Carbon Neutrality Study 1 Scope of Work

CalEPA Contract with

Regents of the University of California; Institute of Transportation Studies

October 6, 2020

Governor Newsom affirmed the State's goal of achieving carbon neutrality by 2045 in the 2019 Budget Act. To achieve our carbon neutrality goal, the State will need to reduce dramatically our greenhouse gas (GHG) emissions while permanently removing carbon from the atmosphere. These efforts will include: managing strategic statewide reductions in fossil fuel demand and supply; electrifying key sectors and end uses; and making significant investments in transitioning the transportation sector and the electrical grid to zero carbon emissions. These shifts will need to take place alongside targeted investments in communities and in the State's workforce to ensure that this transition maximizes equity, resiliency, health, and environmental quality across the State.

The transportation sector is an especially important priority for the State. When including fossil fuel extraction and refining, the transportation sector accounts for half of California's GHG emissions. Additionally, California's transportation sector relies primarily on petroleum fuels, significant amounts of which are produced and sourced from within the State.

Through the 2019 Budget Act, the Newsom Administration funded two studies to identify strategies to reduce the demand for and supply of fossil fuels, with the goal of dramatically reducing emissions across the transportation sector. The purpose of this agreement is to produce one of two comprehensive, integrated studies that identify paths to significantly reduce transportation-related fossil fuel demand and emissions, and, in parallel, manage a strategic, responsible decline in transportation-related fossil fuel supply. This agreement's study will focus on managing the decline in demand.

The two integrated studies will share common guiding principles and will incorporate common workforce and affordability considerations. The studies will also share aligned scenarios and strategies that the State, local governments and others may consider and implement to support achieving the State's carbon neutrality goal. To the extent possible and relevant to the unique characteristics of the State's local and regional economies, the studies shall also draw upon lessons learned from other models of economic and social transitions.

For purposes of the two studies, carbon neutrality means achieving a balance between sources and sinks of GHG emissions.

The guiding principles underlying each of the two studies are:

1. Equity and Justice. Equitably distribute all benefits associated with achieving carbon neutrality and prioritize benefits in communities disproportionately burdened by emissions from transportation fuel production and use.
2. Health. Improve and protect public health.
3. High Road Jobs. Foster sustainable and diversified local and regional economies, and prioritize the creation of accessible high-quality jobs for all communities, particularly the State's most vulnerable and disadvantaged residents and resource-dependent communities.
4. Environment. Improve and protect environmental quality across the State.
5. Resilience and Adaptation. Develop resilience and adaptive capacity locally, across the State.
6. Affordability and Access. Deliver clean, affordable, accessible, and reliable transportation options and technologies.
7. Minimize Impacts Beyond Our Borders. Minimize emissions leakage and external costs beyond the State's borders, to the maximum extent possible.

CalEPA and its interagency partners will facilitate shared and equal access to processes related to the development of the studies.

Study 1: Reducing Transportation-Related Fossil Fuel Demand and Emissions

This study "Study 1" shall be coordinated and integrated with the other study referred to above, here called "Study 2," and shall not duplicate the work of Study 2. Study 2 will focus on strategies to manage the decline in transportation-related fossil fuel supply and will be led by researchers at the University of California, Santa Barbara ("UCSB Team").

The two studies will coordinate the development of potential transportation-related GHG emissions trajectories in California and will develop a scenario that reduces transportation-related fossil fuel demand, and, in parallel, manage the decline in transportation-related fossil fuel supply.

Focus Areas

The contractor shall expend a majority of its time and effort in investigating these Focus Areas as elements of a roadmap to achieve carbon neutrality by 2045:

Task 1. Evaluate market characteristics of the transportation sector and policies already underway and/or under consideration for California, including:

a. Current market characteristics and trends: global, regional and local trends in prices for and access to zero-emission vehicles (ZEV) between now and 2045; global trends in battery capacity/electric vehicle range; current number and

percentage of ZEV in light, medium and heavy duty fleets; length of time of ownership of internal combustion engine vehicles; sales data from primary and secondary markets, to the extent possible; number of and geographic need for electric vehicle charging stations, hydrogen fueling stations, and gasoline stations; gasoline and electric prices; observed current and potential future barriers to access to and the selection of ZEV; factors driving changes in travel behavior; and factors affecting vehicle and ride sharing and public transit ridership options and cost.

b. Current employment characteristics and trends: existing jobs in terms of number (by occupation and industry); quality (e.g., wages, benefits, autonomy, voice); and access (e.g., demography, geography, educational status, and educational or career pathways) across the transportation sector.
c. Current relevant State and local government policies: fuel standards; vehicle mandates and incentive programs, vehicle trade-in and rebate policies; incentives for developing refueling infrastructure for alternative fuels (electricity and hydrogen); purchasing and finance criteria; transportation network company regulations; land use policies; active and public transportation policies.

Task 2. Scenario(s) for accelerating the reduction of transportation-related fossil fuel demand and emissions that include all the strategies listed in sections 3 through 6. The analysis elements outlined here will be undertaken for a main low carbon trajectory and scenario for a transition to a net zero carbon transportation system. This scenario will be an internally consistent and the basis for quantitative impact and policy analysis. Several side cases will be developed but will not be analyzed in as much detail and will be mainly to provide some sensitivity analysis on energy use, CO2 emissions and cost. Analysis of the main low carbon scenario will include:

a. Indicative milestones or targets, e.g., for fleet composition, transit ridership, and other influential indicators; where possible, these should be benchmarked against existing policies and goals.
b. Reductions in transportation fuel demand corresponding with milestones and targets outlined above.
c. Changes in travel demand and behavior due to changes in housing costs, supply and location; land use; transportation infrastructure; emergence of new mobility options; and other changes in society, technology and policy.
d. Assessments of the health, social, environmental and economic benefits, and equitable distribution of those benefits, associated with a dramatic reduction in vehicle emissions across State, regional and local geographies, and with an overall reduction in vehicle miles traveled.
e. Assessment of transportation access and needs, particularly for vulnerable and rural communities, mobility disadvantaged travelers, and long-distance commuters.

f. Where possible, scenarios will include the net effect of combinations of levels of ambition in each strategy (i.e., different pathways to achieve zero or very low emissions).
g. The health analyses will focus on PM2.5, statewide, at 5 year intervals from 2020 to 2045. We will estimate PM2.5 concentration on a 4 km by 4 km grid statewide using InMAP to capture secondary emissions, and then rely on BenMAP to estimate selected health impacts related to PM2.5 exposure. This approach will allow us to contrast the health changes between the main low carbon scenario and the BAU (baseline) scenario. We will also generate PM2.5 concentrations at the census tract level for the Environmental Justice analysis using CalEnviroScreen. In addition, we will run CMAQ for 2045 for both the BAU and the main low carbon scenario on a 4 km by 4 km statewide grid to corroborate our PM2.5 estimates generated via InMAP and to get estimates of the health benefits from reducing ozone and NOx emissions.

Analysis of sensitivity cases will include more focused study of specific relative costs and benefits of the case compared to the main case. This will also allow some analysis of uncertainty and the availability of multiple pathways to a zero carbon scenario. Sensitivity cases that will be considered include:

i. More successful efforts to mitigate transportation demand
ii. Accelerated light-duty ZEV transition
iii. A case with more fuel cell vehicles in both light and heavy duty
iv. A high liquid case, which will also explore the impact of high levels of CCS in fuel production

Task 3. Strategies to accelerate the adoption of light-duty zero-emission vehicles (ZEVs), including:

a. The role of purchase incentives and mandates for new and used ZEVs (e.g., applicability or eligibility, amount, timing, duration, and quantity).
b. Greenhouse gas emission performance standards and feebate policies.
c. Incentives for dealers and automakers to expand availability of ZEVs.
d. Market development, model availability and range.
e. Expanded charging (and hydrogen fueling) infrastructure and impacts on existing infrastructure, including electric and fossil fuel supply infrastructure.
f. Strategies to transition existing light-duty fleets with a focus on those owned and used by low-income residents and the workforce.

Task 4. Strategies to accelerate the reduction of vehicle miles traveled, including:

a. Strategies available to State and local governments to improve housing availability and affordability, and to focus economic activity near existing housing.
b. Strategies to develop land use policies and provide transportation alternatives.
c. Strategies to increase public transit ridership.
d. Strategies to increase active transportation, e.g., walking and bicycling.

e. Strategies that consider the role of technologies including connected and automated vehicles, shared mobility, and micro mobility services.
f. Strategies that consider roadway and vehicle pricing mechanisms.
g. Strategies that encourage ride sharing and vehicle sharing (greater load factors).

Task 5. Strategies to accelerate use of alternative fuel sources and similar technologies for light-, medium-, and heavy-duty vehicles and other modes of transportation (e.g., aviation, rail and marine).

Task 6. Strategies to accelerate the transition to zero-emission medium- and heavy-duty vehicles (including off-road vehicles regulated by the State) and related freight infrastructure (e.g., railyards, shipyards, ports and distribution and logistics centers).

Task 7. Strategies to increase economic opportunity, high quality job creation, and integrated skill delivery, including:

a. How the above scenarios (e.g., Vehicle Miles Traded (VMT) reduction, ZEV adoption, alternative fuels scenarios, and new mobility and automation in transportation) will affect employment in industries including logistics, port operations, manufacturing, construction, operations and maintenance.
b. The role quality transportation will play in providing access to jobs and supporting other careers.
c. What projected labor market indicators (e.g., job numbers, quality, and access) for each milestone in the transitions identified above will tell us about the research and/or policies necessary to advance economic opportunity for all Californians, especially those in disadvantaged, low income and vulnerable communities.

Deliverables

Interdisciplinary Team

The Contractor shall establish an interdisciplinary team of researchers. The team shall include researchers with expertise in:

1. Health impacts of vehicle emissions
2. Environmental impacts of vehicle emissions
3. Just transition for workers and communities, including social and economic equity
4. Economics of vehicles and transportation
5. Land use policy
6. Housing policy and economics
7. Public transit
8. Social/behavioral science

The interdisciplinary team shall meet as often as necessary to ensure coordination among researchers and coherence of products.

Monthly Project Meetings

The Contractor shall meet monthly with CalEPA PM to report on progress, exchange information and ideas, ask questions, and plan work.

Coordination with Other Contractor

The Contractor shall work in collaboration with the contractor team for UC Study 2 to ensure that each study is part of a coherent whole in terms of narrative themes, scenarios considered, and presentation. In order to achieve this coherence, contractor responsibilities include:

- Establishing procedures for, and maintaining, ongoing and regular communication and consultation with contractor team for Study 2
- Developing study timelines in coordination with contractor team for Study 2 and CalEPA to enhance communication and integration of findings, avoid duplication of effort, and enhance coherence between the reports
- Meeting jointly at least once monthly during the contract period to review status and address overlapping research questions
- Identifying overlapping issues in the synthesis, modeling, and analysis of data with Study 2
- Sharing research directions, available data, and results where relevant to develop integrated analyses and coherent findings
- Sharing draft versions of reports, and clarifying through further analysis or in the report, the assumptions and interpretations that might lead to divergent policy directions or options
- Utilizing a shared publication/communication resource to support the production of the report that may include shared formatting, organization, style, and cross-referencing where appropriate.

Work Plan

Two weeks after the starting date of the agreement, the Contractor shall present to CalEPA PM a written work plan. The work plan shall:

- Identify which investigators or staff will be responsible for which parts of the study.
- Present a timeline, including contingencies, CalEPA review periods, and revisions under CalEPA direction, that will ensure the timely delivery of work products.

The Contractor shall revise the work plan as directed.

Synthesis Report

The Contractor shall develop a synthesis report that describes the existing state of knowledge and policy as described above in Focus Area section 1, including work done

by and for the State of California. The contractor shall describe the areas where uncertainty has the greatest potential impact on outcomes and policy decisions.

Four months from the project start date, the Contractor shall deliver the synthesis report.

The synthesis report shall be well presented, including clear charts and graphs, a high standard of graphic design, professional copy-editing, consistent formatting, and compliant with WCAG version 2.0 or later.

Draft Report

Contractor shall deliver a draft report for the study. The draft report shall:

- Be substantially complete, including executive summary, introduction, body, conclusions, references, and all other parts
- Contain the major analyses, evaluation, and conclusions expected in the final report
- Be well presented, including clear charts and graphs, a high standard of graphic design, professional copy-editing, consistent formatting, and compliant with WCAG version 2.0 or later
- In the format detailed in Final Report Format
- Delivered thirty (30) days prior to Final Report date

The Contractor shall revise the presentation of the draft report and inclusion of additional material as directed.

Final Report

Contractor shall deliver the final report in electronic format. The final report shall:

- Be complete and contain the final results of the studies
- Be written to communicate effectively with a diverse audience without technical expertise in the topics covered
- Be well presented, including clear charts and graphs, a high standard of graphic design, professional copy-editing, consistent formatting, and compliant with WCAG version 2.0 or later
- In the format detailed in Final Report Format

Public Outreach materials and Translated materials

Contractor shall deliver electronic materials for public outreach, including:

- Up to eight 1-2-page fact sheets, written for a broad audience and including clear and relevant graphical elements such as charts and graphs, and explaining the analysis or evaluation and major findings of the various investigations in the studies

- Up to four PowerPoint presentations, designed for a broad audience that explain the analysis or evaluation and major findings of the various investigations in the studies

These materials shall be of high standard, formatted consistently with each other and with the final reports, and compliant with WCAG version 2.0 or later.

Meeting attendance and presentations

Contractor shall provide presenters from among the investigators and staff who performed the studies to attend, speak, and answer questions at up to four full-day public meetings in various locations in the State.