Report to Legislature on EITE Allowance Allocation 2035-2050
Document 2: Methods for developing greenhouse gas benchmarks

The Washington Department of Ecology (Ecology) is preparing a report about no-cost allocation to Emissions Intensive Trade Exposed Industries (EITEs) under the Cap-and-Invest Program.

EITEs are important local industries and manufacturing facilities that produce a variety of products including paper, food, building materials, glass, and airplanes. In establishing the Climate Commitment Act (CCA), the Legislature recognized that EITEs faced unique challenges in reducing their greenhouse gas emissions in the early years of the Cap-and-Invest Program.

The Legislature decided to issue allowances at no cost to these industries through to 2034 and didn't specify the approach to providing no-cost allowances to EITEs for 2035-2050. Ecology is required to prepare a report to the Legislature that offers information and recommendations on how best to proceed. This report will include consideration of:

- Best practices for avoiding leakage (when EITEs relocate or limit their operations)
- Different approaches for measuring the emissions generated by EITEs per unit of production
- Opportunities and barriers for decarbonizing EITEs in Washington
- How to allocate no-cost allowance to EITEs from 2035-2050
- Implications for environmental justice outcomes, local air quality, statewide emissions limits, and revenues generated by Cap-and-Invest auction

Further information on EITEs can be found at Ecology's website: Emissions Intensive Trade Exposed industries - Washington State Department of Ecology

Opportunities to provide report input

Ecology is providing multiple engagement opportunities to make sure EITEs, Tribes, covered entities, community organizations, and other interested parties can provide input into the development of Ecology's report to the Legislature. This includes establishing two advisory groups – EITE Industries Advisory Group and EITE Policy Advisory Group – as well as hosting forums for Tribes, the public, and community organizations.

Ecology is specifically seeking feedback on the approach for allocating no-cost allowances from 2035-2050 as well as understanding the potential impacts on individuals and communities where EITE facilities are located. Comments may be submitted through the electronic platform until Sept. 3, 2025 at 11:59 p.m.

To stay updated on the progress of the report, the advisory groups, and public meetings, sign up for the EITE Industries email list.

Document 2: Review of alternative methods for developing greenhouse gas benchmarks for EITE facilities

Disclaimer

This document sets out the draft findings from Ecology's review of alternative methods for developing greenhouse benchmarks for EITE facilities. The purpose of the document is to support discussions with advisory groups and enable interested parties and the public to provide specific feedback on the draft findings and supporting information.

The draft findings and information in this document do not represent the official position of Ecology or the Legislature on any policy or issue mentioned in this document. The final report will incorporate feedback received from advisory group members and other interested parties.

Section 1: Key Context/Background

1. In preparing its report to the legislature on EITE allowance allocation for 2035-2050, the CCA requires Ecology to "…describe alternative methods of emissions performance benchmarking and mass-based allocation of no cost allowances. At a minimum, the department must evaluate benchmarks based on both carbon intensity and mass, as well as the use of best available technology as a method for compliance…".[1]
2. Undertaking this analysis requires an understanding of how existing methods for EITE allowance allocation are prescribed in the CCA as well as key terms and concepts related to benchmarking and allowance allocation in carbon pricing programs, as explained below.
3. This document is structured as follows:
    a) Section 1: Key context and background, including overview of existing EITE allocation methods, clarification of key terms and concepts, and methods used in the review.
    b) Section 2: Draft key findings of the review of alternative methods for benchmarking.
    c) Section 3: Detailed findings and supporting information, including:
        - Description of benchmarking methods for EITE allowance allocation
        - Review of Best Available Technology for EITE allowance allocation
        - How Washington's approach to benchmarking compares to other jurisdictions.
4. This policy paper should be read in conjunction with **Document 1: Best practice policies for avoiding leakage**, which provides draft findings and information from the staff review of best practice policies for avoiding leakage and economic harm to businesses (maintaining competitiveness of EITEs).

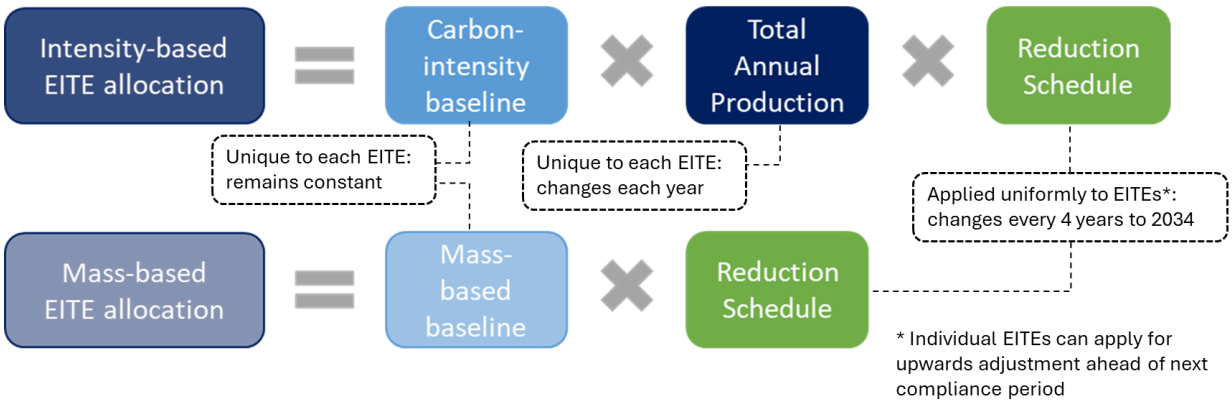
How no-cost allowances are allocated to EITEs in Washington

5. Before considering alternative methods for emissions benchmarking for EITEs in Washington, it is important to understand the current approach for calculating how many no-cost allowances that EITEs receive, which is set out in the CCA (RCW 70A.95.110) and Cap-and-Invest Program Rule (WAC 173-446-220).

[1] RCW 70A.65.110(4)(a)

6. The CCA prescribes two methods for allocating no-cost allowances to EITEs: the intensity-based method and the mass-based method as illustrated in Figure 1 below. These two methods are collectively referred to as 'allocation baselines' in the program rule.
7. The **intensity-based method** is an 'output-based allocation' approach. Under this method the amount of allowances allocated to EITEs each year is calculated by multiplying the facility's carbon intensity baseline by its verified annual production and the applicable reduction schedule. In this formula, the carbon intensity baseline is constant, while total production changes each year, and the reduction schedule changes every four years (until 2035). The 'carbon intensity baseline' is bespoke to each EITE facility and is based on its average covered emissions and production during 2015-2019. This is the default method for EITE allowance allocation in Washington and most EITE facilities in Washington used this method.
8. For the **mass-based method** the amount of allowances for EITEs is calculated by multiplying the facility's mass-based baseline by the reduction schedule.[2] The 'mass-based baseline' is also bespoke to each EITE facility and is equal to its average covered emissions during 2015-2019. Only a small number of EITE facilities in Washington are approved to use this method of allowance allocation.
9. The 'reduction schedule' is prescribed in the CCA and reduces EITE allowance allocation by 0% during 2023-2026, by 3% during 2027-2030, and by 6% from during 2031-2034. However, EITE facilities can petition Ecology for an upwards adjustment to the reduction schedule ahead of the next compliance period if it meets the criteria set out in statute and rule.[3]

Figure 1: Overview of EITE allowance allocation methods in CCA



Note: 'Carbon-intensity baseline' based on EITE facility's average covered emissions and production during 2015-2019 while 'Mass-based baseline' based on EITE facility's average covered emissions during 2015-2019. Some exceptions may apply.

Clarification of key terms and concepts used in this document

Benchmarking

10. The CCA does not define the term 'emissions performance benchmarking'. However, it is a widely used concept in carbon pricing programs whereby benchmarks are developed by

[2] Aerospace facilities can apply to Ecology for an increase in their mass-based baseline if their emissions increase above their baseline as a result of an increase in production.
[3] As per RCW 70A.65.110(3)(f) and WAC 173-446-220(2)(d)(ii).

gathering industry data to determine the emissions intensity or efficiency of industrial activities. These benchmarks are then used as the basis for allocating allowances to eligible EITEs.

11. The CCA uses the term 'benchmark' in a way that is inconsistent with conventional greenhouse gas benchmarking approaches. For example, the CCA uses the term 'carbon intensity benchmark' to refer to facility-specific carbon intensity baselines, which are based only on data from individual facilities and cannot be easily used as a basis for comparison. It also uses the term 'benchmark reduction schedule' to refer to a universally applied adjustment to EITE allowance allocation, which would be more accurately characterized as a 'discount factor'.
12. In this document, the term benchmarking refers to the establishment of greenhouse gas benchmarks for the purpose of determining the relative emissions performance of industrial activities and calibrating EITE allowance allocation in carbon pricing programs.

Intensity versus mass-based 'benchmarks'

13. As noted above, the CCA requires Ecology to "evaluate benchmarks based on both carbon intensity and mass". However, mass-based methods for EITE allowance allocation are based only on historical emissions and do not account for production or energy use data.[4] Therefore, benchmarking is only applicable to intensity-based methods, and mass-based methods were excluded from this review of benchmarking for EITEs.

Best available technology as a 'method for compliance'

14. While the CCA provides an opportunity for EITEs to use 'best available technology' assessments when requesting an upwards adjustment to no-cost allowance allocation[5], it does not enable the use of best available technology as a 'method for compliance'. This is because the only method of compliance available to covered entities, including EITEs, is to surrender the required number of compliance instruments (either allowances or offset credits) equal to their compliance obligations as set out in RCW 70A.65.310 and WAC 173-446-600.
15. Given this context, staff have interpreted "the use of best available technology as a method for compliance" as referring to the use best available technology as a method of EITE allowance allocation and/or benchmarking. This is consistent with the existing reference to 'best available technology' assessment in the CCA in relation to adjustments to the reduction schedule.
16. On this basis staff conducted a review of the use of best available technology (BAT) as a method for benchmarking and allocating allowances to EITEs in carbon pricing programs.

Methods used to inform the review

17. The primary methods for completing Ecology's draft review included:
    a) Discussions with the EITE Industries Advisory Group, the EITE Policy Advisory Group, and subject matter experts on benchmarking approaches used in carbon pricing programs.
    b) Identification and review of literature documenting alternative methods for establishing greenhouse benchmarks for EITEs within carbon pricing programs.

[4] Mass based methods can be categorized as 'grandparenting', see **Document 1: Best practices for avoiding leakage** for more information on allowance allocation methods.
[5] As per RCW 70A.65.110(3)(f) and WAC 173-446-220(2)(d)(ii).

c) Comparative analysis of Washington's approach to establishing allocation baselines for EITEs and benchmarking methods used in other jurisdictions with comparable carbon pricing programs or emissions reductions policies.

Section 2: Key findings of review of alternative benchmarking methods

18. Benchmarking involves the use of metrics to assess and compare the emissions performance or efficiency of similar industrial activities. Benchmarks are developed by collating greenhouse gas emissions and production data from multiple facilities that produce the same or similar products within an industrial sector. Engagement with industry experts is required to ensure benchmarks account for the technical aspects of different manufacturing processes.
19. Benchmarking is considered a 'best practice' approach for allocating allowances to EITEs in carbon pricing programs, particularly when paired with output-based allocation methods.[6] This is because it has the effect of rewarding the most efficient facilities (i.e. those performing better than the benchmark) by providing those facilities with more allowances than required to meet their compliance obligation. This approach is intended to reduce leakage by helping to 'level the playing field' between EITEs and their out-of-state competitors while also providing incentives for investment in efficient production within the jurisdiction.
20. The most common benchmarking approach for the purpose of EITE allowance allocation is product-based benchmarking. This approach is currently used by carbon pricing programs in California, Québec, the European Union (EU) and New Zealand. A benchmarking approach that is used less often for allowance allocation is energy-based benchmarking, which is mostly used as a fallback option when there is insufficient data to establish product-based benchmarks.
21. Within carbon pricing programs that use product-based benchmarks, the 'stringency' of the benchmark determines the proportion of free allowances that facilities receive relative to their emissions. Benchmark stringency is usually set somewhere close to the average emission performance of existing facilities, e.g. average, 90% of average, or average of the best 10%. Most jurisdiction also use 'discount factors'[7] to make adjustments to EITE allowance allocation, which means benchmark stringency is not the only factor determining allowance allocation.
22. The default 'intensity-based' method used for EITE allowance allocation in Washington does not currently involve any benchmarking. Each EITE facility is assigned a 'carbon-intensity baseline', which is based on facility-specific average emissions and production during 2015-2019 and uses a single, composite production metric. It does not consider the relative performance of each facility compared to other facilities that manufacture the same products within the state.
23. While the default allocation methods adopted in Washington are a pragmatic and easy-to-administer approach for establishing allocation baselines for EITEs, they have several potential drawbacks. These include:
    a) It is difficult to assess the emissions performance of EITE facilities in Washington because there is no common benchmark for comparing the emissions intensity of the different products they produce.
    b) The 'stringency' of the carbon intensity baselines in Washington cannot be directly compared with benchmark stringency in other jurisdictions that have adopted product-based benchmarks.
    c) It does not reward the most efficient facilities in the same way as product-based benchmarking, because it does not fully account for the different products

[6] See **Document 1: Best practices for avoiding leakage** for more information on output-based allocation.
[7] See **Document 1: Best practices for avoiding leakage** for more information on discount factors.

manufactured within a facility or subsector or any early action by facilities to reduce their emissions intensity during, or prior to, the baseline years (2015-2019).

d) It may also reduce incentives for investment in new, lower carbon EITE facilities in Washington because allowance allocation would be based on their actual emissions intensity[8] and they cannot utilize the financial incentive provided by the intensity-based allocation method in the same way as existing facilities.

24. These findings suggest there are potential benefits of establishing product-based benchmarks or similar forms of benchmarking for EITEs in Washington. However, there are currently only three industrial subsectors in which there are likely to be enough EITE facilities to develop sector-level product-based benchmarks. These sectors are pulp and paper manufacturing (6 facilities), frozen potato manufacturing (7 facilities), and petroleum refining (5 facilities). For other EITE sectors with only 1 or 2 facilities, developing product-based benchmarks would potentially result in facility-level benchmarks similar to existing carbon-intensity baselines.
25. Therefore, the merits of developing product-based benchmarks for Washington EITEs need to be carefully weighed against the cost, impacts and complexity of making any significant changes to the existing allocation methods.
26. The use of best available technology or 'BAT' as a method for EITE allowance allocation or benchmarking can be considered the most stringent benchmark that can be adopted for the purpose of allocating allowance to EITEs.
27. However, the use of BAT as a method of benchmarking for EITE allowance allocation is uncommon in carbon pricing programs. This is because carbon pricing programs are intended to facilitate a market within which regulated entities have the flexibility to determine least-cost compliance strategies and pathways. Whereas BAT implies specifying performance standards for individual facilities or sectors, which could erode the flexibility for EITE subject to BAT.
28. Establishing BAT for a facility or sector would also require significantly more detailed information about facility operations, along with technology and economic analysis, when compared to the data used to establish product-based benchmarks for EITEs. This approach may also require the establishment of a suitable auditing regime to ensure credibility of the BAT assessments including periodic review. In addition, it is unclear how using BAT as the basis for allowance allocation would affect incentives for investments in low carbon production and ensure total levels of allowance allocation remain under the cap.
29. Therefore, the use of BAT as a method of EITE allowance allocation requires careful consideration of these policy design issues and market implications.

[8] Once sufficient data is available to generate a carbon intensity baseline.

Section 3: Detailed findings and supporting information

Description of benchmarking methods for EITE allowance allocation

Role of benchmarking in the context of carbon pricing programs and climate policy

30. Benchmarking involves the use of metrics to assess and compare the emissions performance or efficiency of similar industrial activities. Benchmarks are developed by collating greenhouse gas emissions and production data from multiple facilities within an industrial sector that produce the same or similar products. These benchmarks are usually expressed in terms of greenhouse gas emissions produced per unit of output (e.g. tons of steel) and provide a basis for measuring the carbon intensity of production. In some cases, benchmarks may be expressed in terms of emissions produced per unit of combustion energy.
31. Benchmarks cannot be expressed in terms of emissions only (i.e. mass-based) because it does not account for the relative performance of facilities producing similar types of products or using similar levels of combustion energy.
32. Benchmarks are often used in climate policy instruments for setting targets or crediting thresholds, or as a performance-based approach for distributing benefits or obligations (e.g. free allowances). Setting a common basis for comparison through benchmarks is intended to ensure that entities are treated comparably and fairly under the rules of a policy instrument.[9]
33. Some of the key design considerations for establishing benchmarks for greenhouse gas emissions from industrial facilities include:[10]
    a) **Product or activity definitions ('level of aggregation'):** How industrial products or activities are defined across industrial subsectors, product types, technologies or other circumstances, which affects incentives and opportunities for emissions reductions.
    b) **Measurement protocols and boundaries ('scope'):** effective benchmarks need robust methods to measure greenhouse gas emissions and production at the facility level, including choices on inclusion or exclusion of indirect emissions (e.g. electricity use).
    c) **Benchmark stringency and updating:** benchmarks can be set at different levels of performance (e.g. sectoral average or '90% of average') depending on their policy objectives, such as leakage protection and/or incentivizing emissions reductions.
    d) **Data availability and complexity:** developing meaningful benchmarks requires detailed greenhouse gas and production data for multiple facilities within a sector to determine the relative performance of individual facilities.
34. Benchmarks have been used by several jurisdictions in the implementation of different carbon pricing and greenhouse gas regulation policies, including carbon pricing programs, carbon taxes, crediting systems, and energy efficiency trading. For this review, Ecology has focused on the use of benchmarking in the design and implementation of carbon pricing programs.

How benchmarks are used in carbon pricing programs

35. As noted in Document 1, benchmarking is generally considered a best practice approach for allocating allowance to EITEs in carbon pricing programs, particularly when paired with output-

[9] PMR - A Guide to Greenhouse Gas Benchmarking for Climate Policy Instruments
[10] SEI, 2010, Issues and Options for Benchmarking Industrial GHG Emissions.

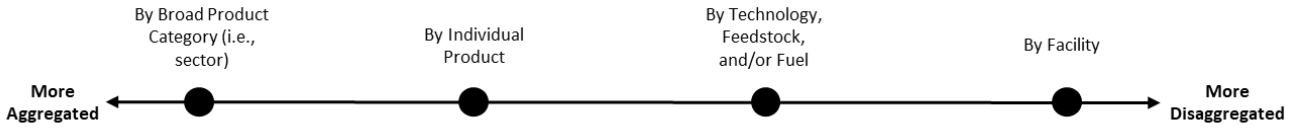
based allocation methods.[11] This is because benchmarking removes the link between an individual facility's historical emissions and the allowances they receive. This means that facilities that are more efficient than the benchmark value will receive more allowances relative to their emissions than facilities that are less efficient than the benchmark value. It has the effect of rewarding facilities that have invested in more efficient production while providing stronger abatement incentives for facilities that have not (relative to the benchmark).

36. While the use of benchmarking for allocation can offer several advantages, successful implementation of this approach requires working through the important design considerations noted above and for certain market conditions to be met, which are discussed below.

Defining benchmarks for industrial products or activities

37. The level of aggregation at which benchmarks are defined is a key design consideration in establishing benchmarks for industrial activities. One of the key challenges is determining which industrial activities are sufficiently similar so that they can be considered as comparable and therefore covered by the same benchmark. Another key challenge includes ensuring that benchmarks cover activities over which the emitting entity has control.[12] Figure 2 below illustrates these different 'levels of aggregation' along with examples from selected industrial sectors.

Figure 2 – Levels of aggregation for benchmarking for selected industrial sectors[13]



Cement	Clinker (white or grey)	Wet vs. dry kiln	e.g., Intalco, Ferndale
Glass	Flat, container, fiber glass	Fraction of recycled cullet used	e.g., Ash Grove Cement, Seattle
Paper	Newsprint, writing paper, market pulp	Mechanical vs. chemical pulp	e.g., Nippon Dynawave, Longview
Steel	High-allow steel, hot-rolled steel, cold-rolled steel	EAF vs. BOF, integrated vs. rolling mill	e.g., Nucor Steel, Seattle

38. In the context of carbon pricing programs, the most common benchmarking approach that has been used for the purpose of EITE allowance allocation are **product-based benchmarks**, which sit within the 'individual product' level of aggregation in Figure 2.

39. **Product-based benchmarks** are based upon the amount of greenhouse gas emissions generated per unit of industrial product (e.g. average tons of CO2 per unit of steel) and can involve differentiation between products within a facility or sector. For example, in the pulp and paper subsector product-based benchmarks can include 'sanitary tissue paper' or 'cardboard', and facilities may receive allowances for more than one product benchmark depending on the product mix at each facility. Product-based benchmarks are generally considered the preferred approach to benchmarking for purpose of allocating allowances to EITEs. This is because they

[11] ICAP 2020, Carbon Leakage and Deep Decarbonization: Future-proofing Carbon Leakage Protection.
[12] PMR - A Guide to Greenhouse Gas Benchmarking for Climate Policy Instruments
[13] Adapted from SEI 2010, Issues and Options for Benchmarking Industrial GHG Emissions.

can provide the strongest incentive for mitigation by setting a uniform efficiency benchmark for a variety of production methods and technologies used to produce the same product.[14] They also reward early action and continued investment to reduce emissions because facilities performing at or above the benchmark will receive more allowances.

40. Most jurisdictions with carbon pricing programs have opted to use product-based benchmarks as the preferred method for EITE allowance allocation, including California, Québec, the EU and New Zealand. In most cases these jurisdictions have adopted the 'one-product, one-benchmark' principle, whereby product-based benchmarks are not differentiated based on technology, fuel mix, size and age of facility, climatic circumstances, or raw materials. This approach is intended to incentivize the full range of abatement opportunities at a facility, including changes to fuels, technologies, and feedstocks. However, there can be challenges in defining unique products within some sectors. The International Carbon Action Partnership (ICAP) has identified some key design principles for developing product-based benchmarks for EITE allowance allocation which are outlined in Appendix 1.
41. Another benchmarking approach that is used less often for allowance allocation are **energy-based benchmarks**, which sit within the 'technology or fuel' level of aggregation in Figure 2.
42. **Energy-based benchmarks** reflect how many greenhouse gases are emitted from combustion energy that is used at a facility (e.g. tons of CO2 per unit of energy) and are often based on a specific reference fuel (such as natural gas) or average emissions intensity of the fuel mix within a sector. Energy-based benchmarks target inputs (energy) rather than outputs (products) and focus on the fuel and energy sources of industrial facilities. They do not encompass the full scope of production activity and emissions within the facility boundary, such as industrial process emissions, or incentivize the complete range of abatement options in the production process. For this reason, they are mostly used as a fallback option for allowance allocation when product-based benchmarks cannot easily be established, for example, in sectors with insufficient production data. For example, in California only 2% of EITE facilities use energy-based benchmarks.
43. In the case of Washington, the intensity-based methods for allowance allocation would sit within the 'by facility' level of aggregation in Figure 2. Each facility has a bespoke allocation baseline based on its emissions and production data during 2015-2019 and does not reward any previous actions to reduce emissions or involve any form of conventional benchmarking. While production metrics were established for the intensity-based method, these metrics do not operate in the same way as 'product-based benchmarks' because they do not differentiate between different types of products that may be produced within a facility or subsector. This means that the facility-level carbon-intensity baselines established for EITE allowance allocation cannot easily be used to identify and compare the relative efficiency of EITE facilities in Washington. In addition, the CCA approach does not directly reward any early action by EITEs to reduce their emissions intensity (i.e. during or before the baseline years that were used to determine their allocation baseline), does not directly account for changes in the product mix within a facility or subsector, and does not reward investment in new emissions efficient facilities within Washington.

[14] ICAP 2022, Benchmark-based allocation in emissions trading systems.

Benchmark boundaries or scope

44. Determining the boundaries or scope of the benchmarks is another a key design consideration when benchmarking industrial activities. Industrial production can involve direct emissions from on-site fuel combustion, chemical transformations during the production process, and indirect emissions from purchased carbon-intensive inputs or feedstocks (e.g. clinker for cement manufacturing). The activities covered by the benchmark should only be those within the control or responsibility of the covered entity[15].
45. Jurisdictions adopting product-based benchmarks often limit the scope of benchmarks to direct, onsite emissions to encourage efficiency improvements at the source of combustion or production and avoid additional data complexity. To support this objective, the emissions associated with producing intermediate products (e.g. virgin pulp production) are usually covered by product-based benchmarks that are distinct from subsequent production activities (e.g. paper or tissues). However, where opportunities to reduce emissions lie outside the scope of the benchmark (e.g. by increasing the use of recycled inputs), facilities may be incentivized to focus only on the mitigation of direct emissions produced onsite rather than exploring opportunities for emissions abatement along the value chain. [16]
46. One approach that has been proposed to address this issue is the concept of 'scope adjusted benchmarks', whereby the carbon intensity of feedstocks and byproducts that are not subject to carbon pricing are incorporated into the benchmark. Under this 'scope adjusted' benchmarking approach, allowance allocation would either be reduced in proportion to the emissions associated with carbon-intensive inputs procured off-site or increased to account for the effect of byproducts on emissions savings generated elsewhere along the value chain. [17] However, such an approach has yet to be adopted in any jurisdictions with comparable carbon pricing programs to Washington and would require significant additional data and complexity in benchmark design. There may also be other policies, such as Buy Clean, Buy Fair, that may be more suitable for incentivizing reductions in emissions across other aspects of the value chain.
47. In the case of Washington, both the scope of the carbon-intensity method and the mass-based method are limited to direct, onsite emissions and exclude indirect emissions, such as those associated with purchased electricity or other feedstocks. This means facilities may be incentivized to focus only on the mitigation of direct covered emissions produced onsite, and potentially precludes other opportunities for emissions abatement along the value chain unless addressed by another policy mechanism. For example, the California Industry Assistance Credit compensates EITEs for a portion of the compliance costs associated with purchased electricity and uses a benchmarking approach that provides an incentive for energy-efficiency. [18]

Benchmark stringency (and updating)

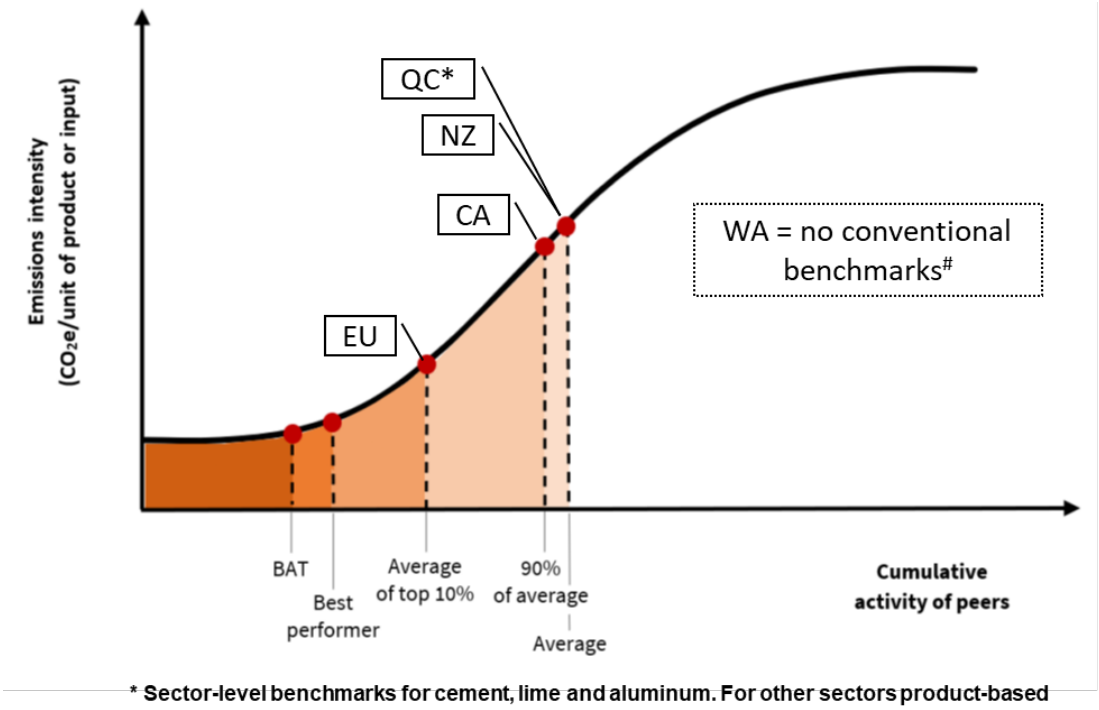
48. Within carbon pricing programs benchmark stringency determines the proportion of free allowances that facilities receive relative to their emissions. Benchmarks can be set at different levels of stringency depending on their policy objectives, such as leakage protection and/or

[15] ICAP 2022, Benchmark-based allocation in emissions trading systems.
[16] ICAP 2022, Benchmark-based allocation in emissions trading systems.
[17] Zipperer et al (2017). Benchmarks for Emissions Trading – General Principles for Emissions Scope.
[18] California Public Utilities Commission, California Industry Assistance Credit

incentivizing emissions reductions. The more stringent the benchmark the fewer allowances will be allocated for free and the greater the impact of the carbon prices on production costs for covered entities.

49. In most carbon pricing programs benchmark stringency is determined by taking in account the average emission performance of existing facilities. Figure 3 below illustrates how benchmark stringency has been set within jurisdictions with comparable carbon pricing programs. Benchmark stringency can range from 'average' performance to 'best available technology', with most jurisdictions setting benchmarks somewhere close to the average. For example, in California, benchmarks are set at either 90% of average efficiency or the 'best-in-class' facility (the most efficient facility in the sector). This approach was intended to ensure that at least one facility in each sector already operates at the benchmark value. [19]
50. In some circumstances, there may be only one facility from an industrial subsector within a jurisdiction, and so the benchmark value is facility specific, unless data is used from comparable facilities outside the jurisdiction to develop the benchmark value.

Figure 3 – comparison of benchmark stringency across selected jurisdictions



*** Sector-level benchmarks for cement, lime and aluminum. For other sectors product-based benchmarks are based on facility-level averages and not specified in regulation.**
 # Carbon-intensity baselines are based on facility-specific averages using composite production metrics that do not differentiate between different products.

51. The impact of benchmark stringency on regulated entities will differ by sector and depend on other key aspects of carbon pricing program design, in particular the extent to which other discount factors are applied to EITE allowance allocation. If sectors receive close to 100% free allocation at the benchmark value, then the benchmark stringency will be the key determinant of compliance costs and abatement incentives for covered entities. However, most carbon

[19] CARB, 2010 - Appendix B: Development of Product Benchmarks for Allowance Allocation

pricing program use discount factors to align allowance allocation with leakage criteria or the trajectory of the program cap (e.g. cap decline factors). In such cases, the stringency of the benchmark remains important but is not the only factor in determining carbon costs and abatement incentives.

52. In the case of Washington, the carbon-intensity method is based on facility specific averages and does not take into account the relative performance of each facility compared to any others. This means that the 'stringency' of these two allocation methods in Washington cannot be directly compared with benchmark stringency in other jurisdiction without gathering further information.
53. One final consideration is whether benchmark values are fixed or updated, for example, as better data becomes available following program implementation. These updates may be pursued if the benchmark value no longer reflects the sector's overall performance or the technical and financial opportunities available to reduce emissions.[20] For example, both Québec and New Zealand have recently enacted regulatory changes to update benchmarks to better reflect actual carbon intensity of production and account for efficiency improvements and new technologies. However, maintaining a consistent benchmark value provides a more predictable incentive for low-carbon investment, and this incentive may diminish if benchmarks become more stringent over time. The impacts and merits of updating benchmarks also depend on the extent to which other discount factors are being used to reduce the overall level of EITE allowance allocation.[21]
54. In the case of Washington, the CCA only authorizes changes to allocation baselines in limited circumstances and does not authorize periodic updates to carbon-intensity or mass-bass baselines based on emissions performance data outside the specified baseline years (2015-2019). However, the CCA does enable EITE facilities to petition Ecology for an upwards adjustment to the reduction schedule ahead of the next compliance period if it meets the criteria set out in statute and rule[22], which is a unique feature of Washington's program.

Data availability and complexity

55. Developing benchmarks require detailed greenhouse gas and production data for multiple facilities within a sector to determine the relative performance of industries facilities. It also requires engagement with facilities to ensure benchmarks account for the technical aspects of facility production processes. The cost and feasibility of developing benchmarks can differ considerably between industrial subsectors, and industrial subsectors with more standardized production processes are often better suited for benchmarking compared to subsectors where production processes and products vary considerably. [23]
56. For example, within California's carbon pricing program there are approximately 130 industrial facilities from about 30 different subsectors that receive free allowances. California has to date developed over 90 product-based benchmarks across each of these subsectors. These benchmarks were developed in consultation with industry experts and required a significant amount of work to identify and understand the complex manufacturing processes that were

[20] PMR - A Guide to Greenhouse Gas Benchmarking for Climate Policy Instruments
[21] ICAP 2022, Benchmark-based allocation in emissions trading systems.
[22] As set out in RCW 70A.65.110(3)(f) and WAC 173-446-220(2)(d)(ii).
[23] PMR - A Guide to Greenhouse Gas Benchmarking for Climate Policy Instruments.

unique to each subsector and facility.[24] For some subsectors only a single product-based benchmark was established, such as for petroleum refining ('complexity weighted barrel') and cement manufacturing ('adjusted clinker and mineral additives produced'). While for other sectors multiple benchmarks were established to account for the wide variation in activities within the sectors, most notably dairy product manufacturing whereby 16 distinct product-based benchmarks were established (e.g. 'Fluid Milk Product' or 'Whey Protein Concentrate'). In some cases, single benchmarks were eventually split into multiple benchmarks.

57. Within the Washington Cap-and-Invest Program there are ~40 EITE facilities from ~20 subsectors that receive no-cost allowances. While Washington has yet to adopt any product-based benchmarks, there are only three industrial subsectors in which there are likely to be enough facilities to develop sector-level product-based benchmarks. Namely pulp and paper manufacturing (6 facilities), frozen potato manufacturing (7 facilities), and petroleum refining (5 facilities). For the other EITE subsectors there are only one or two facilities and developing product-based benchmarks would potentially result in facility-level benchmarks similar to existing carbon-intensity baselines. Therefore, the merits of developing product-based benchmarks for Washington needs to be weighed against the cost, impacts, and complexity of making any significant changes to existing allocation methods.

Treatment of new facilities compared to existing facilities

58. One final consideration in relation to benchmarking is how new facilities are treated compared to existing facilities. In a conventional regulatory context, precedent exists for treating new and existing facilities differently. For example, in the federal Clean Air Act separate requirements apply to new (and modified) facilities compared with existing facilities. In most cases, existing facilities are not expected to meet the same performance standards as new facilities.[25] This is because performance standards are regulatory requirements that must be met.
59. This differs from benchmarks used for EITE allowance allocation in carbon pricing programs. This is because benchmarks do not prescribe a specific emissions performance standard but determine the amount of allowance a facility will receive relative to their emissions, and facilities retain the flexibility to either meet the benchmark or purchase additional allowances. Therefore, assigning the same benchmark to new and existing facilities can encourage investment in more efficient facilities, whether on existing sites or new developments, in a manner that is consistent with the intention of carbon pricing.
60. The Cap-and-Invest Program Rule currently requires that allowance allocation for new facilities is based on their actual emissions intensity[26], rather than an existing industry benchmark. This means new facilities would not be able to take advantage of the financial incentive provided by the output-based allocation method in the CCA in the same way as existing facilities, which may reduce incentives for investment in lower carbon operations in Washington outside of existing EITE facilities.

[24] California Air Resources Board 2014, Appendix A: Additions and Amendments to Product-Based Benchmarks in the Cap-and-Trade Regulation

[25] SEI report to Ecology in 2010 and presentation to advisory group in December 2024.

[26] Once sufficient data is available to generated a carbon intensity baseline.

Review of Best Available Technology for EITE allowance allocation

61. As noted above, Ecology has interpreted the legislative direction to evaluate "the use of best available technology as a method for compliance" as the use of best available technology as a method of EITE allowance allocation and/or benchmarking.
62. Best available technology assessments have been commonly used in air pollution control regulations to define emission performance standards for industrial facilities.[27] However, they are not typically used within carbon pricing programs. This is because carbon pricing programs are intended to facilitate a market within which regulated entities have the flexibility to determine least-cost compliance strategies and pathways, as opposed to specifying emission reductions requirements or performance standards for individual facilities or covered entities.
63. However, the CCA does already provide an opportunity for EITEs to use best available technology assessments when requesting an upwards adjustment to no cost allowance allocation ahead of the next compliance period.[28] In addition, the CCA includes a definition of best available technology (see Box 1) that provides a basis for evaluating the potential role of BAT as a method of EITE allowance allocation and/or benchmarking.

> **Box 1 - CCA definition of best available technology**
>
> *"...a technology or technologies that will achieve the greatest reduction in greenhouse gas emissions, taking into account the fuels, processes, and equipment used by facilities to produce goods of comparable type, quantity, and quality. Best available technology must be technically feasible, commercially available, economically viable, not create excessive environmental impacts, and be compliant with all applicable laws while not changing the characteristics of the good being manufactured."* RCW 70A.65.010(10)

Evaluating BAT as a method of EITE allowance allocation/benchmarking

64. As shown in Figure 3 above, best available technology or 'BAT' is considered the most stringent benchmark that can be adopted for the purpose of allocating allowance to EITEs. However, the use of BAT as a method of allocating allowance has not been typically used in carbon pricing programs. While the European Union enables consideration of the adoption of BAT as part of its qualitative framework for assessing leakage risk for EITEs, Ecology is not aware of any jurisdictions that have used BAT as the basis for EITE allowance allocation.
65. In evaluating the use of best available technology as a method of EITE allowance allocation, the same key design considerations for benchmarking need to be considered. This includes:
    a) **How BAT is defined**, including whether is it determined at the sector-level, product-level and/or based upon facility-specific conditions: for example, the existing CCA definition of BAT (Box 1) would likely enable consideration of different technologies for producing the same product and would not be limited to existing technologies used by a facility, provided that any new technologies are 'technically feasible, commercially available, economically viable' among other considerations.

[27] Best Available Techniques (BAT) for Preventing and Controlling Industrial Pollution - Activity 1: Policies on BAT or similar concepts Across the World | OECD

[28] As set out in RCW 70A.65.110(3)(f) and WAC 173-446-220(2)(d)(ii).

b) **Data availability and complexity:** compared to other forms of benchmarking stringency (e.g. 90% of average), which are primarily based upon historical emissions and production data, establishing benchmarks for BAT would require additional data to assess a wider range of considerations, such as the availability and financial cost of emission reduction technologies, as well as other potentially confidential business information about facility operations.

66. This means that establishing BAT for a facility or sector would require significantly more information from EITEs about their facility and operations, along with other data and methodologies to assess best available technologies and economic costs, compared to conventional benchmarking methods. The recent experience from Colorado's GEMM 1 rule[29], which required the establishment of BAT[30] for four EITE facilities as means of determining facility-level emissions intensity rates, provides an example of potential approaches for establishing BAT for EITEs. This included the establishment of an auditing regime of qualified third-party auditors to ensure credibility and veracity of the BAT assessments.
67. Another consideration is benchmark stringency and updating. The existing CCA policy implies that demonstrating BAT would enable eligible EITEs to temporarily avoid the application of the default reduction schedule for a four-year period. This would effectively set allowance allocation at a level that is deemed to represent BAT for that facility, and so BAT would effectively become the allocation baseline for that facility. However, under the current policy the facility would then need to reestablish that it is still using BAT ahead of the next four-year period if it wanted to maintain the same level of allowance allocation. This is similar to the GEMM 1 rule in Colorado whereby BAT must be reassessed every five years.
68. It is also unclear how using BAT as the basis for allowance allocation would affect abatement incentives. In the case of GEMM 1 rule in Colorado, EITEs are required to achieve an additional 5% emissions reduction beyond the BAT determination and can sell credits for intensity reductions achieved beyond the mandatory 5% reduction, which helps maintain abatement incentives. While the same could potentially be true if BAT was used as a benchmark for EITE allowance allocation, this would depend on whether other discount factors are also being applied to EITE allowance allocation.
69. The use of BAT as a method of allowance allocation requires careful consideration of the issues described above. Most notably is the implication that it would likely require Ecology to establish facility-level performance standards in terms of BAT, which may erode the intended flexibility of the existing EITE allocation policy within the carbon pricing program.
70. In addition, it is unclear whether there will be sufficient allowances available within the annual program budgets to provide those EITEs deploying BAT with the requisite number of allowances beyond 2034. This would depend on how many EITEs can continue to demonstrate BAT (every four years) and the level of allowances allocation for all other entities receiving no cost allowances, among other factors. This is something that would need to be periodically evaluated, and Ecology would likely need to have the ability to adjust total EITE allowance allocation, including those implementing BAT, to ensure it remains within program budgets.

[29] Greenhouse Gas Emissions and Energy Management for Manufacturing in Colorado (GEMM 1)
[30] Defined as GHG Best Available Emissions Control Technology and energy best management practices.

How Washington approach compares to other jurisdictions

71. Table 1 below summarizes the key benchmarking design aspects of EITE allowance allocation policies in Washington compared to other jurisdictions with similar carbon pricing programs. This includes the EITE allocation and benchmarking methods used, and whether benchmarks or allocations are updated to account for efficiency improvements and new technologies.

72. When assessing different approaches to benchmarking across jurisdictions, it is important to remember that the purpose of benchmarking is to reward the most efficient facilities within the jurisdiction and maintain abatement incentives. This differs from the general objective of providing no cost allowances to EITEs, which is to maintain competitiveness of facilities within the state from out-of-state competitors in order to reduce leakage as discussed in Document 1.

73. In terms of benchmarking, the most notable differences between the Washington approach and other jurisdictions include:

    a) Most jurisdictions have adopted product-based benchmarks as the preferred approach, with energy-based benchmarks the most common fallback method. Washington has not yet adopted any conventional benchmarking methods for EITE allowance allocation, and each EITE has a bespoke allocation baseline.

    b) The EU has the most stringent product-based benchmarks (average of the 10% most efficient facilities), followed by California (90% of average or 'best in class'), with Québec and New Zealand each using sectoral (or facility) averages as the benchmark. Product-based benchmarks are usually defined at the sector-level, although in some cases they are set at the facility level. Washington uses a single, composite production metric for its facility-level carbon intensity baselines (rather than product-based benchmarks), which makes it difficult to directly compare with the stringency of other jurisdictions.

    c) Québec, New Zealand and the EU have recently updated their benchmarks and/or apply discount factors to EITE allowance allocation to account for efficiency improvements and availability of new technologies over time. Washington also applies a discount factor (the 'reduction schedule') that can be interpreted as accounting for efficiency improvements by EITE through to 2034. California does not routinely update its benchmarks, but it applies the most aggressive discount factors of all jurisdictions (see Document 1, Table 1 for further details on discount factors applied by these jurisdictions).

Table 1 - key benchmarking design aspects of EITE allowance allocation policies in selected jurisdictions

Jurisdiction	EITE allocation methods	Benchmarking method (or baseline method if no benchmarking)	Approach to updating benchmarks or making other adjustments to account for efficiency improvements and new technologies
Washington	Carbon-intensity method (output-based) Mass-based method (fallback)	**No benchmarks adopted to date** – each facility assigned a facility-specific allocation baseline, with a single production metric (i.e. without product differentiation). Allocation baselines = avg. emissions/avg. production at each facility during 2015-2019 (intensity-based) OR avg. emissions at each facility during 2015-2019 (mass-based).	Facility-level allocation baselines do not routinely change once they are set. The 'reduction schedule' reduces total allocation by 0% during 2023-2026, 3% from baseline during 2027-2030, and 6% from baseline during 2031-2034 (equivalent to an approx. 0.47% year on year reduction across the 12 years), which can be interpreted as representing anticipated efficiency improvements.
California	Product-Based Allocation Method (output-based) Energy-Based Allocation Method (fallback)	**Product based benchmarks:** sector-level equal to 90% of average or "best in class" facilities in CA based on 2008-2010 data. ~90 product-based benchmarks specified in regulation.	Benchmarks do not routinely change once they are set. No other adjustments to explicitly account for efficiency improvements and new technologies (but other discount factors are applied – see Document 1, Table 1)
Québec	Product-Based Allocation Method[31] (output-based) Energy-Based Allocation Method (fallback)	**Product-based benchmarks:** Sector-level benchmarks specified in regulation for cement, lime and aluminum sectors = average emissions intensity based on 2007-2010 data. For all other sectors each facility has an individual 'target intensity' based on its average emission intensity 2007-2010.	During 2024-2030 the target intensity (benchmark) for each facility will be progressively updated based upon actual emissions intensity during 2017-2019. A 1% annual reduction is applied as 'minimal expected effort' to improve efficiency (along with other discount factors and consignment – see Document 1, Table 1).

[31] Referred to as 'intensity targets', see Calculation Method Used to Determine the Quantity of Emission Units Allocated Free of Charge

New Zealand	Product-Based Allocation Method[32] (output-based) *No fallback method*	**Product-based benchmarks** ('allocative baselines') = average emissions intensity per unit of production based on 2006-2009 data from all relevant facilities (in some cases only one facility). NZ has about 44 product-based benchmarks specified in regulation.	Benchmarks ('allocative baselines') are in the process of being updated using emission intensity data from 2016-2021. No other adjustments to explicitly account for efficiency improvements and new technologies (but other discount factors are applied – see Document 1, Table 1).
EU (Phase 4 – 2021-30)	Product-Based Allocation Method (fixed-historical benchmarking with updating)[33] Energy-Based Allocation Method (fallback)	**Product-based benchmarks** = Average of 10% most efficient facilities within a sub-sector based on 2016-2017 data. The EU ETS has 52 product-based benchmarks specified in regulation.	Benchmarks were updated between 2021 and 2025 to account for technological progress. No other adjustments to explicitly account for efficiency improvements and new technologies (but other discount factors are applied – see Document 1, Table 1). From 2026-2034 industrial allocation will be phased out as the Carbon Border Adjustment Mechanism is phased in.

[32] Referred to as 'allocative baselines', see Overview of industrial allocation | Ministry for the Environment (NZ)
[33] Allocation to industrial installations - European Commission

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Appendix 1 – Design principles for developing product-based benchmarks for EITE allowance allocation

74. The International Carbon Action Partnership has identified two key design principles for developing product-based benchmarks for EITE allowance allocation, drawing upon the experience of those jurisdictions that have adopted this approach (California, Québec, the EU and New Zealand)[34]:
    a) The first principle is the 'one-product, one-benchmark approach', whereby product-based benchmarks should not be differentiated based on technology, fuel mix, size and age of facility, climatic circumstances, or raw materials. This approach is intended to incentivize the full range of abatement opportunities at a facility, including changes to fuels, technologies, and feedstocks. In practice, some jurisdictions have chosen to set product-based benchmarks that account for differences in the production process for the same or similar products. For example, the EU ETS set different benchmarks for steel produced in a blast furnace compared to an electric arc furnace. While this approach may maintain abatement incentives within the defined production process it can eliminate incentives for switching to low-carbon production technologies that fall under a different benchmark or are not covered by any benchmark.
    b) The second design principle involves setting the benchmark based on data that is representative of normal operation years across facilities in the relevant industrial sector. This is intended to ensure that the data used in determining benchmarks excludes any abnormal periods of production they may distort the benchmark value. In practice, jurisdictions have generally used the most recently available two to four years of data to develop benchmarks.

[34] ICAP 2022, Benchmark-based allocation in emissions trading systems.