

Environmental Justice and Economic/Market Information on Emissions-Intensive, Trade-Exposed (EITEs) Facilities in Washington

EITE Joint Advisory Group Meeting #2

May 29, 2025



Some of the images and graphs are not accessible to a screen reader. Please contact us at CCAITEIndustries@ecy.wa.gov for assistance with accessibility.

Overview



Purpose



Emissions



Cowlitz County Case Study



Overburdened Communities



Health Impacts



Economic Impacts



Social Costs of Carbon



Market Impacts

Purpose

- ▶ **Provide information and analysis to support the development of Ecology's report to the legislature on the allocation of no-cost allowances to EITEs under the Cap-and-Invest Program through to 2050. The objectives include:**
 - Compiling data and identifying the relative contribution of EITE facilities on air quality, health, and environmental impacts on communities, including comparisons with other emission sources/sectors
 - Compiling data and identifying economic impacts of EITE facilities
 - Identifying the market structure and competitive dynamics for selected EITEs in Washington State
 - Providing data and/or analysis on how those impacts may change over time as a result of the policies in the Cap-and-Invest Program

Emissions: Pollutant Types

Greenhouse Gases (GHG): Gases that trap heat in the atmosphere:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)
- Fluorinated gases

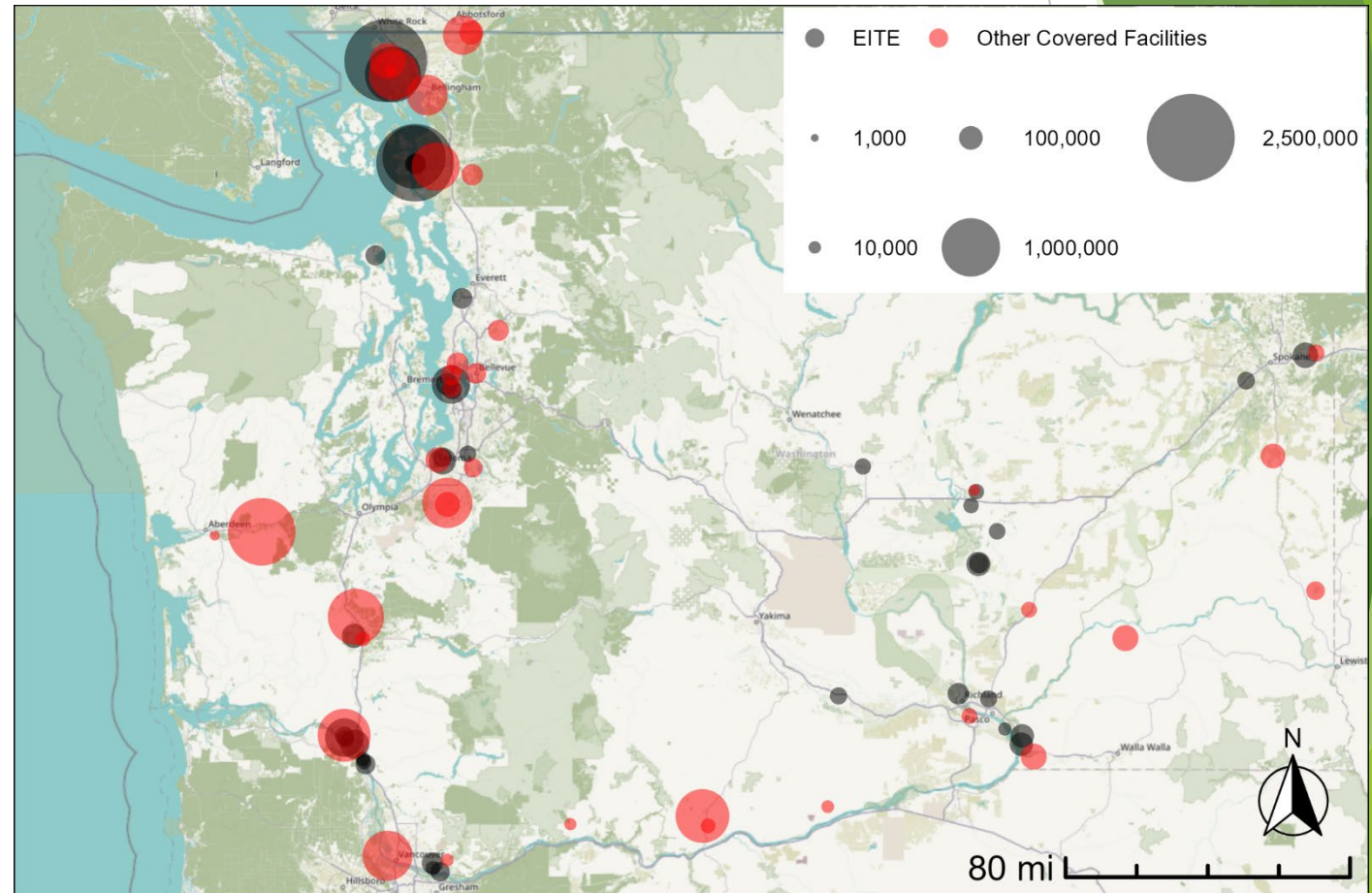
Criteria Air Pollutants (CAP): Six commonly found air pollutants with National Ambient Air Quality Standards (NAAQS):

- Carbon Monoxide (CO)
- Lead (Pb)
- Sulfur Dioxide (SO₂)
- Ozone (O₃)
 - Precursors to O₃ include volatile organic compounds (VOCs)
- Particulate Matter
 - Particulates 2.5 micrometers in diameter (PM_{2.5})
 - 10 micrometers in diameter (PM₁₀)
 - Ammonia (NH₃) can mix with other gases such as NO_x and SO₂ to form particulate matter
- Nitrogen oxides (NO_x)
 - Also a precursor to O₃

Hazardous Air Pollutants (HAP): Pollutants that are known or suspected to cause cancer or other serious health effects.

Emissions: Statewide GHG Emissions 2023

- 39 EITEs
 - 15 counties
 - 13.3% of total reported GHG
 - 14.0% of covered emissions
- 134 CCA covered entities
 - 21 counties
 - 89.0% of total reported GHG
- 270 Reporters
 - 90.8 million MTCO₂e



Map does not include sources without geographic coordinates.

Emissions: Statewide CAP Emissions

Pollutant	EITE Total (tons)	CCA Covered Total (tons)	State Total (tons)	EITE % of State	CCA Covered % of State
PM10	1,440	12,278	352,868	0.4%	3.5%
CO	7,208	588,959	1,446,622	0.5%	40.7%
NH3	224	5,197	36,022	0.6%	14.4%
PM2.5	1,138	8,680	145,444	0.8%	6.0%
NOX	11,840	127,542	145,209	8.2%	87.8%
SO2	1,936	5,953	12,716	15.2%	46.8%
VOC	4,185	56,088	349,882	1.2%	16.0%

Note: EITE emissions for 2023 for major sources, most recent year for minor sources. CCA covered and state totals from EPA National Emissions Inventory 2022.

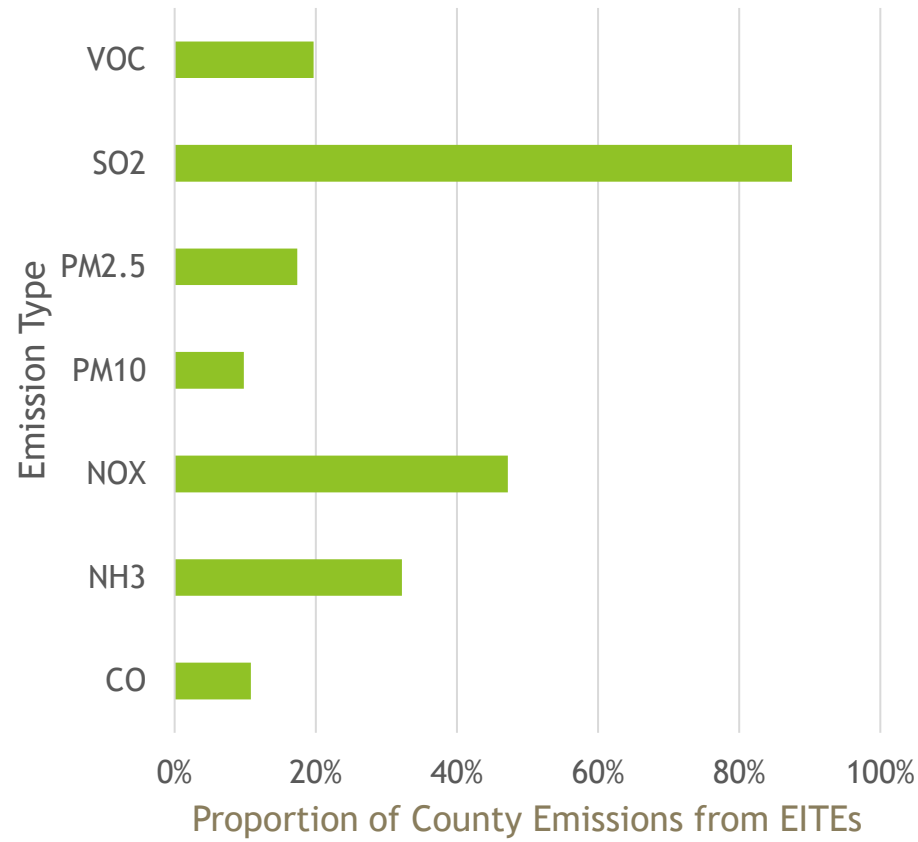
Emissions: County Level CAP Emissions

	Carbon Monoxide		Nitrogen Oxide		Sulfur Dioxide	
County	County Total (tons)	EITE % of Total	County Total (tons)	EITE % of Total	County Total (tons)	EITE % of Total
Adams	4,939	0.9%	2,156	3.2%	13	0.0%
Benton	16,926	0.2%	4,097	1.6%	28	0.6%
Clark	54,545	0.3%	5,813	0.4%	228	1.3%
Cowlitz	20,846	10.9%	6,669	46.6%	746	72.2%
Franklin	7,913	0.2%	2,578	0.9%	19	0.0%
Grant	12,864	0.8%	2,750	3.0%	39	0.4%
Jefferson	6,546	11.0%	1,722	26.5%	111	102.7%
King	291,145	0.5%	29,628	3.8%	1,527	5.7%
Lewis	65,623	0.5%	7,155	11.2%	1,639	3.4%
Pierce	77,659	0.1%	11,358	1.9%	632	0.8%
Skagit	68,457	1.4%	7,662	36.4%	958	31.4%
Snohomish	108,014	0.0%	9,984	0.7%	409	0.0%
Spokane	50,280	0.3%	7,898	1.7%	127	0.7%
Walla Walla	7,526	2.9%	2,263	13.5%	652	21.2%
Whatcom	112,477	0.6%	6,859	37.3%	1,761	39.3%
Yakima	37,128	0.1%	3,959	0.8%	144	0.1%

Note: EITE emissions for 2023 for major sources, most recent year for minor sources.
County totals from EPA National Emissions Inventory 2022, which may lead to percentages over 100.

Cowlitz County Case Study: Emissions

EITE CAP Emissions 2022



2023 GHG Emissions for Cowlitz County(MT CO2e)

	EITE's	Other Covered Sources	All Sources	EITE %
Covered Emissions	745,793	887,232	1,633,025	46%
Biogenic Emissions	2,326,932	--	2,326,932	100%
Total GHG Emissions	3,072,725	887,232	3,959,957	78%

Cowlitz County Case Study: Facility Level CAP Emissions

7 EITE's

Pulp and Paper

- Nippon Dynawave
- North Pacific Paper Company
- WestRock

Chemical Manufacturing

- Solvay Chemicals
- LANXESS Corporation

Glass

- Owens-Brockway Glass Container

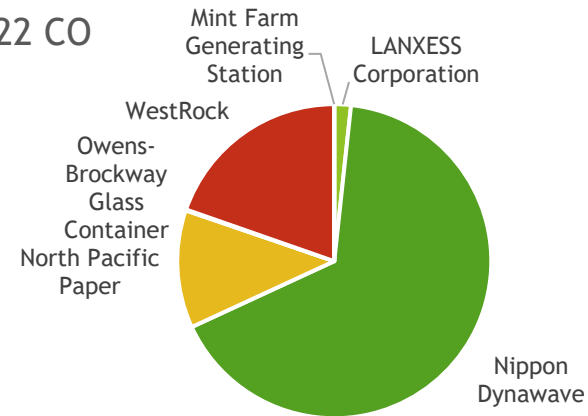
Metals

- Steelscape

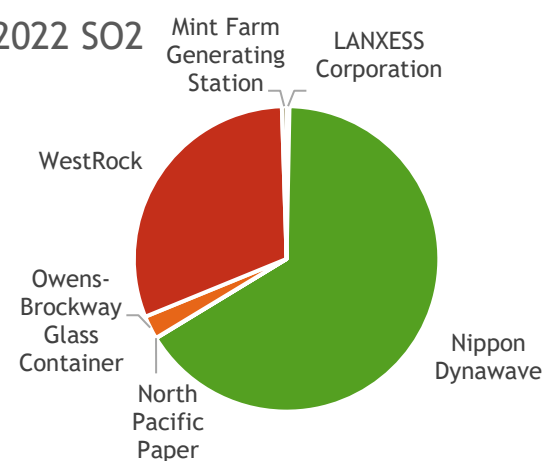
Other covered sources

- Mint Farm Generating Station - Longview

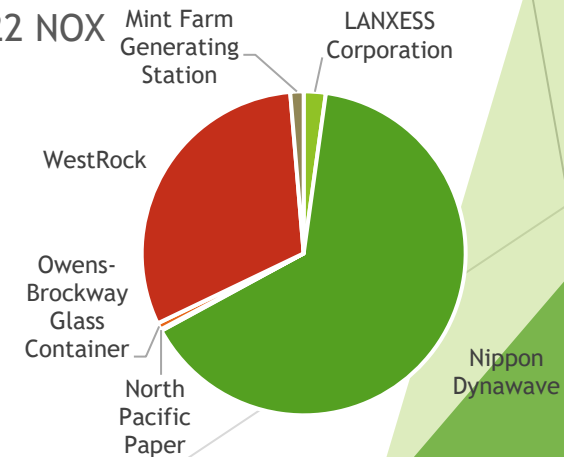
2022 CO



2022 SO2



2022 NOX



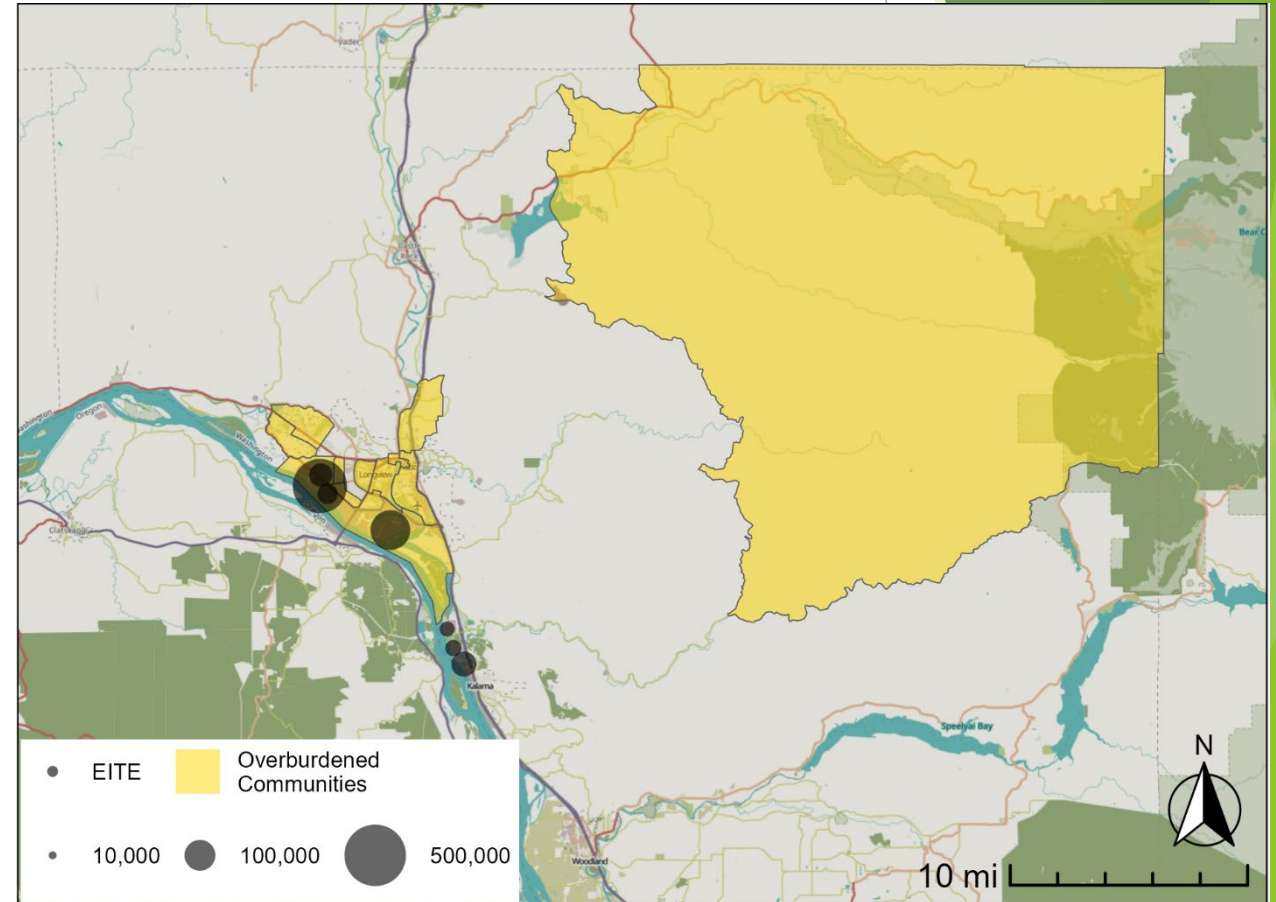
Cowlitz County Case Study: Demographics and Proximity to Overburdened Communities (OBCs)

Demographics compared to state
(in parentheses):

- 113,982 total population (7,705,281)
- 18.0% people of color (16.0%)
- 13.4% poverty (10.3%)
- 5.8% under 5 years of age (5.7%)
- 19.7% over 64 years of age
- 7% without health insurance (6.3%)

4 EITE's in Longview OBC

- Nippon Dynawave
- North Pacific Paper Company
- WestRock
- Solvay Chemicals



Overburdened Communities of Washington State, census tracts where vulnerable populations face cumulative environmental and health impacts. The areas integrate 2010 census tracts ranked 9 or 10 by the Washington Environmental Health Disparities Map, tracts identified as “disadvantaged” by the federal Climate and Economic Justice Screening Tool, and tracts overlapping with Tribal reservations.

Overburdened Communities: EITEs in OBCs Highly Impacted by Air Pollution

Overburdened Communities Highly Impacted by Air Pollution

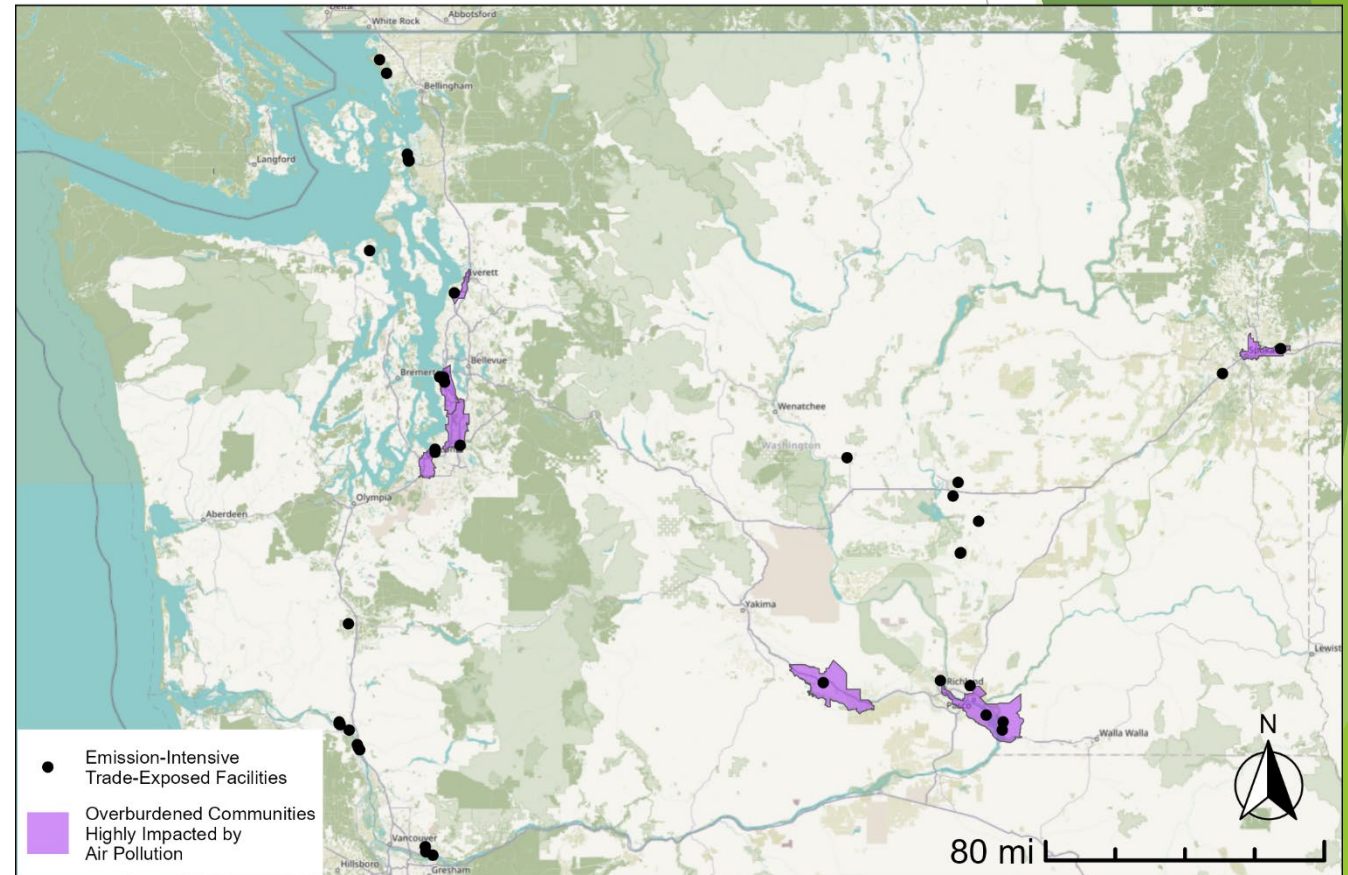
are areas of the state where people who are vulnerable to health, social, and environmental inequities are also highly impacted by criteria air pollution as identified by Ecology.

10 EITEs in OBCs Highly Impacted by Air Pollution

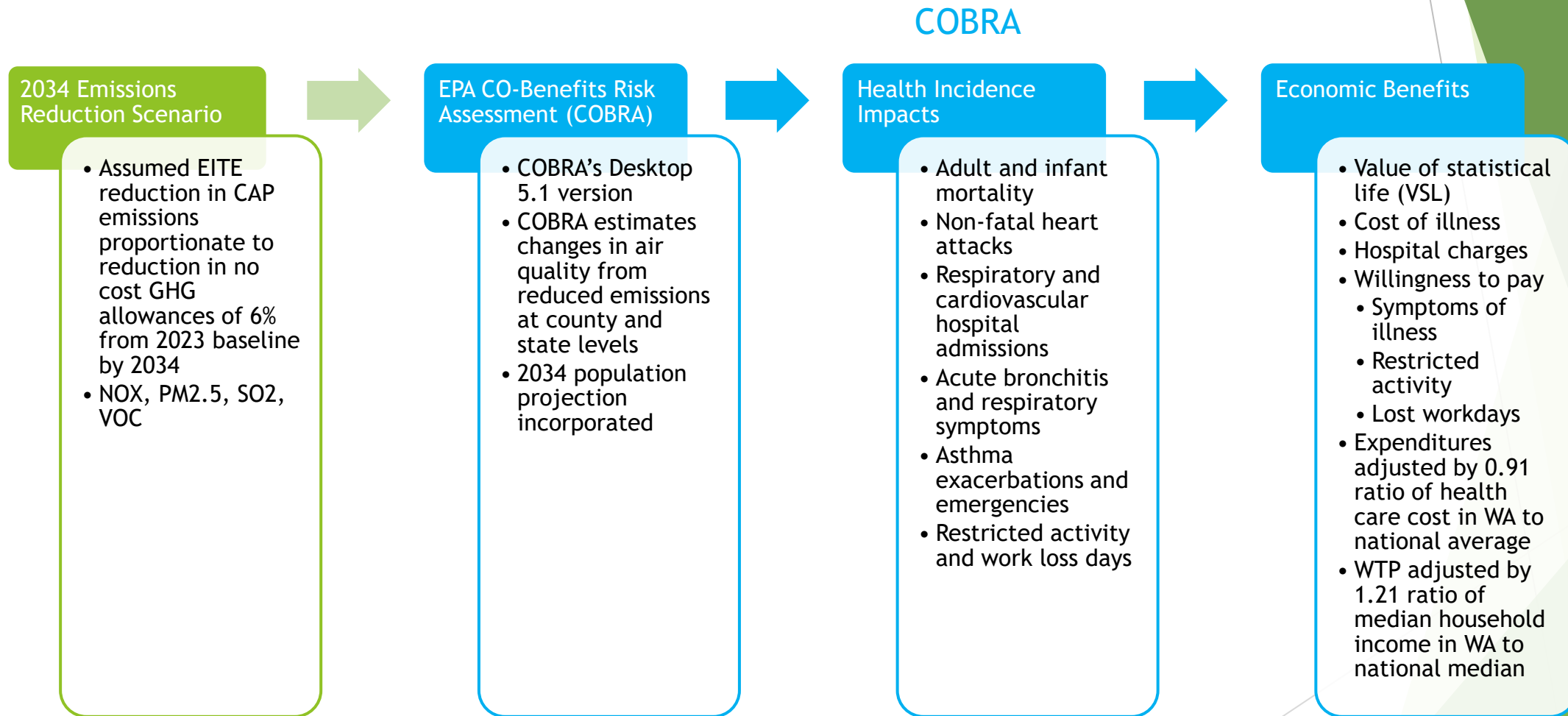
- **Everett**
 - Boeing Commercial Airplanes
- **Lower Yakima Valley**
 - Darigold
- **South King County**
 - Boeing Company-Auburn
- **South Seattle**
 - Ash Grove Cement Co.
 - CertainTeed Gypsum
 - Nucor Steel Seattle
- **Spokane and Spokane Valley**
 - Kaiser Aluminum
- **Tri-Cities to Wallula**
 - Tyson Fresh Meats
 - Packaging Corp. of America
 - Nutrien US

4 EITEs nearby OBCs Highly Impacted by Air Pollution

- **Tri-Cities to Wallula**
 - Lamb-Weston Pasco and Richland
- **South and East Tacoma**
 - U.S. Oil & Refining Co.
 - Georgia-Pacific Gypsum

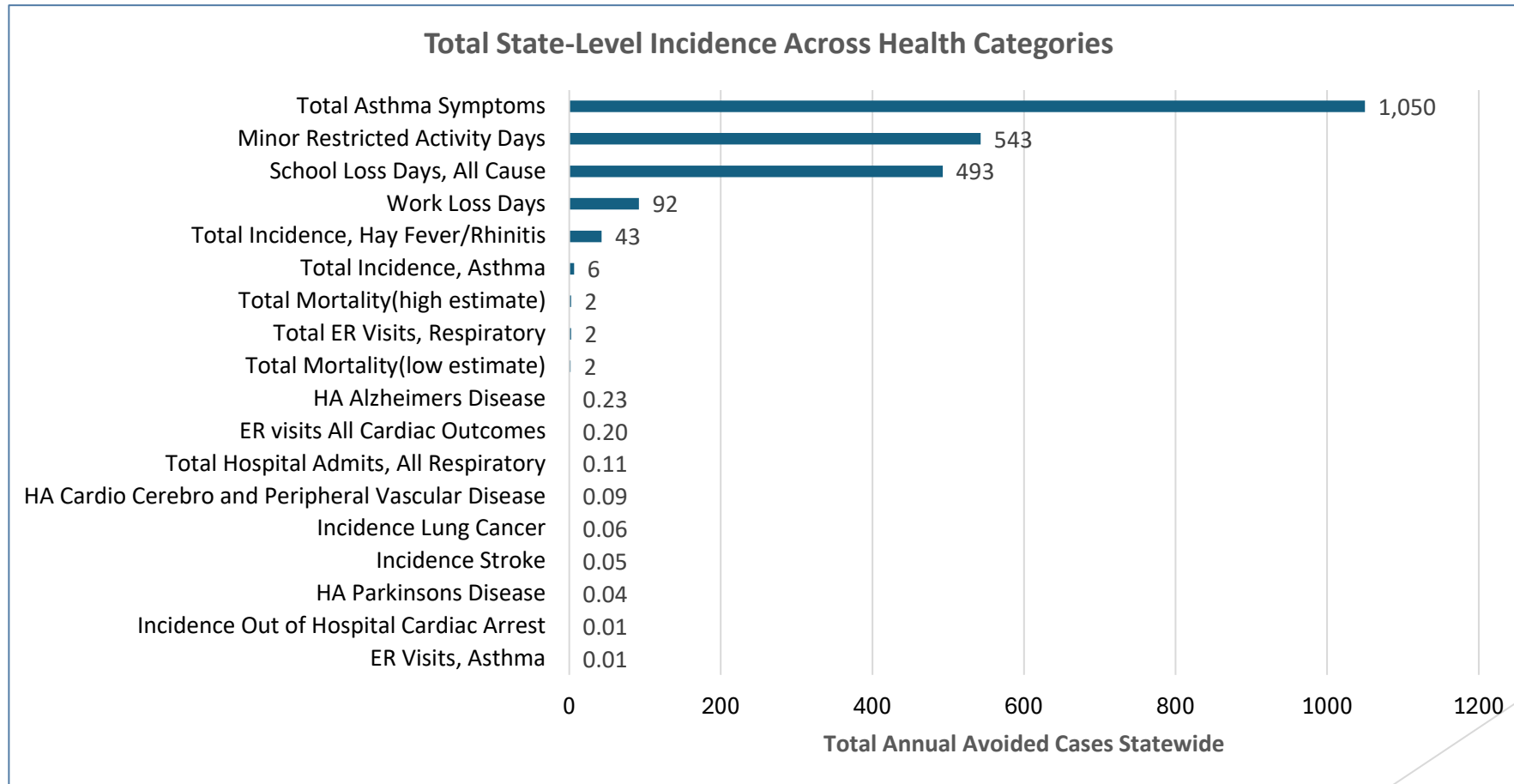


Health Impacts: Methodology



Health Impacts: Incidence by Category

If CAP emissions are reduced by 6% from the 2023 baseline, the state-level avoided incidences across health outcomes in 2034 could look as follows:



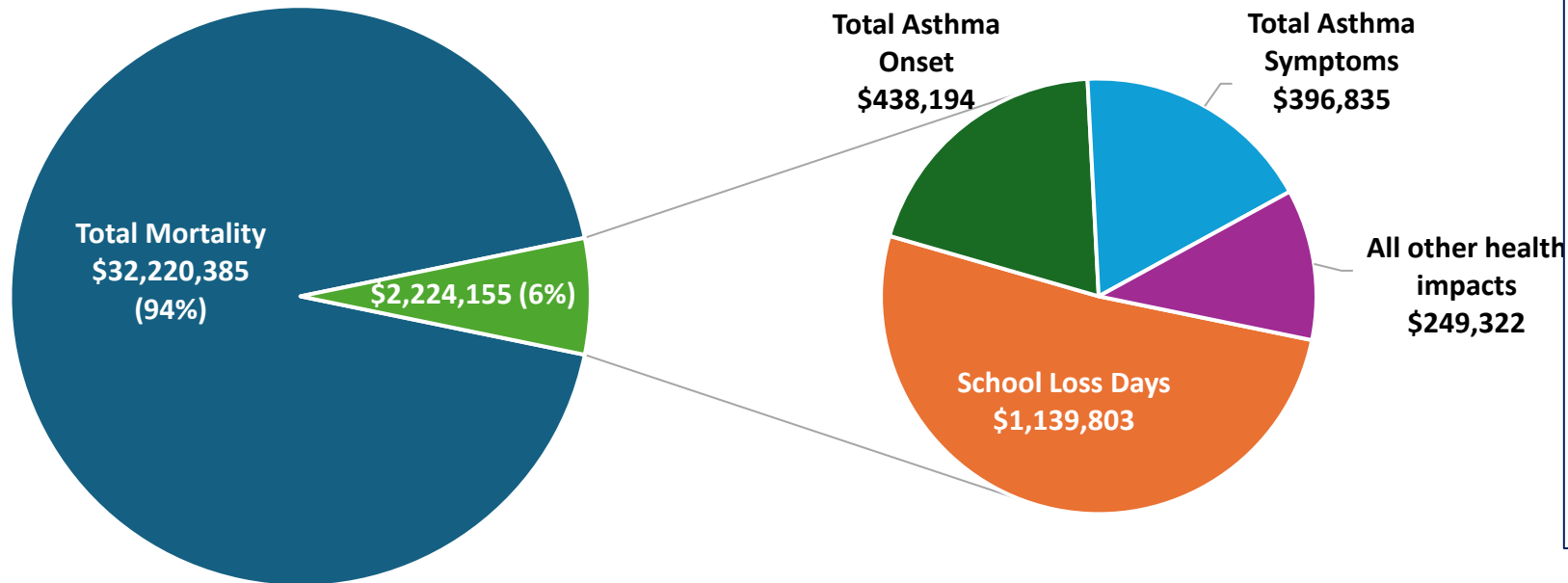
- The **total asthma symptoms** health impact category has the highest total avoided incidence (1,050 annual cases) at the state level.
- **Total asthma symptoms** include albuterol use, cough, chest tightness, wheeze, and shortness of breath.

Health Impacts: Valuation

If CAP emissions are reduced by 6% from the 2023 baseline, the statewide total benefits across health outcomes in 2034 could look as follows:

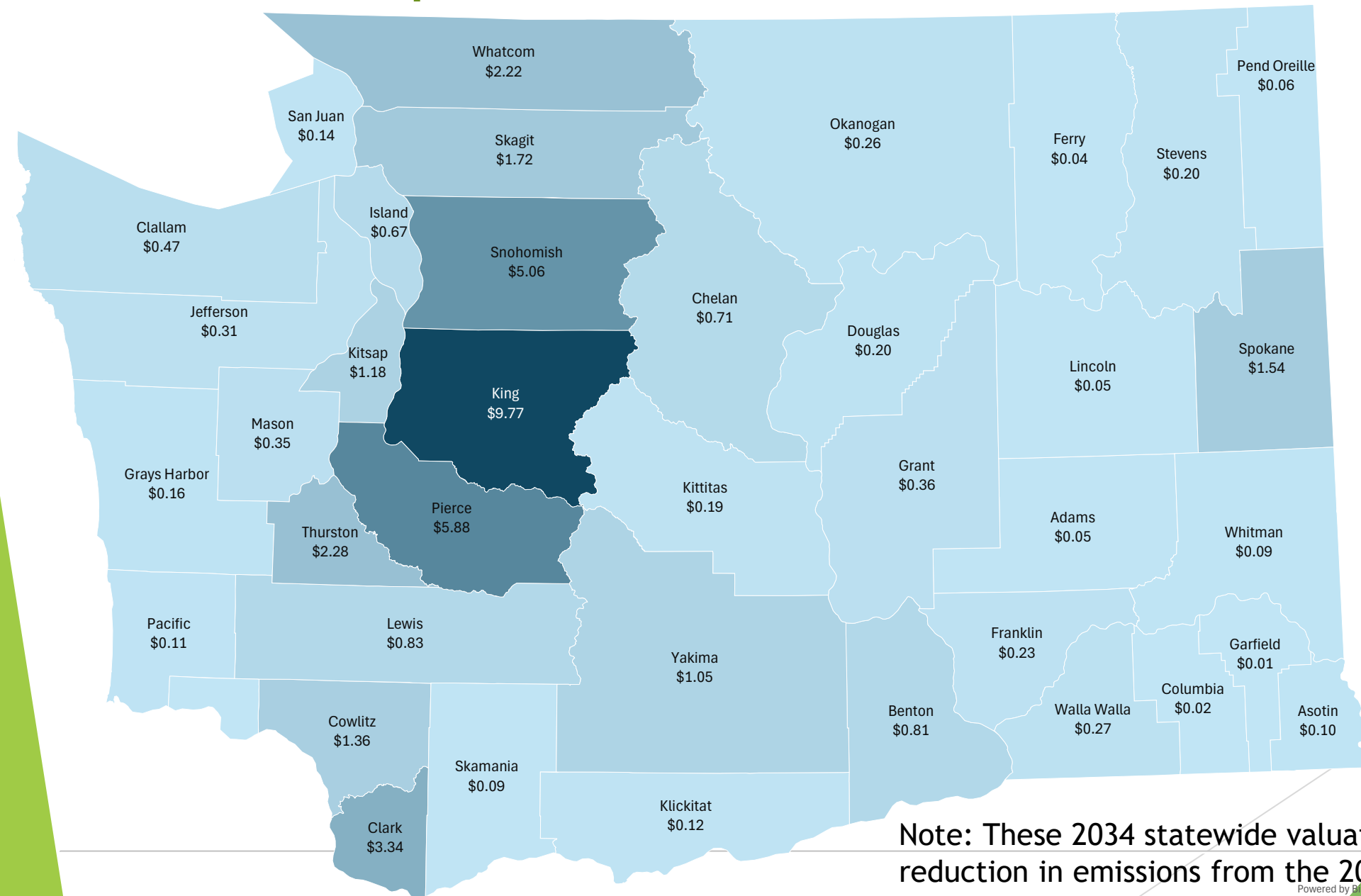
Total Health Impacts
(low estimate): \$34,444,539

Health impact categories
(excluding mortality) make up
6% of the total health impacts

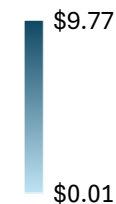


- **Total Health Impacts** range from **\$34 million** (low estimate) to **\$50 million** (high estimate).
- Mortality is the only category with low and high estimates.
 - **Mortality** (low estimate) contributes to **94%** of the low total health impacts, as shown in the pie chart.
 - **Mortality** (high estimate) contributes to **96%** of the high total health impact estimate.

Health Impacts: Statewide Valuation



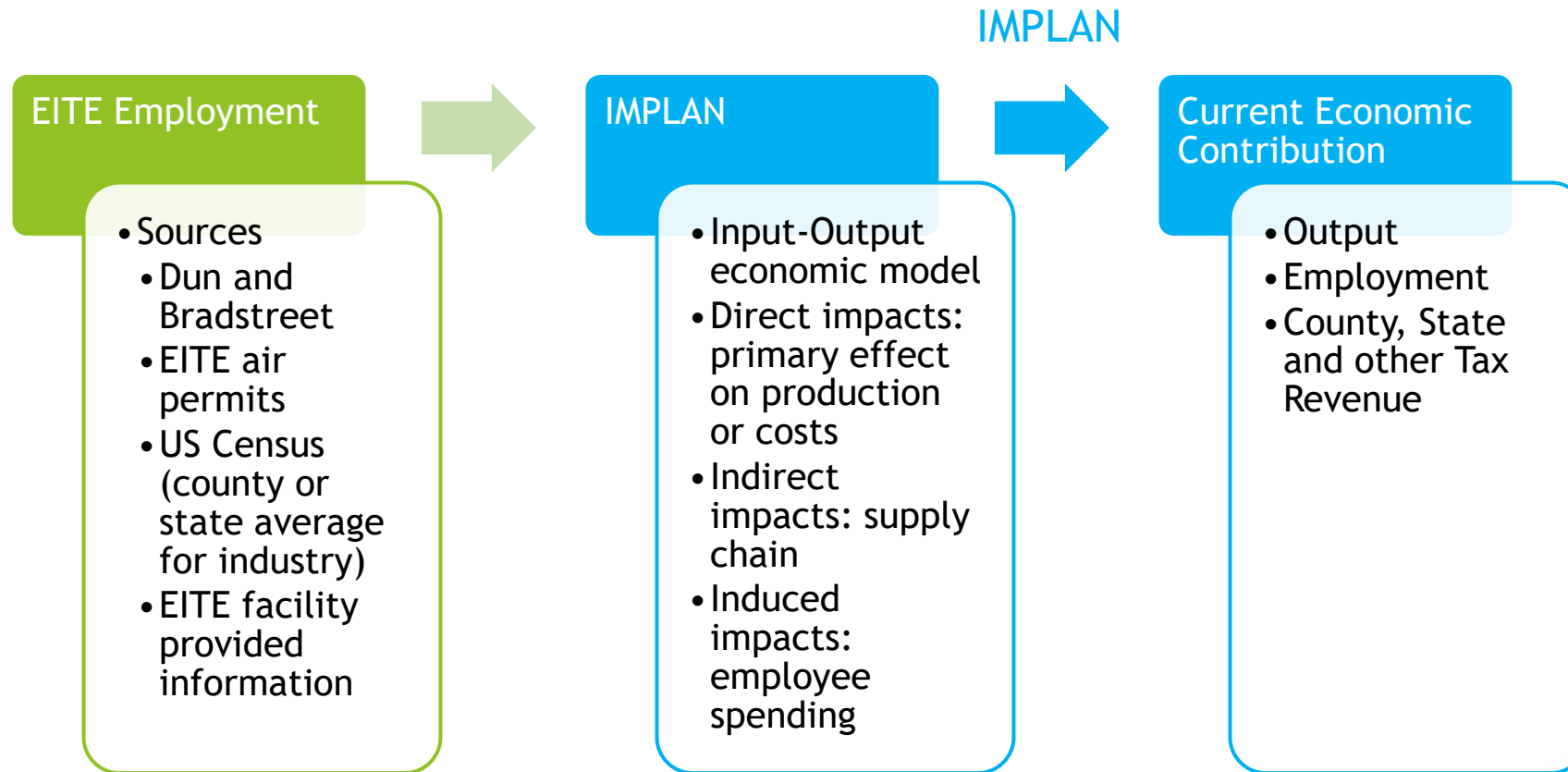
\$ Average Total Health Benefits (in millions)



- In **King County**, the average total statewide health benefits are an estimated **\$9.8 million**.
- Low estimate (\$7.5 million) and high estimate (\$12 million).
- **Population** is primarily driving these estimates.

Note: These 2034 statewide valuations reflect a 6% reduction in emissions from the 2023 baseline.

Economic Impacts: Current Contribution Methodology

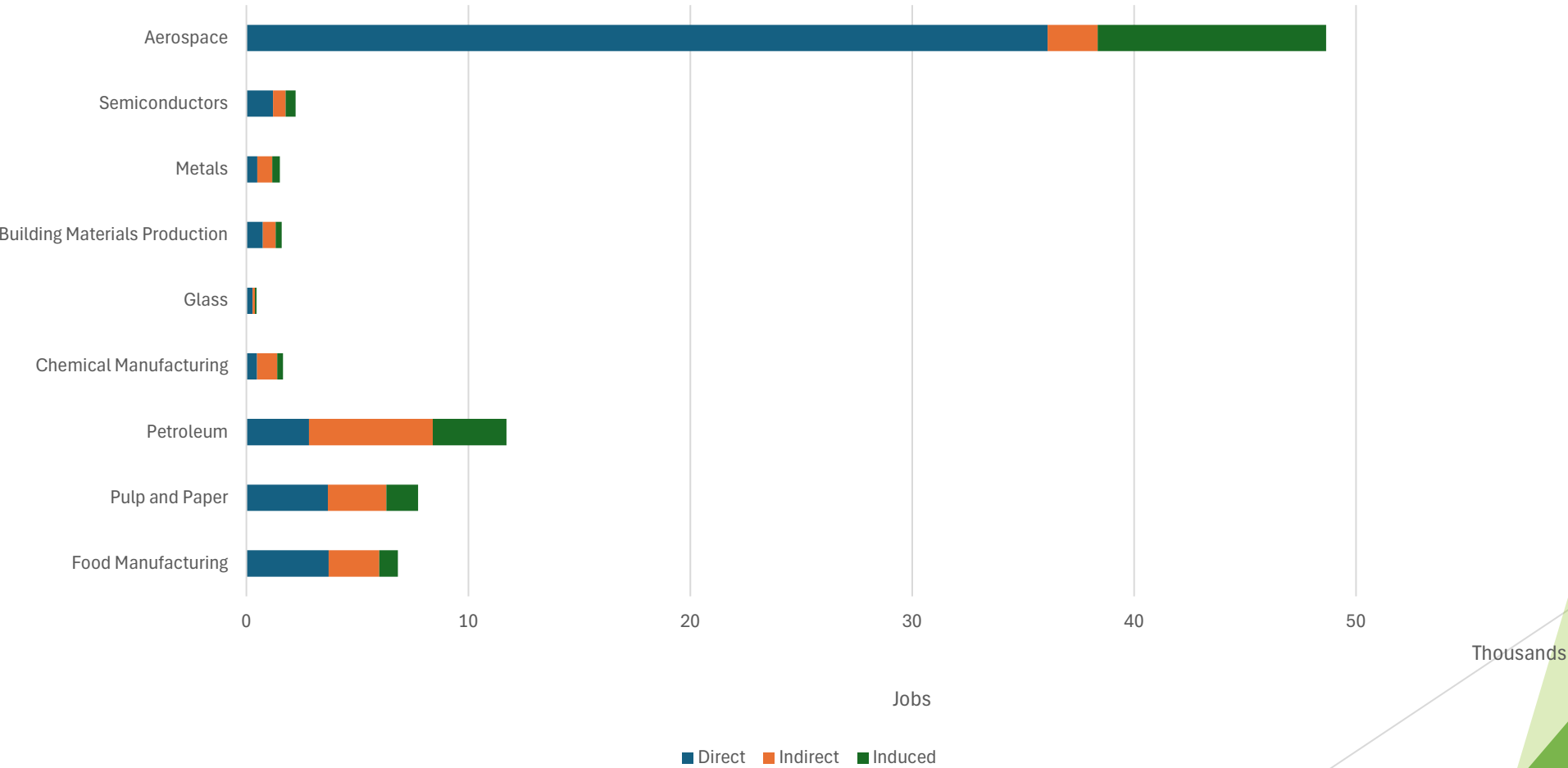


Economic Impacts: Current Direct Impacts

EITE sector	# of Facilities	Direct Jobs	Direct Impact to Tax Revenues
Pulp and Paper	6	3,670	\$403,834,684
Petroleum	7	2,819	\$1,744,607,794
Aerospace	3	36,094	\$2,324,739,615
Chemicals	3	474	\$82,799,589
Food	10	3,702	\$193,016,488
Metals	3	497	\$62,022,783
Building materials	3	743	\$65,859,357
Semiconductors	2	1206	\$86,568,283
Glass	2	273	\$16,763,778

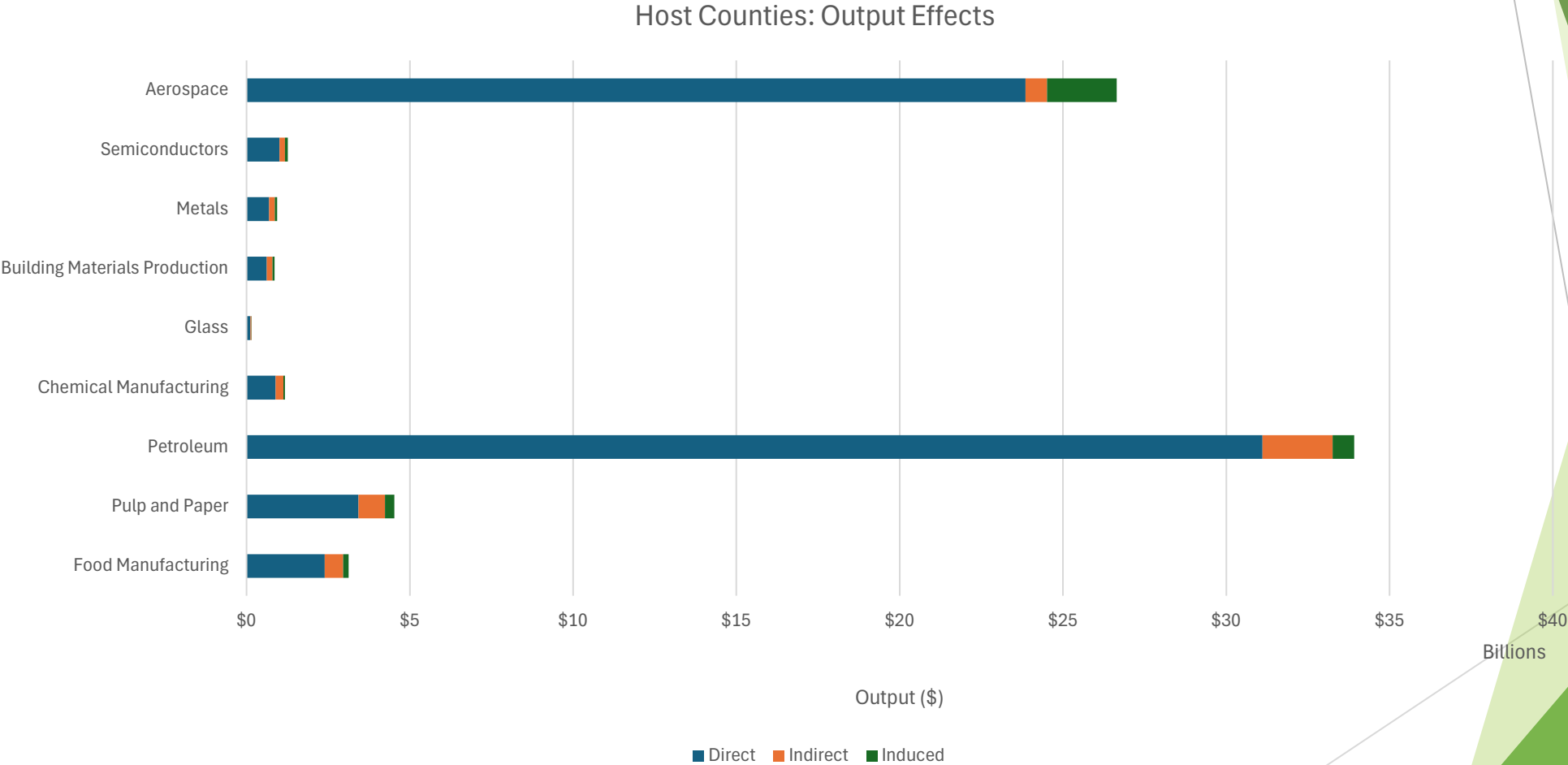
Economic Impacts: Current Employment Effects

Host Counties: Employment Effects



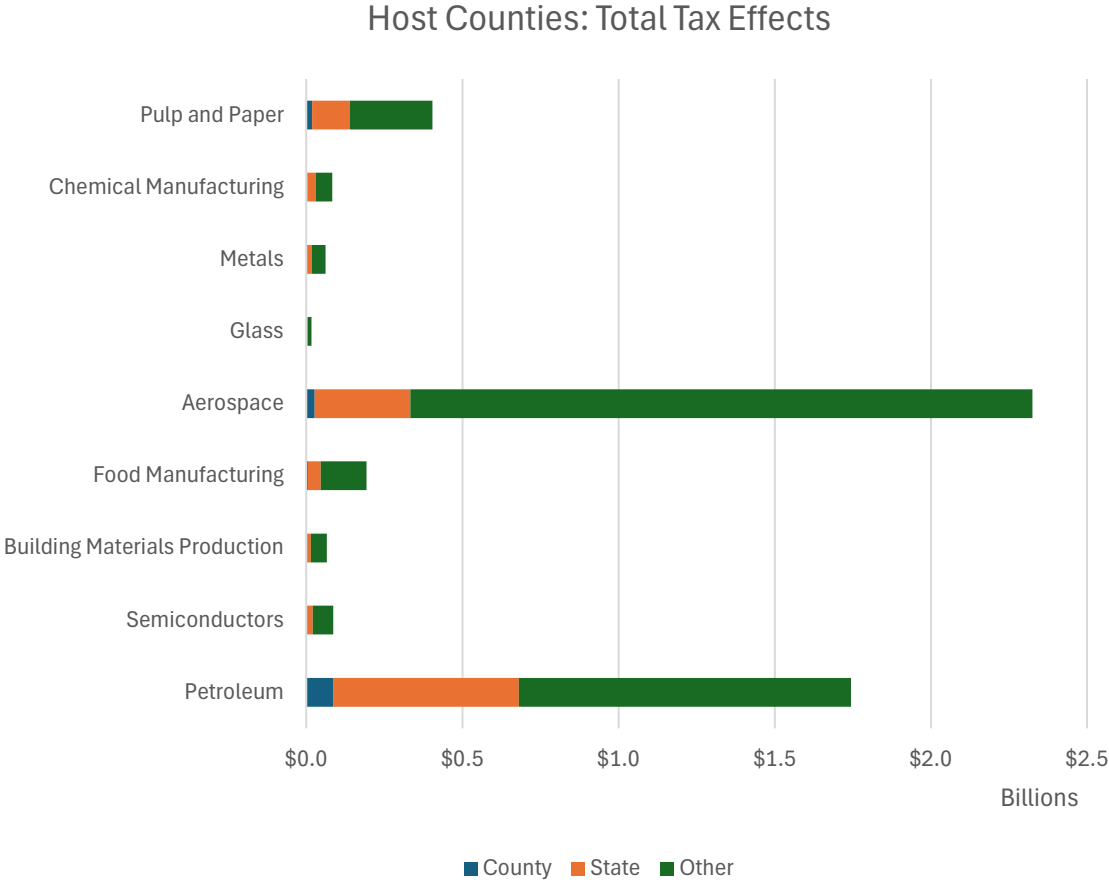
Note - Direct impacts: primary effect on production or costs; Indirect impacts: supply chain; Induced impacts: employee spending

Economic Impacts: Current Output Effects



Note - Direct impacts: primary effect on production or costs; Indirect impacts: supply chain; Induced impacts: employee spending

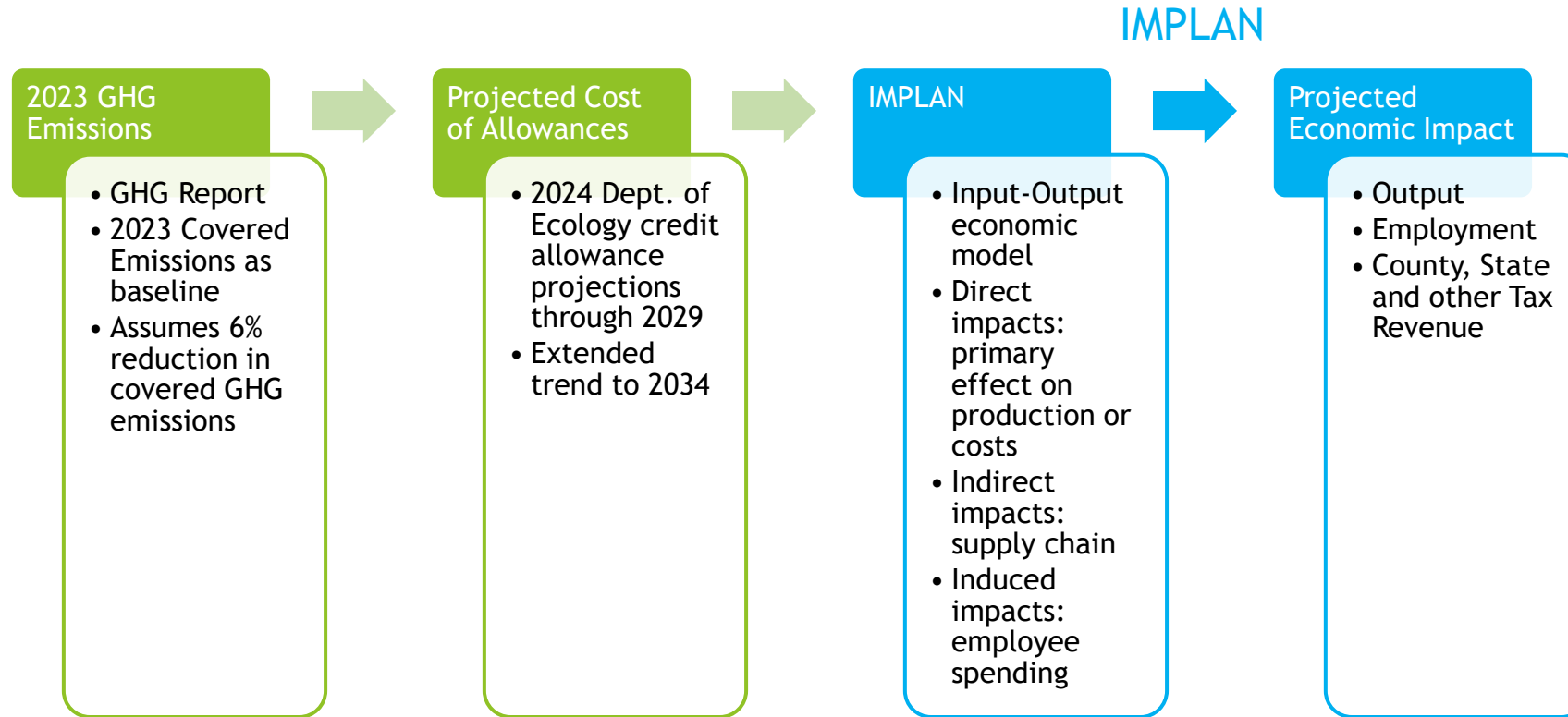
Economic Impacts: Current Tax Impacts



Total tax effects capture direct, indirect, and induced tax effects. “Other” tax effects capture sub-county and federal tax effects. Statewide tax impacts encompass impacts to host counties as well as indirect and induced impacts to non-host counties.

Note - Direct impacts: primary effect on production or costs; Indirect impacts: supply chain; Induced impacts: employee spending

Economic Impacts: Projected Impact Methodology



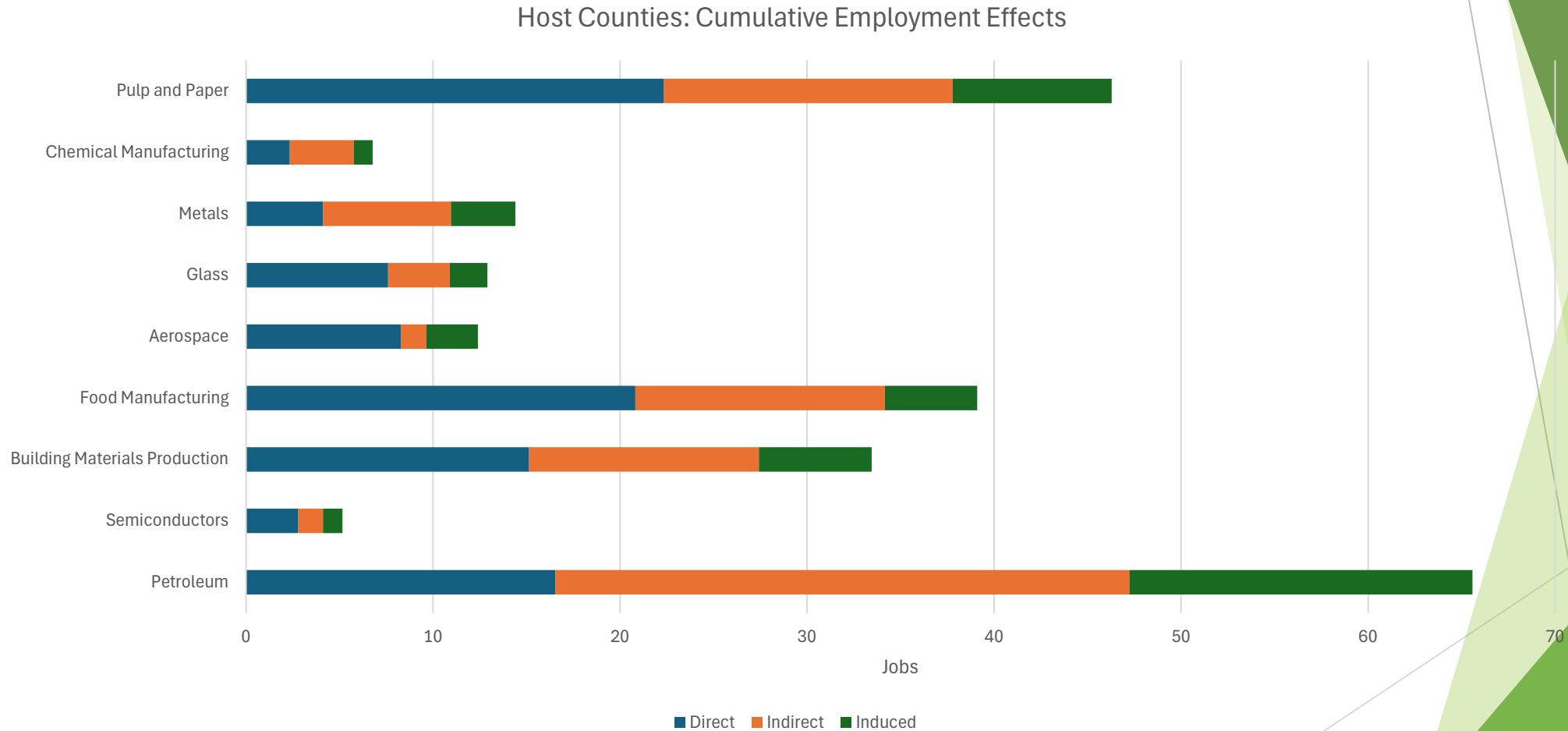
Economic Impacts:

Projected Direct Impacts 2027-34

EITE sector	# of Facilities	Direct jobs	Direct Impact to Tax Revenues
Pulp and Paper	6	22	\$2,407,805
Petroleum	7	17	\$9,566,231
Aerospace	3	8	\$448,767
Chemicals	3	2	\$320,407
Food	10	21	\$1,113,461
Metals	3	4	\$578,701
Building materials	3	15	\$1,532,111
Semiconductors	2	3	\$201,036
Glass	2	8	\$473,237

Note: Projected impacts of the cost of allowances for 6% of 2023 baseline covered GHG emissions.

Economic Impacts: Projected Effects to Employment 2027-34

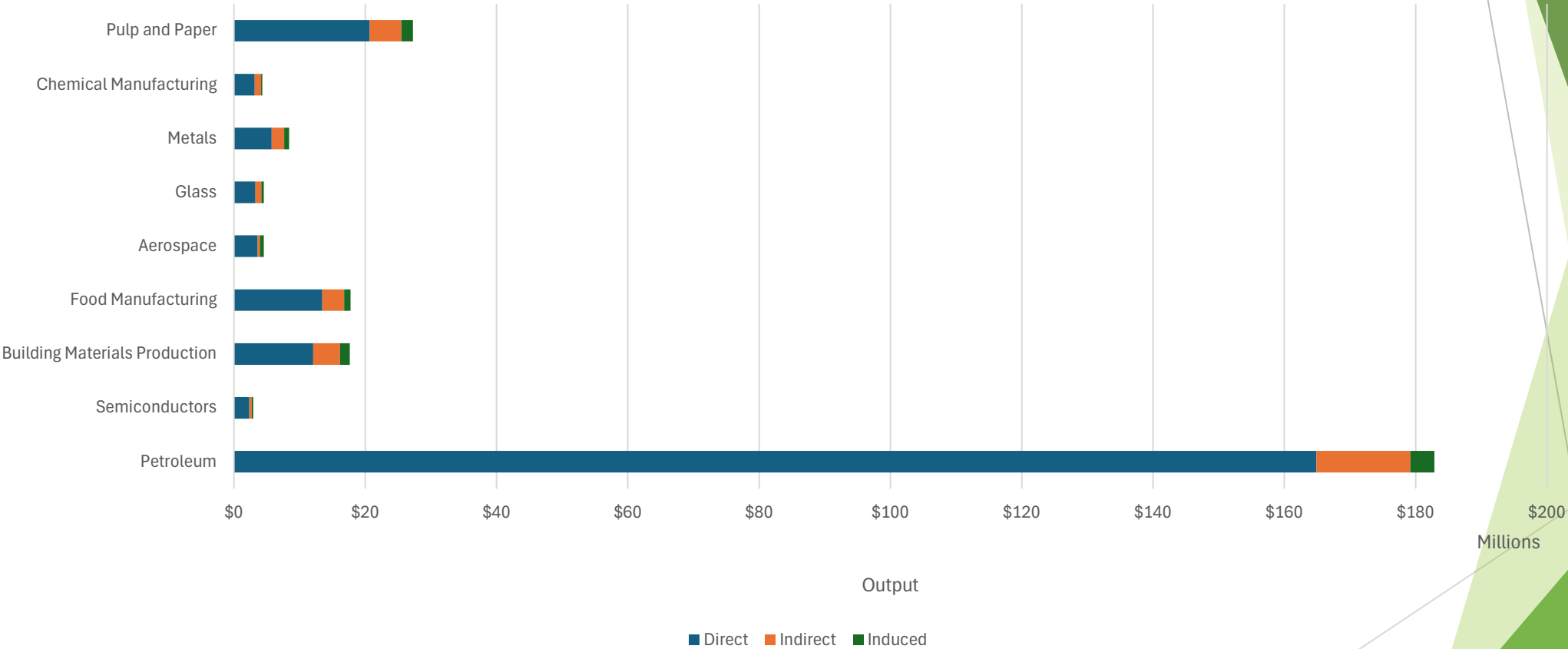


Note: Projected impacts of the cost of allowances for 6% of 2023 baseline covered GHG emissions.

Note - Direct impacts: primary effect on production or costs; Indirect impacts: supply chain; Induced impacts: employee spending

Economic Impacts: Projected Effects to Output 2027-34

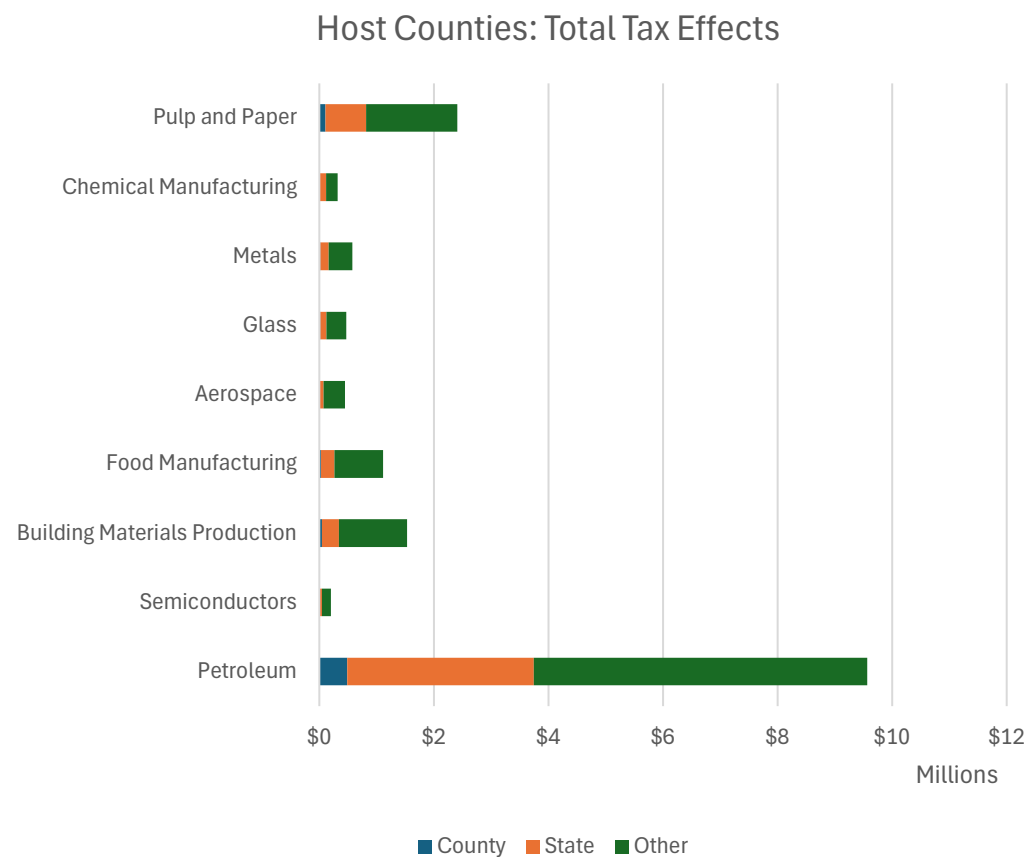
Host Counties: Cumulative Output Effects



Note: Projected impacts of the cost of allowances for 6% of 2023 baseline covered GHG emissions.

Note - Direct impacts: primary effect on production or costs; Indirect impacts: supply chain; Induced impacts: employee spending

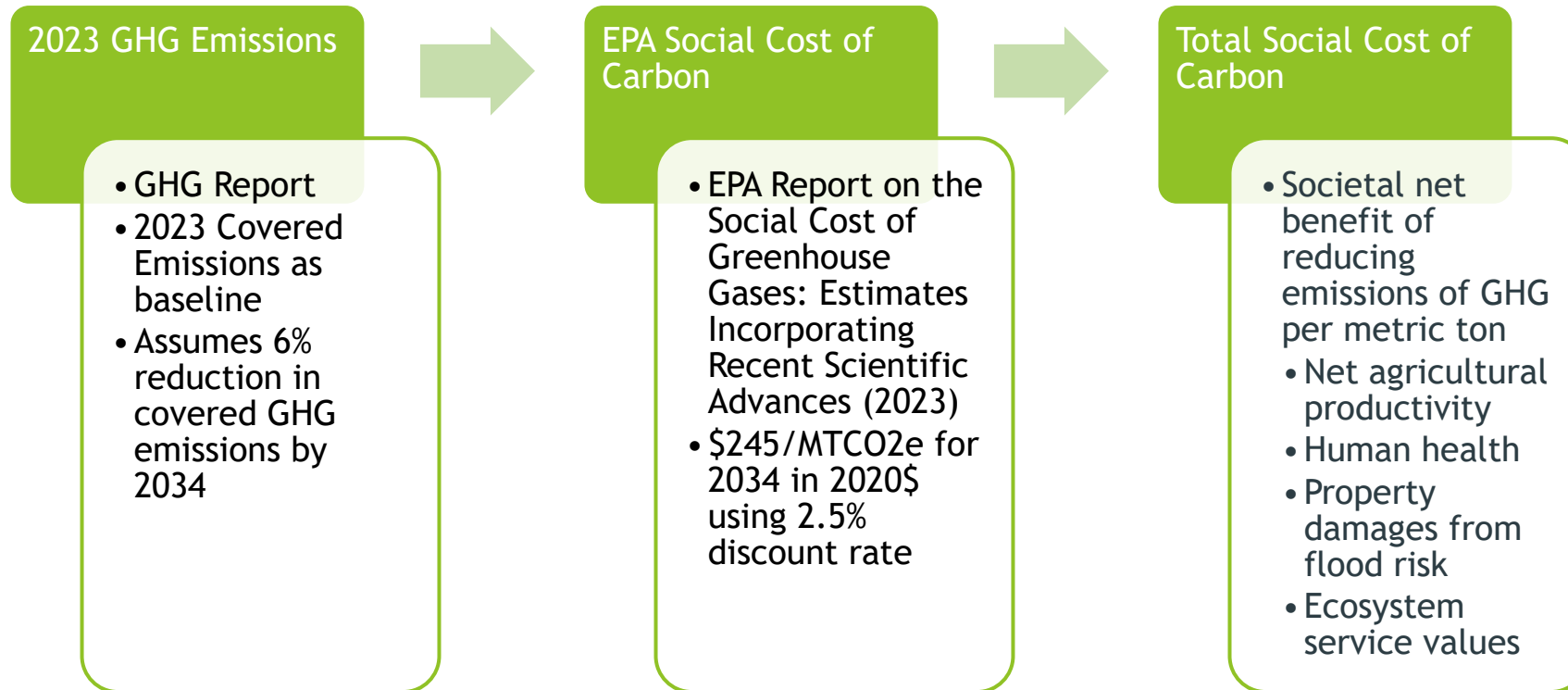
Economic Impacts: Projected Tax Impacts 2027-2034



Note: Projected impacts of the cost of allowances for 6% of 2023 baseline covered GHG emissions. Total tax effects capture direct, indirect, and induced tax effects. “Other” tax effects capture sub-county and federal tax effects. Statewide tax impacts encompass impacts to host counties as well as indirect and induced impacts to non-host counties.

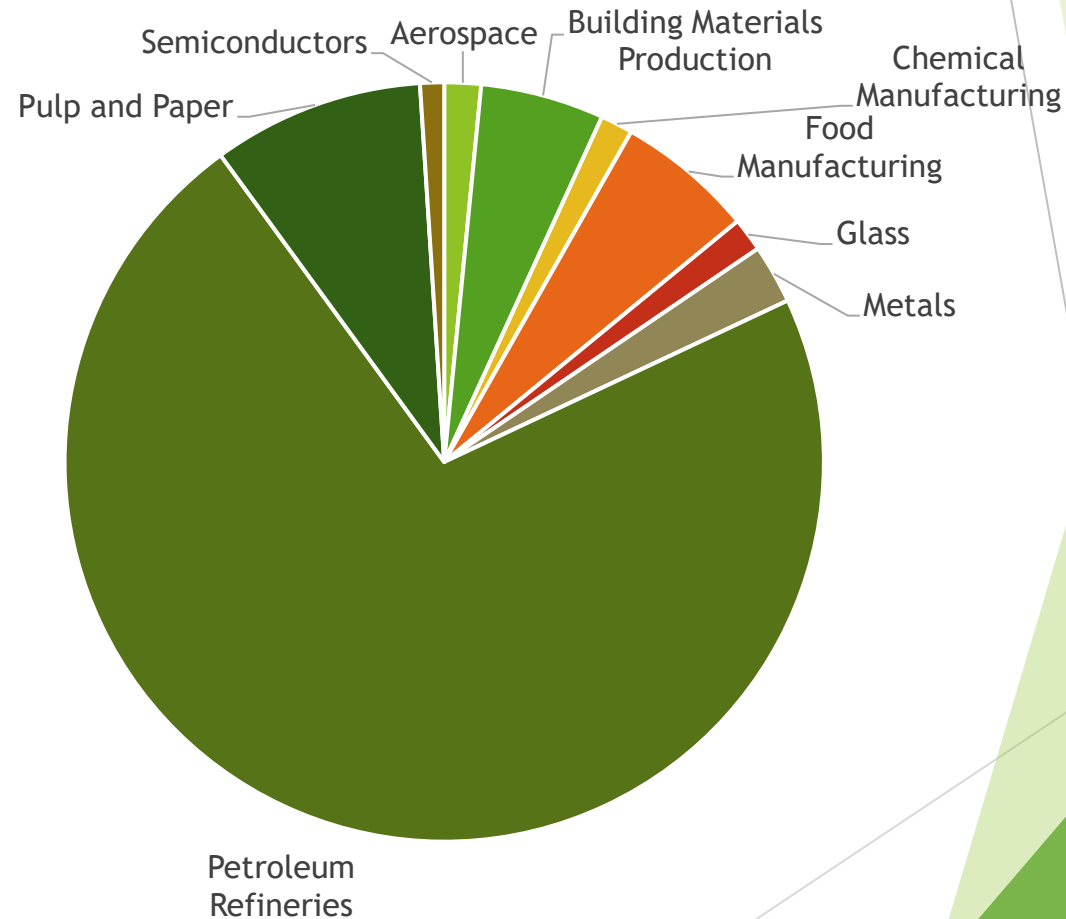
Note - Direct impacts: primary effect on production or costs; Indirect impacts: supply chain; Induced impacts: employee spending

Social Costs of Carbon: Methodology



Social Cost of Carbon: Net Benefit by Industry Sector 2034

\$2.6 billion net benefit of 6% reduction in covered GHG emissions (2024 \$)



Market Impacts: Data Sources

- ▶ **Gross Domestic Product:**
 - U.S. Bureau of Economic Analysis
- ▶ **Revenue:**
 - U.S. Census Bureau, Annual Survey of Manufactures
- ▶ **State Exports:**
 - U.S. Census Bureau, USA Trade Online
- ▶ **International Trade:**
 - Observatory of Economic Complexity
- ▶ **Carbon Pricing:**
 - World Bank and International Carbon Action Partnership
- ▶ **Supply Chains:**
 - IMPLAN

Market Impacts: Data Aggregation

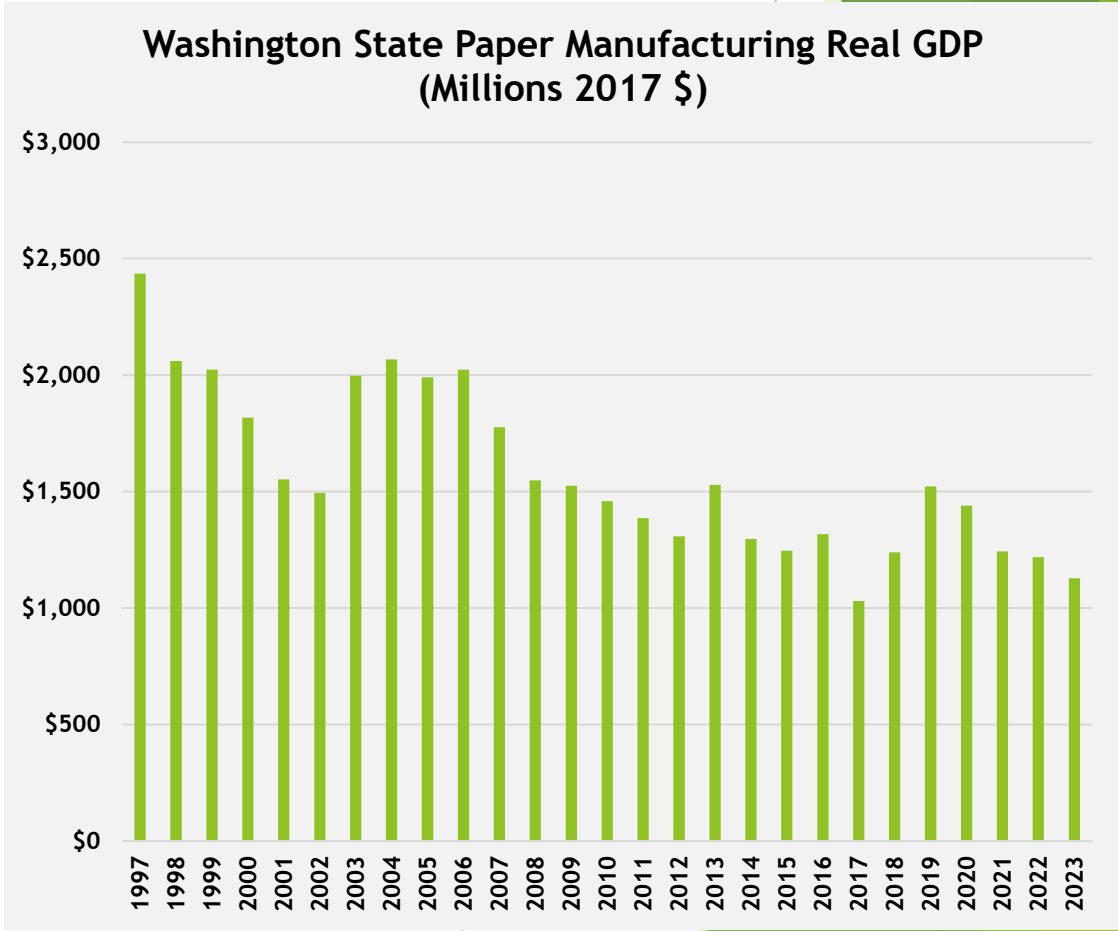
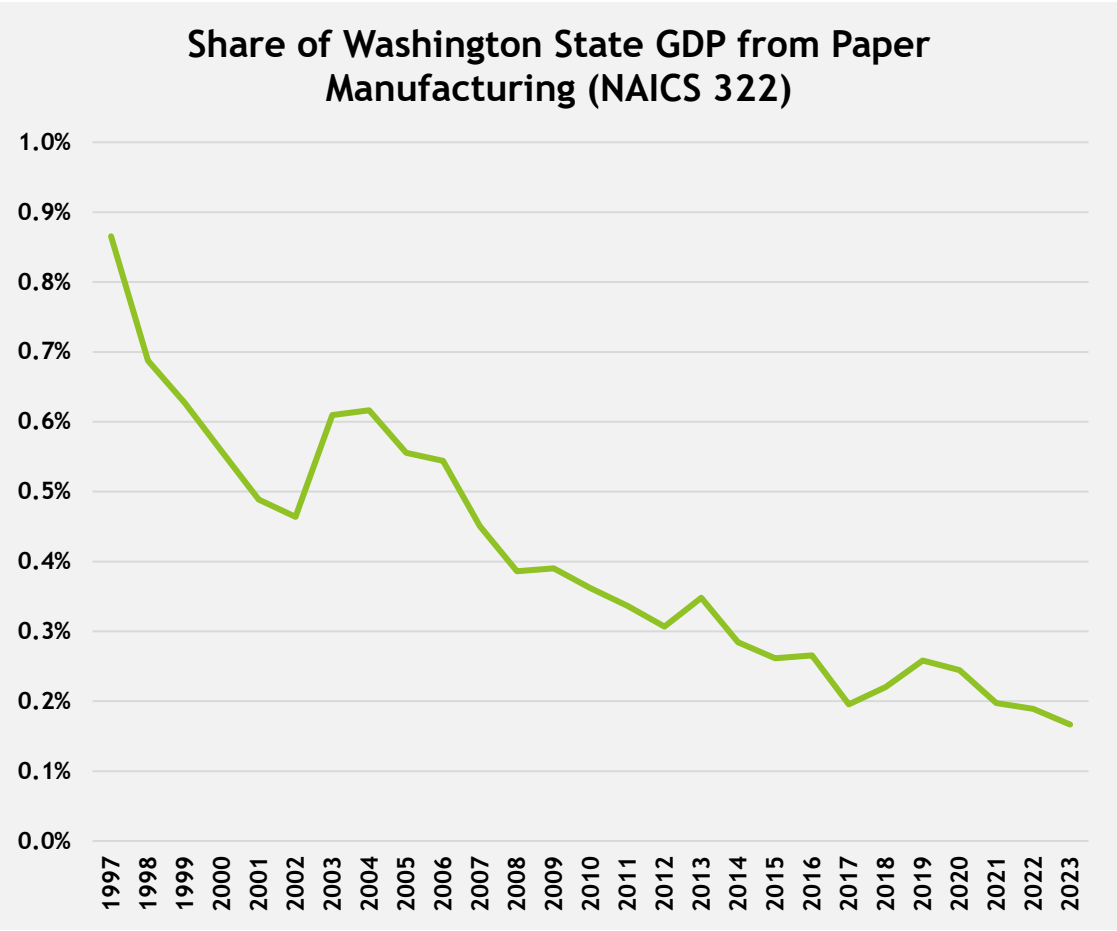
- ▶ The data are typically aggregated at the 3 or 4 digit NAICS code level.
- ▶ International trade data are aggregated by 2 or 4 digit Harmonized System (HS) codes.
- ▶ Supply chains data are aggregated by IMPLAN industry codes.
- ▶ The data are aggregated at a relatively high level:
 - Industries adjacent to the target industry are also included rather than having data on just the target industry (e.g., petroleum and coal instead of just petroleum refineries).
 - The data are less volatile and more reliable than they would be at a lower level of aggregation.

Market Impacts: Pulp, Paper, and Paperboard EITE Locations

- 6 Pulp, Paper, & Paperboard EITEs
 - 3 in Cowlitz County:
 - Nippon Dynawave
 - North Pacific Paper Company
 - WestRock
 - 1 in Clark County:
 - Georgia Pacific Consumer Operations
 - 1 in Jefferson County:
 - Port Townsend Paper Corporation
 - 1 in Walla Walla County:
 - Packaging Corporation of America



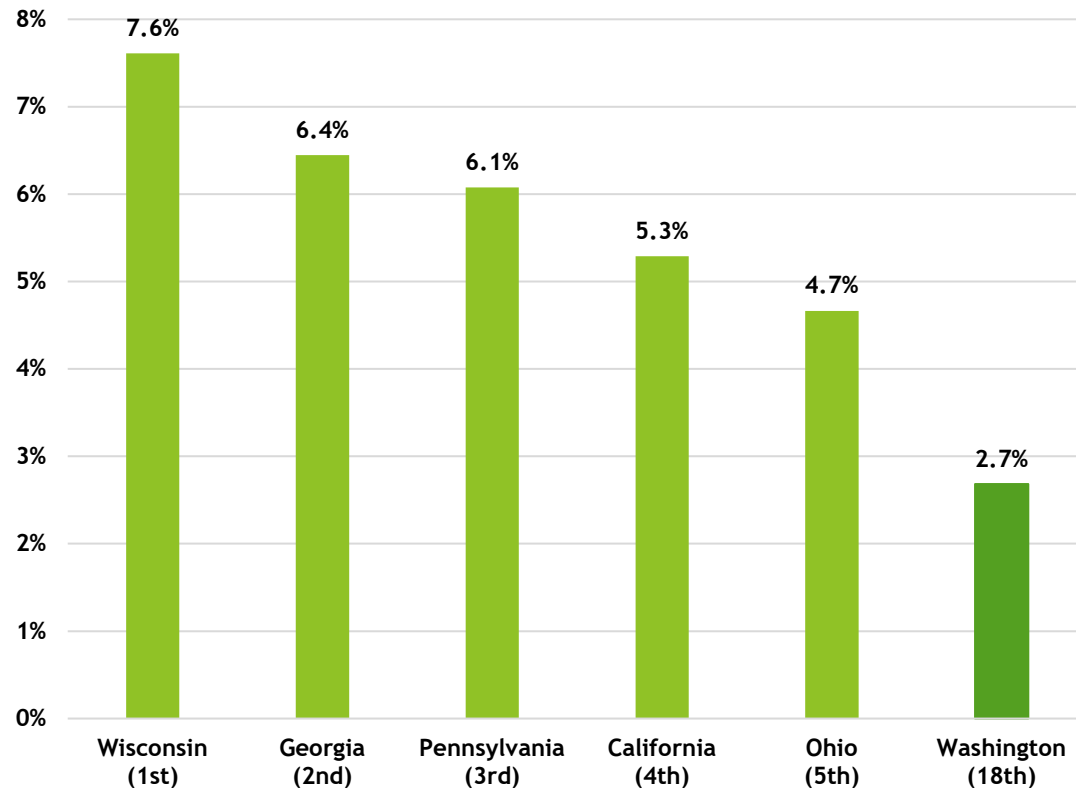
Market Impacts: Pulp, Paper, and Paperboard Gross Domestic Product



Market Impacts: Pulp, Paper, and Paperboard

Domestic Competition and Carbon Pricing

Share of U.S. Paper Industry Revenue, Top Five States and Washington 2021 (NAICS 322)



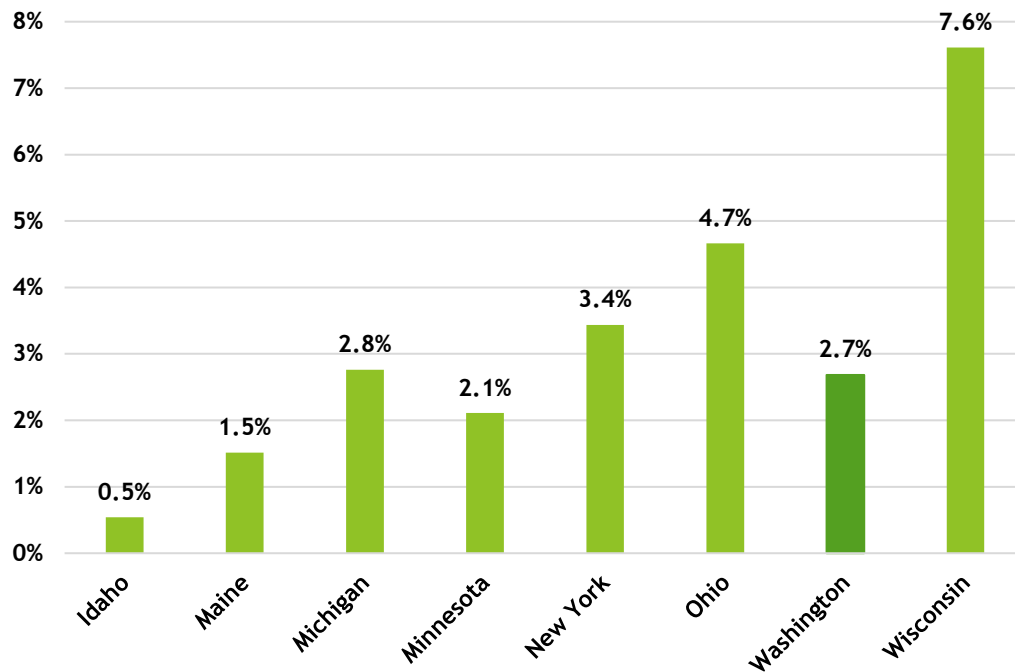
Carbon Pricing

State	Price per MTCO2e	EITE leakage mitigation
Washington	\$50.00	Yes
California	\$29.27	Yes
Wisconsin	N/A	N/A
Georgia	N/A	N/A
Pennsylvania	N/A	N/A
Ohio	N/A	N/A

Market Impacts: Pulp, Paper, and Paperboard

Domestic Competition and Carbon Pricing(continued)

Share of U.S. Paper Industry Revenue by State
(Based on Paper Mill Locations per AF&PA)



Carbon Pricing

State	Price per MTCO ₂ e	EITE leakage mitigation
Washington	\$50.00	Yes
Maine*	\$19.76	N/A
New York*	\$19.76	N/A
Wisconsin	N/A	N/A
Ohio	N/A	N/A
Michigan	N/A	N/A
Minnesota	N/A	N/A
Maine	N/A	N/A

* Only applies to electricity sector

Market Impacts: Pulp, Paper, and Paperboard

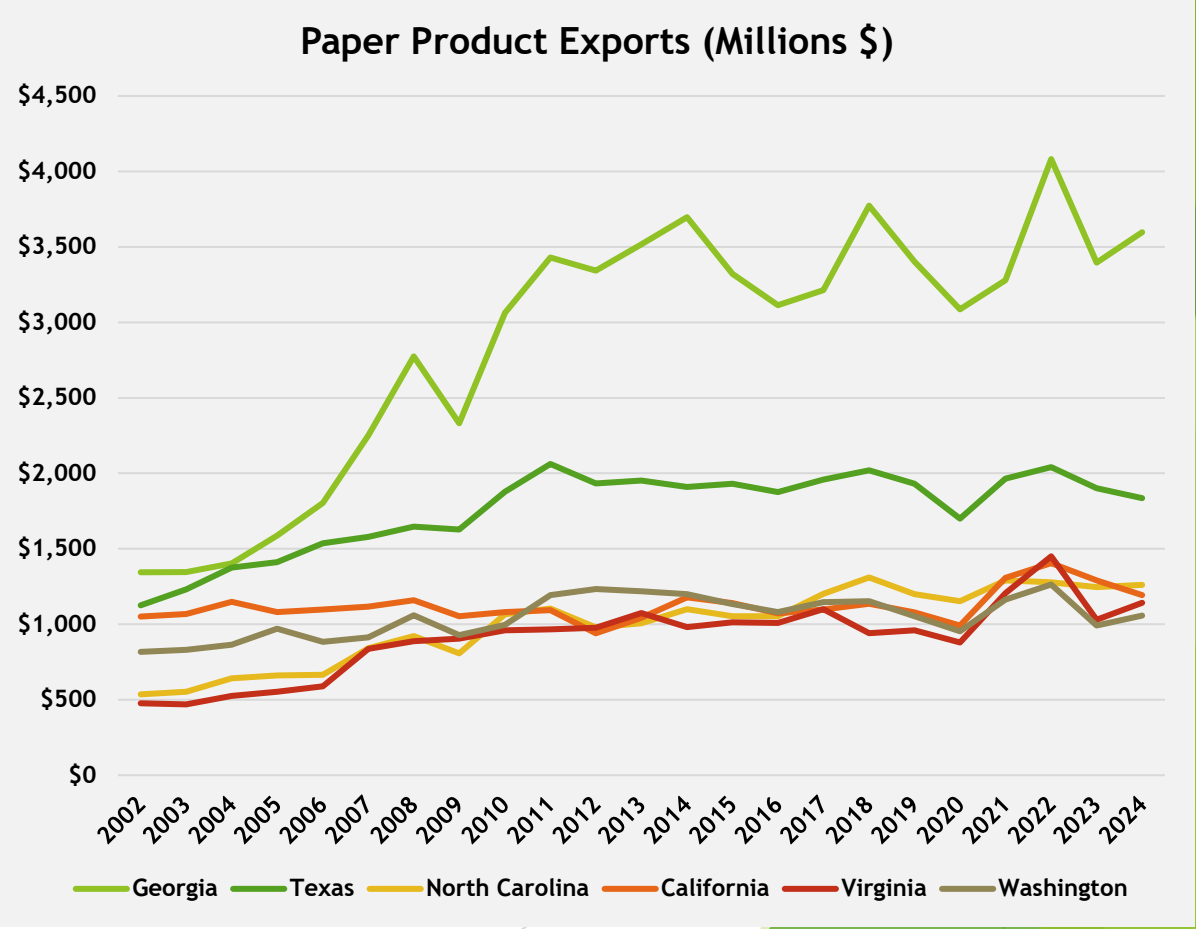
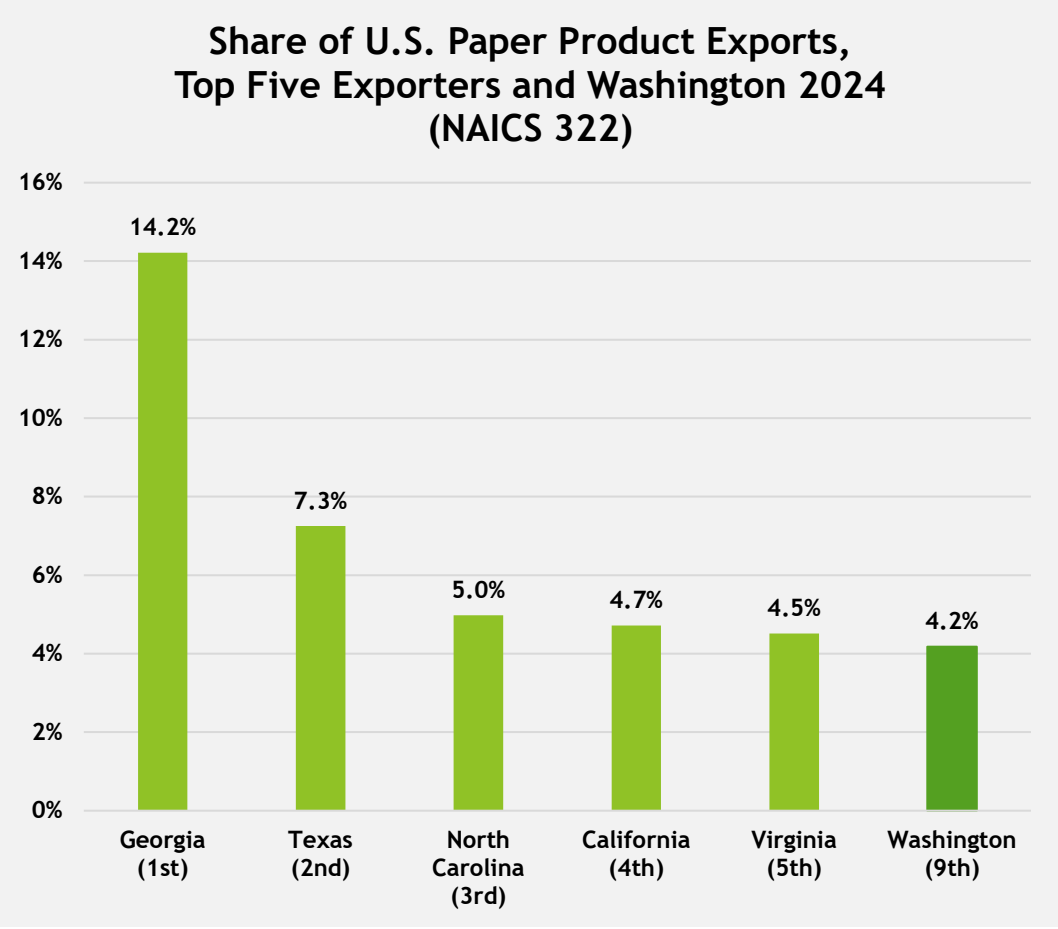
Washington Export Trends



Note: Export data may include exports originating from outside Washington State.

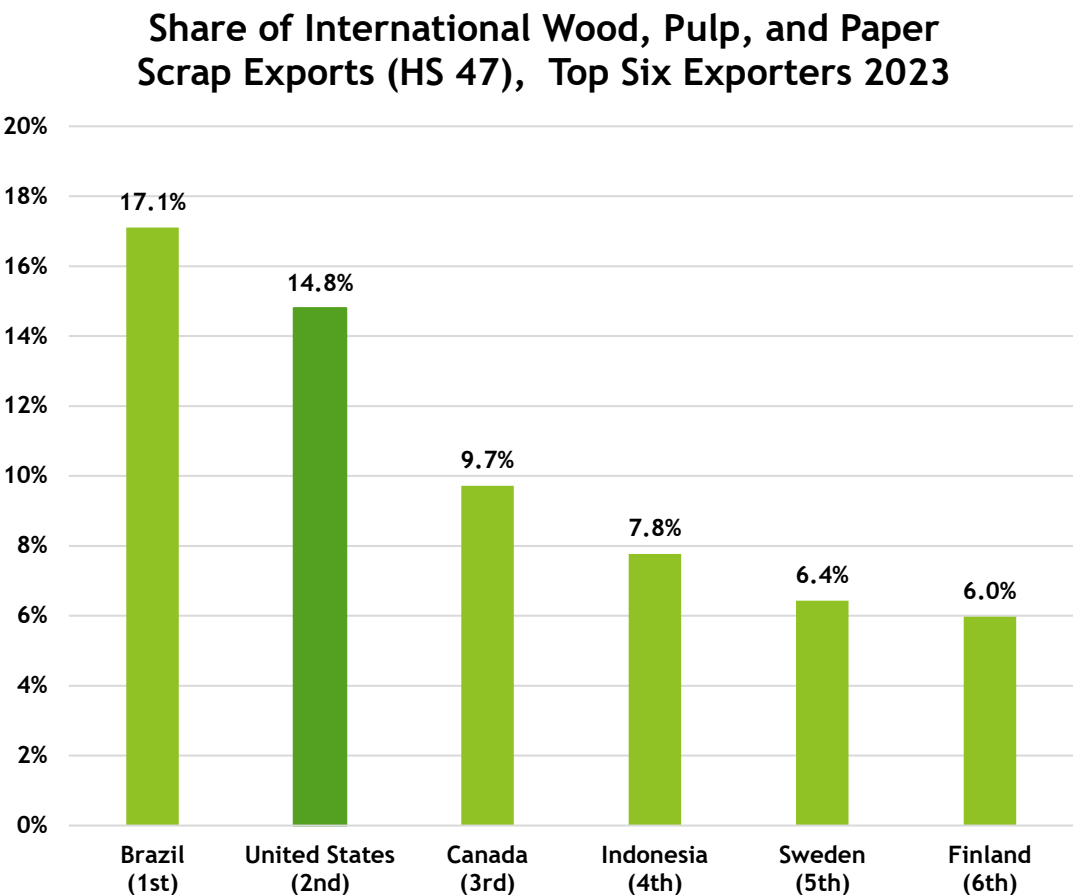
Market Impacts: Pulp, Paper, and Paperboard

Top States Export Trends



Market Impacts: Pulp, Paper, and Paperboard

International Export Trends



Carbon Pricing

Country/Region	Price per MTCO2e	EITE leakage mitigation
Sweden	1,510 SEK (\$155.22)	Only if covered by EU ETS
Finland	93.02 EUR (\$104.45)	Yes
European Union	64.74 EUR (\$72.70)	Yes
Canada	95.00 CAD (\$68.23)	Yes
Quebec	\$29.27	Yes
Indonesia*	12,000 IDR (\$0.74)	N/A
United States	N/A	N/A
Brazil	N/A	N/A

* Only applies to electricity sector

Market Impacts: Pulp, Paper, and Paperboard

International Export Trends (continued)



Carbon Pricing		
Country/Region	Price per MTCO2e	EITE leakage mitigation
Sweden	1,510 SEK (\$155.22)	Only if covered by EU ETS
European Union	64.74 EUR (\$72.70)	Yes
Canada	95.00 CAD (\$68.23)	Yes
Germany	55.00 EUR (\$61.76)	Yes
Quebec	\$29.27	Yes
China*	95.96 CNY (\$13.32)	Yes
Italy	EU ETS only	Yes
United States	N/A	N/A

* Only applies to electricity, cement, steel, and aluminum sectors

Market Impacts: Pulp, Paper, and Paperboard Supply Chains

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Paper Mills (IMPLAN Code 137)

Industry	Industry Output
Wholesale - Other Durable Goods Merchant Wholesalers	(\$37,495)
Sawmills	(\$27,885)
Management of Companies and Enterprises	(\$25,994)
Wholesale - Other Nondurable Goods Merchant Wholesalers	(\$24,522)
Warehousing and Storage	(\$21,568)
All Industries	(\$495,696)

Paperboard Mills (IMPLAN Code 138)

Industry	Industry Output
Wholesale - Other Durable Goods Merchant Wholesalers	(\$83,035)
Sawmills	(\$44,883)
Electric Power Transmission and Distribution	(\$37,074)
Truck Transportation	(\$22,228)
Local Government Electric Utilities	(\$21,738)
All Industries	(\$632,822)

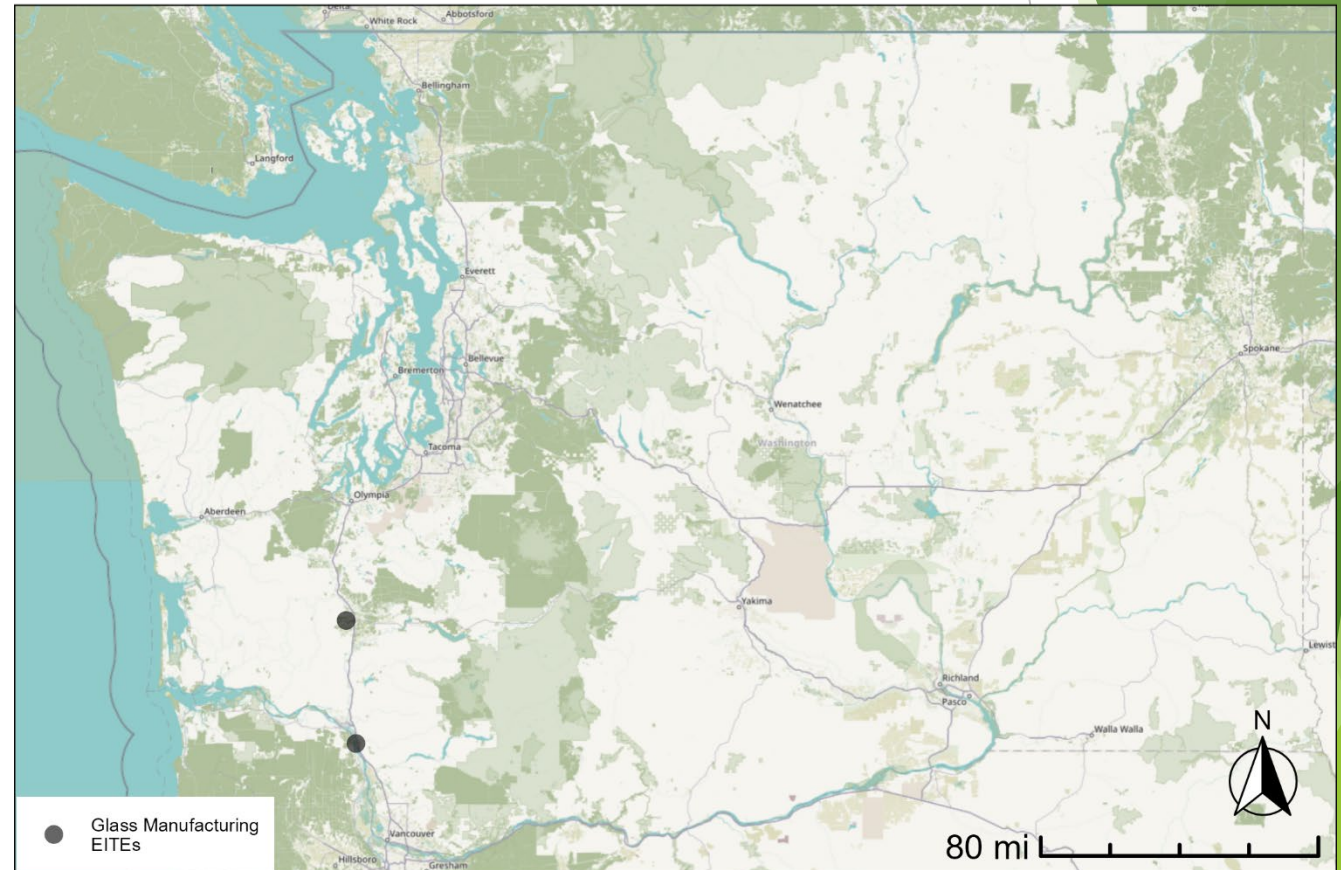
Market Impacts: Pulp, Paper, and Paperboard Outlook

- ▶ Demand for print and newsprint paper products is expected to continue to decline with increased emphasis on digitalization.
- ▶ The paper packaging segment should continue dominance in pulp and paper product market due to increased demand from e-commerce.
- ▶ One study projects that annual paper production in the U.S. would decrease by roughly 6 percent from 2025 to 2050 under “business-as-usual” scenario.
- ▶ Based on IRS data, profitability within the paper manufacturing industry nationwide stands at 14.0% as of 2021.

Appendix

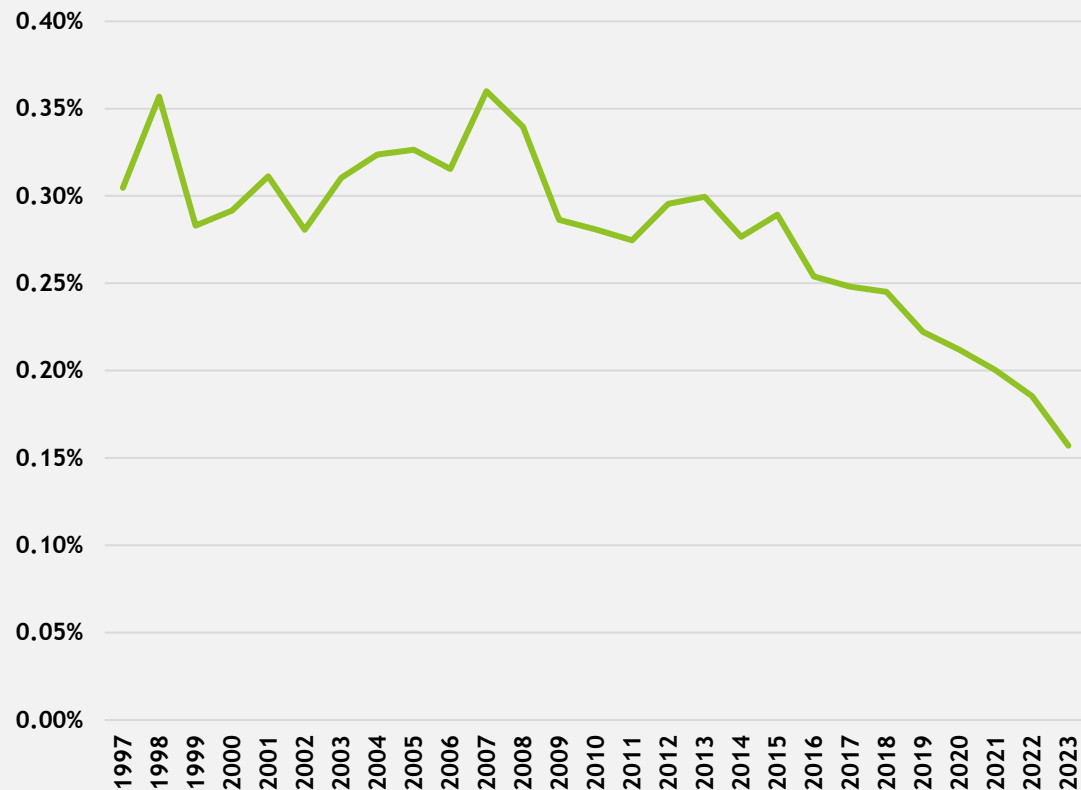
Glass Manufacturing: EITE Locations

- 2 Glass Manufacturing EITEs
 - 1 in Cowlitz County:
 - Owens-Brockway Glass Container
 - 1 in Lewis County:
 - Cardinal FG Company

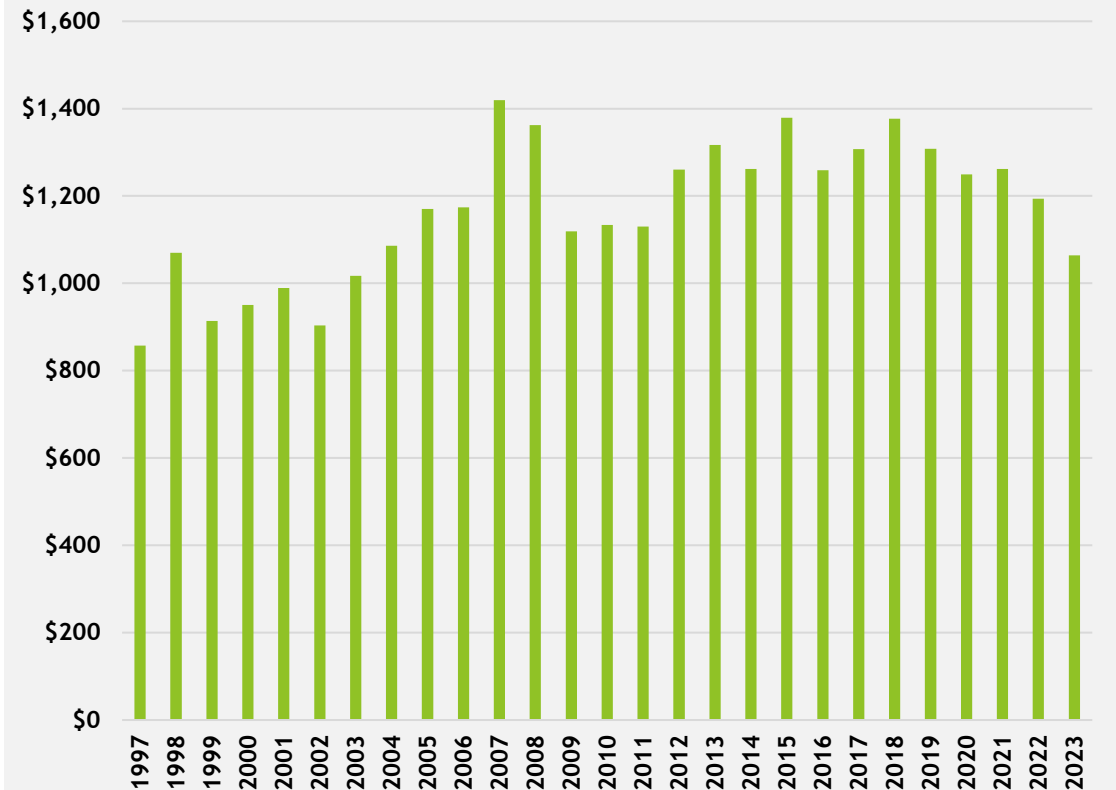


Glass Manufacturing: Gross Domestic Product

Share of Washington State GDP from Nonmetallic Mineral Product Manufacturing (NAICS 327)

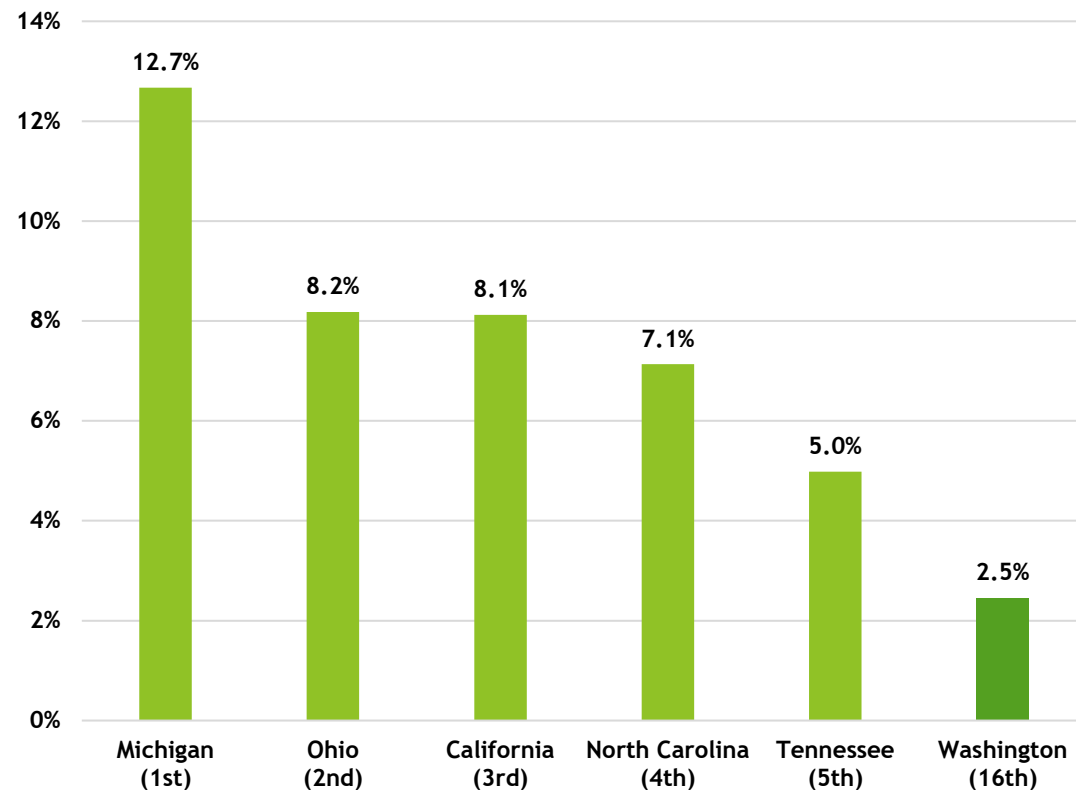


Washington State Nonmetallic Mineral Product Manufacturing Real GDP (Millions 2017 \$)



Glass Manufacturing: Revenue

Share of U.S. Glass Industry Revenue, Top Five States and Washington 2021 (NAICS 3272)

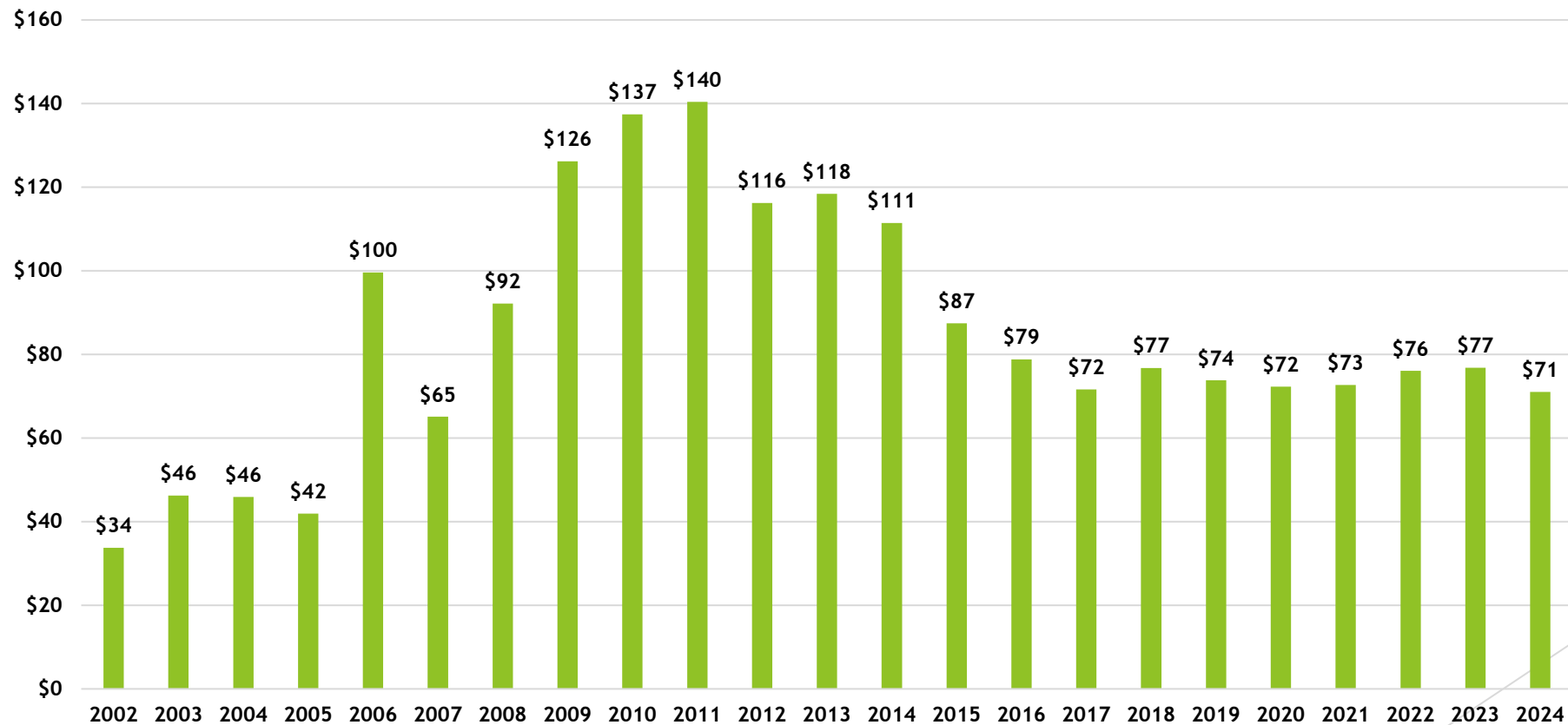


Carbon Pricing

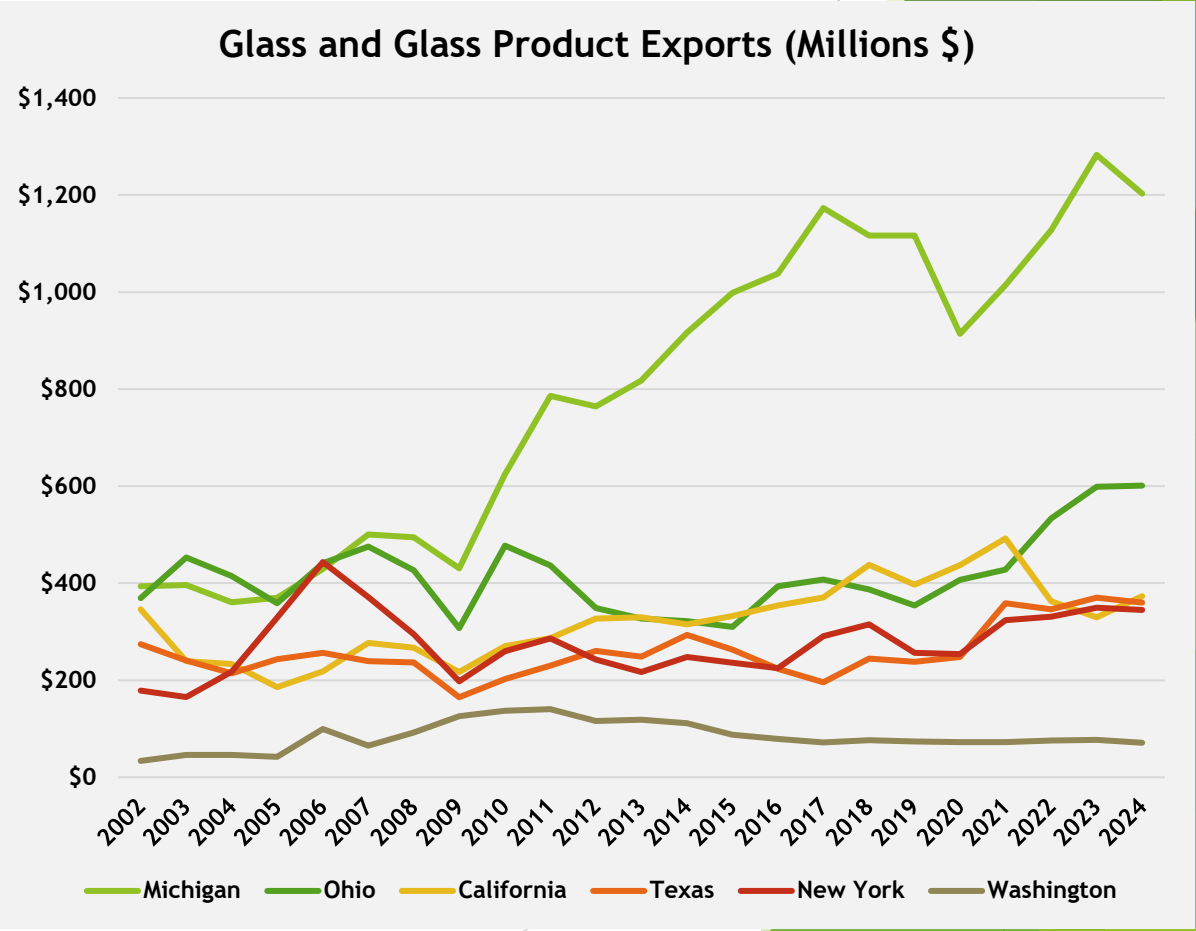
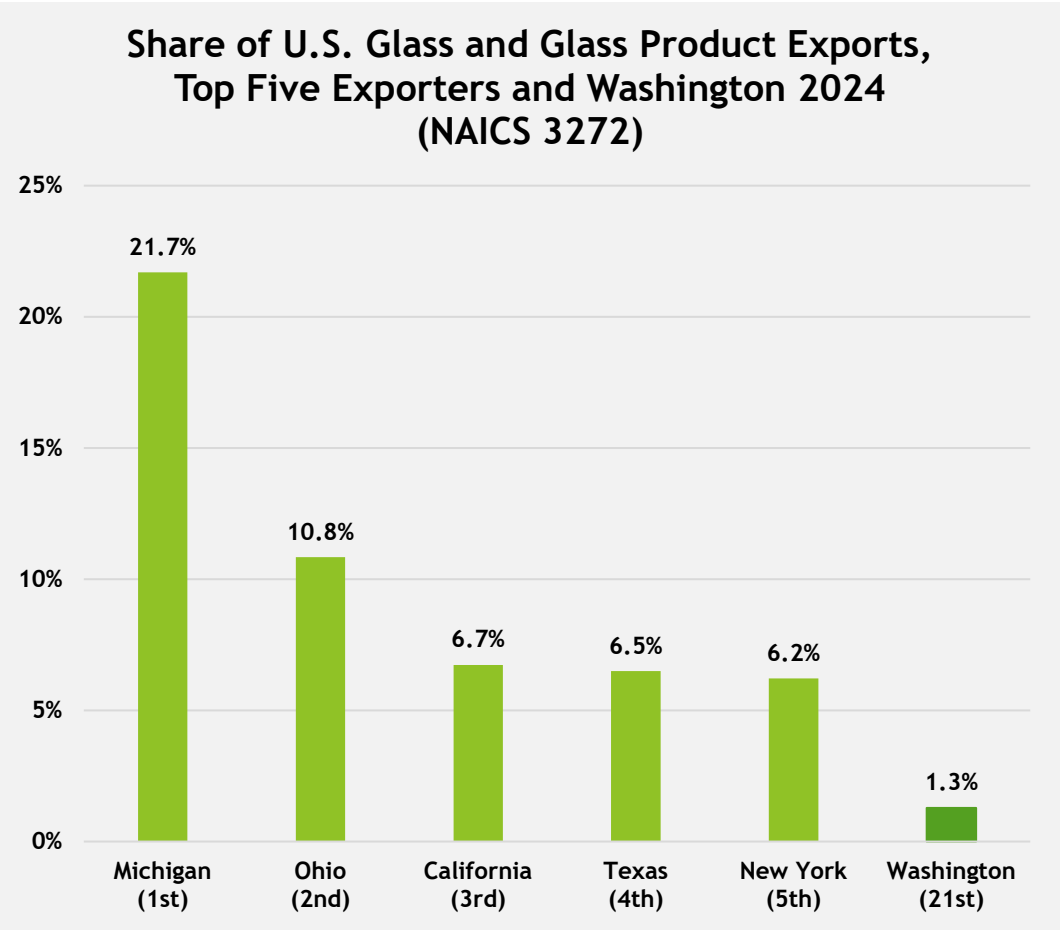
State	Price per MTCO2e	EITE leakage mitigation
Washington	\$50.00	Yes
California	\$29.27	Yes
Michigan	N/A	N/A
Ohio	N/A	N/A
North Carolina	N/A	N/A
Tennessee	N/A	N/A

Glass Manufacturing: Export Trends (Washington State)

Washington State Glass and Glass Product Exports (Millions \$) (NAICS 3272)



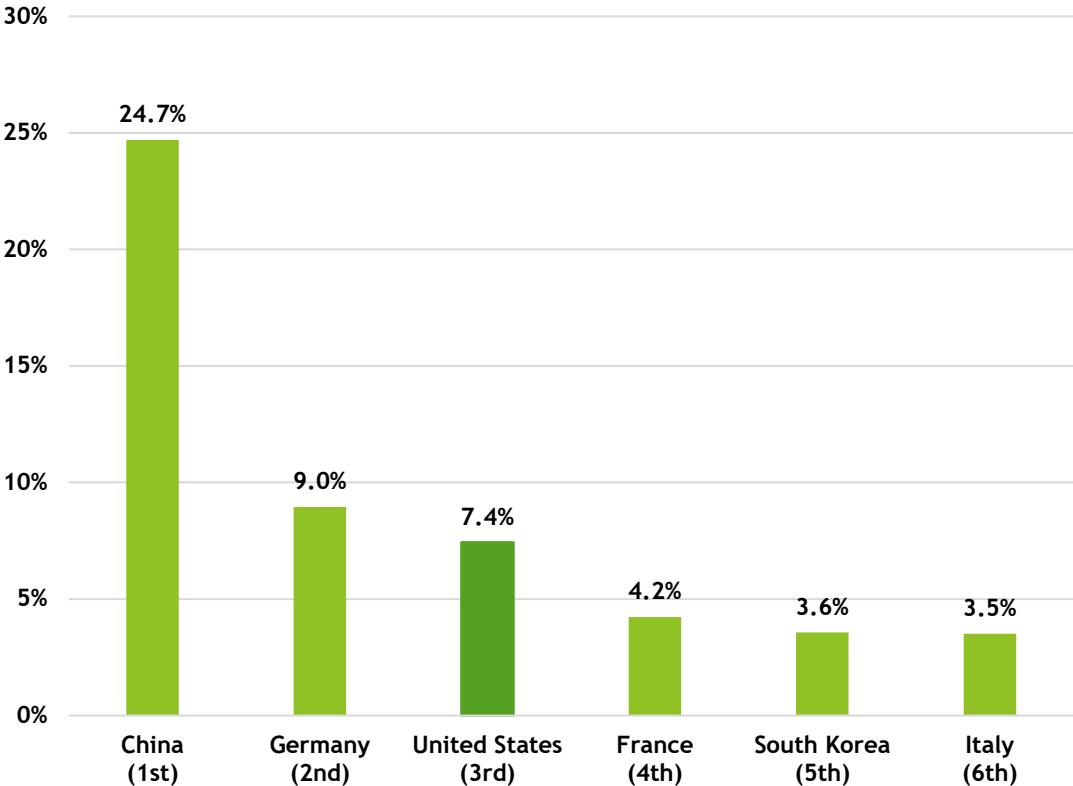
Glass Manufacturing: Export Trends (Domestic Comparison)



Glass Manufacturing:

Export Trends (International Comparison)

Share of International Glass and Glassware Exports (HS 70), Top Six Exporters 2023



Carbon Pricing

Country/Region	Price per MTCO2e	EITE leakage mitigation
European Union	64.74 EUR (\$72.70)	Yes
Germany	55.00 EUR (\$61.76)	Yes
France	44.60 EUR (\$50.08)	Yes
China*	95.96 CNY (\$13.32)	Yes
South Korea	10,355 SKW (\$7.37)	Yes
Italy	EU ETS only	Yes
United States	N/A	N/A

* Only applies to electricity, cement, steel, and aluminum sectors

Glass Manufacturing: Supply Chains

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Flat Glass Manufacturing (IMPLAN Code 191)

Industry	Industry Output
Rail Transportation	(\$35,887)
Electric Power Transmission and Distribution	(\$29,449)
Management of Companies and Enterprises	(\$26,786)
Truck Transportation	(\$25,493)
Other Basic Inorganic Chemical Manufacturing	(\$21,337)
All Industries	(\$480,137)

Glass Container Manufacturing (IMPLAN Code 193)

Industry	Industry Output
Paperboard Container Manufacturing	(\$35,131)
Electric Power Transmission and Distribution	(\$29,623)
Rail Transportation	(\$24,095)
Management of Companies and Enterprises	(\$23,889)
Warehousing and Storage	(\$20,184)
All Industries	(\$451,520)

Glass Manufacturing:

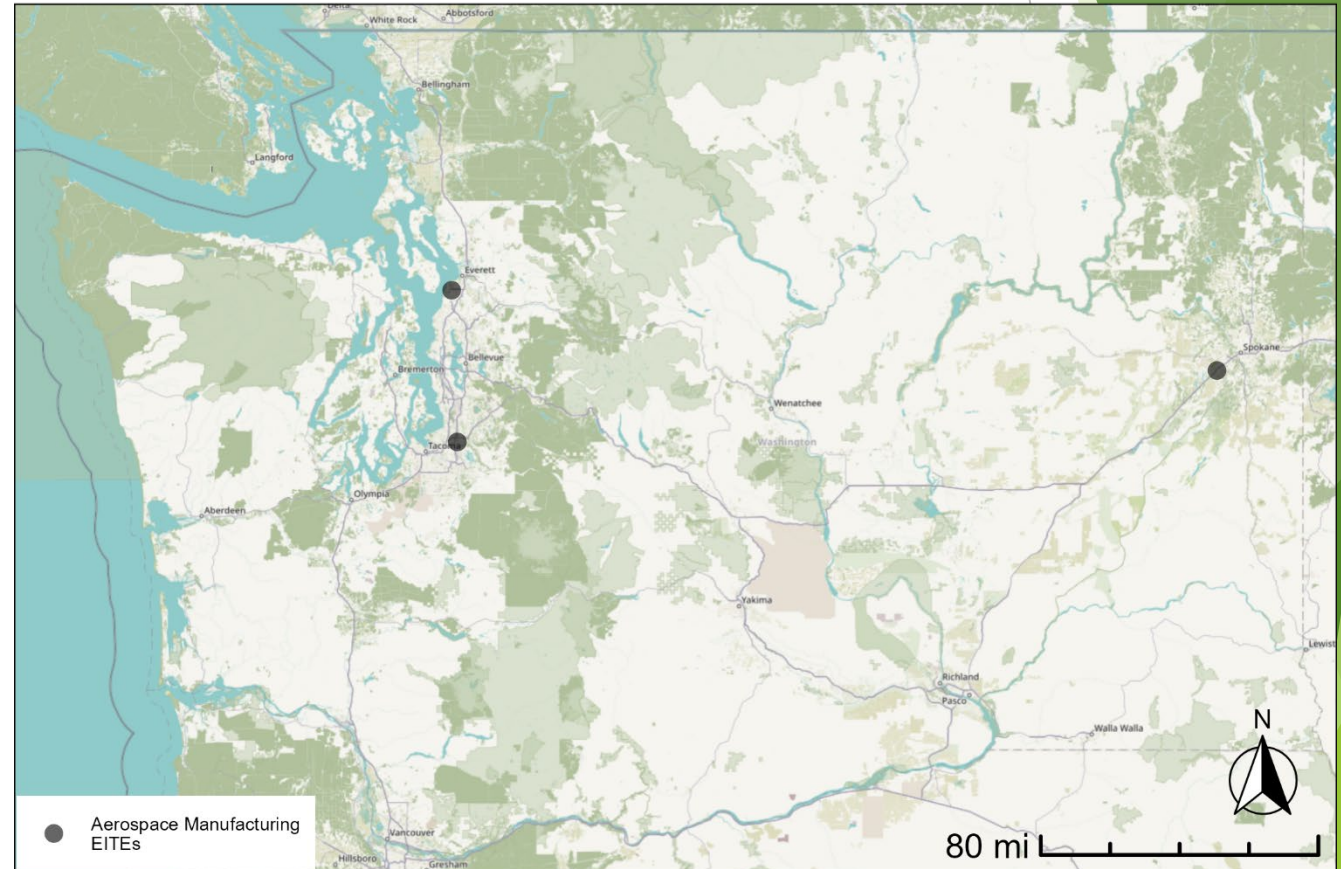
Outlook

- ▶ Growth in the U.S. glass manufacturing industry is based on increased infrastructure spending and a greater emphasis on sustainable/eco-friendly packaging solutions.
- ▶ There is increasing interest in glass production for solar panels in the U.S., while demand for housing continues to provide a strong outlook for float glass manufacturers.
- ▶ One market analysis report projects a CAGR of 5.6% from 2025-2030.
- ▶ Based on IRS data, profitability within the glass manufacturing industry nationwide stands at 12.5% as of 2021.

Aerospace Manufacturing:

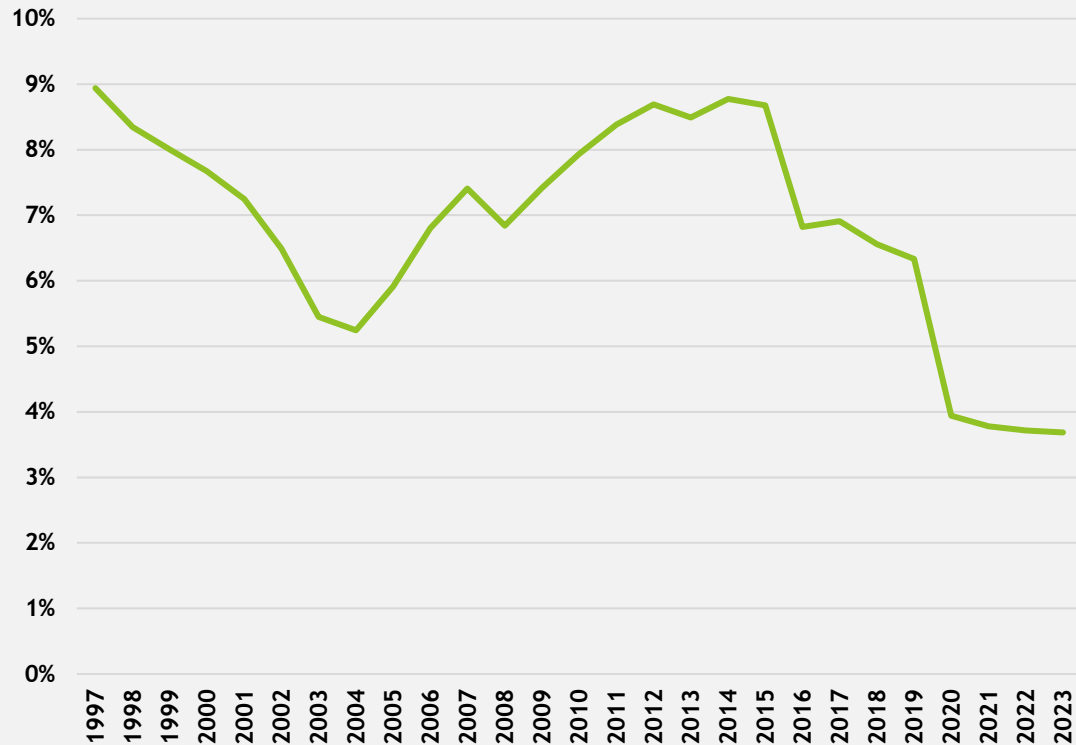
EITE Locations

- 3 Aerospace Manufacturing EITEs
 - 1 in King County:
 - The Boeing Company - Auburn
 - 1 in Snohomish County:
 - The Boeing Company - Everett
 - 1 in Spokane County:
 - Goodrich Corporation

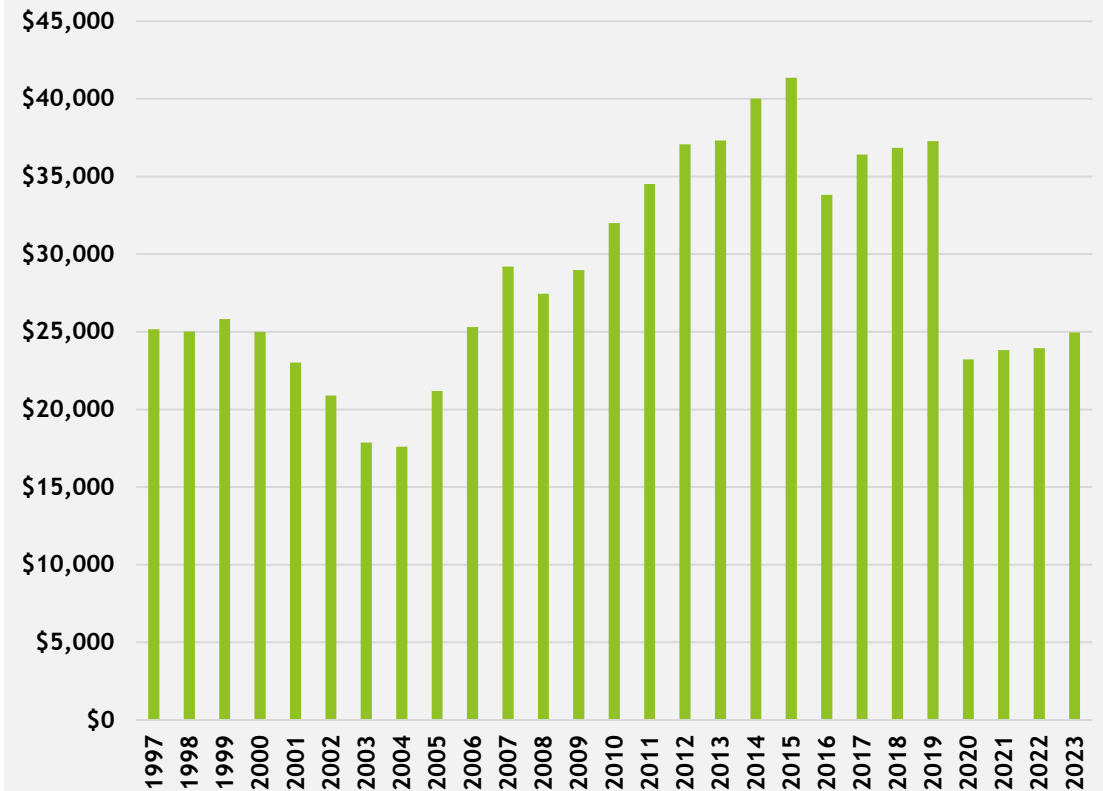


Aerospace Manufacturing: Gross Domestic Product

Share of Washington State GDP from Other
Transportation Equipment Manufacturing
(NAICS 3364 to 3369)

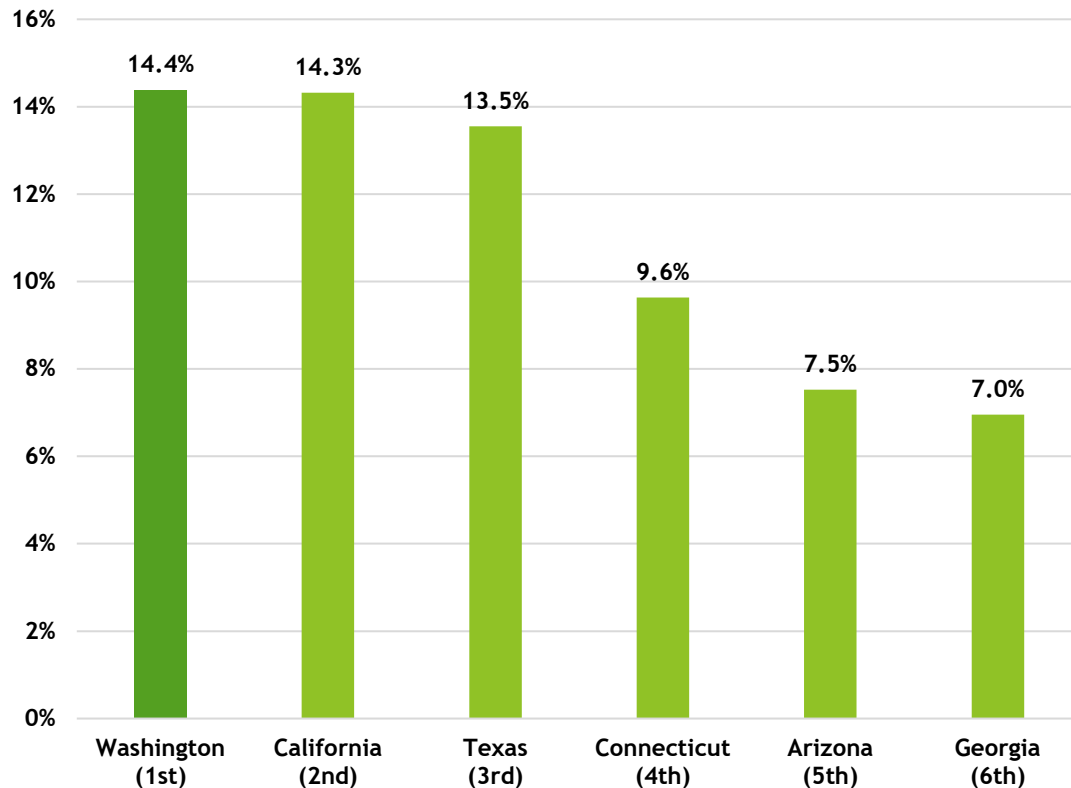


Washington State Other Transportation Equipment
Manufacturing Real GDP (Millions 2017 \$)



Aerospace Manufacturing: Revenue

Share of U.S. Aerospace Industry Revenue, Top
Six States 2021 (NAICS 3364)



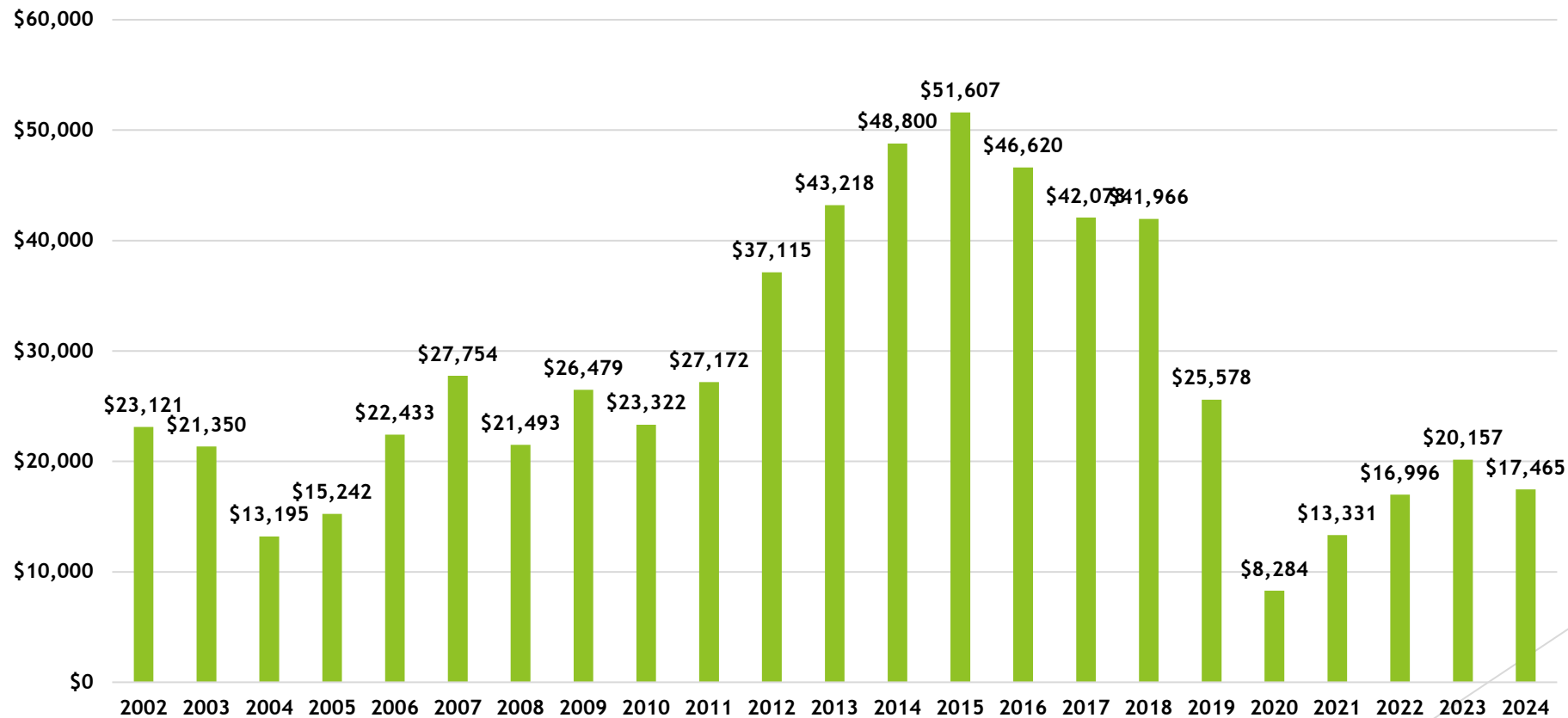
Carbon Pricing

State	Price per MTCO2e	EITE leakage mitigation
Washington	\$50.00	Yes
California	\$29.27	Yes
Connecticut*	\$19.76	N/A
Texas	N/A	N/A
Arizona	N/A	N/A
Georgia	N/A	N/A

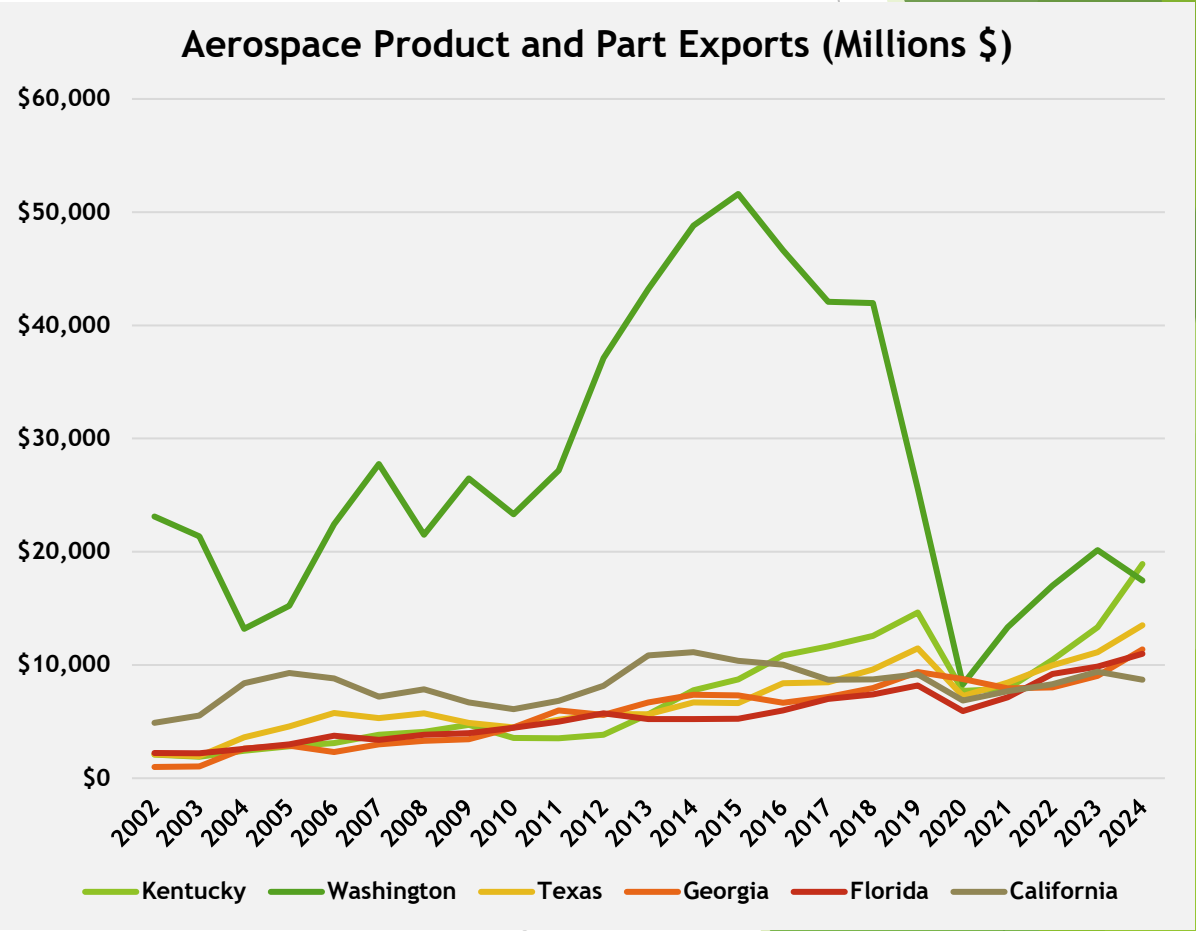
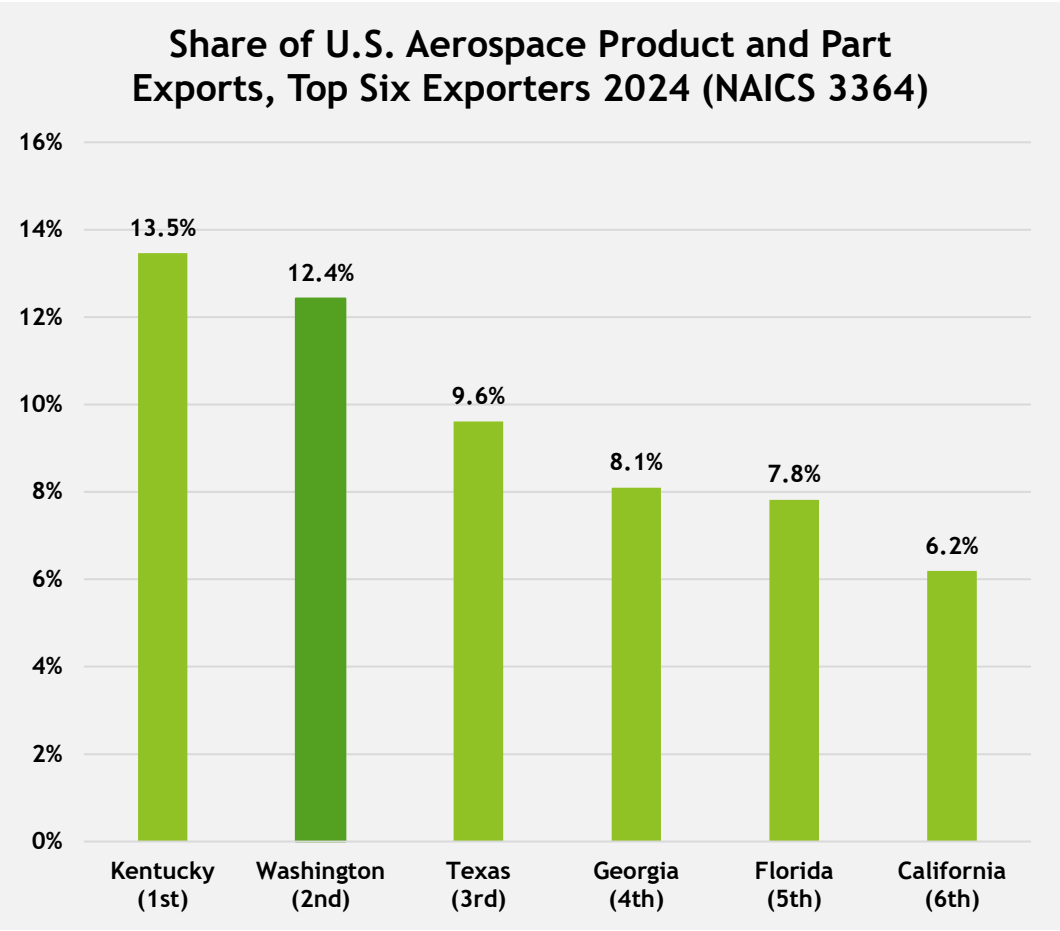
* Only applies to electricity sector

Aerospace Manufacturing: Export Trends (Washington State)

Washington State Aerospace Product and Part Exports (Millions \$) (NAICS 3364)

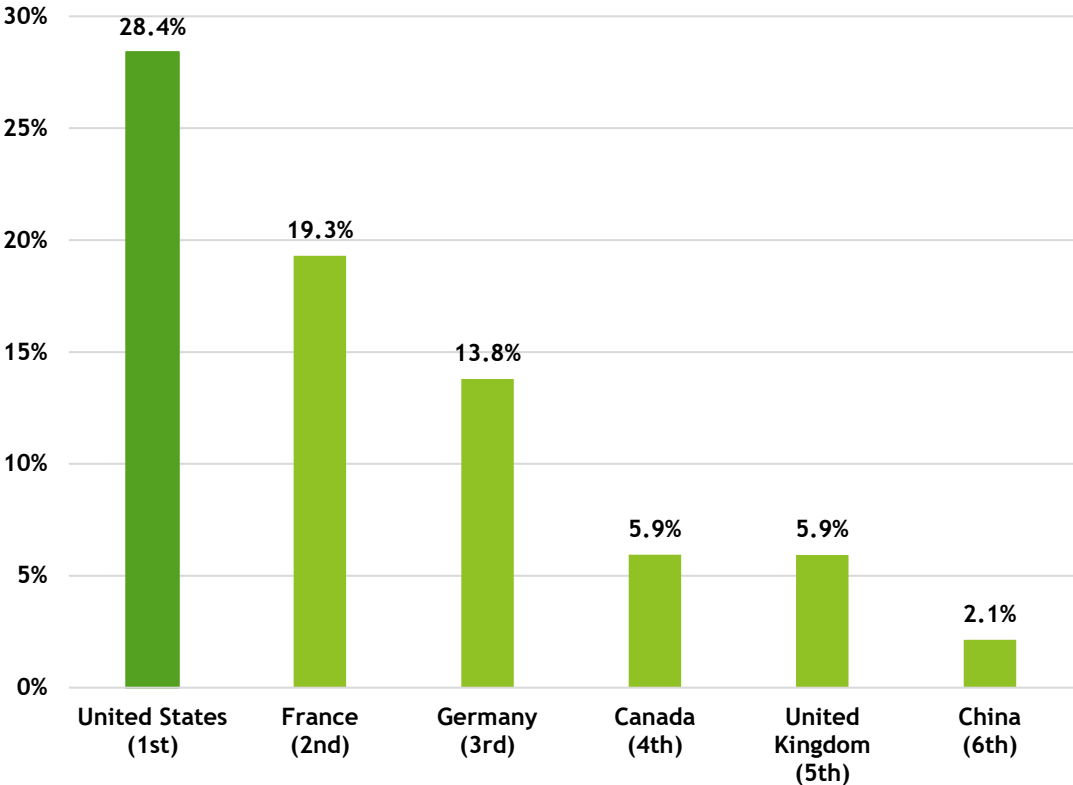


Aerospace Manufacturing: Export Trends (Domestic Comparison)



Aerospace Manufacturing: Export Trends (International Comparison)

Share of International Aircraft and Spacecraft
Exports (HS 88), Top Six Exporters 2023



Carbon Pricing

Country/Region	Price per MTCO2e	EITE leakage mitigation
European Union	64.74 EUR (\$72.70)	Yes
Germany	55.00 EUR (\$61.76)	Yes
France	44.60 EUR (\$50.08)	Yes
United Kingdom	37.18 GBP (\$49.18)	Yes
Quebec	\$29.27	Yes
China*	95.95 CNY (\$13.32)	Yes
South Korea	10,355 SKW (\$7.37)	Yes
United States	N/A	N/A

* Only applies to electricity, cement, steel, and aluminum sectors

Aerospace Manufacturing: Supply Chains

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Aircraft Manufacturing (IMPLAN Code 337)

Industry	Industry Output
Wholesale - Household Appliances and Electrical and Electronic Goods	(\$19,471)
Other Aircraft Parts and Auxiliary Equipment Manufacturing	(\$14,678)
Wholesale - Machinery, Equipment, and Supplies	(\$10,365)
Data Processing, Hosting, and Related Services	(\$5,698)
Wholesale - Other Durable Goods Merchant Wholesalers	(\$5,560)
All Industries	(\$127,164)

Other Aircraft Parts and Auxiliary Equipment Manufacturing (IMPLAN Code 339)

Industry	Industry Output
Custom Computer Programming Services	(\$34,602)
Aircraft Manufacturing	(\$21,838)
Computer Systems Design Services	(\$16,240)
Wholesale - Machinery, Equipment, and Supplies	(\$15,486)
Management of Companies and Enterprises	(\$11,789)
All Industries	(\$213,651)

Aerospace Manufacturing:

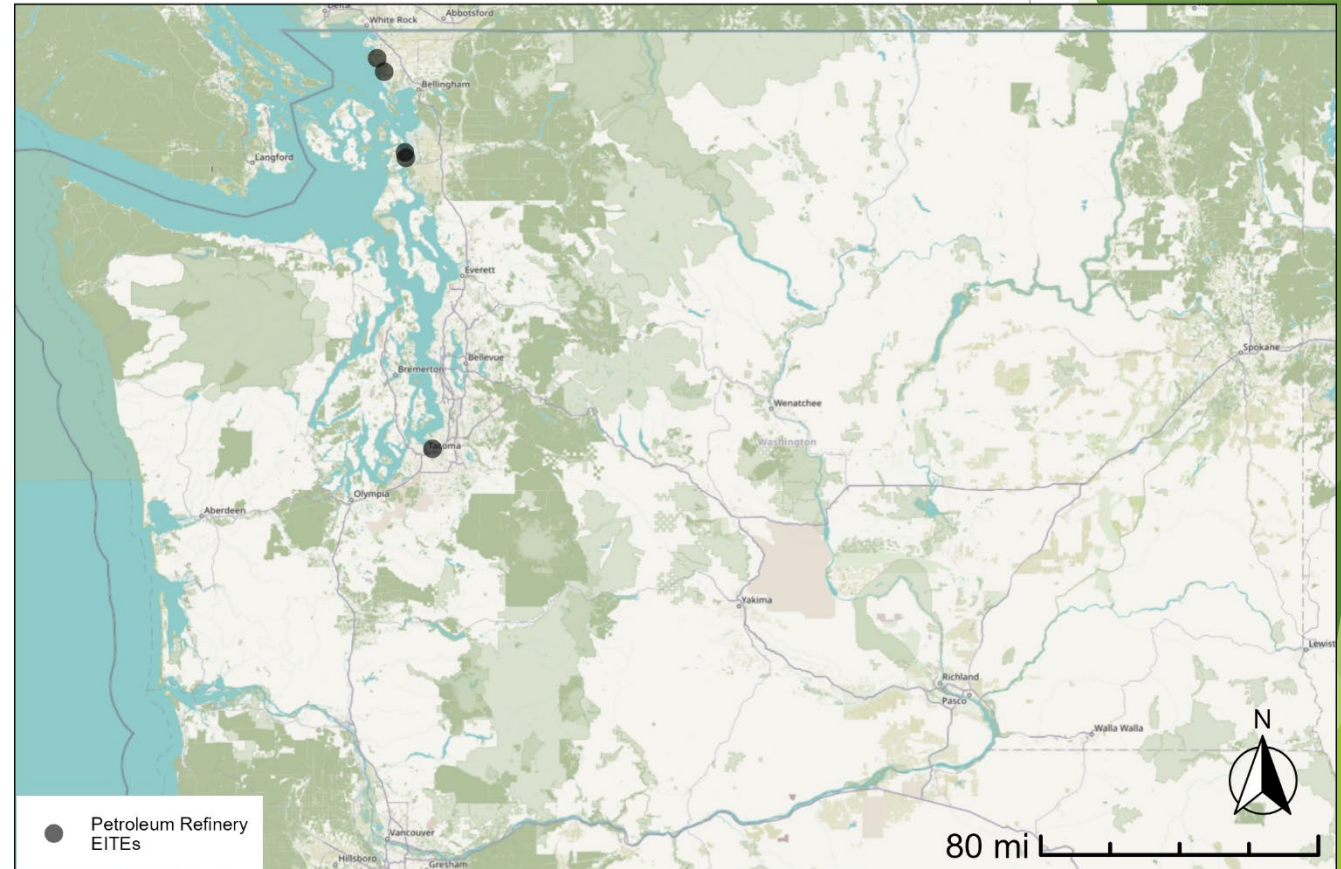
Outlook

- ▶ Air travel is back to pre-COVID levels, with demand increasing in a more connected world.
- ▶ Air transportation for cargo is expected to increase with more e-commerce activity and increasingly global supply chains (although tariffs could dampen this in part).
- ▶ The global fleet is projected to nearly double over the next two decades, with over 85% of the fleet being new builds by 2043.
- ▶ Based on IRS data, profitability within the aerospace manufacturing industry nationwide stands at 12.3% as of 2021.

Petroleum Refineries:

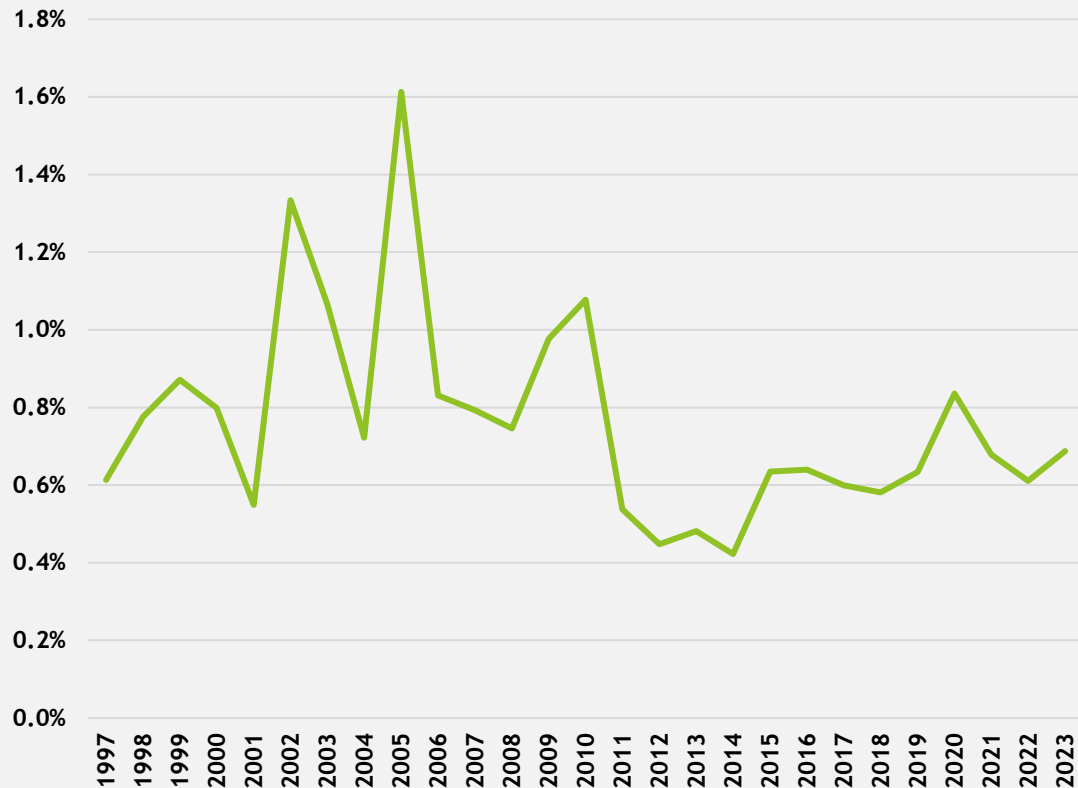
EITE Locations

- 5 Petroleum Refinery EITEs
 - 2 in Skagit County:
 - HF Sinclair Puget Sound Refinery
 - Marathon Anacortes Refinery
 - 2 in Whatcom County:
 - BP Cherry Point Refinery
 - Phillips 66 Ferndale Refinery
 - 1 in Pierce County:
 - U.S. Oil and Refining Co.

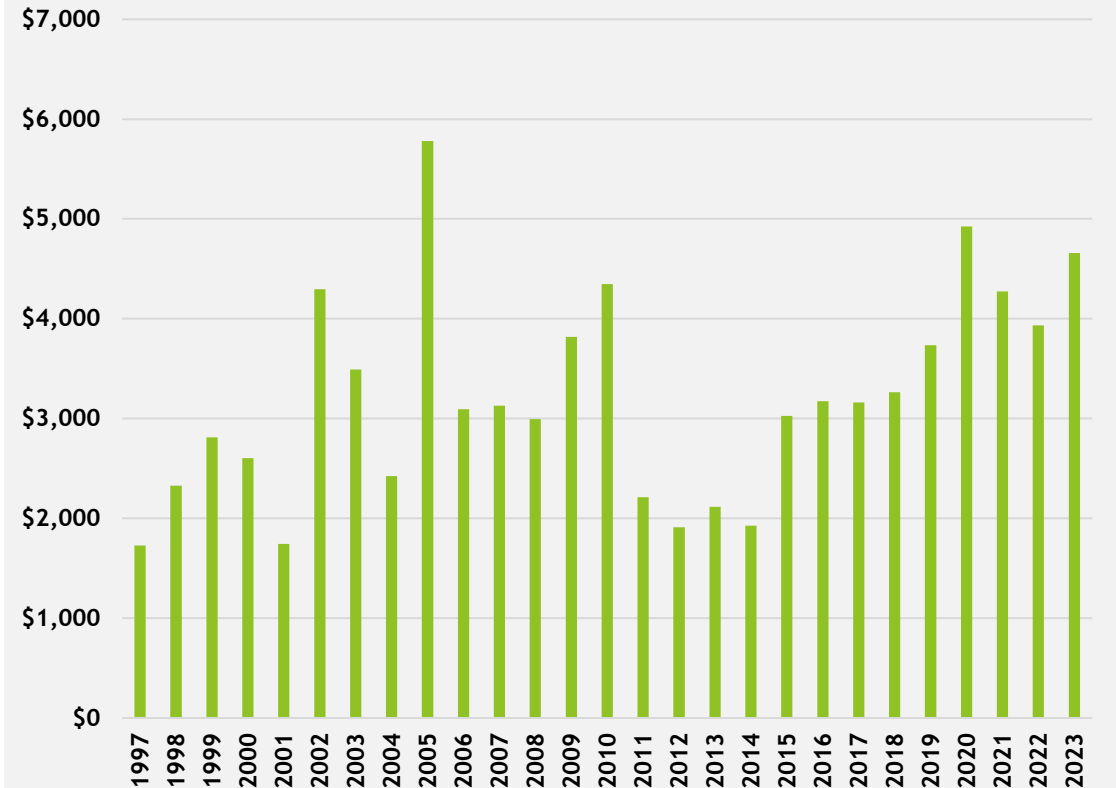


Petroleum Refineries: Gross Domestic Product

Share of Washington State GDP from Petroleum and Coal Products Manufacturing (NAICS 324)

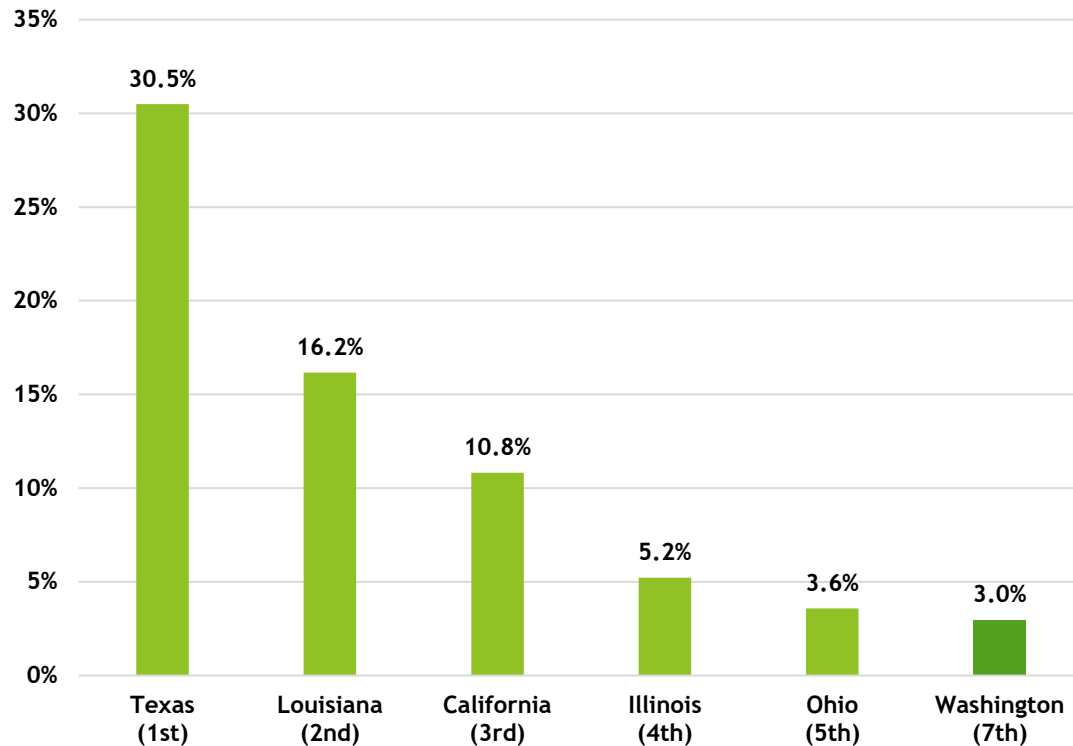


Washington State Petroleum and Coal Products Manufacturing Real GDP (Millions 2017 \$)



Petroleum Refineries: Revenue

Share of U.S. Petroleum and Coal Industry
Revenue, Top Five States and Washington 2021
(NAICS 3241)

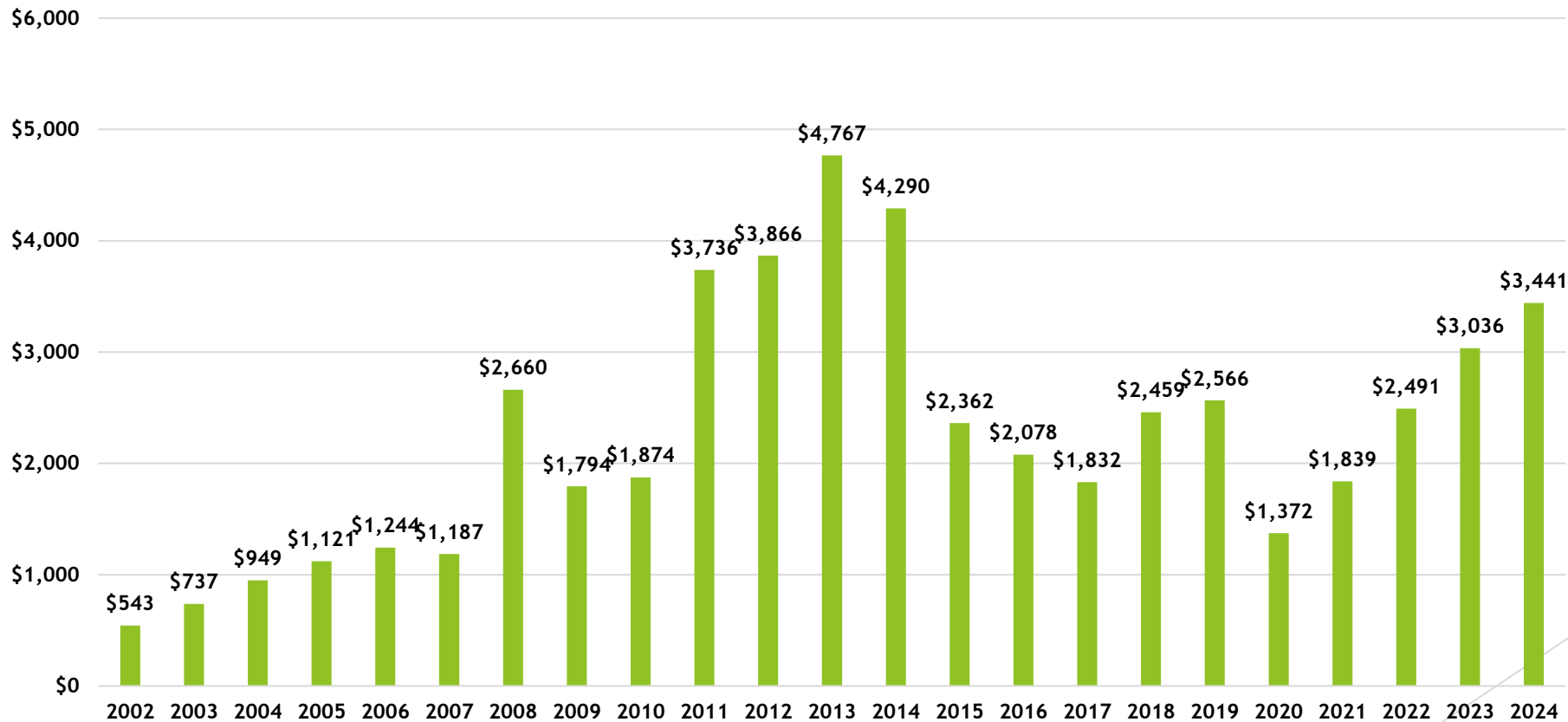


Carbon Pricing

State	Price per MTCO2e	EITE leakage mitigation
Washington	\$50.00	Yes
California	\$29.27	Yes
Texas	N/A	N/A
Louisiana	N/A	N/A
Illinois	N/A	N/A
Ohio	N/A	N/A

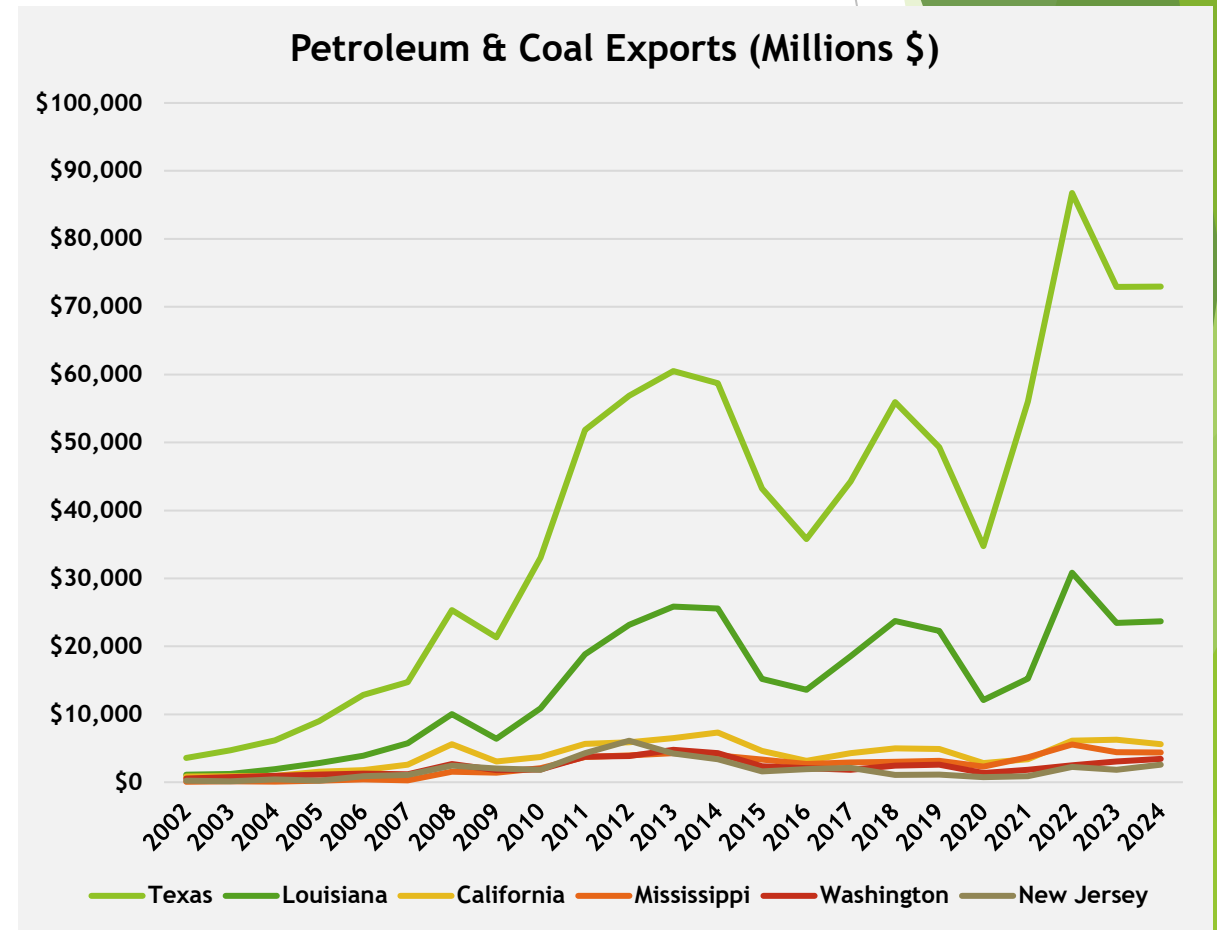
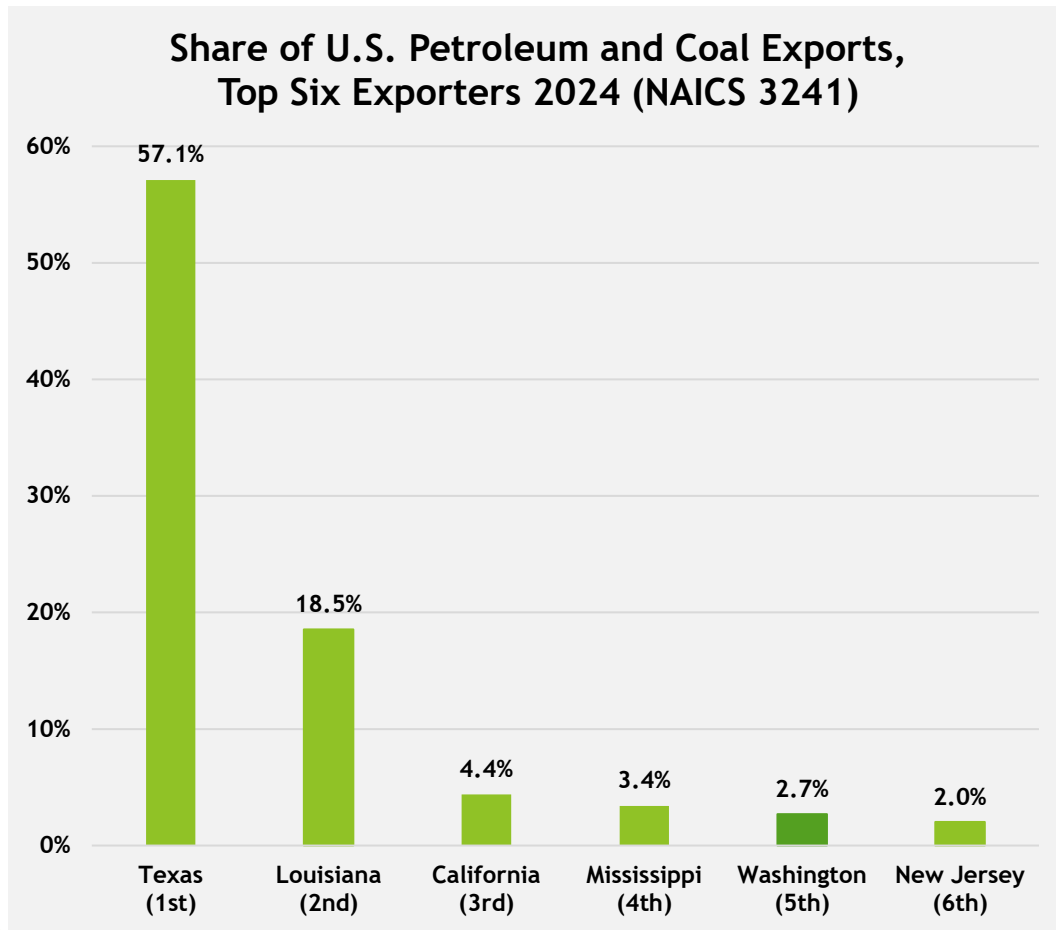
Petroleum Refineries: Export Trends (Washington State)

Washington State Petroleum and Coal Product Exports (Millions \$) (NAICS 3241)



Petroleum Refineries:

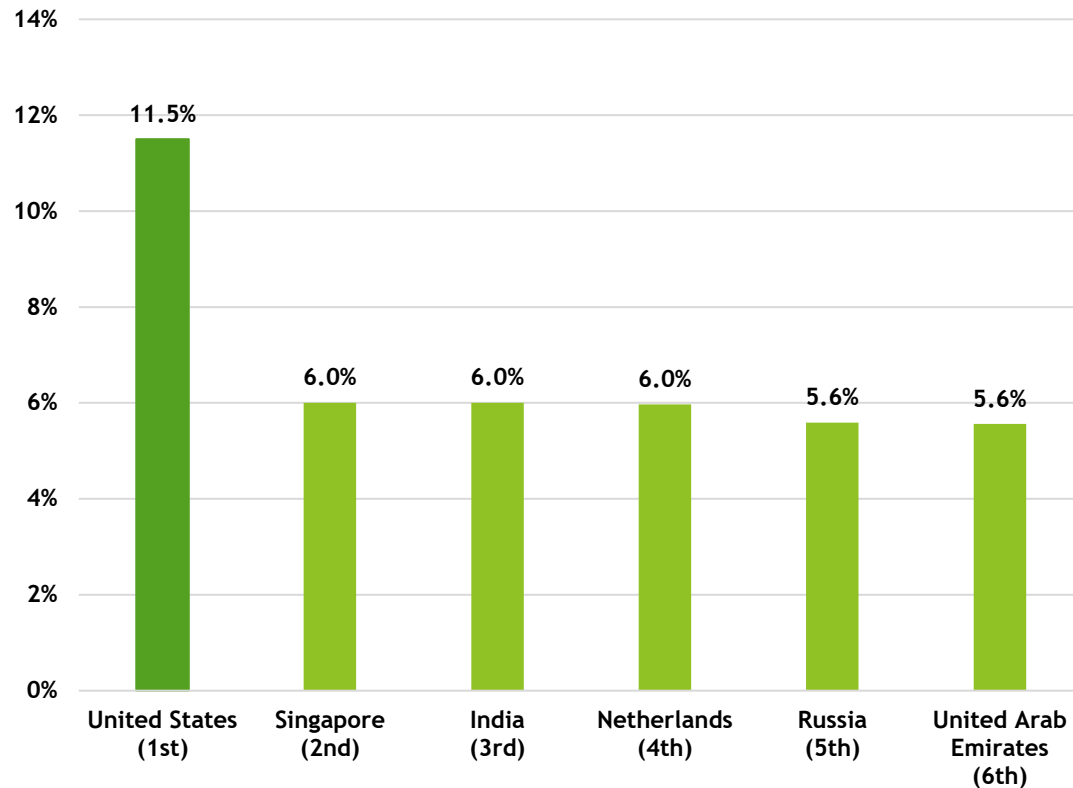
Export Trends (Domestic Comparison)



Petroleum Refineries:

Export Trends (International Comparison)

Share of International Refined Petroleum Exports
(HS 2710), Top Six Exporters 2023



Carbon Pricing

Country/Region	Price per MTCO2e	EITE leakage mitigation
Netherlands	66.50 EUR (\$74.60)	Only if covered by EU ETS
European Union	64.74 EUR (\$72.70)	Yes
Singapore	25.00 SGD (\$19.20)	Yes
United States	N/A	N/A
Russia	N/A	N/A
India	N/A	N/A
United Arab Emirates	N/A	N/A

Petroleum Refineries:

Supply Chains

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Petroleum Refineries (IMPLAN Code 146)

Industry	Indirect Impact
Wholesale - Petroleum and Petroleum Products	(\$29,806)
Oil and Gas Extraction	(\$17,694)
Maintenance and Repair Construction of Nonresidential Structures	(\$13,111)
Truck Transportation	(\$11,079)
Management of Companies and Enterprises	(\$6,419)
All Industries	(\$152,619)

Petroleum Refineries:

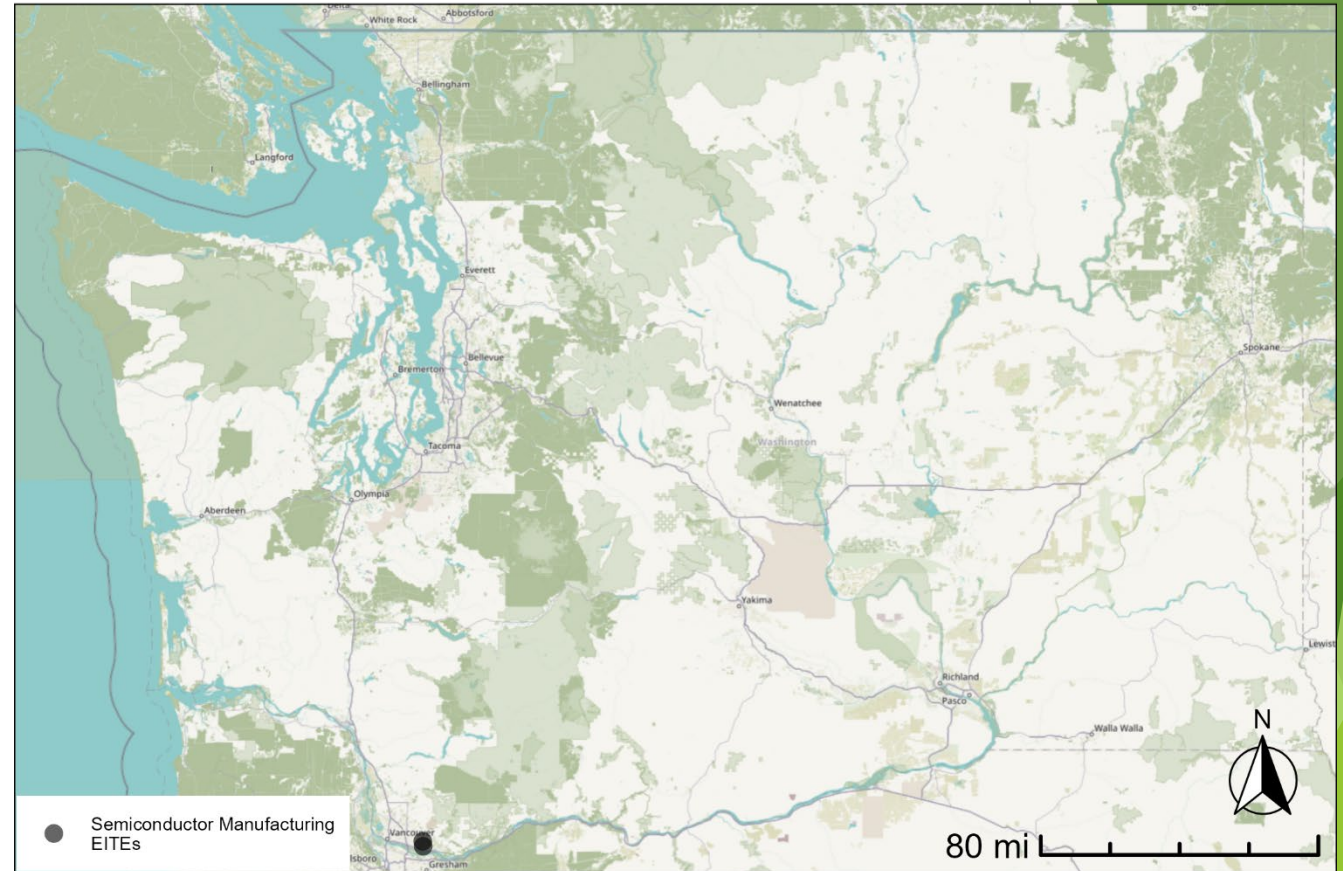
Outlook

- ▶ The U.S. Energy Information Administration (EIA) projects that national demand for petroleum products will decline between 16 and 22 percent from 2024 to 2050.
- ▶ A Western Washington University (WWU) study indicated that demand in Washington could decrease by more than national demand because of the state's carbon policies.
- ▶ The WWU study also showed that increased demand for renewable diesel and sustainable aviation fuel could partially offset lower production of traditional fuels.
- ▶ The EIA projects that global demand for petroleum products will increase between 12 and 23 percent from 2024 to 2050.
- ▶ Based on IRS data, profitability within the petroleum refining industry nationwide stands at 7.9% as of 2021.

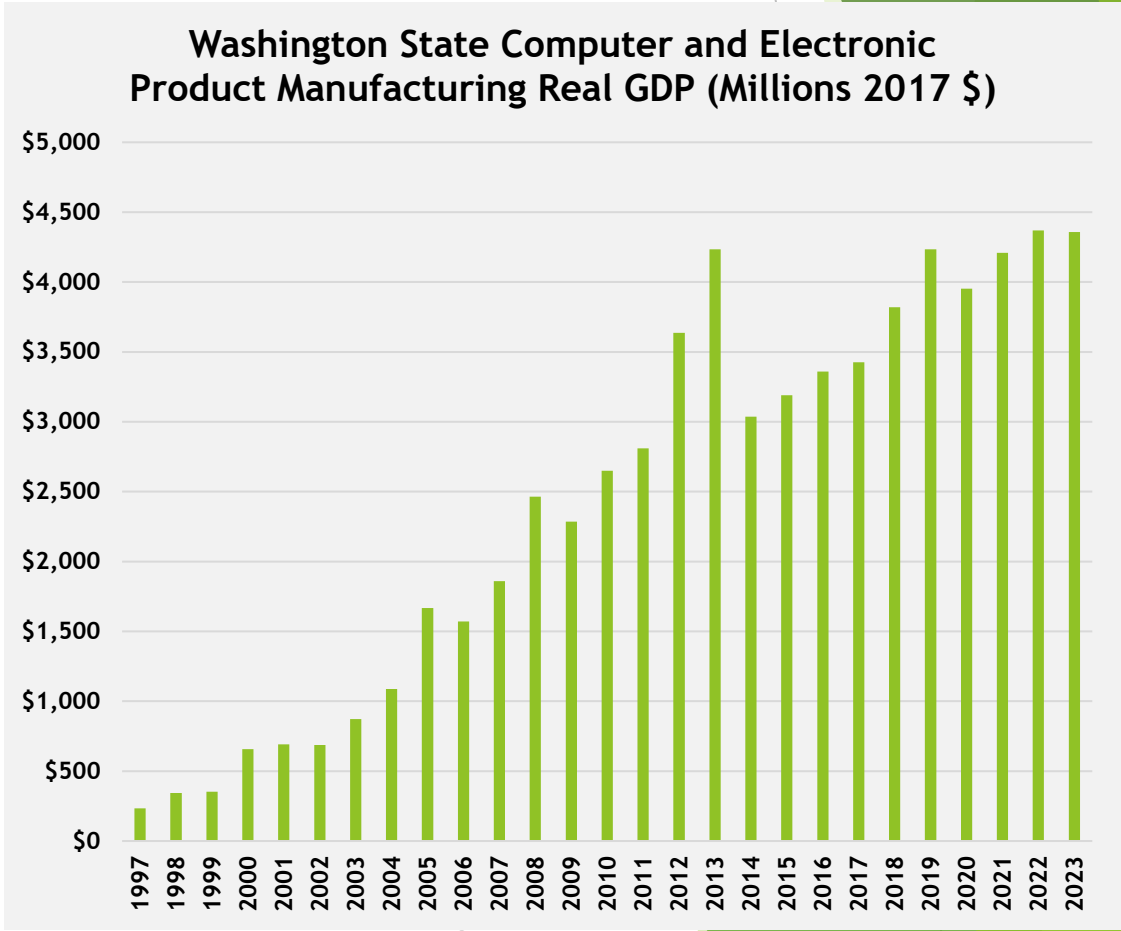
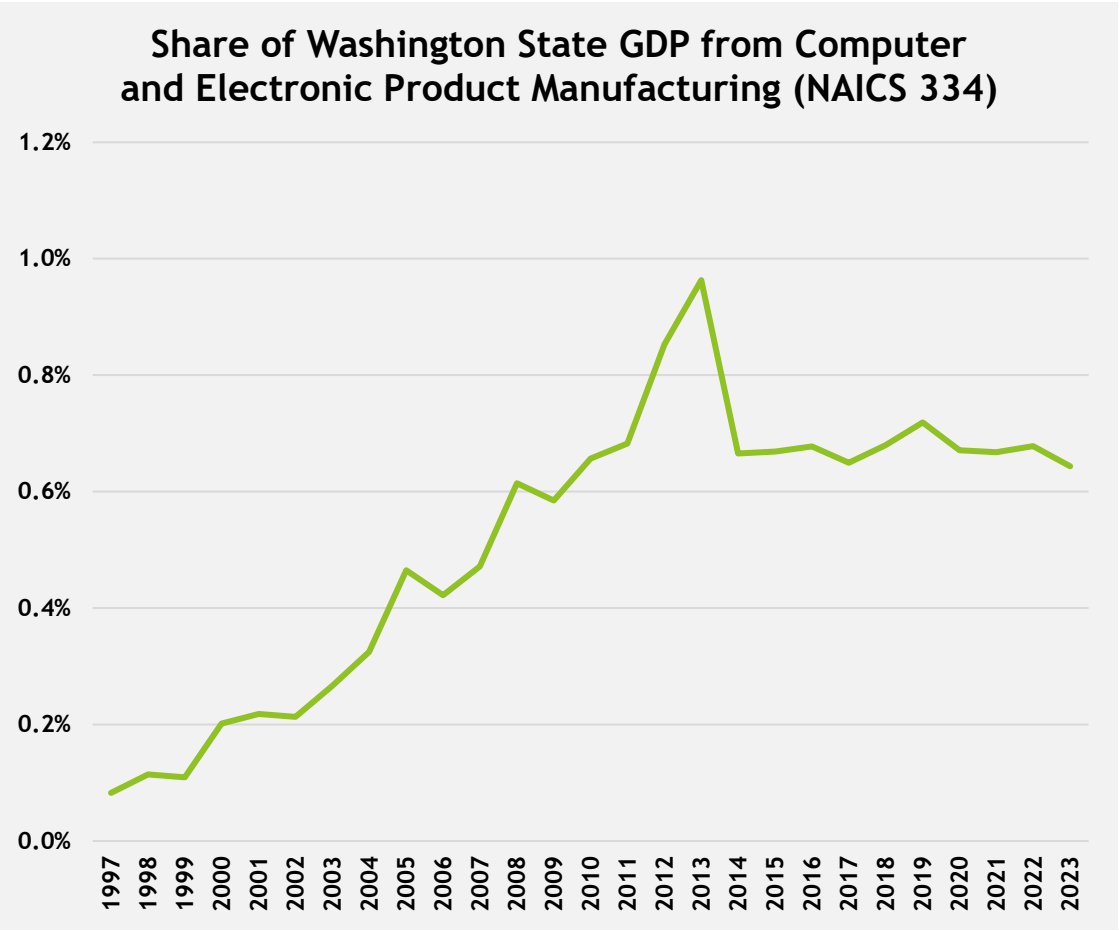
Semiconductor Manufacturing:

EITE Locations

- 2 Semiconductor Manufacturing EITEs
 - 2 in Clark County:
 - Analog Devices
 - TSMC Washington (formerly WaferTech)

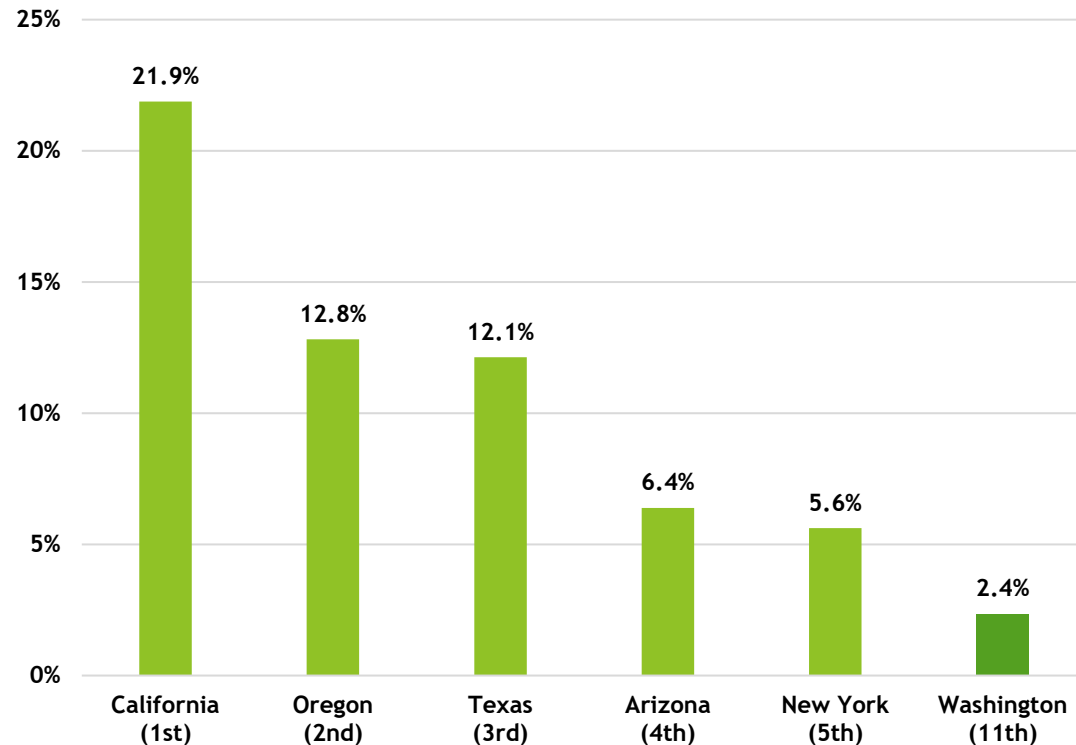


Semiconductor Manufacturing: Gross Domestic Product



Semiconductor Manufacturing: Revenue

Share of U.S. Semiconductor Industry
Revenue, Top Five States and Washington 2021
(NAICS 3344)



Carbon Pricing

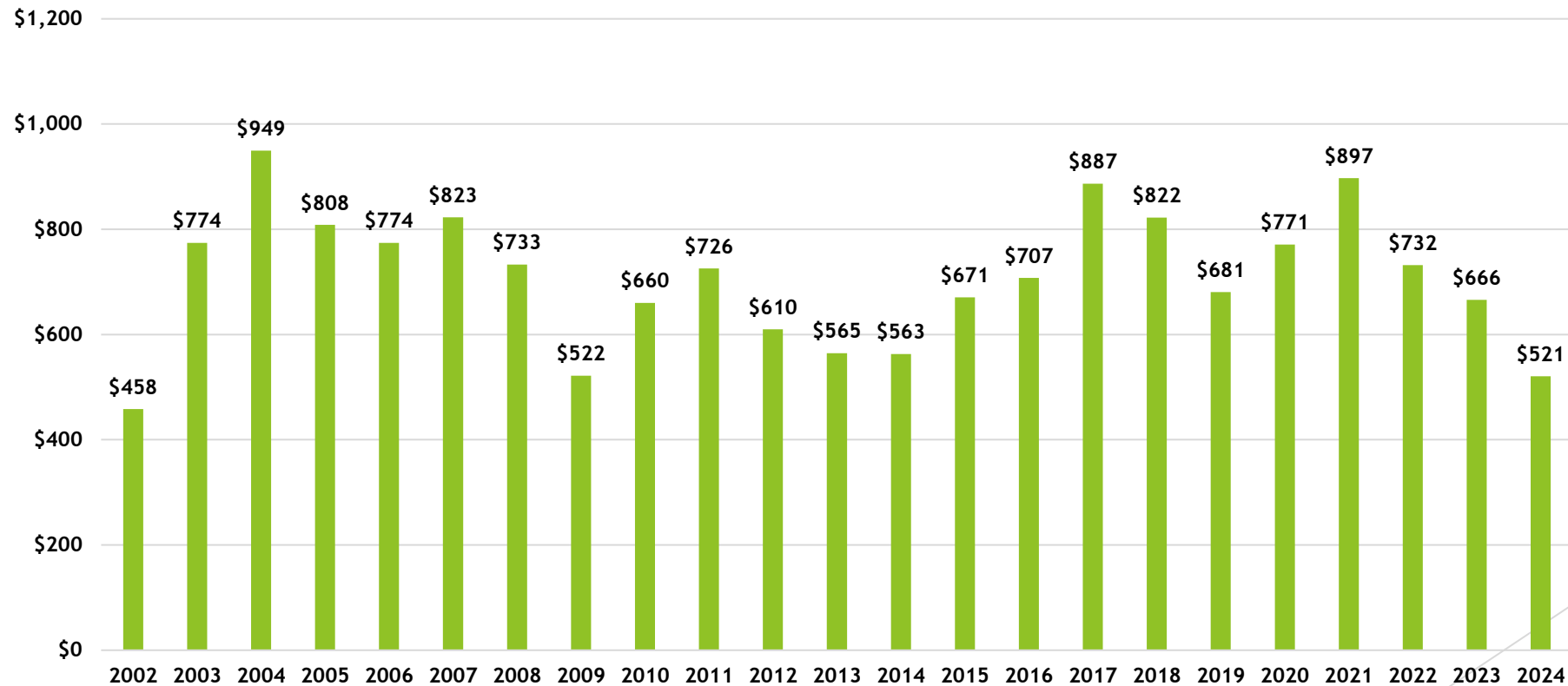
State	Price per MTCO2e	EITE leakage mitigation
Washington	\$50.00	Yes
California	\$29.27	Yes
New York*	\$19.76	N/A
Oregon**	N/A	Yes
Texas	N/A	N/A
Arizona	N/A	N/A

* Only applies to electricity sector

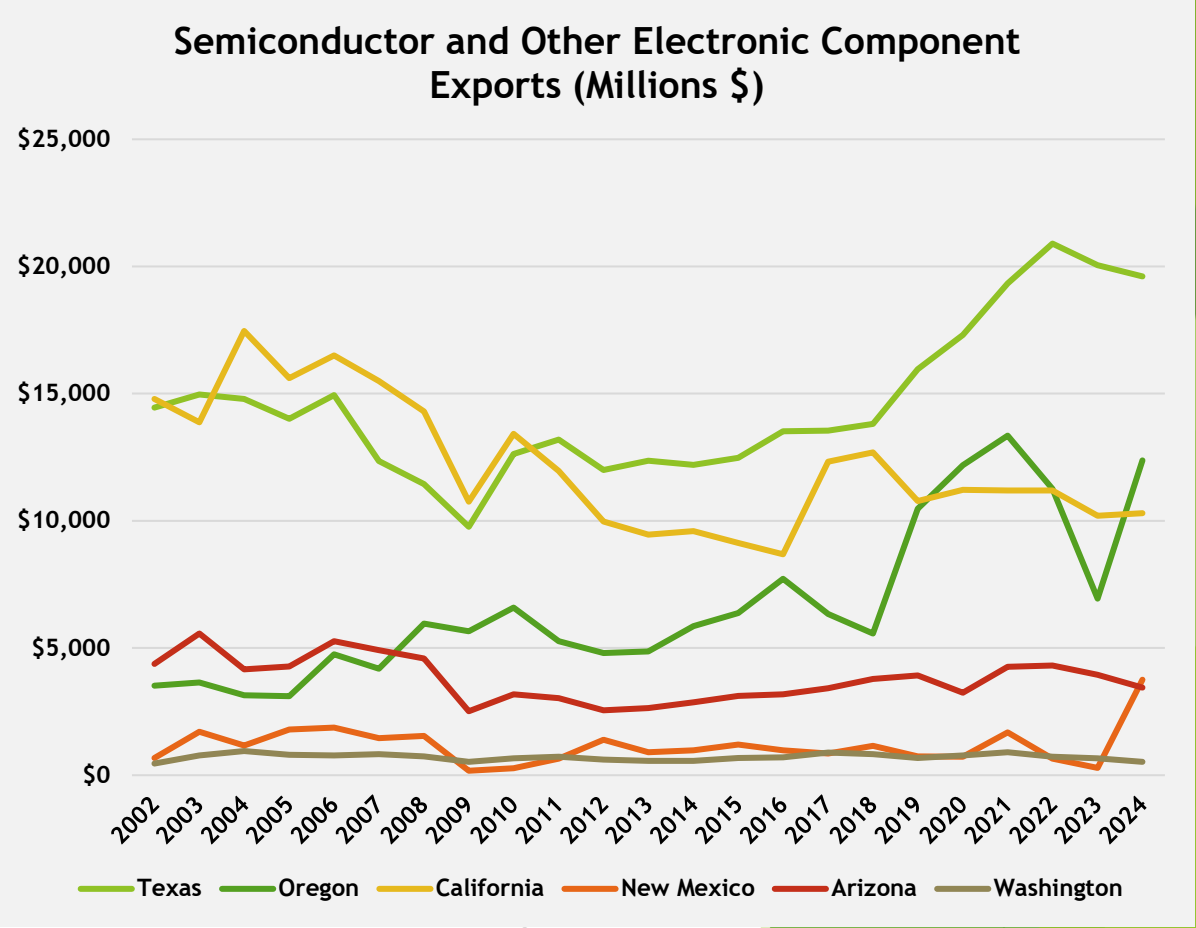
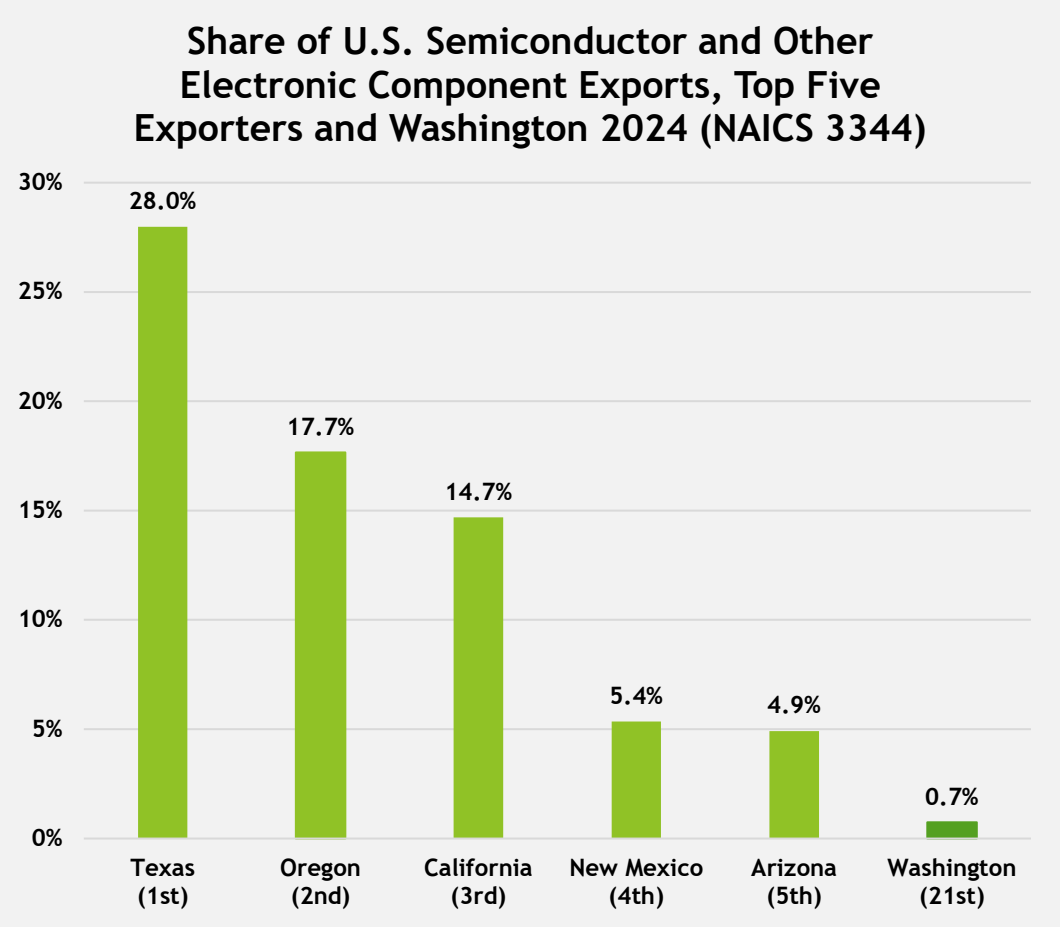
** First allowances will be distributed sometime in 2025

Semiconductor Manufacturing: Export Trends (Washington State)

Washington State Semiconductor and Other Electronic Component Exports
(Millions \$) (NAICS 3344)

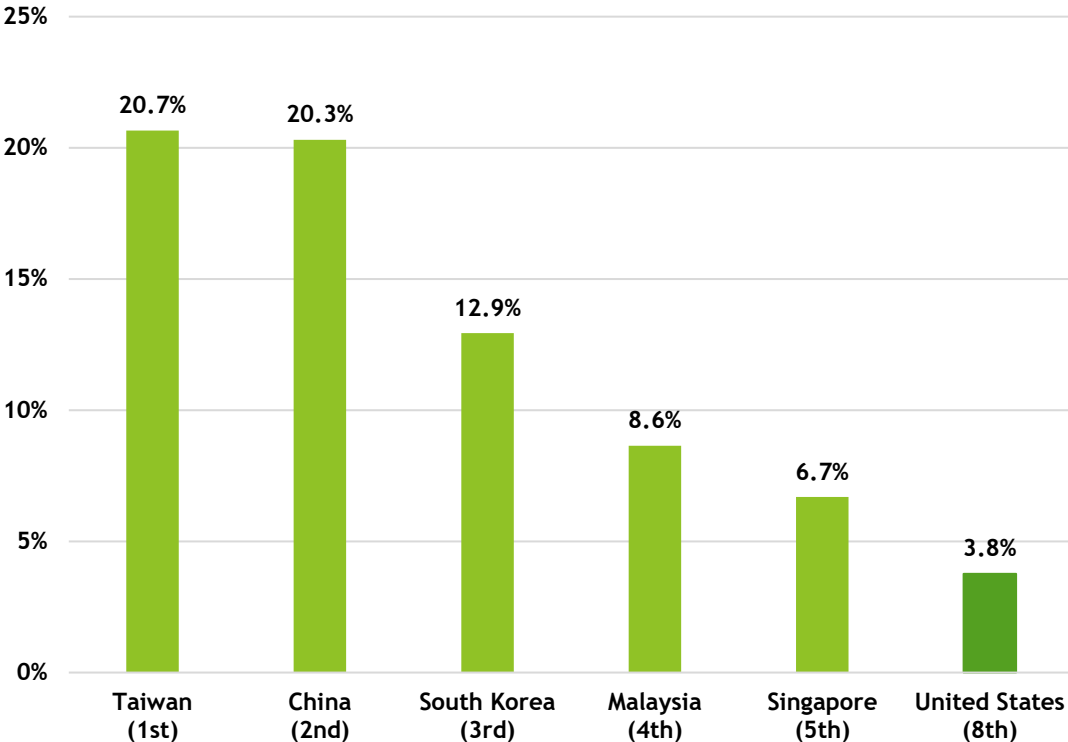


Semiconductor Manufacturing: Export Trends (Domestic Comparison)



Semiconductor Manufacturing: Export Trends (International Comparison)

Share of International Semiconductor Device and Integrated Circuit Exports (HS 8541 & 8542), Top Five Exporters and U.S. 2023



Carbon Pricing

Country/Region	Price per MTCO2e	EITE leakage mitigation
Singapore	25.00 SGD (\$19.20)	Yes
China*	95.96 CNY (\$13.32)	Yes
South Korea	10,355 SKW (\$7.37)	Yes
Taiwan	50 to 300 TWD (\$1.65 to \$9.88)	Yes
United States	N/A	N/A
Malaysia	N/A	N/A

* Only applies to electricity, cement, steel, and aluminum sectors

Semiconductor Manufacturing:

Supply Chains

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Semiconductor and Related Device Manufacturing (IMPLAN Code 296)

Industry	Indirect Impact
Wholesale - Household Appliances and Electrical and Electronic Goods	(\$47,604)
Management of Companies and Enterprises	(\$30,525)
Electric Power Transmission and Distribution	(\$24,592)
Local Government Electric Utilities	(\$14,746)
Wholesale - Other Durable Goods Merchant Wholesalers	(\$10,676)
All Industries	(\$314,252)

Semiconductor Manufacturing:

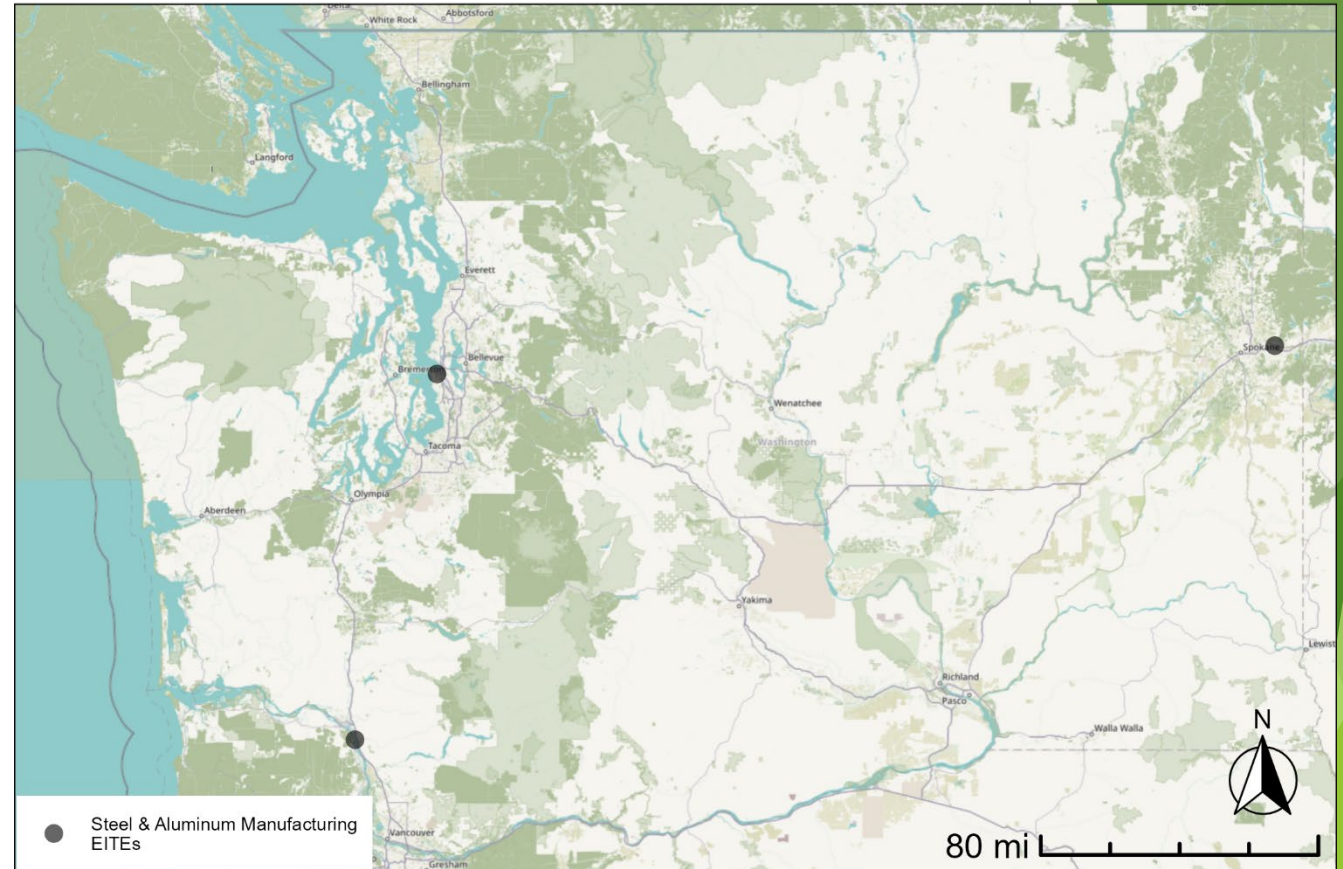
Outlook

- ▶ Analog Devices will potentially receive up to \$105 million from the CHIPS and Science Act to expand its Camas, Washington plant.
- ▶ A study from the Semiconductor Industry Association and Boston Consulting Group indicated that semiconductor manufacturing capacity in the U.S. could potentially triple from its 2022 level by 2032.
- ▶ The industry's global revenue is forecasted to increase from \$600 billion in 2024 to \$1 trillion in 2030.
- ▶ Based on IRS data, profitability within the semiconductor and related device manufacturing industry nationwide stands at 30.9% as of 2021.

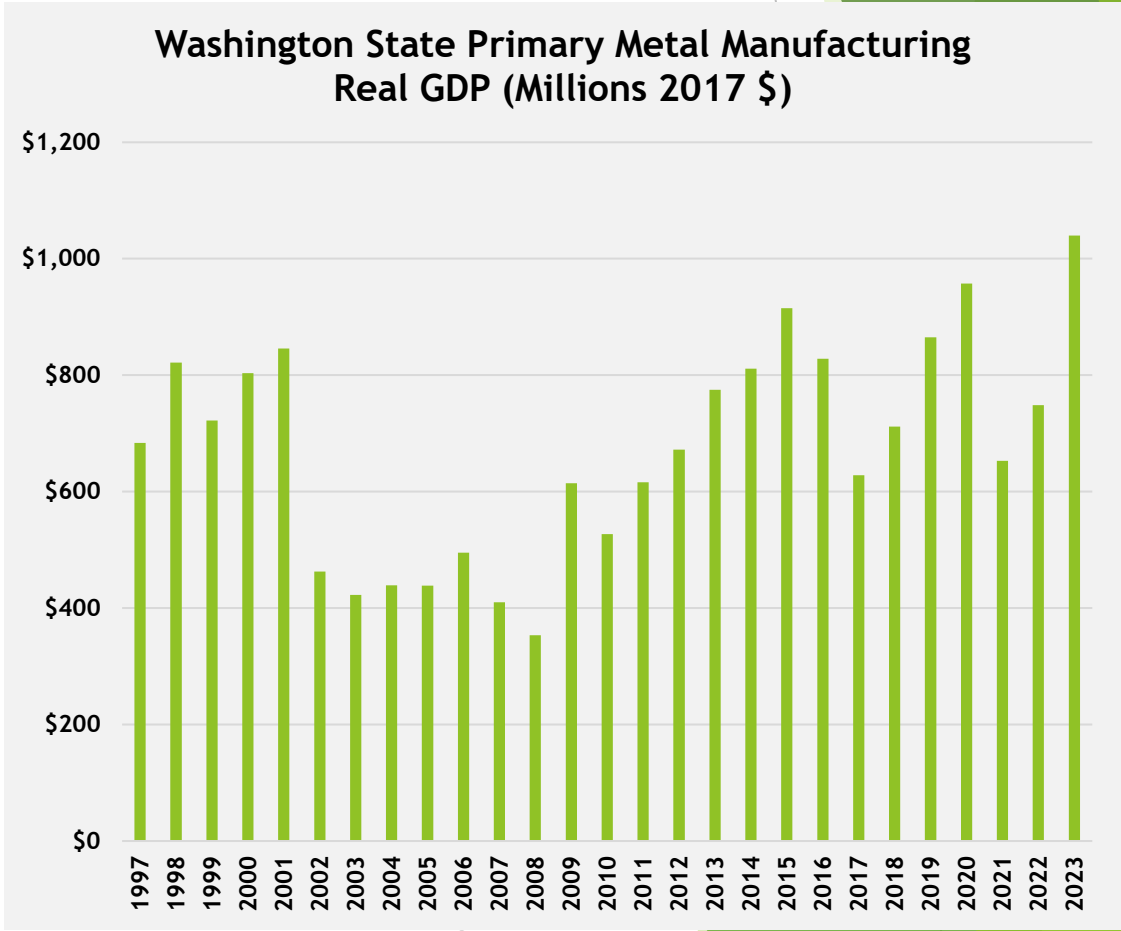
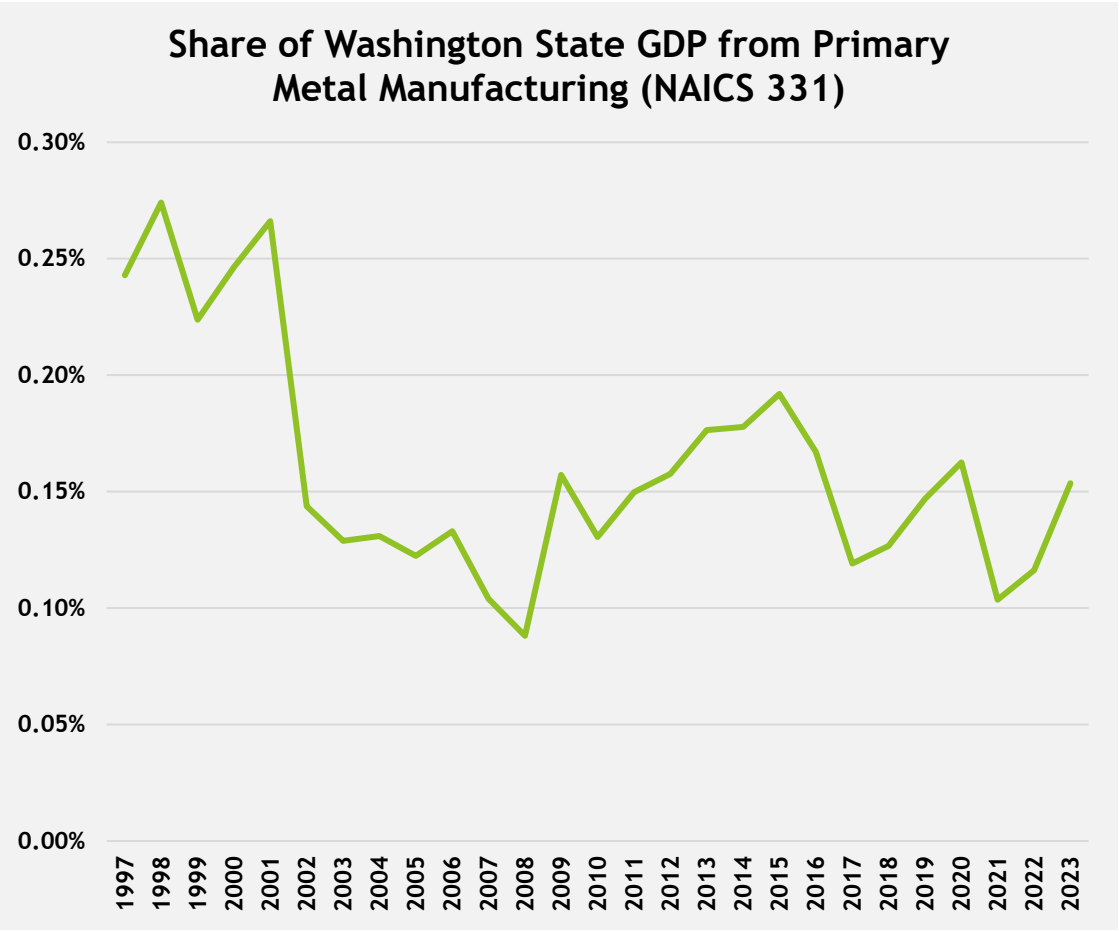
Steel and Aluminum Manufacturing:

EITE Locations

- 3 Steel & Aluminum Manufacturing EITEs
 - 1 in Cowlitz County:
 - Steelscape
 - 1 in King County:
 - Nucor Steel Seattle
 - 1 in Spokane County:
 - Kaiser Aluminum Washington

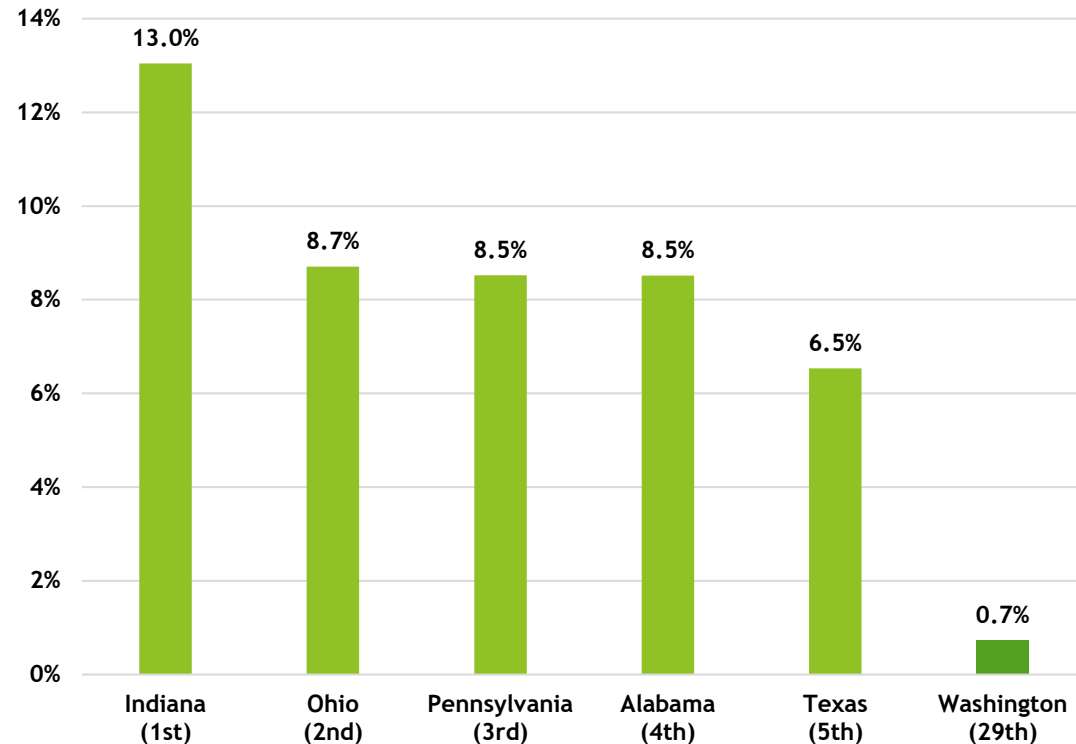


Steel and Aluminum Manufacturing: Gross Domestic Product



Steel and Aluminum Manufacturing: Revenue

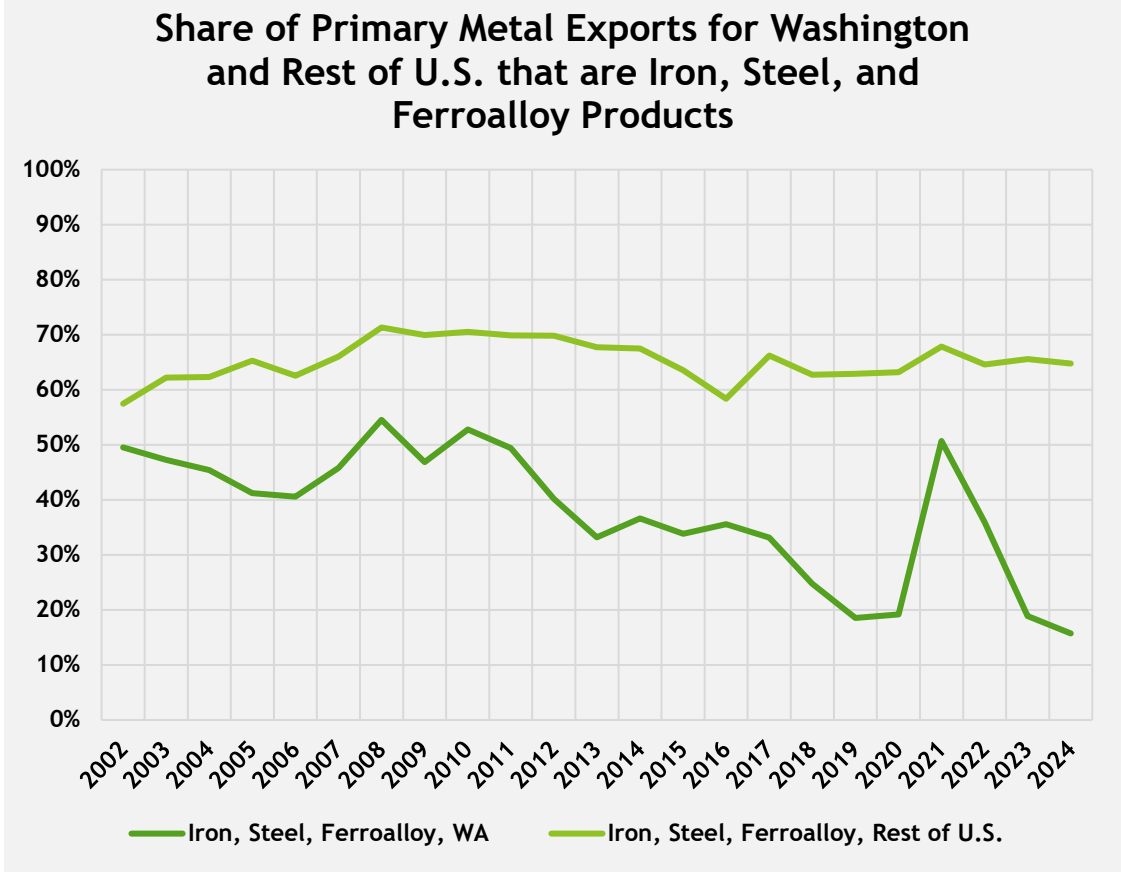
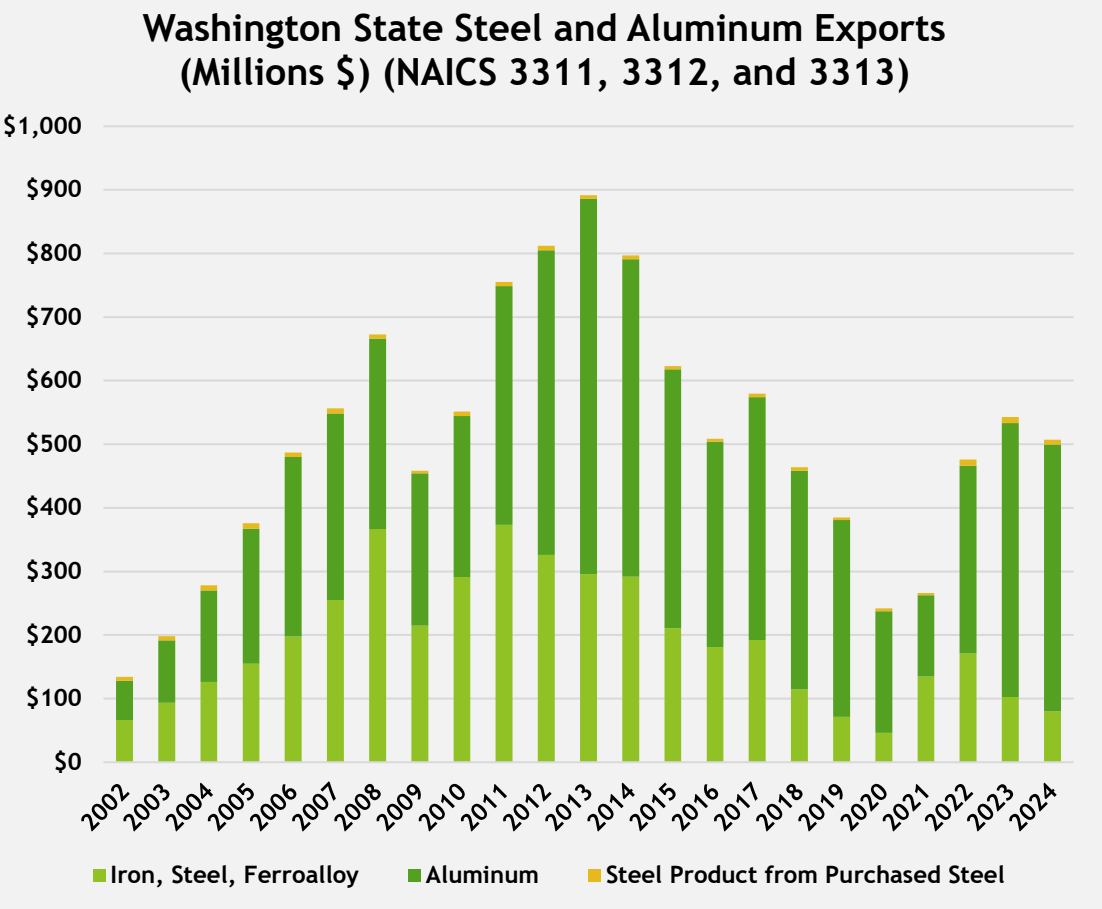
Share of U.S. Primary Metal Manufacturing
Industry Revenue, Top Five States and
Washington 2021 (NAICS 331)



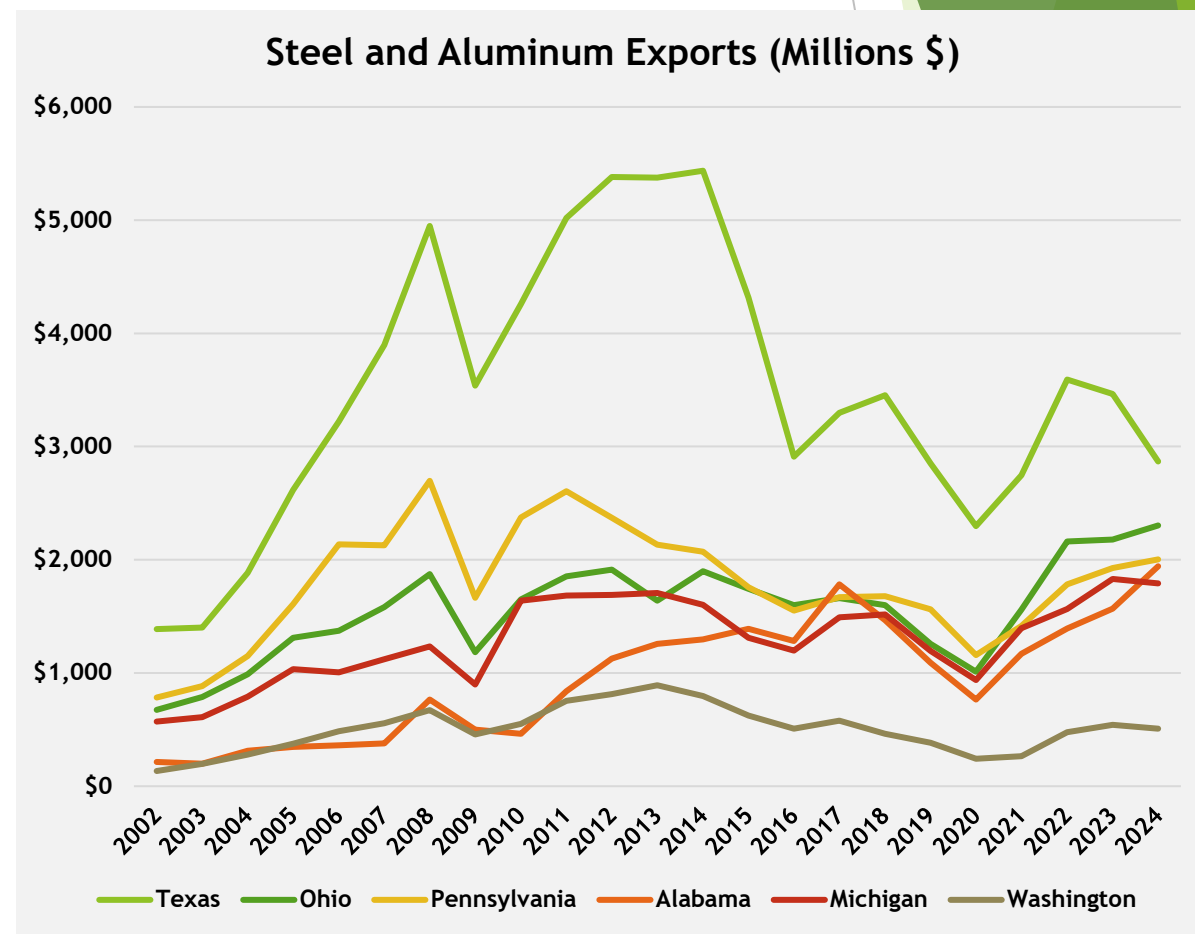
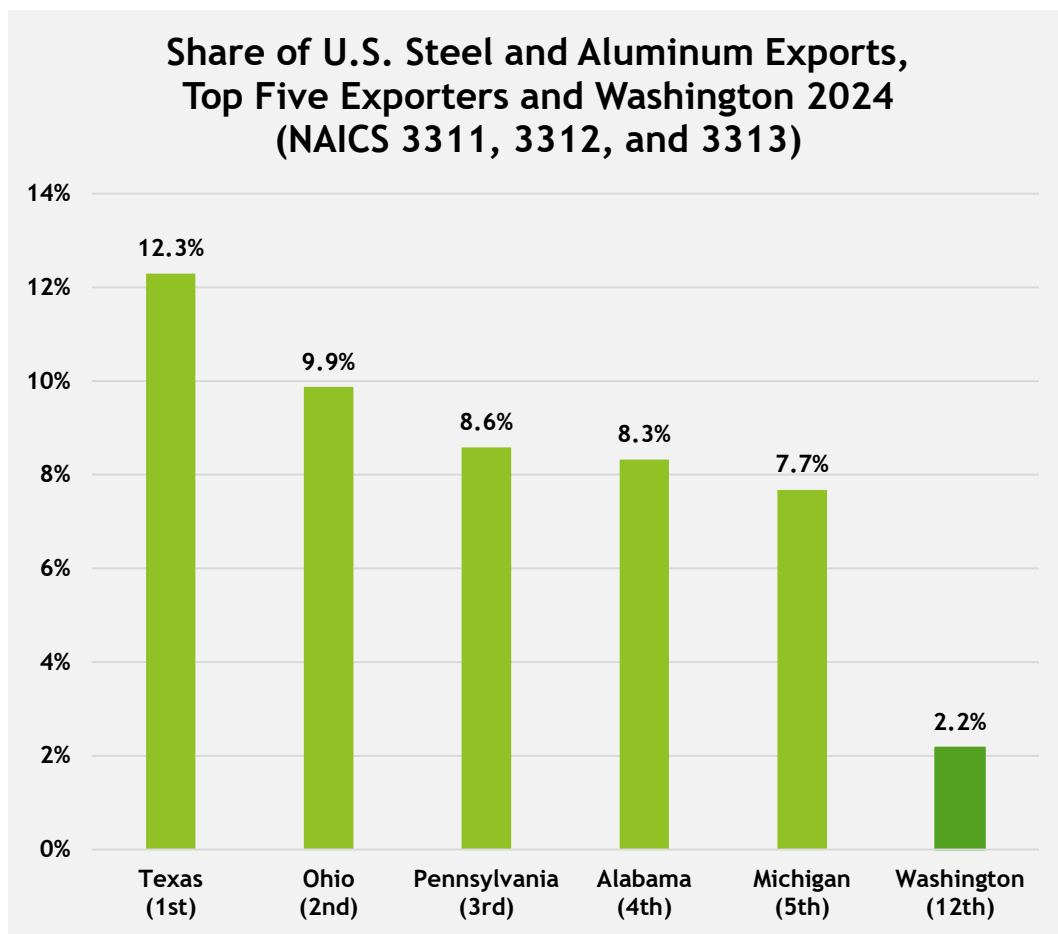
Carbon Pricing

State	Price per MTCO2e	EITE leakage mitigation
Washington	\$50.00	Yes
Indiana	N/A	N/A
Ohio	N/A	N/A
Pennsylvania	N/A	N/A
Alabama	N/A	N/A
Texas	N/A	N/A

Steel and Aluminum Manufacturing: Export Trends (Washington State)

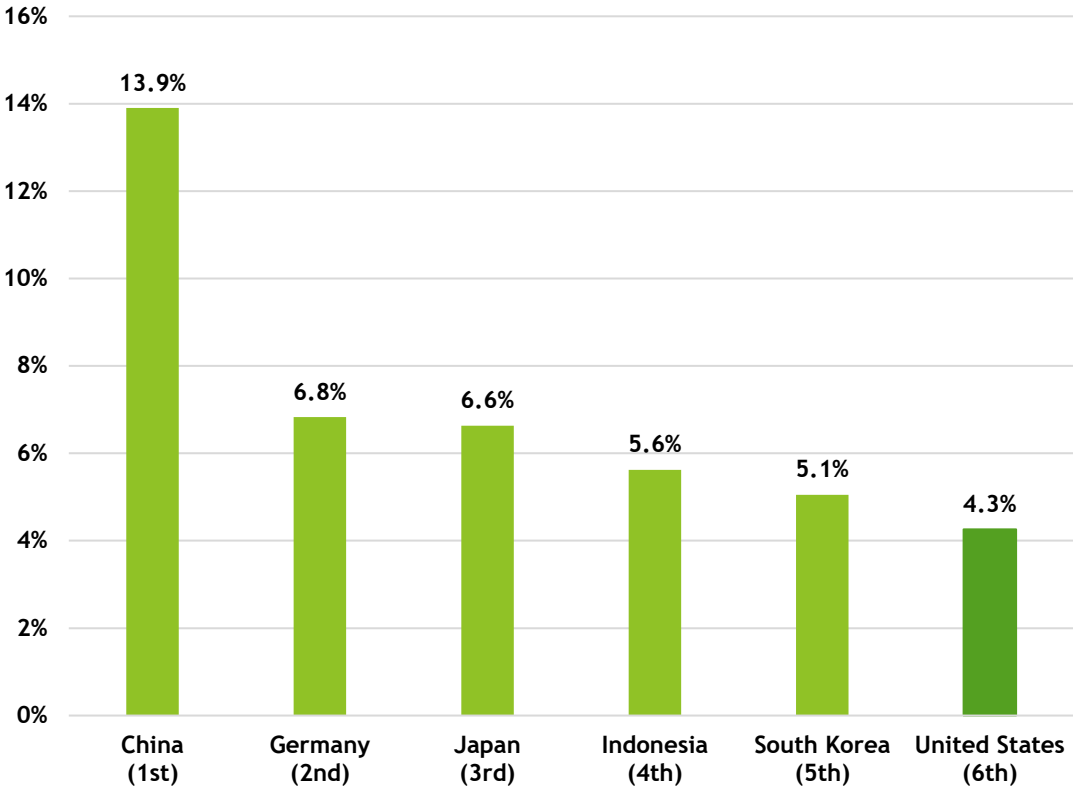


Steel and Aluminum Manufacturing: Export Trends (Domestic Comparison)



Steel and Aluminum Manufacturing: Export Trends (International Comparison)

Share of International Iron and Steel Exports
(HS 72), Top Six Exporters 2023



Carbon Pricing

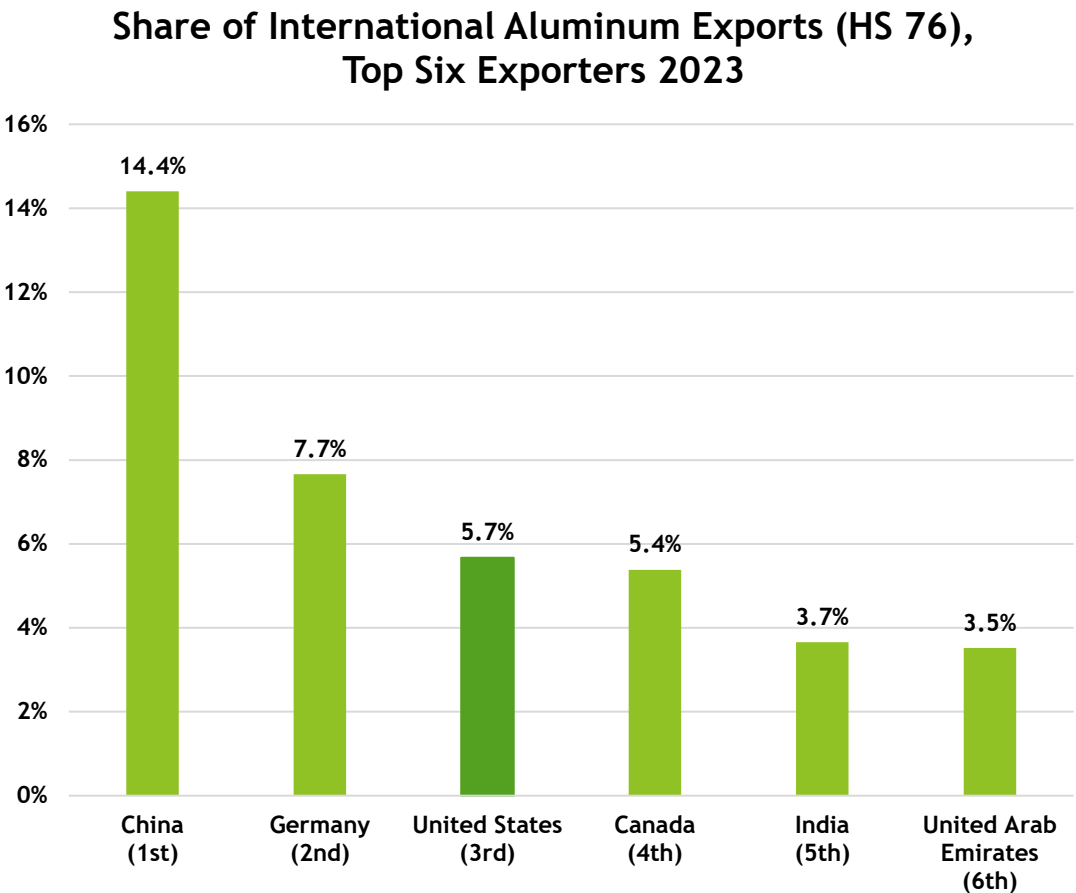
Country/Region	Price per MTCO2e	EITE leakage mitigation
European Union	64.74 EUR (\$72.70)	Yes
Germany	55.00 EUR (\$61.76)	Yes
China*	95.96 CNY (\$13.32)	Yes
South Korea	10,355 SKW (\$7.37)	Yes
Japan	289 JPY (\$1.98)	No
Indonesia**	12,000 IDR (\$0.74)	N/A
United States	N/A	N/A

* Only applies to electricity, cement, steel, and aluminum sectors

** Only applies to electricity sector

Steel and Aluminum Manufacturing:

Export Trends (International Comparison, continued)



Carbon Pricing

Country/Region	Price per MTCO2e	EITE leakage mitigation
European Union	64.74 EUR (\$72.70)	Yes
Canada	95.00 CAD (\$68.23)	Yes
Germany	55.00 EUR (\$61.76)	Yes
Quebec	\$29.27	Yes
China*	95.96 CNY (\$13.32)	Yes
United States	N/A	N/A
India	N/A	N/A
United Arab Emirates	N/A	N/A

* Only applies to electricity, cement, steel, and aluminum sectors

Steel and Aluminum Manufacturing: Supply Chains

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Iron and Steel Mills and Ferroalloy Manufacturing (IMPLAN Code 207)

Industry	Industry Output
Wholesale - Other Durable Goods Merchant Wholesalers	(\$127,452)
Truck Transportation	(\$49,733)
Rail Transportation	(\$22,828)
Rolled Steel Shape Manufacturing	(\$20,960)
Electric Power Transmission and Distribution	(\$15,237)
All Industries	(\$545,684)

Rolled Steel Shape Manufacturing (IMPLAN Code 209)

Industry	Industry Output
Wholesale - Other Durable Goods Merchant Wholesalers	(\$73,072)
Iron and Steel Mills and Ferroalloy Manufacturing	(\$24,906)
Truck Transportation	(\$20,602)
Rail Transportation	(\$9,254)
Insurance Agencies, Brokerages, and Related Activities	(\$9,098)
All Industries	(\$323,979)

Steel and Aluminum Manufacturing:

Supply Chains (continued)

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Aluminum Sheet, Plate, and Foil Manufacturing (IMPLAN Code 213)

Industry	Indirect Impact
Wholesale - Other Durable Goods Merchant Wholesalers	(\$121,076)
Truck Transportation	(\$39,543)
Employment Services	(\$11,306)
Management of Companies and Enterprises	(\$10,030)
Other Real Estate	(\$9,734)
All Industries	(\$389,443)

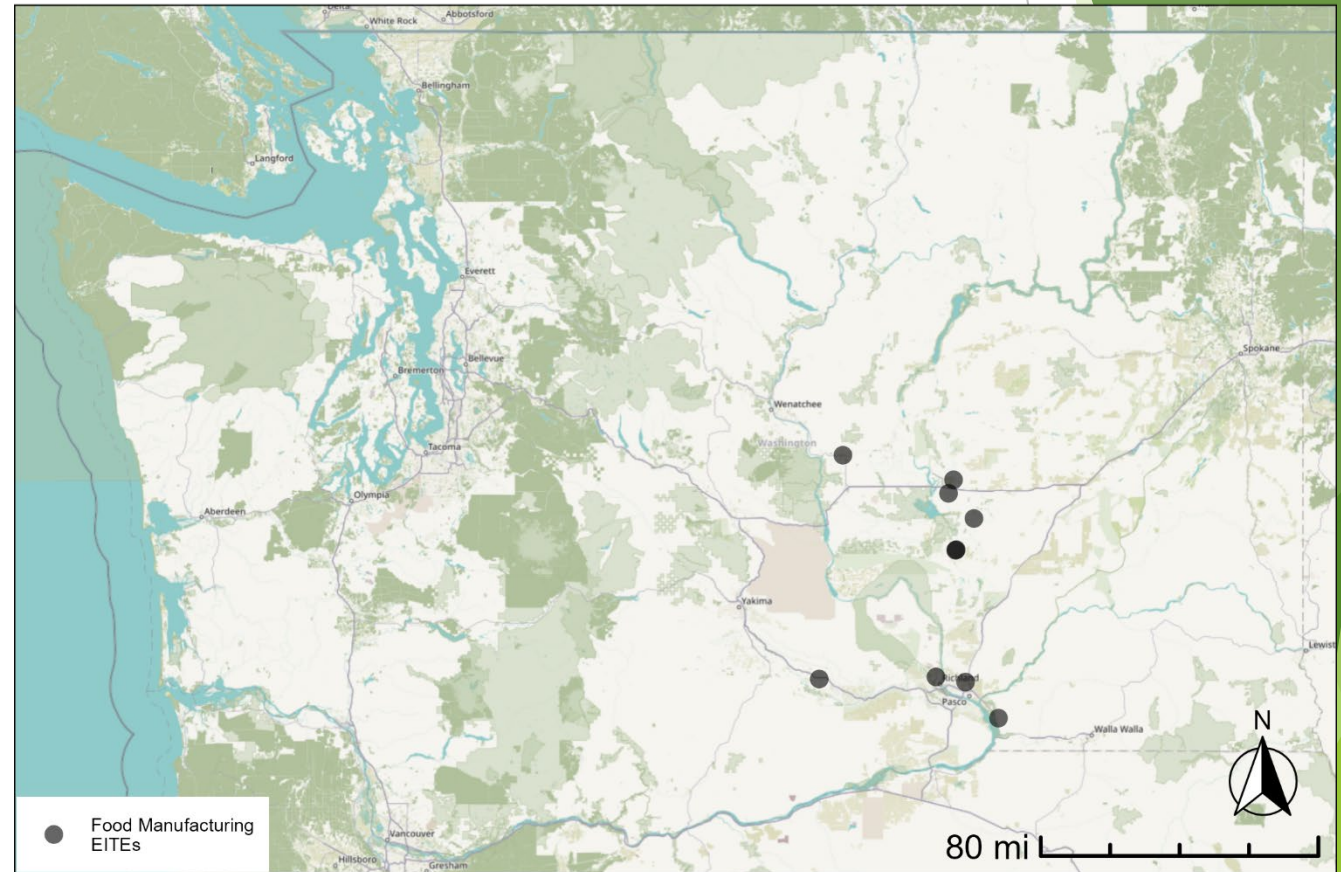
Steel and Aluminum Manufacturing:

Outlook

- ▶ A 2024 report from The Alliance for Innovation and Infrastructure projects that domestic steel jobs and production will remain stable over the next decade.
- ▶ The global steel market was worth \$1.47 trillion in 2024 and is forecasted to grow at a compound annual growth rate of 4.6% from 2025 to 2030.
- ▶ U.S. demand for aluminum is expected to grow over the next decade, with domestic demand being as much as 40% higher in 2035 compared to the average domestic demand from 2020-2024.
- ▶ Global demand for aluminum is forecasted to grow by at a similar rate; a report from the International Aluminum Institute projects that global demand will be nearly 40% higher in 2030 than it was in 2020.
- ▶ Based on IRS data, profitability within the primary metal manufacturing industry nationwide stands at 11.9% as of 2021.

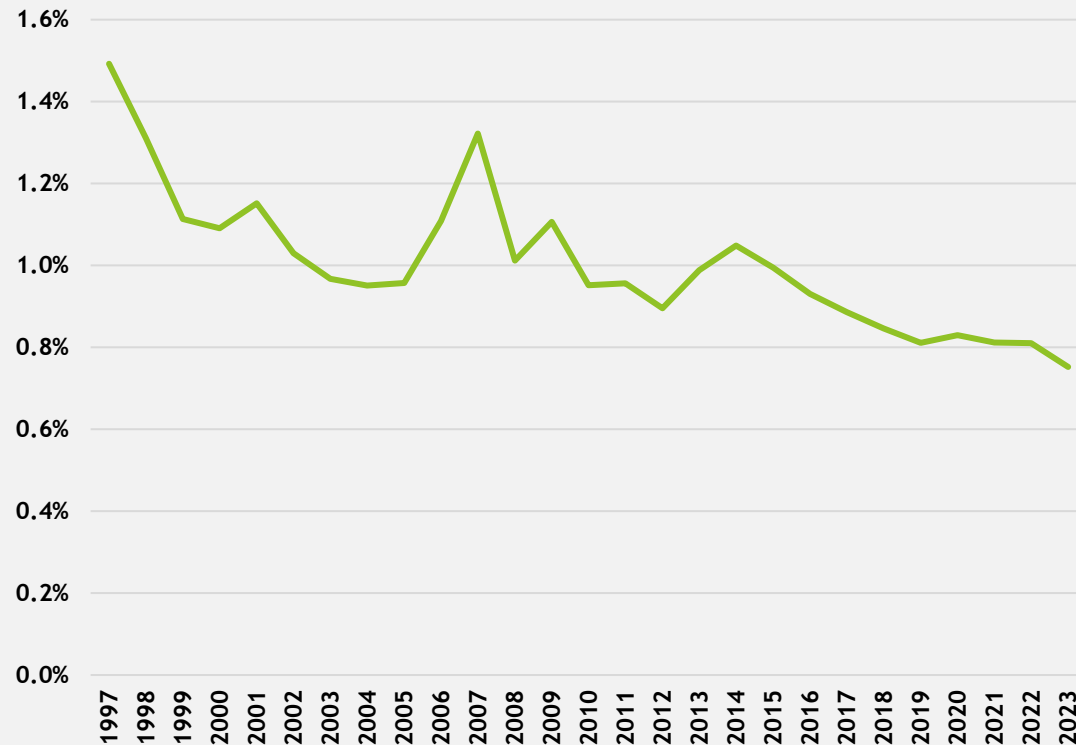
Food Manufacturing: EITE Locations

- 10 Food Manufacturing EITEs
 - 4 in Grant County:
 - Basic American Foods
 - J.R. Simplot Company - Moses Lake
 - Lamb Weston - Quincy
 - Washington Potato Company
 - 2 in Adams County:
 - J.R. Simplot Company - Othello
 - McCain Foods
 - 1 in Benton County:
 - Lamb Weston - Richland
 - 1 in Franklin County:
 - Lamb Weston - Pasco
 - 1 in Walla Walla County:
 - Tyson Fresh Meats
 - 1 in Yakima County
 - Darigold

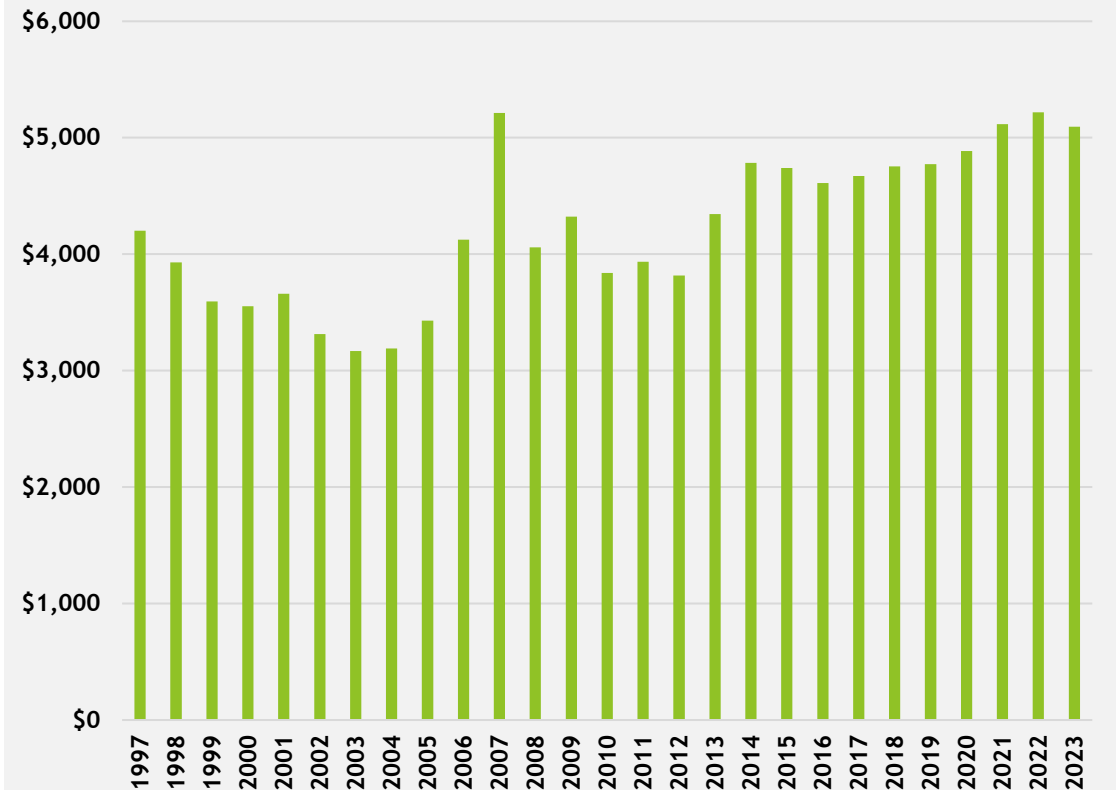


Food Manufacturing: Gross Domestic Product

Share of Washington State GDP from Food, Beverage, and Tobacco Product Manufacturing (NAICS 311 and 312)

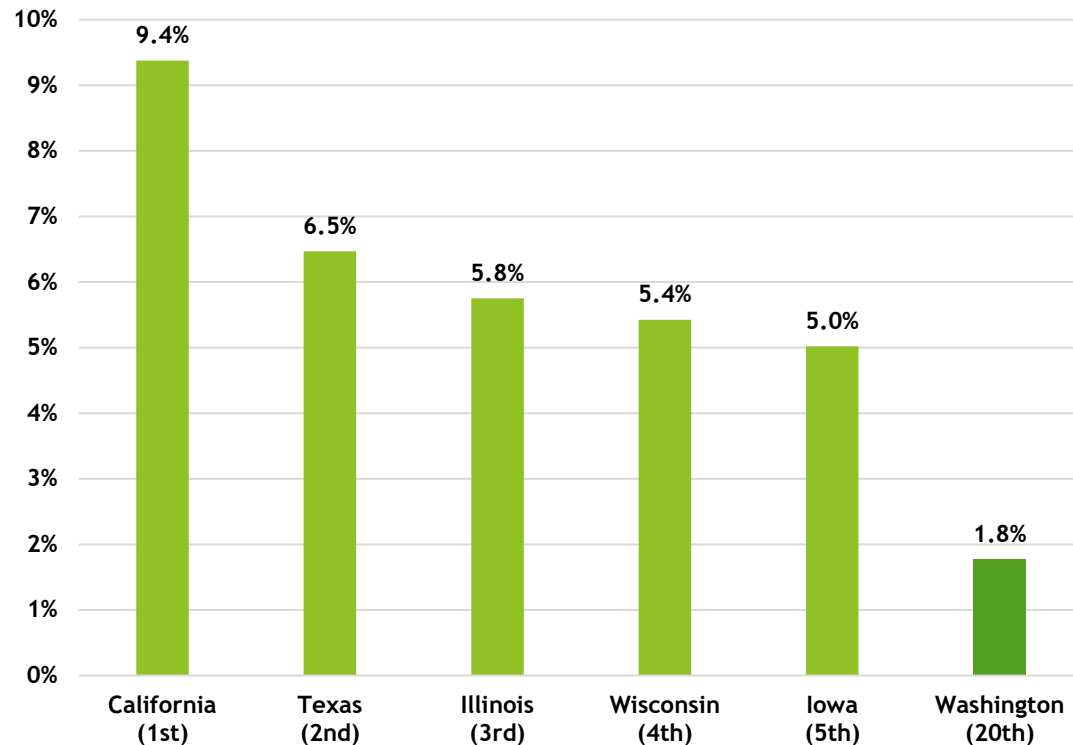


Washington State Food, Beverage, and Tobacco Product Manufacturing Real GDP (Millions 2017 \$)



Food Manufacturing: Revenue

Share of U.S. Food Manufacturing Industry
Revenue, Top Five States and Washington 2021
(NAICS 311)

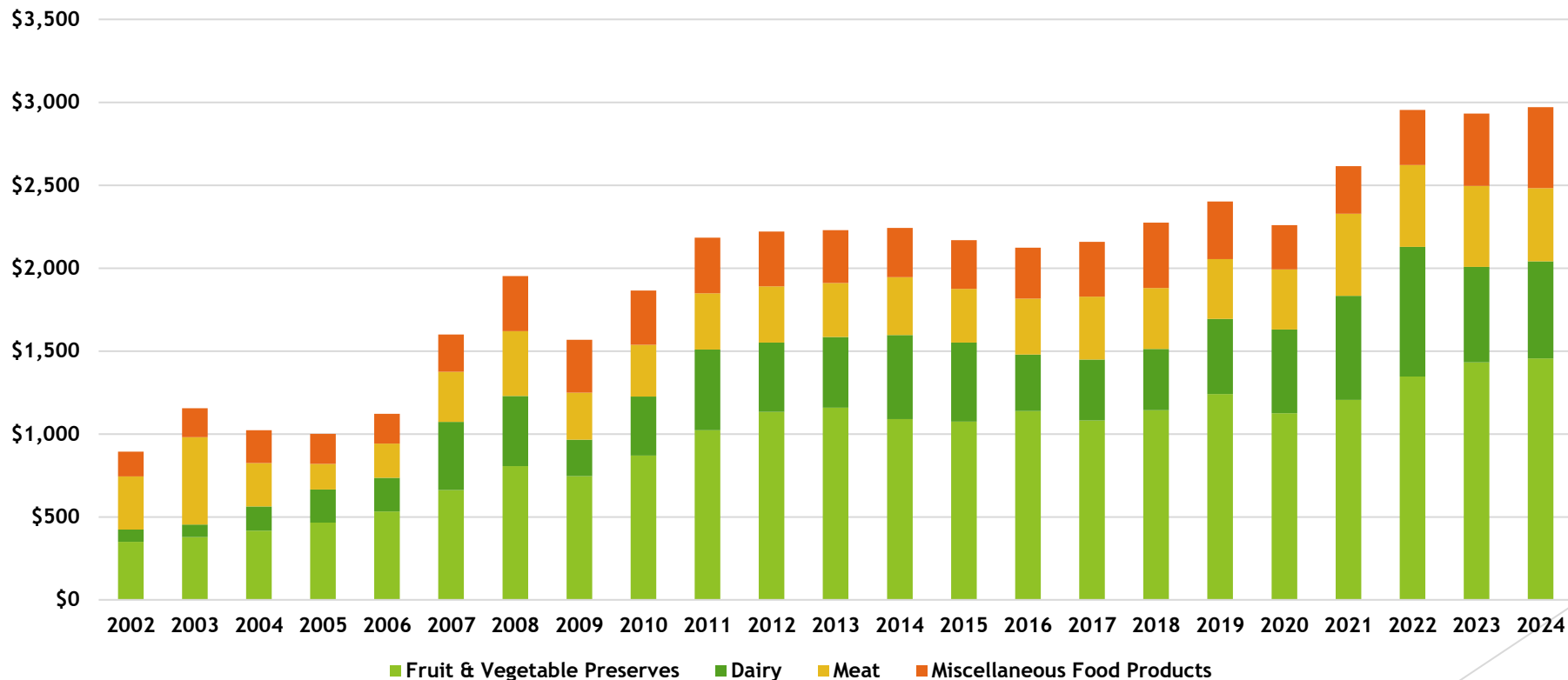


Carbon Pricing

State	Price per MTCO2e	EITE leakage mitigation
Washington	\$50.00	Yes
California	\$29.27	Yes
Texas	N/A	N/A
Illinois	N/A	N/A
Wisconsin	N/A	N/A
Iowa	N/A	N/A

Food Manufacturing: Export Trends (Washington State)

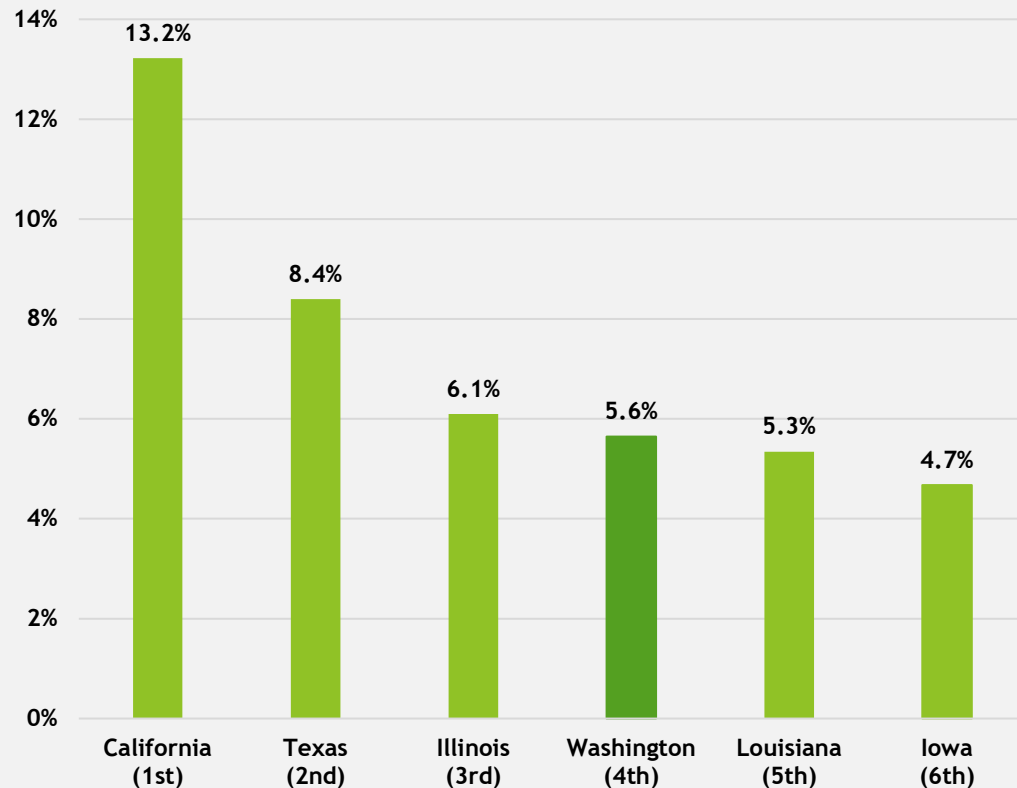
Washington State Food Manufacturing Exports for Select Industries (Millions \$)
(NAICS 3114, 3115, 3116, and 3119)



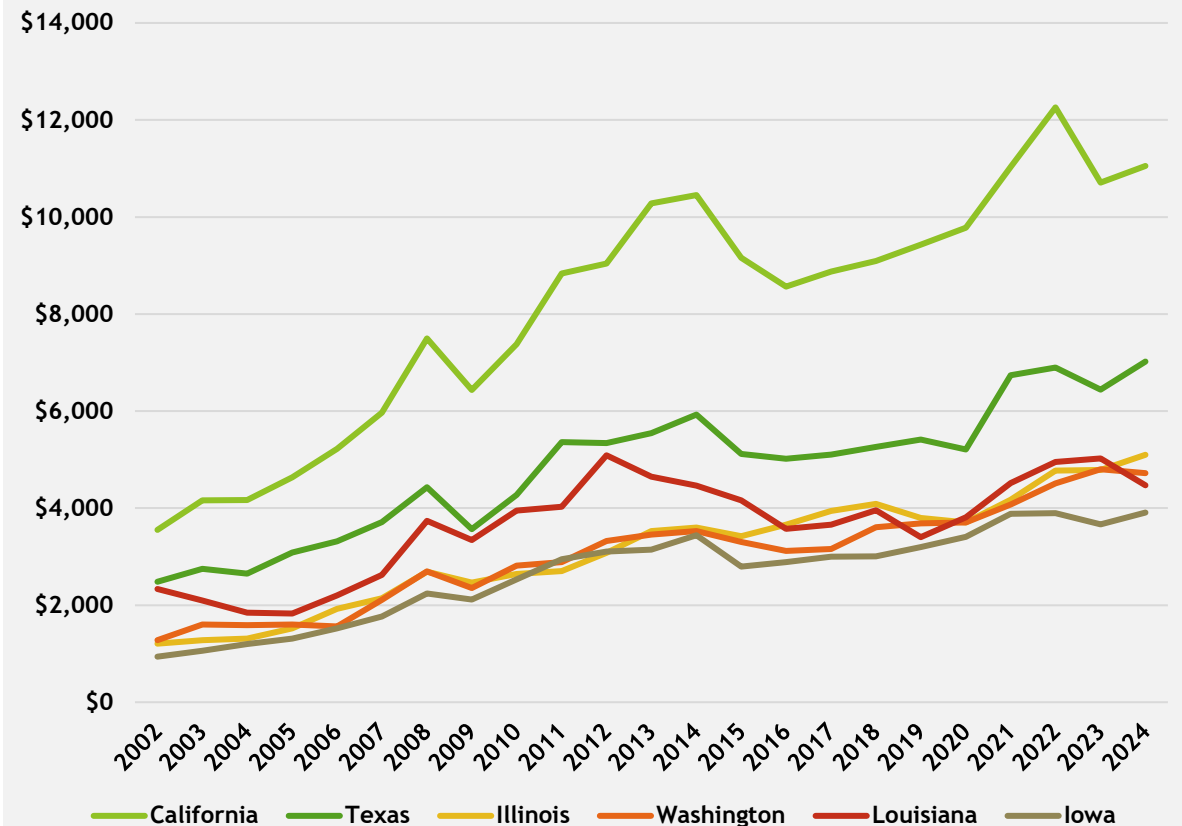
Food Manufacturing:

Export Trends (Domestic Comparison, continued)

Share of U.S. Food Manufacturing Exports,
Top Six Exporters 2024 (NAICS 311)



Food Manufacturing Exports (Millions \$)



Food Manufacturing:

Export Trends (International Comparison)

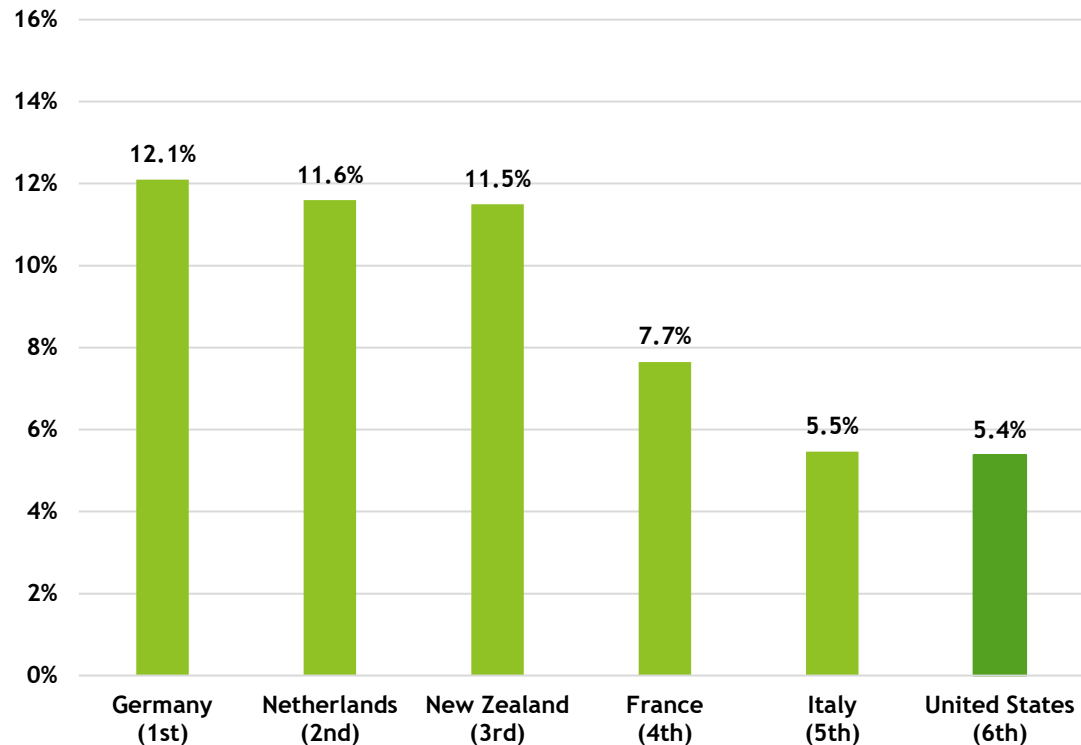


Carbon Pricing		
Country/Region	Price per MTCO2e	EITE leakage mitigation
Netherlands	66.50 EUR (\$74.60)	Only if covered by EU ETS
European Union	64.74 EUR (\$72.70)	Yes
Germany	55.00 EUR (\$61.76)	Yes
Australia	35.25 AUD (\$22.53)	Yes
Spain	15.00 EUR (\$16.83)	Yes
United States	N/A	N/A
Brazil	N/A	N/A

Food Manufacturing:

Export Trends (International Comparison, continued)

Share of International Dairy, Egg, and Other
Animal Product Exports (HS 04),
Top Six Exporters 2023



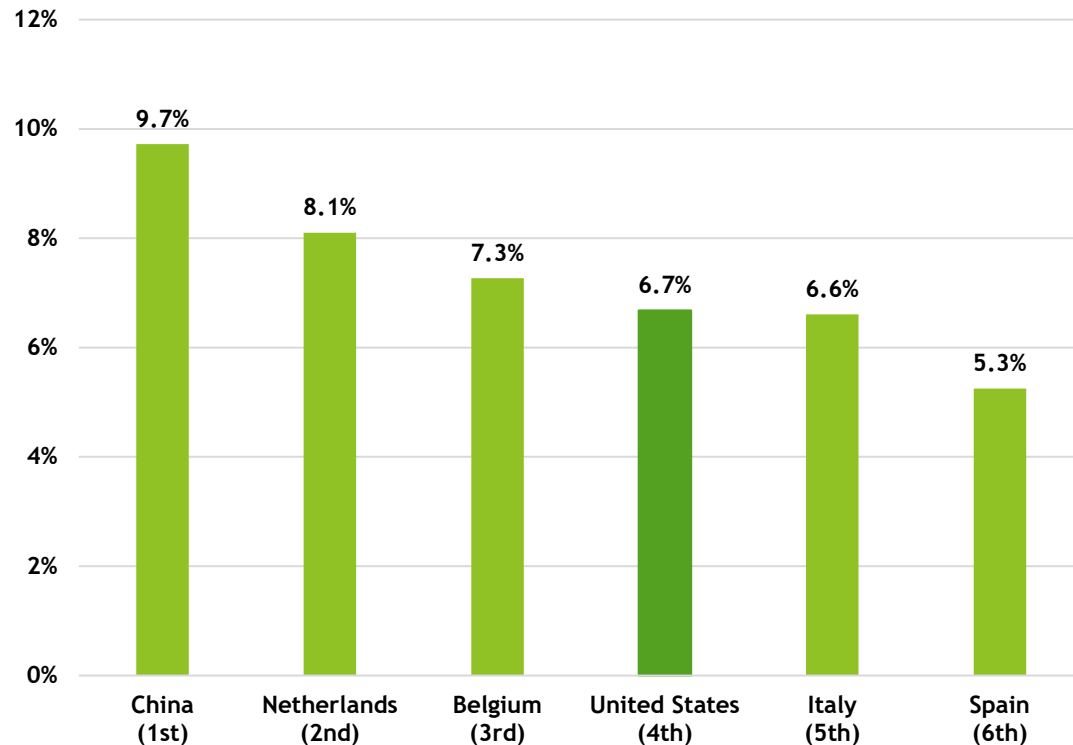
Carbon Pricing

Country/Region	Price per MTCO2e	EITE leakage mitigation
Netherlands	66.50 EUR (\$74.60)	Only if covered by EU ETS
European Union	64.74 EUR (\$72.70)	Yes
Germany	55.00 EUR (\$61.76)	Yes
France	44.60 EUR (\$50.08)	Yes
New Zealand	64.00 NZD (\$37.67)	Yes
Italy	EU ETS only	Yes
United States	N/A	N/A

Food Manufacturing:

Export Trends (International Comparison, continued)

Share of International Prepared Fruit and Vegetable Exports (HS 20), Top Six Exporters 2023



Carbon Pricing

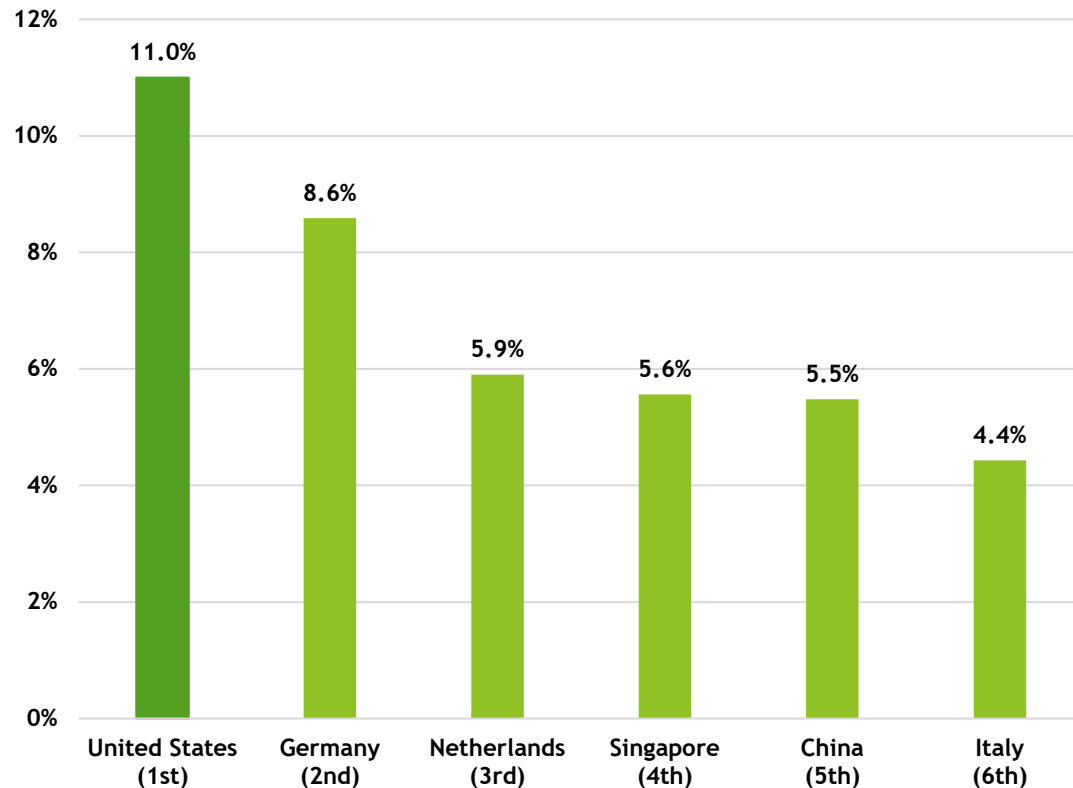
Country/Region	Price per MTCO2e	EITE leakage mitigation
Netherlands	66.50 EUR (\$74.60)	Only if covered by EU ETS
European Union	64.74 EUR (\$72.70)	Yes
Spain	15.00 EUR (\$16.83)	Yes
China*	95.96 CNY (\$13.32)	Yes
Belgium	EU ETS only	Yes
Italy	EU ETS only	Yes
United States	N/A	N/A

* Only applies to electricity, cement, steel, and aluminum sectors

Food Manufacturing:

Export Trends (International Comparison, continued)

Share of International Miscellaneous Food Product Exports (HS 21), Top Six Exporters 2023



Carbon Pricing

Country/Region	Price per MTCO2e	EITE leakage mitigation
Netherlands	66.50 EUR (\$74.60)	Only if covered by EU ETS
European Union	64.74 EUR (\$72.70)	Yes
Germany	55.00 EUR (\$61.76)	Yes
Singapore	25.00 SGD (\$19.20)	Yes
China*	95.96 CNY (\$13.32)	Yes
Italy	EU ETS only	Yes
United States	N/A	N/A

Food Manufacturing: Supply Chains

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Cheese Manufacturing (IMPLAN Code 77)

Industry	Industry Output
Dairy Cattle and Milk Production	(\$316,790)
Wholesale - Grocery and Related Product Wholesalers	(\$85,196)
Truck Transportation	(\$52,237)
Other Animal Food Manufacturing	(\$47,365)
Wholesale - Other Nondurable Goods Merchant Wholesalers	(\$39,681)
All Industries	(\$872,298)

Animal, Except Poultry, Slaughtering (IMPLAN Code 84)

Industry	Industry Output
Beef Cattle Ranching and Farming	(\$570,605)
Truck Transportation	(\$107,320)
Wholesale - Other Nondurable Goods Merchant Wholesalers	(\$66,454)
Animal Production, Except Cattle and Poultry and Eggs	(\$61,028)
Other Animal Food Manufacturing	(\$52,566)
All Industries	(\$1,121,526)

Food Manufacturing:

Supply Chains (continued)

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Frozen Fruits, Juices, and Vegetables Manufacturing (IMPLAN Code 72)

Industry	Industry Output
Wholesale - Grocery and Related Product Wholesalers	(\$103,825)
Vegetable and Melon Farming	(\$66,151)
Wholesale - Other Nondurable Goods Merchant Wholesalers	(\$55,191)
Fruit Farming	(\$50,887)
Management of Companies and Enterprises	(\$50,454)
All Industries	(\$697,285)

Dehydrated Food Products Manufacturing (IMPLAN Code 76)

Industry	Industry Output
Management of Companies and Enterprises	(\$46,994)
Wholesale - Grocery and Related Product Wholesalers	(\$35,430)
Coffee and Tea Manufacturing	(\$12,901)
Truck Transportation	(\$12,843)
Other Real Estate	(\$11,021)
All Industries	(\$328,024)

Food Manufacturing:

Supply Chains (continued)

Impact of \$1 Million Reduction in Output (Top 5 Industries and Total)

Miscellaneous Food Manufacturing (IMPLAN Code 98)

Industry	Indirect Impact
Wholesale - Grocery and Related Product Wholesalers	(\$83,535)
Vegetable and Melon Farming	(\$47,073)
Fruit Farming	(\$46,148)
Management of Companies and Enterprises	(\$37,404)
Truck Transportation	(\$35,768)
All Industries	(\$659,047)

Food Manufacturing:

Outlook

- ▶ The number of jobs in the U.S. food manufacturing industry is projected to increase by 8.0% from 2022 to 2027, compared to a growth rate of 7.1% for jobs in all U.S. sectors over the same period.
- ▶ Based on IRS data, profitability within the food manufacturing industry nationwide stands at 9.1% as of 2021.