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IN THE SUPREME COURT OF THE STATE OF ALASKA

SUMMER SAGOONICK; CH'EELIL P., a minor, by and through her guardian, ENEI P.; CECILY S. and LILA S., minors, by and through their guardians, MIRANDA W. and BOB S.; CARRIE DOCK; LINNEA LENTFER; BAY W., a minor, by and through his guardian, MILLER W.; and JAMIE T., a minor, by and through her guardian, BERTHA T.,

Plaintiffs-Appellants,

v.

STATE OF ALASKA; ALASKA GASLINE DEVELOPMENT CORPORATION; and FRANK RICHARDS, President of the Alaska Gasline Development Corporation, in his capacity,

Defendants-Appellees.

Sup. Ct. Case No. S-19417

Trial Court Case No. 3AN-24-06508

AFFIDAVIT OF MARK Z. JACOBSON, PH.D. IN SUPPORT OF PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION

I, Mark Z. Jacobson, Ph.D., hereby declare and if called upon would testify as follows:

1. In this affidavit, I offer my expert opinion that the Alaska Liquified Natural Gas Project (the "Alaska LNG Project" or the "Project"), and the climate and localized air pollution and ensuing harms to Youth Plaintiffs that would result, is entirely unnecessary to meet its claimed goal of providing Alaskans with a "long-term and affordable source for home heating and industrial needs."[1] For starters, natural gas (also known as fossil gas, since it is a fossil fuel formed primarily from the decomposition of organic matter, from primarily ancient marine organisms, over millions of years under high pressure and temperature), is a limited resource so not a long-term solution to energy needs. Instead, a real long-term solution to energy needs already exists that is less expensive from a private-energy cost and social cost (energy plus health plus climate cost) point of view than fossil gas and does not cause harm to human health or the environment through local air pollution or local and global climate damage. That solution is to electrify most all energy (e.g., by moving to electric heat pumps and electric vehicles and electrified industry) and to provide the electricity with clean, renewable wind, solar, geothermal, and hydroelectric power while using battery

[1] Alaska LNG, *Project Overview*, https://alaska-lng.com/.

storage, pumped hydroelectric power storage, existing hydroelectric reservoir storage, and hydrogen storage for backup electricity. Such a transition would provide a far-more long-term, economically-beneficial, healthful, climate-friendly, and reliable solution than the Alaska LNG Project.

Professional Background & Qualifications

2. I am a Professor of Civil and Environmental Engineering at Stanford University. I have been a professor at Stanford since 1994.

3. I have two Bachelor's Degrees With Distinction from Stanford University, one in Civil Engineering and the other in Economics. I earned a Master's Degree in Environmental Engineering from Stanford University. I earned a second Master's Degree and then a Ph.D. (1994) in Atmospheric Sciences from UCLA.

4. Since 1989, I have been researching the impacts of human emissions of gases (among them carbon dioxide and other greenhouse gases) and particles (including black and brown carbon) from fossil fuel development and use on air pollution, human health, weather, and climate. Starting in 1999, I began examining in detail clean, renewable energy solutions to these problems. I have since developed roadmaps to transition the all-sector energy infrastructures of each of the 50 United States, including Alaska, and each of 149 countries to 100% clean, renewable energy by 2050. In this declaration, I summarize how this research pertains to the Alaskan communities and Asian countries to which the Alaska

LNG Project would supply fossil gas, and how it demonstrates that the Alaska LNG Project is not necessary.

The Alaska LNG Project

5. Alaska Gasline Development Corporation ("AGDC") is pursuing the Alaska LNG Project, which would bring immense amounts of fossil gas from the North Slope of Alaska through an 800-plus mile pipeline, with offtakes for delivery to Alaska communities, to Nikiski where the fossil gas would be liquified for export to Asian countries.[2] The Project comprises three major components: (1) a gas treatment plant on the North Slope; (2) the 42 inch diameter, 800-plus mile pipeline; and (3) the LNG facility that would liquify the fossil gas for export.

6. AGDC is pursuing the Project in two phases. Phase 1 is the pipeline that would connect the North Slope fossil gas fields with the Southcentral region.[3] At some point, AGDC also anticipates that the Phase 1 pipeline would supply gas to Fairbanks and, thus, provide fossil gas to the entirety of Alaska's Railbelt.[4] Phase 2 is the North Slope gas treatment plant and LNG export facilities.[5] The

[2] Alaska LNG, *Project Overview*, https://alaska-lng.com/.

[3] AGDC President's Report (Dec. 13, 2024), at 14; Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 8 (October 2024).

[4] AGDC President's Report (June 13, 2024), at 32; Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 11 (October 2024).

[5] AGDC President's Report (Dec. 12, 2024), at 13.

Phase 1 pipeline would be built to the 42 inch diameter specifications for the Project to allow full capacity of exports through Phase 2.[6]

7. Wood Mackenzie's economic viability and value assessment of Phase 1 of the Project, which I understand AGDC has publicly endorsed and relies upon to promote the Project, estimates the cost of the Phase 1 pipeline at between $10.8 and $14.9 billion, with first deliveries of fossil gas to Southcentral Alaska starting in 2031.[7] To my knowledge, this estimate does not include the cost of the additional infrastructure that would be needed to connect Fairbanks to the pipeline. The Wood Mackenzie report states that Fairbanks "could change" from oil and wood as a primary energy/heat source and assumes a 90% transition to fossil gas from the Project by 2031 to 2033.[8] The entire Project is estimated to cost at least $44 billion.[9] However, the actual costs for Phase 1, and for the entire Project, may very well be substantially higher as it is not uncommon for projects of this size to significantly exceed early stage cost estimates. For comparison, the estimated capital cost (in USD 2020) to transition all energy sectors (residential,

[6] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 8 (October 2024).

[7] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 8 (October 2024).

[8] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 10 (October 2024).

[9] Reuters, *AGDC and Glenfarne to develop $44 bln Alaska LNG project* (Jan. 10, 2025), https://www.reuters.com/business/energy/agdc-glenfarne-develop-44-bln-alaska-lng-project-2025-01-10/.

commercial, industrial, and transportation) in Alaska to 100% clean, renewable energy and storage, thereby eliminating 100% of energy-related air pollution and climate-damaging pollutants (and eliminating all energy-related fossil gas, oil, coal, and bioenergy in the state) and providing reliable energy for the entire state of Alaska for thousands of years (rather than a portion of the state's energy for far less time, as the LNG project will), is estimated at $79 billion.[10] To clarify, the LNG pipeline does not address transportation energy (mostly from oil) nor all residential, commercial, and industrial heat and electricity (which comes from a combination of sources, including gas, oil, wood, coal, and hydroelectricity). Nor does the LNG pipeline cover the whole state. The $79 billion clean, renewable cost covers the whole state and all energy sectors for new electricity and heat generators; electricity, heat, cold, and hydrogen storage; and transmission/distribution.

8. AGDC is touting the Project as a potential solution for expected shortfalls of Cook Inlet gas supplies to Southcentral Communities projected to

[10] Jacobson, M.Z., A.-K. von Krauland, S.J. Coughlin, F.C. Palmer, and M.M. Smith, Zero Air Pollution and Zero Carbon from All Energy at Low Cost and Without Blackouts in Variable Weather Throughout the U.S. with 100% Wind-Water-Solar and Storage, *Renewable Energy, 184,* 430-444, doi:10.1016/j.renene.2021.11.067, 2022, https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-USStatesPaper.pdf; Jacobson, M.Z., *Zero Air Pollution and Zero Carbon From All Energy Without Blackouts at Low Cost in Alaska* (2021), https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-WWS-Alaska.pdf.

occur beginning in 2027, and to substitute fossil gas for oil and wood as the primary electricity and heat source in Fairbanks.[11]

9. Wood Mackenzie's economic viability and value assessment of Phase 1 of the Project, which AGDC relies on to promote the Project, only evaluates two options for supplying energy to South Central Alaska in light of projected shortfalls of Cook Inlet fossil gas (and potentially to Fairbanks): (1) supplying fossil gas through the Alaska LNG Project; or (2) importing fossil gas from other countries.[12] The report concludes that the Alaska LNG Project would be cost competitive or cheaper than importing LNG but gives no consideration to and provides no analysis of meeting energy needs through clean, renewable energy sources, which are cheaper, do not cause climate and localized air pollution, and provide greater economic benefits.[13] Nor does the report factor in the costs of

[11] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 5, 10 (October 2024); Assembly Retreat on Energy and Infrastructure (Dec. 12, 2024), https://www.muni.org/Departments/Assembly/PressReleases/Pages/Top-Takeaways-from-the-Energy-Retreat.aspx.

[12] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 3 (October 2024); Assembly Retreat on Energy and Infrastructure (Dec. 12, 2024), https://www.muni.org/Departments/Assembly/PressReleases/Pages/Top-Takeaways-from-the-Energy-Retreat.aspx.

[13] Jacobson, M.Z., A.-K. von Krauland, S.J. Coughlin, F.C. Palmer, and M.M. Smith, Zero air pollution and zero carbon from all energy at low cost and without blackouts in variable weather throughout the U.S. with 100% wind-water-solar and storage, *Renewable Energy*, *184*, 430-444, doi:10.1016/j.renene.2021.11.067, 2022, https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-USStatesPaper.pdf; Jacobson, M.Z., *Zero Air Pollution and Zero Carbon*

climate change and localized air pollution to Alaskans, which will increase with continuing use of fossil fuels through the Alaska LNG Project.[14]

The Alaska LNG Project Is Not Needed to Meet Alaska's Energy Needs

10. The Alaska LNG Project is intended to operate for decades,[15] perpetuating fossil fuel energy reliance and substantial levels of continuing emissions of climate pollution well into the future, thereby worsening localized air pollution and Alaska's climate crisis and causing further harms to Alaskans, including the plaintiffs in this case. The Project, and the harms it would cause, are entirely unnecessary because technologically and economically feasible clean, renewable energy alternatives are readily available to provide energy to Alaskans and abroad, with major economic benefits and cost saving to the state and its citizens. The Project would lock in continuing fossil fuel use for decades to come, well past the date by which it is technologically and economically feasible to have fully transitioned energy systems in Alaska and abroad off of fossil fuels to clean, renewable sources.

From All Energy Without Blackouts at Low Cost in Alaska (2021), https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-WWS-Alaska.pdf.

[14] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 35 (October 2024); Assembly Retreat on Energy and Infrastructure (Dec. 12, 2024), https://www.muni.org/Departments/Assembly/PressReleases/Pages/Top-Takeaways-from-the-Energy-Retreat.aspx.

[15] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 36 (October 2024).

11. In 2022, I, along with my colleagues, published a study assessing the feasibility of transitioning each of the 50 states, including Alaska, to 100% clean, renewable energy across all energy sectors by 2050, with an 80% transition by 2030.[16] Clean, renewable energy emits zero health- and climate-affecting air contaminants and is derived from continuously replenishable sources. Energy technologies that satisfy the clean, renewable criteria include onshore and offshore wind electricity, solar photovoltaic (PV) electricity on rooftops and in utility-scale plants, concentrated solar power (CSP) electricity, solar thermal heat, geothermal electricity and heat, hydroelectricity, tidal electricity, and wave electricity. Because wind and solar in particular are variable in nature, electricity storage is also needed. The main relevant electricity storage technologies for Alaska included in the study were existing hydroelectric reservoirs, pumped hydroelectric storage, and batteries (although today, I would add the option for hydrogen storage—where the hydrogen is produced from electricity and water and used in a

[16] Jacobson, M.Z., A.-K. von Krauland, S.J. Coughlin, F.C. Palmer, and M.M. Smith, Zero air pollution and zero carbon from all energy at low cost and without blackouts in variable weather throughout the U.S. with 100% wind-water-solar and storage, *Renewable Energy*, *184*, 430-444, doi:10.1016/j.renene.2021.11.067, 2022, https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-USStatesPaper.pdf; Jacobson, M.Z., *Zero Air Pollution and Zero Carbon From All Energy Without Blackouts at Low Cost in Alaska* (2021), https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-WWS-Alaska.pdf.

fuel cell to regenerate electricity). The study examined all energy sectors, including the residential, commercial, industrial, and transportation sectors.[17]

12. Our findings demonstrate that it is technologically and economically feasible to transition all of Alaska, statewide, for all energy purposes, to 100% clean, renewable energy by 2050 and to 80% by 2030, meeting all energy needs across all sectors while keeping the electricity grid stable 100% of the time. Additionally, meeting all of Alaska's energy needs with clean, renewable energy would require no new hydropower generation facilities.[18]

13. Because it is economically and technologically feasible to meet all energy needs statewide across all sectors in Alaska with clean, renewable energy, it is necessarily feasible to do so for the subset of communities and sectors that would receive fossil gas from the Alaska LNG Project. The Project is simply not needed to provide energy for Alaskans when less-expensive, healthier, and longer-

[17] Jacobson, M.Z., A.-K. von Krauland, S.J. Coughlin, F.C. Palmer, and M.M. Smith, Zero air pollution and zero carbon from all energy at low cost and without blackouts in variable weather throughout the U.S. with 100% wind-water-solar and storage, *Renewable Energy*, *184*, 430-444, doi:10.1016/j.renene.2021.11.067, 2022, https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-USStatesPaper.pdf; Jacobson, M.Z., *Zero Air Pollution and Zero Carbon From All Energy Without Blackouts at Low Cost in Alaska* (2021), https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-WWS-Alaska.pdf.

[18] Jacobson, M.Z., *Zero Air Pollution and Zero Carbon From All Energy Without Blackouts at Low Cost in Alaska* (2021), https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-WWS-Alaska.pdf.

lasting alternatives that do not cause harmful climate and localized air pollution are readily available.

Clean, Renewable Energy Avoids the Harms of the Alaska LNG Project While Providing Significant Benefits

14. Fossil gas, immense quantities of which would be delivered through the Alaska LNG Project for combustion in Alaska and abroad, is a limited resource and its extraction, transportation, and use causes climate and localized air pollution, resulting in serious harms to the health and safety of Alaskans, including the plaintiffs in this case, and the fish and wildlife they rely on. In contrast, clean, renewable energy creates zero localized air and climate pollution, avoiding the significant health and climate harms that would result from the substantial emissions of the Alaska LNG Project. Additionally, supplying energy needs through clean, renewable energy—instead of the Alaska LNG Project—provides significant benefits and cost saving for Alaska.

15. My and my colleagues' research demonstrates that transitioning Alaska to 100% clean, renewable energy by 2050, with an 80% transition by 2030 may create about 46,500 more long-term, full-time jobs than lost and saves about 60 Alaskan lives in addition to reducing health problems for thousands more, from air pollution every year. It also may reduce all-purpose, end-use energy requirements in Alaska by 56.9 percent and Alaska's annual energy costs by 53.9 percent, from $20.4 billion per year to $9.4 billion per year, a cost saving of $11 billion per year to the state. It may reduce Alaska's annual combined energy costs,

health costs to Alaskans, and climate costs to the world, including Alaska, by 79.1 percent, from $45 billion per year to $9.4 billion per year, a social cost saving of $35.6 billion per year.[19] By contrast, perpetuating fossil fuel use in Alaska for decades and drastically increasing greenhouse gas emissions though the Alaska LNG Project will only permit the $35.6 billion per year in social to Alaskans and the world to continue.

16. Our study demonstrates that transitioning Alaska to 100% clean, renewable energy across all energy sectors, statewide, would cost roughly $79 billion upfront, paid back over time through energy sales. Given the $11 billion per year energy-cost savings, the payback time from energy-cost savings of this upfront cost is approximately 7.2 years. With social cost saving for Alaska of $35.6 billion per year, the payback time from social-cost savings is 2.2 years.[20]

17. Scaling the costs and benefits to the entire State from a transition to 100% clean, renewable energy to just those communities that would be served by the LNG Project can be estimated by adjusting statewide figures by population percentage because energy needs and consumption are roughly proportional to population and the costs and benefits of energy are roughly proportional to the amount of energy produced.

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[19] *Id.*

[20] *Id.*

18. According to AGDC, the Alaska LNG Project would provide fossil gas for energy in Railbelt communities (first to Southcentral Alaska and eventually Fairbanks), which is about three fourths of the State's population.[21] Thus, for comparison, the costs and benefits of transitioning to 100% clean, renewable energy in these communities can be found by adjusting the costs and benefits of transitioning to clean, renewable energy for the entire state by 75%.

19. Applying these adjustments, transitioning Alaska's Railbelt communities to 100% clean, renewable energy would save approximately 46 lives per year due to the decrease in air pollution.

20. Transitioning the Railbelt to 100% clean, renewable energy also creates about 35,000 long-term, full-time jobs on a net basis, which is far more jobs created by the LNG Project. The Alaska LNG Resource Report estimates that the entire Alaska LNG Project would only create up to 15,160 short-term construction jobs and approximately 730 jobs in operations[22] and Wood Mackenzie estimates that Phase 1 would only create 2,271 short-term jobs during construction (5 years) and 1,138 jobs in operations, with only 250 permanent jobs.[23]

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[21] U.S. Energy Information Administration, *Alaska Profile Analysis* (April 18, 2024), https://www.eia.gov/state/analysis.php?sid=AK.

[22] Alaska LNG Resources Report 1 (General Project Information) (March 2018), at I-5.

[23] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 37 (October 2024).

21. The cost savings of 100% clean renewable energy also far surpasses that of the LNG Project. The Wood Mackenzie report claims the Phase 1 pipeline could result in energy cost saving for Railbelt consumers up to $5.7 billion, and for the full Alaska LNG Project, up to $25.9 billion total.[24] However, these estimates are for energy cost savings over the entire lifetime of the Project, which Wood Mackenzie approximates to be 40 years,[25] and only as compared to importing LNG. Importantly, Wood Mackenzie estimates that the Phase 1 pipeline would deliver fossil gas at higher prices than what Railbelt communities are currently paying.[26] In comparison, meeting the energy needs of Alaska's Railbelt communities through 100% clean, renewable energy would reduce all-purpose, end-use energy requirements by 56.9 percent and reduce energy costs by 53.9 percent compared to present, for a cost savings of $8.25 billion ***per year***. Over 40 years this is a savings of $330 billion.

22. The Wood Makenzie report estimates that Phase 1 could yield approximately $10.3 billion in gross value for Alaska, which would return less than even the lowest potential direct costs for Phase 1, which Wood Makenzie

[24] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 34 (October 2024).

[25] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 36 (October 2024).

[26] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 7, 18, 27 (October 2024).

estimates at $10.8 billion.[27] In a previous assessment prepared for AGDC, the Perryman Group estimated the total gross potential economic benefit of the full Alaska LNG Project to Alaska over the Project's lifetime at $32 billion,[28] which is far less than the total estimated cost of the Project at $44 billion.

23. Significantly, none of the estimates of the purported economic benefits of the Project prepared for AGDC by Wood Makenzie or the Perryman Group account for the substantial health and climate-related costs (such as costs to prevent damage, relocate, and replace infrastructure threatened by permafrost thaw, sea level rise, and coastal erosion)[29] in Alaska that would result from perpetuating the use of fossil fuels for decades through the Alaska LNG Project. Even accepting the estimates of the purported economic benefits of the Project at face value and without addressing problems with the underlying methodologies

[27] Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 3, 8, 33 (October 2024).

[28] The Perryman Group, Potential Economic Benefits of the Alaska LNG Project, https://agdc.us/wp-content/uploads/2018/11/Potential-Economic-and-Job-Benefits-of-Alaska-LNG.pdf.

[29] Berman, M. & Schmidt, J., Institute of Social and Economic Research, University of Alaska Anchorage, *Economic Effects of Climate Change in Alaska* (Nov. 2018) (estimating that five relatively certain, large economic effects from climate change that could be readily quantified would impose an annual net cost of $340-$700 million).

and assumptions,[30] meeting energy needs through clean, renewable alternatives to the Alaska LNG Project would yield greater economic benefits for Alaska.

24. Transitioning Alaska's Railbelt communities to 100% clean, renewable energy would cost roughly $59 billion upfront, paid back through energy sales. Meeting the energy needs of Alaska's Railbelt communities through 100% clean, renewable energy would reduce annual energy and health costs in Alaska, plus climate change costs to the world, including Alaska, by 79.1 percent, for a cost savings of $26.7 billion ***every year*** compared with continued reliance on fossil fuels. With these annual cost saving, Alaska would quickly see significant economic benefits well in excess of those purported from the Alaska LNG Project.

25. The actual cost of clean, renewable energy alternatives to the Alaska LNG Project for Railbelt communities is likely to be much lower than $59 billion. That is the cost for fully transitioning all energy sectors of these communities, including electrifying and providing clean, renewable energy for all transportation—needs that would not be served by the Alaska LNG Project, which is intended to provide fossil gas for much (but not all) residential, commercial, and industrial electricity and heat. Meeting energy needs for these purposes through

[30] Wood Makenzie's assessment assumes the State would significantly forego property taxes on the Project. Project economics would also likely depend on the State significantly forgoing favorable royalties. The State has already spent over $1 billion pursuing the Project. *See* Wood Mackenzie, *Economic viability assessment and economic value of Alaska LNG project – Phase 1*, at 13, 19 (October 2024) (assuming property tax rate of 0.2%).

clean, renewables costs far less. For instance, in January 2024, University of Alaska's Center for Energy and Power published a study concluding that providing electricity to Alaska's Railbelt through 96% renewables by 2050 would cost roughly $10.1 billion.[31] In March 2024, the National Renewable Energy Lab published a study concluding that it is economically and technologically feasible and would save consumers money to produce at least 80% of all electricity in Railbelt communities from renewables by 2040.[32] The costs, savings, and economic benefits of transitioning to clean, renewable energy are roughly proportional to the fossil energy displaced, and thus quickly yield net economic benefits for any level of transition.

26. Transitioning Alaska's Railbelt communities to clean, renewable energy would prevent any energy demand gaps related to declining Cook Inlet fossil gas production without the need for fossil gas from the Alaska LNG Project or imports of LNG. Cook Inlet fossil gas shortfalls are projected to occur as early as 2027 and the Alaska LNG Project could not provide fossil gas to Railbelt communities until 2031, at the earliest estimates. In contrast, new clean, renewable energy generation can be online well beforehand. New wind generation facilities

[31] Cecilio et al., *Alaska's Railbelt Electric System: Decarbonization Scenarios for 2050*, Alaska Center for Energy and Power, University of Alaska, Fairbanks, 2023. UAF/ACEP/TP-01-003. DOI:10.5281/zenodo.10520543.

[32] Denholm, P., M. Schwarz, & L. Streitmatter, National Renewable Energy Laboratory, *Achieving an 80% Renewable Portfolio in Alaska's Railbelt: Cost Analysis* (2024), https://www.nrel.gov/docs/fy24osti/85879.pdf.

and storage capacity can be online as quickly as within one year and usually not longer than 2-3 years. Even if additional fossil gas were needed to make up for any short-term energy demand shortfalls, which it is not, short-term LNG imports would cost less than building out the LNG Project and do less harm because it would not lock in the continued reliance on fossil fuels for decades that would result from the Alaska LNG Project.

The Alaska LNG Project is Not Needed to Meet Energy Needs Abroad

27. The Alaska LNG Project is also not needed to meet energy needs in countries that could receive LNG exports from the Project. In addition to our studies for all 50 U.S. states, my colleagues and I have published studies demonstrating that it is similarly technologically and economically feasible to transition to 100% clean, renewable energy across all sectors in 149 countries across the globe, including in each of the countries to which AGDC proposes to export LNG through the Alaska LNG Project, i.e., Japan, South Korea, Taiwan, the Philippines, etc.[33] Our research further demonstrates that transitioning to 100%

[33]Jacobson, M.Z., D. Fu, D.J. Sambor, and A. Mühlbauer, Energy, health, and climate costs of carbon-capture and direct-air-capture versus 100%-wind-water-solar climate policies in 149 countries, *Environmental Science & Technology*, doi:10.1021/acs.est.4c10686, 2025. https://web.stanford.edu/group/efmh/jacobson/Articles/I/149Country/149-Countries.pdf, https://pubs.acs.org/doi/10.1021/acs.est.4c10686.

clean, renewable energy is more cost-effective than attempting to carbon capture technology.[34]

Conclusion

28. The Alaska LNG Project is simply not needed to meet energy needs in Alaska or abroad. With clean, renewable energy alternatives readily available that provide significant cost-saving and economic benefits to Alaska and its citizens, the Project would only cause serious and unnecessary harm by significantly increasing localized air pollution and climate change, with serious consequences for Alaska's youth, including the plaintiffs in this case.

I declare under penalty of perjury under the laws of the State of Alaska that the foregoing is true and correct. Executed on March 28, 2025.

/s/ *Mark Z. Jacobson*
Mark Z. Jacobson

[34] Jacobson, M.Z., D. Fu, D.J. Sambor, and A. Mühlbauer, Energy, health, and climate costs of carbon-capture and direct-air-capture versus 100%-wind-water-solar climate policies in 149 countries, *Environmental Science & Technology*, doi:10.1021/acs.est.4c10686, 2025. https://web.stanford.edu/group/efmh/jacobson/Articles/I/149Country/149-Countries.pdf, https://pubs.acs.org/doi/10.1021/acs.est.4c10686