

Request for Proposal: Review of the Literature on Environmental & Energy Lifecycle Analyses of Electric and Internal Combustion Vehicles

Sponsoring Organization: The Fuels Institute is a not-for-profit organization led by a collaborative group of fuel retailers, fuel producers and refiners, alternative and renewable fuels producers, automobile manufacturers and others with expertise in the fuels and automotive industries. The Institute delivers comprehensive and balanced research and analysis concerning fuels, vehicles and related policy issues. The Institute does not lobby or advocate for action in either the private or public sector. Institute research seeks to establish a common baseline of information upon which stakeholders can consider various options for resolving challenges in the market.

Summary of Research Objectives: The Fuels Institute Board of Advisors is commissioning a project to evaluate and compare the lifecycle environmental impact of electric (EV) and internal combustion engine vehicles (ICEV), the energy sources that power them and potentially the economic impact of each on consumers. The lifecycle analysis (LCA) review should incorporate all facets of vehicle production, operation and disposal, treating the vehicles and the energy they consume as a system, and should encompass vehicle systems available today, as well as those anticipated to be commercially available in the next 20 years. The results of the analysis should inform stakeholders about opportunities to improve the environmental performance of both vehicle systems while delivering to end users the most cost-effective means of transportation. The majority of this project will be based upon an exhaustive literature review, with the potential to include some additional modeling using publicly available and acceptable models.

Intended Uses: The Fuels Institute intends to use the findings of this project to elevate the national discussion about how transportation-related environmental movements affect society from multiple perspectives. To achieve this objective, the Fuels Institute intends to reproduce the final deliverables and directly distribute these to policymakers, regulators, business leaders and other stakeholders through various media including but not limited to print distribution, unrestricted online publication and oral presentation.

Deadline: Proposals must be submitted no later than **March 15, 2021**. Submit proposals to:

The Fuels Institute
1600 Duke Street, Suite 700
Alexandria, VA 22314

Or via email to: aappelbaum@fuelsinstitute.org

Direct questions to:

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703-518-7974

Research Objectives

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Issue Background: Many stakeholders and leaders have identified electric vehicles (EV) as the primary solution to reducing greenhouse gas and pollutant emissions from the transportation sector and policies have been implemented to accelerate the expansion of the EV market. Some stakeholders, however, question if the comprehensive environmental impact of EVs is net positive when considering all facets of vehicle and battery production, operation and disposal and the generation and distribution of electricity.

By conducting a comprehensive and comparative analysis of the lifecycle impact of each vehicle system, these arguments can hopefully be resolved and a productive discussion can ensue regarding how to effectively capitalize on environmental advantages and minimize environmental consequences of each vehicle system in a cost-effective manner. Further, regardless how quickly the market for EVs expands, both EVs and ICEVs will co-exist for decades and a reliable lifecycle analysis can enable stakeholders and leaders to develop transportation strategies that will benefit the environment and consumers now and long into the future.

Report Structure and Deliverable: The Fuels Institute expects three deliverables from this project: (1) a report, approximately 60-80 pages long including accompanying images or exhibits (ex. charts, graphs, maps, etc.). The report should be technical enough to answer the questions posed in the RFP, but relatable enough for the general public to understand and digest easily. The use of comparative charts, graphs, etc., may be particularly useful in this report; (2) a one-two page executive summary providing a very high-level overview of the main issues and findings from the report. The executive summary should be written in such a way that it is easy to skim and pull out important take-aways, yet detailed enough to provide relevant context; (3) a one page infographic of the main findings of the report.

The following project scope articulates the specific elements that must be incorporated in the proposal, but we are open to and interested in any other elements that the researcher believes should be included to adequately address the topic at hand. Additionally, the Fuels Institute expects all proposals to incorporate the researcher's proposed methodology to address each

element in the RFP. The Fuels Institute typically budgets \$100,000 - \$150,000 for projects of this nature. Please note, however, that the Fuels Institute's priority is the comprehensiveness and objectivity of the final report – therefore, we want to know from the researcher what it will take (content, length and price-wise) to address the RFP in a satisfactory way. With that said, the Fuels Institute is open to and reserves the right to change the project scope and deliverable, including price, until such time that a contract is signed.

The Fuels Institute welcomes the opportunity to speak with researchers prior to their submitting proposals in order to answer questions or clarify anything about the RFP. As questions are submitted, answers will be emailed out to the group weekly so everyone has the same information.

Fuels Institute Selection Process: The Fuels Institute Board is responsible for determining research topics. From there, all Fuels Institute contributors (Board members included) are invited to be on a task group to help narrow the scope of that topic and develop an RFP. Our proposal selection process is multi-step: first, proposals are reviewed in-house; second, our task group reviews all proposals, commenting on their methodology, timeline, cost and overall deliverable(s); third, the Board of Advisors reviews all proposals and comments from the task group and the Board of Directors votes on which proposal the Institute should pursue. At any stage of the review process, the Fuels Institute may invite top candidates to present their proposals to the Board.

Project Scope:

Part 1: Lifecycle Analysis

The lifecycle analysis conducted for this project should rely upon a review of existing, objective literature on the subject, potentially supplemented with analyses made using publicly available models to provide a comprehensive assessment of various components in the lifecycle of a vehicle system. The Fuels Institute is interested in an LCA evaluation that considers emissions of greenhouse gases as well as criteria pollutants (e.g., total hydrocarbon, carbon monoxide, nitrogen oxides, particulate matter). The literature sourced will be identified by the research organization selected and must be properly referenced throughout the report. The analysis must include at a minimum:

- The production, use and disposal of the EVs and ICEVs, along with their associated energy components. In the case of electric vehicles, for example, this would include the production, use and reuse, recycling and disposal of batteries.
- All phases associated with the production and distribution of transportation energy used by ICEVs and EVs. This would include the exploration, production and transport of raw materials used in the manufacture of liquid fuels (including petroleum, chemicals and biofuel components), electricity and hydrogen; the conversion of those raw materials to a form of energy that is consumed by the vehicle; the distribution and ultimate delivery of that energy into a vehicle; and the consumption of that energy and its associated emissions.

- The lifecycle performance of a vehicle and its energy source should be considered as a connected system, evaluating the overall impact of a vehicle and its “fuel” to provide a more holistic perspective.
- The vehicle systems evaluated should represent those available today as well as those that are currently expected to be commercially available within the next 20 years. Proposals should present an approach for conducting this project specifically focused on light-duty vehicle applications, but include options for incorporating medium- and heavy-duty vehicle applications.

The matrix below indicates the elements that should be included in the assessment. While each element should be addressed independently, the final analysis must consider the overall impact of each in terms of the vehicle system involved.

	EV and Battery	ICEV	Electricity	Liquid Fuel
Production				
Use				
Disposal				

Any independent or original modeling incorporated into the report must be accompanied with a citation describing the publicly available model utilized (i.e., Argonne GREET 2020) or a detailed explanation of the methodology used to calculate the model. Such models should be available and amenable to recalculation based upon updated data over time. Any energy sources modeled must be selected to reflect U.S. consumption and be accompanied by a detailed description of each energy source (e.g., liquid fuels modeled must detail the renewable fuel content assumed).

Part 2: Economic Impact

The Fuels Institute is interested in best understanding the economic impact on the ultimate consumer associated with EVs and ICEVs and their respective sources of energy. We recognize this section could become unwieldy given the potential scale of the analysis and are seeking proposals representing realistic approaches to quantifying the economic impacts. Proposals relative to Part 2 of this RFP may be incorporated with Part 1 of this project or may be considered as separate proposals to be considered for an additional project of the Fuels Institute.

If a reasonable and practical approach to quantify such costs is not feasible, then at a minimum, the Fuels Institute is seeking an analysis of costs borne by consumers associated with owning and operating an EV or an ICEV. This could be represented by a total cost of ownership comparison, which would include at a minimum:

- Vehicle purchase price (including and excluding any associated tax incentives as well as applicable finance expenses)

- Cost of energy over expected lifetime
- Fuel efficiency
- Assumed miles traveled
- Cost of maintenance over expected lifetime
- Residual value when traded, sold or scrapped

Proposals addressing the total cost of ownership to consumers should begin with a review and summary of the available literature on the subject and seek to resolve differences in methodology to provide a consensus, objective and reliable assessment.