

-Draft 2017 Forecast -2014 Scenarios Update -Additional Electrification

Oregon Clean Fuels Program Advisory
Committee Meeting #2

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Environmental Quality

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Agenda

- **Draft 2017 Forecast**
- **Draft Assumptions for the 2014 Scenario Update**
- **Draft Additional Electrification**





Draft 2017 Forecast





Review of 2017 Forecast Methodology

■ Demand side inputs

- Vehicle stock – ODOT registrations through 2015 to update estimate vehicle fleet
- Fuel consumptions – Oregon fuel consumption and trends from fuel tax data and EIA

■ Fuel Supply

- Fuels and associated feedstocks – fuels and applications within the regulation including accepted and potential pathways
- Regional fuel supply – using EIA and other publically available data
- Supply Chain infrastructure – infrastructure constraints/limitations considered for out-of-state fuels
- State-wide fueling infrastructure – inventory of fueling infrastructure (blending and storage terminals, pipelines, fueling stations)

■ Carbon Intensity estimates

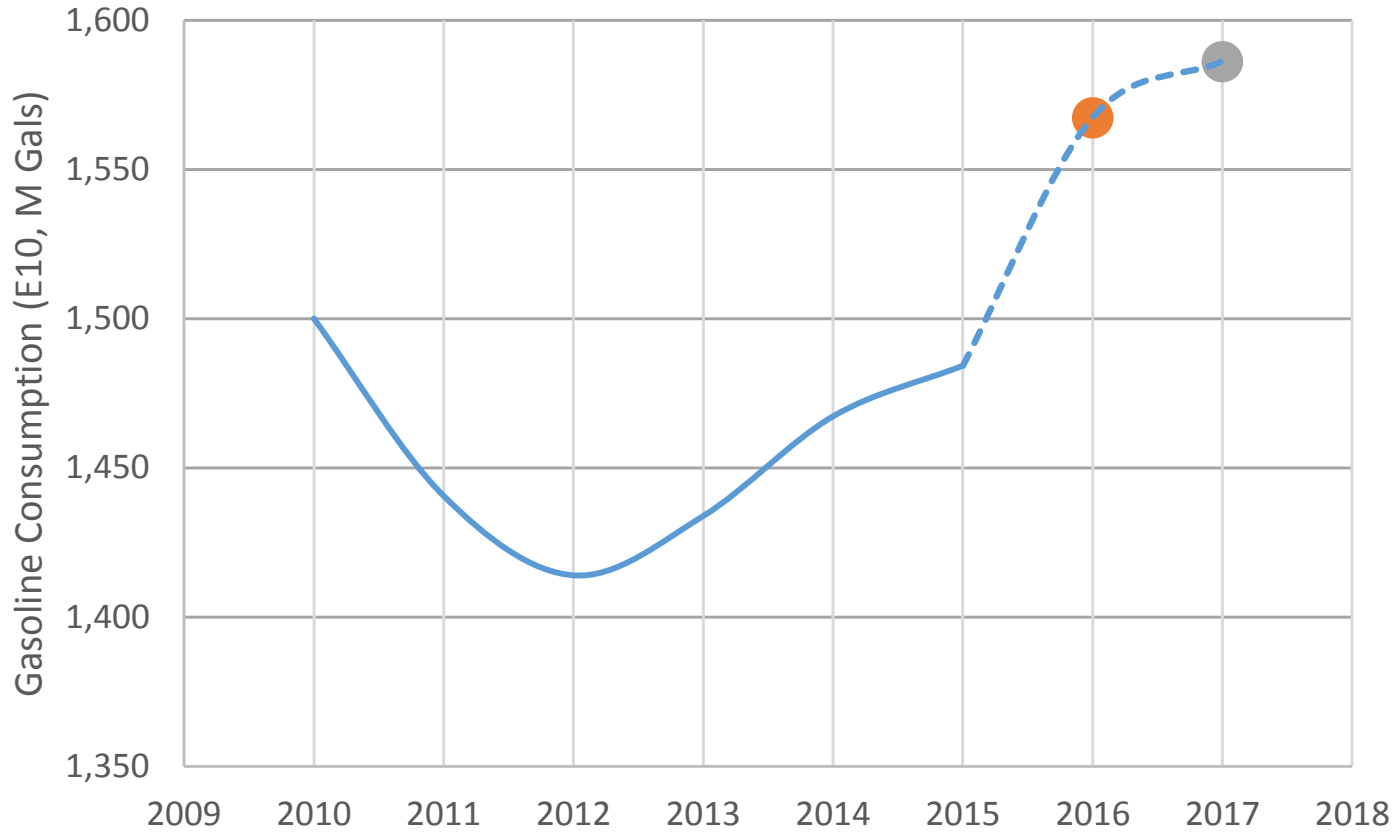
- ICF assigns a carbon intensity for each facility/fuel documented.

2017 Fuel and Deficit Forecast

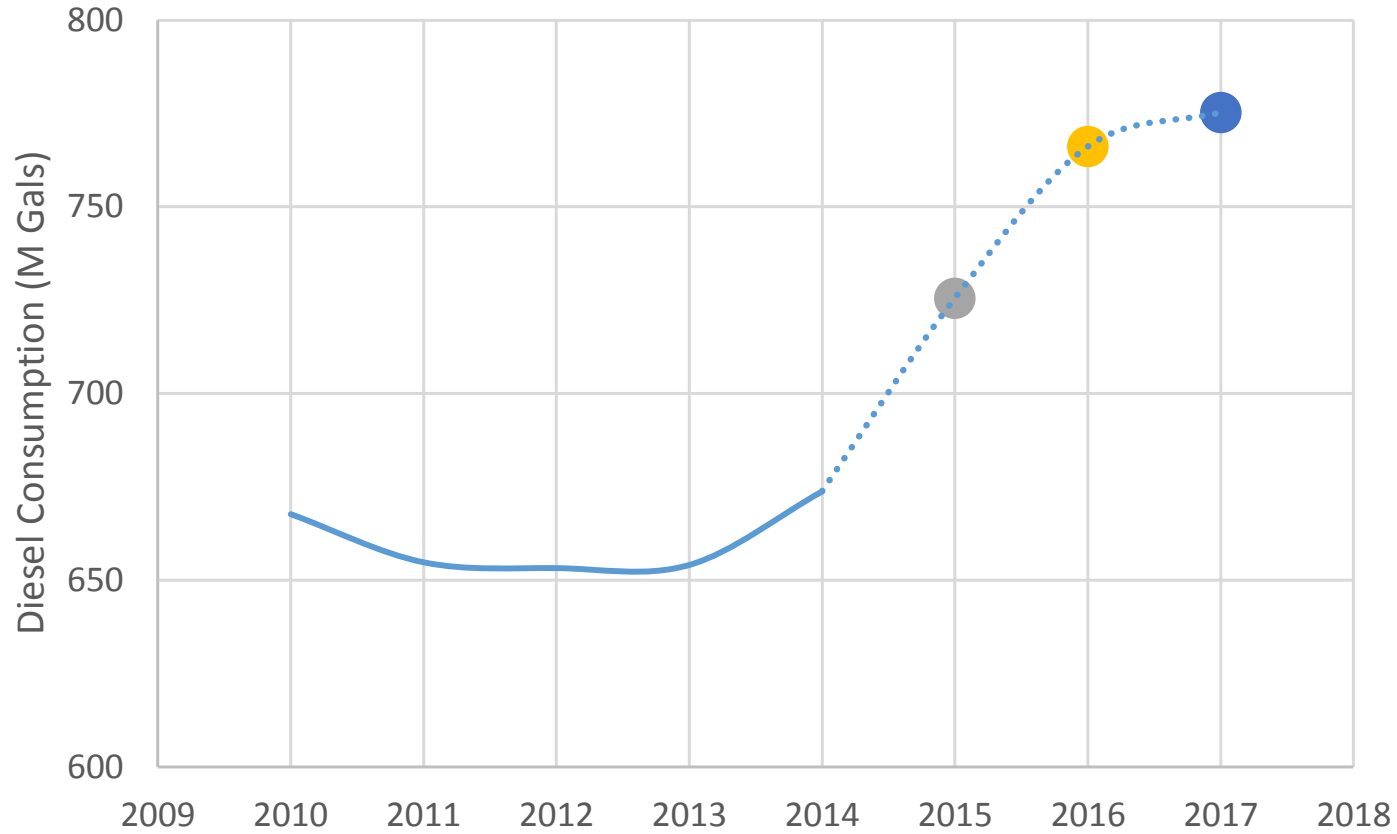
- **State Energy Data System (SES) of the EIA indicates modest growth for motor gasoline and on-road diesel consumption over the last several years; however 2015 data is not available for diesel**
- **ODOT reports fuels tax revenue is on track for 5.6% growth in 2016**
- **ODOT forecasts an increase in motor vehicle fuels and passenger vehicle registrations**
- **This growth is largely driven by increases in total employment statewide, with a focus on non-farm employment**

Fuel	Demand (M Gallons)	Deficits
Gasoline Blendstock	1,428	437,500
Diesel	737	239,400
		676,900

Motor Gasoline Fuel Forecast



Diesel Fuel Forecast





Credit Generation Potential – Gasoline Substitutes

■ Ethanol

- Based on certified fuel pathways and potential pathways that could come online for 2017, ICF estimates at 440,000 credits available in the market based on 10% blend and an average carbon intensity of 60.5g/MJ
- Reviewing existing pathways and including imports (e.g., Brazil), the forecasted upper limit for credits is about 600,000 credits

■ Electricity

- Registrations through 2015 indicate there are more than 13,000 plug-in electric vehicles operating in Oregon
- If sales from 2015 hold flat for 2016-2017, the PEV population increases to nearly 27,000 vehicles; if due to low oil prices, sales dip to 2014 levels, PEV population would be around 20,000 vehicles
- Estimated numbers of credits from electric vehicles are about 64,000-92,000
- *Not included in this forecast are the contribution of fixed guideway and forklift credits which would potentially contribute in excess of 50,000 credits in 2017*

Credit Generation Potential – Liquid Diesel Substitutes

■ Biodiesel

- Maintain 5% blend while seeking lower carbon feedstocks; in AFD there are more than 50 stations in Oregon that can dispense B20+
- Coupled with diesel forecast, 39 million gallons of biodiesel resulting in 190,000 – 280,000 credits

■ Renewable Diesel

- Domestic and international capacity that can be imported is 400-500 million gallons which could generate 2.7 – 3.9 million credits
- Assuming Oregon gets its “fair share” going to carbon constrained markets (Oregon, California, BC), Oregon is estimated to receive 40-50 million gallons generating 265,000 – 395,000 credits



Credit Generation Potential – Gaseous Diesel Substitutes

■ Natural Gas

- Forecasted range of 1.7 – 3.0 million DGE based on modest 9% growth from 2015 for the low end of the range, data from EIA
- More aggressive deployment of NGVs to match the planned infrastructure expansion of 14 CNG stations and 1 LNG station on top of the current 21 CNG and 3 LNG stations results in the higher end of the range
- Depending on the feedstock (fossil or RNG), credit generation can range from 4,500 – 15,000 credits

■ Propane

- Limited data available regarding propane consumption in Oregon
- EIA reports state fleet consumption was around 19,000 GGE in 2014; propane in school buses has gained traction with nearly 700 school buses statewide
- ICF estimates 0.8 – 1.3 million gallons of propane in 2017 generating 1,200 – 2,000 credits

Credit and Deficit Forecast Comparison

Fuel	Demand	Deficits	Credits
Gasoline Blendstock	1,428 MGals	437,500	
Diesel	737 MGals	239,400	
<i>Banked Credits, 2016</i>			160,000
Gasoline Substitutes			
Ethanol	160—190 MGals		200,000—600,000
Electricity	60—85 GWh		64,000—92,000
Diesel Substitutes			
Biodiesel	40—45 MGals		190,000—280,000
Renewable Diesel	40—50 MGals		265,000—395,000
Natural Gas	1.7—3.0 MDGE		4,500—15,000
Propane	0.8—1.3 MGals		1,200—2,000
TOTAL		676,900	885,000—1,544,000



2014 *Illustrative Scenarios* Update





Draft Assumptions For the Scenario Updates

- **Rebranding the 2014 compliance scenarios as 2014 *illustrative* compliance scenarios to further distance them from being mistaken as forecasts**
- **Assumptions for the update to the 2014 *illustrative* compliance scenarios**
 - Be based on previous Illustrative Scenarios: advanced vehicle technology and higher biofuel blends
 - Use the same fuel types and volumes as originally assumed in the 2014 analysis
 - Use estimates from 2014 for available fuel types and volumes
 - Update Oregon Vision with recent vehicle fleet purchase data for 2014 and 2015
 - Utilize data from CFP and EIA for biodiesel and ethanol volumes and feedstocks to understand current use
- **Incorporate most recent carbon intensities used in the CFP**



Additional Electrification





Additional Electrification Technologies

- **Fixed guideway transit including TriMet Max (light rail), City of Portland Street Car (street car), and the Portland Aerial Tram (tram)**
- **Forklifts**
- **Truck stop electrification**
 - Was not included in the draft report but will be included in the final report, an estimate of kWh is included in the table at the end of the presentation section



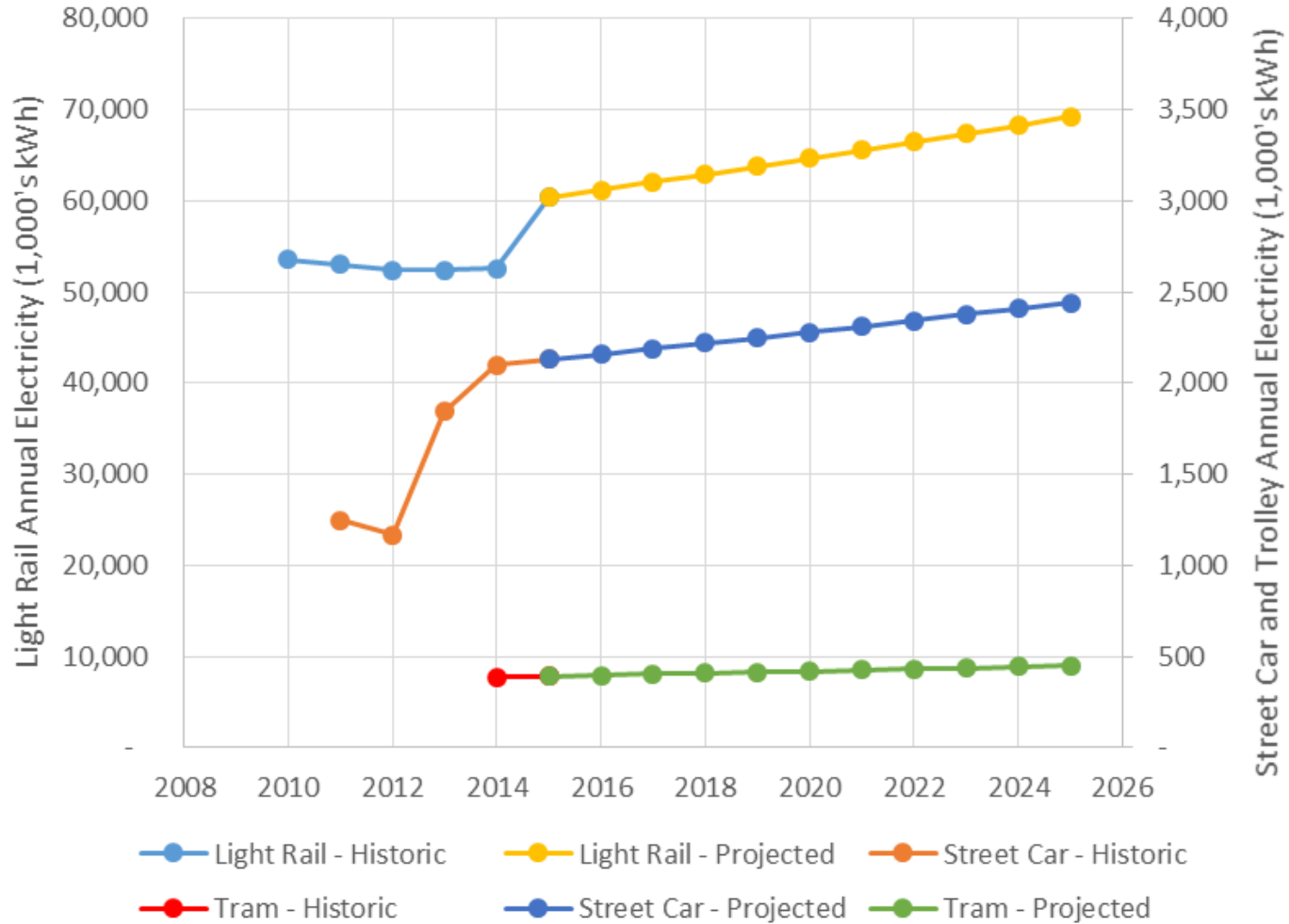


Fixed Guideway Assumptions

- **Utilized National Transit Database (NTD) for annual electricity consumption from 2010-2014**
- **Annual escalation of 1.4% from 2014 to 2025 was assumed based on the updated 2040 Household Forecast Distribution for Portland**
- **Increased in electricity consumption of light rail from 2014 to 2015 is due to Max increased track mileage from 52 to 59.7 miles**



Fixed Guideway Estimated Electricity Consumption



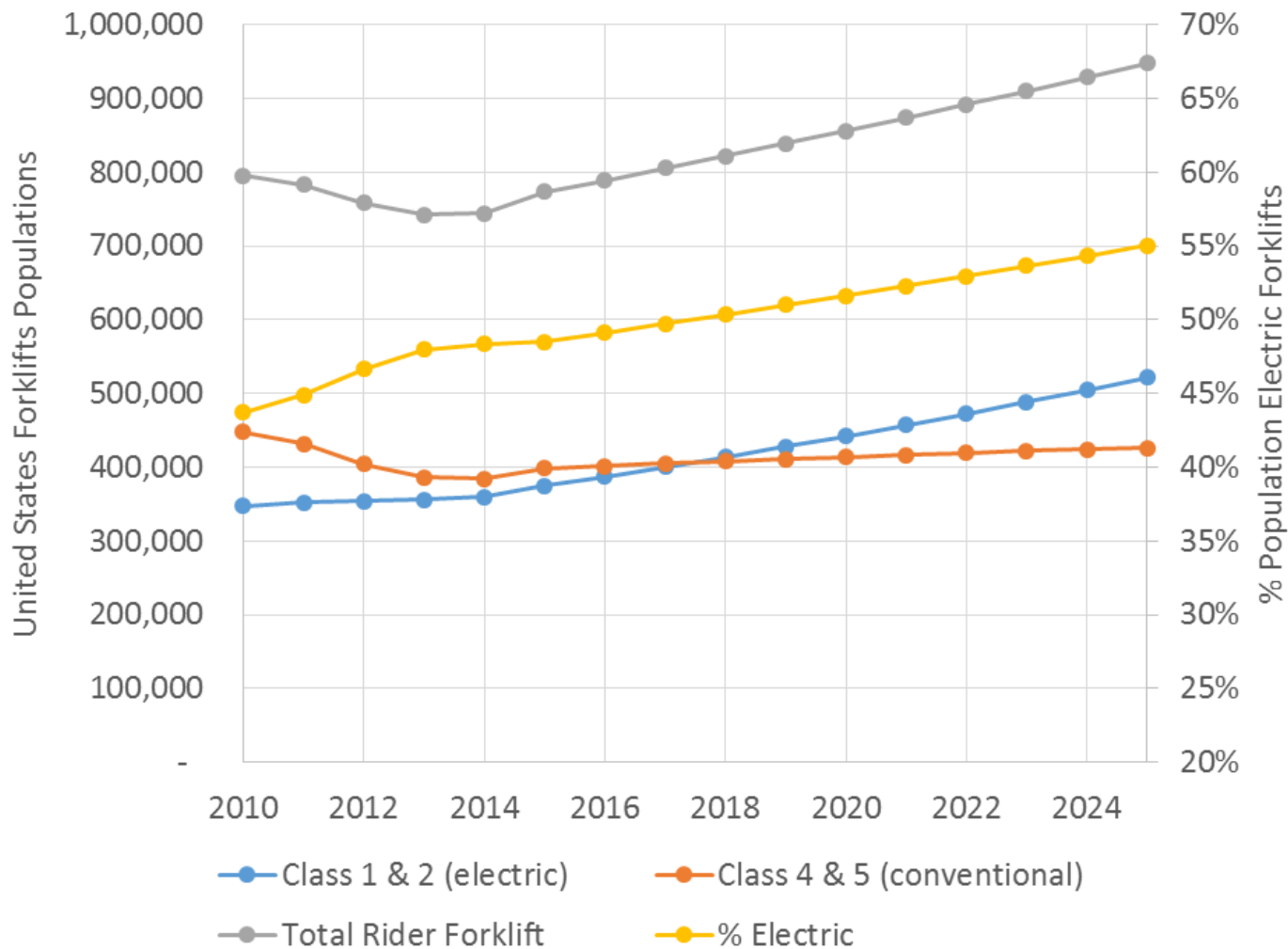


Forklift Assumptions

- Utilized the Industrial Truck Association (ITA) historical forklift sales to estimate current US forklift populations
- Recent trends in forklift sales and population including growth rates and changes in the penetration of electric forklifts were used to project future forklift populations and sales
- Allocated US forklifts to Oregon by population
- CalETC Phase 1 TEA estimate of 18,312 kWh/forklift was used to quantify electricity consumption



US Forklift Populations



Oregon Forklift Population and Electricity Consumption

Year	Oregon <2015 Forklifts	Oregon 2016+ Forklifts	Total Oregon Forklifts	Oregon <2015 Forklift Electricity (kWh)	Oregon 2016+ Forklift Electricity (kWh)
2016	4,101	721	4,822	75,097,512	13,202,952
2017	3,747	1,237	4,984	68,615,064	22,651,944
2018	3,352	1,800	5,152	61,381,824	32,961,600
2019	2,795	2,530	5,325	51,182,040	46,329,360
2020	2,184	3,320	5,504	39,993,408	60,795,840
2021	1,526	4,162	5,688	27,944,112	76,214,544
2022	810	5,070	5,880	14,832,720	92,841,840
2023	-	6,077	6,077	-	111,282,024
2024	-	6,281	6,281	-	115,017,672
2025	-	6,492	6,492	-	118,881,504

It is estimated that TSE could contribute 50,000 – 100,000 kWh/yr





Credit Calculation Assumptions

- **Oregon version of GREET electricity carbon intensity of 120.27 g/MJ instead of 31.85 g/MJ in the regulation**
- **Credit formula and EERs consistent with the LCFS Final Regulatory Order and Staff Discussion Paper for Electricity as a Transportation Fuel**
- **Credits presented for fixed guideway do not include fuel displacement in the credit formula, in the Final Report fuel displacement methodology will be included for the new Max line and the tram**
- **Fuel displacement methodology utilized for forklifts purchased 2016 or later**



Fixed Guideway and Forklift Credit Potentials

Year	Fixed Guideway	Forklifts	Total
2016	14,433	30,549	44,982
2017	14,574	37,585	52,159
2018	14,657	45,010	59,666
2019	14,741	54,400	69,141
2020	14,701	63,906	78,607
2021	14,658	73,737	88,395
2022	14,488	83,392	97,880
2023	14,309	93,639	107,948
2024	14,124	94,438	108,562
2025	13,802	94,374	108,176
Total	144,487	671,029	815,516
% of Total Deficits, 2014 Illustrative Compliance Scenarios	1.1-1.4%	4.9-6.7%	6.0-8.2%

Next Steps for Final Additional Electrification Report

- **Include Truck Stop Electrification**
- **For tram and new 7.7 miles of Max, used fuel displacement methodology**
- **Quantify specific EER value for tram**

Questions?

