

# Economic Impacts of the Refineries in Skagit County

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# Table of Contents

- Executive Summary..... 3
  - About the Authors ..... 3
- Introduction ..... 4
- Petroleum Refining – Direct Impacts ..... 6
- Multiplier effects..... 7
- Employment Impacts in Skagit County ..... 8
- Tax Impacts ..... 8
- Charitable Giving and Other Impacts..... 9
- Authors’ Note..... 9
- Appendices and Notes ..... 10
- Further Notes..... 13

## Executive Summary

With 825 full time workers, and more than 1,000 full time positions if contract workers are included, the refineries in Skagit County account for roughly 2 percent of the total employment in the county. However, the refinery jobs end up supporting between 10 and 14 percent of the jobs in the county, depending on whether you include the contract jobs in the initial count. The refineries also provide several hundred thousand dollars each year in charitable contributions and make a significant contribution to government revenues through a variety of tax payments.

The economic impacts of the refineries are a significant portion of the Skagit economy allowing for a more robust business community than otherwise may exist.

## About the Authors

This report has been prepared by the Center for Economic and Business Research (CEBR) located within the College of Business and Economics at Western Washington University. The Center works in partnership with businesses, government entities and non-profits to bridge the resources of Western students, faculty and staff from throughout the Western Community to create high quality analysis and proposed solutions to challenges. From answering the simple question, creating understandable and thorough analysis documents, creating internships, class projects, to faculty projects we assist in creating an informed path helping business owners and policy shapers make decisions to move forward.

We are always seeking opportunities to bring the strengths of Western Washington University to fruition within our region. If you have a need for analysis work or comments on this report we encourage you to contact us at 360-650-3909. To learn more about CEBR visit us online at <http://cbe.wvu.edu/cebr/>.

## Introduction

An article in the Skagit Valley Herald in September 2014 noted that Skagit lead the U.S. in economic growth in 2013. In examining the data it is apparent that the primary reason for Skagit’s strong performance was the increased value of output from the refineries, inviting questions about the role of the refineries in the local economy.

There were approximately 47,000 jobs in Skagit County in 2013. Table 1 provides a summary of the distribution of those jobs across the major industry sectors.

**Table 1. Employment in Skagit County, by sector, 2013**

<b>Industry Sector</b>	<b>Average Annual Employment</b>	<b>Percent of Total</b>
Agriculture	2,744	5.8
Construction	2,690	5.7
Manufacturing	5,546	11.7
Wholesale Trade	1,224	2.6
Retail Trade	6,655	14.1
Transportation & Warehousing	1,171	2.5
Information	318	0.7
Finance & Insurance	1,524	3.2
Professional & Technical Services	1,309	2.8
Health Care & Social Assistance	4,368	9.2
Food Service & Accommodations	3,933	8.3
Government	10,856	23.0
All Other	4,934	10

Source: Washington State Dept. of Employment Security “QCEW” data -

<https://fortress.wa.gov/esd/employmentdata/reports-publications>

The manufacturing, retail trade, and government sectors are clearly very important in Skagit County. It is important to note that within employment data, the government category includes nearly all tribal employment – from tribal government to employees of companies based on tribal land. That issue notwithstanding, the jobs in just those three sectors account for half of the jobs in the county. However, when thinking about the role of different jobs or sectors, it is also important to consider the wages paid. Almost 10 percent of the jobs in the county are in the Health Care & Social Assistance sector. But those jobs, on average, pay less than the county average – reducing the overall influence of the jobs in that sector. Similarly, the retail jobs pay less than the overall average and don’t look quite as statistically impactful when looking at salary rather than the number of jobs.

Table 2 details the average wage paid for jobs by sector, as well as the percent of total wages paid in the county – by sector, in 2013. (Data for 2014 are not available at this time.)

**Table 2. Wages in Skagit County, by sector, 2013**

<b>Industry Sector</b>	<b>Average Annual Wage</b>	<b>Percent of Total</b>
Agriculture	\$32,485	4.7
Construction	57,237	8.1
Manufacturing	58,398	17.1
Wholesale Trade	50,965	3.3
Retail Trade	28,437	10.0
Transportation & Warehousing	42,480	2.6
Information	39,094	0.7
Finance & Insurance	52,039	4.2
Professional & Technical Services	53,254	3.7
Health Care & Social Assistance	33,746	7.8
Food Service & Accommodations	16,655	3.5
Government	46,073	26.4
Overall	40,060	

Source: Washington State Dept. of Employment Security “QCEW” data -

<https://fortress.wa.gov/esd/employmentdata/reports-publications>

The manufacturing sector stands out as significant in terms of the number of jobs, as well as the percent of total wages paid in the county. Government also stands out, but the wages are typically higher in the manufacturing sector and the percent of total wages paid relative to the share of total jobs is higher in manufacturing than government. Again, it is critical to recall that the government sector reported includes all tribal business related positions which impacts the average salary within the sector.

In this report we focus on petroleum refining, a subsector within manufacturing. These jobs have some of the highest wages of all jobs within the county and perhaps the largest multiplier effect of all jobs in the county. As such, they are very important in terms of supporting the overall economy in the area.

## Petroleum Refining – Direct Impacts

According to Washington State Department of Employment Security, the refineries in Skagit County reported an average annual employment in 2013 of 825 workers. The refineries directly report 828 full-time equivalent workers at the end of 2014, as well as another 368 contract workers who effectively work full-time at the refineries. These numbers do not include the additional contract workers who are often at the refineries for specific, limited-term projects. These numbers suggest that at least 15-20 percent of the manufacturing jobs in Skagit County are located at the refineries, where the higher estimate includes the full-time contractor workers.

It is important to note that the refineries report a lower average wage than the figure provided by the Department of Employment Security. State data show an average annual wage of \$126,634 for workers in the Petroleum and Coal Products Manufacturing sector in 2013. This figure could be influenced by a

variety of payments tracked by the State, including overtime. The refineries indicate that the average wage is closer to \$104,000.<sup>1</sup>

These figures suggest that the refineries account for roughly 2 percent of the jobs in Skagit County, and pay 5-6 percent of all the wages. These direct effects are significant when you consider there are only two firms in this sector. Moreover, the indirect and induced effects are also substantial.

## Multiplier effects

The jobs in a given business, or in a given industry sector to be more precise, support jobs in other sectors through business-to-business activities and through spending by the employee on personal items. In economic impact analysis, the task is often to determine the impact of adding or subtracting jobs at a given business. The jobs being added or taken away are referred to as a change in the direct jobs. These are the jobs directly tied to a particular business or sector. They can also be viewed as the jobs directly affected by a given event. The related impacts that arise due to changes in business activities are called the indirect effects, and those that arise due to changes in household spending are called the induced effects.

The relationship between the direct effects and the indirect and induced effects is often described in terms of multiplier effects. That is, the total change (direct, indirect, and induced combined) is a multiple of the direct change.

It can be important to note that the multiplier effects for a given change depend on the sector in which the change occurs, the geographic location, and when the change occurs. The multiplier effects differ depending on whether a job is added or taken away from a clothing store rather than an engineering firm or business in another sector because the firms in different industry sectors interact differently with the firms in other industry sectors. Moreover, the level of pay varies across firms or sectors. In addition, the interactions between businesses and the patterns in household spending change over time. As such, it doesn't make sense to talk about multipliers without specifying the industry sector and time when the data behind the multiplier were collected.

It is also worth noting that there are different multipliers for different measures of economic activity. It does not make sense to talk about the multiplier for, say, petroleum refining. There is a multiplier for changes in employment; a different multiplier for change in income; and a different multiplier for changes in output. To be sure, the different multipliers are all related. You can describe an event in terms of changes in employment, income, and/or output. The point here is simply to highlight the fact that there is not a single multiplier or single way of describing the ripple effects associated with a given event, despite media and promotional coverage. Nor is there always agreement on what the multiplier effects really are, even if you focus on a particular industry and multiplier type.

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<sup>1</sup> The Washington Research Council conducted a survey of refiners and reports an average salary of \$121,114. <http://researchcouncil.org/2014/12/26/new-wrc-report-the-economic-contribution-of-washington-states-petroleum-refining-industry-in-2013/>

Not surprisingly, there's a tendency for advocates to hope for the largest possible multiplier. For example, economic development specialists might want a large multiplier to make a particular project look attractive - noting that job creation offers political appeal, so a large employment multiplier can help make a project attractive. Similarly, an industry trade group may want a large employment or income multiplier for the industry they support to show the importance of the industry to a community or region. Part of our job at CEBR and in this report is to provide as plausible an estimate as possible for the relevant multipliers.

CEBR generally relies on two different sources for identifying multipliers: The revised Washington State Input-Output Model and IMPLAN. Using the revised Washington State Input-Output Model, we estimate an employment multiplier of 6.70 for petroleum refining in Washington State. The IMPLAN software package gives an employment multiplier of 8.08 for Washington. The Washington State I-O model gives an employment multiplier of 5.7 for Skagit County and the IMPLAN model gives an employment multiplier of 3.87 for Skagit County. The multipliers are larger for the state than for the county because so many more impacts are captured if you broaden the study area to the state rather than limiting it to the county.

## Employment Impacts in Skagit County

As noted, we estimate the employment multiplier for petroleum refining to be between 3.87 and 5.7 in Skagit County. The smaller estimate comes from the IMPLAN model and the larger estimate from the revised Washington State I-O model.

These multipliers suggest that the refineries in Skagit County could support as many as 6,400 jobs in Skagit County, or 14 percent of all the jobs in the County. If we use the multiplier from IMPLAN, a total impact of 4,700 jobs, or 10 percent of all the jobs in the County is suggested.

Looking past the boundaries of Skagit County and using the employment multiplier for the state, we estimate that the two refineries in Skagit County support 7,500 jobs in the state (1,128 direct jobs \* 6.7). We imagine most of those jobs would be in Skagit County and the immediate area. Skagit County, along with the northern parts of Snohomish County and Island County, may be a more meaningful economic area than Skagit County by itself.

## Tax Impacts

The IMPLAN software suggests that the two refineries pay the following in local and state taxes:

- \$902,000 related to employee compensation
- \$67 million business taxes (including property tax)

The model also suggests that the employees at the refineries pay an additional \$1.2 million in income, motor vehicle, and other household taxes.



## Charitable Giving and Other Impacts

The refineries in Skagit County actively support a variety of nonprofits in the area and partner with various organizations in ways that help everyone in the county.

Rough estimates from United Way and others suggest that the refineries provide more than \$350,000 per year in charitable contributions. They are also active in the community supporting efforts such as Leadership Skagit and the Economic Development Association of Skagit County (EDASC).

## Authors' Note

No attempt was made in the study to consider certain benefits, including health care and the opportunity for overtime pay, or costs, such as the risks or hazards inherent to moving and refining oil products. The study is not a comprehensive study that examines the net benefits of refinery operations, but rather a simple impact assessment that shows the employment, income, and other impacts in the county that can be attributed to the refineries.

## Appendices and Notes

We used the Revised Washington State Input-Output Model to create three broad categories of multipliers: output, labor income and employment. Table A-1 contains these multipliers for each industry as well as the average across industries - a simple average, not weighted by output. Each of these categories of multipliers reports estimates of total activity in Skagit County per unit of direct activity. For example, within the crop production sector, total sales of all industries in Skagit County are estimated to be \$1.703 per \$1 of direct output. It is estimated that 1.45 total jobs in Skagit County are created for each direct job in Crop Production, and it is estimated that \$1.56 in labor income is created per dollar of direct income in the crop production sector.

One of the reasons why input-output models are so widely used is because of their ability to capture different multiplier relationships for sectors. The linkage structure of sectors, as well as their magnitude of direct labor income influence these values. Sectors with relatively low labor income per worker have relatively low income multipliers. Sectors with weak linkages to other sectors in the local economy have low output multipliers. Sectors high wages have high employment multipliers, as the spending of this income translates in these models into high levels of consumption expenditures through the induced-effects channel of impacts. There is no easy way to sort-out the reasons why values for a particular sector are high or low on a particular multiplier measure.

**Table A-1. Multipliers for Skagit County (based on Washington State I-O model)**

Sector	Output Multiplier	Employment Multiplier	Income Multiplier
1. Crop Production	1.703	1.405	1.564
2. Animal Production	1.981	1.881	1.874
3. Forestry and Logging	1.819	2.559	2.186
4. Fishing, Hunting, and Trapping	1.748	2.321	1.581
5. Mining	1.703	1.848	1.906
6. Electric Utilities	1.743	3.546	1.686
7. Gas Utilities	1.318	4.533	2.796
8. Other Utilities	1.779	2.073	1.739
9. Highway, Street, and Bridge Construction	1.687	2.346	1.770
10. Other Construction	1.692	2.132	1.848

11. Food, Beverage and Tobacco Manufacturing	1.571	2.774	2.647
12. Textiles and Apparel Mills	1.545	1.727	1.867
13. Wood Product Manufacturing	1.942	2.580	2.510
14. Paper Manufacturing	1.501	2.914	2.023
15. Printing and Related Activities	1.565	1.638	1.584
16. Petroleum and Coal Products Manufacturing	1.098	5.701	2.373
17. Chemical Manufacturing	1.432	2.426	1.551
18. Nonmetallic Mineral Products Manufacturing	1.414	1.945	1.775
19. Primary Metal Manufacturing	1.545	2.904	2.341
20. Fabricated Metals Manufacturing	1.530	1.865	1.741
21. Machinery Manufacturing	1.550	2.472	2.091
22. Computer and Electronic Product Manufacturing	1.512	2.506	1.804
23. Electrical Equipment Manufacturing	1.409	2.207	1.803
24. Aircraft and Parts Manufacturing	1.275	2.114	1.422
25. Ship and Boat Building	1.609	2.279	1.655
26. Other Transportation Equipment Manufacturing	1.338	2.117	1.893
27. Furniture Product Manufacturing	1.586	1.646	1.656
28. Other Manufacturing	1.575	1.863	1.808
29. Wholesale	1.488	1.789	1.493
30. Non-Store Retail	1.516	1.416	1.605
31 Other Retail	1.563	1.342	1.437
32. Air Transportation	1.492	2.217	1.689
33. Water Transportation	1.671	2.523	1.851
34. Truck Transportation	1.778	1.745	1.660
35. Other Transportation/Postal Offices	1.873	1.776	1.522

36. Support Activities for Storage, Transportation and Warehousing	1.848	2.111	1.770
	1.458	2.948	1.509
37. Software Publishers & Data Processing & related services	1.448	2.497	1.865
38. Telecommunications	1.531	1.755	1.398
39. Other Information	1.836	3.375	2.279
40. Credit Intermediation and Related Activities	2.084	2.242	1.991
41. Other Finance and Insurance	1.347	1.226	1.548
42. Real Estate and Rental and Leasing	1.865	1.605	1.350
43. Legal /Accounting and Bookkeeping /Management Services	1.677	1.750	1.415
44. Architectural, Engineering, and Computing Services	1.905	1.436	1.761
45. Educational Services	1.980	1.934	1.643
46. Ambulatory Health Care Services	1.761	1.994	1.640
47. Hospitals	1.821	1.348	1.547
48. Nursing and Residential Care Facilities, Social Assistance	1.775	1.453	1.742
49. Arts, Recreation, and Accommodation	1.774	1.310	1.669
50. Food Services and Drinking Places	1.753	1.280	1.351
51. Administrative/Employment Support Services	1.839	1.629	1.752
52. Waste Management/Other, and Agriculture Services	1.639	2.174	1.788
Average			

## References

Miller, Ronald E. & Blair, Peter D. (2009) Input-Output Analysis. Foundations and Extensions. Cambridge: Cambridge University Press. Chapter 8.2, Location Quotients and Related Techniques, pp. 349-359.

Washington State Office of Financial Management

## Further Notes

The Washington Research Council released a report in December 2014 titled “The Economic Contribution of Washington State’s Petroleum Refining Industry in 2013”.<sup>2</sup> That report is an update of previous reports on the impacts of petroleum refining. The report offers that the employment multiplier for petroleum refining in Washington is 12.88. That claim suggests that adding one job at a petroleum refinery in Washington would support an additional 11.88 other jobs in the state. In comparison, a report prepared for the Western States Petroleum Association (WSPA) in 2011 showed an employment multiplier for the sector of 2.51 in the State of California.<sup>3</sup> That is, adding a job at a refinery in California would support an additional 1.51 jobs in the state.

While we would expect the employment multipliers for a change in employment in one state to differ from the employment multiplier for a similar change in a different state, we would not expect the addition, or subtraction, of jobs in the petroleum industry to be so dramatically different in two western states - even noting the focus on petroleum refining in the report for Washington and a much broader definition of the petroleum industry in the report for California.

We note that the Washington Research Council used the Regional Economic Models, Inc. (REMI) software to estimate the impacts of petroleum refining in Washington State. The REMI software is not a basic input-output (I-O) model like the Washington State model or IMPLAN. It considers more linkages and interactions. Some of the interactions that can be considered in the REMI model may or may not be appropriate when analyzing the employment impacts of jobs in very capital intensive like computer chip manufacturing or petroleum refining. For example, adding a few jobs at a refinery suggests large increases in capital expenditures that can trigger in the model a need for more employment in the public sector and perhaps more housing than is reasonable to expect – and therefore higher employment multipliers than are truly meaningful.

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<sup>2</sup> <http://researchcouncil.org/2014/12/26/new-wrc-report-the-economic-contribution-of-washington-states-petroleum-refining-industry-in-2013/>

<sup>3</sup>

<https://www.wspa.org/sites/default/files/uploads/documents/Industry%20Issues/Purvin%20%26%20Gertz%20Economic%20Impacts%20FINAL.pdf>