Washington's climate change and manufacturing policy landscape

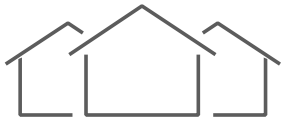
Building Washington's Clean Materials Manufacturing Economy

Glenn Blackmon, Hanna Waterstrat, Stephanie Celt, Joel Creswell, and Carolyn Busch

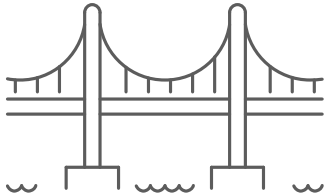
06/28/2022

Washington State Department of Commerce

We strengthen communities



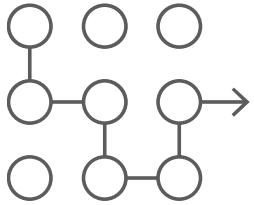
HOUSING HOMELESSNESS



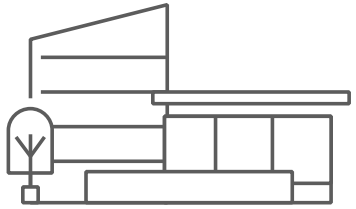
INFRASTRUCTURE

BUSINESS ASSISTANCE

ENERGY



PLANNING



COMMUNITY FACILITIES

CRIME VICTIMS & PUBLIC SAFETY

COMMUNITY SERVICES

2021 Washington State Energy Strategy: Industrial Sector

Glenn Blackmon, Energy Policy Manager

2021 Washington State Energy Strategy

Transportation

Buildings

Industry and Workforce

Electricity

https://www.commerce.wa.gov/energystrategy

Meeting the state's energy needs

- Maintain reasonable and fair **prices** and sufficient **supply** of energy
- Promote a competitive clean energy **economy** and **workforce** development
- Understand and address the needs of **low-income and vulnerable populations**
- Reach and respond to **urban and rural communities**

Aligning energy and climate policy

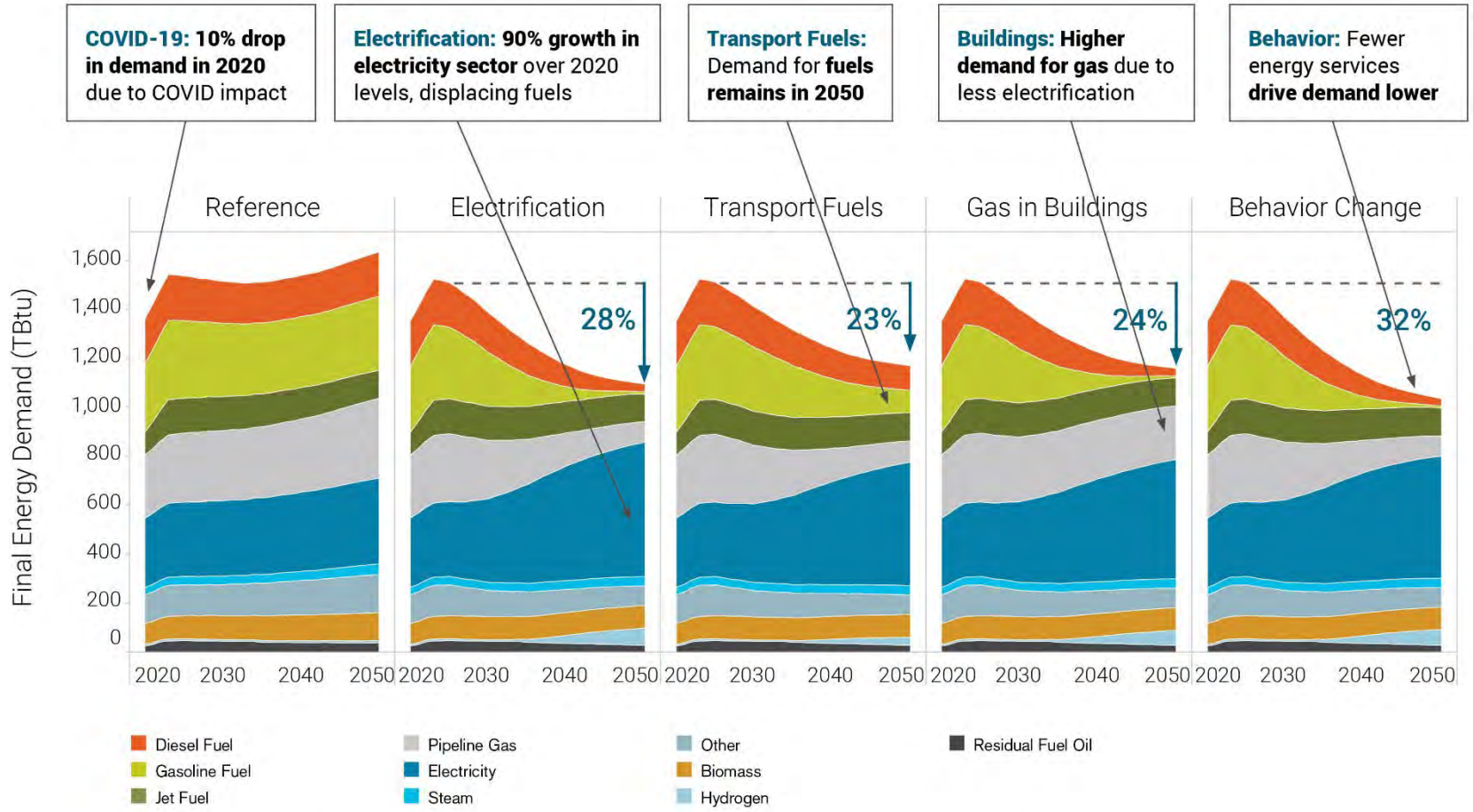
- Align strategy with clean electricity laws
  - Energy Independence Act (I-937, 2006)
  - Clean Energy Transformation Act (SB 5611, 2019)
    - After 2025, no coal in resource mix
    - By 2030, greenhouse neutral electricity supply
    - By 2045, 100% renewable or non-emitting sources
- Align strategy with greenhouse gas emissions limits (HB 2311, 2020)
  - By 2030, 45% below 1990 levels
  - By 2040, 75% below 1990 levels
  - By 2050, 95% below 1990 levels and achieve net-zero emissions.

Ensure equitable transition for communities

Source: Washington State Department of Commerce

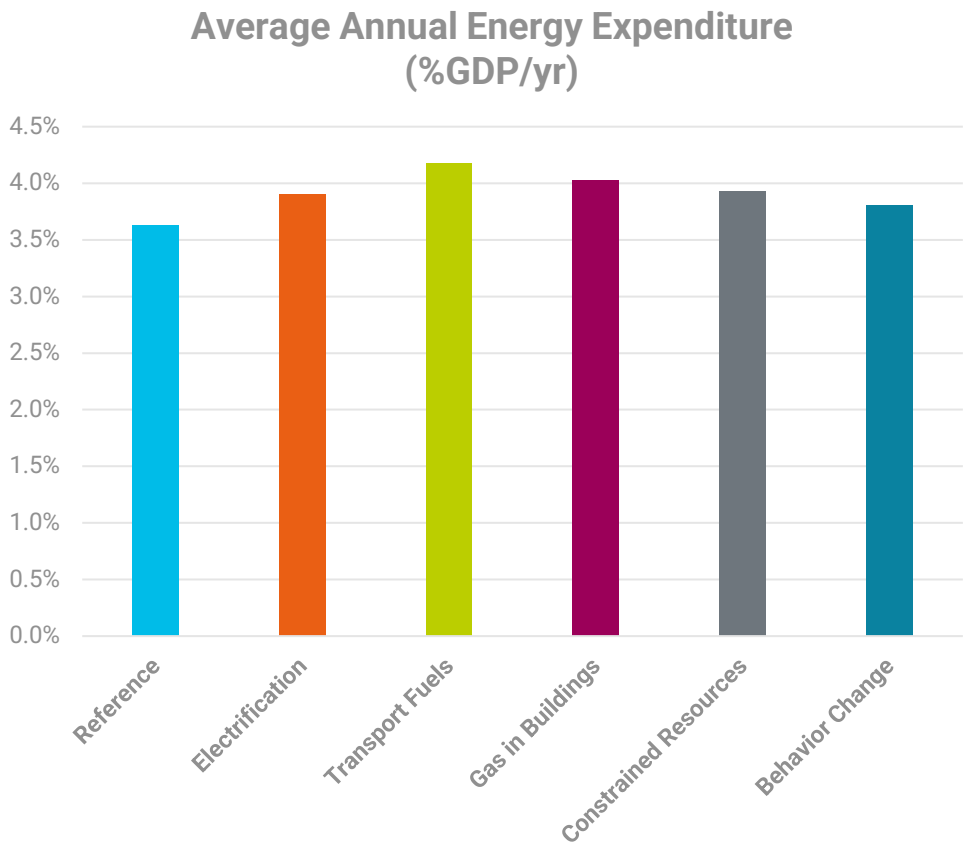
- Apply explicit equity principles
- Ensure impacted communities design solutions
- Invest in equitable and inclusive transition
- Support workers in transition
- Universal broadband access as foundation for transition

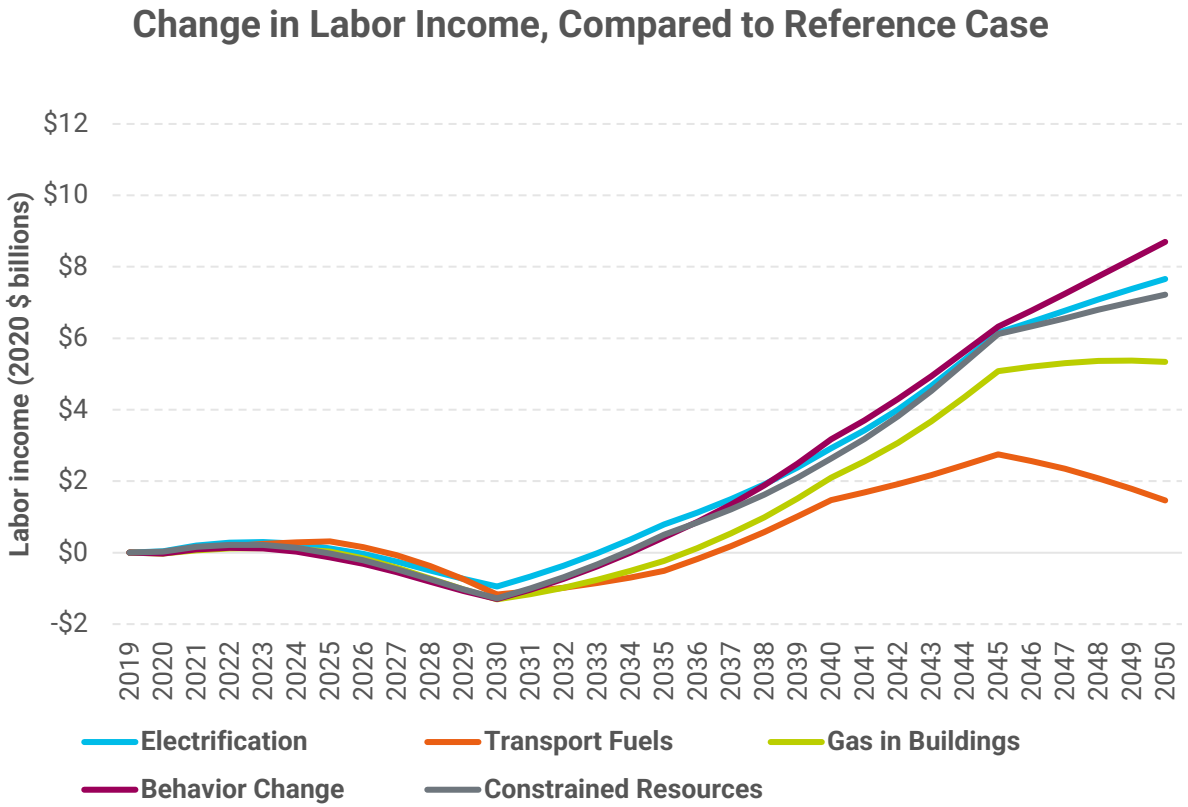
Final energy demand 2020-2050



Source: Appendix A – Deep Decarbonization Pathways Modeling Report, December 11, 2020 (p. 28).

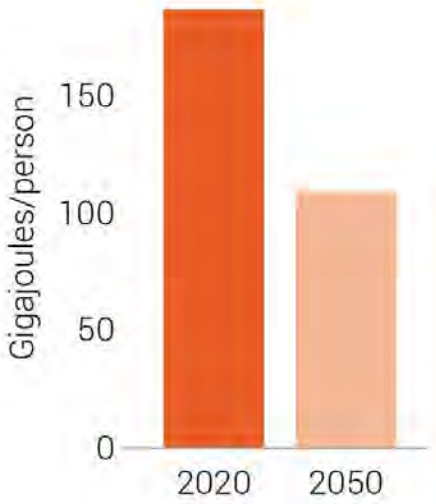
Cost impacts and economic effects



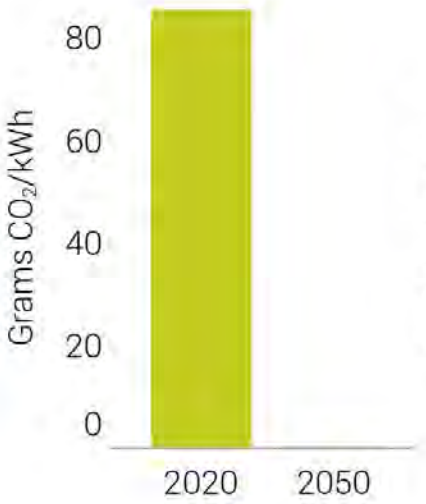


Five decarbonization strategies

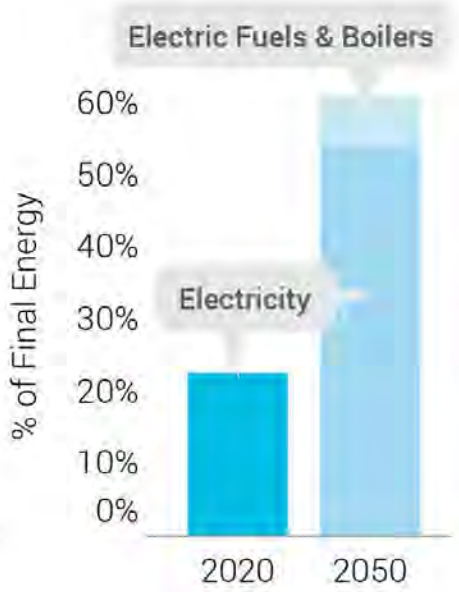
Energy Efficiency
Energy Consumption
(Gigajoules/person)



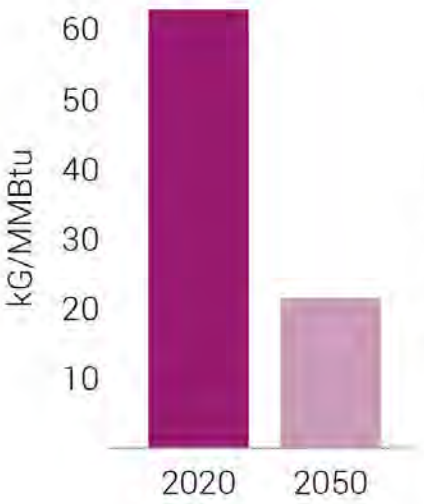
Clean Electricity
Electricity Carbon Intensity
(Grams CO_2 per kWh)



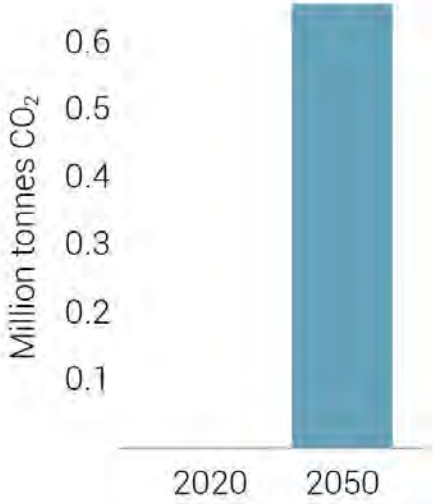
Electrification
Electricity Share of Total Energy
(% of Final Energy)



Clean Fuels
Fuels Carbon Intensity
(kG/MMBtu)



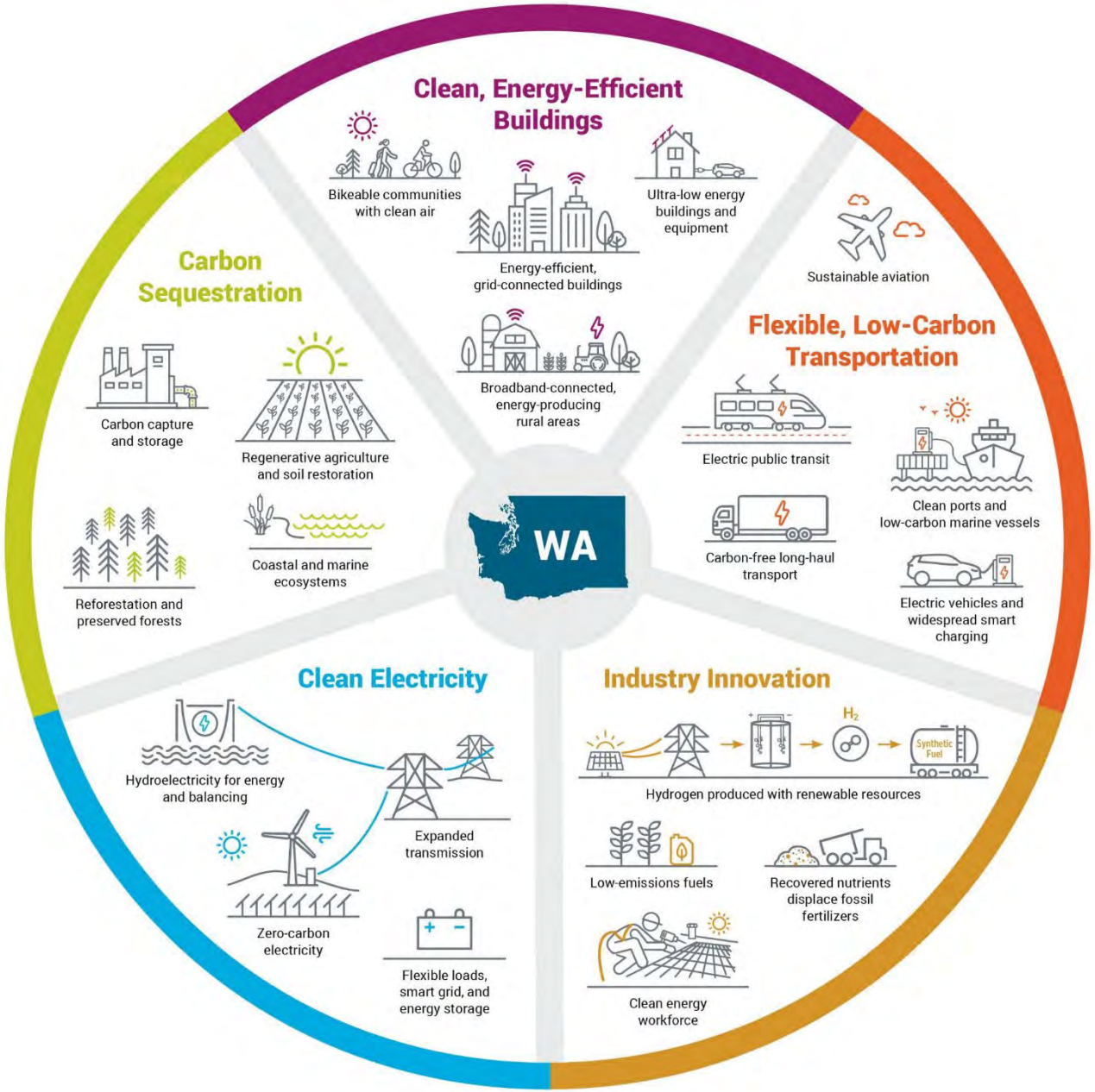
Carbon Sequestration
(Million tonnes CO_2)



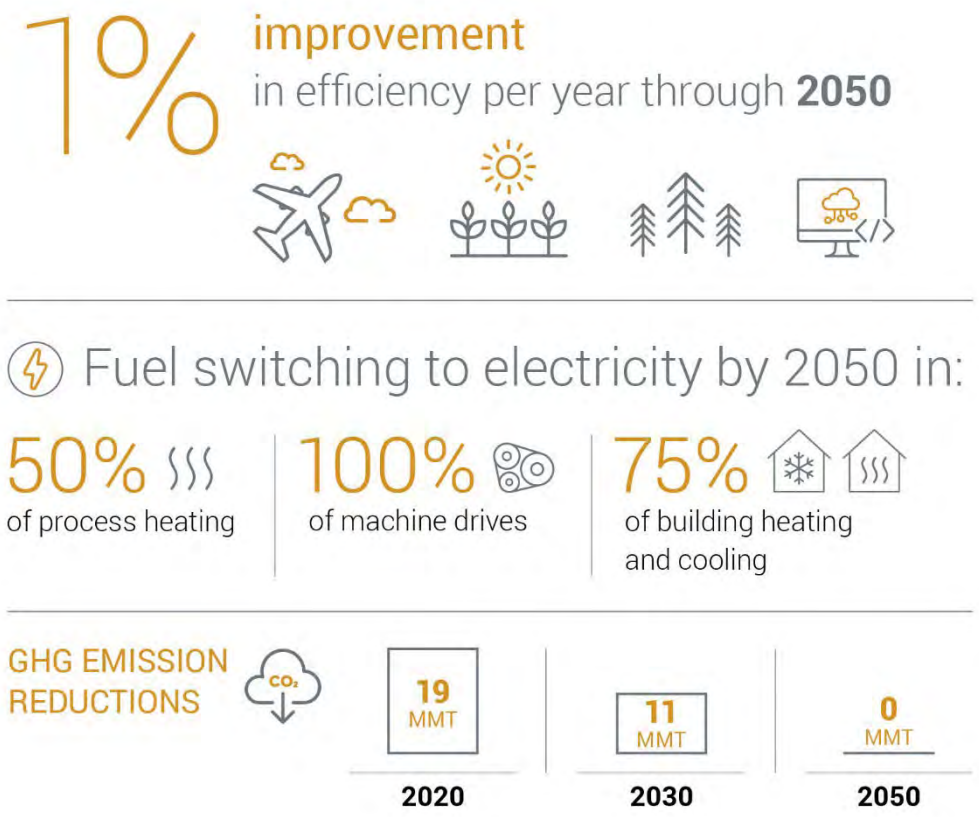
WASHINGTON STATE 2050

Net-Zero Vision

A blueprint for how we can meet our state's climate goals to nearly eliminate the use of climate-threatening fossil fuels by 2050, while growing a prosperous economy and maintaining affordable and reliable energy supplies.



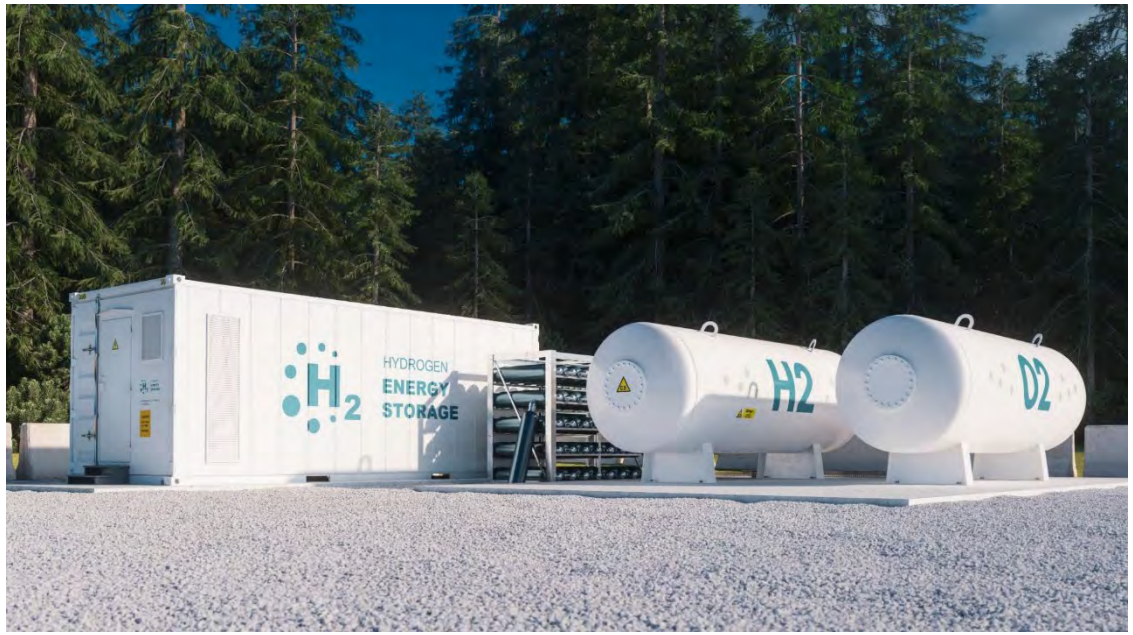
Decarbonizing the industrial sector



- Washington's significant demand for clean fuel requires an investment in clean fuels industry
- Large quantities of synthetic fuels required in 2030 to reach the target of 45% below 1990 emissions by 2045
  - ✓ New industrial flexible loads major emerging industry for producing hydrogen through electrolysis
- Significant fraction of carbon stream used to produce synthetic fuels comes from industrial carbon capture

Clean fuels required to achieve decarbonization

- All liquid fuels fully decarbonized by 2050
- Decreasing fuel consumption over time with electrification and efficiency
- Liquid fuels (gasoline, diesel, jet fuel, others) significantly decarbonized by 2030 with synthetic and biofuels
  - Significant growth in clean fuels industries with few current commercial operations; major challenge
- Emerging opportunities for hydrogen solutions



Industrial sector recommendations

- Improve data and analytical capabilities
- Establish technology-neutral regulatory frameworks
- Develop and implement clean energy industrial policy and technical assistance
- Accelerate research and development
- Develop hydrogen and biogenic feedstocks
- Expand policies to consider consumption-based emissions
- Leverage the transition to create new inclusive, living wage jobs

2021 Strategy – Big themes

- Need for planning, data analysis and outreach
- Role of investment in equitable and inclusive transition
- Universal broadband access as a foundation for energy transition
- Transition of the fossil natural gas industry
- Value of comprehensive pricing mechanisms
- Role of research, development and early deployment
- Development of green hydrogen and clean fuels

Buy Clean and Buy Fair

Hanna Waterstrat, State Efficiency and Environmental Performance Office

Embodied carbon policy in Washington

- Legislative “Buy Clean and Buy Fair” efforts
  - 2020 – HB 2744
  - 2021 and 2022 – HB 1103 “Improving environmental and social outcomes with the production of building materials”
- Executive Order 20-01
  - Requires state agencies to “consider embodied carbon” in new construction
  - SEEP has provided guidance and training to project owners
- 2021 State Energy Strategy

Buy Clean and Buy Fair

- Buy Clean and Buy Fair legislation
  - Required reporting:
    - Type III supply chain-specific environmental product declarations (EPDs) and labor conditions data
    - Covered products: structural concrete, reinforcing steel, structural steel, engineered wood
  - Focused on state building projects
  - Centralized database
  - Ongoing stakeholder engagement
  - Financial assistance for EPD generation at small and diverse-owned businesses

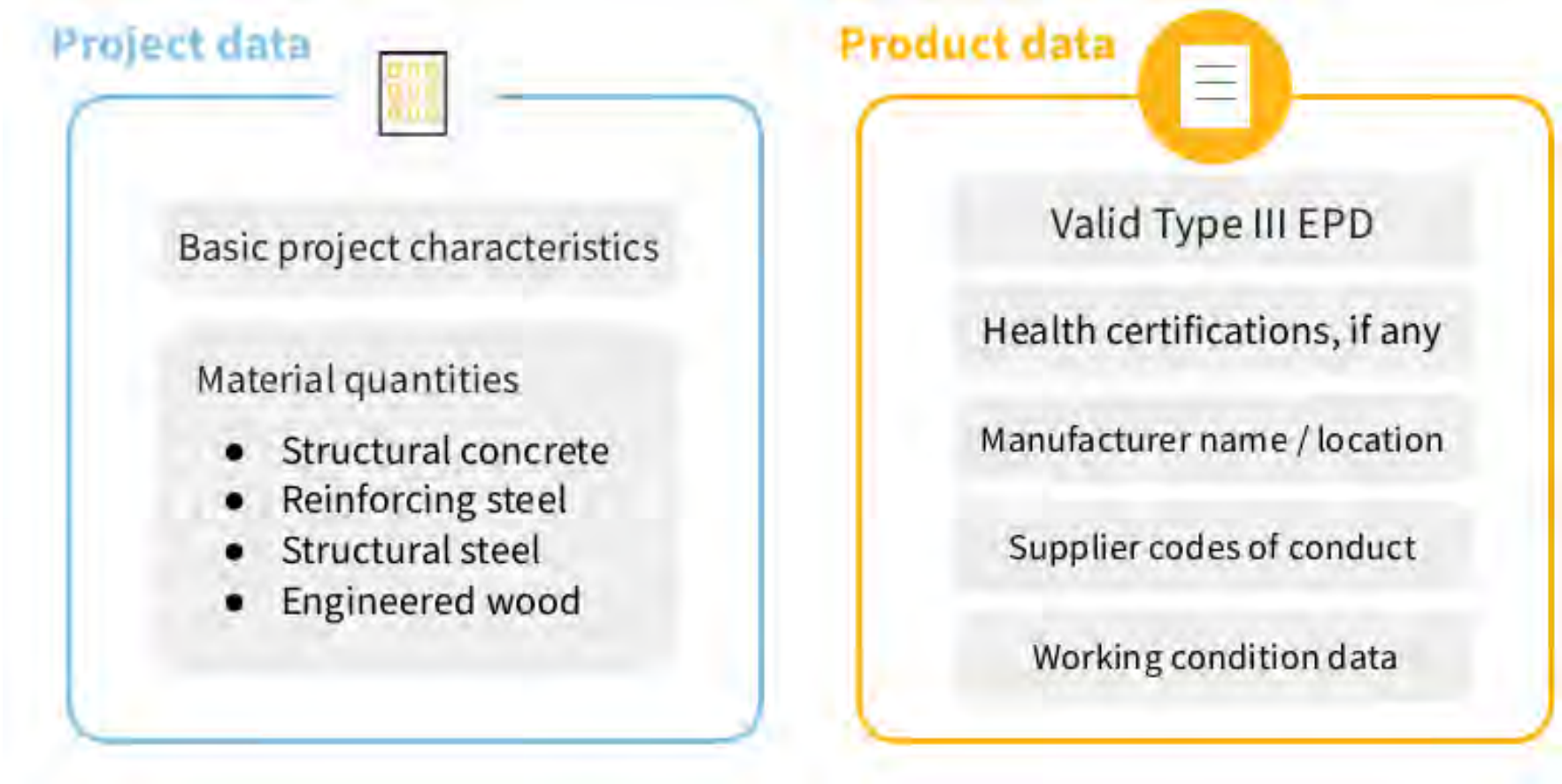
Current work

- SEEP Buy Clean and Buy Fair proviso
  - Work with University of Washington Carbon Leadership forum
  - Pilot projects
  - Prototype database for project disclosures
  - Progress report available, final legislative report due in November
  - More information available at: https://carbonleadershipforum.org/bcbf-project/

Pilot projects

Project Name	Current Stage	Materials
Interdisciplinary Engineering Building (IEB) at UW Seattle	Design	Concrete, rebar, structural steel
Milgard Hall at UW Tacoma	Construction	Concrete, rebar, structural steel, mass timber
WSDOT Olympic Region Maintenance Administration Facility (ORMAF) fuel island	Design	Concrete, rebar, structural steel
WSDOT ORMAF radio tower	Construction	Concrete, rebar, structural steel
Shoreline Community College Allied Health, Science, and Manufacturing replacement	Construction	Concrete, rebar, structural steel
Western Washington University Sciences Building	Construction Completed	Concrete, rebar, structural steel

Pilot project reporting



Pacific Coast Collaborative

- Low Carbon Construction Task Force
  - Participants:
    - States and Provinces: CA, OR, WA, BC
    - Cities: Vancouver BC, Seattle, Portland, San Francisco, Oakland, Los Angeles
  - GOAL: shared regional strategy to accelerate innovation, investment, and market development for low carbon materials by leveraging the scale of the Pacific Coast regional economy.
    - Advancing policy and program efforts to address embodied carbon
    - Sharing resources and best practices

Up next?

- SEEP pilot projects wrapping up– final legislative report due in November 2022

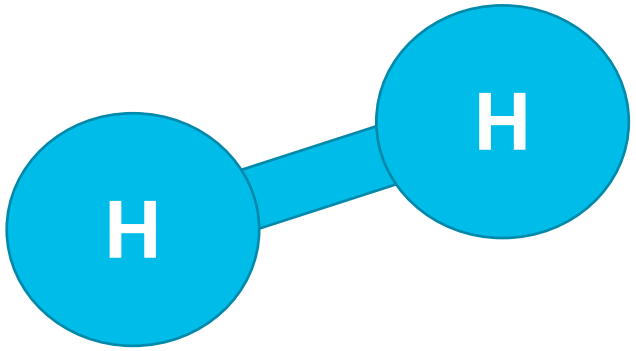
- 2022-23 legislative session:
  - Buy Clean and Buy Fair (HB 1103)
  - Funding for database development, ongoing stakeholder engagement, EPD generation, policy implementation

Fuel switching including hydrogen: hydrogen, renewable fuels and related opportunities for manufacturing decarbonization.

Stephanie Celt, Senior Energy Policy Specialist

Hydrogen and clean fuels

- Fuel: Any material substance that can be consumed to supply heat or power. Included are petroleum, coal, and natural gas (fossil fuels), and other consumable materials, such as uranium, biomass, and hydrogen" (Energy Information Agency)
  - Hydrogen: Green, blue, grey
  - Biomethane
  - Synthetic fuels
- H2 – abundant in the universe, energy dense
  - Energy carrier
  - Not naturally occurring in pure form – we have to make it
- Primary uses today:
  - Refinery operations
  - Fertilizers
  - Chemicals



Hydrogen 101

"Colors" of Hydrogen	Notes
Gray	Steam methane reforming (SMR), no carbon capture, high emissions
Blue	SMR with some of the carbon captured by carbon capture and storage
Green	Electrolysis – splitting of water powered by renewable energy
Pink	Splitting of water powered by nuclear energy
Turquoise	Thermal splitting of methane, producing solid carbon instead of CO2

Main way hydrogen is produced today

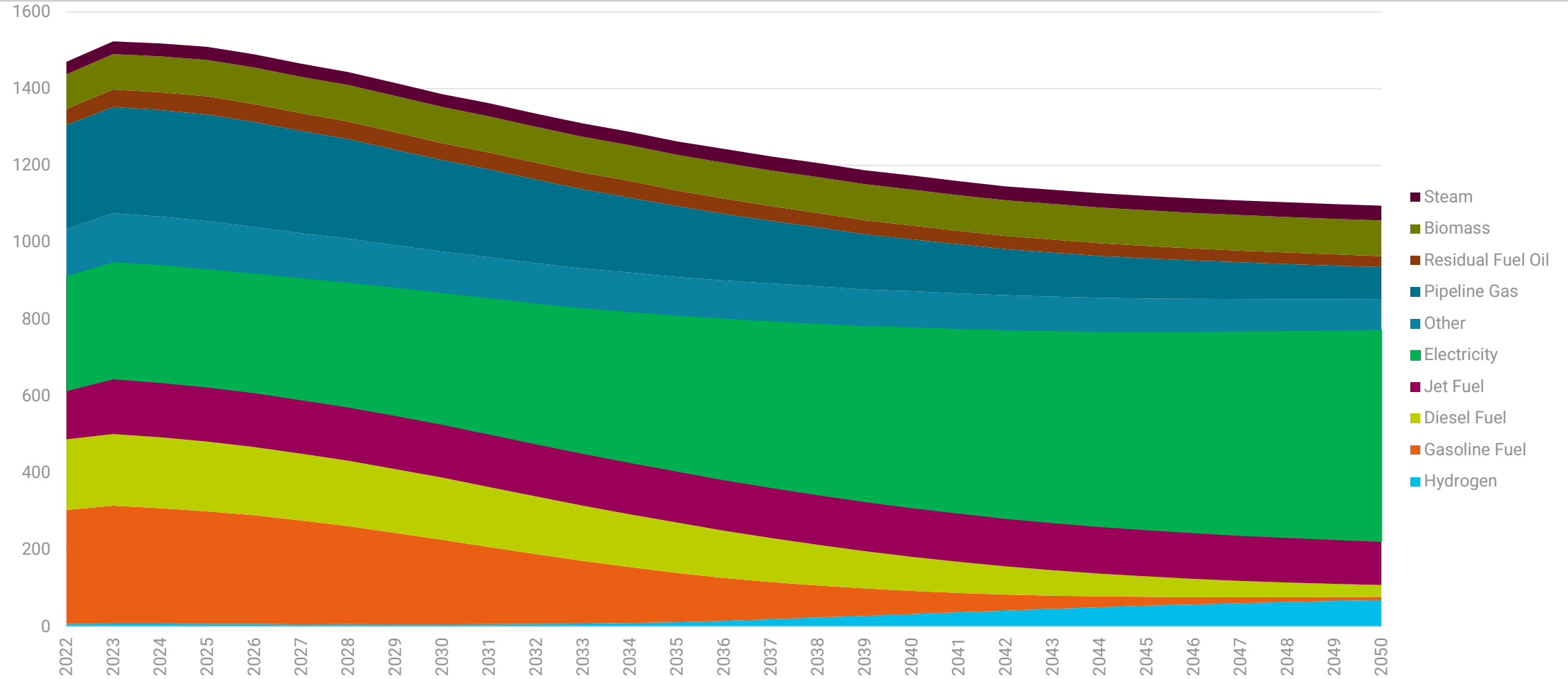
Best aligned with WA GHG emission limits

Green Hydrogen in the State Energy Strategy

"The deep decarbonization modeling and the state energy strategy identify an important role for clean fuels in every sector of the energy economy. **Green hydrogen is of particular significance**, because it could serve both as a flexible use of electricity when generation exceeds demand and as a feedstock for production of synthetic fuels." – 2021 State Energy Strategy

- **Flexible load** for the power system, functions as **storage**
- Replacement for **transportation fuels**: marine, aviation, and heavy-duty trucking
- **Industrial processes**: replace fossil-derived hydrogen, replace fossil fuels for high-temperature processes

SES: Energy Demand by Energy Form



Washington state and federal hydrogen updates:

Recent policy updates

Washington policy context

- Net zero GHG emission limits
  - Statutory targets of net zero by 2050
- Clean Energy Transformation Act
  - 100% clean electricity standard by 2045
- Climate Commitment Act
  - Cap and invest program covering about 75% of emissions
- HEAL Act
  - Requirements for state agencies to advance environmental justice and consult with Tribes in environmental work
- Labor standards incentives

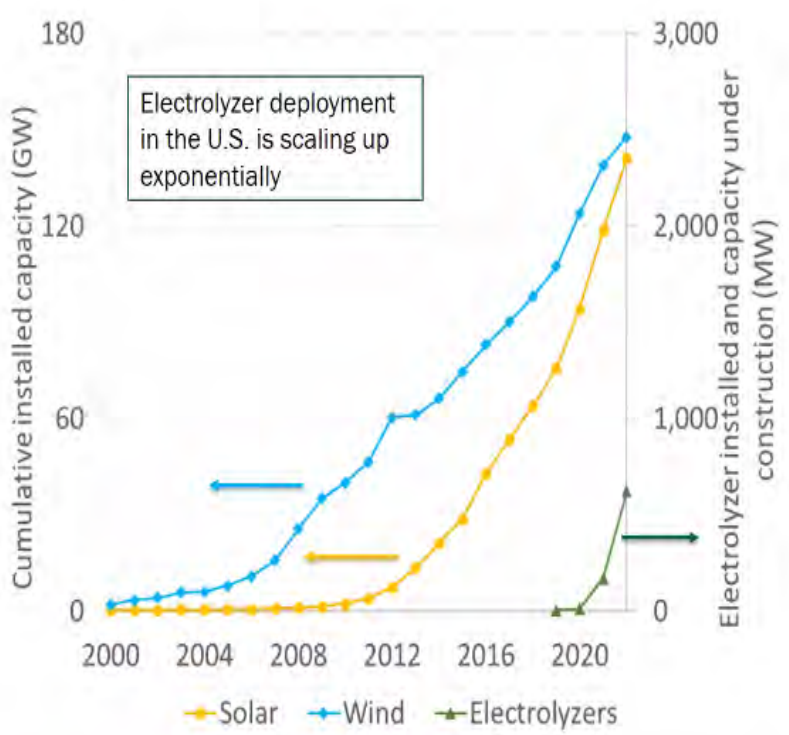
Hydrogen policy updates 2022

- SB 5910
  - “Green electrolytic hydrogen” definition
  - Authorities and incentives
  - New Office of Renewable Fuels
  - Report and recommendations
  - H2Hub references, including engagement
- HB 1812
  - Siting for clean energy projects, including hydrogen
- HB 1988
  - Clean energy manufacturing incentives, including for hydrogen
  - Labor standards

Green hydrogen capacity and growth

Hydrogen production: Strong steer to move from grey to green.

<1GW installed electrolyzer capacity now – but opportunity for exponential growth.



Global electrolyzer market estimates vary

Scenarios show over 60 GW by 2030

Sources: M. Koleva, HFTO/NREL, BNEF, 2021, Global Installed Capacity, IHS Markit, 2021, Hydrogen – CEH, Arjona, V. and Buddhavarapu, P., 2021, DOE Hydrogen Program Record. Electrolyzer Capacity Installations in the United States, Arjona, V., 2022. DOE Hydrogen Program Record. PEM Electrolyzer Capacity Installations in the United States, M. Klippenstein, CHFCA, EIA

Source: US Department of Energy 2022 Annual Merit Review and Peer Evaluation Meeting

Federal goals and funding

- Department of Energy Hydrogen Shot – “1 1 1”
  - Reduce the cost of clean hydrogen to $1 per kilogram in one decade
- Infrastructure Investment and Jobs Act
  - $8 billion Regional Clean Hydrogen Hubs
  - $1.5 billion Clean Hydrogen Manufacturing, Recycling and Electrolysis

H2Hubs key information

- $8 billion to at least four hubs
- At least one each based on:
  - Renewable hydrogen
  - Natural gas with carbon capture and storage
  - Nuclear
- At least one each for different end uses:
  - Electric power generation
  - Industrial sector
  - Residential and commercial heating
  - Transportation sector
- 10 year timeframe
  - Notice of intent released, full applications likely Q1/Q2 2023
  - For work done over 8-10 year timeframe

DOE H2Hub priorities

- Hydrogen Shot:
  - Contribute to 80% cost reduction
- Support clean hydrogen
  - With intent to evaluate life cycle emissions
- Align production and use
  - Avoid hydrogen “stranded assets”
- Equity, Environmental and Energy Justice, Justice40
  - Justice40 program
  - Non-GHG air quality improvements
  - Consent-based siting
- Employment and job creation
  - Focus on U.S. jobs, manufacturing and existing workforce

Justice40 and HEAL Act

40% of overall benefits of certain Federal investments must flow to disadvantaged communities

DOE: “Hub deployment will focus both on reducing harm and increasing benefits to disadvantaged communities”

WA context : Alignment with HEAL Act

First hydrogen projects in WA

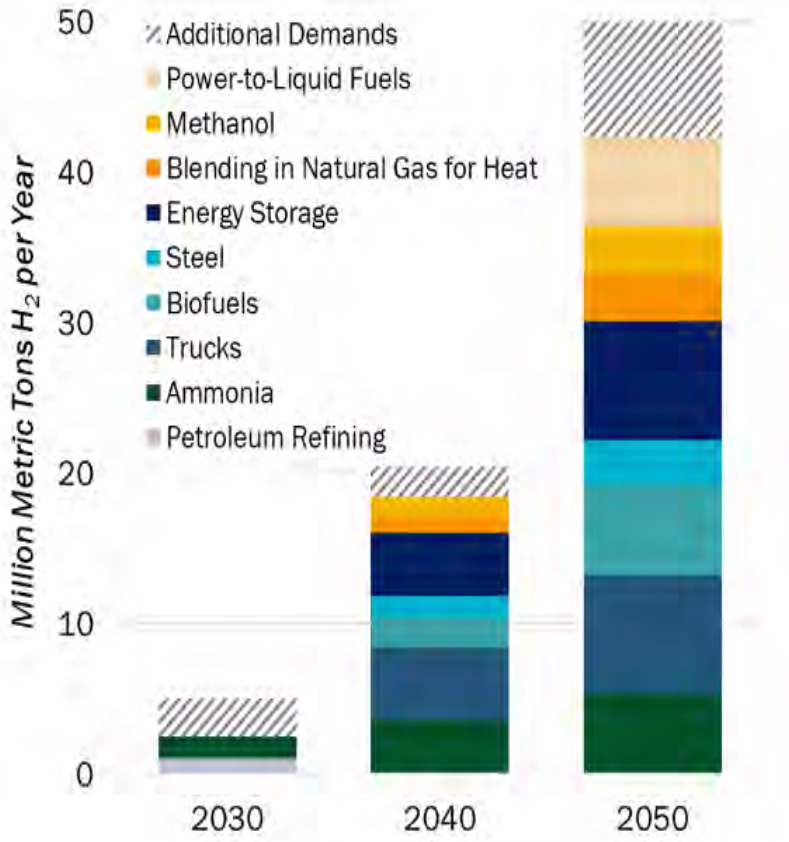
Hydrogen Plant Coming to Centralia

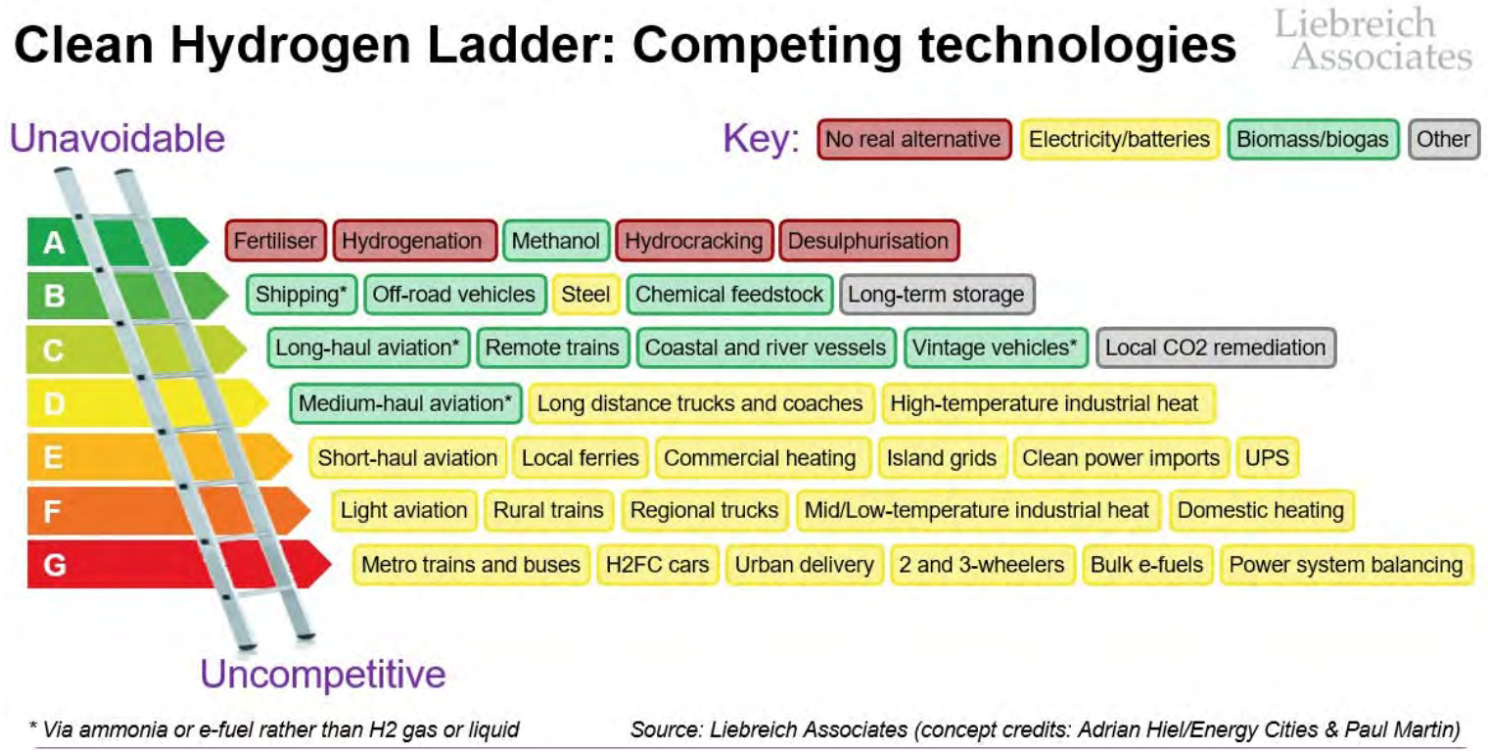
Fortescue Future Industries to Build Plant at Industrial Park at TransAlta

Speakers present during a "Hydrogen Symposium" in the TransAlta Commons at Centralia College on Thursday.
JARED WENZELBURGER / JARED@CHRONLINE.COM

Douglas County PUD launches 5-MW green hydrogen pilot in Washington state

What about the end uses?





Source: US Department of Energy 2022 Annual Merit Review and Peer Evaluation Meeting

Clean power considerations

- End uses of clean power
  - Direct use in manufacturing – example: Intalco
  - Green hydrogen for use in industrial sector
  - Many others – buildings, electric vehicles, etc
- Current renewable power
- Siting of renewable projects

Pacific Northwest H2Hub planning

- Governor request for Commerce to coordinate
- RFI responses
- Established Pacific Northwest Hydrogen Association
- Office of Renewable Fuels

H2Hubs next steps

- Review DOE Notice of Intent (published June 6, 2022)
- Support establishment of Pacific Northwest Hydrogen Association Board
  - NOTE: Current low participation from manufacturing
- Equity, Environmental & Energy Justice Plan
- Workforce Development and Jobs Plan
- Tribal Engagement – multiple pathways
- **Funding proposal finalized likely Q1/Q2 2022.**

Key questions for Commerce

- How to increase engagement with manufacturing sector in H2Hubs?
- What are power planning and siting opportunities, challenges?
  - Example: Low carbon energy siting study
- What next steps to highlight in BER, legislative session?
- How can Office of Renewable Fuels help?
- How will Clean Fuels Standard help?
- What industries and unions want to partner with the state?
- What public investments are needed?
  - Examples: Highlighted hydrogen/industry/utility partnerships in Sweden, Quebec
- How to address environmental justice?

Partnerships will be key

- Goals: thriving manufacturing sector aligned with SES including economic and environmental justice goals
- Strategic approach to renewable power and renewable fuels
- Need partnerships – with industry, unions, community, Tribes

  - Please reach out to discuss H2Hubs or Office of Renewable Fuels and partnership opportunities!

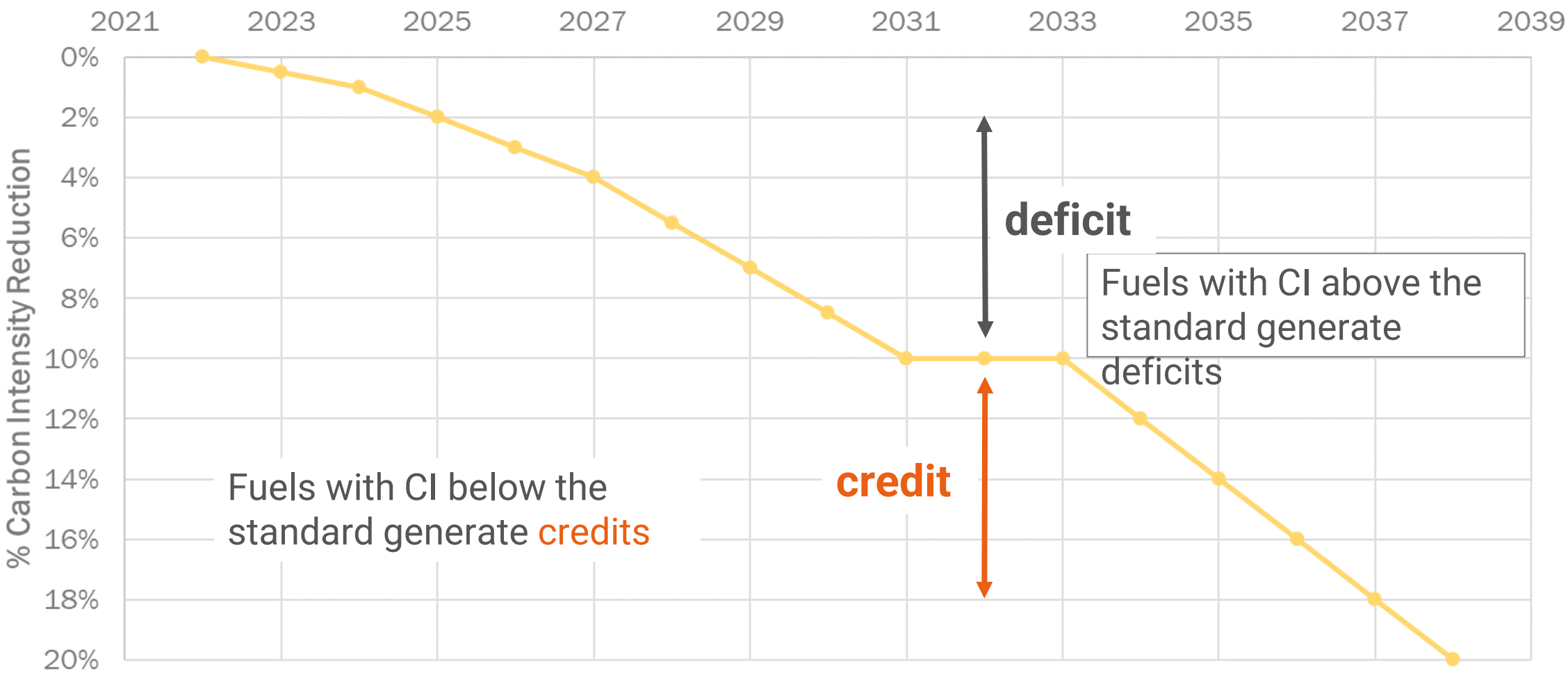
DEPARTMENT OF ECOLOGY
State of Washington

Washington's Clean Fuel Standard

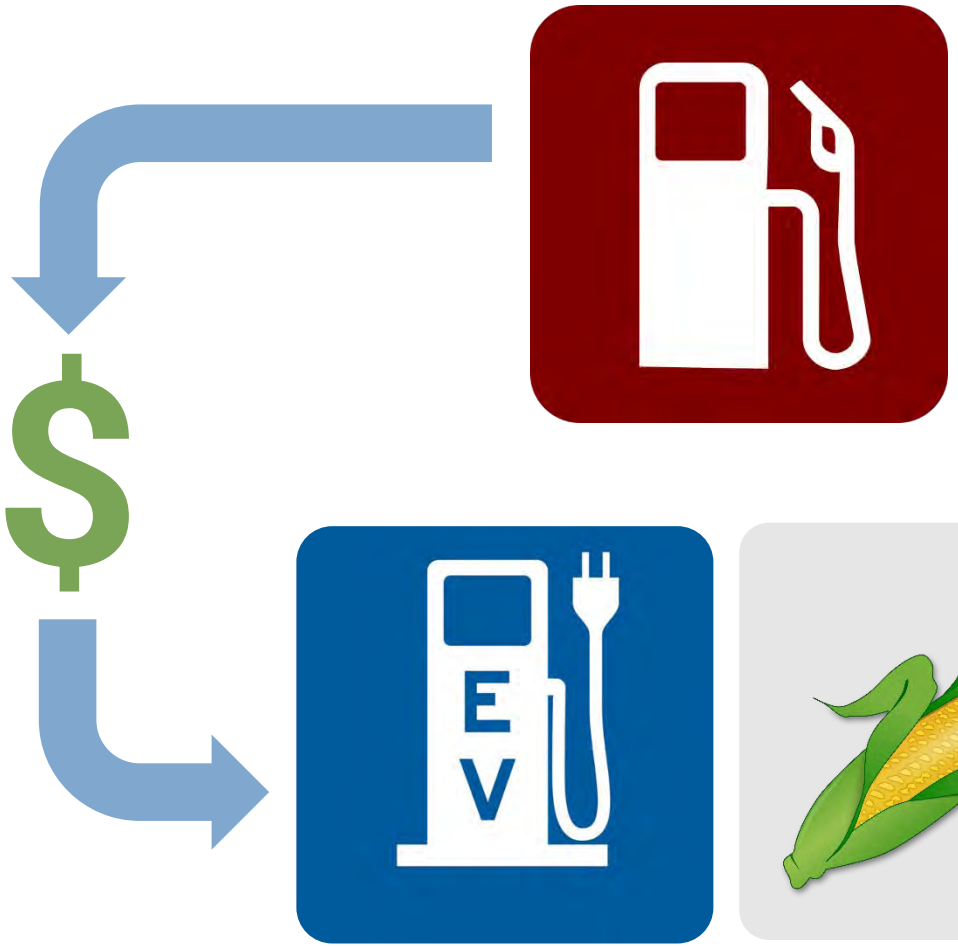
Joel Creswell, Climate Policy Section Manager

June 28, 2022

What is a Clean Fuel Standard?



What is a Clean Fuel Standard?



Higher carbon fuels generate deficits

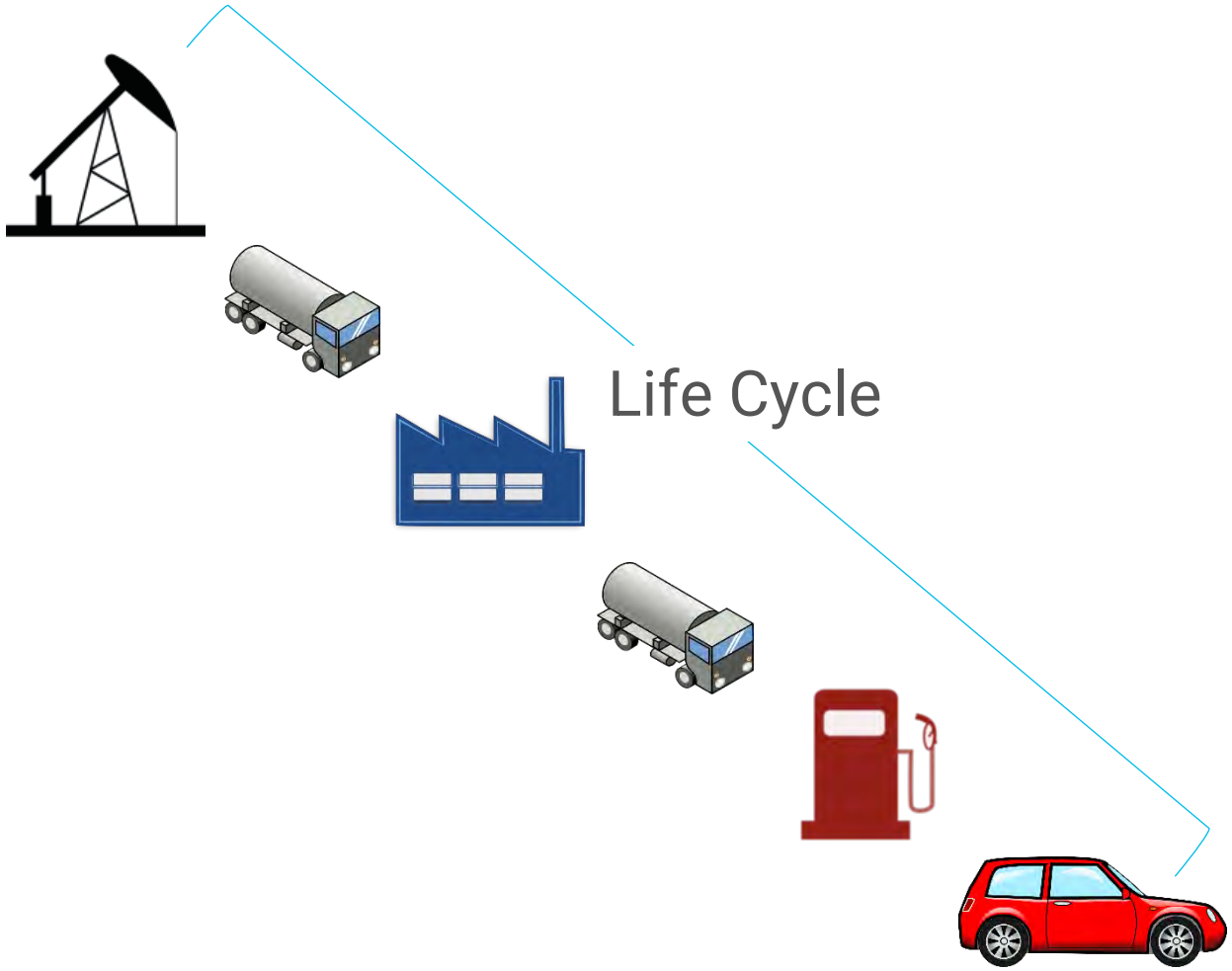
Credits Regulated entities buy credits

Lower carbon fuels generate credits

What is Carbon Intensity?

Carbon Intensity:

"The quantity of life-cycle greenhouse gas emissions, per unit of fuel energy, expressed in grams of carbon dioxide equivalent per megajoule (gCO_2e/MJ)"



Regulated fuels (*must comply*)

DEPARTMENT OF ECOLOGY
State of Washington

Including, but not limited to:

- Gasoline
- Diesel
- Ethanol
- Biodiesel
- Hydrogen (compressed or liquefied)
- Fossil fuel-based compressed natural gas (including fossil CNG, fossil LNG, and fossil L-CNG)

Opt-in fuels (*may participate*)

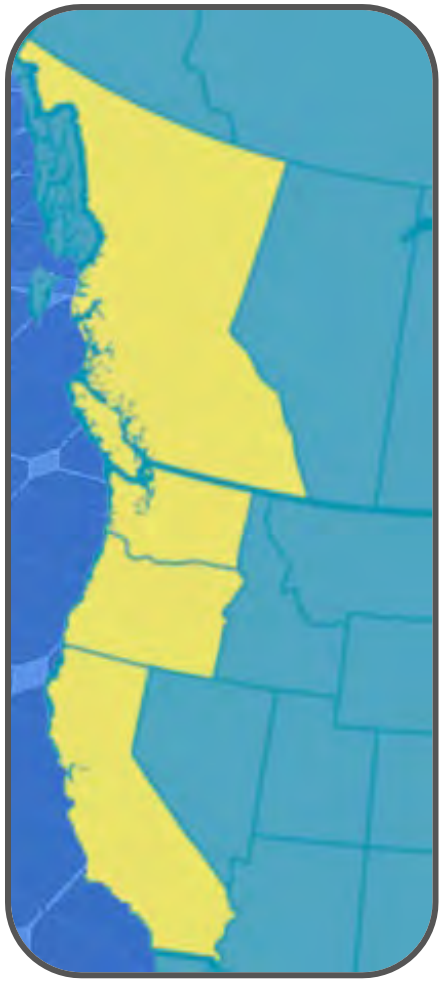
Including, but not limited to: any fuel that has a CI at or below the standard

- Electricity
- Biofuels
- Bio-CNG, Bio-LNG, Bio-L-CNG
- Alternative Jet Fuel
- Renewable propane or renewable LPG

In-State Biofuel Requirements

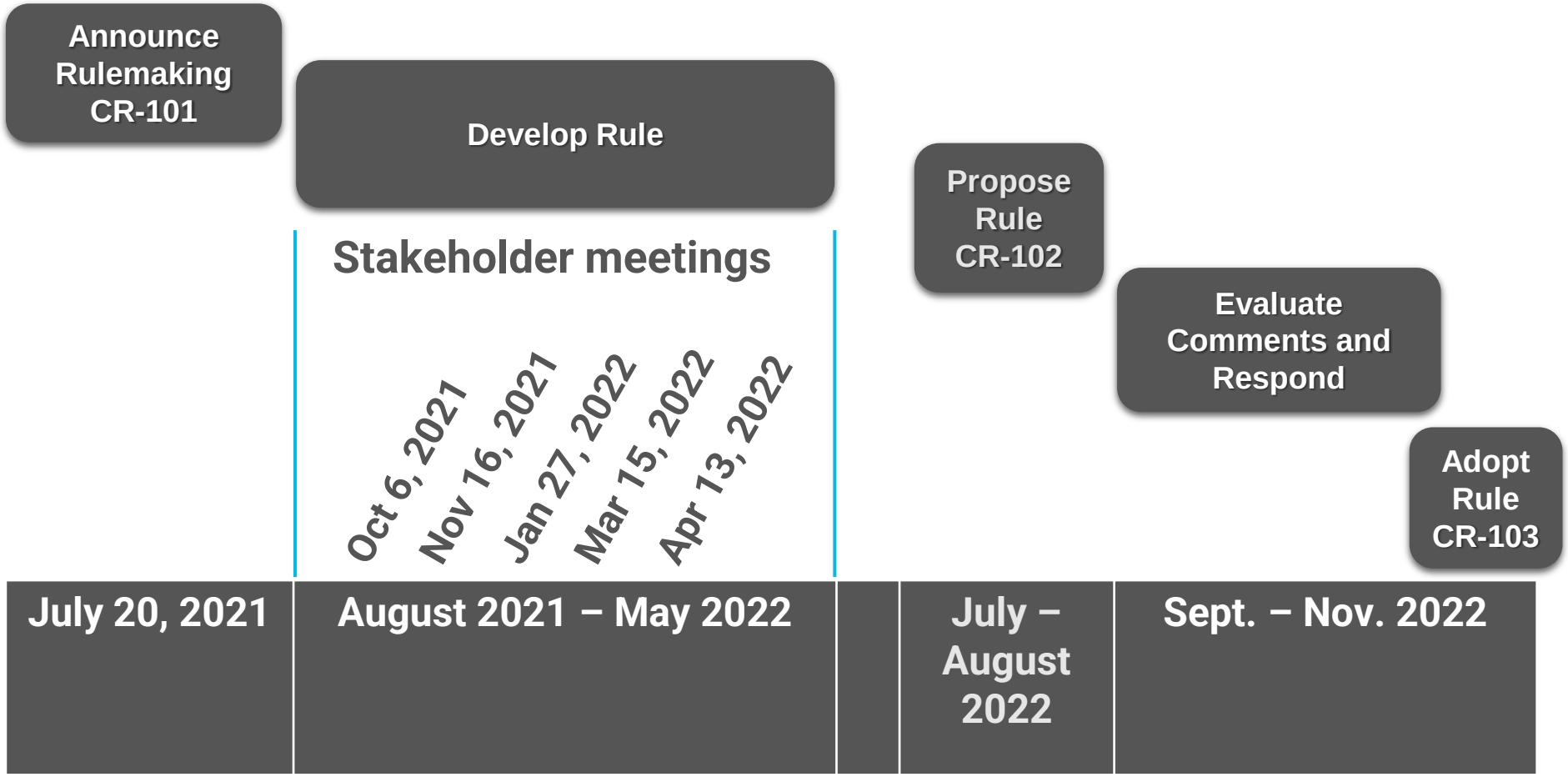
- By 2028, law requires at least:
  - 60M gallons/year of new, in-state biofuel capacity, with at least 10M gallons/year in new facilities
  - 15% increase in biofuel production using Washington feedstocks
- Carbon intensity standard can't exceed 10% until these requirements are met

Implications for fuel producers



- Credit revenue creates incentive for low carbon fuels
- West Coast clean fuels market
  - CA, OR, WA, and BC all have clean fuels programs
- Production location matters:
  - Fuel transport distance affects credit generation

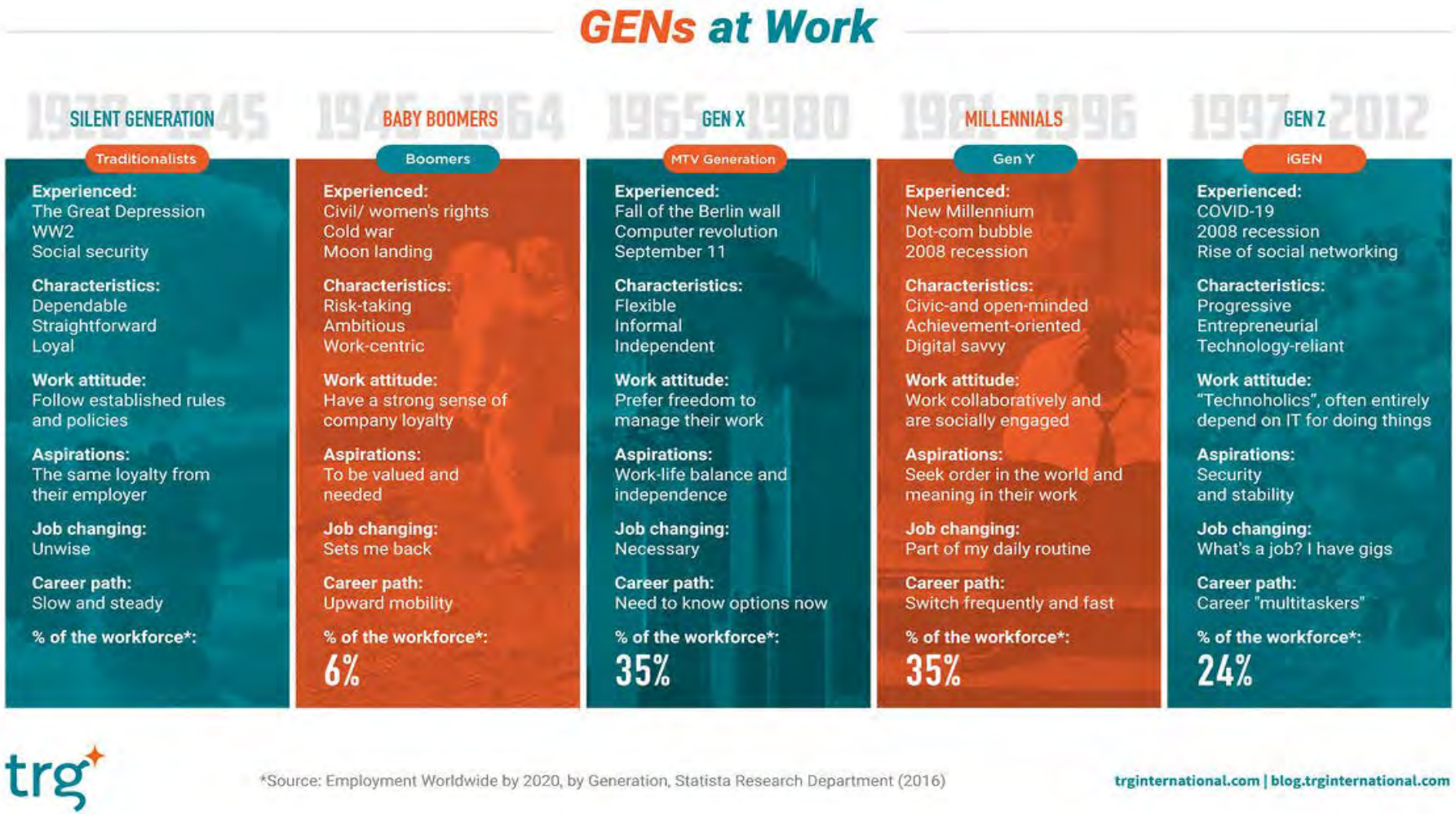
Rulemaking Timeline



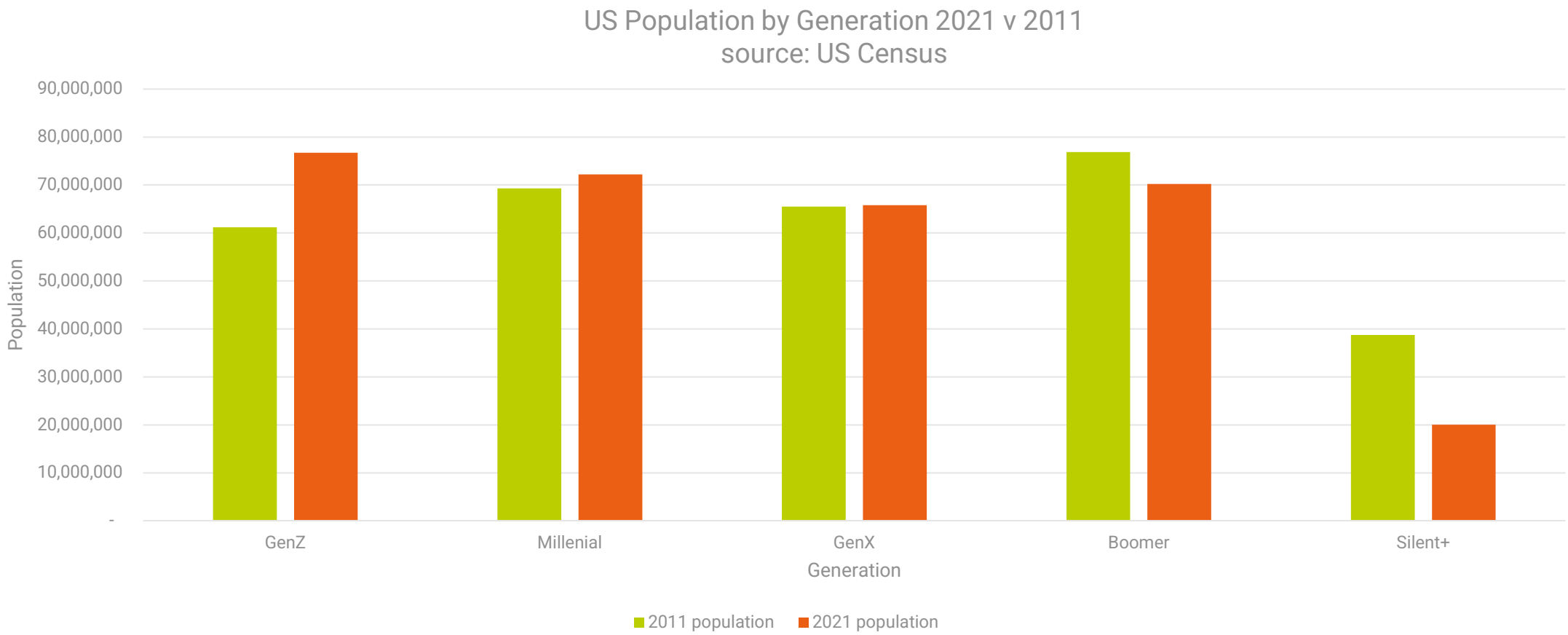
Washington's Manufacturing Outlook: The Big Picture

Carolyn Busch, Workforce sector lead & sector lead coordinator

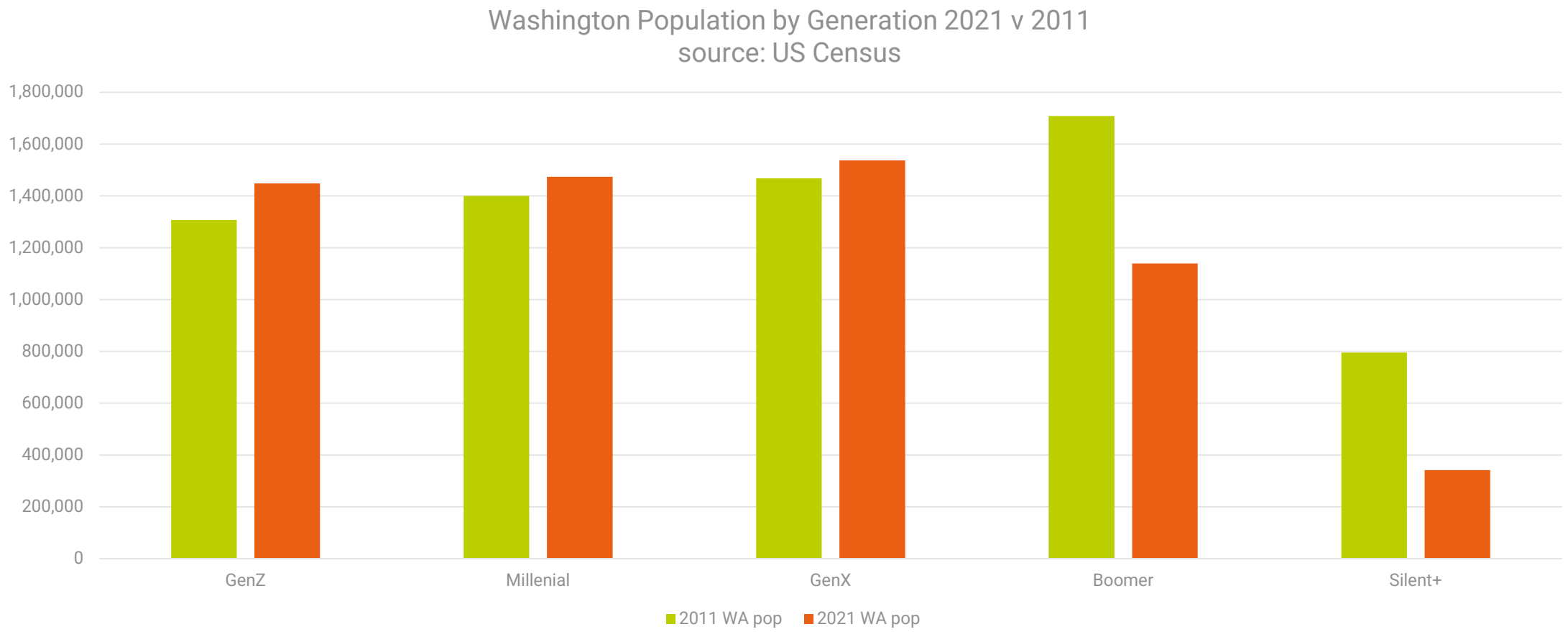
Generations by Year of Birth Described



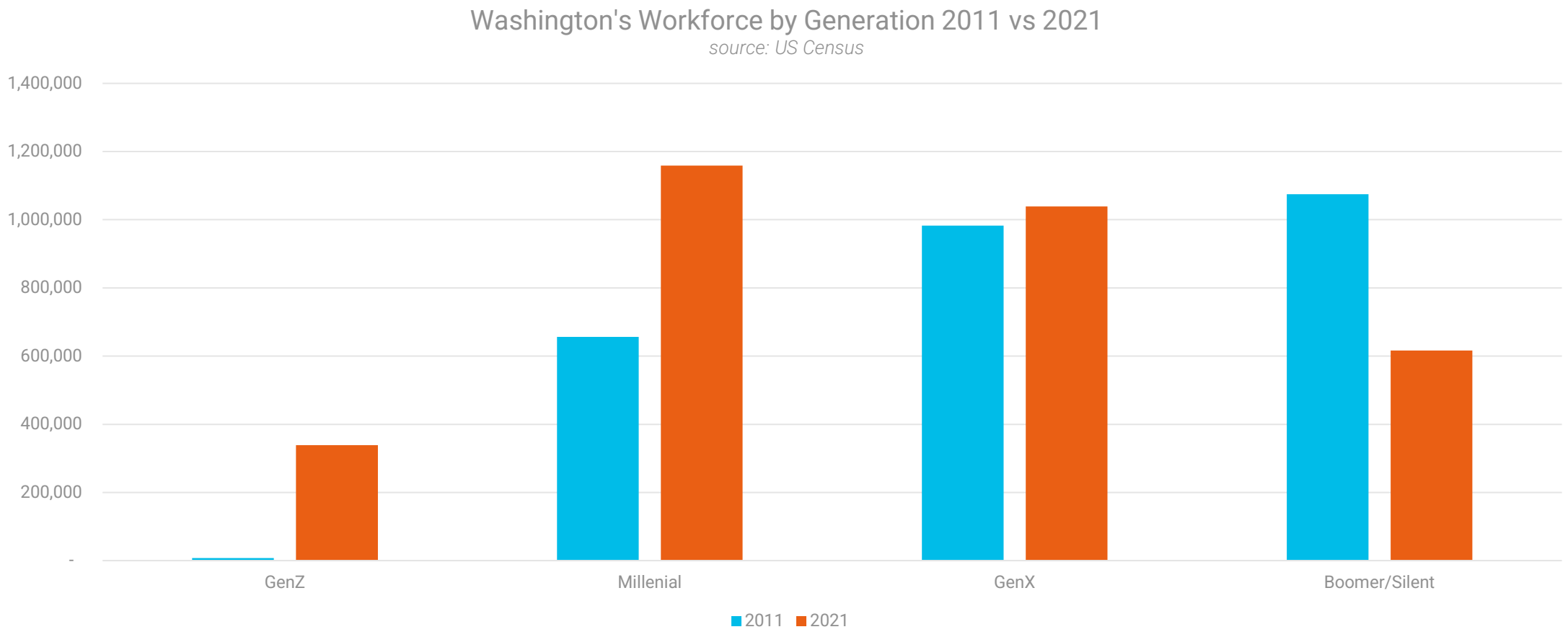
The Big Picture: Changes in the US Population by Generation



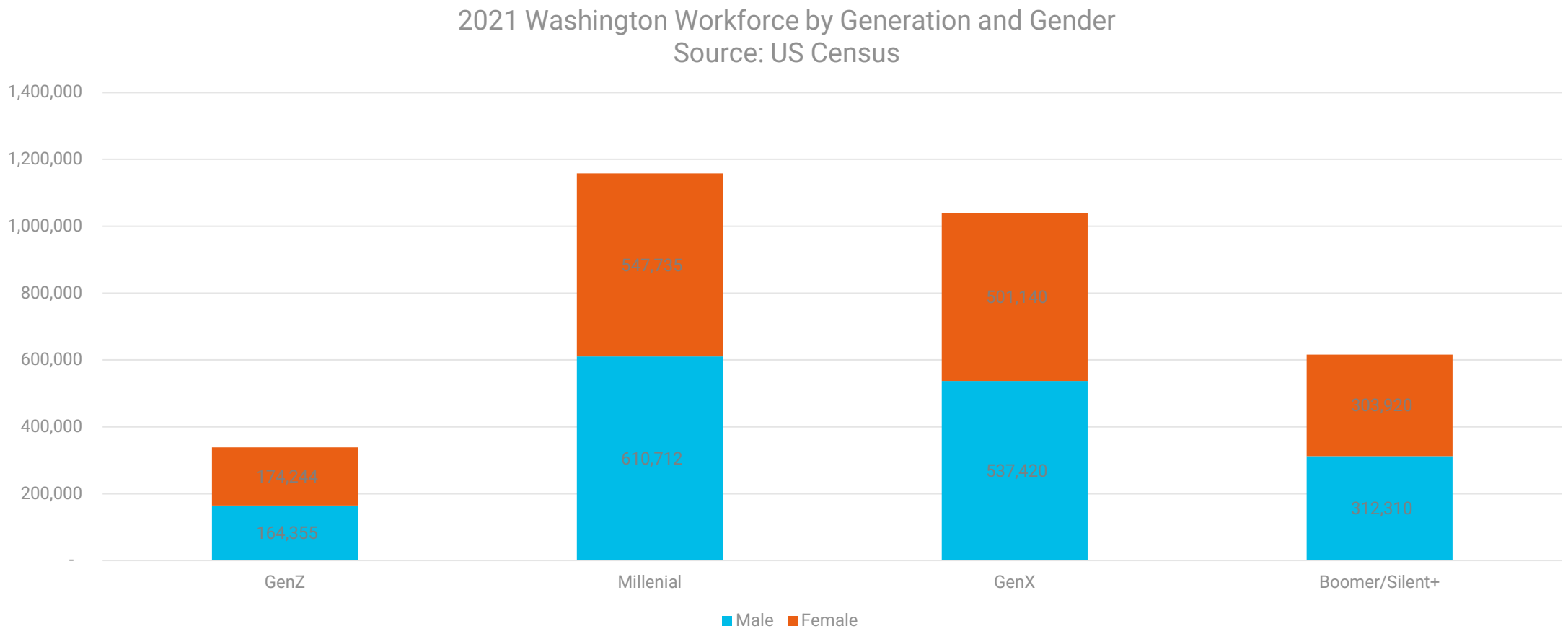
Washington State: Changes in Population by Generation



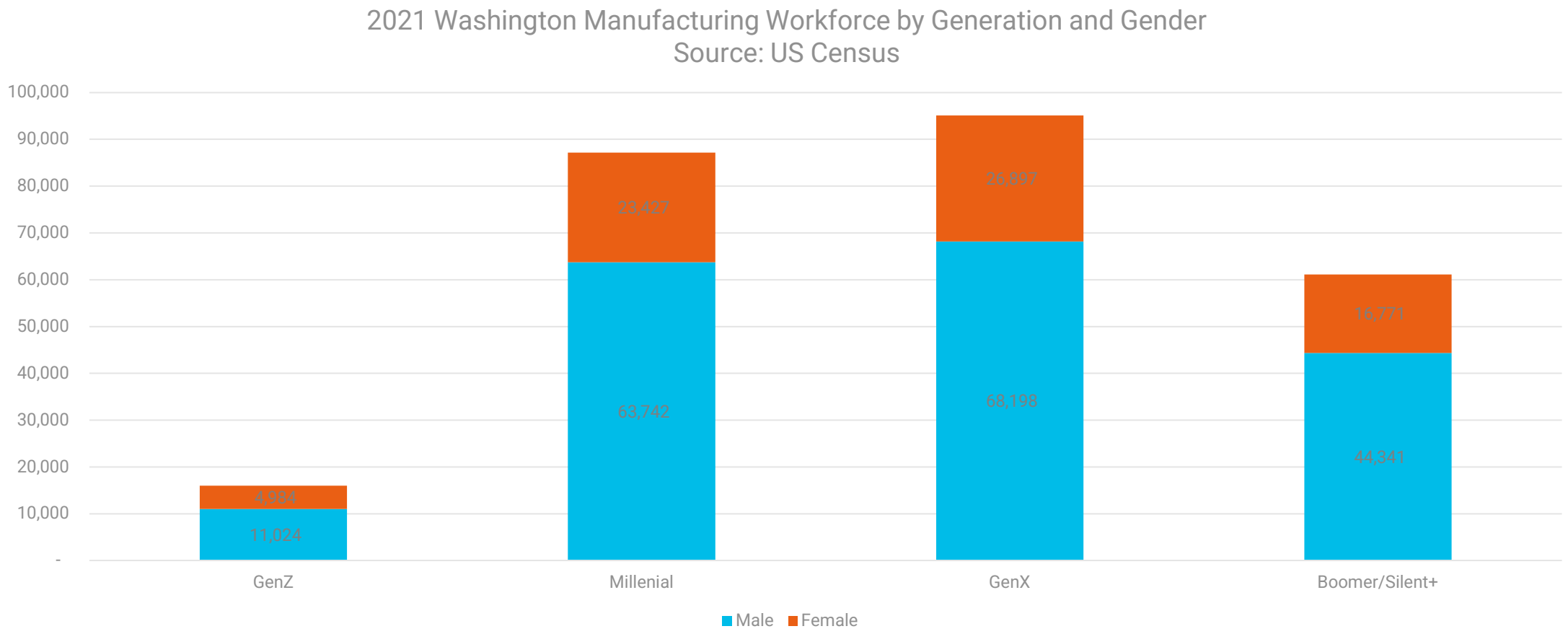
Washington State: Changes in Total Workforce by Generation



Washington State: 2021 Workforce by Generation and Gender



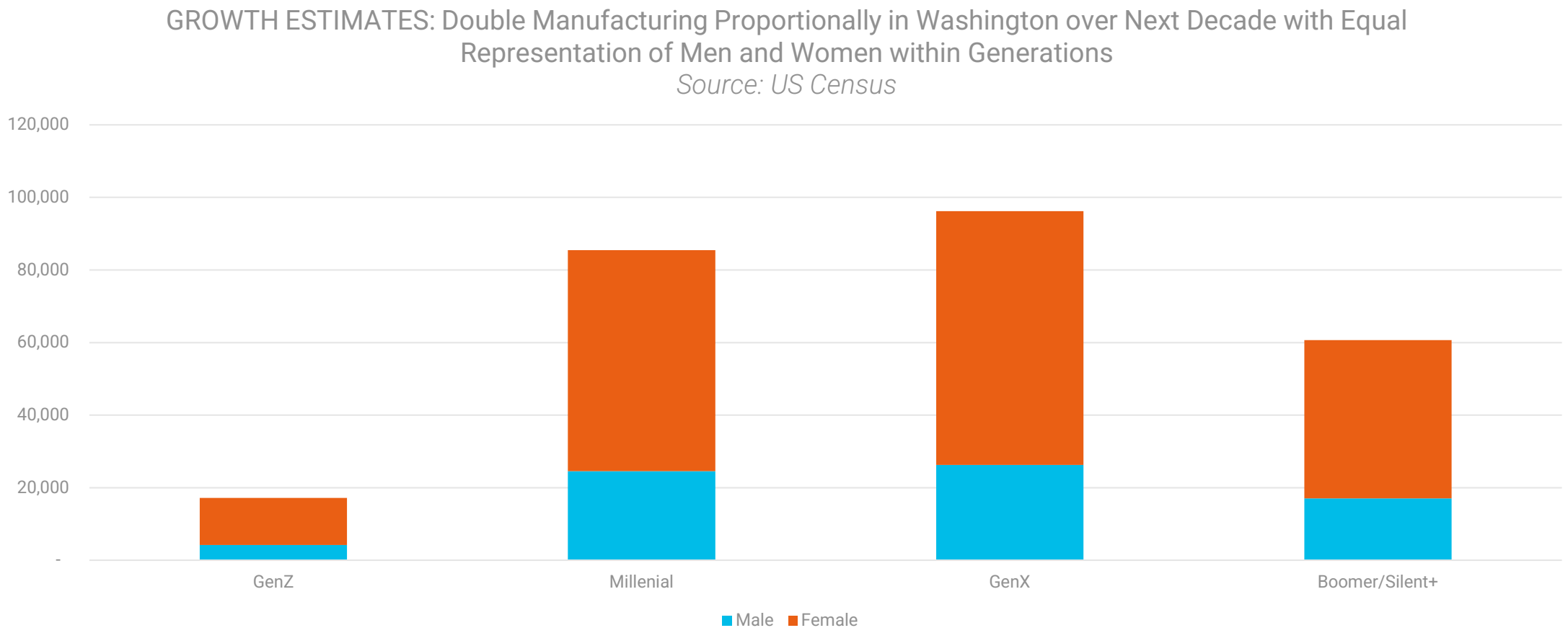
Washington State: 2021 Manufacturing Workforce by Generation and Gender



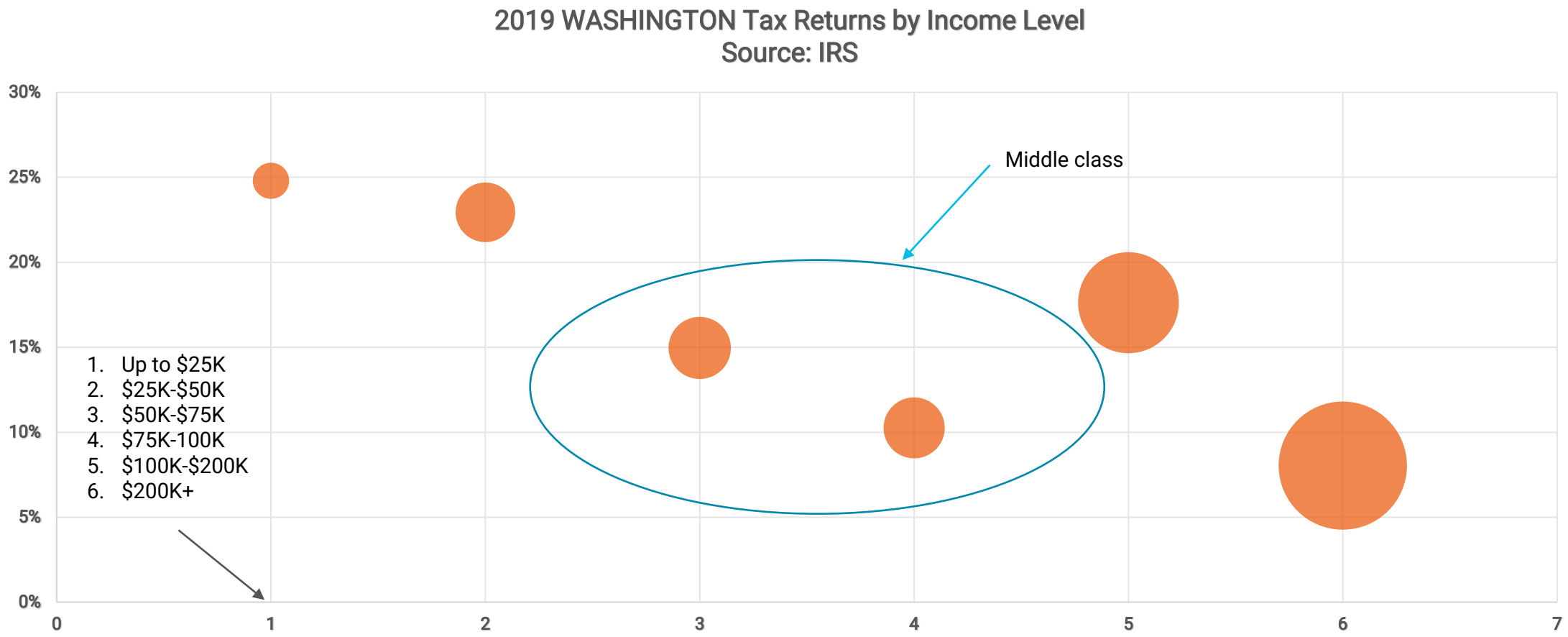
Manufacturing Jobs in 2021

- About 260,000 manufacturing jobs in 2021
- By 2031 our goal is about a 520,000 manufacturing jobs
- This is a net increase of 260,000 jobs (easy math but hard to accomplish when workforce shortages abound)
- In 2018, the average salary for this sector was $93,000/year
- **SHB 1170 creates a Manufacturing Council (equal Labor and Business representation) with the goal of doubling manufacturing in the next decade**

What would it take to double manufacturing jobs *and* reach gender equity in manufacturing job over the next ten years?



Increasing manufacturing jobs provides a much-needed regeneration of the middle class



Where will the growth in manufacturing come from?

- Small and medium sized manufacturers
- New, innovative industries, especially around clean manufacturing
- Existing manufacturers wanting to increase production
- Will require a significantly larger workforce via incumbent worker training, existing training and education programs, including apprenticeships, and new ways of getting workers (labor) and employers ready for a new generation, technology, etc.

Thank you!

Glenn Blackmon
ENERGY POLICY MANAGER
Glenn.Blackmon@commerce.wa.gov

Hanna Waterstrat
STATE EFFICIENCY AND ENVIRONMENTAL PERFORMANCE OFFICE
Hanna.Waterstrat@commerce.wa.gov

Stephanie Celt
SENIOR ENERGY POLICY SPECIALIST
Stephanie.Celt@commerce.wa.gov

Joel Creswell
AIR QUALITY CLIMATE POLICY SPECIALIST
joel.creswell@ecy.wa.gov

Carolyn Busch
WORKFORCE SECTOR LEAD & SECTOR LEAD COORDINATOR
Carolyn Busch@commerce.wa.gov

Washington State Department of Commerce

www.commerce.wa.gov