program end.

With additional complementary policies, more aggressive emissions reductions would reduce the duration that a standalone program would spend at the APCR and/or price ceiling. However, without substantial unforeseen changes, no sensitivity analysis tested in this memo avoids continued APCR and/or price ceiling events in the short term.

California and Washington each have upper, middle, and lower BAU emissions trajectories, which produces a three-by-three grid of AMS sensitivity results for a linked program. Compared to a standalone Washington program, the linked sensitivity cases demonstrate a narrower and more stable range of allowance price outcomes, driven by the larger size and supply cushion of California's market, combined with the counteracting force of its oversupply on Washington's projected allowance deficits in the short to medium term.

Across all linked sensitivity cases, the market makes no material use of reserve or ceiling supply in any year. In cases with lower California BAU emissions, prices remain at the floor for the duration of the program regardless of Washington BAU emissions assumptions. Under California central and upper bound BAU emissions scenarios, prices remain between the floor and APCR trigger for the majority of the program duration. When tested with upper and lower BAU emissions trajectories, Washington experiences a short-term drop in allowance prices under a linked program similar in magnitude to the central case. In one sensitivity case, which consists of upper-bound California emissions and lower-bound Washington emissions, linked market prices flip to higher than standalone market prices as soon as 2038.

Figure 7. Auction-Clearing Allowance Prices, Linked Program Sensitivity Analysis



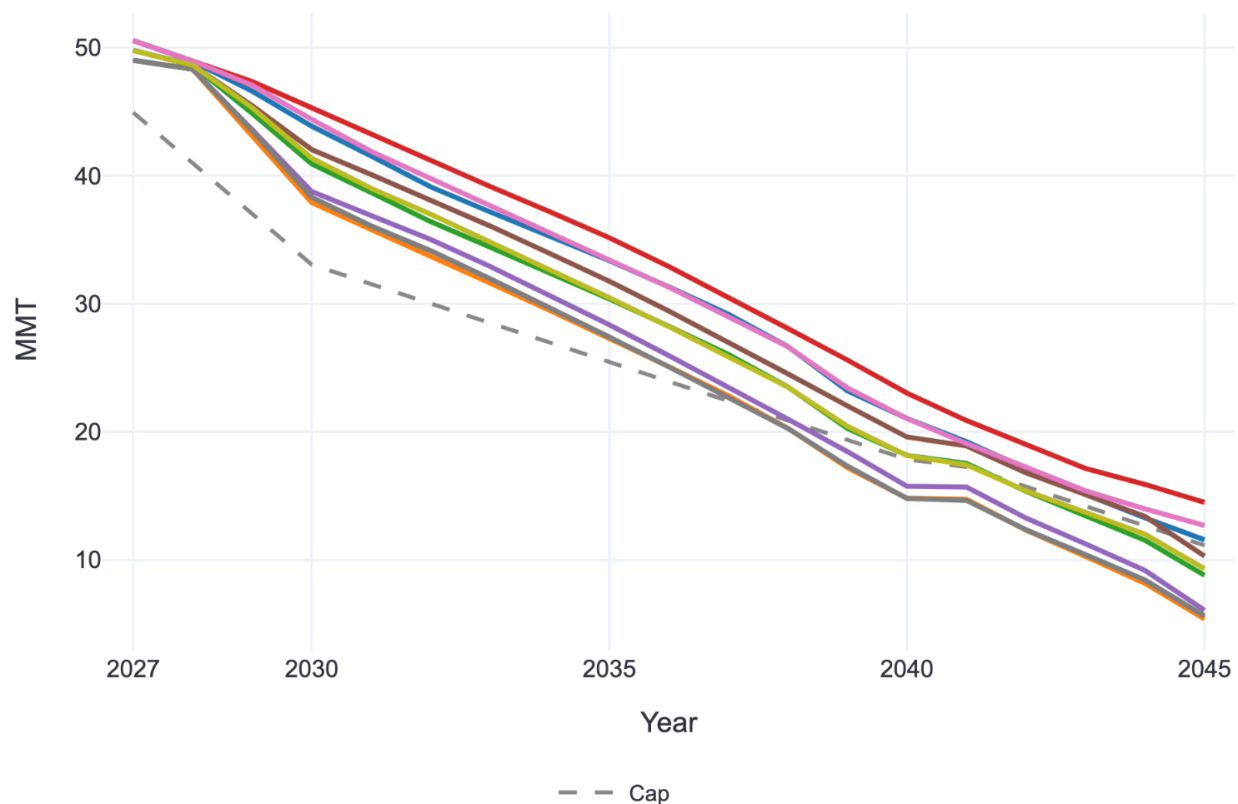
Linked market sensitivity scenarios also result in a greater range of emissions outcomes, compared to a standalone program. This is due to the fungibility of emissions reductions between Washington and California, which can in certain cases result in covered emissions in excess of the Washington cap through the program duration. Both the upper and lower range outcomes of emissions are pushed wider under the linked market, which is an expected statistical outcome driven by greater combinations of BAU emissions cases across the linked market.²

² For example, optimistic Washington emissions, when paired with pessimistic California emissions, results in lower emissions than any standalone Washington scenario, as linkage helps enhance abatement incentives beyond what a standalone program would provide.

A majority of sensitivity cases result in a depleted bank balance by the end of the program. Under sensitivity cases with lower-bound California BAU emissions, a private bank oversupply persists through 2045, ranging from 29 to 137 MMT depending on Washington's emissions case. All other central and upper California emissions scenarios result in a depleted private bank by the end of the linked program.

Under these scenarios, allowances may go unsold at auction toward the end years of the program, rather than clearing at a lower price, a condition the model does not simulate directly. Such undersubscription would reduce the auction revenue available for program investments and weaken the program's abatement incentive. This risk is confined to cases in which California's emissions follow their most optimistic trajectory; under central and upper California emissions, the pooled bank is fully drawn down by 2045 and prices clear above the floor.

Figure 8. Washington Projected Covered Emissions, Linked Program Sensitivity Analysis



Methodology

Allowance Market Simulator

Allowance market outcomes are projected with Greenline Insights' Allowance Market Simulator (AMS), the market module of the TRACE framework. The AMS is a deterministic annual-clearing model: each year, covered emissions demand meets allowance supply with price-responsive abatement represented by a marginal abatement cost (MAC) function calibrated to each state's energy system. Banked allowances are drawn to close annual shortfalls, with limits on withdrawals to represent forward-looking bank behavior. Offset usage is measured against each year's realized compliance obligation. All prices are expressed in real 2026 dollars, with quantities in million metric tons CO₂e (MMT).

The central case scenarios compare two market structures under a common set of verified Washington and California program parameters. A majority of Washington parameters remain unchanged when linked, as Washington's recent proceedings and legislation commit the state to a linkage-friendly structure whether or not linkage occurs in 2027.

Because projected covered emissions are the largest single source of model uncertainty, the analysis brackets each jurisdiction into optimistic, central, and pessimistic cases (also referred to as Lower, Central, and Upper BAU Trajectories). Washington is simulated as a standalone program under each of its three emissions cases, and the linked market is simulated as a full three-by-three grid, totaling nine linked scenarios. All primary results use the central cases, with sensitivity analysis displaying the remaining scenarios. Results are read from 2027 onward, which is the anticipated first year of linked operation.

Washington Parameters

Washington's inputs were certified in July 2026 against the Department of Ecology's proposed Cap-and-Invest Program Updates and Linkage Rule (CR-102 filed June 1, 2026; adoption expected September 23, 2026), the House Bill 1975 implementation guidance (Ecology Publication 26-14-035), the Cap-and-Invest Linkage Criteria Findings (Publication 26-14-020), the November 2024 and November 2025 compliance data publications, and published auction and reserve-sale results.

Allowance budgets. The cap series uses the proposed rule's cap-adjusted total program allowance budgets (proposed WAC 173-446-210, Table 210-1), which implement HB 1975's shift of the statutory emissions-limit target dates from January 1 to December 31 of 2030, 2040, and 2050 and add waste-to-energy facilities as covered entities from 2027 onwards. Budgets fall from 59.7 MMT in 2024 to 34.8 in 2030 and 11.1 in 2045. The market-available cap nets out the 5 percent

price-containment reserve set-asides only; the smaller emissions containment reserve (2 percent, statutorily confined to the 2023–2026 budgets) and voluntary renewable reserve (0.33 percent, likewise first-period-only) are counted as market supply; the model does not represent either mechanism, the ECR's trigger function is suspended in a linked-market world, and the VRE quantity is immaterial.

Price floor, APCR, and ceiling trigger prices. The auction floor is anchored at the 2024 published floor (\$25.33 in 2026 dollars), growing 5 percent real; the model's 2026 floor matches Ecology's published 2026 price of \$27.92. The reserve Tier 1 price is anchored at the published 2026 value of \$65.26. The price ceiling follows the pre-linkage statutory schedule of \$80 in 2026–2027, escalating 5 percent annually thereafter.

Reserve volumes. The model carries a combined 26.7 MMT as a single Tier 1 pool from 2024 with non-binding annual offer limits, reflecting Ecology's phased-release rules, which offer the full remaining reserve at each annual pre-compliance auction. The model releases substantially less reserve volume during 2024–2026 than the roughly 12 MMT actually sold in that period, because it draws cost-containment supply only to close each year's compliance gap, whereas actual participants purchased ahead of future anticipated scarcity. The modeled standalone market therefore enters 2027 holding more remaining reserve than the actual market does, which delays the modeled arrival at the price ceiling. In this respect, the standalone results may understate rather than overstate the program's supply constraint from 2027 onwards.

Initial bank. We assume a modest initial bank of 1.66 MMT in 2024, based on public-data accounting on 2023 net supply plus 6.05 MMT of 2023 reserve sales, less verified 2023 covered emissions of 65.09 MMT.

Covered emissions demand BAU. Washington covered emissions demand is represented by three bracketing trajectories – BAU Upper, BAU Middle (the central case), and BAU Lower – all built on a combination of BAU projections prepared by Vivid Economics for Ecology's 2022 Final Regulatory Analysis combined with the Washington Energy Policy Simulator, authored by Energy Innovation. Because Vivid's ex-ante projection now sits below verified program emissions, the Vivid BAU is scaled to align 2024 values with verified covered emissions. All three trajectories share identical 2024–2025 values.

- **BAU Upper** maintains Vivid's central case, which does not reflect more recent complementary policies, including clean fuel and vehicle electrification policies.
- **BAU Lower** includes Vivid's complementary policies case, modified using the Energy Policy Simulator to reflect a more robust complementary policy package spanning clean electricity, clean fuels, and vehicle electrification. It is an engineering-estimate bound that assumes every complementary policy delivers in full.

- **BAU Middle**, the central case, is the average of the Upper and Lower trajectories. Vivid's BAU and a modified optimistic case, when blended together, represent an emissions case consistent in spirit with market modeling as described in Ecology's Cap-and-Invest Linkage Criteria Findings, which applies probabilistic achievement rates to complementary policies rather than assuming all targets are met.

Offsets. Washington offset usage is assumed to ramp from observed levels (approximately 0.4 percent in 2024) to 5 percent in 2034, within the combined statutory limits of general offsets and additional projects on federally recognized tribal lands. Offset usage remains flat at 5 percent of covered emissions thereafter. The cap is reduced in a given year by the volume of offsets used for compliance purposes in the previous year, ignoring multi-year compliance periods. Varying levels of offset assumptions were tested and found to produce negligible differences in results.

California Parameters

California enters the linked scenarios as Washington's larger partner, with its parameters reflecting the cap-and-invest amendments adopted by CARB in Spring 2026, taken from the final 15-day regulatory text.

Québec linkage. Member net allowance flows in linked runs incorporate a net outflow of 14 MMT to Québec, mirroring CARB staff analysis.

Allowance budgets. Annual budgets for 2024-2045 follow Regulation Table 6-2, with annual reserve designations netted out as the AMS carries the reserve as a separate stock. The Manufacturing Decarbonization Incentive is assumed fully awarded as a deliberate upper-bound supply assumption, adding 9.86 MMT/year across budget years 2027-2038.

Price floor, APCR, and Price ceiling. The floor is anchored at the actual 2024 value, escalating 5 percent in real terms. This produces the actual 2026 floor within 0.1 percent difference. Reserve Tier 1 and Tier 2 prices are anchored at their published 2026 values, escalating 5 percent real. The price ceiling mirrors the published joint 2026 value of \$102.52, escalating 5 percent real. Initial volumes are built from CARB's 2026 APCR Notice balances, plus the scheduled 2027-2030 and post-2030 designations specified in the regulatory text.

Private allowance bank. An initial 2024 starting bank of 342.7 MMT is built from the Independent Emissions Market Advisory Committee's finding of 321 million allowances banked into the post-2020 period, rolled forward through 2023 using verified MRR emissions and allowance budgets net of reserve designations, with offset usage assumed to mirror historical trends. Modifying offset assumptions results in a private bank ranging between 334 and 351 MMT.

Offsets. Usage limits follow adopted regulation with 4 percent of compliance obligations through 2025 and 6 percent from 2026 through 2045. Usage is assumed at the full limit, measured against realized obligations. Consistent with allowance removal requirements, each year's budget is reduced by the prior year's realized offset usage beginning with the 2028 budget. Cap reductions are assumed to affect general auction volumes, without reducing consignment, industry allocation, or other types of allowance allocations.

Covered emissions demand BAU. California covered emissions demand is represented by three bracketing trajectories. All three are anchored in emissions scenarios the California Air Resources Board (CARB) prepared for its Standardized Regulatory Impact Assessment (SRIA) of the Cap-and-Trade Program amendments, the same official modeling CARB relies on in rulemaking. The trajectories differ in how far each departs from CARB's published baseline.

- **BAU Upper** is equivalent to CARB's SRIA Baseline, without adjustment.
- **BAU Middle** equals the same CARB Baseline, brought current with more recent verified emissions data and announced facility changes. The scenario's 2024 value is set to verified covered emissions, sourced from 2024 MRR data, and the trajectory is reduced to reflect two announced refinery closures (Phillips 66 Los Angeles and Valero Benicia) using each facility's 2024 covered emissions. These adjustments follow the baseline updates CARB adopted in its 2026 Initial Statement of Reasons and place the central trajectory modestly below the unadjusted baseline.
- **BAU Lower** assumes a more aggressive reduction in emissions from complementary policies. This trajectory was used as a central case in Greenline's April 2026 Issue Brief, retained here for continuity with that published analysis, and is calculated as a blended average of CARB's SRIA Baseline and CARB's SRIA Proposed Scenario emissions trajectories. In this memo, it is used strictly as the optimistic emissions bound rather than the demand basis central case.

Linked Market Rulebook

The proposed rule's linkage contingencies specify the post-linkage rules directly. Upon linkage, Washington's price floor, ceiling, and APCR trigger prices mirror California's. Banked allowances are fully fungible across jurisdictions. The AMS combines APCR volumes and bank volumes into one market logic, but retains individual jurisdiction accounting. Consistent with CARB staff analysis, Québec linkage is represented as a fixed net outflow of 14 MMT from the pooled market between 2027 and 2045. For revenue analysis, linked results report reserve sales and price ceiling units issued by jurisdiction under two conventions. Reserve sales are split in proportion to each state's initial contribution to the pooled reserve, and price ceiling units are attributed to the jurisdiction whose entities remain short after pooled supply is exhausted. Because pooled allowances are fully fungible, these splits are accounting conventions rather than observable market outcomes.

Washington Revenue Calculations

Allowance allocations. From each year's budget, no-cost allowances are distributed to electric utilities, natural gas utilities, and emissions-intensive, trade-exposed (EITE) facilities and subtracted from the budget. For 2023–2026, allocations follow Ecology's published allocation schedules for each of the three categories. For later years, each category is projected independently. Allocations to natural gas utilities follow a fixed percentage-of-baseline schedule declining in proportion with the cap. Electric utility allocations are held at ~28 percent of each year's budget through 2045, the average share observed over the program's first four years. EITE allocations follow the statutory benchmark schedule of 100 percent of baseline through 2026, 97 percent for 2027–2030, and 94 percent for 2031–2034, and are then assumed to decline linearly beyond 2034, reaching 3.1 MMT by 2045.

APCR. Allowances are set aside for the Allowance Price Containment Reserve (APCR) at 5 percent of the annual budget for 2023–2030, and continued at 5 percent for 2031–2040 consistent with the 2–5 percent range directed by HB 1975.

State investments. All remaining allowances of the budget, net distributions described above, constitute state-owned allowances sold at auction, the proceeds of which are directed to state investments. This revenue is treated as a residual rather than a fixed share, because it is what remains after the formula-driven allocations and set-asides are satisfied. APCR and price ceiling revenue is dedicated to state investments, whereas cap reductions due to offset use are assumed to directly reduce state auction revenue rather than reducing other allowance distribution purposes.

Key Limitations and Assumptions

Model structure. Model outputs are annual resolution, deterministic, and assume full compliance and rational banking. They are best read as indicators of long-term market balance rather than deterministic price forecasts. The AMS clears the market once per calendar year. It does not represent fiscal years, quarterly auction settlement, or the programs' multi-year compliance periods and associated true-up obligations. Reported results for a given year should be interpreted as that year's average market balance, not as the outcome of any specific auction or compliance event.

No forward-looking behavior. The model contains no forward-looking agents. Allowance demand is driven only by compliance obligation, and banking follows a mechanical disbursement rule. Real market participants would be expected to buy ahead of market scarcity, a behavior corroborated by Washington's 2025 and 2026 reserve sales. Anticipatory behavior shifts the timing and smoothness of price transitions and reserve depletion but cannot change the cumulative supply-demand outcomes that drive the headline results. Modeled price paths that rise steeply

toward a reserve tier or the ceiling should be read as scarcity arriving over the surrounding several years, rather than precise calendar predictions.

Demand uncertainty. Demand trajectory uncertainty dominates model results, which is why trajectories are presented as bracketed cases. The scenarios carry no assigned probabilities. The central case represents reasonable mid-range constructions, not statistical expectations.

Abatement response. Washington's abatement cost curve is adapted from California's calibrated curve, using data from the Energy Policy Simulator and observed Washington market data. Abatement cost curves have a secondary effect on model results relative to emissions demand uncertainty.

Regulatory provisionality. Washington's parameters are certified against a proposed rule and are provisional until adoption. Linked market rules follow the proposed rule's linkage contingencies. The upward adjustment of Washington's 2029 and 2030 budgets is unpublished and omitted, as the affected volumes are small. The model has no linkage-start switch, so linked scenarios are simulated as linked across the full model horizon (2024 onwards) and linked results are read from 2027 onward.

Real dollars. All prices and dollar-denominated results are expressed in real 2026 dollars. This is the appropriate basis for two reasons. First, both programs define their price floors and reserve triggers to escalate at five percent plus inflation, so the rails are fixed in real terms and the market's position relative to them is undistorted only in real dollars. Second, a real-dollar basis makes values comparable across the nineteen-year horizon and with other published analyses without embedding an inflation forecast.