CORRECTED VERSION OF TESTIMONY

February 6, 2023

House Committee on Climate, Energy and Environment
Oregon State Capitol
900 Court St. NE
Salem Oregon 97301

Re: Support: HB 2530 and -1 amendment

Dear Chair Marsh, Vice-Chairs Levy and Levy, and Members of the Committee,

Climate Solutions is a regional non-profit working to accelerate clean energy solutions to the climate crisis.

We support HB 2530 and the anticipated -1 amendment. Renewable hydrogen, specifically green electrolytic hydrogen, will play an important and increasing role in sectors of Oregon's economy that are hard-to-decarbonize over the coming decades. The climate crisis requires an all-hands-on-deck effort. It means every sector of the economy will need to adopt cleaner technologies & be more resilient to the impacts of climate change. We need to act with urgency to figure out how and where new emerging technologies like green electrolytic hydrogen can be deployed to best help us achieve our climate and economic goals while respecting serious environmental justice and community considerations. Oregon has the opportunity now at the outset to get it right and support the burgeoning production and deployment of green electrolytic hydrogen into our economy where we need it most.

HB 2530 helps us start this journey on the right foot, clearly defining the types of low- and zero-carbon hydrogen we should be exploring production in Oregon and allowing important distinctions between them. In consultation with other stakeholders, Climate Solutions, Sustainable NW and the Renewable Hydrogen Alliance have worked together to identify clear, workable definitions for "renewable hydrogen" and "green electrolytic hydrogen" technologies, using the existing statutory definitions of these technologies in Washington and California as an initial base for regional consistency and clarity. Our hope and expectation is that these clear, fair terminologies can now be deployed in future legislation around incentives, strategies, studies and support for the emerging renewable hydrogen industry (*see a detailed walk through of the -1 amendment below*).

Background context: Large-scale federal dollars will soon become available to help our state grow its renewable hydrogen sector. The new production tax credits in the Inflation Reduction Act of 2022, among other federal boosts like the hydrogen hubs, are frankly game changers for making green electrolytic hydrogen a cost-effective technology solution that is now on the near-term horizon. However, in preparing for this emerging clean energy sector, it is imperative that Oregon focus on truly zero-carbon hydrogen and channel its use toward the sectors of our economy hardest to electrify and decarbonize. This focus matters for the climate, equitable community outcomes, and regionally-aligned strategic decarbonization efforts.

Like most climate policy, there is some nuance required to maximize the benefits and minimize potential harms. To this end, from a climate and equity perspective, the two factors that matter most when it comes to deploying hydrogen are:

1. how it is made, and
2. how it is used.

With the -1 amendment, HB 2530 focuses on how hydrogen is made, i.e., produced, to be considered "renewable" or "green electrolytic." Other bills before you this session and in the future will delineate ways to incentivize or support different ways hydrogen should be used, i.e., deployed. Those distinctions and the sideboards will matter immensely as well.

Green electrolytic hydrogen production made without fossil fuels is key: Producing hydrogen takes a large amount of energy and that process can rely on either fossil fuels or renewable electricity. Over 95% of the hydrogen produced and used in the U.S. derives from fossil fuels today, primarily from gas. Oregon should not support continued development of fossil fuel-based hydrogen. With the projected build out of wind and solar facilities to meet Oregon's 100% clean electricity standard, there will be opportunities to use excess renewable energy generation to create **green electrolytic hydrogen, which is the gold standard for hydrogen production.**

In an industry rife with color names that can obfuscate their true source and meaning ("gray hydrogen" means fossil-fuel derived while "blue" and even "turquoise" hydrogen are emerging as new variations of fossil-based hydrogen depending on how the emissions are captured or used), clear definitions of what we call "green electrolytic hydrogen" and "renewable hydrogen" for purposes of Oregon strategically incentivizing and supporting the development of hydrogen matters immensely.

What the -1 amendment is and why it's important: With the -1 amendment, HB 2530 would define the terms "green electrolytic hydrogen" and "renewable hydrogen" and differentiate between the two terms. In case the -1 amendment is not posted in time for the hearing on February 6, 2023, the anticipated language in the -1 amendment is included for your consideration as Attachment A (with a caveat that the very capable LC may change some of the exact verbiage slightly because they know best).

Green electrolytic hydrogen uses renewable power as the feedstock to power electrolysis, splitting water molecules into hydrogen and oxygen. This is the cleanest option available. There are no fossil fuels used or carbon emissions emitted through this process. Essentially, the -1 amendment definition affirms that this is what Oregon means by "green electrolytic hydrogen" too: that the hydrogen is made via electrolysis and is derived from non-fossil fuel based forms of renewable energy and/or nonemitting electricity. It does allow for grid electricity that is clean or cleaner than the current Oregon resource mix as well to reflect the carbon-free hydropower that almost all consumer owned utilities in the state provide and could power electrolyzers to create very low-carbon hydrogen and the clean energy trajectory that Oregon's overall grid is on thanks to HB 2021.

The -1 defines renewable hydrogen to be broader than just green electrolytic hydrogen, and also includes the production of hydrogen using feedstocks like biomass or renewable natural gas via steam methane reformation. The state of Washington similarly defines "renewable hydrogen" to be inclusive of both these types of technologies, but also focuses much of their strategy and prioritized deployment on green electrolytic hydrogen. We think this definition of renewable hydrogen is regionally-consistent, broadly understood in the industry, and enables an

important starting point for future work around incentives, strategies, and other support for the emerging industry.

I have attached a memo as Attachment B about the new federal hydrogen incentives in the recently passed Infrastructure, Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA), and how they are structured to support what we define as green electrolytic hydrogen in particular. The federal government is structuring its new production tax credits to give much higher subsidies for zero carbon electrolytic hydrogen over fossil-fuel based hydrogen production. This is helping shift and focus the market quickly. As the memo underscores, these definitions in the -1 amendment to HB 2530 help both regionally align our state's focus and leverage the region's carbon-free and increasingly-renewable based power to make projects more competitive for lucrative federal hydrogen funding.

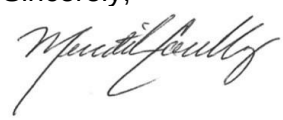
The -1 amendment would also remove the specific taskforce and study the develop a renewable hydrogen strategy. We still think this is very important, and hope separate legislation to undergo a state energy strategy would fold a hydrogen strategy within it. This will help guide the state's strategic deployment of renewable and green electrolytic hydrogen technologies going forward.

Next up: a focus on hydrogen deployment to support decarbonization and communities: It will be important for Oregon to channel renewable hydrogen towards its highest and best uses. The top no-regrets applications are focusing hydrogen in sectors of the economy hardest to decarbonize and electrify, particularly heavy industrial uses, fertilizer and ammonia production, heavy-duty transportation sector, and perhaps for energy storage on the grid. It should not be used to try to "green" the natural gas system both because only small blends of hydrogen are compatible with the existing natural gas pipeline and appliance infrastructure and because blending small percentages of hydrogen in pipeline infrastructure is not a highest and best use of the limited, costly, energy-intensive resource. There is a wealth of studies and data that underscore this, and ODOE's Renewable Hydrogen study is an excellent resource.

There are also serious environmental justice considerations around issues like siting, safety, air quality and costs that require a thoughtful approach. If we don't get it right, we risk hydrogen infrastructure becoming a stranded asset as our policy shifts to meet urgent decarbonization goals, or worse, we could actually see increases in climate or air pollution compared to the fuel it replaced in the first place. For all these reasons, a nuanced discussion about the strategic deployment of state resources to support particular uses of green electrolytic and renewable hydrogen will be a critical future discussion for the legislature and stakeholders.

For all these reasons, **we urge your support of HB 2530 with the -1 amendment**. Doing so will position Oregon well to avail itself of federal funding opportunities that can provide local economic benefits, and accelerate our transition to a clean energy future. This is an exciting inflection point for the state and we're looking forward to supporting progress on this opportunity. Thank you for your consideration of these comments.

Sincerely,



Meredith Connolly
Oregon State Director

Attachment A

Here is the anticipated language in the -1 amendment to HB 2530 for your consideration (with a caveat that the very capable LC may change some of the exact verbiage slightly because they know best).

Anticipated -1 amendment language for HB 2530:

(1)(a) "Green electrolytic hydrogen" means hydrogen produced through electrolysis using:

(A) A renewable energy source as defined in ORS 469A.005;
[note: this references the definition in Oregon's RPS statute]

(B) Nonemitting electricity that is not derived from a fossil fuel; or

(C) An electricity mix that has a carbon intensity that does not exceed the most recent average carbon intensity of the statewide electricity mix as defined in OAR 340-253-0470 at the start of project construction.
[note: OAR 340-253-0470 says: "Statewide electricity mix." The carbon intensity for the statewide electricity mix will reflect the average carbon intensity of electricity served in Oregon and be calculated by using the carbon-intensity of electricity from the most recent year as submitted to DEQ.]

(b) "Green electrolytic hydrogen" does not include hydrogen manufactured using any conversion technology or steam reforming that produces hydrogen from a fossil fuel feedstock.

(2) "Nonemitting electricity" has the definition in ORS 469A.400.
[note: this references the definition in HB 2021 (2021), Oregon's 100% Clean law].

(3)(a) "Renewable hydrogen" means hydrogen produced using:

(a) A renewable energy source as defined in ORS 469A.005;

(b) Nonemitting electricity; or

(c) An electricity mix that has a carbon intensity that does not exceed the most recent average carbon intensity of the statewide electricity mix as defined in OAR 340-253-0470 at the start of project construction.

Attachment B

Re: Federal funding opportunities for renewable hydrogen
From: Meredith Connolly, Climate Solutions
Date: February 5, 2023

I am writing to provide more details on the new hydrogen incentives in the recently passed Infrastructure, Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA), and how they are structured to support green electrolytic hydrogen in particular. As Joseph Webster of the Atlantic Council Global Energy Center has summarized about the IRA's impact, "green hydrogen appears set to displace gray hydrogen in many, perhaps most, domestic markets by 2030."

IRA: Clean Hydrogen Production Tax Credits
The IRA (passed in August 2022) contains two provisions that will subsidize cleaner hydrogen production.

Section 45V: Clean Hydrogen Production Tax Credit
The first provision is a new clean hydrogen production tax credit under Section 45V of the tax code, which provides up to $3 per kg of low-carbon hydrogen produced. The value of the Section 45V credit is based on 1) life cycle emissions associated with hydrogen production, and 2) projects meeting prevailing wage and apprenticeship requirements.

Emission reductions determine the federal tax credit amount available. The highest tier of tax credit amount is only available for hydrogen produced with the lowest life cycle emissions. Life cycle emissions of blue and gray hydrogen made with fossil gas are more carbon-intensive and will have to count upstream methane leakage (which now has a methane fee attached as well). Having clean and affordable electricity in Oregon, particularly carbon-free sources, to produce green electrolytic hydrogen will result in significantly lower life cycle emissions and higher available tax credit values. This tax credit will run for 10 years for any new project that begins construction before 2033.

Stacking incentives available for green electrolytic hydrogen, not blue hydrogen: Further, a hydrogen production facility can use this Section 45V hydrogen production tax credit in combination with the extended production tax credit (PTC) or investment tax credit (ITC). The PTC and ITC brings down the cost of building new solar and wind energy resources and energy storage technologies, which can power the electrolysis to make green electrolytic hydrogen. Green electrolytic hydrogen production may become cost competitive with gray hydrogen production thanks to these new tax credits bringing down its cost by up to two-thirds.

Section 45Q: Carbon capture tax credit
The second hydrogen-related provision in the IRA is an increase in the value of the existing tax credit for carbon capture under Section 45Q of the tax code, which is used to make blue hydrogen. This represents an increased incentive for CCS and therefore blue hydrogen, but it

cannot be paired with the Section 45V tax credit to reduce the production cost of blue hydrogen. As S&P Global reported, “unlike green hydrogen incentives, carbon capture tax credits cannot be "stacked" with other incentives... In other words, a blue hydrogen production facility must choose between earning credits for the hydrogen it produces and earning credits for the CO2 it captures.”

IIJA: Federal Hydrogen Hubs

The IIJA (passed in November 2021) contains $9.5 billion in funding for clean hydrogen, including $8 billion for hydrogen hubs. $1 billion will stand up a “clean hydrogen electrolysis program” specifically to reduce costs of green electrolytic hydrogen production. $500 million is dedicated to support clean hydrogen manufacturing and recycling initiatives. The US DOE will be awarding up to 10 hydrogen hubs around the country. It will be a very competitive award program.

The state of Oregon through the Oregon Department of Energy is coordinating with the State of Washington on a combined hydrogen hub application (called the “Pacific Northwest Regional Hydrogen Hub” or PNWH2). As Washington Governor Jay Inslee made clear (and is quoted on the front of the PNWH2 website), the focus is how to “decarbonize the hardest-to-reach parts of the economy, such as heavy transportation, aviation, maritime, and industrial operations with *green electrolytic hydrogen* and our incredible renewable electricity resources” (emphasis added).

That is not surprising because the Pacific Northwest has a competitive advantage with respect to renewable electricity compared to other states, due to our hydropower and both states having 100% clean electricity requirements and timelines set out in legislation. Many other states and regions will presumably focus on blue hydrogen (produced with fossil fueled electricity and carbon capture) due to their dirtier grids and less progress on renewable electricity generation.

Further, US DOE has made clear that the hydrogen hub applications “will be **evaluated by the degree to which they reduce emissions** across the full life cycle.” (US DOE source; emphasis in original). Green electrolytic hydrogen reduces emissions far more than blue hydrogen, which increases the competitiveness of green hydrogen hub applications in the scoring methodology. (see, e.g., a 2021 study from Stanford and Cornell professors concluding that “total carbon dioxide equivalent emissions for blue hydrogen are only 9%-12% less than for gray hydrogen,” and that the GHG footprint of blue hydrogen is greater than that of simply burning natural gas for heat.)

I hope this information is helpful in your consideration of legislation to support the emerging renewable hydrogen sector in Oregon.