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ENERGY AND ENVIRONMENTAL ECONOMICS, INC.

San Francisco, CA

Director

Mr. Aas joined E3 in 2017 after ten years of work and study in energy and decarbonization policy including two graduate degrees, a Master of Public Policy and a Master of Arts in Energy and Resources, from the University of California, Berkeley. At E3, Mr. Aas focuses on climate and clean energy policies, with an emphasis on the future of natural gas utilities in a deeply decarbonized future. He has led projects focused on issues related to gas sector transitions on behalf of public and private clients across the country. Recently, Mr. Aas led E3's technical analysis of decarbonization pathways and regulatory modifications in support of a long-term gas planning proceeding at the Massachusetts Department of Public Utilities. Mr. Aas brings with him extensive knowledge of policy planning, development and implementation as well as regulatory model analysis. Select projects at E3 include:

- **California Energy Commission, *Future of Retail Gas in California's Low Carbon Future (2017-2020)***. Led a California Energy Commission-funded study examining the implications of economy-wide decarbonization for the state's natural gas utilities and customers. The study compares electrification- and renewable natural gas-based pathways to decarbonize buildings. A key finding is that electrification is cost-effective in California from both societal and customer perspectives. The customer perspective was found to be critical for understanding the economics of gas distribution in the context deep decarbonization: as customers exit the gas system, the average cost of service for remaining customers increases, further incentivizing customers to electrify. This feedback effect motivates the need for a managed gas transition strategy that is consistent with both meeting the state's climate objectives and protecting customers.
- **Exelon Utilities, *Decarbonization Strategy Analysis (2021-Present)***. Co-leader of decarbonization pathways strategy analysis on behalf of a subset of Exelon's distribution utilities. The analysis explores strategies to leverage the company's electric and gas infrastructure to support achievement of net-zero GHG reduction targets across the states Exelon operates in. E3 found that direct electrification paired with renewable electricity is the primary driver of emissions reductions across the economy. However, E3 did identify that hydrogen and other renewable fuels could have important, complementary roles to electrification by providing firm capacity for electric generation, fuel for heavy-duty and long-distance freight transportation use-cases, industrial high temperature heat, and a niche role in the buildings sector.
- **Xcel Energy, *Net-Zero Vision for Gas (2021-2022)***. Led a study where Xcel Energy engaged E3 to evaluate decarbonization scenarios consistent with its corporate goal of a 25% reduction gas emissions by 2030 and net-zero by 2050. E3 worked with Xcel to develop portfolios that trade of varying levels of direct emissions reductions versus reliance on negative emissions technologies. For the direct emissions reductions, E3 found that hybrid electrification strategies that use a heat pump for most of the year, backed-up by renewable gasses during the coldest hours of the year, was a core strategy in the cold climates Xcel Energy serves.
- **Massachusetts Local Distribution Companies, *DPU 20-80 Independent Consultant Report (2021-2022)***. Led an initiative where E3 was retained by the joint Massachusetts Local Distribution

Companies to develop an independent analysis of decarbonization pathways for the state, identify the implications of the pathways for the utilities and their customers, and evaluate regulatory designs that would support the transition to decarbonization. E3 found that electrification was the primary driver of decarbonization in most scenarios, but that strategic use of gas lowered the challenge of achieving decarbonization when used alongside electrification. Hydrogen was found to have a limited role in the gas distribution system, but a potentially important role in providing firm generation during periods of cold weather in scenarios with high levels of electric heating.

- **Rhode Island Energy, *Act on Climate and RI PUC Support (2022-Present)***. Supervising a project where E3 is assessing the impacts of Rhode Island’s statewide net-zero GHG target for Rhode Island Energy and its customers. As part of this analysis, E3 has developed an assessment for the cost of delivered hydrogen to Rhode Island given the 45V Production Tax Credit established under the Inflation Reduction Act.
- **Washington State Department of Commerce, *Impact of Building Electrification on Consumer Owned Utilities (2021-2022)***. Supervised a project that evaluated the impacts of building electrification on consumer owned utilities in Washington State. E3 evaluated those impacts from a marginal cost basis, considering the impacts of a single customer adopting a building electrification package, as well as at a utility scale. E3 found that electrification was cost-effective for customers in new construction and in cases where a heat pump can replace both a furnace and an air conditioner. At the utility scale, E3 found that air-source heat pumps could substantially increase peak demands seen by consumer owned utilities, but that measures like building shell improvements, hybrid electrification and heat pump technology improvements could mitigate those impacts.
- **Puget Sound Energy, *Decarbonization Strategy Support (2019-present)***. Led two projects that evaluate options for Puget Sound Energy (PSE) to reduce emissions from its natural gas system. The first project included a high-level scenario analysis of options that emphasized electrification. That study found that a hybrid approach resulted in lower costs relative to an all-electric strategy. The second study supported a more granular analysis conducted in partnership with PSE’s modeling teams. E3 developed a supply curve of renewable fuel options for PSE, including electrolytic hydrogen. As part of that, E3 worked with PSE’s gas supply and engineering experts to reflect the physical characteristics of the company’s system to refine our estimates of hydrogen blending potential.
- **Minnesota G21 Initiative, *Decarbonization of Gas End-Uses (2021-2022)***. Supervised a study that evaluated alternative strategies to decarbonize gas end-uses in Minnesota. Given the Minnesota’s very cold climate, E3 found that full electrification would produce very large impacts on the state’s electricity system. However, exclusive reliance on low-GHG fuels was found to be cost-prohibitive and would carry a substantial amount of risk given those fuels low-levels of commercialization. With that, E3 identified hybrid electrification as a key strategy to decarbonize building heating, but did identify a potentially larger role for hydrogen in reducing GHG emissions from high temperature industrial processes.

Intern

Summer 2016

- Co-authored an E3 white paper that considers the future of electric utilities in the context of increased competition and policy-obligations. Instead of focusing on regulatory tweaks to reconcile competition and policy, we focus on the structure of utilities in terms of their form and function. The thesis of the piece is that policymakers must decide whether utilities should be

heavily involved in policy implementation or whether a more competitive market structure is preferable.

- Co-developed a public tool spreadsheet model—called a Locational Net Benefits Analysis—that quantifies that value of distributed energy resources.

NATURAL RESOURCES DEFENSE COUNCIL

Consultant

San Francisco, CA
September 2016 – May 2017

- Produced policy analysis in support NRDC’s distributed energy resources advocacy. Developed written regulatory comments that were block quoted in several CPUC decisions.

ENERGY INNOVATION, LLC

Policy Consultant

San Francisco, CA
2016 – 2017

- Wrote a paper for the America’s Power Plan series evaluating the impact of different performance-based regulation (PBR) designs on utilities’ revenue and motivation to accomplish societal goals. This report added specificity to discussions of new regulatory models by illuminating the implications of PBR for utility decision-making on a project-by-project basis.

CALIFORNIA PUBLIC UTILITIES COMMISSION

OFFICE OF PRESIDENT PICKER

Graduate Student Intern

San Francisco, CA
Summer 2015

- Developed an analysis of regulatory models that better align electric utility incentives with changing electricity system technological trends, market structures and policy goals. Provided clarity on the various regulatory models labeled PBR and mapped out what forms of PBR may be aligned with California’s energy policy goals.
- Reviewed proposed decisions and regulatory filings to advise President Picker on active energy related proceedings. Covered topics including grid modernization, grid integration, prudence reviews, and fuel-cost balancing accounts.

THE ENERGY FOUNDATION

Program Associate/ Senior Program Associate/ Staff Consultant

San Francisco, CA
2011 – 2016

- Conduct policy issue research on a part-time basis to inform strategy development for, and implementation of, Energy Foundation’s energy efficiency grant portfolio. Tasks have ranged from developing fundraising materials to reviewing grantee proposals.
- As a full-time employee effectively managed, and guided the strategic direction of, the \$4 million energy efficiency portfolio grant portfolio during a period of significant senior staff turnover. Developed a strong knowledge of the policy and political barriers to deep energy efficiency commitments. Synthesized and prioritized strategies from a diverse set of over 40 advocacy groups to ensure that energy efficiency policies were successfully defended, implemented and improved in 35+ states.
- Effectively told the story of the energy efficiency program’s strategy in writing, in presentations and in funder meetings. On two separate occasions, my work played a key role in unlocking at-risk funding, totaling over \$1.2 million, for the industrial energy efficiency initiative.

- Worked to bolster the effectiveness of an energy efficiency advocate network by facilitating technical assistance and consulting expertise for grantees, making connections between groups conducting complementary work, and organizing an annual conference where over 150 experts shared best practices in energy efficiency regulatory policy and politics.
- Produced high quality written and visual materials to effectively communicate the energy efficiency program's progress and challenges to a diverse set of audiences including board members, Energy Foundation colleagues and external advisors.
- Demonstrated a commitment to internal process improvement by leading work to implement new Program Team budget spreadsheets that enable more coordinated grantmaking. Served as an effective manager of three program budgets, ensuring that all internal spending deadlines were met.

TETRA TECH EM, INC.

Energy Analyst

Bothell, WA
June 2008 – July 2010

- Calculated the greenhouse gas abatement potential of power sector-oriented, state-level climate policy options in four states (FL, IL, MI, OH). Assisted in the management of stakeholder processes to ensure quantitative work was credible to a broad set of interest groups, businesses and decision makers.
- Worked on a variety of environmental consulting projects including greenhouse gas inventory verifications, food chain modeling in remediation projects, environmental impact statements, environmental site assessments, and environmental justice initiatives.

Education

University of California, Berkeley
Master of Public Policy, Master of Arts in Energy and Resources

Berkeley, CA
May 2017

Whittier College
B. A. Economics and Political Science
Honors: Outstanding Economics Major, Distinction in Economics and Political Science Majors

Whittier, CA
May 2008

University of Oxford
Politics, Philosophy and Economics

Oxford, UK
2005 – 2006