Memorandum

To: Bill Peters and Cory Ann Wind | Oregon DEQ

From: Philip Sheehy and Jeff Rosenfeld

Date: October 2016

Re: Task 1: Proposed Methodology for Fuel Supply Forecast

Background

The objective of Task 1 of ICF's contract with Oregon DEQ is to design and develop a forecasting tool to serve as the analytical basis for DEQ's decision making as it relates to the potential deferral due to the clean fuel supply.

Outline of Proposed Methodology

ICF's proposed methodology for the tool is based on the following components: a fuel demand component, a fuel supply component (with multiple facets driving the supply estimate), and a carbon intensity component.

- **Demand side inputs**
  - **Vehicle stock**: ICF will work with DEQ to obtain vehicle registration data, including new vehicle registrations—distinguished by vehicle type to the extent feasible. The vehicle stock will be used to assess continually the potential for advanced vehicle technologies. Where possible, ICF will seek commercial vehicle registrations, with a focus on fleets, to identify the potential adoption of alternative fuels in those fleets.
  - **Fuel consumption**: ICF will track Oregon fuel consumption and trends via fuel tax data collected, as well as other sources, such as the Energy Information Administration.
- **Fuel Supply**
  - **Fuels and associated feedstocks**: The fuels and applications eligible for the Clean Fuels Program are outlined in the regulation—ethanol, biodiesel, renewable diesel, hydrogen, electricity, natural gas, propane, and biogas. For each fuel type, ICF will include the feedstocks for consideration in the tool.
  - **Regional fuel supply**: ICF will report the fuel supply for each fuel type on a regional basis. ICF proposes to use the same nine regions employed in the EIA's

Annual Energy Outlook—New England, Middle Atlantic, East Coast North Central, West Coast North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific. ICF will also have a 10th region referred to as imports. Where possible, ICF will document the fuel production on a facility-basis in the tool; however, for modeling purposes, these point sources will be aggregated together into regions.

    - **Supply chain infrastructure constraints (Out-of-state)**: For each region, ICF will outline the supply chain infrastructure constraints that inhibit or facilitate the delivery of fuel to Oregon. ICF's forecast will focus on the physical constraints to fuel supply.
    - **State-wide fueling infrastructure**: ICF will develop an updated inventory of state-wide downstream fueling infrastructure such as blending and storage terminals, natural gas pipeline distribution, and fueling stations. This information will help determine qualitatively the impact of fueling infrastructure on the supply of low carbon fuels within Oregon.
- **Carbon intensity estimates**
    - ICF will seek to assign a carbon intensity for each facility documented. In many cases, ICF anticipates being able to use carbon intensity values reported to DEQ. Where necessary, ICF will use the GREET model to develop carbon intensity estimates for fuels. This might happen, for instance, when a new fuel/feedstock combination is forecasted to be produced and does not have a reported carbon intensity. ICF will document all assumptions regarding GREET inputs used to develop carbon intensity estimates. Furthermore, ICF will work with DEQ to develop a protocol for GREET modeling as part of the tool development. ICF proposes to use conservative assumptions regarding key input parameters, thereby avoiding unintentionally aggressive carbon intensity values.

Data and Metrics

The underpinning of the proposed tool is robust and defensible data. Given that ICF will be delivering a tool for use by DEQ staff, it is important that the data be derived from publicly available data sources. The table below outlines ICF's sources for various data points relevant to the three components listed above: demand side inputs, fuel supply, and carbon intensity estimates.

Model Component	Data / Metric	Potential Sources
Demand side inputs	Past OR fuel consumption and trends	• Fuel tax data collected by ODOT • Check against EIA reported data
	OR and nationwide alt fuel trends	• ODOT / OR DEQ where possible • EIA data • Clean Cities Coalitions (mainly for fleet-related consumption) • Trade organizations
	Alt fuel vehicle deployment	• State of Oregon DMV • IHS Automotive (formerly RL Polk; data available for purchase)
	Projected total fuel consumption	• VISION modeling • ODOT revenue forecast modeling
Fuel supply	Planned projects in/near OR (e.g., EV charging or NG fueling infrastructure)	• NREL's Alternative Fuels Data Center • Utility filings (e.g., NW Natural) • Stakeholder outreach/interviews
	Existing and planned fuel production facilities	• Market reports (e.g., UC Davis work,[1] trade publication e.g., National Biodiesel Board) • DOE and SEP solicitations for pre-commercial scale facilities
	Nationwide volumes for RFS-eligible fuels	• EPA maintains a monthly update of RINS generated under the RFS2, tracked via the EPA Moderated Transaction System (EMTS); these data are disaggregated by fuel type • Additional nuance can be provided via simply analysis of industry publications (freely available)
	Other data	• Environmental commodity data; these can help ascertain investment activity • USDA FAS National reports for potential exports (e.g., biofuels from Brazil)
Fuel supply & Carbon intensity estimates	Banked clean fuel credits	• Clean Fuels Program data (via OR DEQ)

[1] It is ICF's understanding that UC Davis has taken on work related to the production of conventional and advanced biofuels, work that was previously conducted by Environmental Entrepreneurs (E2).

Model Component	Data / Metric	Potential Sources
Carbon intensity estimates	Updates to the CI of fuels	• Fuel pathways submitted to OR DEQ and ARB as part of the LCFS program are usually a leading indicator regarding the directional changes for CI of transportation fuels • For new and emerging fuels that may not have a CI, GREET modeling from ANL and others can help characterize low-high ranges

ICF will document our findings regarding data sources and data availability; this will enable our team to propose a finalized list of metrics with rationale for including it in the forecast. Where necessary, ICF will note data sources or metrics that were excluded due to data limitations or other concerns regarding data quality/reliability.

The proposed data and metrics outlined above will serve as the foundation for the three components of the proposed tool. Each data type or metric will constitute an analytical building block for each of the three components. Where appropriate, ICF will identify relationships between metrics so that the fuel supply forecast can be updated in the event certain data elements are inconclusive in a given year (e.g., because the data are not available, sources have changed, there are quality control issues, etc.).