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State of Washington

Small Business Economic Impact Statement

Chapter 173-485 WAC
Petroleum Refinery Greenhouse Gas Emission Requirements

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Note: Due to size limitations relating to the filing of documents with the Code Reviser, the SBEIS does not contain full explanation of Ecology's analysis. Additionally, it does not contain raw data or all summaries of data used in the analysis, or all of Ecology's analysis of this data. However, this information is being placed in the rule-making file, and is available upon request for the rule file. A full analysis of compliance costs is available in the associated Cost-Benefit Analysis for this rule: https://fortress.wa.gov/ecy/publications/SummaryPages/1302033.html

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Executive Summary

Based on research and analysis required by the Regulatory Fairness Act – RCW 19.85.070 – Ecology has determined that the proposed rule, Petroleum Refinery Greenhouse Gas Emission Requirements (Chapter 173-485 WAC) does not have a disproportionate impact on small business. This is because the rule only impacts large businesses. (A small business is defined as having 50 or fewer employees.) Ecology did not, therefore, include language in the proposed rule to minimize disproportionate impacts.

The Small Business Economic Impact Statement is intended to be read with the associated Cost-Benefit Analysis (Ecology publication #13-02-033), which contains more in-depth discussion of the analysis.

Ecology determined that the parent companies that own the five refineries to which the proposed rule applies are not small businesses as defined by Chapter 19.85 RCW (employing 50 or fewer people). From firm annual reports and statements to the public and shareholders, Ecology identified the approximate employment of the parent companies as:

- BP: 85,700
- Phillips 66: 13,500
- Shell Oil: 87,000
- Tesoro: 5,700
- US Oil and Refining (Astra Transcor Energy): 350

Ecology did not involve small businesses in the development of the proposed rule. Similarly, Ecology did not involve local governments beyond the two local air agencies involved in the RACT determination and rule making process.

We used the Washington State Office of Financial Management's 2002 Washington Input-Output Model (OFM-IO) to estimate the proposed rule's first round impact on jobs across the state. This methodology estimates the impact as reductions or increases in spending in certain sectors of the state economy flow through to purchases, suppliers, and demand for other goods. Compliance costs incurred by an industry are entered in the OFM-IO model as a decrease in spending and investment.

We estimated that up to 13 jobs statewide, over 20 years, are likely to be lost under the proposed rule, based on the overall highest possible present-value of compliance costs, occurring in the petroleum refining industry. This includes direct job losses in the petroleum refining industry, additional employment or utilization of existing petroleum refinery employees performing reporting and recordkeeping tasks, and transfer payments to licensed professional external engineers for report review.

Section 1: Background

Based on research and analysis required by the Regulatory Fairness Act – RCW 19.85.070 – Ecology has determined that the proposed rule, Petroleum Refinery Greenhouse Gas Emission Requirements (Chapter 173-485 WAC) does not have a disproportionate impact on small business. This is because the rule only impacts large businesses. (A small business is defined as having 50 or fewer employees.) Ecology did not, therefore, include language in the proposed rule to minimize disproportionate impacts.

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Description of the proposed rule

The proposed rule requires:

- Demonstrated emissions reduction, by a petroleum refinery either:
    1. Meeting an Energy Intensity Index ® (EII®)[1] greater than or equal to the 50th percentile EII® for petroleum refineries its size, using any EII® report issued between 2006 and the first annual report in 2014, **OR**
    2. By 2025 reporting (2024 data), implementing sufficient projects that result in a 10-percent reduction from 2010 (or 2011 if 2010 data is not representative) emissions, or meet the energy efficiency standard described in option 1, above.
- Annual reporting:
    - Submitting annual reports on October 1st until compliance with either standard above is demonstrated.
- Recordkeeping:
    - Keeping records supporting reports and compliance for five years after last report.

Reasons for the proposed rule

Ecology initially undertook this rule making in response to a March 27, 2012 Order on Remedies entered in the United States District Court – Western District of Washington at Seattle (Case No. C11-417 MJP, Washington Environmental Council, et al. vs. Sturdevant, et al.). In that order, Ecology, Puget Sound Clean Air Agency (PSCAA), and Northwest Clean Air Agency (NWCAA) were ordered to complete a reasonably available control technology

[1] The Solomon Associates proprietary petroleum refinery energy efficiency metric that compares actual energy consumption for a petroleum refinery with the standard energy consumption for a petroleum refinery of similar size. The standard energy consumption is based on an analysis of refining capacity as contained in the database maintained by Solomon Associates. The ratio of a facility's actual energy consumption to the standard energy consumption is multiplied by 100 to arrive at the Solomon EII® for a refinery.

(RACT) determination process pursuant to Revised Code of Washington (RCW) 70.94.154 within 26 months, addressing greenhouse gases (GHGs) for each of five Washington State petroleum refineries owned and operated by:

- BP PLC (BP)
- Phillips 66 Company (Phillips 66)
- Shell Oil Company (Shell)
- Tesoro Refining and Marketing Company (Tesoro)
- US Oil & Refining Company (US Oil)

Because the RACT analysis and determination affects three or more refineries, state law requires Ecology to establish the new standards in rule. The Order on Remedies established a schedule to implement the judge's decision, and required the rule to be effective by May 27, 2014.

On July 10, 2013, a three judge panel of the 9th Circuit Court of Appeals heard an appeal of the District Court decision. On October 17, 2013, the court ruled the plaintiffs do not have standing to bring a citizen suit under the Clean Air Act to force state and local air agencies to regulate greenhouse gas. At the time of this publication, the 2011 court case is still in the appeal process and pending resolution. At this time, Ecology is proceeding with rule making per the original schedule unless alternate instruction is received.

Petroleum refineries in Washington State

The proposed rule applies specifically to five petroleum refineries in Washington State, as listed above in section 1.3. Ecology estimated relevant[2] 2010 emissions for the five petroleum refineries as follows.

Table 1: Petroleum Refinery Emissions

Facility	Metric Tons per Year of CO2-Equivalent Emissions[3]
BP	2,536,740
Phillips 66	880,730
Shell*	1,578,330
Tesoro**	1,164,670
US Oil**	147,120
TOTAL	6,307,590
*The Shell calculation excludes the emissions from electricity production at the cogeneration unit. ** 2011 emissions (due to plant shutdown affecting 2010 data).	

[2] The proposed rule applies only to certain greenhouse gas emissions; carbon dioxide, nitrous oxide and methane.Carbon dioxide from combustion of fuels accounts for 90+% of the CO2-equivalent emissions.

[3] NWCAA, PSCAA, Ecology (2013), Washington Oil Refinery RACT Technical Support Document.

All confidential business information (CBI) data used in making the determination was provided only to Northwest Clean Air Agency or Puget Sound Clean Air Agency, depending on which refineries they regulate. Ecology has not received any of the data covered under CBI requirements. , Because of this, we do not have comprehensive data on specific facility attributes, emissions and energy efficiency, completed or planned projects, reports made to Solomon Associates, or evaluations and results provided by Solomon Associates. We feel that, despite lack of this data and information, this analysis addresses the assessments required under the Regulatory Fairness Act.

Section 2: Analysis of Compliance Costs for Washington Businesses

Emissions reduction costs

We did not have sufficient public data to develop refinery-specific estimates of costs based on technology and processes specific to each refinery. Due to the need to maintain the confidentiality of business data, within the petroleum refinery owner companies, and throughout the rule-making process (especially as regards recordkeeping), we did not have comprehensive data on specific facility attributes, emissions and energy efficiency, completed or planned projects, reports made to Solomon Associates, or evaluations and results provided by Solomon Associates.

Instead of making refinery-technology specific estimates, we estimated the results of complying with the proposed rule based on the incentives it creates: To demonstrate emissions reductions, and thus compliance with the energy efficiency standard in the first year, or invest in emissions-reduction and efficiency projects in subsequent years. To account for uncertainty as to which projects, and how many projects, would be done when, we estimated a range of present value costs associated with all five refineries complying immediately with the energy efficiency standard, through all five refineries investing in emissions-reduction and efficiency projects in 2024 (for the 2025 reporting year).

Based on estimated 2010 or 2011 emissions, we estimated the total reductions in emissions that would have to occur across all five plants as 630,759 metric tons of CO2 equivalent emissions, or an average reduction per refinery of 126,152. Confident and viable estimates for emissions reduction technology at petroleum refineries were only available for reductions to steam systems (e.g. boilers), with associated efficiency improvements. Using reductions in steam systems as an example, calculated the average cost of a 1-percent reduction to steam-system emissions and used that to estimate the equivalent reduction to total emissions for all applicable technologies at the refinery, and total cost estimation for complying with a 10-percent reduction in total emissions at an average plant. We expect these estimates based on technologically based projects to generate conservatively high estimates of costs, as compared to other systems (that lacked representative data) and programmatic modifications.

We estimated that a 1-percent reduction in boiler emissions cost $90,000 – $137,000, and represented at 0.101-percent reduction in total emissions at the plant across all technologies, based on relative 2010 emissions from boilers and from refineries as a whole.[4] Therefore, a 10-percent reduction in total emissions was equivalent to a 99-percent reduction in the equivalent value of boiler emissions.[5]

Based on this, we estimated a total cost across all five plants of $8.9 - $13.5 million, in nominal (at the time it is spent) value.[6] We then calculated the discounted present value of this compliance cost for data years 2014 through 2024, allowing for variance in the year the emissions reduction is achieved. Table 2 summarizes these discounted present values of this estimated compliance cost.

Ecology also expects costs of efficiency improvements to fall over time, as new technological advances are made in efficiencies. Also as present-value costs of emissions reductions are lower for later years, Ecology expects refineries complying with the 10-percent reduction to delay installation of emissions reduction technology that is not currently in-use or planned.

Table 2: Discounted Present-Value Costs of 10-percent Emissions Reduction

If All Five Refineries:	Technological Costs LOW	Technological Costs HIGH
Meet EII® standard now	$0	$0
Meet the 10% in 2014 (report 2015):	$8,787,983	$13,350,466
Meet in 2015 (report 2016):	$8,532,022	$12,961,618
Meet in 2016 (report 2017):	$8,283,517	$12,584,095
Meet in 2017 (report 2018):	$8,042,249	$12,217,568
Meet in 2018 (report 2019):	$7,808,009	$11,861,716
Meet in 2019 (report 2020):	$7,580,591	$11,516,229
Meet in 2020 (report 2021):	$7,359,797	$11,180,805
Meet in 2021 (report 2022):	$7,145,434	$10,855,151
Meet in 2022 (report 2023):	$6,937,315	$10,538,981
Meet in 2023 (report 2024):	$6,735,257	$10,232,021
Meet in 2024 (report 2025):	$6,539,085	$9,934,001

[4] For emissions calculation basis, see Washington Oil Refinery RACT Final Technical Support Document (NWCAA, PSCAA, Ecology; 2013), Table 6-1 and Table 6-2. A one-percent reduction in total boiler emissions across all five refineries would have been 6,381 metric tons in 2010 (or an average of 1,276 per refinery). A reduction of 6,381 metric tons would have been a 0.101-percent reduction from total 2010 emissions of 6,307,590. For emissions-reduction cost basis, see Washington Oil Refinery RACT Final Technical Support Document (NWCAA, PSCAA, Ecology; 2013), Table 7-1. We limited the cost calculation to boiler options that had sufficient information to calculate the reduction-to-cost relationship range.

[5] If 1 percent of boiler emissions is equivalent to 0.101 percent of total emissions, then 1 percent of total emissions is equivalent to 9.88 percent of boiler emissions. Therefore 10 percent of total emissions is equivalent to 98.8 percent of boiler emissions.

[6] 98.8 multiplied by the cost range of $90 - $137 thousand per 1-percent reduction.

Reporting costs

We estimated reporting costs based on the EPA's past assumptions about the types of employees or outside contractors required for reporting greenhouse gas emissions, as well as the amounts of time those workers would require for the task.[7] We also included assumed hours required for a licensed professional engineer to review and certify reports and supporting data. These assumptions are summarized in Table 3, which also includes the associated wage by type of worker, and loading factors to account for overhead and current dollar values.[8] The loading factor accounts for 4.35-percent benefits loading, and 17-percent overhead loading.[9]

Table 3: Inputs to Reporting Costs with Loading Factor

	First year hours	Subsequent Year hours	Wage 2012$	Loaded wage 2012$	Loaded wage 2013$
Senior Management	0.05	0.04	$51.76	$62.81	$64.06
Middle management	1.24	1.08	$49.69	$60.30	$61.50
Junior Engineer/Technician	4.13	3.73	$19.40	$23.54	$24.01
Senior Operator	13.81	13.1	$31.29	$37.97	$38.72
3rd-party Licensed Professional Engineer	8	8	$60.87	$73.87	$75.33

[7] See Environmental Protection Agency (2010), Table 4-3.

[8] See May, 2012 State Occupational Employment and Wage Estimates for Washington State (Bureau of Labor Statistics, 2013a). Wages updated to 2013-dollar values using the Consumer Price Index, as reported by the US BLS (2013b)

[9] See Environmental Protection Agency (2010).

The resulting estimates of total reporting costs for all five refineries are listed in present values, based on year of expenditure, in Table 4. Unlike emissions reduction or efficiency technology or other measures, reporting costs are assumed to be spent in the reporting year.

Table 4: Total Present-Value Reporting Costs by Year

If All Five Plants Have Their Last Report in the Following Year	Reporting Costs
2014	$6,389
2015	$12,367
2016	$18,171
2017	$23,806
2018	$29,277
2019	$34,588
2020	$39,745
2021	$44,752
2022	$49,613
2023	$54,332
2024	$58,914
2025	$63,362

Recordkeeping costs

We estimated recordkeeping costs based on the EPA's past assumptions about the types of employees required for recordkeeping in GHG reporting, as well as the amounts of time those workers would require for the task.[10] These assumptions are summarized in Table 5, which also includes the associated wage by type of worker, and loading factors to account for overhead and current dollar values.[11] The loading factor accounts for 4.35-percent benefits loading, and 17-percent overhead loading.[12]

Table 5: Inputs to Recordkeeping Costs with Loading Factor

	First year hours	Subsequent Year hours	Wage 2012$	Loaded wage 2012$	Loaded wage 2013$
Senior Management	0.15	0.15	$51.76	$62.81	$64.06
Middle management	0.24	0.23	$49.69	$60.30	$61.50
Junior Engineer/Technician	2.74	2.6	$19.40	$23.54	$24.01
Senior Operator	0.52	0.52	$31.29	$37.97	$38.72

[10] See Environmental Protection Agency (2010), Table 4-3.

[11] See May, 2012 State Occupational Employment and Wage Estimates for Washington State (Bureau of Labor Statistics, 2013a). Wages updated to 2013-dollar values using the Consumer Price Index, as reported by the US BLS (2013b)

[12] See Environmental Protection Agency (2010).

The resulting estimates of total recordkeeping costs for all five refineries are listed in present values, based on five years of expenditure following reported compliance, in Table 6. Recordkeeping costs are assumed to be spent during the five years following the final report (of compliance with emissions or efficiency standards).

Table 6: Total Present-Value Recordkeeping Costs by Year

If All Five Plants Have Their Last Report in the Following Year	Recordkeeping Costs
2014	$2,454
2015	$2,382
2016	$2,313
2017	$2,245
2018	$2,180
2019	$2,117
2020	$2,055
2021	$1,995
2022	$1,937
2023	$1,881
2024	$1,826
2025	$1,773

Section 3: Quantification of Cost Ratios

While the proposed rule does impact businesses in an industry (five petroleum refineries), it does not affect small businesses. It is therefore impossible to compare the impacts of the proposed rule on small businesses to the impacts on the largest businesses. Consequently, we conclude that the rule does not have a disproportionate impact on small businesses.

Not affecting small businesses, however, does not make the proposed rule exempt from the preparation of a Small Business Economic Impact Statement, and we have completed all portions of the analysis required for this document.

Ecology determined that the parent companies that own the refineries to which the proposed rule applies are not small businesses as defined by Chapter 19.85 RCW (employing 50 or fewer people). From firm annual reports and statements to the public and shareholders, Ecology identified the approximate employment of the parent companies as:[13]

- BP: 85,700
- Phillips 66: 13,500
- Shell Oil: 87,000
- Tesoro: 5,700
- US Oil and Refining (Astra Transcor Energy): 350

Section 4: Actions Taken to Reduce the Impact of the Rule on Small Businesses

Ecology did not take any action to reduce the impact of the proposed rule on small businesses because the proposed rule does not have a disproportionate impact on small businesses.

Section 5: The Involvement of Small Businesses in the Development of the Proposed Rule

Ecology did not involve small businesses in the development of the proposed rule. Similarly, Ecology did not involve local governments beyond the two local air agencies involved in the RACT determination and rule making process.

Section 6: The SIC Codes of Impacted Industries

The SIC (Standard Industry Classification) system has long been replaced by the North American Industry Classification System (NAICS). The proposed rule specifically applies to five petroleum refineries in Washington State. All of these refineries are classified as NAICS code 32411, Petroleum Refineries.

Section 7: Impacts on Jobs

We used the Washington State Office of Financial Management's 2002 Washington Input-Output Model (OFM-IO) to estimate the proposed rule's first round impact on jobs across the state. This methodology estimates the impact as reductions or increases in spending in certain

[13] BP (2013), 2012 Summary Review; Phillips 66 (2013), 2012 Summary Annual Report; Royal Dutch Shell PLC (2013), Annual Report Royal Dutch Shell PLC Annual Report and For 20-F for the Year Ended December 31, 2012; US Securities & Exchange Commission (fiscal year 2012), Form 10-K for Tesoro corporation; Astra Transcor Energy (2013), "Our People" website as accessed November 2013, http://www.astratranscor.com/en/our-people/our-people.aspx

sectors of the state economy flow through to purchases, suppliers, and demand for other goods. Compliance costs incurred by an industry are entered in the OFM-IO model as a decrease in spending and investment.

We estimated that up to 13 jobs, statewide over 20 years, are likely to be lost under the proposed rule, based on the overall highest possible present-value of compliance costs, occurring in the petroleum refining industry. This includes direct job losses in the petroleum refining industry, additional employment or utilization of existing petroleum refinery employees performing reporting and recordkeeping tasks, and transfer payments to licensed professional external engineers for report review.

Section 8: References

Astra Transcor Energy (2013), "Our People" website as accessed November 2013, http://www.astratranscor.com/en/our-people/our-people.aspx.

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