Oregon Clean Technology Task Force Report

September, 2024

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- John O'Leary, CEO, Daimler Truck North America
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Members

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Executive Summary

In June 2024, Governor Tina Kotek, Senator Ron Wyden, and Daimler Trucking North America CEO John O'Leary, together with Congresswoman Suzanne Bonamici and Senator Jeff Merkley, launched the Oregon Clean Tech Manufacturing Task Force. The group brought together leaders across private and public sectors with a mission to create and expand jobs for Oregonians by growing Oregon's place as a leading hub for the discovery and manufacture of clean energy technologies the world needs to quickly decarbonize.

The Task Force found that the $3 trillion restructuring of the US energy system driven by the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA) is creating an enormous and untapped economic development opportunity for Oregon to become a leader in clean energy tech manufacturing and innovation. This includes potential for $4-$8 billion in new manufacturing investment in Oregon, the creation of 9,000 to 18,000 manufacturing jobs in rural and urban communities, the founding of dozens and perhaps hundreds of new start-ups, and the creation of hundreds of millions in new tax revenues to support critical community priorities. If policies are designed with intentionality, black, brown, tribal and rural communities can lead in the development, commercialization, manufacture and deployment of these clean energy technologies.

The Task Force found that Oregon is worryingly behind in the race to develop a clean tech manufacturing cluster of critical mass. To correct course and realize the state's potential will require bold action. The Task Force identified the following key challenges and recommendations:

1. **Shortage of Shovel Ready Industrial Land:** Address the shortage of shovel-ready industrial land by improving Business Oregon's RSIS program, adding additional tools to provide site readiness resources to developers upfront, and capitalizing these tools with adequate resources.
2. **Bottlenecks Straining Availability of Clean Energy**: Ensure priority for siting energy infrastructure in state land use system, encourage investment in transmission infrastructure including upgrading existing lines, and pursue creative financing such as a state Transmission Authority to support grid development.
3. **Insufficient Incentives Stack:** Develop competitive incentive packages, including R&D incentives, job training support, and capital expenditure offsets, that prioritize benefits for environmental justice communities.
4. **Underdeveloped Workforce Pipeline:** Invest in partnerships and programs to build a robust clean tech manufacturing workforce pipeline.
5. **Underperforming Innovation Ecosystem:** Strengthen support for research, innovation, and entrepreneurship in clean tech by filling gaps in financing for early-stage start-ups, building physical infrastructure for research and prototyping, and improving coordination among currently fragmented stakeholders in the I&E ecosystem.

Introduction

In spring 2024, Senator Ron Wyden, Governor Tina Kotek, and Daimler North America CEO John O'Leary, along with Senator Jeff Merkley and Representative Suzanne Bonamici, announced the formation of the Oregon Clean Tech Task Force. The task force was charged with providing recommendations to maximize the state's competitiveness in two critical domains: 1) attracting, clean energy technology (clean tech) manufacturing investment, and 2) positioning the state as a leader in research, development, and commercialization of important new energy technologies.

This initiative was formed in response to the historic opportunity presented by the Inflation Reduction Act's enormous investment in developing leadership in the industries and technologies that will enable the energy revolution, an opportunity Oregon has yet to capitalize on.

The task force brought together approximately 40 leaders from across Oregon, representing government, business, economic development, labor, climate, land use, and academic interests. This diverse group prioritized both geographic and demographic representation, as well as expertise in key clean energy technology sectors. To address the complex challenges facing Oregon's clean tech industry, the task force organized itself into five subcommittees: Industrial Land Availability, Incentives and Regulatory Competitiveness, Workforce Development, Research, Innovation and Entrepreneurship, and Energy Availability and Transmission. Each committee was tasked with identifying solutions to overcome challenges in their respective areas.

Throughout its work, the task force engaged with industry stakeholders to gain perspective on Oregon's strengths and weaknesses in each of these critical areas. What emerged was a picture of extraordinary opportunity for Oregon to grow its clean tech sector, with far-reaching benefits for our state. However, the task force also identified significant barriers that must be overcome for this opportunity to be realized.

The first section of the report provides a general summary of what the Task Force about Oregon’s opportunities and challenges before quickly providing a high-level summary of committee recommendations. The subsequent sections present the findings and recommendations of each subcommittee.

It's important to note that while the full Task Force reviewed and provided feedback on committee recommendations, it did not vote on their adoption. This approach allows for a comprehensive view of the challenges and opportunities while recognizing that some recommendations may require further discussion and refinement.

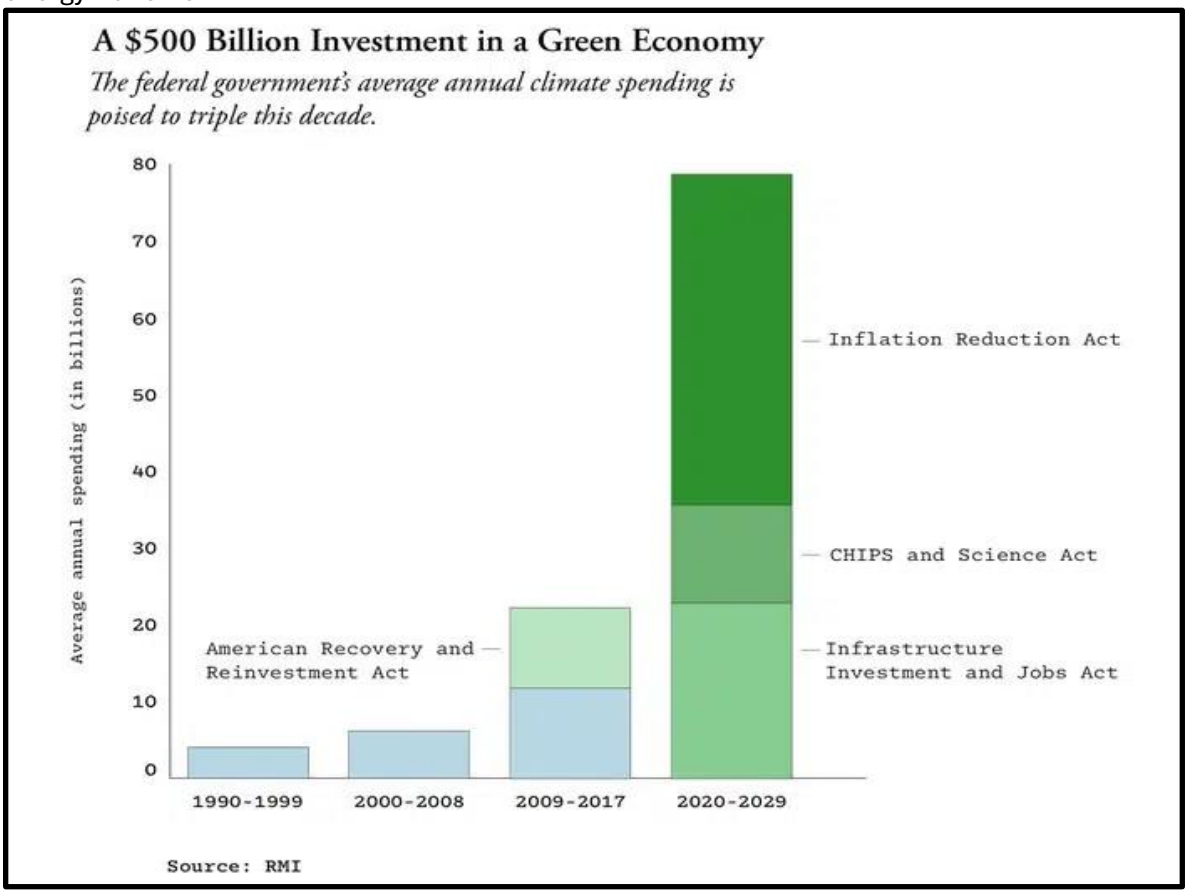
Oregon has the potential to become a world leader in clean energy technology design, manufacturing, and innovation. This report provides a roadmap for the work needed to realize that potential, creating prosperity and opportunity for a broad cross-section of Oregonians in the process. The time to act is now, and this report serves as a guide for the critical work ahead.

Report Summary

The transition from a fossil fuel powered economy to one powered by clean energy is a titanic undertaking. The magnitude of this economic transformation represents a historic opportunity.

Goldman Sachs estimates that the federal Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA) will drive $3 trillion in investment to restructure the US energy system by 2032 – a sum equal to roughly 3% of current world GDP.[1]

The shift, supercharged by the IRA's projected $1.2 trillion in clean energy incentives, offers immense economic development and job creation opportunities for states like Oregon, in addition to the societal benefits of decarbonization and climate change mitigation. Of the $369 billion in total new spending authorized, the IRA allocates roughly $60 billion in tax credits, loans, and grants to spur the development and manufacturing of the clean energy technologies that will power the energy transition.



Findings show that state-level actions to accelerate the clean energy transition can stimulate Oregon's economy. Modeling estimates that recently adopted policies will bring increasing growth, adding nearly 10,000 jobs and $2.5 billion *annually* to Oregon's GDP in 2050, and provide $49 billion in cumulative benefits, including avoided health care costs, through 2050, while additional

[1] https://www.goldmansachs.com/insights/articles/the-us-is-poised-for-an-energy-revolution.html

policies could increase Oregon's GDP by almost $4 billion annually and create more than 18,000 jobs in the year 2050.[2]

The Oregon Clean Tech Task Force - which focused on clean energy technology development and manufacturing - was formed to provide recommendations to add to this economic benefit by maximizing the state's competitiveness in two domains:

1. Expanding and sustaining existing clean energy technology manufacturers and attracting new ones
2. To position the state as a leader in research, development and commercialization of important new energy technologies.

The benefits for Oregon communities could be enormous: the BlueGreen Alliance[3] estimates that 900,000 new manufacturing jobs will be created nationwide while Data for Progress[4] estimates that the IRA's provisions could stimulate $440 billion in public and private manufacturing investment. If Oregon attracted 1-2% of this investment, a share equal to the state's proportion of national population, the state could see the creation of between 9,000 and 18,000 good manufacturing jobs, between $4 billion and $8 billion invested here, and the generation of hundreds of millions in new tax revenues per biennium – the largest economic development opportunity in the state outside of semiconductors. And with intentional program design and concrete metrics, these opportunities can reach into underserved BIPOC, rural, coastal and other communities.

Oregon's potential to realize this opportunity is real.

1) We are already home to some enormously promising clean energy tech activity:

- Daimler Truck North America, headquartered in Portland, recently invested $40 million in an R&D center for the future of zero-emission long haul trucking.[5] Here Daimler employs 3,000 in research, development and manufacture of its next generation zero emission trucks, with a test facility in Madras. Jaguar Land Rover and several other automotive companies maintain presences in Oregon anchored by the ecosystem of talent and suppliers developed to support Daimler. That ecosystem is giving rise to exciting start-ups in electric mobility like Photon Marine, a company making electric motors for maritime vessels.
- Oregon is home to a unique and growing ecosystem of global utility scale battery energy storage systems (BESS) companies at varying stages of development using different chemistries for diverse use cases. This, plus an abundance of computational and energy industry expertise makes the region ideal for accelerating a world class cluster to develop cutting edge smart grid, BESS, and grid-interactive products and services. BESS companies here - including Powin (recently named by Time Magazine as one of the 100 most influential companies in the world[6]), ESS Inc, ZincFive, Gridstor and QPO – benefit from close proximity to the semiconductor industry and numerous data centers. Portland is one of the top 10 cities nationally in terms of data center concentration.

[2] https://energyinnovation.org/2022/03/10/new-oregon-energy-policy-simulator-modelling-shows-major-benefits-of-accelerating-climate-policies/
[3] https://www.bluegreenalliance.org/site/9-million-good-jobs-from-climate-action-the-inflation-reduction-act/
[4] https://www.filesforprogress.org/memos/IRA-Climate-Jobs-Memo.pdf
[5] https://oregonbusiness.com/daimler-staying-put-in-oregon-with-planned-40m-swan-island-expansion/
[6] https://time.com/6980458/powin/

- Start-ups like next-generation heat pump manufacturer, Aris Hydronics, and floating offshore wind component manufacturer Willamette Technical Fabricators (WTF), have been recognized for their innovative technologies and processes by recent federal grant awards.
- The state is home to an emerging cluster of marine energy research, development and commercialization. Along with WTF, the state is home to the Pacific Marine Energy Center, the first wave energy test center in PacWave and related start-ups like Panthalassa. On offshore wind alone, independent research from the National Renewable Energy Laboratory[7] finds Oregon could be in line for enormous job creation by supplying the national industry.
- Oregon is also home to a strong base of metal fabricators like Radius Recycling (formerly Schnitzer Steel), a metals recycling business. While not strictly a "clean energy technology" company, Radius and the state's metals and machinery companies will be a critical supplier of wind, solar and EVs due to those products' reliance on certain metals. Radius's Cascade Steel Rolling Mill in McMinnville offers some of the lowest carbon finished steel products for infrastructure construction.

2) Independent research from the Rocky Mountain Institute and the Brookings Institute finds that many of Oregon's regional economies have significant opportunities in primary manufacturing of clean energy technologies, representing a huge potential boon to geographic equity in economic development.[8] These include electric vehicle manufacturing, battery and component manufacturing, offshore wind component manufacturing and heat pump manufacturing (see chart below). Among other opportunities listed is high potential in solar cell manufacturing. While

Cleantech Opportunity in Oregon: Industry Feasibility by Metropolitan Area

Feasibility scores represent percentile, with 384 metropolitan statistical areas (MSAs) considered nationwide.

Feasibility Percentile Range

< 20 | 20–40 | 40–60 | 60–80 | ≥ 80

	Albany-Lebanon, OR	Bend, OR	Corvallis, OR	Eugene-Springfield, OR	Grants Pass, OR	Medford, OR	Portland-Vancouver-Hillsboro, OR-WA	Salem, OR
Batteries & Components	54	87	32	92	55	87	95	56
Electric Vehicle & Component Manufacturing	56	89	24	93	56	90	96	66
Energy Transmission Equipment	50	87	33	92	53	88	94	58
Green Hydrogen	46	80	29	89	50	82	88	65
Heat Pumps	50	83	22	92	53	84	90	65
Low-Carbon Cement & Concrete	67	98	21	98	81	97	95	70
Low-Carbon Iron & Steel	56	87	24	93	57	90	93	54
Solar Energy Components	47	86	45	89	55	86	95	70
Wind Energy Components	55	91	24	95	63	91	96	58

Table: RMI • **Source:** Clean Growth Tool • Download image • Download PDF

RMI

Per RMI: "Feasibility" is determined by calculating by "noting that if two industries historically tend to locate in the same areas then they must require similar local capabilities. Extending this idea to all combinations of clean energy industry pairs allows [one] to use a location's existing industry base to generate a measure of likelihood that any industry will be successful in that area."

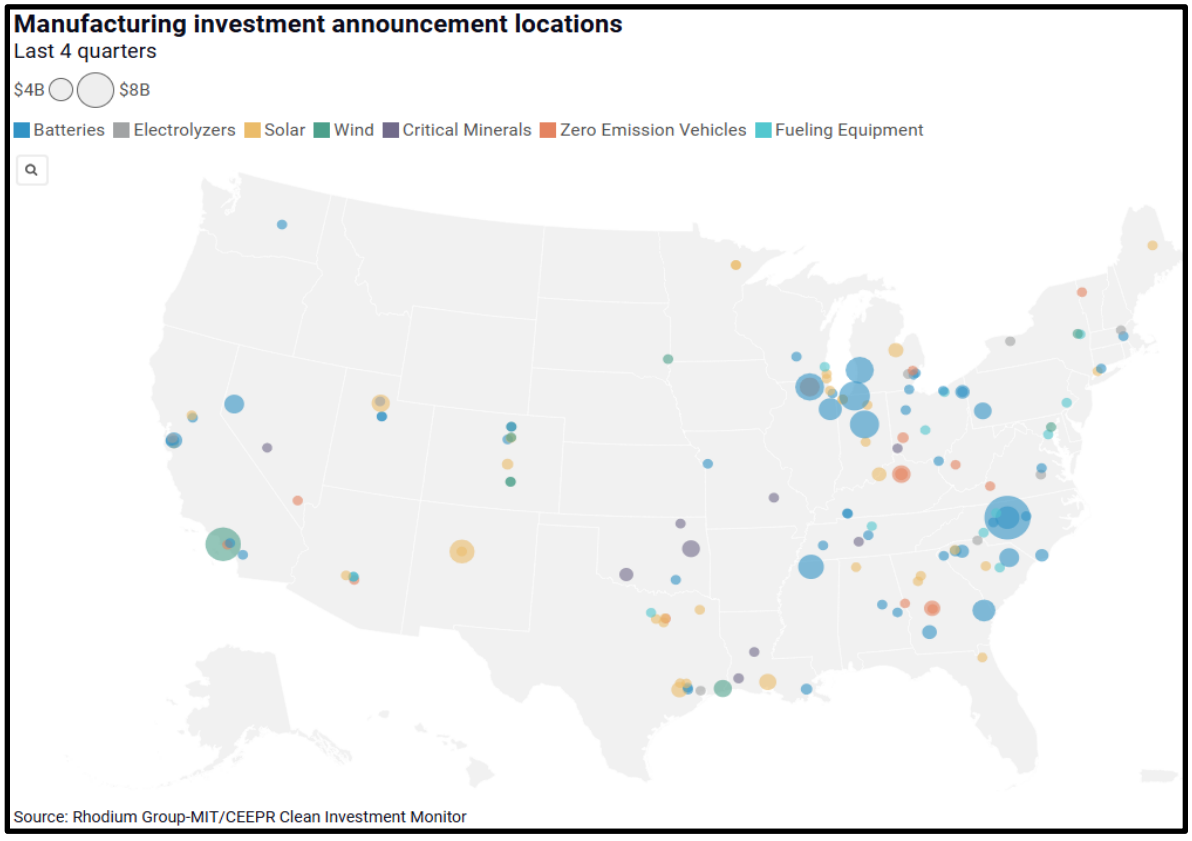
[7] https://www.nrel.gov/docs/fy23osti/84710.pdf

[8] https://cleangrowthtool.rmi.org/

domestic solar cell manufacturing faces steep challenges from Chinese oversupply, if the industry can flourish in the US there's a high likelihood it can do so in Oregon. Oregon's potential in this segment owes to its globally recognized semiconductor cluster; manufacturing solar photovoltaic cells is very similar to fabricating semiconductor chips and can benefit from our nation-leading concentration of semiconductor talent and suppliers.

3) Greater Portland Inc, the economic development agency representing the greater Portland metro region, reported to the Task Force a number of open recruitment projects that, if landed in Oregon, would invest upwards of $6 billion and bring 5,000 manufacturing jobs here.

Oregon's window of opportunity to stake its claim as a leader in clean energy tech manufacturing is narrow and rapid response is essential; without it much of the $440 billion manufacturing surge will go to states more ready and welcoming of it. Despite strong building blocks for success – including existing policies and incentives programs aimed at accelerating the deployment and adoption of clean energy technologies – the state has been left off the map for clean energy tech manufacturing investments. While Oregon has successfully drawn down $6.5 billion[9] in federal Infrastructure Investment and Jobs Act and IRA funds for infrastructure and clean energy investments, **of the more than $100 billion in privately led, federally supported clean energy tech manufacturing investments tracked by the Clean Investment Monitor, Oregon has received $0 as of July 2024**.[10]



[9] https://www.whitehouse.gov/wp-content/uploads/2024/05/Oregon-IIA-State-Fact-Sheet.pdf
[10] https://www.cleaninvestmentmonitor.org/

As Oregon stagnates, our competitors are developing centers of gravity to attract investment. Firms in traded-sector industries form clusters as they are drawn to specific places with unique workforces, specialized suppliers, or critical natural resources. This kicks off a virtuous cycle of success: the more that companies and their competitors invest in a place, the greater the density of specialized workers and suppliers, and the more they and their competitors will be drawn to invest. This dynamic is at play in the developing "battery belt" in the Southeast and Midwest United States, where automotive and battery manufacturers are clustering near existing supply chains and population centers, sweetened by significant incentive packages.[11] A similar dynamic has recently played out in Oregon where the state, home to 15% of the national semiconductor workforce, attracted $40 billion in new investment here (more than 10% of the national total as of this writing[12]) after passing a historic economic incentive package to strengthen the local semiconductor ecosystem.

Oregon must move quickly to develop its own center of gravity. Because of the clustering effect, the stronger that competitor states' clean tech clusters grow, the greater the challenge Oregon faces in attracting investment.

Several obstacles are limiting the state's ability to capitalize on the promising market footholds mentioned above.

- **Industrial Land Availability:** According to GPI several billion-dollar, large employment projects had to locate elsewhere due to a lack of suitable industrial land in the Portland Metro region. But land readiness is not just a Metro issue, and clean tech manufacturing is not just a Portland opportunity. A 2023 statewide survey found that more than half of responding cities are missing economic development opportunities because of a lack of shovel ready industrial land (meaning the land is ready for facility construction to begin as soon as the project is approved), and that 80% of state industrial lands are not shovel ready. Clean energy tech manufacturing needs land. Without it, businesses will manufacture elsewhere.[13]
- **Energy Capacity Constraints:** Clean energy tech manufacturing will add meaningful load to a grid already straining to meet demands. The pace of new and upgraded transmission infrastructure construction to bring clean energy to our load centers where new manufacturing plants are proposed is one of the most significant challenges to maximizing Oregon's opportunity in clean tech manufacturing.
- **Insufficient Incentives**: The "table stakes" have shifted in terms of what is deemed competitive as states have moved aggressively to provide incentives to ensure they have a foothold in this generational opportunity. States like Massachusetts announced a ten-year, $1 billion investment to develop leadership in clean tech industries. Others like Kansas, Mississippi, and West Virginia, have announced nine and ten figure incentive packages for individual projects. What companies view as competitive now is colored by the knowledge of what they could receive elsewhere in clusters at least as compelling as Oregon's. That places an imperative on Oregon to at minimum address the notable gaps in its own incentive stack. Those include: incentives for R&D, incentives for job training/retraining,

[11] https://www.canarymedia.com/articles/clean-energy-manufacturing/the-south-is-building-the-most-vibrant-ev-and-battery-hub-in-the-us
[12] https://www.whitehouse.gov/invest/?utm_source=invest.gov
[13] https://www.opb.org/pdf/Statewide%20Industrial%20Land%20Survey%20Breakdown_1675899718106.pdf

matching funds for pursuit of federal grants, and cash to offset upfront capital expenditures.

- **Underdeveloped Clean Tech Manufacturing Workforce Pipelines**: As noted above, Oregon has nascent strength in a variety of clean energy tech domains. But by and large, clean energy tech manufacturing is largely underrepresented in Oregon and so relevant workforce development pipelines are underbuilt relative to our ambitions.
- **Underperforming Innovation and Entrepreneurial Ecosystem**: The world economy remains in the early innings of its transition to a decarbonized economy. Many new technologies that will enable the transition await discovery and commercialization, with others already in development but still years and even decades away (see Oregon firm Clean Edge's "tech maturation model" for more detail on this[14]).. With robust innovation and entrepreneurship ecosystems featuring the right mix of supports and incentives, states like Oregon can ensure many of these breakthroughs are made and commercialized here. While Oregon has strengths to build upon in terms of clean tech innovation and entrepreneurship, the state has critical gaps in financing and infrastructure that impede aspiring hard tech companies from transitioning from innovation to marketplace. This fact is born out in the data. Business Oregon's 2024 Innovation Index underscores that Oregon is trending downward relative to other states across every metric related to commercialization and nearly every metric related to Business Environment (exports is the only one that increased in the last 5 years).[15] Over the past 5 years, Oregon has trended in the bottom 20% among all states in both Entrepreneurship and Research and Development.

The good news is that Oregon is not without solutions to these challenges. But the solutions will need to be bold to have the desired impact. The size of the opportunity and the activity of competitors demands it, while the challenges confronting Oregon's ability to develop leadership in clean tech manufacturing also limit the state in other dimensions. For example, without solutions to the transmission bottleneck Oregon will fail to reach its clean energy goals. Or without solutions to make a significant dent in Oregon's shovel ready industrial land shortage, the state will struggle to maximize its opportunities in all industries that require industrial land, not just clean tech.

The shovel ready **industrial land** shortage can be solved by improving and adding tools to encourage local jurisdictions to invest in shovel ready land, and by capitalizing them with significant amounts to make them workable. Hundreds of millions are needed to make a dent.

The **energy capacity** bottleneck also needs significant public and private investment. This could be facilitated by the creation of a state Transmission Authority tasked with providing tools to finance and support transmission development. But investment in new transmission lines alone will not address the bottleneck; support is needed to make transmission siting more expeditious, utilities need to implement grid enhancing technologies to maximize the capacity of existing transmission infrastructure, and western state entities need better transmission planning across their jurisdictions.

The state and workforce partners need to invest in partnerships and resources to build a **workforce development** pipeline that clean tech manufacturers trust will meet their skill needs and that

[14] https://cleanedge.com/data-dive-charts/2024-Clean-Edge-Tech-Maturation-Model
[15] https://www.oregon.gov/biz/Publications/InnovationIndex2024.pdf

ensure good jobs for Oregonians. The state needs to utilize existing forums such as the Oregon Clean Energy Workforce Coalition and workforce boards for statewide coordination among stakeholders in the clean tech manufacturing workforce ecosystem, which can help training providers understand market demand for new programs and limit duplication of time and resources in new program development. This coordination includes prioritizing community-centered design to ensure these family wage jobs benefit underrepresented workforce members, driving alignment with Justice40 goals. But financial resources are also needed, including those that support apprenticeship programs and higher education providers to develop new clean tech-focused programs or scale-up proven ones. It also includes direct support for on-the-job training for companies inventing new tasks in new industries (like floating offshore wind) and those participating in legacy industries transitioning to a zero-emission paradigm, like long haul trucking.

New **clean energy tech incentives** as well as support for **research, innovation and entrepreneurship** are needed to reach parity with other states. Following the model deployed by Massachusetts - a leader in the development and manufacture of a variety of clean energy technologies - $500M over 10 years would be needed to fill important gaps in the state's incentive and entrepreneurial support offerings. By providing incentives for capital investments (in the form of loans and tax incentives), funds for development of technology R&D facilities, matching grants and technical assistance for pursuit of federal grants, procurement subsidies, and incentives for research and development, this effort would plug important gaps in the state's incentive stack limiting capital investment into Oregon and improve the state's ability to foster the development of new technologies.

The Task Force recognizes the challenging budget situation facing the state. While difficult decisions lie ahead for the Legislature, **by investing now, the state positions itself not just to maintain its competitiveness but to lead in the rapidly growing sector of clean energy technology manufacturing.** The economic, social, and environmental benefits that come from this investment—new jobs, private sector growth, and a cleaner energy future—will compound over time and create significant return on investment. As other states and countries move quickly to capture these opportunities, a proactive investment will secure our place in the race and help ensure that we can build a prosperous, equitable, sustainable economy.

A Vision of Success in Oregon

As Oregon implements these Task Force recommendations and gains growing traction in clean energy technology manufacturing, the state stands to realize a vision of innovation, growth, and shared prosperity, across the state, that builds on itself in a virtuous cycle. Along with the metrics – a potential for $4-$8 billion in new manufacturing investment in Oregon, and the creation of 9,000 to 18,000 manufacturing jobs in rural and urban communities – the following provides a view of what this success could look like on the ground for Oregonians. The vision includes:

- Start-up, university, and industry inventions moving from the bench stage into early production and scale.
- Industry, university, workforce, labor, and community-based groups collaborating to define crucial skills for new and growing technical and family wage jobs, leveraging existing and

new programs to build a thriving clean tech manufacturing workforce, explicitly prioritizing disadvantaged workers, and engaging new as well as transitioning workers.

- Inventors and entrepreneurs emerging in Black, Brown, Tribal, and rural communities, supported by statewide as well as targeted programs and investments, bringing new solutions, teams, and skills to a more diverse and resilient clean energy ecosystem.
- Clusters of new manufacturing and prototyping facilities popping up, leveraging infrastructure in a planful, growing network of expanding and new sites, including in underdeveloped and disadvantaged communities, with abundant clean power, housing new clean manufacturing and research throughout the state.
- Businesses from across the country and around the globe choosing Oregon as the site for their expansion facilities and new ventures.
- Highly-skilled experts – from engineering to production to business functions – bringing world-class skills and elevating their careers as they move up within clusters of related companies.
- Kids in primary and secondary schools seeing an exciting future in STEM subjects and technical skills, whether industry- or college-bound, building a strong pipeline of innovators and contributors to Oregon's continuing growth.
- Expanding income and tax bases across the state, boosting education, programs, infrastructure, investments, and services that support thriving and resilient communities.

In this vision, 'success' doesn't require that Oregon is *the* center of U.S. manufacturing in this sector, but that it becomes one of the clear leaders, among a handful of other states, in multiple industries – with those industries realizing synergy across skills, investments, and policies – while attracting and inventing new industries in the process.

Key Recommendations

1. **Bolster State Incentives Programs** to deliver needed, up-front investment for clean energy technology manufacturing companies to build, start-up and conduct R&D, hire, train and retain diverse workers, and leverage private and federal capital.
2. **Advance Strategic Procurement & Talent Development** through policies and programs to require or incentivize public and private procurement practices that support local clean energy tech manufacturers and promote local jobs, apprenticeships, and "high road" training partnerships.
3. **Establish Clean Tech Centers of Innovation Excellence** that support collaboration, innovation, workforce development and training, are strategically located in emerging areas of innovation and designed to serve disadvantaged communities, that provide infrastructure that supports hard tech development and maturation, and that can serve as focal points for partnerships among university scientists, innovators, and investors.
4. **Adopt Siting, Land Use, & Technology Improvements to support clean energy mandates** and economic development goals, while expanding new transmission and maximizing existing grid infrastructure.
5. **Support Regional Energy Market Development & Transmission Investments** by establishing unique finance mechanisms for critical infrastructure and proposing

improvements to BPA transmission planning and investment.

6. **Prioritize Site Readiness for Industrial Land** by modifying and adding tools and providing state resources to enable local governments to invest in site readiness.
7. **Promote High Road Job Creation & Inclusive Career Pathways** and leverage state and federal investment for workforce training in clean tech.
8. **Cultivate Strategic Collaboration & Partnerships**, that fill gaps in Oregon's clean tech innovation ecosystem, including collaboration with neighboring states through aggregated purchasing to promote Oregon-based manufacturers, and leading clean technology firms to attract expertise and investment.
9. **Initiate Strategic Marketing Campaigns** to promote Oregon's clean tech capabilities and exports in local, national and international markets.
10. **Develop Clean Tech Manufacturing Hubs** to maximize available land use and energy capacity.
11. **Maintain a Supportive Policy Framework** by upholding and expanding existing climate, justice, and workforce policies to further drive the marketplace to scale.

An Example for Prioritizing Justice Across Committee Recommendations

One of the primary reasons the clean tech manufacturing opportunity is so exciting for Oregon is its potential to deliver economic and environmental justice for communities that have been left behind across the state. However, for Black, Brown, Tribal, and rural communities to benefit meaningfully—especially in developing and commercializing solutions—intentionality will be needed in the design of policies, investments, and partnerships.

Economic and environmental justice must be central when implementing the Task Force's recommendations. For instance, economic justice can be achieved by ensuring that policies prioritize job creation, workforce training, and access to capital for historically marginalized communities. Environmental justice can be realized by directing clean energy investments toward communities disproportionately affected by pollution and climate change, and ensuring they have a voice in decision-making. We launch the report with the following examples to show how justice can be intentionally built into the Task Force's recommendations, encouraging readers to consider this approach from the start.

Where & Who

The federal government developed the Climate & Economic Justice Screening tool (CEJST) map.[16] As described in the Justice40 Interim Guidance, the tool includes *"interactive maps with indicators to assist agencies in defining and identifying disadvantaged communities."*[17] The Climate and Economic Justice Screening tool is just one methodology for how disadvantaged communities can be identified and investment steered toward them. Oregon has its own definition for "environmental justice communities"[18] that could also be deployed. Regardless of what definition is used, the concept is what is important: using data to create an agreed-upon methodology of identifying geographic disadvantaged communities.

Encouraging investment in disadvantaged communities

Financial Incentives: The Incentives Committee calls for incentives to attract clean tech manufacturing capital investment, job retention incentives, incentives for R&D and expanding investments in SBIR/STTR programs. These could be designed such that either priority is given to companies investing in disadvantaged communities, or that material bonus incentives are given to companies investing in these communities. Incentives could also be designed to encourage companies to meet diversity targets in their hiring. The same could be true of state procurement of clean technologies - prioritizing procurement from DBEs and MBEs.

Research, Innovation and Entrepreneurship Ecosystem: The Research, Innovation and Entrepreneurship Committee calls for investment in physical infrastructure to fulfill prototyping and scale-up needs for translation of innovation to practice. The state could structure funding

[16] https://screeningtool.geoplatform.gov/en/
[17] https://screeningtool.geoplatform.gov/en/
[18] Oregon statute (HB 4077, 2022) defines environmental justice communities as "communities of color, communities experiencing lower incomes, communities experiencing health inequities, tribal communities, rural communities, remote communities, coastal communities, communities with limited infrastructure and other communities traditionally underrepresented in public processes and adversely harmed by environmental and health hazards, including seniors, youth, and persons with disabilities."
https://olis.oregonlegislature.gov/liz/2022R1/Downloads/MeasureDocument/HB4077

supporting such infrastructure to encourage these facilities to be built or expanded in disadvantaged communities.

Industrial land: The Industrial Land committee calls for significant state investment in site readiness and improving land use permitting and processes to make it faster for sites to reach shovel ready status. The state and/or localities could both provide bonus resources for site preparation and development for undeveloped lands in disadvantaged communities, and provide streamlined permitting for these projects.

Workforce: The Workforce Committee calls for better coordination and partnerships across workforce development stakeholders and investments to support development or scale-up of clean tech manufacturing training programs. Partnerships should be designed to ensure workers and community-based organizations from disadvantaged communities are informing program development, and the state could prioritize funding for training programs in local colleges and technical schools.

Generation and Transmission Committee

Introduction & Background

Thanks to the leadership of the 2021 Oregon legislature, Oregon's electricity grid is on a path to transition to 100% clean energy sources by 2040. If done right, the transition to a clean electricity grid will serve as the clean energy backbone to power our industries, support job creation and economic growth in local communities, and reduce energy costs for Oregon households and businesses. Even with minimal load growth, achieving Oregon's clean energy mandate will require addressing pressing barriers to accelerate the development of renewables and rapidly expand transmission capacity to deliver that energy to end users.

Electricity utilities in the region are already expecting significant load growth in the next decade. Load growth is projected to increase 30% over the next 10 years, driven largely by the rapid expansion of energy-intensive data centers and growth of Oregon's world-leading semiconductor research cluster.[19] This anticipated load growth increases the challenge of meeting Oregon's clean energy targets reliably, and adding new clean tech manufacturing in the state only increases it further. While significantly less energy intensive than AI data centers, multi-billion dollars worth of clean energy tech manufacturing will add meaningful load to a grid already straining to meet demands. The state urgently needs solutions to ensure clean energy availability is not a bottleneck to this generational opportunity.

Lack of transmission infrastructure to bring clean energy to our load centers where new manufacturing plants are proposed is one of Oregon's most significant challenges. Estimates for the cost to build out the necessary transmission infrastructure needed to meet load growth and Oregon's clean energy targets range from $3-$5 billion dollars over the next 10 years.[20] Other challenges to build out the necessary infrastructure include lengthy local, state, and federal siting and permitting timelines and costs, lack of a fully integrated regional electricity market, land use laws that prioritize other uses over clean energy infrastructure, public opposition and community impacts, a lack of competitive financing opportunities, and the unique role the region's federal power marketing agency, the Bonneville Power Administration plays in the region.

Recommendations

The Generation and Transmission Subcommittee of the Oregon Clean Technology Task Force pulled from expertise in land use, transmission planning, technology advancements and finance to develop a subset of recommendations to address clean energy availability as a bottleneck to the state's generational clean tech manufacturing opportunity. Membership included representatives from investor owned utilities, a consumer owned utility, advocacy organizations, labor organizations, and city, county and state government leaders.

At a high level, the committee's discussion and recommendations focused on the following:

[19] https://www.pnucc.org/system-planning/northwest-regional-forecast/
[20] https://www.bpa.gov/-/media/Aep/transmission/attachment-k/2023-bpa-transmission-plan.pdf

1) **Technology:** The state should support utilization of Grid Enhancing Technologies where appropriate to maximize existing transmission and encourage the use of backup technologies and storage.
2) **Siting and Land Use:** The state should consider revisions to land use goal 13, audit current siting regimes for efficiencies, review judicial review processes, and encourage siting in existing ROWs.
3) **Geographic and Site Considerations:** Energy infrastructure must be included in industrial site readiness and new large manufacturing loads should be strategically located.
4) **Federal and Regional Issues:** The state must resource agencies to participate in regional conversations around markets and resource adequacy, as well as engage with the federal delegation on issues around the Bonneville Power Association.
5) **State Role:** The state should support identification of critical infrastructure and explore potential solutions to funding new transmission development.

The following sections provide context on the 5 topic areas where actions are needed in order to meet the Oregon Clean Tech Task Force goals. Many of these topics are currently under discussion in legislative workgroups, the state energy strategy development, and other venues, providing various opportunities for action and engagement. The recommendation sections also highlight the areas of jurisdiction for the recommendations.

Technology

Summary of Recommendations and Responsible Parties

- *Increase the application of Grid Enhancing Technologies where appropriate to maximize capacity of existing transmission.* - (Legislature, Utilities, Public Utility Commission)
- Consider grid flexibility, back-up generation, and storage for new clean tech loads

Increase the application of Grid Enhancing Technologies (GETs) where appropriate to maximize capacity of existing transmission.
Recommendations: In order to maximize the deployment of GETs where technically feasible and effective, the state could direct transmission operators to undertake a comprehensive analysis of GETs, including cost effectiveness compared to other transmission options, gains in efficiency and capacity, and implementation where appropriate. The state may need to consider regulatory mechanisms, including mandates and incentives that ensure utilities are able to invest in and deploy GETs. Likewise, the state should seek ways to incentivize the use of GETs for both investor owned utilities and consumer owned utilities.

Issue summary: Considering the challenges and costs associated with developing new transmission infrastructure, emphasis on improvements and capacity increases for existing transmission should be prioritized. There are several technologies that can be applied to existing transmission infrastructure to increase grid capacity, efficiency and reliability known as GETs. Examples of GETs include dynamic line ratings, ambient adjusted ratings, line monitoring systems, advanced conductors, flexible AC transmission systems (FACTS) such as series capacitors, synchronous condensers and more. The Federal Energy Regulatory Commission (FERC)'s recent order No. 1920 requires that transmission providers consider the use of GETs such as dynamic line

ratings, advanced power flow control devices, advanced conductors, and transmission switching in long-term regional transmission planning. The committee recommends that the state considers regulatory incentives and mandates to implement GETs where feasible to support maximizing current infrastructure in light of clean tech manufacturing goals. Likewise the state should explore federal grants available to support implementation of new technologies aimed at improving transmission capacity.

Consider grid flexibility, back-up generation, and storage for new clean tech loads.

Flexibility of new large loads, including clean tech manufacturing, must be considered. The state should direct utilities to work with their customers to develop demand-side management and energy efficiency programs which result in greater grid flexibility.

Similarly, the state should encourage the use of carbon free back-up generation or storage technologies, especially for loads that are unable to provide flexibility during peak events. Financial incentives may be needed for clean-tech businesses to add these types of back-up generation. More broadly, the state should also consider ways to increase the application of storage to support grid reliability and expand the capacity of existing transmission.

In addition to providing back-up generation, storage technologies can be used to enhance the electricity grid by reducing congestion, balancing supply and demand, integrating renewable generation and providing ancillary services. The state should evaluate the role storage plays in meeting clean energy mandates and maintaining grid reliability and establish a roadmap to implementing storage which includes both mandates and incentives.

Siting and Land Use

Summary of Recommendations and Responsible Parties

- *Amend Oregon's Land Use Planning Goal 13 to acknowledge clean energy (Legislature, Department of Lands Conservation and Development)*
- *Review Federal/State/Local jurisdiction over siting to identify overlap and duplication (Legislature, Oregon Department of Energy)*
- *Review EFSC judicial review process to identify clarifying language which will support more streamlined and efficient processes (Legislature, Oregon Department of Energy)*
- *Address local opposition and community impacts by supporting local communities and local governments (Oregon Department of Energy, Department of Land Conservation and Development, Local Governments)*
- *Support policies which encourage use of existing ROWs. Streamline permitting processes for upgrading existing transmission lines. (Legislature, Department of Transportation)*

Achieving Oregon's clean energy mandate will require addressing pressing barriers to accelerate the development of renewables and rapidly expand transmission capacity to deliver that energy to end users.

Inconsistency between local, state, and federal permitting processes, lengthy timelines, outdated state land use planning processes and public opposition have resulted in ever increasing timelines and costs to permit new clean energy infrastructure and transmission. The most recent transmission line permitting process, Boardman to Hemingway, is still underway after 20 years of review at the state and federal level. Utilities should be encouraged to upgrade, reconductor and use existing easements and public rights of way (ROWs) for needed capacity prior to looking to build new lines. Federal, state, and local regulations and policies should encourage these efforts as the first choice whenever possible. The state needs to take a close look at the policies which have exacerbated lengthy permit timelines and result in serial appeals which add millions of dollars to the cost of electricity.

The state must evaluate amendments to existing policies and develop new policies which better support the state's clean energy targets and economic development goals, while maintaining a robust process for Oregonians' input and participation. The state should also look for ways to utilize federal resources and processes, such as the federal Coordinated Interagency Transmission Authorizations and Permits Program (CITAP) process and use federal timelines outlined in CITAP and streamlined federal review to inform their decision-making. The following recommendations will support the build out of necessary infrastructure to meet CTTF goals and maintain a reliable electricity grid. Siting challenges are also relevant to other task force recommendations on industrial land.

Amend Oregon's Land Use Planning Goal 13

Oregon's 19 Statewide Land Use Planning Goals express the state's policies on land use and related topics, like citizen involvement, housing, and natural resources.[21] Oregon's land use goals have not been updated to reflect the impacts of climate change and the significant need for new infrastructure to meet electricity demand growth and decarbonization targets. Land use Goal 13 is the only goal to address energy use in the state by establishing a goal to prioritize "energy conservation".[22] Clean energy projects are at a disadvantage in Oregon's land use process as they are not acknowledged in the state's land use laws and other uses of land always take priority. By amending Goal 13 to add "clean energy" as an important priority, it will create parity between clean energy and other uses of land and make it more efficient for clean energy projects to earn approval. This will allow clean energy projects to be developed using the same review process as uses such as housing, nurseries and wine tasting rooms. This amendment to Oregon's land use goals will retain the state's ability to value and protect land and natural resources while also promoting renewable energy generation to meet new load growth and achieve decarbonization of the electricity system.

Review of Federal/State/Local Jurisdiction

Currently in Oregon where federal permitting for new clean energy and transmission projects is needed, the state also conducts a permitting process and issues a site certificate through the Oregon Energy Facility Siting Council, which is supported by the Oregon Department of Energy. If the project is on federal land, the National Environmental Policy Act (NEPA) also applies. Going through both permitting processes can take significant amounts of time and add cost to a project. The state should audit the various local, state, and federal permitting regimes which apply to renewable energy generation and transmission in the state to identify areas of duplication and

[21] https://www.oregon.gov/lcd/op/pages/goals.aspx
[22] https://www.oregon.gov/lcd/OP/Pages/Goal-13.aspx

opportunities for streamlining processes, shortening timelines and addressing increasing costs which add to the costs of new clean energy resources. This work should be done in a manner which ensures adequate opportunities for input and influence of all jurisdictional entities as well as community members and interested parties. Results of this analysis should be used to inform legislation amending state processes to align better with federal permitting processes.

Review EFSC judicial review process to identify clarifying language which will support more streamlined and efficient processes
The State Energy Facility Siting Council process for review and approval of clean energy projects and transmission should be reviewed to identify areas to streamline and improve efficiency of project approvals.

Address Local Concerns and Community Impacts
Local opposition to infrastructure projects remains one of the biggest challenges to getting the much needed clean energy generation and transmission projects built. Since it is the policy of the state of Oregon that utilities will serve customers with 100% clean energy by 2040, the state should consider ways to support deeper engagement with communities and local governments during the development and permitting process, recognizing the process local governments need to implement for any development. The state should consider ways to support local governments through efforts like matching communities who host existing clean energy projects with state and federal funding.

The state should also support communities to better understand the benefits and impacts of projects. To minimize exacerbation of the rural/urban divide on issues such as clean energy and transmission projects, the state should support local decision making.

Encourage Use of Existing Right of Ways and Streamline Permitting Processes for Upgrades of Existing Transmission Lines
Given the amount of new transmission needed to meet increasing electricity demand across the nation, states are considering ways to site new lines within the rights of way (ROWs) of other infrastructure such as existing transmission lines, roads and rail. While consolidating infrastructure into existing ROWs can minimize public opposition to development on unimpacted lands, it is not always easier to permit considering ownership and use of existing ROWs. The state should facilitate development of transmission infrastructure where feasible into highway ROWs by ensuring laws allow multiple uses of these ROWs. Likewise, the state should work collaboratively with private ROW holders such as railroads to identify ROWs available for co-location.

Upgrades to existing transmission lines require less impact than building new transmission lines. The state should encourage use of existing transmission ROWs by streamlining the permitting processes for upgrades to existing lines. The federal government recently finalized rules allowing for categorical exclusions under NEPA for upgrades to transmission lines in existing ROWs. The state should evaluate its own permitting process for upgrading existing transmission lines and offer a similar streamlined or minimized permitting process.[23]

Geographic & Site Considerations

[23] https://www.federalregister.gov/documents/2024/04/30/2024-09186/national-environmental-policy-act-implementing-procedures

Summary of Recommendations and Responsible Parties

- *Aligning work of identifying new industrial lands with infrastructure and generation (Business Oregon, Department of Lands Conservation and Development, Oregon Department of Energy)*

Transmission and energy infrastructure must be considered when new clean energy technology manufacturing sites are being selected. Even further upstream, these must be a key component of industrial site selection and readiness. The industrial land subcommittee explored various ways to support industrial land readiness that tie closely with discussions around energy.

Align work of identifying new industrial lands with energy infrastructure and availability
As the state works to increase clean tech manufacturing, industrial sites, suited for the needs of different types of manufacturers, are paramount. The more detailed summary and recommendations in the industrial land section outline Oregon's unique challenges with industrial land development. Utility infrastructure and any needed improvements must be considered and addressed. Moreover, working closely with utilities on location and sites will help ensure that these sites will be able to serve these new loads. Locating similar clean tech manufacturing in strategic "hubs" should also be considered. Funding for dedicated site readiness is crucial to move this forward in communities across the state.

Federal & Regional Dynamics

Summary of Recommendations and Responsible Parties

- *Monitor and pursue opportunities presented by the Inflation Reduction Act and the Infrastructure Investment and Jobs Act that support investment in regional transmission and clean energy infrastructure. (Oregon Department of Energy)*
- *Continue support for agency engagement on regional issues*, including regional market development and regional transmission planning. *(Legislature, Public Utility Commission, Oregon Department of Energy)*
- *Ask the federal congressional delegation to support implementing improvements to the Bonneville Power Administration's (BPA or the Administration) transmission planning and financing process to help meet load growth and clean energy mandates. Likewise, the federal congressional delegation should work with BPA to ensure that decisions around energy market participation consider impacts to ALL Oregonians who rely on BPA's hydro power and transmission system. (Legislature, Governor's Office, State Agencies, Federal Delegation)*

The electricity infrastructure and market that Oregon relies on is influenced far beyond the borders of the state. Oregon's consumer and investor owned utilities participate in a regional market and import approximately 60% of the electricity Oregon consumers use.[24] For this reason continued expansion and improvements to market operations as well as increases to high voltage transmission capacity are critical to ensure access to clean diverse renewable generation from across the west to meet the state's reliability and clean energy needs.

[24] https://energyinfo.oregon.gov/energy-by-the-numbers

The evolution of regional markets, including the most recent efforts to establish a day ahead market is an important topic for Oregon lawmakers, agencies and utilities to track and engage in. In the 2021 legislative session, the state passed a bill directing ODOE to conduct a study on the benefits and challenges associated with Oregon utilities joining a Regional Transmission Organization (RTO).[25] The study, completed in December, 2021 found that Oregon customers will benefit from Oregon utilities participating in the most geographically expansive regional market as possible.[26] On the other hand, Oregon may be harmed by the development of new market seams if they result in isolating customers from critical transmission infrastructure and diverse generation resources.[27]

Oregon customers also rely heavily on the Bonneville Power Administration (BPA) who markets the hydropower resource from the Columbia and Snake River dams and owns approximately 75% of the high voltage transmission in the region. Oregon utilities seeking to procure clean electricity from resources across the west are heavily dependent upon BPA, which is a federal agency, not subject to regulations and laws enacted by the state. Given the critical role BPA plays in meeting the state's reliability and decarbonization goals, it is important for state decision makers to track and engage regularly with BPA as well as the Pacific Northwest Congressional Delegation to ensure Oregon priorities are considered in federal lawmaking.

The areas where regional and federal decision making influences outcomes related to Oregon's electricity grid the most deeply are related to energy markets and transmission. Likewise federal grants and loans available under the Inflation Reduction Act and the Bipartisan Infrastructure Law can support improvements to Oregon's grid and therefore it is critically important that state agencies are aligned on priorities related to federal funding and communicating regularly with counterparts in the federal government to take advantage of opportunities.

Federal clean energy incentives and funding opportunities
The state should support efforts to proactively leverage funding opportunities under the Inflation Reduction Act and the Infrastructure Investment and Jobs Act that support investment in regional transmission and clean energy infrastructure. Specifically, the State should build on past success by supporting agency staff capacity and facilitating public-private coordination to pursue federal investment opportunities.

Continued Support for Agency Engagement on Regional Issues, including regional market development and regional transmission planning
Decisions on development of regional markets are occurring in various regional venues. It is critically important that Oregon state agencies such as the Public Utility Commission and the Oregon Department of Energy are adequately staffed and supported to participate in these venues.

The Western Electricity Transmission Expansion Coalition and the Western Resource Adequacy Program, both administered by the Western Power Pool, are serving the important functions of regional transmission planning and regional resource adequacy. Similar to regional market development, these are critically important venues for Oregon state agencies to be adequately staffed to engage in.

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[25] https://olis.leg.state.or.us/liz/2021R1/Downloads/MeasureDocument/SB589/Enrolled
[26] https://www.oregon.gov/energy/energy-oregon/Pages/RTO.aspx
[27] https://renewablenw.org/sites/default/files/Reports-Fact%20Sheets/Market%20Configuration%20Matters%20June%202024.pdf

Engagement with Federal Congressional Delegation on Issues Related to BPA
The role the Bonneville Power Administration plays in meeting Oregon's clean tech sector growth and the delivery of clean electricity to support this growth cannot be overstated. The state must coordinate regularly with the Pacific Northwest Federal Congressional Delegation to ensure ALL Oregonians are served fairly and effectively by this federal resource. BPA's transmission planning and finance process needs much improvement and recommendations outlined by Grid Strategies in 2023 highlight important considerations.[28] The state should also work with the federal congressional delegation to make certain that BPA's decisions on energy markets do not result in new electricity market seams and improve access and costs associated with the use of BPA's transmission system.

State Role

Summary of Recommendations and Responsible Parties

- *The state should explore development of a state Transmission Authority to provide more tools to finance and support development of transmission. (Legislature)*
- *The state should identify critical infrastructure needed to meet clean energy mandates and maintain system reliability and support agencies in ensuring streamlined processes for approval. (Legislature)*
- *Oregon Department of Energy state energy strategy should consider challenges and opportunities highlighted by the OCTT (Department of Energy)*

State Transmission Authority
States across the west are grappling with the need to build out additional transmission infrastructure. One tool states are considering is development of a State Transmission Authority who is authorized to issue bonds and work with public and private investors to identify the most competitive and critical transmission infrastructure projects to meet the needs of customers and support the state's economic development goals. Oregon should explore unique financing tools, such as development of a State Transmission Authority in the 2025 legislative session.

State Identification of Critical Infrastructure
The state should identify critical transmission infrastructure needed to meet the state's clean energy targets and economic development goals and work with state, local and federal partners to ensure a clear path towards completion.

State Energy Strategy
The Oregon Department of Energy State Energy Strategy is currently underway, with targeted completion by November 2025. While convening a diverse group of stakeholders and examining key issues, the state energy strategy should consider the challenges and opportunities highlighted by the OCTT and look for ways to support implementation of the actions identified in this report where the agency is the responsible party.

[28] https://renewablenw.org/sites/default/files/Reports-Fact%20Sheets/BPA%20Tx%20Whitepaper%2005.03.2023.pdf

Committee Membership:

- Larry Bekkedahl, Portland General Electric, Chair
- Nicole Hughes, Renewable Northwest, Chair
- Nora Apter, Oregon Environmental Council
- Megan Decker, Public Utility Commission
- Janine Benner, Oregon Department of Energy
- Brandon Pursinger, Association of Oregon Counties
- Brandon Capps, Pacificorp
- Nolan Plese, League of Oregon Cities
- Ted Case, Oregon Rural Electric Cooperative Association
- Randall Edwards, Former Oregon State Treasurer
- Robert Westerman, IBEW 932
- Ranfis Giannettino Villatoro, BlueGreen Alliance
- Meredith Connolly, Climate Solutions

Incentives, Regulations & Procurement Committee

Introduction & Issue Summary

The CTTF Incentives, Procurement, and Regulations Committee included representatives from established industry leaders, economic development organizations, early stage start-ups, labor leaders, and foundations. The Committee relied on both members' and outside experts' experience, insights, and expertise to inform our research and recommendations.

The Committee assessed Oregon's existing incentives landscape as well as other leading states' financial incentives–including cash grants, rebates, tax credits, and procurement subsidies–that the State may consider to entice companies to relocate, expand, or stay in Oregon. Based on that analysis, committee members identified incentive tools for the State to consider to minimize the "cost gap" between Oregon and its key competitors, identifying incentives strategies and scale that will be most effective in both attracting capital investment and job creation and accelerating research and development.

The Committee also explored how public procurement and private purchasing practices can further attract, retain, and promote in-state clean tech manufacturing and supply chains. The Committee identified policy opportunities to incentivize local, state, regional, and private entities to leverage their significant buying power to stimulate demand for clean energy technologies and create a stable market environment that encourages manufacturers to invest and grow in Oregon.

Lastly, the Committee examined Oregon's existing regulatory environment to consider how existing and future regulatory programs can best promote technological innovation and advancement and position Oregon as a leader in clean manufacturing and industrial decarbonization. The Committee focused on the role of climate and clean energy policies as a mechanism to catalyze economic development and bring the clean energy technology manufacturing market to scale.

The Committee organized our discussion and our ensuing report recommendations around three distinct but related topic areas: 1) Incentives, 2) Procurement, and 3) Regulations. The Committee found that Oregon can leverage its existing strengths to foster innovation and attract investment in clean technology manufacturing through strategic initiatives focusing on:

1. **Incentives: Enhance & Expand State Incentive Programs** to provide needed, up-front investment ($50 million/annually) for companies to:
    a. Leverage federal and private funding (e.g. matching grants, technical assistance, etc.) to drive capital investment;
    b. Advance family-wage job creation and hire, train and retain diverse workers;
    c. Facilitate research for site location and project development.

2. **Procurement: Advance Strategic Public & Private Procurement** to further attract, retain, and promote in-state clean tech manufacturing and supply chains and incentivize localized production, including through policies and programs to:
    a. Adopt statewide purchasing policies that support local clean energy tech

manufacturers and promote local jobs, apprenticeships, and high road training partnership;

b. Leverage partnerships and collaboration with neighboring states, through aggregated purchasing to promote Oregon-based manufacturers, and leading clean technology firms to attract expertise and investment.

c. Initiate strategic marketing campaigns to promote Oregon's clean technology capabilities and exports in local, national and international markets.

3. **Regulations: Maintain a Supportive Policy Framework** by upholding and expanding existing climate, justice, and labor workforce policies to further drive the marketplace to scale.

The below sections provide context on the above topic areas where actions are needed in order to meet the Oregon Clean Tech Task Force goals.

INCENTIVES

Available incentives are often a critical factor for companies determining where to establish or expand their manufacturing base. A robust incentives stack can help Oregon compete with other states and nations for investment, jobs, and income associated with clean energy technology manufacturing. Well-designed fiscal incentives can help encourage companies to open, expand or maintain production facilities or activities here including research and development. Without a robust incentives stack, Oregon will fail to maximize its opportunities in this sector, which some expect will drive $440 billion in investment over 10 years.

The Committee assessed incentives offered by 27 states that have seen more than $100 million in clean tech manufacturing investment since the beginning of 2023. We found that while Oregon has some important strengths, our existing incentive offerings do not "stack up" compared to other leading states or match our ambitions to excel as a leader across the clean energy supply chain. Notably:

- Oregon is one of the few states competing for clean tech investment without an R&D incentive for that activity (Ohio, Arizona, Washington, New Jersey, Massachusetts, which have all seen upwards of $100 million in clean tech investment, all offer R&D tax credits). As discussed in the RIE committee report, many breakthroughs in clean energy technologies await discovery and commercialization needed to spur decarbonization in all sectors of the economy. Well-designed R&D incentives can both increase the amount of R&D done in a state as well as increase the quantity and quality of entrepreneurship.
- While some state incentive programs encourage job creation, Oregon lacks incentives that support job retention and worker (re)training. This void in Oregon's incentives landscape is detrimental to Oregon's ability to capture two critical segments of the energy revolution.
    - First, it harms our ability to retain the state's existing manufacturers in the midst of retooling their factories to produce in-demand clean energy technologies, which often requires training incumbent workers on new equipment and processes. The automotive sector is an example where companies such as Daimler, headquartered

in Portland, are transforming their facilities to produce zero-emission vehicles and need workers trained in new processes and equipment. Incumbent worker training can be very expensive, and competing states' incentives for retraining (for example, South Carolina, Kansas, and Georgia) can entice companies to relocate or expand outside of Oregon.
    - Second, entirely new jobs and skills are being created to commercialize new technologies. Floating offshore wind is an example. Enterprising companies involved in manufacturing pieces of this supply chain require skills and competencies too new for the existing workforce development system to train, so they must train them on-the-job. Subsidizing on-the-job training for these companies encourages companies inventing the jobs of the future to invent them in Oregon.
- According to the "time value of money" a dollar today is worth more than a dollar a year from now. This is the challenge presented by Oregon's premier incentive for large capital investments, the Strategic Investment Program (SIP). The SIP is a property tax abatement that pays out over a period of 15 years. While the sums are often large, even in the hundreds of millions of taxes abated, the SIP incentive can be less compelling than a significantly smaller sum offered up front. Upfront cash, provided in a vehicle similar to the Oregon CHIPS Fund passed in 2023, can be catalytic for a variety of purposes: enticing large (and small) capital investments, providing matching funds for companies' pursuit of federal grants, grants for technical assistance, etc.

Given our current incentives landscape, it is unsurprising that, according to the Clean Investment Monitor, $0 of private sector investments in clean energy manufacturing have been invested in Oregon since the adoption of the federal Inflation Reduction Act.[29] Unfortunately, Business Oregon's 2024 Innovation Index underscores that Oregon is trending downward relative to other states across every metric related to Commercialization and nearly every metric related to Business Environment (exports is the only one that increased in the last 5 years).[30] Over the past 5 years, Oregon has trended in the bottom 20% among all states in both Entrepreneurship and Research and Development; notably, this downward trend coincides with the sunsetting of Oregon's R&D tax credit, which lapsed in 2019. Incentives can help reverse these trends. Particularly given that Oregon's tax environment is among the worst in the country, incentives are essential to helping to defray that disadvantage.

Recommendations

Based on the above analysis, strategic initiatives focusing on increasing the availability of early-stage capital, supporting nascent companies in research and development (R&D), and providing established companies with incentives to upgrade facilities and retrain/retain workers are critical for both near-term and sustained growth in the clean energy technology economy. Collaboration between public and private sectors, as well as academic institutions, can further drive R&D and commercialization of new technologies.

1. **Enhance Existing & Adopt New State Incentives Programs** to provide needed, up-front investment ($50 million/annually) for companies to leverage federal and private capital

[29] While not yet appearing in the Clean Investment Monitor's database, Daimler and ZincFive have recently announced investments in Oregon.
[30] https://www.oregon.gov/biz/Publications/InnovationIndex2024.pdf

(e.g. matching grants, technical assistance, etc.); foster economic vitality and advance family-wage job creation and retention for diverse workers statewide, prioritizing benefits for environmental justice communities; facilitate research for site location and project development; and drive capital investment for constructing, retooling or expanding manufacturing facilities. Recommended mechanisms include:

1. A new Clean Tech Manufacturing Opportunity Fund to provide grants, low-interest loans, or other expenditures to support companies in the above activities, as well as to support strategic procurement (see section 2 below).
2. Job retention incentives, including amending existing tools like the Enterprise Zone program to balance job creation with job retention, resourcing existing on-the-job training programs, and reestablishing the lapsed Employer Workforce Training Fund for incumbent worker training. Programs should be structured such that incentives are prioritized for companies that meet quality jobs standards.
3. Extend the R&D tax credit for semiconductor activities to clean tech.
4. Expand investments in the SBIR/STTR programs to provide matching funds comparable to other states' offerings ($100k-150k).

2. **Maintain Existing Incentive Programs** including Strategic Investment Program and Strategic Reserve Fund critical for encouraging large capital investments. The state should also uphold and expand programs providing low-interest loans, which can be particularly important for start-ups in this period of high interest rates and capital costs.

3. **Initiate Strategic Marketing Campaigns** to promote Oregon's clean tech capabilities and exports in local, national and international markets. Support local clean tech companies in expanding their market reach and export capabilities, including through regional partnerships and in-state marketing (such as through public purchasing municipal handbooks) to emphasize benefits of locally produced/procured products.

Incentives should have clear metrics around job creation/retention and climate goals that must be achieved to apply, qualify, continue, or get the full amount of the incentive. All of the above incentives should have a demonstrable and data driven return on investment, and have strings in alignment with Oregon values. Incentives should be designed to foster statewide economic vitality and quality job creation and retention, prioritizing benefits for environmental justice communities, support collaboration across clean tech industries and public/private sector, and promote technological innovation and industrial decarbonization.

Above all, the committee emphatically agrees that any state incentives effort needs to be bold. That's because the competitive landscape has changed since the IRA passed, with many states opening their pocket books to develop strong clusters of clean tech manufacturers. As such, the committee recommends the state follow models put forward by states like Massachusetts that announced a $1 billion investment plan over ten years. A similar plan proportioned for a state the size of Oregon would be roughly $500M over that same period, and comparable to the Legislature's investment in the state's semiconductor industry over eight years. That money would be split up across the categories mentioned above.

PROCUREMENT

The Committee explored how state, local and regional public purchasing and private procurement practices can further attract, retain, and promote in-state clean tech manufacturing and supply chains.

State and other public purchasing of clean energy technology can be a powerful incentive for localized production. For example, transit agencies that purchase zero-emission buses and related infrastructure (i.e EV charging stations) in large quantities could encourage local assembly and supply-chain production. Similarly, schools, housing authorities, and local government agencies that procure large quantities of clean tech equipment, such as electric heat pumps or water heaters, could be used to further encourage local assembly or supply-chain production of those technologies.

Importantly, public procurement policies can serve as budget-friendly incentives to encourage local production while fulfilling the state's existing purchasing needs. To date, Oregon has underutilized public procurement as a tool for promoting in-state clean energy technology manufacturers. For example, California and Washington have both implemented beneficial clean tech procurement practices that are driving investment in their home-grown clean tech industries.

The Committee also identified opportunities for policies to incentivize or require private companies to adopt procurement practices that support local clean energy tech manufacturers. Procurement subsidies can incent large private companies, for instance, utilities, to leverage their significant buying power to stimulate demand for clean energy technologies and create a stable market environment that encourages manufacturers to invest and grow and further attract local assembly and supply chains.

Beyond prescriptive procurement policies or subsidies, strategic state marketing campaigns and collaboration efforts can support Oregon clean tech companies expand their market reach and export capabilities. Examples include leveraging public purchasing municipal handbooks to emphasize benefits of locally produced/procured products, and facilitating cooperative purchasing agreements between West Coast governments and businesses.

Recommendations:

Committee members recommend the State consider adopting procurement policies designed to prioritize clean energy technologies, and opportunities to favor the procurement of locally-manufactured clean tech products, including:

A. **State:** Establish statewide public purchasing programs to stimulate demand for clean energy technologies and create a stable market environment that encourages manufacturers to invest and grow.
    a. **Adopt Clean Energy Technology Procurement Standards:** Provide preference to in-state clean energy manufacturing companies, including those:

i. Owned by economically and socially disadvantaged individuals and benefit environmental justice communities;
ii. Providing an employment plan to support local job creation, diverse hire, Disadvantaged Business Enterprise program utilization, training, living wage, benefits, and community benefit/workforce agreements; and
iii. With emissions reduction/local air quality mitigation plans in place.

b. **Expand Buy Local Manufacturing Requirements**: Expand on programs requiring a certain percentage of clean energy technologies to be manufactured locally. For example, the City of Portland's Sustainable Procurement Policy, which adds additional weight to bids from local companies under the rationale that goods sourced locally do not have as large of a climate impact as those sourced from areas outside of the region.
c. **Leverage Demand-Side and Energy Efficiency Incentives:** Amend existing State, local, utility, and other demand-side and energy efficiency incentive programs for clean energy technologies to prioritize/weight incentives for technologies sourced from local manufacturers.

B. Regional: Expand in-state and regional market opportunities through aggregated purchasing and strategic marketing campaigns.
a. **Aggregated Purchasing:** Leverage neighboring states' (e.g. California and Washington) certification processes, which provides up-front discounts for clean energy technology products produced locally. Initiate cooperative purchasing agreements between West Coast governments and businesses (e.g., utilities). Consider a West-wide procurement list to support interoperability and promote Oregon-based manufacturers
b. **Strategic Marketing:** Utilize public purchasing municipal handbooks, to emphasize benefits of locally produced/procured products/services to area businesses.

C. Private: Adopt policies to incentivize private companies to adopt procurement practices that support local clean energy tech manufacturers and the local economy.
a. **Utility Procurement:** Consider mechanisms to incentivize utility procurement for clean energy projects to provide preference for Oregon-based clean energy technology manufacturers and suppliers.
b. **Purchase Subsidies:** Provide subsidies for private businesses to purchase clean tech technologies from Oregon businesses. Additionally, provide smaller incentives for regional (CA, WA, BC) based business procurement. As an example, CARB's Clean Off-Road Equipment Voucher Incentive Project (CORE) offers commercial businesses incentives to purchase certified electric systems.[31]

POLICY

Lastly, the Committee examined Oregon's existing regulatory environment to consider how existing and future regulatory programs can best promote technological innovation and advancement and position Oregon as a leader in clean manufacturing and industrial decarbonization. The Committee focused on the role of climate and clean energy policies as a mechanism to catalyze economic development and bring the clean energy technology manufacturing market to scale.

[31] https://californiacore.org/dealerlist/

Committee members reviewed Oregon's current regulatory landscape, focusing on existing climate policies and programs and the intersection with clean energy technology manufacturing growth. The committee considered how recently-adopted policies give Oregon the opportunity to spur job growth and technological innovation, improve public health, and increase affordable access to cleaner, cheaper, healthier energy and transportation options for Oregon households, businesses, and communities.

The Committee considered modeling finding that recently-adopted climate policies will add nearly 10,000 jobs and $2.5 billion annually to Oregon's GDP in 2050, and provide $49 billion in cumulative benefits, including avoided health care costs, through 2050; additional policies could increase Oregon's GDP by almost $4 billion annually and create more than 18,000 jobs, in the year 2050.[32] Additional policies, coupled with strategic procurement and partnerships with in-state suppliers and manufacturers, can help drive stable demand while ensuring steady supply of components.

Finally, business leaders have identified a need for the State to make Oregon's full suite of regulations more operable through enhanced coordination and efficiency. The State should uphold its nation-leading efforts to reduce climate emissions and advance economic and environmental justice, while considering opportunities to accelerate permitting and compliance, provide clarity in rules, and minimize redundancy across regulations. The Task Force supports efforts (such as Governor Kotek's 2023 guidance to ensure greater clarity of expectations, accountability and transparency across agencies[33]) to centralize the state's governance scheme and ease clean energy technology companies' ability to comply with State policies and regulations.

Recommendations:

The Committee identified the following strategies to promote the large-scale adoption of clean energy technologies through effective state policies and regulations. By building on Oregon's track record of adopting ambitious yet flexible clean energy policies, the State can drive the clean tech marketplace to scale and provide manufacturers with the certainty needed to bring a wide range of desirable electrification technologies to market, which will in turn help ensure the viability and long-term success of Oregon's clean energy technology manufacturers and industries.

A) Maintain existing, effective state policies and regulations, and demand-side and energy efficiency incentives, including but not limited to:
    - DEQ's Climate Protection Program
    - Clean transportation rules (e.g. Clean Fuels Program, Advanced Clean Cars II, Advanced Clean Trucks)
    - 100% Clean Electricity mandate (e.g. HB 2021)
    - State incentives programs for the deployment and adoption of clean energy technologies (e.g. Heat Pump Deployment, Electric Vehicle/Charge Ahead Rebate, Solar + Storage Rebate, Medium and Heavy Duty Rebate, and Community Renewable Energy programs).
    - Energy Trust of Oregon programs.

[32] https://energyinnovation.org/2022/03/10/new-oregon-energy-policy-simulator-modelling-shows-major-benefits-of-accelerating-climate-policies/
[33] https://www.oregon.gov/das/Docs/Oregon_Agency_Expectations_Governor_Letter.pdf

B) Consider future clean energy and climate policies to further drive the marketplace to scale, prioritizing equitable access, flexibility, and certainty, including but not limited to:
    - Dedicated long-term funding and easy-to-navigate incentive programs to remove cost barriers for consumers, wholesalers, and contractors to adopt electric vehicles, heat pumps, and other clean energy technologies,
    - Holistic energy system planning, including increased grid-scale electricity storage potential and transmission capacity, to chart a path forward for the electric grid and the natural gas system as Oregonians electrify their homes, businesses, and vehicles.
    - Leverage federal investments for industrial innovation through standards for lower process emissions.
    - Encourage or require all-electric new construction; Reward electric customers and keep rates down when possible through utility ratemaking.

C) Consider opportunities to accelerate permitting and compliance, provide clarity in rules, and minimize redundancy across regulations, while upholding Oregon's efforts to reduce climate emissions and advance economic and environmental justice.
    - Build on Governor Kotek's 2023 guidance to state agencies to centralize the state's governance scheme and ease clean energy technology companies' ability to comply with State policies and regulations.[34]

Committee Membership:

- Nora Apter, Oregon Environmental Council, Chair
- Skip Newberry, Technology Association of Oregon, Chair
- Katherine Krajnak, Prosper Portland
- Angela Jackson, Powerize Northwest Consortium
- Steve Curley, Economic Development for Central Oregon
- Monique Claiborne, Greater Portland Inc.
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- Eric Dresselhuys, ESS Inc.
- Robert Benjamin, Aris Hydronics
- Catie Theisen, AFL-CIO
- Marcelino Alvarez, Photon Marine
- Kory Murphy, Lemelson Foundation
- Meredith Connolly, Climate Solutions

[34] https://www.oregon.gov/das/Docs/Oregon_Agency_Expectations_Governor_Letter.pdf

Industrial Lands Committee

Introduction & Issue Summary

As was well documented by the Oregon Semiconductor Competitiveness Task Force, Oregon lacks certain types and sizes of developable industrial land, shovel-ready industrial sites, the tools necessary to bring sites to shovel-ready status, and the ability to protect against the conversion of shovel-ready industrial sites to non-industrial uses.[35] The state also does not maintain an up-to-date, easily accessible inventory of available industrial sites. Without these sites, tools, and information, Oregon is at a competitive disadvantage for growing and retaining its manufacturing sector, a cornerstone of strong, stable, and equitable economic growth. Manufacturing facilities, especially those producing at scale, generally require large amounts of space, power, and water. If this shortage is unaddressed, Oregon's cannot reach its full potential of clean tech industry growth. According to Greater Portland Inc, Oregon has already missed out on thousands of quality jobs and billions of investment due to the metro region's lack of shovel-ready industrial land with the characteristics industry requires.

Rural communities will miss out on significant clean tech manufacturing opportunities without land readiness support too. While the metro region lacks sites, many rural communities struggle to finance industrial site readiness.

Developing sites without an interested developer or company entails a significant amount of financial risk for communities. Oregon's hallmark site readiness tool, the Regionally Significant Industrial Sites (RSIS) program, is designed to encourage local governments to invest in site readiness for large industrial sites. RSIS has statutory authority to be administered as either partially forgivable loans or reimbursement but it has never been funded to operate as a partially forgivable loan. Currently, RSIS works by committing to reimburse governments for the cost of site readiness once an employer builds on the land and is employing people. The reimbursement comes from a share of the income tax generated from facility employment. The problem with reimbursement is that all the risks of investment are carried by local governments, many of whom are dealing with enormous challenges funding basic services and site readiness is expensive.[36] Bend's Southeast Area Plan for the development of 122 acres residential, 103 acres mixed employment, and 67 acres for commercial use will require an estimated $60M in 2020 dollars for just transportation and sewer infrastructure.[37] A community will have to spend millions of dollars upfront upgrading utility and infrastructure service for development that may or may never happen.[38] The cost and risk challenges are increased significantly for sites with one or more constraints including most brownfield sites and infill sites.

Investing tens of millions in site readiness that may not get paid back for decades is often a gamble resource-constrained cities cannot make. This constraint is apparent in the conversion of RSIS sites to operational status. Since the program's 12 inaugural sites were approved in 2018 only 2 have had successful developments. The Port of Portland and City of Pendleton have the only developed sites under the RSIS program per the Business Oregon website. The City of Pendleton

[35] https://oregonbusinessplan.org/wp-content/uploads/2022/08/Semiconductor-Task-Force-Report-for-Release.pdf
[36] https://www.opb.org/article/2024/01/12/oregon-cities-are-struggling-to-find-revenue-for-services/
[37] https://bend.granicus.com/MetaViewer.php?view_id=9&clip_id=799&meta_id=76695
[38] https://www.eastoregonian.com/news/local/field-of-dreams-or-road-to-nowhere/article_517f77b1-b8f3-5787-b2d3-4d9ec147872d.html

highlighted that they were able to use the RSIS program because they were very committed to the UAS range. The Port of Portland is a unique government agency that was able to use funds that most other agencies don't have access to. Port staff also highlighted that they applied for reimbursement in 2016 and as of 2024 had only received half of the award amount. These types of repayment conditions make it impossible to get private underwriting of the development.

Both Pendleton and the Port highlighted that RSIS was beneficial in supporting the development of their sites but its usability is limited. No taskforce member nor government wanted to see RSIS ended, rather it needs to be supported with additional flexible state level funding. The RSIS program is insufficient on its own to support the state's economic development goals.

A critical eye must also be turned to the time it takes to achieve operation on even a ready site. Metro's 2023 Site Readiness toolkit highlighted that permitting, zoning, and constantly evolving regulatory requirements at the State and Federal level further delay the ability to develop sites. These factors mean that the time it takes to develop Oregon's industrial sites makes them increasingly uncompetitive as they fail to meet industry operational timelines. No level of other desirable characteristics at a site or community can overcome the market requirement for rapid operation. In addition to having sites that meet company needs, Oregon must be able to meet company's operational timeline expectations if they want to grow, attract, and retain the clean tech industry.

Key findings from ECONorthwest's forthcoming report to Business Oregon on clean tech opportunities in Oregon validates that Oregon is at a disadvantage with respect to land readiness because 1) other states have better incentives, 2) those other states have processes which allow their programs to be used quickly and with certainty, and 3) Oregon's site readiness program is fragmented and generally underfunded. Although there have been statewide initiatives for site readiness generally, those efforts have been disjointed and unfunded, and will require a concerted effort to align those initiatives into a single cohesive program. Addressing many of these issues requires coordination of state and local efforts.

Beyond the rural and urban benefits, industrial development has important equity and economic mobility impacts. Metro's 2023 Site Readiness toolkit found that the Portland Metro region's lack of small industrial spaces disproportionately impacts minority and women owned businesses.[39] Ensuring an adequate supply of affordable spaces at all stages of company growth can boost economic inclusion. Recent national economic research also highlighted that industrial development, primarily the expansion of the manufacturing sector, was historically a significant source of economic mobility in rural communities.[40] Investing in a site-readiness program directly supports equity goals and improves economic mobility across the state.

The bottom line is that Oregon does not have dedicated funding designed to meet the needs of the jurisdictions investing to improve the lands to support industrial land development for clean tech along with all other sectors. Tools must be adaptable to the variety of challenges communities face competing for clean energy and other advanced manufacturing opportunities. With these findings in mind, we recommend strategic action be taken in the

[39] https://www.oregonmetro.gov/tools-partners/guides-and-tools/site-readiness-toolkit
[40] https://www.nber.org/digest/202407/public-investment-spurred-regional-economies-evidence-wwii

2025 session that will prioritize long-term site readiness leading to quality jobs, improved economic mobility and equity across the State of Oregon.

The effort to identify and map available industrial sites in Oregon most suitable for clean tech development is founded on past analyses, including the Regional Industrial Land Inventory Project with its updates, and the recent Semiconductor Task Force Report.[41] An initial review included refinements to these previous maps and expansion of the geographic coverage to include the entire state. Source data for sites was Oregon Prospector, a tool that suffers from data quality issues and could benefit from refinement.[42] While the list of potential sites this effort uncovered is significant, the vast majority will not meet the development criteria or operational timeline expectations of clean energy manufacturers. A survey from 2023 finds that only 20% of state industrial lands may be shovel ready.[43] A ECONorthwest report on Clean Tech found the following requirements for site characteristics:

Table 1: Cleantech Industries Land Use Competitiveness Summary

	Battery Storage	Mass Timber	Ag-Tech	Circular Economy	Solar and Wind Energy Production	Water Technologies	Building Energy Technologies	EV Infrastructure Technologies
1. Site Size	Small to Large[1]	Med to Large	Small[2]	Small to Med[3]	Med to Large[4]	Small to Med	Small	Med to Large
2. Use Allowance	Varies by jurisdiction							
3. Site Slope Tolerance (Flatness)	Mod.	Low	High	Mod.	Mod.	Low	High	Mod.
4. Transportation Access	Low	High	Low	High	Mod.	Low	Low	High
5. Rail Access	Low	Mod.	Low	Mod.	Wind: High Solar: Low	Low	Low	Mod.
6. Marine Access	Low	Low	Low	Low to Mod.	Low to High[5]	Low	Low	Low to Mod.
7. Airport Access	Low	Low	Mod.	Low	Low	Low	Mod.	High
8. High Pressure Water	Low	Low to Mod.	Low	Mod.	Mod.	High	Low	Low
9. Electrical Supply	High[6]	Mod. to High	Low	Mod.	High[6]	High	Mod. to High	High

With the sites identified and mapped, the committee recommends continuing to refine siting requirements to better understand what additional characteristics manufacturers in the clean energy space need. For example, offshore wind requires port or marine facility access that is not

[41] https://www.oregonmetro.gov/sites/default/files/2018/12/03/Appendix8-RegionalIndustrialSiteReadinessInventory_12032018.pdf
[42] https://oregon.zoomprospector.com/
[43] https://www.opb.org/article/2023/02/08/orergon-cities-infrastructure-industrial-land-development/

needed for other energy manufacturing companies. Adding to these complexities, company siting requirements change as their technology grows and scales, which requires the state to have everything from accelerator space to large manufacturing sites. To support the overall growth of the sector, it will be critical to have a variety of employment sites that meet all stages of company growth.

To ensure that the State of Oregon has the sites necessary to compete for $5bn-$10bn of clean energy tech manufacturing investment over the next decade, the committee recommends the following actions.

Recommendations

1. **Continue to refine and edit the site requirements and maps for opportunities within clean energy technology manufacturing**.

2. **Improve RSIS by enabling new sites to be added and enhancing program reporting documentation**. RSIS could be improved in a number of ways, with the most impactful change being to allow new sites to be added as sites are developed. Currently, there is no mechanism to add new sites to replace the two operating sites. Without this ability the program will end once all sites are operating and no sites outside of those already approved will be able to use the program. This single change would enable the program to support continual site readiness which it cannot currently do. Additionally, program managers highlight that the documents used for reimbursement could be enhanced to make reporting easier.

3. **Establish a new site readiness program at Business Oregon that provides up-front grant-based capital to local governments to encourage risk-taking that can be used to cover due diligence, site acquisition, predevelopment, land assembly, site preparation, utility, infrastructure, and transportation improvements, as well as environmental remediation and mitigation, financing, and development costs.** The program should be open to small, medium, and large industrial sites as well as brownfield and infill sites. The structure of the program also needs to be designed to enable the program funds to be used to leverage additional private sector or federal government funds.

4. **Establish a Revolving Land Development Authority to coordinate a revolving fund, systemic monitoring, and analytical technical assistance. Tasked with piloting two clean energy hubs—one in a rural community and the other in an urban community**. Other states and communities have begun establishing entities with the sole purpose of ensuring a supply of ready industrial land and to enhance coordination. These revolving land development authorities are similar to land bank authorities which the State of Oregon authorized in 2015. The biggest difference is funding and authority. Land banks have failed to materialize in part because of the risk highlighted above and because of the upfront capital required. Oregon would benefit from an entity whose charter is to establish a revolving fund, a systemic monitoring program, provide analytical technical assistance, and

other services, to advance industrial development across the state. The authority would be overseen by an external and dedicated oversight body. Given that clean energy opportunities exist across the state and all areas have challenges to overcome in getting sites shovel ready, it would be a great opportunity to pilot a revolving land authority tasked with developing an urban and rural clean tech hub. If successful, the revolving land authority could support land development for all of Oregon's target industries.

5. **Recommendations 4 & 5 require state funding to launch.** It is recommended that the programs be seeded with at least $400 - $500 million with the intention of becoming self-sustaining in seven years.

6. **Improve land use processes** including expediting UGB expansions that support critical industrial opportunities, increase capacity to support 75-day permitting, allow lower impact industrial in underutilized employment sites, reduce regulatory uncertainty by slowing the speed of new rulemaking, extend the shovel ready pilot program, and improve data quality and usability of Oregon Prospector.

Additional information on Seeding Recommendations 4 & 5

Any path towards addressing Oregon's persistent and systemic industrial land shortage will require dedicated state level funding. Potential sources of funding were explored and the pros and cons of each option can be found in the ECONorthwest Clean tech Task Force Memo. Based on the costs of the 12 RSIS sites and the Semiconductor Task Force analysis, it was determined that a minimum of $400-$500 million is needed to support new site readiness programming. Most revolving land authorities are able to achieve self-sufficiency after receiving seed capital by reinvesting returns into new development opportunities. The proposed new program (recommendation 4) could be designed to become self-sustaining. It could achieve this by using the same mechanism as RSIS, income tax generated at the site once it becomes operational. In RSIS the developing agency is reimbursed, the new program could capture a portion of income tax generated to repay itself. As long as the initial investment is sufficient to support the program until early sites are operational, the program will achieve self-sufficiency.

Potential seed sources are:

1. Lottery or GO Bonds
2. A portion of statewide tax revenues from the construction industry
3. A portion of income tax revenue from recent semiconductor expansions

Using a portion of tax revenues from the construction industry is particularly beneficial as the additional government spending getting sites ready will generate more activity in this industry. It will theoretically repay the state general fund through the additional taxable activity. In this regard the state could consider setting up a permanent fund funded by a small portion of construction industry tax that is already collected to support additional development. This type of fund could also be expanded to cover investment into any activity that will generate additional construction activity (Industrial site readiness, brownfield development, housing, and employment land readiness).

To learn more about Industrial Land in Oregon or review all supporting documents please see the following:

- Metro land Readiness December 2023
- Metro Site readiness Toolkit 2020
- 2022 Oregon Semiconductor Competitive Task Force Report
- C2ER incentive database
- Task 4 development roadmaps final report 2020
- The Condition of Oregon's Manufacturing Sector Fall 2021
- ECONorthwest Memo on Industrial Lands for OBC Fall 2021
- Business Oregon/ECO Clean Tech report
- Fall 2024 release IPRE External Recruitment Study
- Fall 2024 release OBI Manufacturing Report October

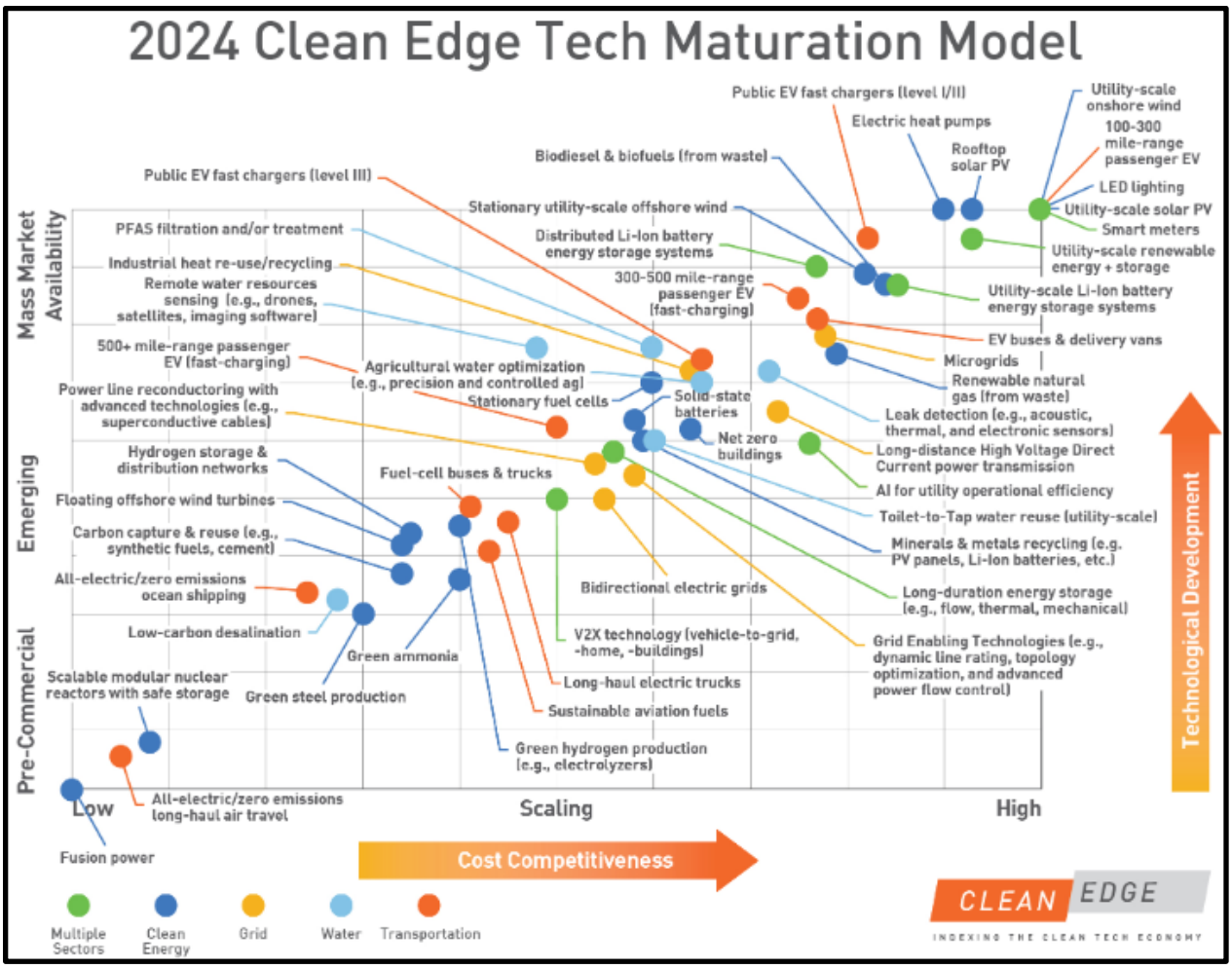
Committee Membership:

- Curtis Robinhold, Port of Portland, Committee Chair
- Alicia Chapman, Willamette Technical Fabricators
- Lindsey Tenes, League of Cities
- Sophorn Cheang, Business Oregon
- Monique Claiborne, Greater Portland Inc
- Steve Curley, EDCO/REDI
  Randall Edwards, State Treasurer Emeritus
- Robert Westerman, IBEW
- Erika Fitzgerald, City of Gresham

Research, Innovation, and Entrepreneurship Committee

Background and Need

The transition to a decarbonized society will require a diversified approach that couples current technologies with innovation in energy production, transmission and storage, and carbon management. As illustrated by local firm Clean Edge's Tech Maturation Model, many technologies required for the energy transition remain under development and in varying levels of commercialization.[44] Much R&D, many start-ups and many billions in investment lie ahead for these technologies. By developing a robust innovation and entrepreneurship ecosystem, enabled by targeted supports, incentives and partnerships, Oregon can ensure much of this R&D and entrepreneurship happens here. We can and should be home to many of the breakthroughs necessary to enable a swift energy transition.



While Oregon has many strengths in clean tech innovation, including talented and motivated researchers and entrepreneurs, and available state and federal programs to support commercialization, the committee identified critical gaps in funding, infrastructure, and

[44] https://cleanedge.com/data-dive-charts/2024-Clean-Edge-Tech-Maturation-Model

partnerships that impede aspiring hard tech companies from transitioning from innovation to marketplace. Oregon's ability to generate and/or commercialize breakthrough innovations will hinge on its ability to align talent, strengths and opportunity to create a robust clean tech innovation ecosystem.

The committee's discussions were informed by recent publications, including reports commissioned by Business Oregon, that highlight strengths, weaknesses, threats and opportunities.

Strengths:

- Oregon's universities have significant research capability and demonstrated expertise in clean tech fields, including materials science, engineering, and marine energy.
- Oregon has the talent and skilled STEM workforce to attract clean-tech industry and manufacturing. Notably, university-level training that supports semiconductor research also has high relevance to diverse clean energy technologies. Investments in one leverage the other.
- Oregonians are entrepreneurial, as indicated by the number of small company startups, licenses, and other forms of intellectual property; manufacturing GDP, and exports. The most recent Oregon Innovation Index indicates that compared to other states, Oregon consistently places in the top third for 14 of 18 indicators.
- Funds are available to leverage federal grant applications (University Investment Research Fund (UIRF), and small businesses SBIR/STTR)
- Gap funds are available through the University Venture Development Fund and the Oregon Inc Gap Fund, to bridge early stage capital gaps, leading to private capital investments.

Weaknesses:

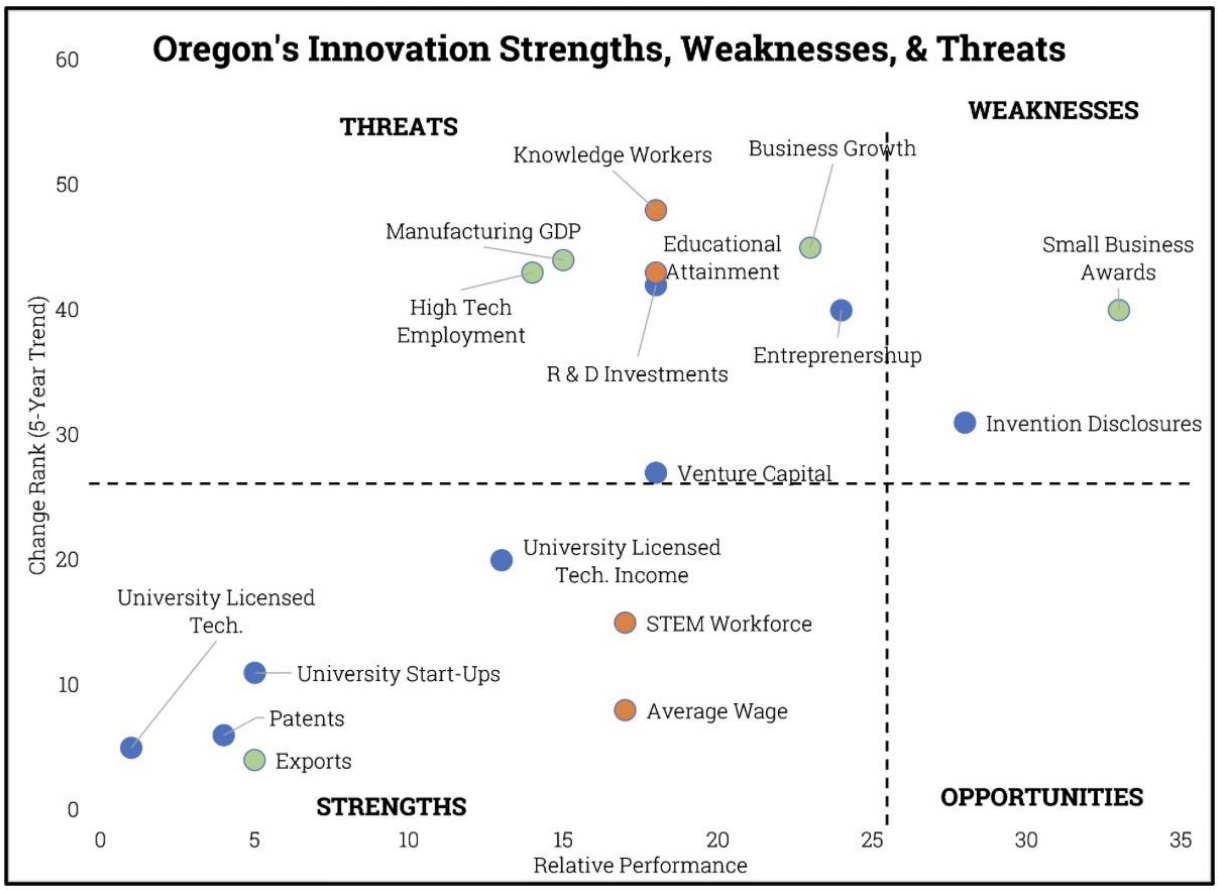
- Oregon's innovation ecosystem is fragmented. Cross-sector partnerships in clean tech among key stakeholders such as universities, communities, businesses and investors are lacking, and innovation occurs in isolated and unconnected pockets. Stakeholder alignment is needed.
- Oregon's investments in research, innovation, and entrepreneurship lag other states. For example, the UIRF is an order of magnitude smaller than our aspirational peers (e.g., North Carolina[45]), which effectively lowers Oregon's competitiveness for large federal awards (e.g. EDA Tech Hubs, NSF Regional Innovation Engines, and related DOE opportunities made available by IRA and IIJA) that can support critical infrastructure needed for the clean tech transition. Critical infrastructure includes space, facilities, equipment and supplies needed to develop technologies that support clean tech.
- Oregon's investments in research, innovation, and entrepreneurship lag other states. For example, the UIRF is an order of magnitude smaller than our aspirational peers (e.g., New York, North Carolina), which effectively lowers Oregon's competitiveness for large federal awards (e.g. EDA Tech Hubs, NSF Regional Innovation Engines, and related DOE opportunities made available by IRA and IIJA) that can support critical infrastructure needed for the clean tech transition. Critical infrastructure includes space, facilities, equipment and supplies needed to develop technologies that support clean tech.

[45] https://ncinnovation.org/media/statement-on-ncinnovations-inclusion-in-state-budget-conference-report/

    - In general (semiconductors are the exception), investments have not been directed strategically to elevate specific economic sectors or differentiate and elevate university research strengths in desired fields;
- Entrepreneurs indicate that matching (SBIR/STTR) funds and gap (bridge) funds are insufficient to meet demand. More funding to move technologies from invention disclosure through proof of concept to valid prototype is needed.
- Relatedly, prototype facilities and 'maker spaces' are not available for testing and scaling innovations. Unlike software development, most clean tech innovation and manufacturing involves deep/hard tech that requires technology-specific infrastructure- power, space and hardware/equipment.
- Exacerbating these funding and facility needs, there is a notable shortfall of venture capital investments, particularly given the significant resources needed to develop hardware and deep tech.
- Relative to other states, OR does not prioritize support for university research and research infrastructure, further hindering translation to practice through lack of support for discovery and deep tech development.
- Entrepreneurs describe absence of mentoring and advising, particularly in efforts to scale innovation and bring products to market.
- There is a lack of C-Suite talent to help entrepreneurs scale successful startups into the next generation's mature businesses.

Threats:

- Oregon's 2024 Innovation Index outlines continued strengths in key areas, but an absence of clear leadership in any one index or class of activities. The report characterizes the state as a "jack of all trades and master of none".
- The report further argues the state is losing ground in areas where it is currently strong: knowledge workers, manufacturing GDP, R and D, venture capital, entrepreneurship.
- This slippage, coupled with longstanding weaknesses (small business awards) is effectively a 'shot across the bow' for the state to do more to support economic development.



The Case for a Bold Approach

The Oregon innovation ecosystem can be characterized as one teaming with potential yet to be maximized. Addressing the challenges listed above and positioning Oregon to lead the nation in clean tech research, development, innovation, and manufacturing will require the state to take a bold approach. The time and the scale of action is important. As previously noted, "as Oregon stagnates, our competitors are losing no time developing centers of gravity for additional investment." As a result, bold and swift action is necessary to form a center of gravity realize the opportunity – many thousands of new jobs, dozens if not hundreds of new start-ups (and the opportunity to ensure that diverse communities lead in their development), and much research and development of the technologies to decarbonize the world economy.

Massachusetts, already a leader in the research, development and manufacture of a variety of clean technologies, recently announced a 10-year, $1.3 billion state investment to further develop its prospects in developing the technologies that will define the energy systems of the future. This committee recommends the state mirror this approach. As Oregon's economy is roughly 40% the size of the Massachusetts economy, a similar effort sized for Oregon would be about $500M with the potential to leverage additional millions from philanthropy, federal agencies and others.

Recommendations:

If Oregon wants to develop a leading clean tech innovation and entrepreneurship ecosystem, the gaps and weaknesses identified above must be addressed. The recommendations below address them:

- Fill long-recognized gaps in financing to support entrepreneurial efforts among early-, mid- and growth-stage Oregon-based clean tech businesses
    - $2 million per biennium in state matching funds for clean tech-focused federal grant recipients (incremental to existing $2.3 million SBIR/STTR funds, with flexibility for matching other federal grants other than SBIR/STTR) to support aspiring entrepreneurs and small businesses to expand and become competitive
    - Additional resources into the UIRF to support pursuit of federal grants. Importantly, the State should relax standards on the use of UIRF to allow submission of more grant applications, made more competitive through inclusion of state matching funds.
    - Additional resources to bridge gaps in early stage funding (e.g. Oregon Inc Commercialization Gap Fund)
    - Incentives for clean tech R&D

- Invest in physical infrastructure to fulfill prototyping and scale-up needs for translation of innovation to practice. This includes:
    - The expansion and improvement of higher education and other publicly-available facilities and infrastructure to support clean tech R&D and prototyping, and better integration of diverse student populations into cutting-edge clean tech research and coursework
    - Establish four Clean Tech Centers of Innovation Excellence (CIE). These CIEs should be partnerships among public/private/university entities that provide physical space for prototype development, showcase entrepreneurial talent to prospective investors and provide opportunity (internships, training, jobs) for aspiring entrepreneurs and underserved communities. For example:
        1. EV mobility hub on Swan Island leveraging infrastructure from PGE and Daimler Trucks North America.
        2. Renewable energy center of innovation in Central Oregon.
        3. Smart grid R&D center and demonstration site in downtown Portland (linked to work of Powerize Consortium)
        4. Advanced building science product research center

- Incent the creation of partnerships to:
    - Increase collaboration, innovation, mentorship, and development of competitive grants applications among university researchers, entrepreneurs, and industry partners. The centers for innovation excellence could be the venues for this collaboration.

  - Provide visibility and a portal, for investors and venture capitalists, into OR's strengths, investments and opportunities (tell our story). The centers for innovation excellence could be the venues for this collaboration.

- Include communities and place-based activities that enable underserved regions to experience the benefits of economic growth, including equitable access to internships, training, and jobs; underpinned by a more resilient energy supply

Underserved Communities and Place-based activities[46]
Oregon's 10-year innovation plan underscores the inclusion of underserved communities in the innovation ecosystem through place-based investments and incentives; training, and educational access to the knowledge, skills, and mindsets needed for a technology-driven society.[47] Clean Tech Hubs, or Centers for Innovation Excellence, placed in pockets of innovation across the state can serve as nuclei for outreach to and engagement of underserved communities.

A recent Pew Charitable Trust report provides an analysis of the success of place-based economic development initiatives – noting that such investments often fail - and provides programmatic guidance that better supports distressed areas.[48] As a result, we strongly urge that initiatives intended to lift underserved communities:

- are carefully planned, and co-developed with community stakeholders;
- incorporate lessons learned, and metrics, from newly available findings from the Pew study and other recent findings;
- and ensure jobs and economic development are welcomed and appropriate for the region.

A recent EDA report provides useful metrics for identifying underserved communities and for understanding success and improvement.[49] Appropriate data collection and metrics are critical for ensuring that investments have the desired growth in economic development.

References Note: additional research and theory relied on by this committee:

- https://www.oregon.gov/biz/Publications/InnovationIndex2024.pdf
- https://www.vertuelab.org/catalyzing-change
- https://www.oregon.gov/biz/Publications/Boards/Futures%20Commission/IE-BenchmarkingRpt0319.pdf
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[46] https://heartlandforward.org/case-study/place-based-economic-development/
[47] https://www.intentionalendowments.org/leading_with_justice_paper_feb_2022
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[49] https://www.eda.gov/sites/default/files/2024-06/BBBRC_Report_1_Final.pdf

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- Roberta Marinelli, Oregon State University, Chair
- Skip Rung, ONAMI
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Talent & Workforce Committee

Guiding Questions and Goals

1. How can we meet the skill needs of burgeoning industries with scalable models that can raise the potential of billions in investment and thousands of jobs?
2. How can we develop a framework in Oregon to turn partnership-based workforce development into a durable competitive advantage that helps Oregon attract additional federally supported clean energy tech manufacturing investment?
3. How do we support high road job creation, good quality training, and support inclusive career pathways for underserved or underrepresented communities?

Introduction

According to an analysis commissioned by the BlueGreen Alliance from the Political Economy Research Institute (PERI) at the University of Massachusetts Amherst finds that the Inflation Reduction Act's 100+ climate, energy, and environmental investments will create more than 9 million good jobs over the next decade—an average of nearly 1 million jobs each year.[50] Roughly two-thirds of direct job creation is expected to take place in the construction and manufacturing sectors, representing 453,000 jobs and 230,000 jobs annually respectively.

The Task Force's goal is to develop a strategy to ensure the greatest amount of those jobs come to Oregon. Doing so, particularly with respect to the manufacturing jobs, will require that Oregon invest in terms of partnerships and resources to build a workforce development pipeline that clean tech manufacturers trust will meet their skill needs. Without it, manufacturers will invest in different states where current and future talent is more readily available.

This will represent a significant challenge for Oregon workforce developers where clean energy tech manufacturing is largely underrepresented and so workforce development pipelines are underbuilt relative to our ambitions. This creates a unique opportunity to revisit approaches to ensure good job creation into family wage jobs, and promote inclusive career pathways for underserved and underrepresented communities.

Some key challenges and opportunities rose to the top in committee discussions:

- Challenge: Existing training programs are limited and isolated from employers and other training providers. Opportunities in this space are emergent, which require scalable models that can expand (and contract if needed) with demand. However, the current environment characterized by industry uncoordinated with training providers and training providers uncoordinated with each other makes it challenging to respond systematically and with resource efficiency.
- Opportunity: Quality registered apprenticeship and pre-apprenticeship program models exist and should be effectively utilized and built upon. That's because apprenticeship programs are easily scaled up (or down) in the face of fluctuating demand, a characteristic of Oregon's nascent leadership in clean tech manufacturing. However, the committee discussed collaboration to avoid duplication or parallel construction of apprenticeship training programs.

[50] https://www.bluegreenalliance.org/site/9-million-good-jobs-from-climate-action-the-inflation-reduction-act/

- Challenge: starting new industry-oriented educational programs anticipating industry needs is risky and expensive for higher education institutions, which are already stretched fiscally. Funding for higher education in Oregon is well below that of other states. Oregon is ranked 44th out of 50 states in funding universities and 18th out of 50 in funding community colleges. (FY23 statistics)
- Challenge: Highly specialized jobs/tasks are being created to build new clean energy tech products. Legacy companies that have been working with much of the same equipment and processes for years are transitioning to wholly new equipment and processes. Skilling up new workers or re-training existing workers is a significant challenge and expense.
- Opportunity: Workforce development happens in all domains – organized labor, K-12, community colleges, universities, community-based workforce organizations, and private companies. There is a huge opportunity to more effectively coordinate these partners to build the clean tech manufacturing workforce pipeline.
- Challenge: While the Task Force developed a general understanding of the forms of clean tech manufacturing most likely to agglomerate in Oregon, how many jobs - and which types, requiring what kinds of skills - remains largely unknown. The following is drawn from the PERI report mentioned above. The state must provide resources to comprehensively study the types of jobs in clean energy tech manufacturing, agree on occupational definitions, and how many need to be filled in the coming years.
    - The occupations that will experience the largest increases in construction are laborers, operating engineers, electrical power-line installers and repairers, and carpenters.
    - The jobs that will see the largest increases in the manufacturing sector are assemblers and fabricators and electrical, electronic, and electromechanical assemblers.
    - Forty-eight specific occupations are likely to experience significant increases in demand through the direct jobs channel resulting from investments. Of these, twenty-seven have relatively higher entry requirements that will require formal training/credentialing. Twenty occupations will face labor shortages, resulting in an anticipated total labor shortage of nearly 1.1 million workers if the investments reach their full anticipated levels without an expansion of newly qualified workers.
    - Within this backdrop, Women and people of color are significantly underrepresented in occupations created by these investments that are likely to face labor shortages. In half of the 20 infrastructure-related occupations with estimated labor shortages, women make up 10%, compared to 47% in the entire U.S. workforce. In 15 of the 20 infrastructure-related occupations with estimated labor shortages, workers of color make up less than 39%, compared to 39% in the entire U.S. workforce
- Opportunity: Public workforce development boards have available resources to track labor employment that can be more targeted to support and can better coordinate with existing public infrastructures, subsidies, investments to support cohort and individual workers to be ready for on the job training (i.e- individual training scholarships aligned with industry identified KSA priorities; On-the-job Training Agreements; Industry Advisory Panels.)

Emerging Solution Framework for Workforce Development

Three major themes evolved from the Committee's discussion: **Collaboration, Coordination, Scalability, and Good Jobs**.

Collaboration and Partnership:

As discussed above, partners in Oregon's clean tech manufacturing workforce system lack robust coordination (employers, labor, workforce training providers) which can often lead to inefficient spending on workforce training (i.e duplication of training programs, parallel programs), poor market signals between employers and workforce training providers (i.e workforce supply, demand), and a lack of partnerships between training providers and employers which can often lead to ineffective programs hampered with unclear expectations– such as relevant skills training, clear hiring commitments, baseline wages and benefits, and inclusive workplace practices.

We recommend supporting existing venues, like the Oregon Clean Energy Workforce Coalition and workforce boards, to convene and facilitate clean tech manufacturing-specific partnerships among employers, organized labor, public agencies, community colleges, universities, workforce boards, K-12, and community-based organizations to systematically collaborate on meeting workforce training needs.

Such a forum will facilitate:

- Partnerships among industry and organized labor (ex: manufacturing apprenticeships), industry, community colleges and universities (ex: workforce development centric educational models, curricula development, wraparound services, pilot projects), community colleges and organized labor (ex: pre-apprenticeship pipeline models and programs), WorkSource Oregon and community-based service providers, etc. These should facilitate creation of new training programs including community college programs, university programs, registered apprenticeship programs | high road training partnerships/programs
- Alignment and agility in helping companies apply for federal grants or loans and quickly form robust, sustainable partnerships to meet federal quality jobs requirements, among other criteria.
- De-risking development and launch of training programs by better understanding employer demand and forecasting industry workforce needs.
- Creation of avenues for employers to ensure their workplaces and cultures are welcoming environments for diverse, younger workforce members.
- Recognition that aptitudes and attitudes start early and highlight the need to implement appropriate pedagogy in K-12.
- Reduced duplication of effort and resources (i.e., efficiency) in developing and sustaining training programs among providers not currently coordinating.

- Data collection to communicate outcomes through a variety of channels and replicate effective models and strategies throughout the State.
- Career pathways development for current and future employees (including K12 students) to enable workforce preparation, boost on-the-job education and training, upskilling and reskilling, retention, and economic mobility.
- Accessible on-ramps into registered apprenticeship programs, such as developing soft-skills, identify existing skills

Coordination and Technical Assistance:

It is not sufficient for industry, labor, academia, and other workforce training providers to be coordinated in the development of programs, we need public agencies to be coordinated in their approach to strategies around promoting good jobs, promoting registered apprenticeship programs and high road training partnerships, and also being a resource and offering technical assistance to external parties.

- Public agencies (ex. DEQ, ODOE, ODOT, etc) should create an inter-agency coordination committee to collaborate specifically with Workforce development board and Bureau of labor and Industries (BOLI) to further examine spending on climate action activities, update policies and practices to promote high road job creation and inclusive career pathways, further leverage state and federal investments for workforce training in clean tech. (See Federal Good Jobs Executive Order[51] (2024) Creating Intergovernmental Task Force, California High Road Climate Agency Partnership Initiative[52])
- Better equip and fund our public workforce system (Workforce Boards) and Apprenticeship Training Division (BOLI) to help employers, labor, CBOs to navigate existing training programs, regulations, and provide technical assistance to support efforts such as upskilling, retraining, etc. to meet industry needs (demand), that is also worker informed
- Creation of a High Road Training Partnership Initiative (see footnote for definition[53]) that develops high road job principles, issues climate jobs and clean tech manufacturing studies, and funds– through state and federal resources– high road training partnerships in consortium and forums between employers, labors, and any additionally combination of community colleges, universities, pre-apprenticeship programs. (Example: California's High Road Training Partnership program[54]). The ultimate goal is to fund high road training partnerships.
- Support dedicated FTE from agencies at Bureau of Labor and Industries and workforce development boards to support employers navigating existing occupational definitions for an ever-evolving clean energy sector. Additionally technical assistance can support employers to seek and apply for federal funds and incentives.

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[51] https://www.whitehouse.gov/briefing-room/statements-releases/2024/09/06/fact-sheet-days-after-labor-day-biden-harris-administration-issues-executive-order-to-promote-good-jobs-through-investing-in-america-agenda/
[52] https://cwdb.ca.gov/regional-plan-implementation/high-road-climate-agency-partnerships-initiative/
[53] *Definition Note:* High Road Training Partnership Initiative is a program administered by public agencies that can provide a structure in which to engage employers and protect workers and find collaborative solutions as technological change and/or climate policies cause large disruptions or even elimination of certain jobs.
[54] https://cwdb.ca.gov/initiatives/high-road-training-partnerships/

Scalability:

An important consideration in addition to coordination and collaboration is to prioritize scalable training programs that can quickly to the needs of multiple employers to train, graduate, and retain a diverse workforce without over-supplying the market

- Encourage the utilization of registered apprenticeship programs as the gold standard for scalable and impactful approaches to train workers in construction and manufacturing
    a) Support and encourage the use of existing BOLI registered trade apprenticeship and pre-apprenticeship programs in construction with good retention and graduation rates.

    b) Support and encourage new registered apprenticeship in advanced manufacturing, with good monitoring to ensure good progress, completion, and graduation rates. Partnerships with the Industrial Manufacturing Technician apprenticeship program can help employers, unions, and workforce development organizations set up new programs for emerging technologies.[55] (*Case Study:* IBEW 569 new apprenticeship initiative in California for battery and advanced manufacturing sectors.[56])

    c) Encourage up-skilling, re-skilling, certifications through apprenticeship programs in construction and manufacturing.

    d) Support and fund strong performing, self-sustaining pre-apprenticeship programs as a vehicle to support inclusive pathways into apprenticeship programs.

    e) Additional case studies of Apprenticeship Readiness Programs–that partner with labor, community colleges, and employers–to support and expand:
        - Construction Union Apprenticeship Programs & Job Training Near Me[57]
        - PACT - Oregon Coast Community College[58] (Pre-apprenticeship Pipeline)
        - Maine Career Catalyst[59] (Pre-apprenticeship Pipeline)
        - Apprenticeship Programs | California Community Colleges Chancellor's Office[60] (Emerging Sectors Pipeline)
        - HireLAX Apprenticeship Readiness Program: Explore Pre-Apprenticeship[61]

- Support, fund, and encourage High Road Training Partnerships (see footnote for definition[62]) to further ensure leverage partnerships to scale training, outreach, job-placement, and good job retention. High road training partnerships are sustainable new workforce-development-centric educational models that promote partnership and appropriate interface between employers, labor, apprenticeship programs, community colleges and universities and balance the needs of employers and worker voices. (Example: California's High Road Training Partnership[63]). Additionally, these initiatives can partner

[55] https://www.imtapprenticeship.org
[56] https://www.ibew569.org/news/ibew-local-unions-announce-new-apprenticeship-initiative-for-battery-and-advanced-manufacturing-sectors/
[57] https://nabtu.org/apprenticeship-and-training/apprenticeship-readiness-programs/
[58] https://oregoncoast.edu/pact/
[59] https://mainecareercatalyst.org/registered-apprenticeship-pre-apprenticeships/
[60] https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/Workforce-and-Economic-Development/apprenticeship
[61] https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/Workforce-and-Economic-Development/apprenticeship
[62] *Definition note:* High Road Training partnership integrates demand- and supply-side strategies, avoiding the pitfalls of niche "green jobs" training and ensuring that Oregon workers are prepared for long-term careers in a rapidly-evolving clean tech sector.
[63] https://cwdb.ca.gov/initiatives/high-road-training-partnerships/

with community colleges and other training organizations to deliver skills to accelerate the adoption of clean technologies.

- Support local Workforce Development Boards to expand proven incumbent worker training and on-the-job training models for companies, including reinvesting in the Oregon Employer Workforce Training Fund, specifically for high road training partnerships, that are seeking to expand access to existing on-the-job training programs that offer a grant to employers to support occupational training and worker retention, and living wage jobs with benefits.
- Support the development of novel and innovative workforce-development education models at higher education institutions:
    - Create pathways for graduate students in emerging technical areas to serve as Graduate Teaching Assistants at community and technical colleges to expedite the innovation to curriculum translation.
    - Leverage higher education's robust online educational platforms into partnerships with industry and other workforce development partners to develop new offerings that can increase access to training and workforce development programs.
    - Leverage capabilities and infrastructure at universities and industry partners to utilize new AI and virtual reality tools to provide enhanced educational capacity and modalities.
    - Establish clean tech internship, capstone courses, and other experiential learning opportunities for students in relevant clean tech fields to retain talent in Oregon.
    - Create fellowships for graduate students to support new clean tech manufacturing ventures.
    - Establish training & educational centers for emerging clean tech workforce development (HS to PhD) – co-locate centers on educational campuses, industry partner sites, or areas with high concentrations of employers.
- Support connections to WorkSource Oregon to recruit workers and trainees and build connections to community-based service providers.
- Catalyze employer-funded training programs by creating and disseminating effective workforce development strategies within small, medium, and large employers.
- Create a summer institute for K-12 educators to equip teachers with the necessary tools to understand and inspire their students to pursue clean tech training, education and careers. By delving into the intricacies of the Oregon Clean Tech Ecosystem with content experts and local teacher leader collaboratives, participants would engage in sessions designed to cultivate systematic thinking and foster a comprehensive understanding of clean tech as a system.

High Road Jobs Standards: Where Job Access and Job Quality Meets

Institutions like Inclusive Economics and Emerald cities have documented the challenges that generally as job quality increases jobs access becomes exclusionary[64]. High road employers[65] considers both job access and job quality for the benefits of attracting and retaining[66] a talented diverse workforce for the clean tech manufacturing sector. High road job standards are a benefit to

[64] https://www.nrdc.org/bio/caroline-keicher/good-jobs-through-climate-action-high-road-path
[65] https://mitsloan.mit.edu/ideas-made-to-matter/high-road-approach-to-worker-compensation
[66] https://equitablegrowth.org/wp-content/uploads/2020/12/122120-turnover-costs-ib.pdf

both employers[67] [68] and a benefit to workers in supporting self-sufficiency or family supporting careers.

- Ensure clear goals for training, retaining, hiring, and promoting underrepresented communities, such as women, people of color.
- Encourage and embed labor standards in state policies and clean tech incentives and procurement that lead to higher diversity, equity, and retention while ensuring that Oregon's workforce (construction and manufacturing) also benefits from attracting new manufacturing to Oregon. (see workforce & labor provisions, below[69]).
- Encourage the statewide adoption of the Portland-Metro Quality Jobs Framework[70] and DOL's Good Jobs Principles[71] in our public workforce system as high road job standards. Institutions such MIT Sloan School of Management[72] and UC Berkeley[73] have also developed good jobs or high road jobs frameworks.

[67] https://hbr.org/2012/01/why-good-jobs-are-good-for-retailers
[68] https://mitsloan.mit.edu/institute-work-and-employment-research/can-we-find-employment-high-road-low-wage-indusitries
[69] https://docs.google.com/document/d/1YF7s4MqafMahtD7MZYDdErjqO9Ik75r7bUE31O4OgnI/edit?usp=sharing
[70] https://worksystems.org/quality-jobs-initiatives/
[71] https://www.dol.gov/general/good-jobs/principles
[72] https://mitsloan.mit.edu/centers-initiatives/institute-work-and-employment-research/a-new-definition-good-jobs-support-iwer-faculty-members
[73] https://laborcenter.berkeley.edu/wp-content/uploads/2020/08/Executive-Summary-Putting-California-on-the-High-Road.pdf

Addendum A: Workforce Provisions

Construction:

Workforce Recommendations	BIL/IRA comparisons
• 15% apprenticeship utilization	• 15% apprenticeship utilization
• 15% workforce equity goal	
• Prevailing wage (wage+benefit)	• Prevailing wage (wage+benefit)
• Family health and retirement	• Bona fide benefits
• In lieu of workforce provisions…Project Labor Agreement	• Utilization of Project Labor Agreement as form of compliance (treasury rule)

Manufacturing operations and maintenance work:

Workforce Recommendations	BIL/IRA comparisons (Good Job Principles)
• Labor Peace Agreement	**Empowerment and Representation:** Workers can form and join unions. Workers can engage in protected, concerted activity without fear of retaliation. Workers contribute to decisions about their work, how it is performed, and organizational direction.
• Living wage and pay transparency requirement	**Pay:** All workers are paid a stable and predictable living wage before overtime, tips, and commissions. Workers' pay is fair, transparent, and equitable. Workers' wages increase with increased skills and experience.
• Fair Scheduling	**Job Security and Working Conditions:** Workers have a safe, healthy, and accessible workplace, built on input from workers and their representatives. Workers have job security without arbitrary or discriminatory discipline or dismissal. They have adequate hours and predictable schedules. The use of electronic monitoring, data, and algorithms is transparent, equitable, and carefully deployed with input from workers. Workers are free from harassment, discrimination, and retaliation at work. Workers are properly

	classified under applicable laws. Temporary or contractor labor solutions are minimized.
• DEI	Diversity, Equity, Inclusion, and Accessibility (DEIA): All workers have equal opportunity. Workers are respected, empowered, and treated fairly. DEIA is a core value and practiced norm in the workplace. Individuals from underserved communities do not face systemic barriers in the workplace. Underserved communities are persons adversely affected by persistent poverty, discrimination, or inequality, including Black, Indigenous, people of color; LGBTQ+ individuals; women; immigrants; veterans; military spouses; individuals with disabilities; individuals in rural communities; individuals without a college degree; individuals with or recovering from substance use disorder; and justice-involved individuals.
• Comprehensive benefits (Health, retirement)	**Benefits:** Full-time and part-time workers are provided family-sustaining benefits that promote economic security and mobility. These include health insurance, a retirement plan, workers' compensation benefits, work-family benefits such as paid leave and caregiving support, and others that may arise from engagement with workers. Workers are empowered and encouraged to use these benefits.
Workforce Training and Job placement: High road training partnership: • Labor-Management Partnership and any combination of community college, pre-apprenticeship, etc • Taft-Hartley apprenticeship	Skills and Career Advancement: Workers have equitable opportunities and tools to progress to future good jobs within their organizations or outside them. Workers have transparent promotion or advancement opportunities. Workers have access to quality employer- or labor-management-provided training and education.
In lieu of provisions, a Community benefit agreement or Community Workforce Agreement	

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- Andrew McGough, Worksystems
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