

Heavy Industry Decarbonization Policy Analysis with Evergreen Action



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Objectives:

This proposal will support Evergreen Action (EA) in their mission to lead an all-out mobilization to defeat the climate crisis and speed the transition to a just and equitable 100% clean energy economy. This will be achieved through the following objectives, which will enable EA to better advocate for decarbonizing U.S. industry, which currently accounts for 30% of U.S. emissions:

1. **Analyze** existing policies advancing industrial decarbonization and synthesize other organizations' policy proposals for industrial decarbonization
2. **Identify** hard-to-abate pollution sources within heavy industry that currently suffer from policy gaps and subsequently propose new opportunities for government regulation of industrial pollution
3. **Develop** maps of sites of industrial pollution in relation to disadvantaged environmental justice communities, which will enable EA to identify the current distribution of regulations on industrial decarbonization in relation to disadvantaged communities and target areas where policy measures will have the greatest impact on community health.
4. **Create** a final report encompassing all completed tasks suitable for Evergreen Action's policy campaign needs in addition to a Shiny App public database through RStudio

Significance:

Founded by alumni of Gov. Jay Inslee's campaign for president in 2020, Evergreen Action is an established leader in the climate movement; their work on the [Clean Electricity Standard](#), [Civilian Climate Corps](#), [justice and equity mapping program](#), and numerous other policy proposals have been foundational to President Biden's climate agenda. In 2021, EA released A Roadmap to 100% Clean Electricity by 2035 which provided federal lawmakers with the Clean Electricity Performance Program and complementary investments that will help the United States achieve 100% clean electricity by 2035. Many of the provisions provided by EA were included in the historic Inflation Reduction Act passed in 2022. However, though there has been extensive work and improvements in energy policy and decarbonization, there has been comparatively less research, technological innovation, and policy implementation work done to decarbonize heavy industry in particular due to greater variation in respective industry technologies. This therefore provides an opportunity for intervention through innovative policy analysis focusing on heavy industry. The compilation and advocacy of effective decarbonization policy mechanisms can help decision makers adopt policies that align with Paris Agreement goals. EA plans to develop an industrial decarbonization policy campaign to advocate for innovative policy tools, protect frontline communities exposed to toxic industrial pollution, and guide lawmakers in this difficult-to-decarbonize sector.

To support EA's policy campaign, Bren students will identify the most problematic industrial processes via literature review, compile existing policies mitigating heavy industry pollution, and ideate new opportunities for policy intervention. The project team will synthesize their findings into policy briefs and memos useful for EA's campaign needs, such as advocacy materials for state and federal lawmakers. Bren students will also develop visualizations of pollution sites and industrial regulations in relation to disadvantaged communities which will be another useful advocacy resource. The team will also develop an open-source database to assist stakeholders beyond EA in efforts to decarbonize heavy industry which will be useful in producing new insights on industrial decarbonization barriers and how they can be effectively addressed with a specific policy tool. As part of the policy analysis, the project team will assess which existing policies are effective by defining measures of success, such as emissions reduced and cost of adoption. New policy opportunities will be evaluated for success by comparing metrics with similar, existing policy programs.

Background:

Industrial emissions account for 30% of U.S. energy related greenhouse gas (GHG) emissions (Cresko, 2022). Heavy industry, the umbrella term for the manufacturing of metals, cement, and chemicals, is

responsible for 50% of industrial emissions (Cresko, 2022). To achieve carbon neutrality by 2050, as established by the Paris Agreement, heavy industry must rapidly decarbonize. Unlike transportation or building energy demands that can be decarbonized via electrification based on renewable energy sources, many industrial processes cannot be electrified with existing technologies. Heavy industry is considered ‘difficult-to-decarbonize’ because of three main technical factors: 1) Many industrial processes require temperatures that are currently difficult to achieve without fossil-fuel combustion; 2) Heavy industry often requires fossil fuel as an input in the chemical processes or the chemical reactions produce GHGs as a by-product ; 3) industrial process equipment is capital intensive and often has long lifespans, leading to long replacement cycles and slow stock turnover (Cresko, 2022).

Economic factors that contribute to the decarbonization challenge include high capital costs and low profit margins from heavy industries such as steel and cement. The market for these materials is also highly dependent on raw material costs and economic growth, and due to the low and volatile profit margins and high capital costs, there is little room for investments in advanced low-carbon technologies (Gross, 2021). Additionally, because these industries must produce in bulk, buyers primarily focus on cost due to the perception that products are the same across suppliers, which eliminates market forces toward sustainable alternatives (Gross, 2021).

Another challenge of decarbonizing heavy industry is that of carbon-leakage. Industrial materials are traded internationally and if emissions regulations decrease the competitive advantage of local production, foreign products could dominate the market (Gross, 2021). Carbon-leakage occurs when emissions are pushed into another market rather than eliminated, undermining emissions abatement efforts.

Due to the high costs and challenges posed by industry decarbonization, there is little incentive for companies to improve their industrial processes. Government intervention via policy mechanisms is therefore necessary to reduce emissions in this heavy-polluting sector. Policy tools such as investment in developing technologies, carbon cap and trade programs, and industry protection from foreign trade can help industries decarbonize while maintaining economic feasibility. Research is needed to determine effective policy mechanisms and to predict the impacts on industrial emissions and economies. The project team will answer this need by assessing how these technical and economic industrial decarbonization barriers can be effectively addressed with a specific policy tool.

Equity:

Heavy polluters are often located near disadvantaged communities due to decades of environmental racism, exposing marginalized people to disproportionate levels of PM2.5, PM10, SO_x, and NO_x which increase the risk of illnesses such as respiratory diseases or cancer. Without any decarbonization policies, research indicates that disadvantaged communities could be exposed to up to 34% more air pollution compared to the national average between 2020–2050 (Goforth, et. al. 2022). Achieving energy justice requires an equitable distribution of risks, harms, and benefits. Understanding the distribution of pollution sources in relation to disadvantaged communities will help policymakers address pollution and health disparities. The project team will visualize industrial pollution sites, applicable regulations, and the demographics of impacted communities with mapping tools such as QGIS and Rstudio. The visual representations will be used as accompanying advocacy material to support EA lobby for equity-based solutions.

Available Data:

Qualitative and quantitative data will be gathered through an extensive literature review of existing policies advancing industrial decarbonization, hard-to-abate heavy industry pollution sources and low-carbon alternatives, international precedents for regulation of industrial sources, and synthesis of other organizations’ policy proposals for the industrial sector. Quantitative data will be collected from at least

two EPA databases: (1) Facility Level Information on Greenhouse Gasses Tool ([FLIGHT](#)), which provides data on greenhouse gas emissions from industrial facilities in the U.S, and (2) Environmental Justice Screening and Mapping Tool ([EJScreen](#)), a nationally consistent dataset and approach for combining environmental and demographic socioeconomic indicators. Other data sources will include (3) Database of State Incentives for Renewables and Efficiency ([DSIRE](#)), a comprehensive source of information on incentives and policies that support renewables and energy efficiency in the U.S., (4) the American Council for an Energy-Efficient Economy ([ACEEE](#)), a non-profit organization which develops policies to reduce energy waste and combat climate change, (5) International Energy Agency ([IEA](#)), which hosts databases including fossil fuel subsidies, gas trade flows, and methane trackers, and (6) [OpenEI](#), an energy efficiency database.

Possible Approaches and Deliverables :

Table 1 details a proposed scope of work, including project tasks and deliverables.

Table 1: Scope of Work

Task	Description	Deliverables
Develop project work plan	Conduct a broad industrial decarbonization literature review to identify the most problematic industrial processes, existing policies mitigating heavy industry pollution, and new opportunities for policy intervention. Use knowledge gained to refine scope and develop project work plan.	Project work plan
Heavy industry background research	Research various industrial processes and generate a list of industries, processes, and technologies which should be targeted by decarbonization policies. This research will be compiled into a public policy database, detailed below.	Heavy industry decarbonization opportunities memo
Policy literature review	Landscape analyses on existing policies advancing industrial decarbonization. Synthesis of other organizations’ policy proposals for the industrial sector Identify gaps in current policy and points of intervention. Research on international precedents for bold regulation of industrial sources	Landscape analysis and policy gaps brief.
Identification of new regulation opportunities	Analysis of opportunities for new federal and state regulation of industrial pollution	Regulation opportunities memo
Industrial pollution mapping	Mapping of regulations and sites of industrial pollution in relation to disadvantaged environmental justice communities.	Data visualizations
Industrial decarbonization policy public database	A database compilation of industrial decarbonization policy efforts	Public online database
Final policy recommendation report	A final report encompassing all completed tasks suitable for Evergreen Action’s policy campaign needs.	Final policy recommendation report

Internship:

Evergreen offers several fellowship positions over the summer but due to equity concerns, Evergreen cannot guarantee a fellowship to a GP member. However, Evergreen will give strong preference to GP candidates for a fellowship. Please see the Letter of Support for more details.

Supporting Materials:

Citations

Cresko, J., “U.S. Department of Energy’s Industrial Decarbonization Roadmap” *DOE/EE* 2635 (2022).
<https://www.energy.gov/sites/default/files/2022-09/Industrial%20Decarbonization%20Roadmap.pdf>

Goforth, T., Nock, D. (2022). “Air pollution disparities and equality assessments of US national decarbonization strategies.” *Nat Commun* 13, 7488 . <https://doi.org/10.1038/s41467-022-35098-4>

Gross, S. “The Challenge of Decarbonizing Heavy Industry.” *Foreign Policy at Brookings*. (2021).
https://www.brookings.edu/wp-content/uploads/2021/06/FP_20210623_industrial_gross_v2.pdf.

Budget Justification:

This project should not need funding beyond the given \$1,300 from the Bren School.

Client Letter of Support:

To the Bren Group Project Committee,

On behalf of Evergreen Action, I write this letter to support the proposed Bren School Master's Group Project entitled, "Industrial Decarbonization Policy Analysis with Evergreen".

Founded in 2020, Evergreen has played a pivotal role in the development of national climate policy, with major influence shaping and advancing President Biden's climate agenda. Evergreen's mission is to lead an all-out mobilization to defeat the climate crisis and speed the transition to a just and equitable 100% clean energy economy. We collaborate with climate and community leaders, and advocate for policymakers to adopt the urgent climate and economic policies that science demands.

Bren School students will play a key role in developing these policy campaigns through research on existing policies mitigating industrial pollution, opportunities for federal and state action to decarbonize heavy industry, and geographies of polluting sites. Evergreen staff will guide students' policy research and development and synthesize students' work into advocacy materials for lawmakers at the state and federal level.

The project would entail a continuous output of research on industrial decarbonization for multiple memos over the course of the year, with deliverables including: (1) landscape analyses on existing federal and state policies advancing industrial decarbonization, (2) synthesis of other organizations' policy proposals for the industrial sector, (3) briefs on hard-to-abate pollution sources within heavy industry, (4) analysis of opportunities for new federal and state regulation of industrial pollution, (5) research on international precedents for bold regulation of industrial sources, (6) mapping of sites of industrial pollution in relation to disadvantaged environmental justice communities.

Students' work would largely consist of qualitative studies of the industrial climate policy landscape, alongside visual and quantitative analysis of pollution sources. Quantitative data will be collected from the EPA's Facility Level Information on Greenhouse Gases Tool (FLIGHT), which provides data on greenhouse gas emissions from industrial facilities in the U.S. Mapping will be especially critical — identifying where target industries are impacting frontline communities would be a valuable resource to deliver to policymakers, and visually representing the distribution of state regulations on industrial pollution will be constructive.

In support of their work, Evergreen will offer strong preference to Project members for our Summer 2023 internships. The position generally focuses on providing research and policy content for policy and communications projects, tracking relevant state legislation and regulatory proceedings in Evergreen's priority states, tracking notices of federal funding opportunities and requests for information associated with implementation of the climate provisions in both the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, and fact-checking any products as needed. The intern will additionally work collaboratively within the States program and the broader policy team and author original policy research, devising recommendations for state-decision makers. The 10-week position would be full-time (40 hours/week) and include compensation of \$27/hr.

To ensure hiring consistency and equity, students will be required to apply to any open role. All candidates will be evaluated and interviewed according to Evergreen's hiring practices, and strong consideration will be given to Bren students for their contributions to Evergreen. Evergreen will make all final hiring decisions based on skills, experience, and alignment with our values and theory of change. No guarantee of employment will be made in advance of interviews or during the Project.

The proposed Bren School Master's Group Project to innovate policy tools to decarbonize heavy industry and protect frontline communities exposed to toxic industrial pollution will be invaluable in achieving Evergreen's mission to support the transition to a just and equitable 100% clean energy economy. We look forward to working with the students of the Bren School, and thank you for your consideration of this proposal.

Sincerely,

Sam Ricketts
Evergreen Action Co-Founder and Senior Advisor