Knowledge Brief
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Scope 2 emissions mitigation using green power purchases

COLLEGE OF BUILT ENVIRONMENTS
UNIVERSITY of WASHINGTON

CLF Carbon Leadership Forum

This knowledge brief addresses the following requirement from RCW 39.116.050:

> *(iv) Make recommendations for consideration of scope 2 greenhouse gas emissions mitigation through green power purchases, such as energy attribute certificates and power purchase agreements;*

Prepared for the Washington Buy Clean Buy Fair Technical Workgroup in February 2026 by:

- Monica Huang, University of Washington
- Brook Waldman, Carbon Leadership Forum
- Jordan Palmeri, University of Washington

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- Hanna Waterstrat, Washington Department of Commerce
- Jade Ing, Washington Department of Commerce
- Kamilah Keyes-Brown, Washington Department of Commerce

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Introduction

This brief explains how Washington manufacturers can purchase "green power" to reduce the environmental impacts of consuming energy.

This brief first provides the definition for Scope 2 emissions, then explains where manufacturers get their electricity in Washington State and how they can reduce their emissions. This brief also introduces the concept of green power purchases, whether or not they make a difference in supporting the transition to clean energy, how they could be incorporated into a BCBF reporting program, and whether or not a future compliance program should accept green power purchases.

What are Scope 2 emissions?

The Greenhouse Gas Protocol[1] defines Scope 1, Scope 2, and Scope 3 emissions as follows[2]:

1. **Scope 1 emissions** are from operations that are owned or controlled by the reporting company. This includes the combustion of fuel in boilers, furnaces, and transportation vehicles.
2. **Scope 2 emissions** are the indirect greenhouse gas emissions associated with the purchase of electricity, steam, heat, or cooling (as defined in RCW 39.116.010).
3. **Scope 3 emissions** are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.

In this brief about Scope 2 emissions, we will focus on electricity instead of heat, steam, and cooling because 1) electricity is the most significant source of Scope 2 emissions and is the focus of the Greenhouse Gas Protocol Scope 2 Guidance,[3] and 2) it is specifically called out in the legislation above.

[1] The Greenhouse Gas Protocol is a multi-stakeholder partnership of businesses, nongovernmental organizations (NGOs), governments, and others convened by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). They created the reporting guidelines for how organizations should estimate and report their greenhouse gas emissions.
[2] Greenhouse Gas Protocol. (n.d.). Corporate Standard Frequently Asked Questions. Retrieved January 27, 2026 from https://ghgprotocol.org/corporate-standard-frequently-asked-questions
[3] Greenhouse Gas Protocol. (2015). GHG Protocol Scope 2 Guidance. Retrieved January 27, 2026 from https://ghgprotocol.org/sites/default/files/2023-03/Scope%202%20Guidance.pdf

Where do Washington manufacturers get their electricity?

Washington manufacturers purchase electricity from their utility companies, who supply electricity to their customers through the electricity grid. Approximately sixty utilities provide electricity in Washington,[4] the majority of which are publicly owned.[5]

In the State of Washington, based on 2024 data, the majority of electricity was generated through hydropower (~60%), followed by natural gas (~18%), other renewable sources (~10%), nuclear (~10%), and coal (~3%).[6]

Utilities trade electricity across regions to match supply with demand. This means that a customer's electricity may not have been generated by the utility that they purchased it from — the electrons could have come from a different source. According to federal reports, the net electricity generated exceeds the net electricity demand in the state, though some Washington manufacturers have mentioned that there is a lack of electricity capacity in the state. Further investigation would be required to understand this discrepancy.

See Figure A1 in Appendix A for the spread in carbon intensities for Washington utility companies.

How can manufacturers reduce the environmental impacts of electricity?

Generally, the emissions intensity of electricity depends on the *grid mix*, which refers to the specific combination of various energy sources used to generate electricity for that grid. Different utilities and geographic regions use different sources of energy, which have different emissions intensities. Renewable sources like hydropower, wind, and solar emit little to no GHG emissions, while fossil fuel sources like coal and natural gas emit large amounts of GHGs.

Grid mixes and their associated carbon intensities vary by location (as different utilities have different generation sources) and by time (as both generation and demand fluctuate hourly and seasonally).[7]

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[4] State of Washington. (n.d.). List of public utilities in Washington. Retrieved January 1, 2026 from https://wa.gov/health-safety/public-utilities

[5] Solar Washington. (n.d.) Utilities in Washington. Retrieved January 1, 2026 from https://www.solarwa.org/utilities_washington_state

[6] U.S. Energy Information Administration. (2025). Washington Analysis. Retrieved January 1, 2026 from https://www.eia.gov/states/WA/analysis

[7] Washington State Department of Ecology. (2025). Utility-Specific Carbon Intensity of Electricity Clean Fuel Standard program utility-specific electricity for 2025. https://apps.ecology.wa.gov/publications/documents/2514008.pdf

There are three primary ways that manufacturers can reduce the environmental impacts of electricity:

1. **Use less energy**. Manufacturers can use less energy by improving the efficiency of their manufacturing processes.
2. **Directly generate their own energy using renewable energy sources.** Manufacturers can reduce their electricity impacts by generating their own energy either on-site at their facility or off-site.[8]
3. **Purchase green power**. This option is explained more below.

Green power purchases

Green power purchases are based on renewable energy certificates (RECs), which are a common type of energy attribute certificate (EAC)[9] used in North America, where one REC represents one megawatt-hour (MWh) of renewably generated electricity.

A manufacturer in Washington can purchase green power in the following forms:

1. **Unbundled REC products.** Companies can purchase "unbundled" RECs, which are certificates that are separated ("unbundled") from the actual electricity that was generated. This allows a company to purchase RECs independent of where or when the renewable electricity was generated.
2. **Power purchase agreement (PPA)**. A PPA is a contractual agreement between the purchaser and the supplier of renewable electricity or other energy. While not all states allow PPAs, Washington does allow them.[10]
3. **Utility retail options.** Manufacturers can purchase green power products from their utility. The Revised Code of Washington (RCW) requires Washington utilities to offer their customers "a voluntary option to purchase qualified alternative energy resources"(RCW 19.29A.090(2)). Customers can purchase "blocks" of alternative green energy products to offset or reduce their electricity emissions.[11]

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[8] US EPA. (2018). Guide to Purchasing Green Power. Retrieved January 27, 2026 from https://www.epa.gov/greenpower/guide-purchasing-green-power

[9] An energy attribute certificate (EAC) is "a contractual instrument that conveys information (attributes) about a unit of energy, including the resource used to create the energy and the emissions associated with its production and use." Source: https://www.epa.gov/green-power-markets/energy-attribute-certificates-eacs

[10] Solar Washington. (n.d.). Solar Power Purchase Agreement in Washington. Retrieved January 27, 2026 from https://www.solarwa.org/what_is_a_solar_power_purchase_agreement_ppa_and_is_it_valid_in_washington

[11] Washington Utilities and Transportation Commission. (n.d.) Retrieved January 27, 2026 from https://www.utc.wa.gov/regulated-industries/utilities/energy/conservation-and-renewable-energy-overview/green-power-programs-washington

These green power purchase options are illustrated in Figure 1.

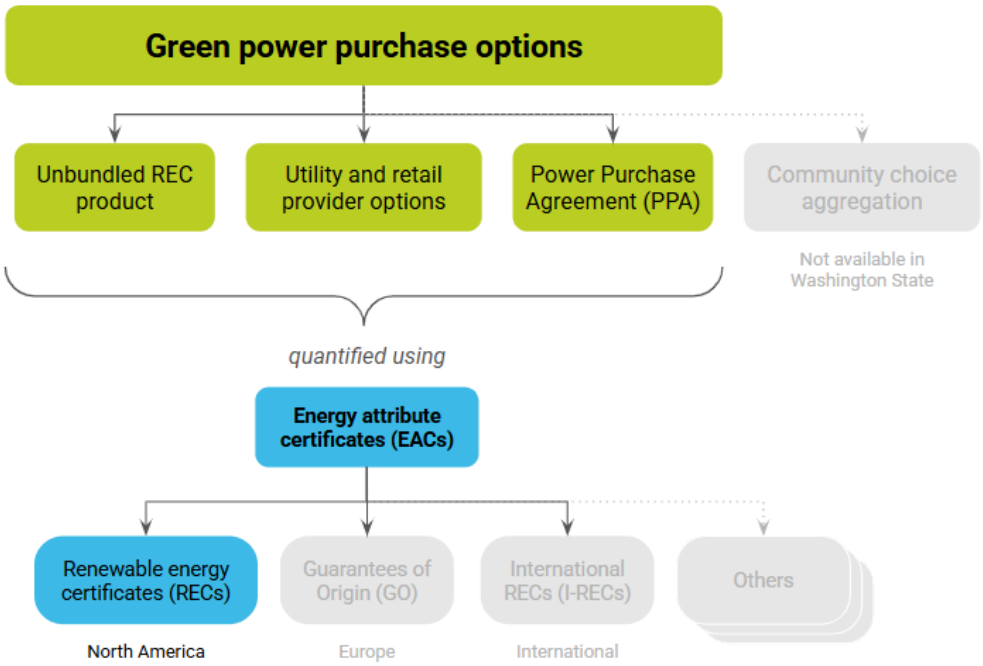


Figure 1. Green power purchase options in Washington State.

It should be noted that **carbon offsets** are different from green power purchases in that carbon offsets are focused on carbon emissions (or global warming potential), whereas green power purchases are focused on electricity accounting. Carbon emissions and electricity consumption are not the same, though a calculation can be performed to convert electricity consumption into carbon emissions.[12] For additional comparisons, see this footnote.[13] Examples of specific products that use green power purchases are:

- **GRN Steel™**, a net-zero-carbon steel produced in Oregon by Cascade Steel Rolling Mills, partnered with Radius Recycling. They purchase and retire RECs each year to address their Scope 2 emissions.[14]

[12] EPA Green Power Partnership. (2018). Offsets and RECs: What's the Difference? Retrieved January 27, 2026 from https://www.epa.gov/sites/default/files/2018-03/documents/gpp_guide_recs_offsets.pdf

[13] Additional comparisons about carbon offsets vs green power purchases:

1. Carbon offsets are *subtracted* from the total carbon emissions (Scope 1, 2, and 3), while green power purchases are *substituted* for the actual grid mix in the Scope 2 calculations.
2. Carbon offsets only affect carbon emissions, whereas green power purchases (electricity) would affect other LCA results. Adding renewable energy in an LCA would affect the whole LCA model, and thus affect all of the LCA impact categories, not just global warming potential.

[14] GRN Steel™. (n.d.). GRN Steel™, Green. Recyclable. Necessary. Delivering a net zero carbon solution. Retrieved January 27, 2026 from https://grn-steel.com/

- **Econiq™ steel**, made by Nucor, North America's largest steel manufacturer. Nucor has purchased multiple PPAs to procure renewable electricity for their operations.[15] They have an EPD for their Econiq™-certified steel (produced in Blytheville, Arkansas) which includes two sets of results:
    1. the results adjusted to include the effect of green power purchases, calculated per the Smart EPD® Part B PCR for Designated Steel Construction Products, and
    2. the non-adjusted baseline results that do not reflect the effect of green power purchases.[16]

Do scope 2 green power purchases make a difference?

Whether green power purchases lead to real overall emissions reductions (rather than simply lowering a given company's carbon footprint on paper) depends on the particular case. When a power purchase leads to emissions reductions that would not have otherwise happened, this is called "additionality" (because the benefits are additional to what would have happened in a business-as-usual scenario if the purchase had not been made).[17] There is a spectrum of how much a purchase or program can demonstrate additionality, and thus a range of how confident we can be that a green power purchase makes a difference.

Currently, most unbundled RECs being sold on the open market *likely do not* make a difference in advancing the transition to clean energy.[18] Purchasing an unbundled REC is simply removing an abstract certificate from the market—it doesn't directly clean the grids. In other words, it doesn't fund or drive demand for more renewable energy. A point of contention is if REC purchases should be more geographically and temporally connected to the customer's consumption, which would theoretically drive more demand for renewable energy production. This is known as "24/7-matching," meaning that all RECs should be precisely matched by hour and grid area to the consumption of the purchaser.[19] However, this topic is hotly debated and

[15] Nucor. (2024). Corporate Sustainability Report. Retrieved January 27, 2026 from https://downloads.ctfassets.net/aax1cfbwhqog/1sjMqwvmB35fkCkKEzKFpi/f0daf98fed1096251b31909841f8022c/2024_Sustainability_Report.pdf

[16] Nucor. (2025). Environmental Product Declaration, Econiq™ RE Hot-Rolled Structural Steel Sections. Retrieved January 27, 2026 from https://api.nucornow.com/api/getFileAttachment?fileId=5291

[17] "Additionality" is a common term in carbon credit programs, where high-integrity programs ensure that reductions are "'additional' to what would have happened if the project had not been carried out" (https://goldstandardhelp.freshdesk.com/support/solutions/articles/44001989691-what-does-additionality-mean-and-why-is-it-important). See also: https://blogs.edf.org/growingreturns/2023/03/03/carbon-credit-integrity/.

[18] Brander, M., Gillenwater, M., & Ascui, F. (2018). Creative accounting: A critical perspective on the market-based method for reporting purchased electricity (scope 2) emissions. *Energy Policy*, 112, 29–33. https://doi.org/10.1016/j.enpol.2017.09.051

[19] Roberts, David. (2025) The debate over renewable energy certificates (RECs). https://www.volts.wtf/p/the-debate-over-renewable-energy

not yet implemented on a large scale (only by certain large tech companies that can afford to do it voluntarily).[19] Some even say that RECs are harmful, threatening the integrity of corporate science-based targets.[20]

However, RECs in the form of PPAs have the power to support the transition to clean energy because they finance future clean energy projects that otherwise would not have been funded, and thus likely demonstrate additionality.[21] In other words, if an organization buys RECs through a long-term contract—a PPA—it can financially support the construction of new renewable energy projects, thus supporting the transition to clean energy.

As for utility green power retail options, these are often unbundled RECs that are purchased by the utility providers, so they face many of the same benefits and shortcomings as other unbundled RECs as described at the beginning of this section.[22, 23] Washington utility green power retail purchases must have a potential physical transmission path from the source to the customer.[24] This provides further confidence in additionality, beyond the overall market for unbundled RECs. More research into specific utility retail programs will help determine the extent to which they demonstrate additionality.

It should be noted that at the time of this writing, the GHG Protocol is currently being revised, which means that the accounting rules for Scope 2 emissions will be changing soon. With new accounting rules, unbundled RECs could become better instruments to support the transition to clean energy.

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[20] Bjørn, A., Lloyd, S. M., Brander, M., & Matthews, H. D. (2022). Renewable energy certificates threaten the integrity of corporate science-based targets. *Nature Climate Change*, *12*(6), 539–546. https://doi.org/10.1038/s41558-022-01379-5

[21] Leggett, Michael. (2022). Greenwashing or true impact? Not all RECs are created equal. Retrieved January 27, 2026 from https://ever.green/insight/role-of-additionality

[22] Puget Sound Energy states that they "use the funds collected from the programs to purchase renewable energy on behalf of program participants, to educate our customers about the programs and to administer the programs," so they do not use the money to directly fund new renewable energy projects (though they state that their green energy program broadly supports renewable energy generation in the region). https://www.pse.com/en/Customer-Service/help-center/renewable-energy

[23] Avista, another utility company, states that "Any funds not used towards the purchase of RECs may support the construction of new community-based projects that increase public education and awareness of renewable technologies." It is not clear if "community-based projects" includes the construction of new renewable energy projects. https://www.myavista.com/energy-savings/green-options/my-clean-energy

[24] B. Cebulko, personal communication, March 2, 2025. This means that the power must come from the Western Interconnection, which covers the west coast to the Rocky Mountain states. See a map and further description at https://www.ferc.gov/OPP/western-markets-explainer

How can green power purchases be reported in BCBF?

When an organization purchases a REC, it must "retire" the certificate (remove it from the market) in a tracking system such as Green-e in order to claim green power usage and avoid double-counting.[25]

Currently, green power purchases are not reported in Washington State's Cap-and-Invest Program (Climate Commitment Act)[26] nor are they reported in Washington's greenhouse gas inventory, which relies primarily on data from the Environmental Protection Agency's (EPA) State Inventory Tool.[27]

For the purposes of a BCBF reporting program, a manufacturer could report their green power purchases in two ways:

1. **In an EPD.** Manufacturers of many construction product types may, depending on the PCR rules, incorporate RECs into their EPD results following the American Center for Life Cycle Assessment (ACLCA) guidance. For more information about how this would work, see Appendix B.
2. **In a BCBF reporting form.** The BCBF reporting program could collect information about green power purchases by adding a section to the reporting form called "Green Power Purchases," similar to the other sections of the BCBF reporting form that collect information about material quantities, environmental product declarations (EPDs), health product declarations (HPDs), and labor. For more information about how this could work, see Appendix B.

Should a future compliance program accept green power purchases?

We tentatively believe that a future BCBF compliance program should accept a GWP result from an EPD that incorporates green power purchases—if the submitter wishes to use such an EPD—but only if it meets the following criteria:

[25] Solar Tech Online. (2026). What is a Renewable Energy Credit (REC)? The Complete Guide. Retrieved January 28 from https://solartechonline.com/blog/what-is-renewable-energy-credit-rec-guide/

[26] Washington State Legislature. (2025). Greenhouse Gas Emissions - Cap and Invest Program. Retrieved January 29, 2026 from https://app.leg.wa.gov/RCW/default.aspx?cite=70A.65&full=true

[27] EPA. (2025). Download the State Inventory and Projection Tool. Retrieved on January 29, 2026 from https://www.epa.gov/statelocalenergy/download-state-inventory-and-projection-tool?token=FnQ95P-Xqm_MFVjuQxQgvw4SdmRw0bcfAFEi4izbGSk

- The EPD follows the **ACLCA's** *Guidance for Quantifying Renewable Electricity Instruments in Environmental Product Declarations* (EPDs).[28] This guidance document very thoroughly considers how green power (a.k.a. "electricity instruments") should be accounted for in LCA modeling and reporting. It should be noted that this guidance document is currently under review and will be updated in the future.
- Additionally, the EPD should **separate the GWP results** (so that there are two sets of results: one reflecting the green power purchase, and one without the green power purchase). The ACLCA guidance does not recommend this, but the steel PCR currently does,[29] and we think this is a good idea because it provides more transparency.
- **The green power purchase demonstrates additionality**. How additionality should be demonstrated should be defined by consulting experts in this field. Current recommended options for demonstrating additionality include purchasing (a) PPAs or (b) unbundled RECs that match the manufacturing facility's grid and hourly use.

[28] American Center for Life Cycle Assessment (ACLCA). 2022. Guidance for Quantifying Renewable Electricity Instruments in Environmental Product Declarations (EPDs). https://cdn.prod.website-files.com/685abecf52079050b589879c/685abecf52079050b58988f7_quantifying%20renew....pdf

[29] Smart EPD. (2025). Part B PCR for Designated Steel Construction Products (1000-008) v3.

Appendices

Appendix A: Carbon intensities, generation, and fuel sources for electricity in Washington State

Figures A1 and A2 show the range in carbon intensity values (left), total generation (center), and mix of fuel sources (right) of electricity provided by utility companies in Washington State.

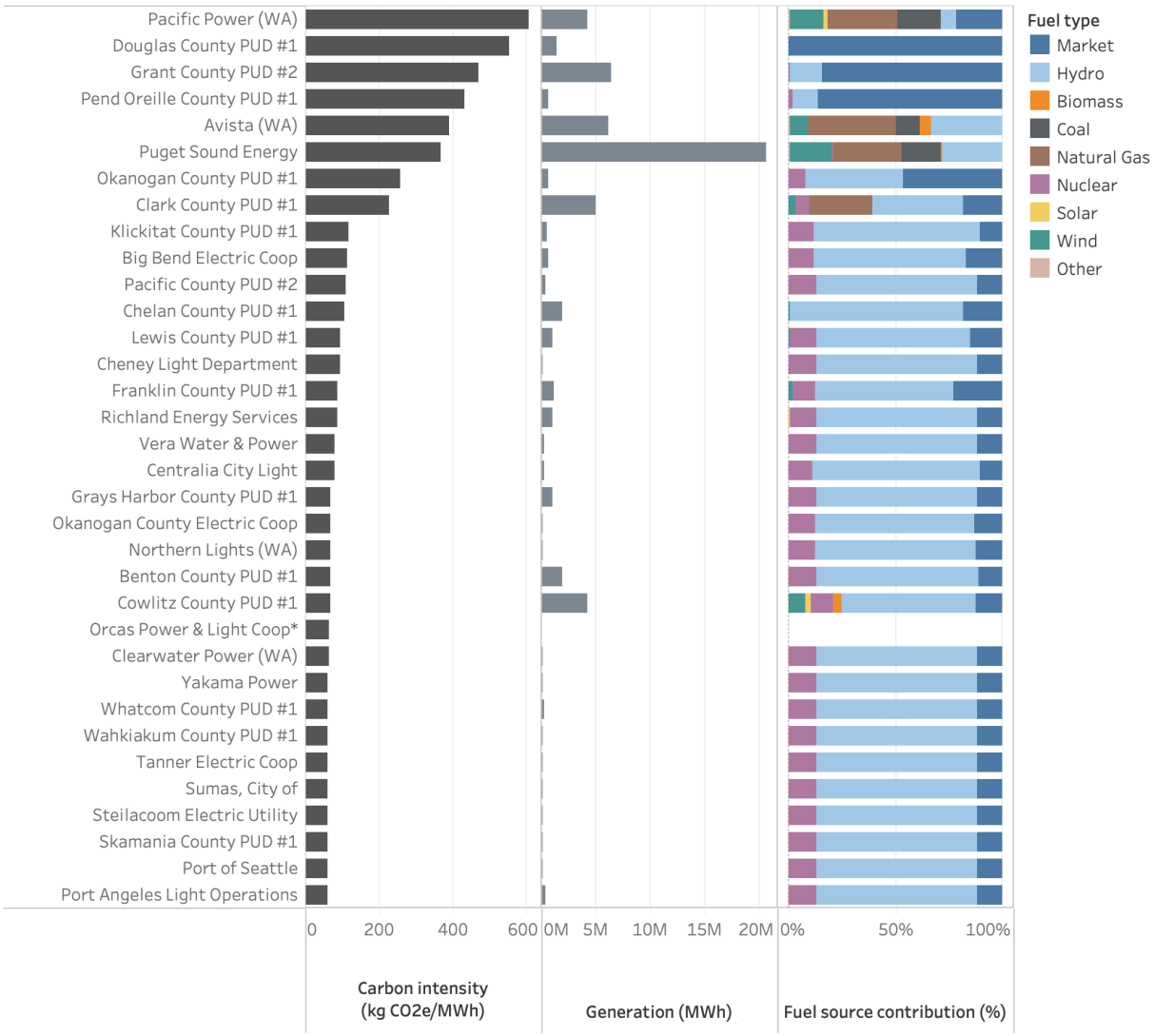


Figure A1. Carbon intensity values, generation quantities, and fuel sources of electric utilities in Washington State — part 1 of 2. Source of carbon emissions intensity data: Washington State Department of Ecology Utility-Specific Carbon Intensity of Electricity 2025 (converted from g CO2e/MJ to kg CO2e/MWh). Source of generation and fuel type data: Washington State Department of Commerce Fuel Mix Disclosure 2023. Visualization by CLF, modeled after a similar visualization by Priopta. *Generation data was unavailable for Orcas Power & Light Coop.

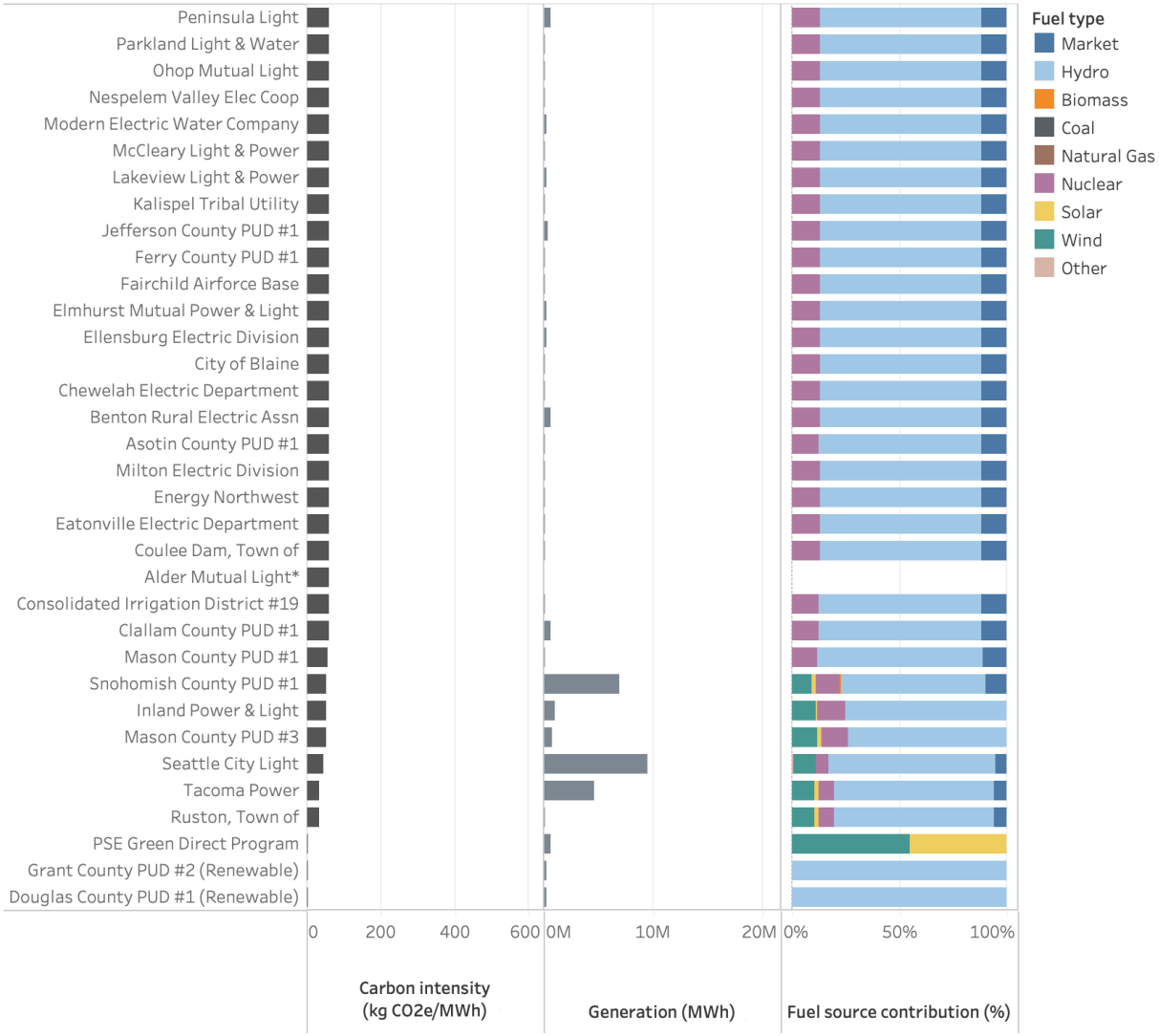


Figure A2. Carbon intensity values, generation quantities, and fuel sources of electric utilities in Washington State — part 2 of 2. Source of carbon emissions intensity data: Washington State Department of Ecology Utility-Specific Carbon Intensity of Electricity 2025 (converted from g CO2e/MJ to kg CO2e/MWh). Source of generation and fuel type data: Washington State Department of Commerce Fuel Mix Disclosure 2023. Visualization modeled after a similar visualization by Priopta. *Generation data was unavailable for Alder Mutual Light.

Appendix B: Options for reporting green power in BCBF

The following subsections provide a bit more information about how green power could be reported in the BCBF reporting program.

Option 1: Reporting green power purchases in EPDs

As stated above in the section "Should a future compliance program accept green power purchases?" we believe that *if a submitter wishes to submit an EPD with a GWP result that incorporates the benefits of green power purchases*, the EPD should meet the following criteria:

- The EPD follows ACLCA's Guidance for Quantifying Renewable Electricity Instruments in Environmental Product Declarations, which is briefly summarized in the next paragraph.
- The EPD separates the GWP results (so that there are two sets of results: one reflecting the green power purchase, and one without the green power purchase)
- The green power purchase demonstrates additionality

Under the current ACLCA guidance: Quantifying Renewable Electricity Instruments in Environmental Product Declarations,[30] EPD results are calculated using RECs-based electricity emission factors using the following basic steps:

1. Apply the manufacturer's purchased RECs to designated facility(ies) and product(s). (This could include some portion of the total production volume for a given product, where that portion is marketed as *green*, *100% renewable electricity*, etc.)
2. When modeling the RECs-applied portion of the electricity consumption, use emissions data that reflect the RECs electricity (generation type, location, etc.).[31]
3. Document REC details in the EPD (Table 2 of the guidance) and the LCA background report (Table 3).[32]

Option 2: Reporting green power purchases in a BFBF reporting form

In a BCBF reporting program, there could be a "Green Power Purchases" section to collect the following information:

- RECs
    - Number of RECs purchased
    - The tracking system used for REC retirement

[30] ACLCA is in the process of updating this guidance at the time of this writing (January 2026).

[31] The guidance directs the modeler to use consumption grid mix emissions data to model any remaining electricity. (A residual grid mix — i.e., "the mix which represents the emissions and generation that remain after certificates, contracts, and supplier-specific factors have been claimed and removed from the calculation" — would be preferable in this context. But North America currently lacks robust residual grid mix data, which the guidance identifies as a limitation.)

[32] Quantifying Renewable Electricity Instruments in Environmental Product Declarations

    - Additional attributes for each REC purchase, such as:[33]
        - Certificate data
        - Certificate type
        - Tracking system ID
        - Renewable fuel type
        - Renewable facility location
        - Nameplate capacity of project
        - Project name
        - Project vintage (build date)
        - Certificate (generation) vintage
        - Certificate unique identification number
        - Utility to which project is interconnected
        - Eligibility for certification or renewable portfolio standard (RPS)
        - Emissions rate of the renewable resource
    - Attachments documenting each REC purchase
- PPAs: The following information for each PPA should be provided:
    - Contract amount ($)
    - Contract duration (years)
    - Total quantity of electricity purchased (MWh)
    - Attachments documenting the PPA purchase(s)
- Utility retail option
    - The utility from which the green power was purchased
    - The name of the green power program
    - The quantity of electricity purchased (in MWh)
    - Attachments documenting the purchase

[33] EPA. (n.d.). Renewable Energy Certificates (RECs). Retrieved January 30, 2026 from https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs