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Subject:	Sierra Club Comments on PSE IRP
Date:	Thursday, February 22, 2018 12:25:26 AM
Attachments:	Sierra Club comments on PSE 2017 IRP.pdf Fracked Gas, Next Big Climate Fight.pdf

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Hello, please post these as the Sierra Club's formal written comments on the PSE IRP, Docket UE-160918 and UG-160919.

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February 21, 2018

Docket UE-160918 (Electric) and UG-160919 (Gas)

To: Washington Utilities and Transportation Commission

RE: Sierra Club Comments on 2017 Integrated Resource Plan

Dear Commissioners:

Sierra Club provides the following comments based on Puget Sound Energy's ("PSE") Draft 2017 Integrated Resource Plan ("Draft IRP"). As you know, Sierra Club has participated extensively in PSE's IRP Advisory Group since 2009. Nationally, the Sierra Club's Beyond Coal campaign advocates for the transition off fossil fuel sources through the development of energy conservation and renewable energy policies. Sierra Club's work includes advocating for the implementation of robust incentive programs that assist its members and utility consumers to generate their own renewable energy and increase energy efficiency. We appreciate the work that both PSE staff and UTC staff have committed during this process.

At a high level, the 2017 IRP provides better methodology, market analysis, and numbers that lead to answering useful questions as well as better results. PSE's staff worked hard on trying to address stakeholder questions with many quantitative scenarios, and we appreciate their willingness to analyze and answer questions.

However, there are numerous areas where the company needs to improve, and where the Commission needs to provide better guidance. We strongly recommend the Commission provide a clear signal to utilities that they must shut down Colstrip in 2025, by ruling future CapEx is not prudent. PSE seems to be pursuing a business model of moving loads to natural gas. If you take a longer perspective, we need to be moving off fossil fuels as fast as possible, replacing natural gas with clean electricity from renewable generation sources. PSE needs to rethink this entire direction, and the Commission needs to help by setting appropriate planning goals, such as:

- State law reducing GHG emissions to 70% below 1990 levels by 2050
- King County's Strategic Climate Action Plan[1] calling for phasing out coal power by 2025
- King County Executive Dow Constantine testified before the UTC, the county's goal is to eliminate 90% of GHG emissions from electricity by 2030.
- Closing Colstrip units 3 & 4 by 2025

[1] https://www.kingcounty.gov/services/environment/climate/strategies/strategic-climate-action-plan.aspx

- Eliminating the use of natural gas for residential and commercial heating by 2050.

Without a vision like this, we can't know where we should be going nor how fast we should be working to get there. We could see utilities shifting load from electric to gas, only for society to have to rip out those investments and replace them a decade or two down the line. We need a top-down vision to protect our ability to live in harmony with the Earth, and plans that get us there. And we need policy tools like a carbon price (or at least a greenhouse gas planning adder) to get utilities to function in our best interest.

Areas Where PSE Is Improving

A. Solar Costs

We are happy to see this IRP propose several utility-scale solar projects, and even propose one energy storage project. This change was driven primarily by the Northwest Energy Coalition's push to using experience curves to model declines in solar costs. As we discussed in our 2015 IRP comments[2], PSE's previous solar cost estimates were not accurate given market conditions. We are pleased to see a dramatic improvement this year. While we can quibble that states like Texas and California are building solar projects at half the levelized cost as what PSE is estimating, it's still good to see PSE using numbers closer to market rates. Given that solar was the big surprise in this IRP, we look forward to PSE continuing to do a detailed analysis of solar costs in future IRP's.

B. Weather Forecasts

Puget Sound Energy has been previously blind to any possibility of climate change when modelling its weather forecasts. These weather forecasts project colder winters than we've recently seen, causing the utility to believe they need more peak capacity than they may actually need. This has been brought up by multiple IRPAG participants for many years.

This year, PSE finally took a baby step towards solving this problem. They started weighing the most recent years more heavily in their weather forecasts. So if recent years have been amongst the warmest years recorded by humans (they have), this warming would have a larger effect on weather projections. This is a good start, as it attempts to emphasize climate change that has already happened. However, there was no attempt to make this forward-looking; i.e., there is no input from a future climate model to inform where temperatures, rainfall, or snowpack may be headed within the IRP's 20 year planning window.

We are glad PSE took this first step. However, we encourage PSE to engage with the University of Washington's Climate Impacts Group. We argued for this in our 2015 IRP comments[3], but there was no follow-through to this date.

[2] See "Inadequate and Incorrect Solar PV Adoption Assumptions", Sierra Club comments on PSE's 2015 IRP: https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/CaseItem.aspx?item=document&id=00045&year=2014&docketNumber=141170&resultSource=&page=1&query=141170&refiners=&isModal=false&omItem=false&doItem=false

[3] See "No Engagement on Long Term Climate Forecasts", Sierra Club comments on PSE's 2015 IRP: https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/CaseItem.aspx?item=document&id=00045&year=2014&docketNumber=141170&resultSource=&page=1&query=141170&refiners=&isModal=false&omItem=false&doItem=false

C. Fast Demand Response

As we detailed in comments on PSE's 2015 IRP[4], we believe fast, automated demand response is a key demand side resource. With the right incentives, this can grow into demand flexibility programs that lower peak capacity need, lower daily energy cost through shifting load to off-peak hours, and integrate non-dispatchable resources like wind and solar better with an electric grid. PSE's previous view of demand response meant calling up factories and schools in the coldest days of the winter and asking them to shut down. In 2017, PSE's economists started to up their game and grasp the potential; however, PSE may not have the right tools to model demand flexibility programs. They tried; it needs to get better.

One aspect would be to capture distribution system costs, including locational marginal value of avoided peak capacity as well as avoided power consumption at given times of day. We elaborate on these thoughts in the Distribution Grid Planning section below.

As a reminder, the Rocky Mountain Institute wrote a report characterizing Demand Flexibility[5] and the economic value of "flexiwatts". RMI analyzed the value to both the grid and customers for peak capacity reduction, energy need, and renewable energy integration. We hope this is fully internalized for future demand response RFP's.

Areas Where PSE Needs Improvement

A. Colstrip

Seven years ago, the Sierra Club first came before this Commission to express our concerns about the Colstrip coal plant in Colstrip, Montana. Since then, we have seen a majority of Puget Sound Energy's service territory – as represented by its local governments – explicitly calling for the retirement of Colstrip. You have received thousands of comments on Colstrip, and its extensive environmental and economic liabilities have been well documented. There may well be no other generation resource in PSE's portfolio that has been concerning to its customers and local elected officials.

For issue areas before this Commission, no issue has generated more concern than climate change: the statutory reductions mandated by the legislature, the Governor's executive order on climate, our Emissions Performance Standard, and now a host of legislative proposals addressing climate. And again, thousands of comments provided to this Commission with climate change as a central theme.

It is now time for the Commission and Puget Sound Energy to clearly act in the public interest and cut off ratepayers funding for Colstrip by 2025. While the UTC cannot cut off funding for Colstrip in its evaluation of PSE's IRP, it can recommend that PSE start planning for that inevitability.

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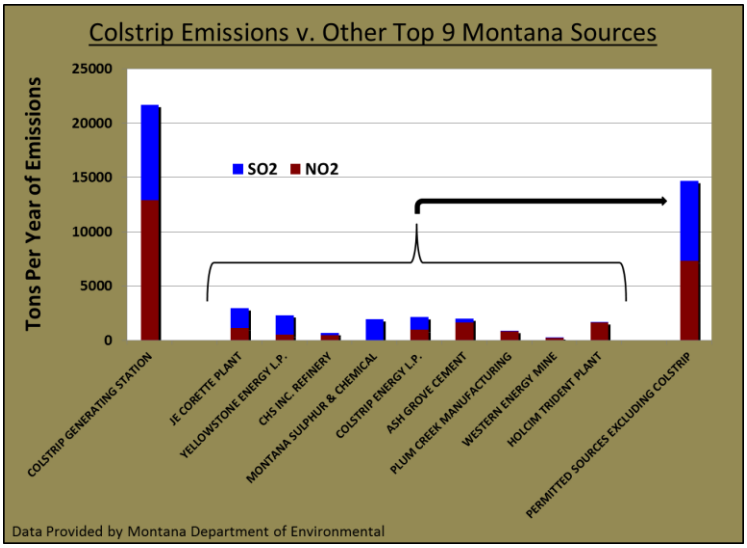
[4] See "Demand Response and the Third Industrial Revolution" and the "Modelling Demand Flexibility" sections of the Sierra Club comments on PSE's 2015 IRP: https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/CaseItem.aspx?item=document&id=00045&year=2014&docketNumber=141170&resultSource=&page=1&query=141170&refiners=&isModal=false&omItem=false&doItem=false

[5] "The Economics of Demand Flexibility: How 'Flexiwatts' Create Quantifiable Value for Customers and the Grid", August 2015, Boulder. http://www.rmi.org/electricity_demand_flexibility

Colstrip is an unmitigated environmental catastrophe with its 800 acres of leaking coal ash waste ponds that are polluting the groundwater with toxic carcinogens. Montana District Judge Robert Deschamps said that the 380 gallons of waste is leaking from the ponds every minute was "alarming." This statement was made four years after there already was an agreement to address the problem. The most recent Site Evaluation Report shows that the Colstrip owners are doing everything in their power to avoid the real solution and that is to excavate the polluted groundwater and soil.

Colstrip's sulfur emissions are bigger than the next nine largest air polluters combined in Montana. Its nitrogen emissions are nearly twice as big as the next nine largest air polluters combined.



Colstrip is a leading source of air toxins in Montana.

COLSTRIP PLANT TOXIC AIR RELEASES 2009-2013

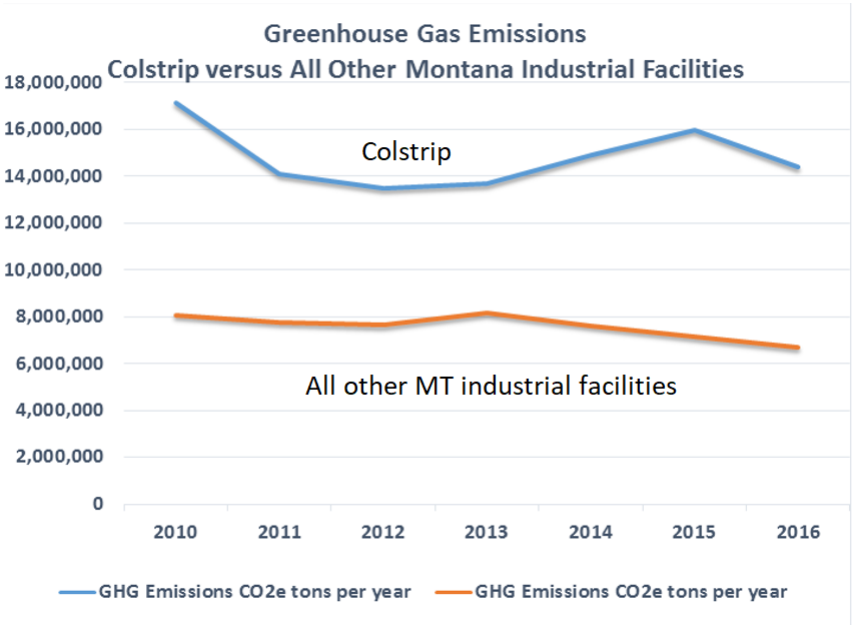
DATA IN POUNDS

Toxin	2013	2012	2011	2010	2009
Barium	62100	60500	63910	79100	65180
Hydrogen Fluoride	15500	15000	16000	20000	53000
Manganese	2930	2810	2970	3760	3670
Hydrochloric Acid	23000	22000	23000	43000	36000
Vanadium	2202	2142	2262	2801	2312
Copper	1752	1711	1802	2201	1842
Mercury	120	110	110	150	560
Chromium	425	411	431	650	510
Sulfuric Acid	66000	66000	67000	83000	68000
Lead	681	671	701	772	392
Zinc	1341	1301	1381	1711	1412
Listed Toxins Total	176051	172656	179567	237145	232878
All Toxins Total	305616	299328	312369	399811	236510

Data collected from EPA: http://iaspub.epa.gov/enviro/tris

Data Source is EPA's Toxic Release Inventory (TRI). All figures are in pounds. Emissions totals for the specific chemicals include TRI data reported for air stack emissions and fugitive emissions

Colstrip's carbon emissions make it the single largest greenhouse gas polluter in the West, generating 15 to 17 million tons per year, equivalent to three million cars, or half of all passenger cars in Washington. When the plant is fully retired, it will be the single greatest greenhouse gas reduction ever achieved in the Northwest.



If the environmental impact is not enough for this Commission to use its authority to move PSE toward retiring Colstrip, then the Commission can act for economic reasons.

Of growing concern is the Rosebud mine that is the sole source of coal for Colstrip. Mine owner Westmoreland reported to the Securities and Exchange Commission that its "estimated mine life with current plan" has Rosebud running out of coal by the end of 2024. This date lines up with likely end of Colstrip yet Westmoreland is pursuing two expansions of mining area. However, Westmoreland is on the edge of bankruptcy. It is not clear how Westmoreland can acquire a surety bond for reclamation when it is near bankruptcy.

Not only is the financing of these expansions in question, they are unlawful. Under state and federal law, mine owners must restore the existing mine area back to its original condition before an expansion can be granted. The Rosebud mine has ripped up over 10,000 acres of habitat, polluted groundwater, and dried up portions of a stream. Sierra Club and other organization are challenging these expansions. We are confident about the sound legal basis for this injunction but we fear state and federal agencies may turn a blind eye to the evidence. Part of what will discourage these agencies from doing their job will be the coal contract extension that PSE and other Colstrip owners are about to, or have, signed. PSE acknowledged that they are negotiating this contract extension from its current 2019 expiration to 2029. Even though PSE says they have "off ramps" that allow them to get out of the contract if the plant retires, this contract will enable already negligent agencies.

If the mine does expand, more costs for Colstrip owners should be expected. Mining operations will have to shift to a new area. The coal is expected to be of lesser quality that may require

adjustments to the boiler. And the stripping ratios will be higher meaning you have to remove more earth per portion of coal extracted.

What is not clear about mining costs, is how much reclamation costs will be folded into the "cost plus" contract that allows Westmoreland to pass on costs to the Colstrip owners. Only 2 percent of existing mining areas have been fully reclaimed. How is full reclamation going to be achieved and what will be the cost to Colstrip owners?

Three of the six Colstrip owners expect nitrogen controls – more specifically selective catalytic reduction technology – to be installed at Colstrip around 2025. Best current estimates for SCR for Colstrip Units 3 and 4 would be approximately $400 million in new capital costs and tens of millions in annual operational costs. It is inconceivable that any Colstrip owner or utility commission would allow such an extraordinary cost when the plant is already financially unstable.

Through our intervention in the Avista rate case in Idaho, we learned about the $160 million in new capital expenditures for Colstrip starting now in 2018 through 2020. PSE is on the hook for roughly one-third of those costs or $50 million. As Colstrip has now lived beyond its original 30-year expected life, those costs will only increase. We recommend that the Commission look closely at these expenses. Some of them may well extend the life of the plant beyond 2025. At this point in time, every annual budget that is approved by PSE must be given intense scrutiny.

Carbon pricing is coming. Whether it is this legislative session with the Governor's bill or through the ballot initiative by the Alliance for Jobs and Clean Energy, we know carbon pricing is inevitable. And so does PSE, which is why they so vigorously supported HB 2839, the alternative form of regulation which included a $40/ton carbon price. PSE knows carbon pricing is coming so they would rather have to plan for $40/ton and make Colstrip obsolete, than to pay for $20/ton of an actual price. But the more important point is this: PSE supports carbon pricing. So there should be no reason left for this Commission to not include carbon in any calculation of resources. As PSE found, even a modest carbon price on Colstrip would cost its customers $150 million by 2025.

There is also an equity issue. This Commission has allowed the most iconic businesses in the world that reside in PSE's service territory to move off of PSE's dirty resources to clean energy. The Boeing Renton facility now has a direct contract for wind. The Commission approved the Microsoft settlement enabling Microsoft to move to clean energy. The Commission also approved the Green Direct program that enables Starbucks and others to move to clean energy. It is not just the rich and powerful that want this clean energy. A majority of PSE's service territory, as represented by its local governments, have explicitly called for the end of coal power. If the Commission has gone through three separate proceedings for these big and powerful companies, then it can at least get rid of the dirty source of PSE's portfolio for the rest of its customers.

Continued investment in Colstrip is not prudent. The financial risks that Colstrip poses to ratepayers is too great. PSE and the Commission now must plan for an end of ratepayer funding by 2025.

Colstrip may be the best circumstance where the Commission should exercise its authority for pre-approval. Such a future ruling for cutting off ratepayer funding by 2025 also will provide PSE with a way to get out of their Colstrip ownership contract without fear or reprisal. PSE and the other Colstrip

owners like to say that because of their ownership contract, no single owner can retire Colstrip. They also have acknowledged they are afraid of being sued for damages if they "walk away." Yet when PSE testified about Colstrip before our state legislature three years ago, they said Colstrip owner Talen Energy may just "walk away" because they were losing millions a year at Colstrip. In fact, Talen testified before the Montana legislature saying that they are losing "tens of millions of dollars a year. It cannot continue to do that and it will not."

Yet no one ever talked about suing Talen. Why? What all Colstrip owners have said is that their ownership contract never properly envisioned retirement as we see it today. They all say the contract language is vague. So Talen can simply walk away without reprisal. Why? Because in addition to whatever vague language is in ownership contract, our legal experts have counseled us about a fundamental of contract law and investment ownership and that is no minority owner in an investment can be forced to continue to spend millions on an investment that is no longer in its best interest.

Of course this makes sense. If PSE cuts off its funding for Colstrip, a lawsuit against them by the other Colstrip owners will not succeed because no court is going to force owners to keep spending tens of millions on an investment that was supposed to only last 30 years. We are now in year 33 for the younger Units 3 and 4. Said another way, under the Colstrip owners assertion that they cannot walk away, then what they are saying is that the other owners can make them pay tens of millions a year for decades to come. This is absurd and it is a great disservice to PSE's customers that they would rather pretend they can't walk away based upon a flimsy legal theory rather than actually representing their customers' interest.

But you can help PSE. By issuing a binding order – in some future proceeding – to cut off ratepayer funds by 2025 you can provide PSE with additional legal cover. No other Colstrip owner can sue another for cutting off funding if it is from a binding legal order, hence the law in Oregon mandating no more funding for coal by 2030 ensures Portland General Electric and PacifiCorp in Oregon can walk away from Colstrip without reprisal.

You have all the evidence you need to cut off funding in a future proceeding. Colstrip is a huge financial risk to customers. Lest we forget, NorthWestern Energy in Montana valued Talen's portion of Colstrip at *negative* $340 million (575 megawatts of Colstrip, 175 megawatts of Corette). With big costs looming for coal ash, mining, air pollution and carbon, Colstrip is a financial time bomb. The risks are just too great and the continued environmental damage is untenable. We must plan now for a 2025 retirement and work toward a proceeding to make that real as soon as possible.

B. Fracked Gas – The Next Big Climate Fight

<u>Upstream leaks of methane</u>

As you probably know, there is growing concern about the upstream emissions of natural gas. And to be clear, it is not "natural." Fracking dominates our gas supply at 70 percent and is only projected to grow. Upstream emissions include fugitive emissions from drilling, extraction, processing, transport, storage and distribution. All these leaking gas emissions occur before ever reaching the gas power plant, the methanol refinery or a liquefied natural gas facility.

The upstream leakage from gas is methane. There are two international standards for measuring methane's impact on the atmosphere: A 100-year Global Warming Potential and a 20-year Global Warming Potential. We strongly recommend the 20-year standard. First, the real impact from methane occurs within the first 12 years of its atmospheric life. If you want to address the damage from methane, you should use a standard that is more aligned with when the damage occurs. Second, and more importantly, we simply cannot wait 100 years to solve global warming. We must act aggressively now and move to eliminate most coal and gas within the next 20 years or less.

When we use the 20-year standard, then we find that methane is 87 times more damaging than carbon dioxide for its impact on the climate. (Actually, it is 86 times more damaging but EPA adds an additional one point due to an oxidation process that bumps methane's impact to 87 times.)

The other important factor about upstream leaking methane from gas is how much is the leakage rate. Sierra Club conducted extensive review of the government, academic and industry literature on leakage rates. What we found was that a three percent leakage rate is a modest, if not conservative, leakage rate.

When you combine these two factors, you find that smokestack emissions from a gas power plant are only half the climate problem. In fact, when you compare the average lifecycle climate emissions of an average gas plant you find that is as bad as an average coal plant. The imperative for creating climate accountability for gas is to make sure you look at these upstream emissions. When you do, you will find that you have already lost the climate battle before the gas power plant is built just by bringing the gas from the wellhead to the power plant.

We are thankful that we now have two agencies in the state that have acted on the problem of upstream emissions. The state's Environmental Hearings Board rejected the Environmental Impact Statement for the Kalama methanol refinery because the Port of Kalama did not review these upstream emissions. The Puget Sound Clean Air Agency has now ordered a Supplemental Environmental Impact Statement for Puget Sound Energy's LNG facility at Tacoma because the City of Tacoma did not account for these upstream emissions.

We can debate about the level of upstream emissions. We hope to have our three percent standard tested in court because we believe this is an accurate, if not conservative, estimate. But what we cannot debate is the existence of these upstream emissions and their severe impact on the climate. Going forward, if the Commission were to review a solicitation for new electricity resources, it would be a grave dereliction of duty to not require a review of these emissions.

The other important aspect of upstream emissions is the burden of proof. The gas industry is the keeper of most, if not all information, of the true upstream emissions level. But the industry has been negligent in accounting for the problem. Of the 65 large oil and gas companies reviewed by the Environmental Defense Fund, only 14 percent reported leakage rates. Only one company thoroughly addressed how it planned to prevents leaks. And zero companies had methane emission reduction targets. With such negligence on the part of gas companies – who have an inherent interest in keeping this information from the public – the burden of proof should be on these companies and not upon regulators.

As such, we strongly recommend this very reasonable three percent leakage rate with ample opportunity for gas companies to prove otherwise. But the burden of proof must be on the gas companies. They are the foxes guarding the hen house. The Precautionary Principle would mandate a three percent leakage rate with opportunity to prove otherwise.

Attached to this testimony is our recently released fact sheet and policy primer on upstream emissions of gas. This paper went through extensive internal and external review. We hope to see these recommendations passed into law. In the meantime, regulators need to be aware of, and take action upon, the extreme climate impacts from leaking upstream methane emissions. At a minimum, any new Integrated Resource Plan should account for these emissions.

Gas is a financial risk for customers, not utilities

In today's world new gas plants are unique because they hold unique risks to customers: future fuel price and carbon price.

Gas fuel prices remain at historic lows. Most industry and government predictions have prices remaining low for the next 5 to 10 years. PSE's forecast from Wood MacKenzie validates this assumption. Further keeping pressure on low prices is a surplus of gas and Canadian gas fields looking to find a home for new gas in Washington or exports at our ports. There is a strong consensus that beyond the next 5 to 10 years, gas prices are likely to only go up.

Historically, power cost adjustments accounted for fuel cost because gas prices were considered "volatile." If prices were higher than expected, costs would get passed on to customers. If prices were lower than expected, savings would get passed on to customers. But now prices are expected to climb slowly with a generally agreed-upon expectation: gas prices will rise over time. Power cost adjustments should take this into account so as to not have these operational costs fall solely to the customer.

Given coal is on its last leg, gas is the only resource that will create fuel price pressure on customers. Now add carbon into the mix. There will be a price on carbon, one way or another, and hopefully sooner rather than later. But just about everyone agrees it is inevitable.

Like fuel price, carbon price is generally seen as an operational cost and therefore mostly likely to fall to customers. So gas plants, and in particular, new gas plants have two customer liabilities: future fuel price and carbon price. Coal also is subject to carbon price but we can assume coal will be gone in Washington by 2025.

Combine these two unique features of new gas plants with capital costs. PSE can invest its equity in a new gas plant and make around 10 percent in profit. This alone is rather extraordinary. There are no great risks in buying a new gas plant except for what PSE testified about last month to our state legislature. They are concerned that future carbon prices could make their investment obsolete. This is a major concern and we pleased that PSE acknowledges it. But their investment is otherwise mostly risk-free for PSE. If the machine breaks, GE or Rolls Royce will have to fix it. Gas plants are a well-known technology that has few operational breakdowns.

But that is only half the problem. The bigger problem is who shoulders the risk. Here is the scenario: PSE invests hundreds of millions in a new gas peaker plant, they make extraordinary profits but customers have to absorb the biggest known risks of uncertain future fuel or carbon prices. That's not

fair. PSE knows the big risks on gas are future fuel and carbon prices. So why should customers have to absorb that risk? PSE should not be allowed to have all profit and no risk. So either they forego the profit, or the when the plant is built, shareholders have to pay for any increases in fuel and carbon. But PSE should not be allowed to have it both ways: all profit and no risk. New gas plants are likely going to create unfair and disproportional risks to customers.

This is yet another reason why the Commission should use its existing authority to incorporate carbon price in all of its planning and acquisition oversight, and in any prudency determination.

C. PSE LNG Storage Facility in Tacoma

The Sierra Club has previously submitted the following comments on PSE's LNG storage facility, and shares them here for visibility.

PSE is sacrificing Puyallup Tribal land, community safety, and customer money for a liquefied natural gas (LNG) terminal in Tacoma that we do not need.

PSE sells the project as necessary to provide backup for its gas utility on peak winter heating days, but the "deficit" it seeks to meet is largely a product of PSE's own design. PSE currently leases 4,000,000 Dth of its storage capacity at the Clay Basin facility in Dagget County, Utah to third parties and is considering extending these arrangements when the existing contracts expire in March 2018. PSE also plans to transfer 10,000 Dth/day to Puget LNG to provide service to Totem Ocean Trailer Express (TOTE). Instead of wasting ratepayer dollars on new gas fracked gas infrastructure, PSE could not renew its third-party leases and limit its transfer to TOTE.

PSE's 20-year plan falsely treats the Tacoma LNG facility as a done deal and assumes that the project will be complete in time for the winter 2019/20 heating season.

With this in mind, it is perhaps not surprising that PSE has already begun construction on the facility. However, PSE has yet to secure all the necessary permits, and the Puget Sound Clean Agency recently announced that it will conduct a Supplemental Environmental Impact Statement (SEIS) to analyze the project's climate impact. Illegally breaking ground without all the necessary permits is financially imprudent and also shows a troubling lack of respect for public process.

PSE's disregards environmental review process, and is inconsistent about their capacity plans for the Tacoma LNG facility.

In their application to the Puget Sound Clean Air Agency, the claim that the facility will operate at 250,000 gallons/day, as opposed to the 500,000 gallons/day that PSE themselves indicated that operations could fluctuate up to in the original environmental impact statement. This discrepancy significantly impacts the numbers associated with the amount of toxic emissions the facility will release, and is evidence of PSE's lack of transparency in the public process.

D. Load Growth Drivers

Demand in Puget Sound Energy's service territory after DSR has been flat for a decade. This is a testimony to the power of technologies like LED lightbulbs, state building codes & standards, more efficient appliances, and PSE's accelerated conservation ramp rate in recent years. Additionally, perhaps our residents care more about going off-grid and conserving power. Consistent with the Northwest Power & Conservation Council's 7th Power Plan, the last decade suggests load growth will be met with improved energy efficiency, demand response and conservation. However, PSE's IRP shows load growth beyond 2025 requiring new power plants. We need to carefully evaluate the necessity of those plants & the quality of the load forecasts.

Beyond population growth, there are four industrial drivers that will increase load in the future, some of which will occur in PSE's service territory. However, substantial load growth might occur elsewhere in WA state, limiting PSE's access to future power contracts from the BPA or PUD's. PSE needs to monitor both, to understand its own needs, the pricing & availability of long-term power contracts, as well as the spot market. Load growth drivers include:

- population growth
- data centers
- cryptocurrency & blockchain mining
- electric vehicles
- "indoor agriculture"

While cryptocurrency mining is technically a subclass of data centers, it should be tracked differently, as the miners have different economics from traditional data center owners, faster ramp rates, and they are growing in different counties. These five drivers should be modelled independently, so PSE has better insight into potential load growth.

To model cryptocurrency & data center growth, PSE needs to look at Chelan, Douglas & Grant counties. Mining operations will likely eat up a substantial amount of those counties' available electricity, and may cause those PUD's to acquire more power from the BPA at the next available opportunity. That may further reduce the amount of power that PSE could obtain either directly or indirectly via the spot market from the BPA in the future. How much power? Steve Wright, General Manager of Chelan PUD said there have been 75 inquiries from cryptocurrency miners, and four of those requests were for 100 MW[6]. Are these counties willing to build infrastructure? CNBC interviewed Ron Cridlebaugh, Port of Douglas County economic development manager saying Douglas County PUD is building out 100 MW of infrastructure for data centers[7]. By comparison, Grant County has traditional data centers from Internet companies and computer vendors. Perhaps some of their loads are doubling every year, but the cryptocurrency craze may be substantially faster.

E. Battery Cost and Benefit Concerns

[6] CNBC interview with Chelan PUD: https://www.cnbc.com/video/2018/01/11/bitcoin-mining-epicenter-found-in-rural-wenatchee-washington.html

[7] CNBC interview with Port of Douglas County: https://www.cnbc.com/2018/01/11/cryptocurrency-mining-puts-electrical-grid-of-small-washington-state-county-to-the-test.html

As pointed out by Synapse Energy Economics[8], we are concerned that the benefits of batteries may not be fully captured. We have a suggestion for both capturing the economic benefits and ensuring costs are lower.

Snohomish County PUD has substantial experience with both lithium ion batteries and vanadium flow batteries from multiple different vendors. To ease management of several different battery technologies, SnoPUD developed MESA as a software system to integrate battery dispatch into the utility's operations in a better manner. We strongly recommend PSE contact SnoPUD's engineers (in particular H. Scott Gibson, Principal Engineer in the Generation Department) and economists in Everett to learn from their experience. SnoPUD has been publicly presenting their results over the past 1.5 years with groups like the Distribution System Collaborative and Solar Washington[9]. SnoPUD has a well-developed microgrid R&D program. PSE will be able to better assess battery system costs and operational costs by learning from cutting-edge SnoPUD research & development.

Areas Where the Commission Should Provide Guidance

A. The UTC Holds the Keys to Ending Global Warming in Washington

Governor Inslee's Deep Decarbonization Pathway Project reiterated the "three pillars" of ending global warming that have now been validated by the United States under past Secretary of State John Kerry, by the United Nations, by countries around the globe and increasingly by other state in the U.S.

The three pillars are the same. First, deep energy efficiency across all sectors of the economy. The first step in solving global warming is to cut out waste. Studies abound showing we can cut our building electricity in half with deep retrofits and innovative "pay for performance" contracting with longer pay-back periods. Second, we must move to 100 percent clean electricity. All coal and gas must be removed from our electricity grid. Finally, we then move to electrify as many vehicles (including marine vehicles), buildings and appliances as possible.

This Commission has jurisdiction over all three of these pathways to end global warming. As such, your importance as a regulatory agency is only going to grow. You hold the keys to ensuring Washington State is aggressively pursuing all three of these pillars.

Because of this, there is an obvious next step for this Commission in this process for shaping Integrated Resource Plans. For this point forward, no utility should provide a 20-year IRP unless it is a pathway to 100 clean electricity with deep efficiency and solid plans for massive electrification. Anything less, is a disservice to our children who will pay the real cost of global warming.

This isn't an environmentalist dream. The Washington legislature passed 70.235 RCW saying:

[8] See "Evaluation of Battery Storage Resources", Synapse Energy Economics report on PSE 2017 IRP: https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/CaseItem.aspx?item=document&id=00167&year=2016&docketNumber=160918&resultSource=&page=1&query=160918&refiners=&isModal=false&omItem=false&doItem=false

[9] Snohomish County PUD presentation on the Arlington Microgrid for Solar Washington, Jan 10 2018. https://d3n8a8pro7vhmx.cloudfront.net/solarwa/pages/302/attachments/original/1515794852/SnoPUD_microgrid_SW_General_Meeting_Jan_10_2018.pdf?1515794852

> The State shall limit emissions of greenhouse gases to achieve the following reductions for Washington State:
>
> - By 2020, reduce overall emissions of greenhouse gases in the State to 1990 levels;
> - By 2035, reduce overall emissions of greenhouse gases in the State to 25 percent below 1990 levels;
> - By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emissions to 50 percent below 1990 levels, or 70 percent below the State's expected emissions that year.

However the UTC has not yet followed through with these requirements. Where does the UTC require utilities to reach these emissions targets, or even attempt to model compliance costs with state law? Commissioners and Staff are encouraged to re-read our brief, two page comments in the IRP process improvement docket[10] for inspiration on how the Commission could choose to ensure compliance with state law. How will a natural gas utility voluntarily choose to stop selling 50% of its gas? What incentives are necessary for private homes to replace gas furnaces with baseboard heating or heat pumps? Perhaps a new business model is necessary, especially for the parts of a utility business that must be slowly, carefully wound down over the next 30 years.

This Commission must lead the way. PSE's 2019 IRP needs to have as a baseline, as its Preferred Resource Portfolio, a pathway to 100 percent clean electricity. Then "least cost" or "lowest reasonable cost" is measured by how cost effectively PSE can get to 100 percent clean electricity in the next 20-year cycle. The Sierra Club raised this issue in 2015[11], but PSE chose not to analyze this scenario. The UTC must require that utilities model compliance with state law.

Washington State is uniquely positioned to deliver on the solutions to global warming. With our large hydropower base, and with world leaders in aerospace and software, we have a culture of innovation and ability to address any level of complications. If we here in Washington cannot lead on this pathway to 100 percent clean energy, then we are in big trouble. And this Commission will play a central role, if not THE central role, in delivery on that promise of stopping global warming in Washington.

B. Transmission Grid Resiliency Planning

As the Commission is aware, FERC just convened a docket on resiliency. This was prompted by a horribly misguided Federal Dept. of Energy proposal on "Grid Reliability and Resilience Pricing", which claimed that only plants with a 90 day fuel supply on-site could be counted on to provide resiliency. This was meant as a technology-biased subsidy for coal and nuclear plants, conveniently ignoring generation

[10] U-161024 Sierra Club comments on WA GHG emissions reduction targets: https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/CaseItem.aspx?item=document&id=00027&year=2016&docketNumber=161024&resultSource=&page=1&query=161024&refiners=&isModal=false&omItem=false&doItem=false

[11] See "No Pathway to Reduced Emissions", Sierra Club comments on PSE 2015 IRP: https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/CaseItem.aspx?item=document&id=00045&year=2014&docketNumber=141170&resultSource=&page=1&query=141170&refiners=&isModal=false&omItem=false&doItem=false

sources that rely on the air or the sun rising every day. FERC rejected this proposal[12], and wisely recognized that over 90% of outages were due to distribution grid problems instead of transmission grid failures. Commenters pointed out less than 0.08% of grid events were due to fuel supply problems at power plants, and recognized that coal plants have had their coal piles freeze in the extreme cold events that DoE sited as the primary motivation for resiliency subsidies.

That being said, FERC concluded that resiliency was something that needed to be analyzed in more detail. We are interested in understanding industry efforts to protect the transmission and distribution grid from storms, trees, earthquakes, cyber attacks, and the most common threat to the grid – squirrels. Seattle even has to contend with birds dropping fish on power lines. FERC wants this process driven by regional transmission organizations and independent system operators.

We would like to see utilities like PSE participate in a WECC-wide, or at least BPA-convened, planning effort around improving resiliency. To prepare for an event like a massive earthquake on the West Coast or yet another year of record wildfires, we may need to design the grid to provide most of its current load even if natural gas pipelines are damaged for a month and transmission lines are severely damaged. This requires open, transparent WECC-wide planning with involvement from FERC. We suspect that a technology-neutral approach would value cross-state transmission highly. There are a few approaches that could be taken, and they aren't mutually exclusive:

1) Build microgrids to improve resiliency on the neighborhood or city level. Interoperate with the WECC for spot market and cheaper operation on normal days.
2) BPA could consider increasing transmission to and from California, so utilities could take advantage of existing power plants for additional operating reserves.
3) BPA could prepare for an east-west high voltage DC line to allow more wind generation in Montana to provide backup for our fragile natural gas infrastructure.
4) Increased usage of the California Energy Imbalance Market for a better spot market and fast, automated demand response capabilities WECC-wide.

The right mix of the above ideas may provide a substantial improvement in the resiliency of our electric grid to catastrophic failures with modest investments. We recommend the UTC require utilities to evaluate these types of resiliency investments in an appropriate regional or WECC-wide forum, and reflect the outcome of that forum in the next IRP.

C. Distribution Grid Planning – Transformers, Locational Marginal Value of Conservation, Batteries, and Demand Response

We'd like to see future IRP's discuss distribution grid upgrades. We are concerned about PSE's Energize Eastside project, and wonder whether a regional transmission project may have been miscategorized as a local distribution grid upgrade. A report from EQL Energy suggests that distribution grid improvements could be had for a substantially lower price than a new power line through an urban area. We are concerned about the proximity of the power line to the Olympic pipeline (which carries

[12] FERC order terminating Rulemaking Proceeding, Initiating New Proceeding, etc. This was a fun read. Docket RM18-1-000 Jan 8 2018. https://www.ferc.gov/CalendarFiles/20180108161614-RM18-1-000.pdf

natural gas, jet fuel, diesel, and gasoline) due to the possible advanced corrosion risk, as well as the integrity of the pipeline in the event that the power line falls to the ground in a storm or earthquake. We wonder whether the Columbia River Treaty requires BPA to send power north to Canada even in a power emergency, and whether that power must be sent on lines going through PSE's service territory in Bellevue vs. other routes. We question whether flat or declining load growth postpones the need for expanding the distribution grid for several decades. We are concerned that ratepayer money may be imprudently allocated to the Energize Eastside project.

After reading the Lauckhart-Schiffman load flow study[13], we believe there is no clearly demonstrated need to build extra distribution lines to meet load growth. It's possible Eastside demand might be flat instead of growing at over 2% annually, but PSE hasn't provided an updated Eastside-specific demand forecast after Energize Eastside started. However if resiliency is something FERC recommends we explicitly subsidize, then perhaps one or two extra transformers at existing substations would meet this need in a cost-effective manner.

We want to understand the locational marginal value of conservation. For instance, perhaps a mix of utility-scale batteries, home weatherization, and fast, automated demand response between Bellevue, Redmond, Kirkland, and Woodinville may delay or alleviate the need for a distribution grid upgrade. Weatherization may benefit the utility not just from reduced energy usage and peak capacity savings, but lower peak distribution grid capacity as well. We need some numerical way to evaluate these benefits and plan for them in an IRP. Additionally, perhaps distribution lines should be placed underground more aggressively in areas on the urban-rural boundary to help provide a more resilient distribution grid.

Tesla's experience with quickly building a 100 MW/129 MWh battery for South Australia is impressive, with the Hornsdale power reserve capable of swinging from providing 100 MW of power to absorbing 70 MW as well as to provide frequency regulation[14]. When a coal power plant went offline, the battery provided 8 MW within 140 milliseconds[15]. This real-world experience suggests that batteries could address an occasional distribution shortfall in an N-1-1 scenario for a few suburbs. This system went online 54 days after the final regulatory approval. Demand response could potentially provide similar benefits like shedding a similar amount of load within 5 minutes, to either augment or provide redundancy for a battery. And like conservation, demand response in specific neighborhoods may provide a similar locational marginal value from deferred distribution grid capacity upgrades.

We recommend that future distribution grid planning & improvements be driven through the IRP process, so stakeholders can participate in the discussion from load forecasts, conservation & DR investments, to a brief discussion of substation siting, battery alternatives, and transformer performance.

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[13] Lauckhart-Schiffman load flow study, http://cense.org/Lauckhart-Schiffman%20Load%20Flow%20Study.pdf

[14] "A month in, Tesla's SA battery is surpassing expectations", by Dylan McConnell, Researcher at University of Melbourne, Jan 10 2018. https://theconversation.com/a-month-in-teslas-sa-battery-is-surpassing-expectations-89770

[15] "Tesla big battery outsmarts lumbering coal units after Loy Yang trips", RENewEconomy, Dec 19, 2017 http://reneweconomy.com.au/tesla-big-battery-outsmarts-lumbering-coal-units-after-loy-yang-trips-70003/

Thank you to the Commission and Staff for your thoughtful actions in response to our comments.

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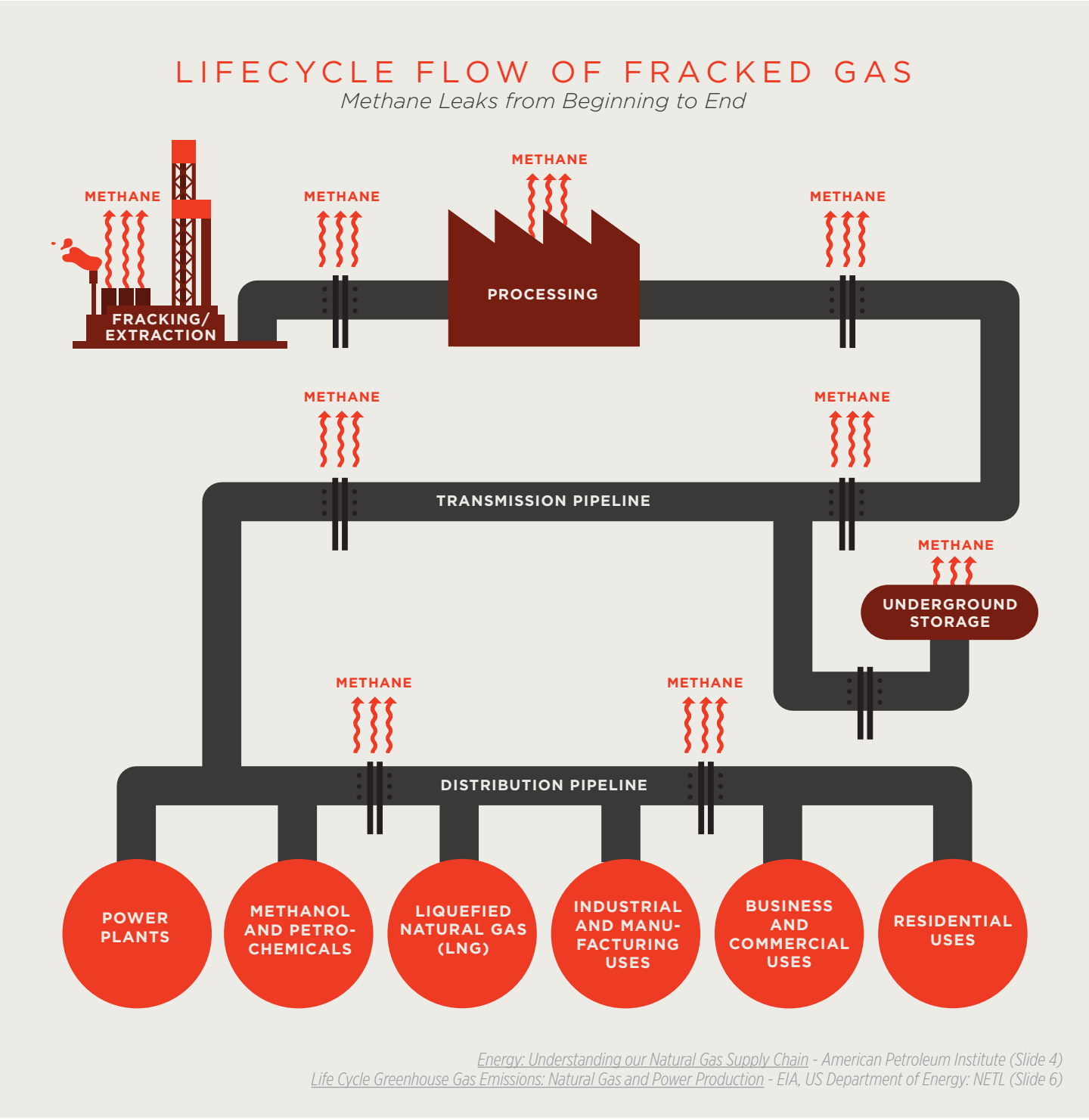
Sierra Club

FRACKED GAS

THE NEXT BIG CLIMATE FIGHT

SIERRA CLUB

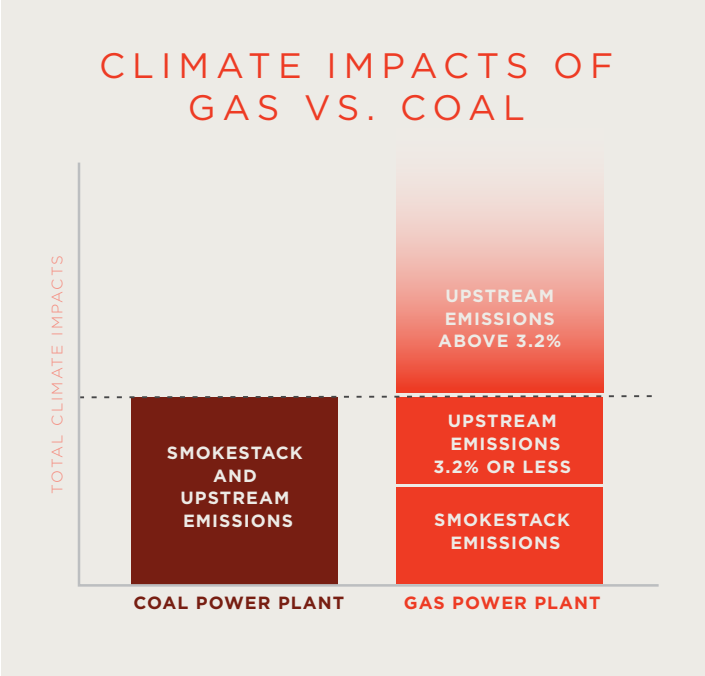


Coal, oil, and natural gas are the primary sources of human-caused climate change. Coal use has seen a dramatic decline in recent years and rapid advances in electric vehicle technology offer the promise of reduced oil use. However, natural gas—which, in the United States, comes primarily from the environmentally-destructive practice of hydraulic fracturing, or "fracking"—is on the rise. **Fracked gas is the next big climate fight in Washington State.**

SECTION 1: **THE TRUE CLIMATE DAMAGE OF FRACKED GAS**

There's nothing "natural" about natural gas. The introduction of fracking has transformed the industry and made fracked gas into one of the largest threats to our climate. Although fracked gas produces less carbon emissions than coal when burned, the production, processing, storage, transmission, and distribution of fracked gas leaks into the atmosphere immense amounts of methane, which is a much more destructive pollutant for our climate than carbon dioxide. **When accounting for methane leaks, fracked gas has climate impacts that rival those of coal.**

Two-thirds of all gas produced in the U.S. is fracked. In this report, we refer to all gas as "fracked" gas because any increase in gas infrastructure will also lead to a sustained increase in the harmful practice of fracking.

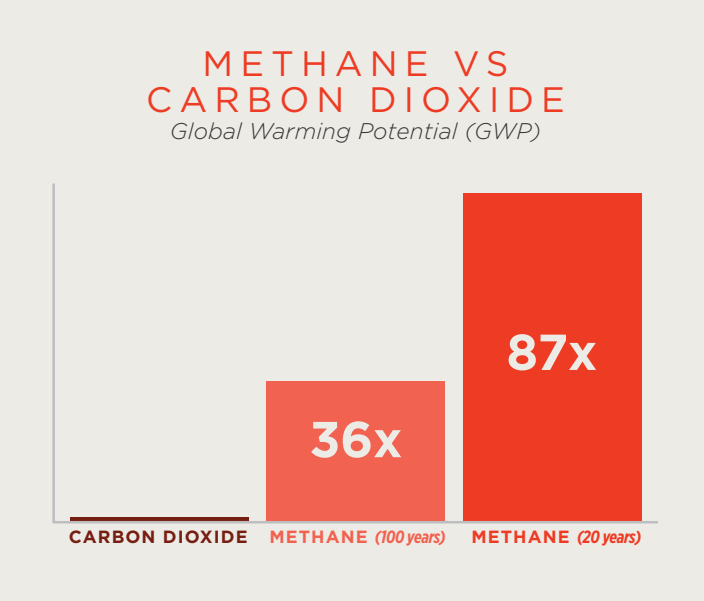


To meet our long-term climate reduction goals, we must first stop making the problem worse by halting all new or expanded uses of fracked gas, including new power plants, the Kalama methanol refinery, and the Tacoma liquefied natural gas facility. Then we must systematically retire all existing gas plants.

To address other climate emissions, we also must electrify as many vehicles as possible and replace gas appliances such as hot water heaters and furnaces with devices that are powered by a clean electricity grid. To that end, a truly clean electricity grid becomes an essential anchor for addressing global warming.

SECTION 2: **WHY FRACKED GAS IS SO DAMAGING**

When burned at the power plant, fracked gas emits about half as much carbon dioxide as a typical coal plant to generate the same amount of energy.[1] However, unburned fracked gas consists primarily of methane. While carbon dioxide remains in the atmosphere for longer than methane, methane has a much stronger climate warming effect. **When methane is leaked directly into the atmosphere, it is 36 times more powerful at trapping heat than carbon dioxide when its impact is averaged over a 100-year period. Over a 20-year period, methane's heat-trapping impact is 87 times more powerful than that of carbon dioxide.[2,3]**



SECTION 3: **METHANE'S DEADLY RISE**

A 2016 Harvard study found that methane emissions in the United States increased by over 30 percent between 2002 and 2014.[4] This domestic increase accounted for a substantial share—by some estimates, a majority or more—of the total growth in methane emissions that occurred worldwide over that time period.

An academic study adopted by the United Nations predicts that without an immediate reduction in methane and other carbon emissions, we are in grave jeopardy of reaching a 1.5 degree (Celsius) warming by the year 2030 and continuing to a 2 degree increase soon after.[5] These are considered the thresholds above which the worst effects of climate change are likely to occur.

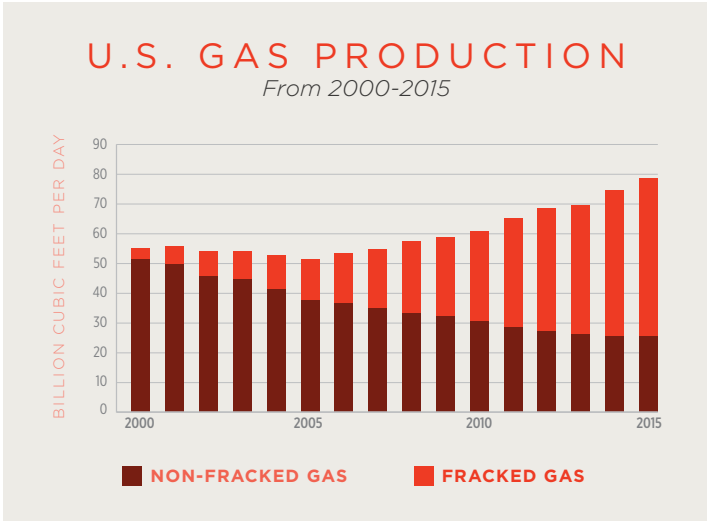
With this warming trend, we will not meet the goals set under the Paris Climate Agreement, the landmark climate plan signed by every country but the United States. The Paris Agreement has been upheld by thousands of U.S. cities, states and businesses despite the Trump Administration's stated intention to abandon the agreement in 2020.[6]

Washington's climate future with current emission trends:[7]

- *38 to 46 percent less snow than 1916-2006 by the 2040s*
- *Up to 400 percent increase in wildfire size with 1 more degree (Celsius) of warming[8]*
- *Up to 109 percent increase in ocean acidity compared to before 2005*

SECTION 4: **THE GAS INDUSTRY'S ROLE IN METHANE EMISSIONS**

Fracking has increased dramatically in recent years. The Energy Information Administration reports that about two-thirds of all natural gas production in the United States now comes from fracked wells, compared to less than 10 percent in 2000.[9] During that time, the average daily gas production from fracking has increased by about 1,200 percent. And according to the Environmental Protection Agency's (EPA's) 2017 U.S. Greenhouse Gas Emissions Inventory, the oil and gas industry is the second-largest source of methane emissions in the United States, contributing over 30 percent of all domestic methane pollution.[10]



SECTION 5: **HOW MUCH METHANE IS LEAKING?**

> *"Natural gas is not a bridge—it's a gang plank"*
>
> *—Michael Brune, Sierra Club executive director*

Just how bad is gas for the climate? That depends on how much methane is leaked before it is burned. Researchers have concluded that at leakage rates exceeding 3.2 percent of total production, the lifecycle climate impacts of burning gas are the same as those of burning coal.[11] So are leakage rates actually this high?

Studies indicate that the upstream methane leakage rates in the gas industry vary significantly from one production site to the next, as well as from one geological basin to the next, making it difficult to settle on a single average number. To the extent that researchers *have* calculated average emission rates from gas production, the most common global estimate is about 3 percent.[12] Although not all geologic formations in the United States necessarily reflect this estimated global average, studies of gas-producing basins in the West,[13] such as the Denver-Julesberg Basin, the San Juan Basin, the Uintah Basin, and the Los Angeles Basin,[14] indicate some of the highest leak rates in the country, often exceeding the global 3 percent average.

Furthermore, these figures only account for leakage that occurs between initial production and delivery to local distribution systems. Therefore, they don't capture leaks that occur while the gas is being moved *within* those distribution systems or at end-use facilities, implying that a 3 percent estimate may be conservative in many cases.

A 2016 study by the Environmental Defense Fund of 65 large oil and gas companies found that only:[15]

- Only 14 percent of companies reported their methane leakage rate
- Zero companies had methane emission reduction targets
- One company thoroughly addressed how it planned to prevent leaks

Although Exxon recently announced plans to reduce methane voluntarily, the vast majority of gas companies have not taken active steps to address emissions from existing equipment and show no indication that they intend to do so soon.

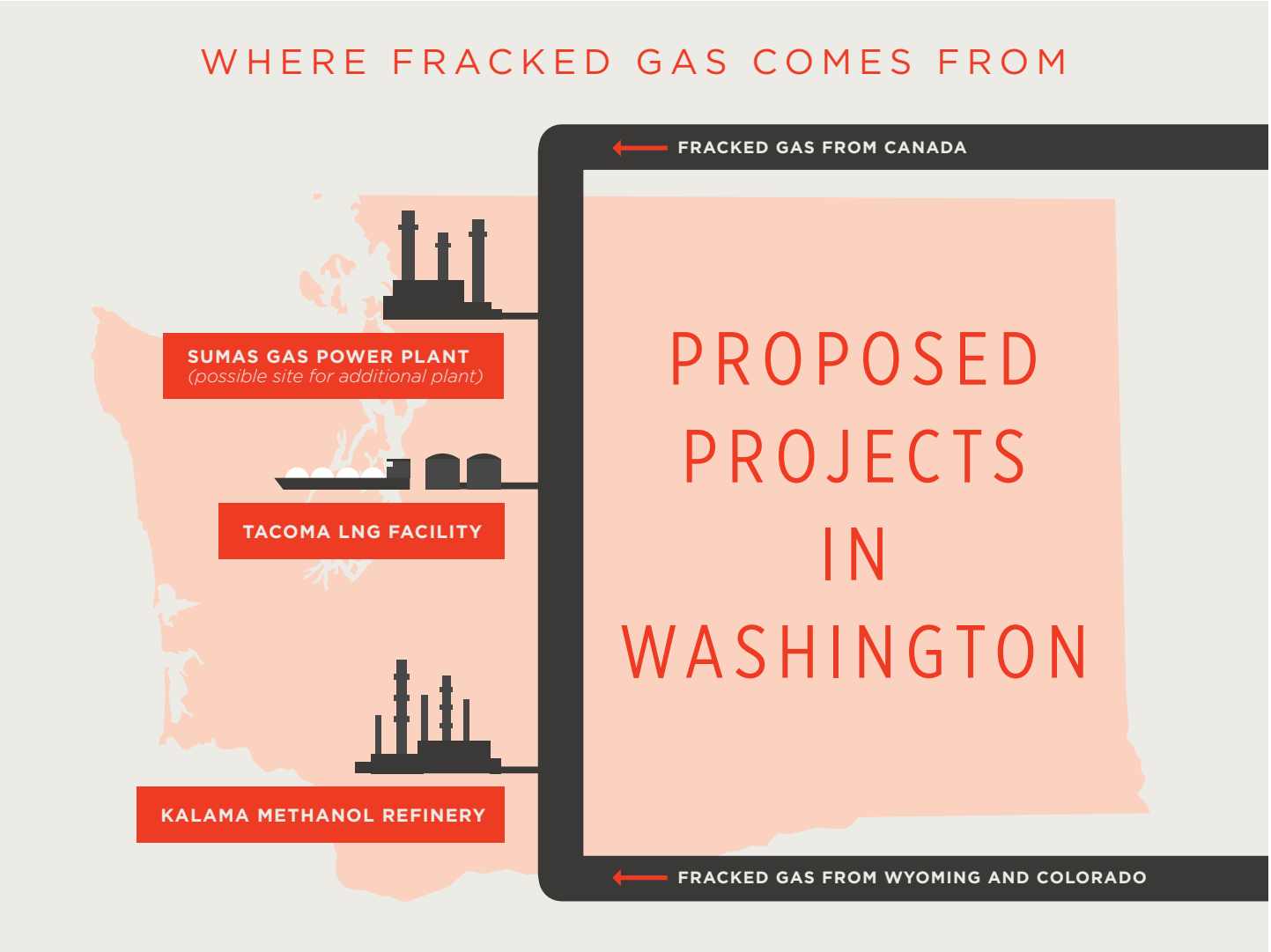
EPA's Greenhouse Gas Reporting Program requires companies to report their methane pollution. However, companies are able to exploit numerous loopholes that cause under-reporting of these emissions. These loopholes include:

- Completely excluding facilities under a certain size from the Program's requirements
- Exempting certain kinds of equipment, activities, and practices in the oil and gas industry from the Program's requirements, even though we know they emit methane
- Frequently relying on estimates rather than direct measurement

Making matters worse, one of Scott Pruitt's first orders of business when President Trump selected him to lead EPA was to cancel the agency's request for more information on opportunities for reducing methane emissions and to reconsider important safeguards against methane emissions from new oil and gas equipment, which the Obama Administration put in place last year.

SECTION 6: **THE GAS INDUSTRY'S BURDEN OF PROOF**

To the extent that there is uncertainty about the level of upstream emissions, the evidence points in one direction only: emissions are higher than industry currently estimates. The only way to quickly ensure accountability for the true magnitude of fracked gas's impact on the climate is to shift the burden of proof onto the gas industry. Fair yet minimal standards need to be established immediately. If the gas industry disagrees, then they can prove otherwise. Unless and until we shift the burden of proof, we will not know just how bad the problem truly is.



SECTION 7: **FRACKED GAS POLICY RECOMMENDATION**

Due to the extreme climate harm caused by methane emissions and the current lack of general accountability, proactive measures are needed.

As noted above, while the estimated global average emission rate for gas production is 3 percent, studies show that leakage rates at production sites in the West—where Washington sources most of its gas—may exceed this figure. To begin addressing this under-recognized climate threat, **we recommend four essential steps to address the gas problem.**

(1) As a baseline matter, projects in Washington State should assume a 3 percent overall leakage rate of methane. This modest standard reflects the global average leak rate, and is conservative in light of high average leak rates in the West and the additional losses that occur within distribution systems or at end-use facilities.

(2) This 3 percent standard should be applied **unless each company with a gas project can provide clear evidence that the leakage rate associated with that particular project is, in fact, below this 3 percent standard** (for instance, if it sources gas from a geologic basin with valid evidence of lower rates). The burden of proof for adopting a project-specific

Washington Current Proposed Projects

- *Kalama methanol refinery*
- *Tacoma liquefied natural gas facility*
- *Puget Sound Energy and Avista proposed gas plants*

standard should be on the project proponent, because the gas industry is the keeper of all crucial information about leakage rates. As such, if the proponent is confident that the 3 percent standard is inaccurate, it is in the strongest position to disprove this standard.

(3) State and local agencies use the more urgent 20-year Global Warming Potential, at which the climate-disrupting impact of methane is 87 times greater than that of carbon dioxide. Not only does the 20-year potential more accurately correspond to the average 12-year atmospheric lifetime of methane molecules than the 100-year potential, the urgency of climate impacts is with us now which merits using nearer-term impacts as the standard.

(4) All state and local agencies, including but not limited to those listed below, should include this 3 percent methane leakage rate and the 20-year Global Warming Potential when assessing the climate impacts of all fracked gas power plants, methanol refineries, LNG facilities, and all other projects and infrastructure in Washington State.

- The State Legislature
- The Utilities and Transportation Commission
- The Department of Ecology
- The Department of Natural Resources
- State and local government siting and permitting agencies
- State and local air agencies

SECTION 8: **FRACKED GAS: A BRIDGE TO NOWHERE**

As coal plants are shuttered across the United States, our decisions for energy replacement options will affect our climate, our health, and our security for years to come.

The fossil fuel industry has long touted gas as a "bridge" to a carbon-free energy mix, asserting reductions in climate pollution while clean energy technology develops. The truth is that our clean energy future is here now, creating jobs and cutting pollution through solar, wind, and energy efficiency projects. The gas plants we build now will likely be with us for decades to come. We must more rapidly reduce our reliance on fossil fuels and replace them with truly clean alternatives, such as wind, solar, and energy efficiency, not build a new fossil fuel backbone for our energy grid at a time when clean energy is cheap and plentiful.

SECTION 9: **BIG PROBLEMS BEYOND CLIMATE**

Climate impacts from fracked gas are one aspect of a larger problem; concerns about this dirty fuel run much deeper and deserve intense scrutiny. Many of these additional impacts are of primary concerns for communities living on the frontlines where these impacts occur. They include (but are not limited to):

- Contaminated groundwater from fracking
- Earthquakes from fracking
- Explosions due to leaking pipelines and storage facilities
- Nitrogen oxides and other air pollutants from smokestacks at end-use facilities
- Upstream emissions of traditional air pollutants, such as smog- and soot-forming volatile organic compounds and air toxins such as benzene, a known carcinogen

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ACKNOWLEDGMENTS

1. *All information is attributable to Sierra Club only*
2. *Thanks to Tarika Powell at Sightline Institute for research, analysis, and editorial review*
3. *Special thanks to energy policy intern Liam Moser of Western Washington University for research, writing and conceptual framework*
4. *Cover photo from Greenpeace. Cattle Grazing near Hydrofracking Installation in Texas*

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