Northwest **Power** and **Conservation** Council

June 9, 2020

MEMORANDUM

TO: **Council Members**

FROM: **Steven Simmons**

SUBJECT: **Upstream Methane Emissions and The 2021 Power Plan**

BACKGROUND:

Presenter: Steven Simmons

Summary: This presentation will cover the methodology used to incorporate estimates of upstream methane releases into our power planning. It will also present the staff recommendation for the 2021 Power Plan emission inputs related to the combustion of natural gas and coal.

Relevance: With the technological advances in natural gas extraction – fracking and horizontal drilling – gas has been undercutting coal as a fuel for electricity generation for some time now. Natural gas, along with energy efficiency, wind and solar, has been displacing coal – leading to a cleaner electrical grid in terms of CO_2 emissions.

However, the primary component of natural gas, methane (CH_4), is a highly potent greenhouse gas. Methane that is released directly to the atmosphere is one of the biggest issues currently facing the natural gas and oil industry. Recent studies indicate that the natural gas supply system may be releasing more methane than previously thought. Reducing these upstream methane leaks could be an important component for any decarbonization strategy. In order to gauge the impact of methane leak reductions, a methodology to incorporate these emissions

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into the power planning models is required, as well as an estimate of the magnitude of the releases.

Workplan: A.4. Forecasting and Economic Analyses

Background: A methodology to incorporate upstream methane emissions into power planning, along with proposed release rates was presented to the Natural Gas Advisory Committee (NGAC) on December 18, 2019.

Following feedback on upstream methane release rates, staff gathered data from additional methane emission studies, normalized the results and proposed a new rate, and discussed at the NGAC meeting on April 9, 2020.

Following feedback from this meeting, staff further refined the analysis to include potential regional differences in methane releases. A final recommendation was communicated to the NGAC on May 01, 2020.

The Northwest Gas Association submitted formal comments on June 9, 2020. The comments are available with the packet.

More Info: The staff recommendation, paper, data and methodology workbook are available on the NGAC web location.

https://www.nwcouncil.org/energy/energy-advisory-committees/natural-gas-advisory-committee

June 9, 2020

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Richard Devlin, Chairman
Northwest Power and Conservation Council
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RE: Dissent to staff recommendation accounting for upstream methane emissions from the natural gas system.

Dear Chairman Devlin and Council members:

The Northwest Gas Association represents the five natural gas utilities and two transmission pipelines that provide warmth and comfort to 2.5 million households in Idaho, Oregon and Washington, and productive energy for more than 200,000 regional businesses and institutions. The NWGA is a charter participant in the Council's Natural Gas Advisory Committee (NGAC).

NWGA members support and are actively engaged in reducing regional greenhouse gas emissions. We assert that there is a meaningful role to be played by smartly utilizing more than 100,000 miles of existing energy infrastructure represented by the natural gas transmission and distribution systems in the Northwest.

The NWGA also supports objective analyses to understand and account for carbon emissions such as that proposed by staff. In that regard, we wish to acknowledge the work of Steve Simmons. He has been sincerely receptive to stakeholder comments and diligently worked to identify common ground.

Our dissent to the staff recommendation on accounting for upstream methane emissions can be summarized in two parts: 1) the consistent application of life-cycle carbon accounting, and 2) a selected data source.

Consistent application of life-cycle carbon accounting. The need to consistently account for life-cycle carbon emissions was discussed in detail during the NGAC process. We feel it is a critically important issue and that the Council would benefit from more discussion than is included in the recommendation from Council staff.

All types of energy have a higher emissions intensity when upstream emissions are considered. Therefore, an approach including only the non-combustion life-cycle emissions of natural gas (and coal) would not achieve the Council's objective of a true and comprehensive emissions comparison between energy sources. In fact, we contend that it will tilt the scales against natural gas (for both direct use and power generation) at the expense of sound carbon accounting and without scientific support. We further maintain that such a "thumb-on-the-scale" approach could negatively affect our shared objective of reducing regional greenhouse gas emissions.

Hundreds of studies on life-cycle emissions, including meta-studies that have been adopted by the U.S. National Renewable Energy Laboratory (NREL) and the United Nations' Intergovernmental Panel on Climate Change (IPCC), utilize and promote consistent carbon

accounting across all fuel types rather than picking and choosing certain sources of upstream emissions for inclusion in emissions analysis.

To highlight this inconsistency, please see the illustration below taken from the IPCC.[1]

Table A.III.2 | Emissions of selected supply technologies (gCO_2eq/kWh)

Options	Direct emissions	Infrastructure & supply chain emissions	Biogenic CO_2 emissions and albedo effect	Methane emissions	Lifecycle emissions (incl. albedo effect)
	Min/Median/Max	Typical values			Min/Median/Max
Currently Commercially Available Technologies					
Coal—PC	670/760/870	*9.6*	*0*	*47*	**740/820/910**
Gas—Combined Cycle	350/370/490	*1.6*	*0*	*91*	**410/490/650**
Biomass—cofiring	n.a.	–	–	–	**620/740/890**
Biomass—dedicated	n.a.	*210*	*27*	*0*	**130/230/420**
Geothermal	0	*45*	*0*	*0*	**6.0/38/79**
Hydropower	0	*19*	*0*	*88*	**1.0/24/2200**
Nuclear	0	*18*	*0*	*0*	**3.7/12/110**
Concentrated Solar Power	0	*29*	*0*	*0*	**8.8/27/63**
Solar PV—rooftop	0	*42*	*0*	*0*	**26/41/60**
Solar PV—utility	0	*66*	*0*	*0*	**18/48/180**
Wind onshore	0	*15*	*0*	*0*	**7.0/11/56**
Wind offshore	0	*17*	*0*	*0*	**8.0/12/35**

The Council has included only “direct emissions" for natural gas in prior Power Plans (the values for direct emissions in the first column of the table). For a natural gas combined-cycle plant, that value would have been between 350/370/490 gCO_2eg/kWh. The corresponding number for solar, wind, and hydropower would be zero. We can support continuing this approach.

However, the Council is moving to include upstream methane emissions from natural gas for the 2021 Power Plan. We do not understand the rationale for assessing upstream emissions for natural gas – circled in blue – and coal, if the Council does not intend to include upstream emissions for other fuel sources (highlighted by the green box). This is an inconsistent application of carbon accounting and will yield incorrect results.

The staff recommendation points out that this effort to account for upstream emissions does not constitute a full life-cycle accounting for natural gas. However, the table depicts that 99.5% of natural gas system emissions occur from direct combustion or methane leakage; only 1.6g/kWh occur otherwise (which we are not opposed to including as part of a broader move to life-cycle accounting for all energy sources).

Therefore, including upstream emissions for natural gas is effectively, if not technically, equivalent to a life-cycle accounting. We believe it is the Council’s intention to conduct an apples-to-apples comparison, and including upstream figures from only natural gas does not lead to this result.

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[1] Source: IPCC – Climate Change 2014 Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-iii.pdf (Page 7)

Selected Data Source. If the Council agrees to consistently account for carbon emissions from all fuel sources, then we can turn our attention to emissions from the natural gas system. Our objective from the start of this process has been to ensure that any approach to assessing upstream methane emissions incorporates distinctions unique to our region: 1) research demonstrates that the natural gas system here is significantly tighter than other regions;[2] and 2) robust regulation of production in the jurisdictions from which we source our gas yields significantly lower emissions from production than is typical of other producing regions.[3]

The NWGA appreciates and endorses staff's recommended methodology to account for regional distinctions. We accept the recommendation to allocate 65% of the region's natural gas supplies to Canadian sources and 35% to the U.S. Rockies. We also concur with staff's recommended Canadian-sourced gas emissions rate identified in the life-cycle analyses conducted for the environmental impact statements of the Tacoma LNG project[4] and the proposed methanol plant at Kalama. Finally, we support staff's recommendation to factor in the reasonable expectation that regional life-cycle emissions will decline over time.

Given the above, we accept the blended emissions rate of 1.37% of methane delivered to the region *as a starting point* for the analysis. However, we are opposed to the application of an emissions rate of 2.47% of methane produced to U.S. Rockies production**.** This rate comes from an Environmental Defense Fund (EDF) study published in Science Direct (Alvarez, 2018). Among other reasons, we oppose the use of this factor because:

- *The EDF data represents a U.S national average emissions rate* rather than a regionally specific data point. The data are skewed by the inclusion of several prolific oil and other plays that do not comport with the regulatory and operating conditions of the natural gas plays upon which our region relies.
- *The EDF data represent emissions from both oil and gas production*, rather than distinguishing emissions related to natural gas systems only, which is the relevant factor.
- *The EDF study represents a snapshot in time.* It is a synthesis of studies conducted from 2012 through 2015, published from 2013 to early 2017. Consequently, the findings do not incorporate advancements in methane reduction technologies, regulations and practices that have been implemented since.
- *The recommended EDF rate does not reflect source-based (life-cycle) emissions estimates included in the EDF Study,* which more closely approximate the rates estimated by the Environmental Protection Agency (EPA) in its annual Inventory of GHG Emissions and Sinks. While the full EDF study includes both site-based and source-based emission rate estimates, only the site-based estimates were included in the published article.

If a national average must be used for the Rockies, the 2020 EPA Inventory reference case emissions rate for natural gas systems (1.0% of methane produced) is appropriate as it is

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[2] Washington State University/EDF Methane Emissions study: https://methane.wsu.edu/
[3] Tacoma LNG Final Environmental Impact Statement: https://www.cityoftacoma.org/government/city_departments/planning_and_development_services/planning_services/pse_proposed_tideflats_lng_facility/final_environmental_impact_statement_feis.
[4] Ibid.

produced annually, subject to stakeholder input, and incorporates the latest data, methodologies and practices.

To summarize, we encourage the Council to consistently account for carbon emissions across all fuel types. To single out only coal and natural gas will yield incorrect results. We support the recommended regionally specific approach to estimating life-cycle emissions, including the allocation of gas by source (65% Canada, 35% U.S. Rockies) and use of the Canadian emissions' rate and a declining U.S. emissions' rate over time. However, we oppose applying the EDF's estimated national average emissions rate for oil and gas systems to the U. S. Rockies portion of the Northwest's natural gas supply.

It is with the Council's legacy of producing robust, credible and independent planning and analysis in mind that we encourage the Council to apply its methodologies consistently and to objectively source its data. It is in that spirit that we offer this dissent. And it is in that spirit that we stand ready to support the Council in its efforts.

Thank you for the opportunity to offer constructive dissent. The NWGA is grateful to participate in the Council's Natural Gas Advisory Committee. We especially appreciate the work of Steve Simmons who strives to be inclusive and incorporate diverse perspectives.

Please don't hesitate to contact me with any questions you may have.

Sincerely,

DAN S. KIRSCHNER
Executive Director

Upstream Methane & The 2021 Power Plan

June 16, 2020

Steven Simmons

THE 2021 NORTHWEST POWER PLAN
FOR A SECURE & AFFORDABLE ENERGY FUTURE

1

Today's Discussion

1. Brief background on upstream methane and power planning
2. Methodology to incorporate upstream methane releases in emission rates
3. Final staff recommendation
4. Further information

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Brief background on methane and power planning

Upstream Methane & The 2021 Power Plan

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Background

1. Methane (CH_4) concentrations in the atmosphere have been rapidly increasing – and the gas is a powerful greenhouse gas with a potency 34 times that of carbon dioxide (CO_2) on a pound to pound basis. Methane is the primary component of natural gas.
2. In the US, the natural gas and oil system accounts for around 30% of the methane emissions related to human activities, with coal around 8%
3. Recent studies suggest that past estimates of methane releases from the gas and oil system have been undercounted
4. Around 85% of the methane releases from the natural gas & oil system are occurring far upstream – from the production, gathering & processing stages

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Background

1. Estimating methane releases from the natural gas and oil system is a complex issue with inherent uncertainty – but methane is one of the most important issues facing the industry today – and there is evidence that emissions can be reduced
2. This is the first power plan in which we have included upstream methane emissions related to the extraction, production and transport of coal and natural gas as a planning input

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Methodology to incorporate upstream methane releases for emission rates

Upstream Methane & The 2021 Power Plan

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Methodology

The key is to establish a value for – L_d – the percent of delivered methane that is released upstream of the point of final delivery. The rest follows:

1. Calculate an upstream methane emission rate - **pounds of CH_4 released upstream per MMBtu of fuel consumption** at the point of final delivery
2. Convert to an upstream CO_2 equivalent emission rate – **pounds of CO_2e released upstream per MMBtu of fuel consumption** at the point of final delivery
3. Combine with established combustion emission rates for an overall fuel emission rate that captures both upstream and combustion emissions for fossil fuels natural gas and coal - **pounds of CO_2e released per MMBtu of fuel consumption** at the point of final delivery
4. This total rate is an input to our power planning models and is used to determine future emissions resulting from the use of fossil fuels

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Quantifying Methane Releases

Quantifying the upstream methane release rate for natural gas – L_d – is at the heart of the matter

Emission studies break into 3 basic categories

1. Inventory modeling: bottoms-up type estimate (EPA for US, GHGenius for Canada) based on equipment operating under normal operations
2. Ground and air-based facility-scale measurements (EDF/Research Universities US only)
3. Hybrid approach (IEA, NETL)

Additional uncertainty arising from differences in regional factors, extraction techniques, monitoring practices, etc.....

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Approach for the Plan

1. Collected a wide range of methane emission estimates from the most recent studies that were available and normalized to produce a comparable value for L_d
2. Typically the inventory model approaches produce estimates on the low end of the methane release rate, the facility-scale measurements on the high end, and the hybrid approach in the middle
3. Staff has brought the analysis to the NGAC, have listened to concerns, have made modifications, additions, and refinements, and have settled on a recommendation

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Staff Recommendation

Upstream Methane & The 2021 Power Plan

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Upstream Methane Release Rate

L_d = 1.37 %

The percent of delivered methane that is released upstream of the point of final delivery

1. In the low range of the normalized study estimates
2. Assumes a weighted mix of natural gas sourced from Canada and the US Rockies
3. Canadian rate 0.77 % (GHGenius), US Rockies 2.47 % (low range of EDF studies)
4. Assumes improvements in methane monitoring and capture – by end of planning horizon rate under 1 %

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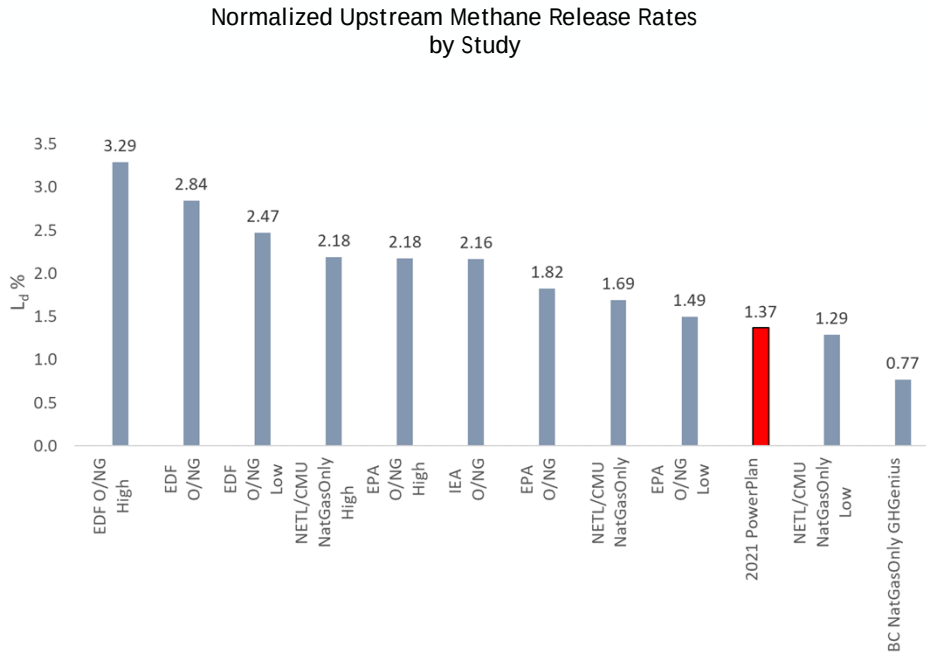

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Fuel Emission Rates	Natural Gas 2021		Coal
	Lbs. CO_2 e/MMBtu		Lbs. CO_2 e/MMBtu
Combustion			
CO_2	116.88		213.9
CH_4	0.0748		0.8245
N_2O	0.6556		1.0519
Total Combustion	118		216
Upstream			
	Year 2021	Year 2041	
CH_4	18.38	10.35	3.51
Total (Combustion+Upstream)			
Total	136	128	219

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Staff Recommendation

- Staff wishes to thank the Natural Gas Advisory Committee for their engagement, insights, and feedback on this complex subject
  - NGAC met in December of 2019 and April of 2020
  - Feedback informed much of the analysis, additional data was brought in and refinements were made to the analysis as a result
- We understand there is uncertainty around current upstream methane emission rates, future emission rates, and future regional gas mixes.
- We encourage future studies and discussion, particularly as it relates to the Northwest, of this complex issue

THE 2021 NORTHWEST POWER PLAN

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References & Further Reading

1) NWPCC Natural Gas Advisory Committee Site
   Paper, Recommendation, and Model Workbook
   https://www.nwcouncil.org/energy/energy-advisory-committees/natural-gas-advisory-committee
2) EDF Methane Studies
   https://www.edf.org/climate/methane-studies
   Assessment of methane emissions from the U.S. oil and gas supply chain
   Science 13 Jul 2018:
   Vol. 361, Issue 6398, pp. 186-188
   DOI: 10.1126/science.aar7204
3) EPA
   U.S. Inventory of Greenhouse Gas Emissions and Sinks:1990-2017
   https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2017
3) NOAA Methane Trends
   https://www.esrl.noaa.gov/gmd/ccgg/trends_ch4/
4) IEA
   Methane Tracker 2020
   https://www.iea.org/reports/methane-tracker-2020
5) NETL/CM
   Synthesis of recent ground-level methane emission measurements
   from the U.S. natural gas supply chain
   Journal of Cleaner Production 148 (2017) 118-126
6) Published study on pre-industrial age fossil methane emissions in Nature
   Preindustrial 14CH4 indicates greater
   anthropogenic fossil CH4 emissions
   Benjamin Hmiel, et al.

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Affiliated Tribes of Northwest Indians
AirWorks, Inc.
Alaska Housing Finance Corporation
Alliance to Save Energy
Allumia
Alternative Energy Resources Organization
American Rivers
Backbone Campaign
Beneficial State Bank
BFA Energy
BlueGreen Alliance
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CleanTech Alliance
Climate Smart Missoula
Climate Solutions
Coffman Engineers
Community Action Center of Whitman County
Community Action Partnership Assoc. of Idaho
Community Action Partnership of Oregon
Community Energy Project
Counterbalance Capital
Earth Ministry
Ecumenical Ministries of Oregon
eFormative Options
Elevate Energy
Energy350
Energy Trust of Oregon
Environment Oregon
Environment Washington
Forth
Global Ocean Health
Green Energy Institute at Lewis & Clark Law School
Grid Forward
Homes for Good
Home Performance Guild of Oregon
Human Resources Council, District XI
Idaho Clean Energy Association
Idaho Conservation League
Idaho Rivers United
League of Women Voters Idaho
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Montana Audubon
Montana Environmental Information Center
Montana Renewable Energy Association
Multnomah County Office of Sustainability
National Center for Appropriate Technology
National Grid
Natural Resources Defense Council
New Buildings Institute
Northern Plains Resource Council
Northwest EcoBuilding Guild
Northwest Energy Efficiency Council
NW Natural
OneEnergy Renewables
Opportunities Industrialization Center of WA
Opportunity Council
Oracle/Opower
Oregon Citizens' Utility Board
Oregon Energy Fund
Oregon Environmental Council
Oregon Physicians for Social Responsibility
Oregon Solar Energy Industries Association
Pacific Energy Innovation Association
Pacific NW Regional Council of Carpenters
Portland Energy Conservation, Inc.
Portland General Electric
Puget Sound Advocates for Retirement Action
Puget Sound Cooperative Credit Union
Renewable Hydrogen Alliance
Renewable Northwest
Save Our wild Salmon
Seattle City Light
Sierra Club
Sierra Club, Idaho Chapter
Sierra Club, Montana Chapter
Sierra Club, Washington Chapter
Small Business Utility Advocates
Snake River Alliance
Snohomish County PUD
Solar Installers of Washington
Solar Oregon
Solar Washington
South Central Community Action Partnership
Southeastern Idaho Community Action Agency
Spark Northwest
Spokane Neighborhood Action Partners
Sustainable Connections
The Climate Trust
The Energy Project
Transition Missoula
UCONS, LLC
Union of Concerned Scientists
United Steelworkers of America, District 12
Washington Environmental Council
Washington Physicians for Social Responsibility
Washington State Community Action Partnership
Washington State Department of Commerce
Washington State University Energy Program
YMCA Earth Service Corps
Zero Waste Vashon

NW Energy Coalition
for a clean and affordable energy future

June 15, 2020

Richard Devlin, Chair
Northwest Power and Conservation Council
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Dear Chair Devlin and Council members:

The NW Energy Coalition (NWEC) is pleased to write in support of the staff recommendation – with one exception as described below – for the assessment of upstream methane emissions for the 2021 Northwest Power Plan. We appreciate the review of the Natural Gas Advisory Committee and the work by staff member Steve Simmons to prepare a thorough and well documented methodology.

NWEC is committed to achieving the vision of a reliable, clean and affordable Northwest power system, and considers the work of the Council to have even more importance from this point onward in providing clear guidance for the rapid transformation needed to achieve our region's climate, clean energy, reliability, economic and environmental protection goals.

Identifying and rapidly reducing greenhouse gas emissions attributable to the power sector is a crucial aspect of that effort. While the role of carbon dioxide (CO_2) as the "control knob for the climate" with atmospheric and climate system effects for thousands of years is relatively well understood, methane (CH_4) is another very important greenhouse gas with climate impact on relatively short time scales of up to 20 years. The primary locus of emissions for CO_2 is combustion – and indeed, natural gas, primarily composed of methane, creates substantial CO_2 on combustion, as already accounted for in the Council's assessment and methods.

The key concern for methane, however, is emissions in the supply chain prior to combustion in natural gas power plants and otherwise. As staff's report indicates, assessing upstream methane emissions is a complex undertaking, and considerable research is ongoing to acquire more observational data and develop more robust assessment methods.

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Given the relevance and magnitude of methane emissions related to the Northwest electric power system, NWEC believes it is very important to take the initial steps outlined by staff to include upstream methane assessment in the 2021 Plan. We recommend that the Council:

- Take an evidence-based approach to upstream methane emissions, recognizing rapid advances being made in data acquisition, refinement and assessment, but also recognizing the remaining areas of uncertainty and data gaps.

- Focus on data and assessments most relevant for the primary supply basins for Northwest power system use, particularly northeast British Columbia, Alberta, and the Rockies.

- Also fully consider national assessments in providing guidance.

- Invite scientific experts in the field of methane emissions, atmospheric chemistry and climate science to provide views and advice to the Council on the complex data and assessment issues involved.

- Take a flexible and incremental approach to avoid significant under or overestimation of upstream methane emissions and to incorporate new relevant information on an ongoing basis.

- Include one or more elements in the Action Plan for the 2021 Plan to facilitate additional progress on this important topic.

NWEC also supports the efforts by environmental regulators and the natural gas industry to mitigate upstream methane emissions through improved monitoring, reporting, leak detection and response (LDAR) programs, regulatory compliance and other efforts. As verifiable evidence of those efforts develops, that should also be folded into the Council's analysis.

Turning to the specific approach recommended by staff for the 2021 Plan, the key metric is L_d, the aggregate upstream methane emissions rate. The staff methodology is appropriate overall, and we support the recommendation to adopt the EDF Low L_d value for upstream emissions for US sourced natural gas used by the Northwest power sector, primarily from the Rockies region.

The EDF managed research program, which has now been running for a decade, is supported across many relevant sectors, involves rigorous field research protocols and scientific review, assesses emissions from many US supply basins, especially the Rockies, and has resulted in numerous peer reviewed publications.

However, we do not support the staff's recommendation for Canadian natural gas sources based on provincially adopted L_d values. Because Canadian gas, primarily from northeast British Columbia but also various parts of Alberta, comprises about two-thirds of Northwest gas supply, this is an important issue to consider as the Council finalizes the 2021 Plan.

NWEC believes that while the provincial values for upstream emissions have been widely cited, they are based on earlier baseline assessments that have not been updated for many years.

However, quite a lot of new research is now available, and below we provide a capsule summary of several relevant publications:

- Atherton et al. (2017)[1] conducted an extensive field survey of gas and oil production areas in northeastern British Columbia, covering more than 1,600 well pads and processing facilities. They conclude: "Our calculated emission frequency values, combined with estimated and pre-established emission factors for wells and facilities, provided a CH4 emission volume estimate of more than 111 800 ± 15 700 t per year for the BC portion of the Montney. This value exceeds the province-wide estimate provided by the government of BC even though the Montney only represents about 55 % of BC's total natural gas production."

- Wisen et al. (2020)[2] reviewed natural gas well leakage data from the British Columbia Oil and Gas Commission. They found that about 11% of over 21,000 wells reported leakage during their lifetime, twice the rate indicated from earlier research in Alberta, and highlighted that both BC and Alberta have almost no leakage reporting from abandoned or retired wells.

- Ravikumar et al. (2020)[3], as part of a field study of leak detection and response (LDAR) efforts, reviewed emissions studies in both Alberta and British Columbia and likewise concluded: "Both ground-based and aerial-measurements in Alberta showed higher vented and total methane emissions compared to provincial regulatory estimates. Similarly, mobile measurements using truck-mounted sensor systems in British Columbia and Alberta have consistently shown that a majority of the emissions are dominated by a small number of high-emitting sites, often identified as 'super-emitters.'"

- O'Connell et al. (2019)[4] surveyed 1,299 oil and gas well pads and 2,670 unique wells and facilities in Alberta, and found: "As a result of measured emissions being larger than those reported in government inventories, this study suggests government estimates of infrastructure affected by incoming regulations may be conservative. Comparing emission intensities with available Canadian-based research suggests good general agreement between studies, regardless of the measurement methodology used for detection and quantification."

[1] Atherton et al., 2017, "Mobile measurement of methane emissions from natural gas developments in northeastern British Columbia, Canada," *Atmospheric Chemistry and Physics*, 17, 12405–12420, 2017, DOI: 10.5194/acp-17-12405-2017.
[2] Wisen et al., 2020, "A portrait of wellbore leakage in northeastern British Columbia, Canada," *Proceedings of the National Academy of Sciences*, 117 (2) 913-922; DOI: 10.1073/pnas.1817929116
[3] Ravikumar et al., 2020, "Repeated leak detection and repair surveys reduce methane emissions over scale of years," *Environmental Research Letters* 15 (2020) 034029, DOI: 10.1088/1748-9326/ab6ae1
[4] O'Connell et al., 2019, "Methane emissions from contrasting production regions within Alberta, Canada: Implications under incoming federal methane regulations. *Elementa* 7: 3. DOI: 10.1525/elementa.341

After our review of the literature, including the examples cited here, NWEC believes the Canadian L_d upstream emissions metric should be updated to a higher value reflecting the more recent research.

To summarize, the Canadian L_d value proposed by staff is a methane loss rate of 0.77%. In comparison, that is about two-fifths of the EPA rate of 1.82%, and less than one-third of the EDF Low rate of 2.47%. We conclude the Canadian value is out of date and implausibly low given the results of numerous peer-reviewed studies in British Columbia and Alberta.

We recommend that the Natural Gas Advisory Committee be reconvened later this year to review the upstream methane emissions rate for Canadian supply areas, including presentations from experts having direct experience with these issues. It may be appropriate as a starting point to consider the EDF Low rate and adjust from there.

NWEC again thanks Council staff and the NGAC for close attention to this important issue and urges the Council to move forward with the staff recommendation to include the assessment of upstream methane emissions for the 2021 Plan, with an upward adjustment for the Canadian emissions rate.

Sincerely,

Fred Heutte
Senior Policy Associate
NW Energy Coalition
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