BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of the Investigation Required by S.B. 275, Energy Amendments, Addressing Cleaner Air through the Enhanced use of Alternative Fuel Vehicles	**DOCKET NO. 13-057-02** **Initial Comments of the Southwest Energy Efficiency Project and Utah Clean Energy**

INTRODUCTION

Senate Bill 275, *Energy Amendments*, was adopted in the 2013 Legislative Session and, among other things, directs the Commission to open a docket to investigate "options and opportunities for advancing and promoting measures designed to result in cleaner air in the state through the enhanced use of alternative fuel vehicles." These comments present analysis of air quality and economic impacts associated with enhanced use of electric "fueled" vehicles. Based on this analysis, the Southwest Energy Efficiency Project (SWEEP) and Utah Clean Energy (UCE) make recommendations about policies that can help overcome barriers that currently limit greater use of electric vehicles in Utah and prevent air quality benefits associated with their enhanced use. We understand that the Commission will present a report of its findings in this docket it to the Utah Legislature and ask the Commission to consider these comments in its investigation and subsequent report to the Legislature.

SUMMARY

Because electric vehicles (EVs) provide air quality and economic benefits to the Wasatch Front and the state of Utah, the state should adopt policies that overcome barriers to their enhanced use.

Analysis shows that in the Wasatch Front region, all types of EVs reduce emissions of criteria pollutants compared to a comparable gasoline-fueled vehicle. In 2013, the largest emissions reductions (99% compared to a gasoline-fueled vehicle) are for Volatile Organic Compounds and Carbon Monoxide with significant additional reductions in Sulfur Dioxide (96%), Nitrogen Oxides (76%) and Particulate Matter (65% for PM2.5 and 49% for PM10). The adoption of EVs will clearly help the region address its current air quality challenges. Electric vehicles also provide an economic benefit to the state by reducing fuel costs and shifting consumption away from imported oil to locally produced electricity sources.

Electric vehicle drivers can expect to save between $1,000 and $2,000 annually on fuel costs depending on the type of electric vehicle, amount of driving, and the future cost of gasoline. Net lifetime savings are estimated to be between $11,000 and $24,000. Depending on the rate of adoption for EVs, the total economic benefit to the state of Utah in reduced fuel costs would be between $64 million and $280 million in 2030.

We recommend that the Commission consider the following analysis and key policies in its investigation of improving quality through the enhanced use of alternative fuel vehicles:

- **Allow the commercial resale of electricity for vehicle charging**, without invoking Commission regulation to facilitate the availability of public charging stations;
- **Create an EV electricity rate tariff** unconnected to current tiered rates that will incentivize off-peak charging and not penalize a household with an EV for high levels of electricity use compared to households without EVs;
- **Bring parity to the State tax credit for electric vehicles and natural gas vehicles** (currently set at $605 for electric vehicles and $2,500 for natural gas vehicles);
- **Create EV-ready requirements in building codes**, requiring that new garages and parking lots have conduit available for EV charging stations;
- **Implement an annual decal fee on electric vehicles**, a portion of which will be used to pay a fair share of roadway infrastructure costs, and portion of which will be invested in providing publically available charging stations;
- **Support adoption of EVs in government fleets** when EVs are appropriate to the fleet's needs and cost effective compared to a gasoline vehicle;

- **Develop a strategic plan for deployment of EV charging infrastructure**, including direct current quick charging stations to address range anxiety; consider cooperative effort with neighboring states on interstate highways.

COMMENTS

The Southwest Energy Efficiency Project (SWEEP) and Utah Clean Energy (UCE) would like to thank the Utah Public Service Commission for the opportunity to comment on Docket No. 13-057-02. Our comments will focus on the potential role that electric vehicles (EVs) can play in helping to address air quality challenges specifically along the Wasatch Front. We analyze the emissions reductions that EVs provide compared to gasoline vehicles, both today and in 2020; discuss the economics of EVs; and discuss policy options that could enhance market adoption of EVs in Utah. These comments are organized as follows:

1. **BENEFITS OF ELECTRIC VEHICLES**
2. **ANALYSIS OF AIR EMISSIONS FROM ELECTRIC VEHICLES IN UTAH**
3. **ECONOMIC ANALYSIS OF ENHANCED USE OF ELECTRIC VEHICLES**
4. **BARRIERS TO ENHANCED USE OF ELECTRIC VEHICLES**
5. **RECOMMENDED PRIORITY POLICIES FOR UTAH**
6. **ADDITIONAL POLICY OPTIONS**
7. **CONCLUSION**

1. BENEFITS OF ELECTRIC VEHICLES

There are currently fifteen light-duty electric vehicles (EVs) available from large scale vehicle manufacturers, including plug-in hybrid electric vehicles (PHEVs), with seven more models expected by 2014.[1]

[1] FuelEconomy.gov. 2013. Electric Vehicles and Plug-in Hybrids. http://www.fueleconomy.gov/feg/evsbs.shtml and http://www.fueleconomy.gov/feg/phevsbs.html

Listing of Light-Duty Alternative Fuel Vehicles

Currently Available in the US	**Type of Vehicle**
Scion IQ EV	EV
Chevy Spark EV	EV
Coda	EV
Fiat 500e	EV
Ford Focus	EV
Honda Fit	EV
Mitsubishi I-MIEV	EV
Nissan Leaf	EV
Smart for Two	EV
Tesla Model S	EV
Toyota RAV4	EV
Ford Fusion Energi	PHEV
Toyota Prius Plug-In	PHEV
Chevy Volt	PHEV
Ford C-MAX Energi	PHEV
Honda Civic Natural Gas	CNG
Available in 2014	
BMW i3	EV
Mercedes-Benz B-Class EV	EV
Kia Soul EV	EV
Volkswagen eGolf	EV
Honda Accord	EV
Mitsubishi Outlander Plug-in	PHEV
Cadillac ELR	PHEV

With so many diverse models available over the next two years, electric vehicles have the potential to play an important part in the transportation future of Utah. The benefits of EVs compared to gasoline fueled vehicles include the following:

- *Greater efficiency*: Compared to gasoline powered internal combustion engines, electric vehicles can travel the same distance using approximately 12% less energy.[2]
- *Locally produced energy source*: Almost half (44%) of the petroleum used in Utah is imported, while electricity is produced almost entirely from domestic sources of energy and within the state.[3]
- *Reduced emissions*: EVs have the potential to reduce greatly harmful tailpipe emissions and climate changing greenhouse gas emissions compared to gasoline powered vehicles.[4]
- *Reduced Fueling Cost*: Because of their higher efficiency and the low cost of electricity compared to gasoline per unit of energy, electric vehicles can travel the same distance as a typical conventional vehicle at the cost-equivalent of $0.95 per gallon.[5]

Furthermore, the energy and environmental benefits of electric vehicles are expected to increase as older power plants are retired, and additional natural gas and renewable generation is constructed.[6] The Salt Lake County area and other portions of the Wasatch Front suffer from serious air quality challenges, and mobile source emissions are a significant source of emissions that contribute to this problem. Supporting widespread adoption of electric vehicles is an important strategy for addressing air quality in the region.

2. ANALYSIS OF AIR EMISSIONS FROM ELECTRIC VEHICLES IN UTAH

SWEEP performed analysis comparing the emissions associated with three types of electric vehicles, both in 2013 and 2020: a plug-in hybrid electric vehicle (PHEV) that has an electric range of 10 miles (PHEV10)[7]; an extended range EV (PHEV40) with an electric range of 40 miles[8]; a battery electric vehicle (BEV) with a range of 70 miles[9]; a compressed natural gas

[2] Salisbury, M. and Toor, W. 2013. Transportation Fuels for the Southwest's Future: Life-cycle Energy Use and Environmental Impacts of Electric, Compressed Natural Gas, and Gasoline Vehicles. Available at www.swenergy.org
[3] Energy Information Administration. 2013. Utah: State Profile and Energy Estimates. Retrieved from http://www.eia.gov/state/data.cfm?sid=UT
[4] Salisbury and Toor, 2013. Transportation Fuels.
[5] Based on a gasoline fueled vehicle with a fuel economy of 28 mpg and an electric vehicle traveling 3 miles per kWh and a kWh costing $0.103.
[6] Salisbury and Toor, 2013. Transportation Fuels.
[7] The PHEV10 was modeled on the 2013 Toyota Prius Plug-in Hybrid.
[8] The PHEV40 was modeled on the 2013 Chevy Volt.
[9] The BEV was modeled on the 2013 Nissan Leaf.

(CNG) vehicle[10]; and a traditional gasoline passenger vehicle. This analysis focused on air quality emissions within Utah's current non-attainment areas: Box Elder County, Cache County, Davis County, Salt Lake County, Tooele County, Utah County, and Weber County.

The analysis evaluates emissions of the following criteria pollutants[11]: ozone precursors, such as Volatile Organic Compounds (VOCs) and Nitrogen Oxides (NOx); Particulate Matter of 2.5 and 10 micrometers (PM2.5 and PM10); Carbon Monoxide (CO); and Sulfur Dioxide (SO_2). The analysis also evaluates greenhouse gas emissions. *The PM2.5, PM10 and SO_2 emissions are particularly important as the region is currently in non-attainment for permissible levels of these three pollutants.* Note that SO_2, NOx and VOCs are all also precursors for PM2.5. For ozone and CO, the region is a maintenance area[12]; however the US EPA is expected to issue new ozone standards in 2014, which may present additional challenges by lowering allowed ozone levels from 75 parts per billion (ppb) to 70 ppb or lower.

The emissions inventories developed by the Utah Department of Environmental Quality show *mobile sources* account for greater than 50% of the pollution in the Salt Lake area,[13] so strategies that can reduce emissions from mobile sources have significant potential benefit.

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[10] The CNG vehicle was modeled on the Honda Civic Natural Gas

[11] "The Clean Air Act requires EPA to set National Ambient Air Quality Standards for six common air pollutants. These commonly found air pollutants (also known as "criteria pollutants") are found all over the United States. They are particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. These pollutants can harm your health and the environment, and cause property damage. Of the six pollutants, particle pollution and ground-level ozone are the most widespread health threats. EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels. The set of limits based on human health is called primary standards. Another set of limits intended to prevent environmental and property damage is called secondary standards." US EPA, *What are the Six Common Air Pollutants*, available at: http://www.epa.gov/airquality/urbanair/.

[12] "A maintenance area is an area that was once designated as nonattainment, and which subsequently demonstrated to EPA statistically that it will attain and maintain a particular standard for a period of 10 years." From *Utah Division of Air Quality 2012 Annual Report*, Retrieved from http://www.airquality.utah.gov/Public-Interest/annual-report/.pdf/2012Annual%20Report.pdf

[13] See, for instance, http://www.airquality.utah.gov/Public-Interest/Current-Issues/pm2.5/presentations/presentation.html?fips=49035

The analysis shows that in the non-attainment area all types of electric vehicles reduce emissions of criteria pollutants compared to a comparable gasoline fueled vehicle. Except for greenhouse gases, the scale of the reductions in emissions depends on the amount of electricity used as a fuel. BEVs achieve the greatest level of reductions, with PHEVs having smaller level of reductions; PHEV40s (which travel 57% of their miles on electricity) have the second greatest level of reductions and PHEV10s (which travel 26% of their miles on electricity) have the least amount of emissions reduction compared to gasoline vehicles. The analysis also shows that EVs and CNG vehicles have comparable emissions profiles, with both having a clear advantage over gasoline-fueled vehicles pollutants.

A. <u>Emissions Scenarios</u>

SWEEP performed analysis using the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) fuel-cycle model developed by the Argonne National Laboratory with funding from the U.S. Department of Energy.[14] The GREET model was used to make a comparison between the life-cycle emissions of three light-duty vehicle fuels: gasoline, electricity, and natural gas. SWEEP analyzed the energy consumption and emissions of these three vehicle fuels in three different scenarios in order to assess the emissions impacts of two major trends: the planned improvements in fuel economy for new vehicles and the shift in the electrical generation sector away from coal and towards natural gas and renewables, as described below.

Scenario 1: New vehicles purchased in 2013 are analyzed in 2013 to show which vehicles will have the most immediate impact regarding energy use and emissions. See Figure 1, below.

[14] Argonne National Laboratory. 2012. Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation. Retrieved from http://greet.es.anl.gov/

Scenario 2: The same 2013 vehicles are then compared again assuming they are still operating in 2020. Because vehicles purchased in 2013 will remain on the road, consuming energy and emitting pollutants for many years, it is important to understand how they will perform in the future. While vehicle tailpipe emissions from internal combustion engines purchased in 2013 are expected to increase over time due to deterioration of engine performance and emission control systems, no change in tailpipe emissions has been assumed for this analysis. Therefore, this analysis presents a conservative estimate of tailpipe emissions, and actual tailpipe emissions are likely to be higher. See Figure 2, below.

Scenario 3: The analysis also looks at how new vehicles purchased in 2020 perform in that year. We only considered regulations that have been adopted, so did not assume emissions reduction in 2020 for gasoline vehicles from the EPA's proposed new Tier III emissions and fuel standards, which will impact 2017 and later model years if they are adopted.[15] If the Tier III standards are adopted, the emissions associated with new gasoline vehicles sold after 2017 will decline significantly. We also did not assume new EPA rules that may further reduce emissions from electric power plants. We assumed new gasoline vehicles purchased in 2020 will meet the CAFE fuel economy standards that will be in effect in 2020. See Figure 3, below.

To estimate electricity generation mixes in the future, SWEEP relied on forecasts conducted by Synapse Energy Economics for SWEEP's *$20 Billion Bonanza* study.[16] We have used the "high efficiency scenario," which best fits our assessment of the region's trajectory regarding the retirement of coal power plants. Also from the *$20 Billion Bonanza* study, we used NOx emission rates from coal power plants for 2013 and 2020 to reflect the retirement of older

[15] Assuming, the federal Tier III emissions and fuel standards are implemented, beginning in 2017 all new passenger vehicles will have the same tailpipe emissions as the Honda Civic CNG. Therefore, beginning in 2017 EVs will represent the primary opportunity for additional reductions in tailpipe emissions in new passenger vehicles.
[16] Geller H. et al, The $20 Billion Bonanza: Best Practice Utility Energy Efficiency Programs and Their Benefits for the Southwest, 2012.Retreved from http://www.swenergy.org/programs/utilities/20BBonanza.htm

plants and the installation of emission controls on remaining plants to meet existing Clean Air Act requirements.

There are two major variables to consider when estimating what electricity sources will meet the marginal demand created by increased utilization of EVs. For most utilities, natural gas is expected to meet the majority of marginal electricity demand over the course of the year. However, as most EV charging is expected to take place during the evening and early morning hours at people's homes, this is also the time when there may be spare coal capacity that could be used to meet additional EV demand. These late hours are also when wind generation usually peaks. As the relative importance of these two variables is unknown and especially difficult to attempt to quantify for future years, we have decided to use the regular generation mix forecast for 2020 for both baseload and marginal electricity demand.

The GREET model calculates the amount of emissions occurring in urban areas to show which emissions would be most likely to contribute to air quality issues. To better represent the impact that electric and gasoline vehicles will have on air quality, SWEEP characterized the transportation energy system in Utah to show exactly what emissions are likely to contribute to the Wasatch Front's airshed. Note that on July 15, 2013 SWEEP will release a multi-state analysis of emissions from electric vehicles, which arrives at different conclusions for Utah, as it analyzes *statewide* lifecycle emissions, and does not focus specifically on the Wasatch Front non-attainment area.[17]

[17] Because almost all of the state's coal fired power plants are located outside of the Wasatch Front area, their emissions do not contribute the emissions shown in the analysis for this docket. While the statewide analysis mentioned above shows increased electric vehicle emissions compared to this analysis (since the electricity is sourced from Utah's statewide (mostly coal) power plants), electric vehicles are nevertheless estimated to result in long-term state-wide emissions reductions.

Regarding relevant upstream emissions from electricity, SWEEP has calculated that 0% of statewide coal plant emissions[18] and 60% of natural gas plant emissions take place along the Wasatch Front. This is based on 60% of the state's natural gas generation occurring in counties that are either in non-attainment or maintenance areas for criteria pollutants (Salt Lake, Utah, Davis, Weber, and Cache Counties all have natural gas plants). For upstream emissions for gasoline vehicles, 100% of the emissions associated with gasoline refining take place in the Wasatch Front as all five of the state's refineries (which produce more gasoline than the state consumes) are located in Salt Lake and Davis Counties.

Regarding the extraction of fuel (mining and drilling): all of the state's coal mines are located outside of the non-attainment area and a very small number of oil and gas fields are located in non-attainment counties. For the purposes of the GREET model, it was assumed that 1% of oil and gas extraction and 0% of coal mining contributes to urban emissions.

Ozone precursor emissions from transportation fuels will be critical information in 2020, because at that time states will be required under the Clean Air Act to demonstrate attainment of the revised National Ambient Air Quality Standard (NAAQS) for ozone that the Environmental Protection Agency is required to issue in 2014. Our analysis demonstrates that a shift to electric vehicles will help Utah comply with the new standard.

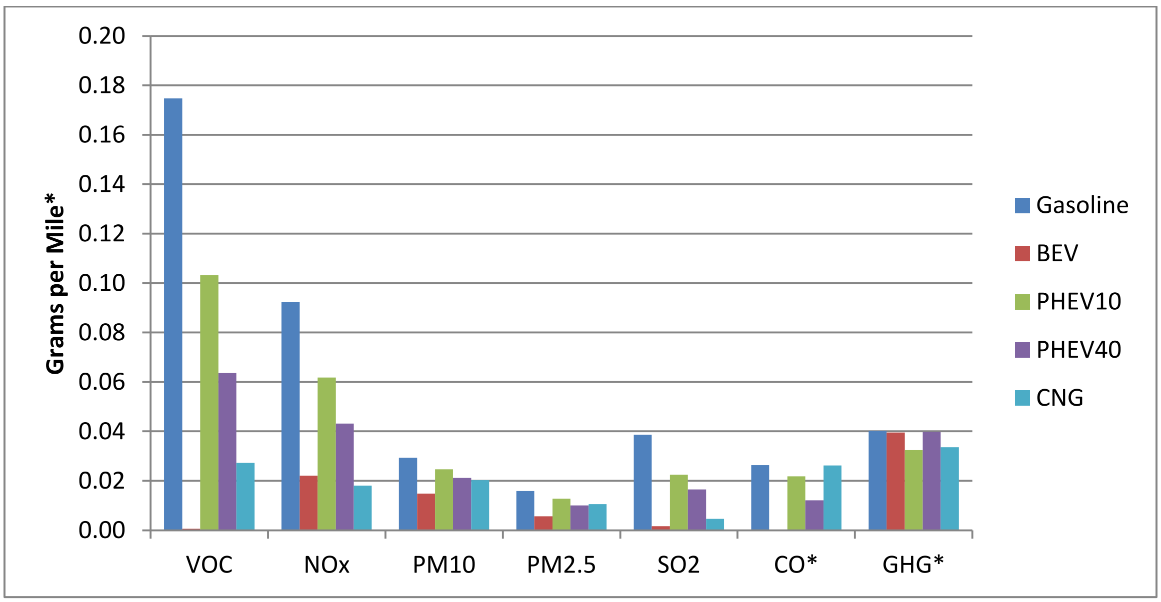
B. <u>Findings</u>

Below, we present the impacts on Utah's air quality from enhanced adoption of EVs in Utah. Figures 1-3 show that all types of electric vehicles have lower levels of emissions for all the criteria pollutants compared to gasoline vehicles. The scale of the reductions corresponds to percentage of miles driven on electricity, with BEVs offering the greatest reductions and

[18] While the Kennecott coal plant operates in the Wastach Front, its power is only used for operations at the Kennecott facility and is therefore not supplying electricity to EVs charging in the area.

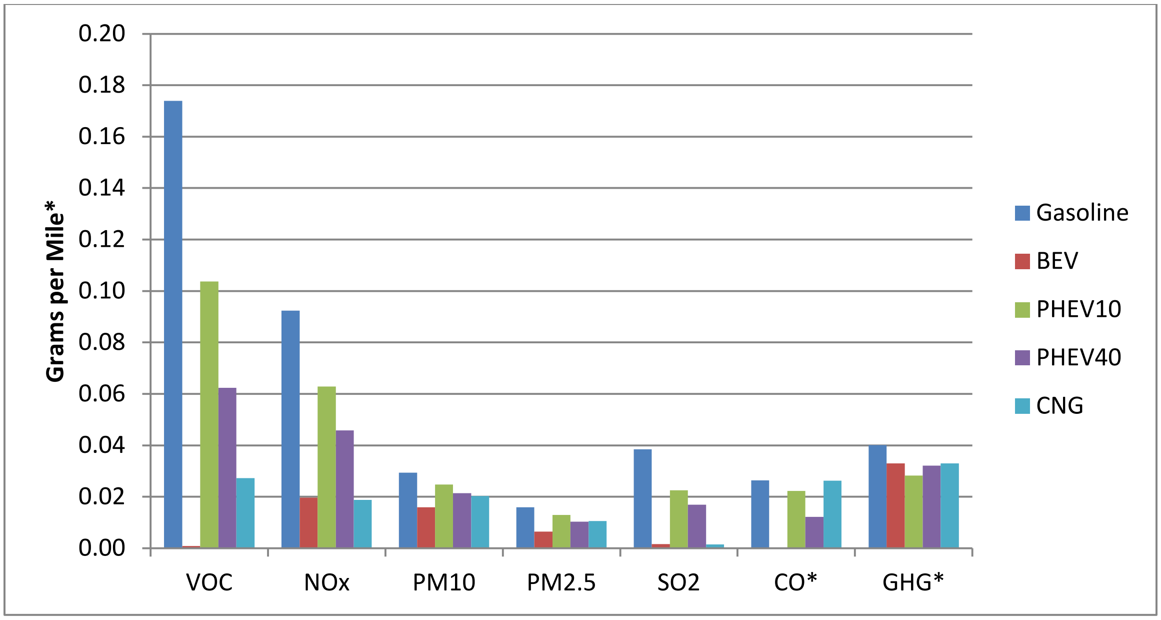
PHEV10s the least amount of emission reductions. BEVs have essentially zero emissions of VOCs, SO2 and CO. The most significant reductions are in the ozone precursors, VOC and NOx. Compared to CNG vehicles, the BEVs generally have lower emissions (except for NOx) while the PHEVs generally have higher emissions (except for CO) with PM2.5 emissions being almost equal.

Figure 1. Criteria Pollutant Emissions in Wasatch Front by Vehicle Type, New 2013 Vehicles



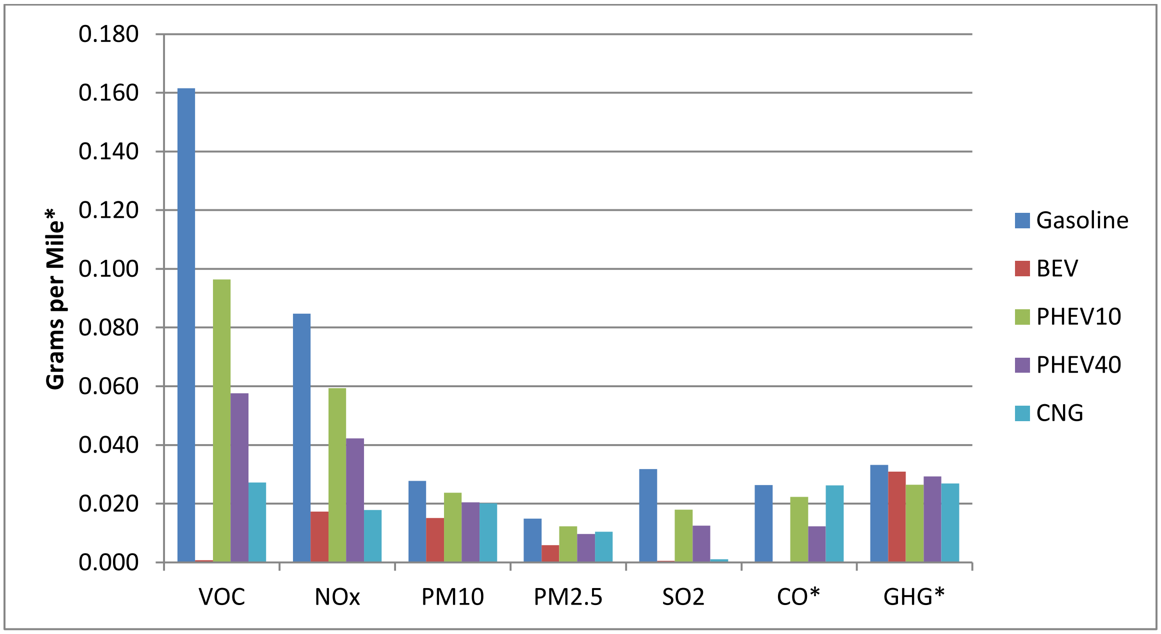
*The scale of emissions from CO and GHG has been changed so that all the pollutants could be placed in one chart. CO emissions have been reduced by a factor of 100 so in fact numbers are around 2.5 grams per mile and GHG emissions have been reduced by a factor of 10,000 so in fact numbers are around 300 grams per mile.

Figure 2. Criteria Pollutant Emissions in Wasatch Front by Vehicle Type, 2013 Vehicles in 2020



*The scale of emissions from CO and GHG has been changed so that all the pollutants could be placed in one chart. CO emissions have been reduced by a factor of 100 so in fact numbers are around 2.5 grams per mile and GHG emissions have been reduced by a factor of 10,000 so in fact numbers are around 300 grams per mile.

Figure 3. Criteria Pollutant Emissions in Wasatch Front by Vehicle Type, New 2020 Vehicles in 2020



*The scale of emissions from CO and GHG has been changed so that all the pollutants could be placed in one chart. CO emissions have been reduced by a factor of 100 so in fact numbers are around 2.5 grams per mile and GHG emissions have been reduced by a factor of 10,000 so in fact numbers are around 300 grams per mile.

3. Economic Analysis of Enhanced Use of Electric Vehicles

Higher upfront costs for electric vehicles will be more than offset by significantly lower fuel costs than gasoline vehicles, bringing economic benefits to their owners that will in turn provide an economic benefit to the state. SWEEP has analyzed the economic benefits of EVs based on two forecasts for the price of gasoline developed by the Energy Information Administration (EIA), the Reference Case and the High Oil Price Case.[19] The current average price of residential electricity per kWh for Rocky Mountain Power customers (estimated at $0.102 per kWh[20]) was increased based on the expected increase in electricity prices for the Mountain region by EIA.

Table 1. Economic Benefits of Individual EVs Compared to a Gasoline Passenger Vehicle[21]

	Incremental Cost (less federal tax credit)	**Payback Period (years)**		**Lifetime Savings**		**Average Annual Fuel Savings**	
		Reference	High	Reference	High	Reference	High
PHEV10[22]	$3,735	4	4	$11,264	$15,572	$1,000	$1,287
PHEV40[23]	$4,095	5	4	$11,151	$16,117	$1,016	$1,347
BEV[24]	$4,410	4	3	$17,092	$24,479	$1,433	$1,926

Utah produces enough oil to satisfy 56% of its own demand, meaning that almost half of the money spent on fuel will leave the state's economy. The main sources of electricity, coal and natural gas, are produced in the state, with a large amount available for export after in-state

[19] In the last six years of the EIA's Annual Energy Outlook, the High Oil Price Case has actually more closely tracked with actual gasoline prices.
[20] If EV owners used a Time of Day rate to charge their electricity costs for vehicle charging (assuming they charged their vehicles during off-peak times) the rate would be lower than considered for this analysis.
[21] A new gasoline passenger vehicle is estimated to have an on-road efficiency of 28 mpg.
[22] The PHEV10 is modeled on the 2013 Toyota Prius Plug-in Hybrid.
[23] The PHEV40 is modeled on the 2013 Chevy Volt.
[24] The BEV is modeled on the 2013 Nissan Leaf.

demand has been met. Therefore a greater share of money spent on electricity as a transportation fuel will remain in the state's economy.

Table 2. Energy Resources Consumption and Production in Utah[25]

	Production	**Consumption**	**Production as a % of Consumption**
Oil	30.1 million barrels	53.1 million barrels	56%
Coal	19,648 thousand short tons	1,193 thousand short tons	1,646%
Natural Gas	457,525 million cubic feet	221,166 million cubic feet	207%

To estimate the total economic impact of EVs, we must consider the potential market penetration of EVs into the light duty vehicle fleet. To project the potential impact of EVs, SWEEP used two possible market penetration scenarios. The first comes from the U.S. Energy Information Administration and is their forecast of EV sales in the Mountain region. We estimate that based on the percentage of vehicle registrations, Utah would make up 11.7% of vehicles sales in the region. By 2020, EIA forecasts that EVs will make up 1.2% of all new vehicles sales and by 2030, 2.8% of sales.[26] This translates to approximately 0.5% of all light duty vehicles in 2020 and 1.2% of all light-duty vehicles in 2030. A more aggressive market penetration scenario was also analyzed that assumed that by 2020 EVs would make up 2% of all light-duty vehicles and that by 2030 this percentage would rise to 5%. Table 3 shows that adoption of EVs in Utah have the potential to provide between $64 million and $280 million in economic benefits to Utah in 2030.

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[25] Energy Information Administration. 2013. Utah: State Profile and Energy Estimates. Retrieved from http://www.eia.gov/state/data.cfm?sid=UT

[26] Energy Information Administration. 2013. Annual Energy Outlook. Table 48. Light-Duty Vehicle Sales by Technology Type – Mountain. High Oil Price Case. Retrieved from http://www.eia.gov/forecasts/aeo/data_side_cases.cfm

Table 3. Annual Economic Benefits (Millions of $)

	2020	**2030**
EIA Scenario	$12.9	$63.9
5% by 2030 Scenario	$64.5	$281.5

4. BARRIERS TO ENHANCED USE OF ELECTRIC VEHICLES

As a new transportation technology, EVs will have to overcome a number of barriers to gain widespread adoption. One of the greatest barriers to EV adoption is higher upfront capital cost relative to gasoline vehicles. The lowest price for EVs currently on the market is just under $30,000, significantly higher than the price for comparable dedicated gasoline vehicles. Savings from reduced fuel costs will offset the higher purchase prices over the *lifetime* of the vehicle, but consumers may not be willing or able to bear the additional *initial* cost. While the upfront purchase costs are expected to come down as battery technology improves and large scale production of batteries and EVs expands, EVs will continue in the short term to cost more than similar gasoline fueled vehicles.

Some of this incremental cost is offset by a federal tax credit, which offers up to $7,500 (depending on battery size) toward the purchase of an EV. The federal government also offers a tax credit of up to $1,000 for individuals and up to $30,000 for commercial entities for the purchase and installation of electric vehicle charging equipment. At the state level there are a number of policies that can make owning an EV more economical. Some policies focus on reducing the upfront cost, while others reduce annual operating costs.

Another barrier is consumer range anxiety: the fear that there will not be charging stations available where they are needed. Policies that expand the network of charging stations will give EV drivers the confidence to take longer trips and give more people the confidence to purchase an electric vehicle. In addition, PHEVs, which can drive up to 40 miles on electricity but then switch over to gasoline, can allow consumers to drive most of their daily trips on electricity, while removing the range barrier for long distance trips.

To help overcome some of these barriers, the federal government has invested resources to support vehicle and battery manufacturing in the United States. The U.S. Department of Energy (DOE) has partnered with private companies to fund the EV Project, which has facilitated the installation of over 8,000 residential and public charging stations in cities across the country. The DOE's Clean Cities program has funded EV and charging readiness plans for communities across the country while building coalitions to support EV adoption. In addition, the DOE provides support for educational institutions which provide training and research for electric vehicle technologies.

Because EVs and their charging infrastructure are emerging technologies, new regulations and laws may be appropriate to provide necessary infrastructure for EV market expansion and public interest. For example, in most states only utilities are allowed to sell electricity for vehicle charging (or any other use), which limits flexibility for businesses interested in setting up public charging stations (known as Electric Vehicle Supply Equipment, or EVSE[27]). Additionally, utility rates that were designed without considering EV charging may create a disincentive to using an EV and may not send an ideal price signal to EV drivers who, for example, may increase utility costs by charging during peak demand hours. EV charging, however, has the potential to increase the electric grid's resilience, by making better use of existing capacity during night-time off peak hours, if appropriate policies and incentives are in place. Updating and streamlining existing policies impacting EVs and EVSE will insure that these technologies do not face a disadvantage compared to existing transportation modes, and will help to ensure that EVs provide maximum public benefit.

[27] Such businesses can charge a flat rate, or a rate based upon the time spent charging, but cannot charge based upon actual electric energy consumed.

5. Recommended Priority Policies for Utah

Below, we recommend a suite of key policies to address air quality through the enhanced use of alternative fuel vehicles in Utah. A more comprehensive list of additional state polies for advancing EVs begins on page 22.

A. Allow the commercial resale of electricity for vehicle charging, to facilitate the availability of public charging stations.

This policy would allow EVSE owners and operators additional flexibility in how they provide and sell electricity to EV owners at public charging stations. Under current regulations, only entities regulated as utilities are able to sell electricity to the public on a $/kWh basis. While there are alternative methods of selling charging to EV owners—for example, paying based on time spent charging, membership and subscription services or assessing a flat fee for use of the parking space—there is a fundamental disadvantage to not charging by the kWh. Because different vehicles have on-board chargers that accept different levels of electricity (from 3.3 kW up 20 kW), different vehicles would be able to receive more electricity over the same period of time. For example, a Chevy Volt has an onboard charger rated at 3.3 kW and the Ford Focus EV has an onboard charger rated at 6.6 kW. If both vehicles charge for one hour at a Level 2 public charger, the Focus will receive twice as much electricity as the Volt. Allowing EVSE owners to charge by the kWh ensures that all vehicles are paying equitably for the energy they are receiving. This is not to say that this is the only way that EVSE operators will sell vehicle charging, but it gives them the flexibility to find a business model that works.

Currently, ten states (California, Washington State, Virginia, Colorado, Florida, Oregon, Minnesota, Illinois, Maryland, and Hawaii) have changed their laws to allow the re-sale of electricity to EV owners.

B. <u>Bring parity to the tax credit for electric vehicles and natural gas vehicles (currently set at $605 for electric vehicles and $2,500 for natural gas vehicles).</u>

The additional incremental cost of an electric vehicle is one of the most significant barriers to greater adoption. The state has recognized this and currently offers a tax credit of $605 for the purchase of a qualifying electric vehicle. However, this is less than the tax credit currently offered for CNG vehicles which goes up to $2,500. The state should encourage a diverse set of alternative fuels based on air quality improvement potential regardless of fuel used. Given the relatively small number of EVs sold in Utah, this policy is expected to have a minor fiscal impact to the State. Our analysis indicates that the emissions benefits of EVs and CNG vehicles are similar, and we recommend that the tax credits for EVs be set at the same level as CNG vehicles.

The following states offer tax credits or rebates for electric vehicles (maximum value in parentheses): California ($2,500), Colorado ($6,000), Georgia ($5,000), Illinois ($4,000), Louisiana ($3,000), Maryland ($2,000), Oklahoma (50% of incremental cost), Pennsylvania ($1,000), South Carolina ($2,000), Tennessee ($2,500) and West Virginia ($7,500).

C. <u>Create a time of day EV electricity rate tariff without tiers that will incentivize off-peak charging.</u>

Rocky Mountain Power currently offers a time of day (TOD) rate (limited to 1,000 customers) that offers a discount on electricity used during off-peak hours. Those enrolled pay $0.016 less per kWh for usage during off-peak hours and pay $0.042 per kWh more for usage during peak hours (Monday through Friday, 1 pm to 8 pm from May to September). The TOD rates are linked to a customer's regular residential schedule which is based on tiered rates. Because EV owners who charge their vehicle at home would be expected to add several hundred kWh to their monthly bill this could easily push them into the second or third tier and result in increased rates, creating a disincentive for EV ownership. The average monthly consumption of RMP customers is approximately 800 kWh so adding electric vehicle charging would likely push the average customer into the third tier (from $0.112 per kWh to $0.139 per kWh).

It will benefit the utility to shift EV owners onto a TOD rate as this will decrease the likelihood that EVs will add to demand during peak times. As many EV owners would be expected to plug their vehicles in when they return home from work for the day (in the late afternoon) this can correspond with peak demand times, especially during the summer when there is significant air conditioner usage in the late afternoon. This may increase peak demand and require more expensive peaking plants to be brought on line and can also increase the possibility of localized transformer overload in neighborhoods with high levels of EV ownership.

Creating a TOD rate separate from current tiered rates would give EV owners a greater incentive to switch to these rates, while at the same time helping the electric utility to "fill the valleys" through increasing electricity use at night and thereby make better use of existing generating capacity. Arizona Public Service offers both TOU and a special EV rate that are not based on tiers (like their regular residential rates).

D. Adopt EV-ready requirements in building codes, requiring that new garages and parking lots have conduit available for EV charging stations.

Establishing capacity for EVSE during construction (or during planned renovation) costs significantly less than retrofitting a building for EVSE capacity, as retrofitting often requires retrenching, rewiring or upgrades to electric panels. For commercial installations, retrofitting can cost an additional $1,100 per station for surface lots and $800 for parking garages.[28] For residential single-family homes, the Vancouver Electric Vehicle Association estimates that, on

[28] Electric Vehicle Charging Infrastructure Recommendations to Fairfax County. Available at : http://www.mitre.org/work/tech_papers/2011/11_2916/11_2916.pdf

average, the cost of retrofitting for Level 2 charging is at least $900 more than preparing that home during new construction.[29]

Promoting EVSE requirements in building codes will ensure all new construction is EVSE-ready and indirectly encourage the existing building stock to become EV-ready too. Given that Utah is expecting a 77% increase in population between 2013 and 2050, an EVSE building code requirement will be crucial to ensuring that all new buildings (and residents) are EV-ready. This new building stock will increase competition for existing building owners (especially in multi-unit residential buildings and in the resale market), putting on the pressure for everyone to offer EVSE-ready properties or EVSE charging.

Several governments including Boulder County CO, Los Angeles, CA, Vancouver, British Columbia and the state of California have already enacted this type of update to their building code.

E. Implement an annual decal fee on electric vehicles, a portion of which will be used to pay a fair share of roadway infrastructure costs, and portion of which will be invested in publically available charging stations.

Under current Utah law, electricity sold to electric vehicles is exempt from state fuel taxes (propane and natural gas as vehicle fuels are also exempt). While this does provide a small financial incentive to EV owners, it is important that EVs pay their fair share of fuel taxes to maintain the state's transportation infrastructure. As sales of alternative fuel vehicles increase in future years, the current exemption could have significant impacts on the state's ability to fund roadway infrastructure projects. While it may eventually be feasible to directly tax electricity used in vehicle charging, using smart grid technology that can recognize individual vehicles, this is currently not a practical approach, and a fixed fee (dubbed a "decal fee") is a reasonable interim solution.

[29] EV Infrastructure Costing Worksheet. Available at http://www.veva.bc.ca/home/index.php

The decal could also include a surcharge that would be used to fund the development of public charging stations across the state. This ensures that those that are benefitting from government supported public charging stations (EV owners) are the ones paying for their installation. This would provide a stable funding source for EVSE which can be used to develop a statewide charging infrastructure.

Currently Colorado, Washington State and Virginia have instituted annual fees on EVs to replace fuel taxes and a number of other states (Arizona, Michigan and Texas) have considered or are still considering similar measures. Colorado is the only state to have created a self-funded mechanism (paid for by EV owners) for setting up public charging stations.

F. Support adoption of EVs in government fleets when EVs are appropriate to the fleets' needs and cost-effective compared to a gasoline vehicle.

Electric vehicles have the potential to serve as an ideal transportation solution in government fleets because many vehicles in Utah's state fleets are used for short, urban driving, and most vehicles are returned to the same parking place. EVs represent a good solution for fleets for air quality improvements and for reducing state fleet fuel costs since electricity is much cheaper per unit of energy compared to gasoline. Government fleets can also serve as early adopters and provide examples of new technologies to the general public. State policies could include a requirement for the purchase of EVs (or other alternative fuel vehicles) as a certain percentage of new state fleet vehicles. Alternative financing mechanisms such as performance contracting could also be modified to allow upfront capital costs of EV charging infrastructure to be offset by future fuel savings.

G. Develop a strategic plan for deployment of EV charging, including DC quick charging stations, to address range anxiety; consider cooperative effort with neighboring states on interstate highways.

Range anxiety, or the fear that EV drivers will be stranded without recharging options, is a concern for EV owners and potential purchasers. The provision of strategically placed, publicly available chargers (especially DC fast chargers) along major corridors (such as the interstates) and between major destinations will allow EV drivers to make extended trips in their vehicles and give potential purchasers confidence that an EV will be able to make longer trips outside of urban areas.

The West Coast Electric Highway (including British Columbia, Washington, Oregon, and California) is the most prominent example of statewide and regional planning for EV corridors. In both Washington and Oregon federal funding served to provide some of the financing for the stations.

6. ADDITIONAL POLICY OPTIONS

In this section we offer a more comprehensive list and brief descriptions of additional state-level policies that could be adopted to facilitate enhanced use of electric vehicles. They are grouped according to the three general areas of policy development that contribute to public acceptance of electric vehicles: financial incentives, making EVs more convenient, and regulatory support. We can provide additional information about these policies to the Commission if needed.

A. Financial Incentives for EVs/EVSE:

- **EV Rebate**: Consumers receive an upfront discount off the purchase price of an EV rather than having to wait to for a tax credit when they file a state tax return. Rebates would also be available to those with little or no tax burden as well as organizations such as government and non-profits which do not pay taxes.
- **EV Income Tax Credit**: An EV purchaser receives the incentive when they file their state income taxes.
- **EVSE Rebate**: This would provide an EVSE purchaser an upfront discount off the price of EVSE rather than having to wait for a tax credit when the purchaser files a tax return. Rebates would also be available to those with little or no tax burden as well as organizations such as government and non-profits which do not pay taxes.

- **EVSE Income Tax Credit**: An EVSE purchaser receives the incentive when they file their state income taxes.
- **EV Exempt from Sales Tax**: This policy provides a discount to an EV purchaser at the time of sale and could be set up so that EVs would be either exempt or face a lower sales tax rate.
- **Grants to Local Governments for EVs/EVSE**: The state supplies a source of funding to aid local governments in the purchasing of EVs and EVSE.
- **Reduced License Tax**: Vehicles are often charged a license or registration tax based on a vehicle's assessed value. A reduced license tax creates an incentive for EV owners whenever they license or reregister their vehicles.
- **Free EV Parking**: This policy either designates free parking for EVs or allows EVs to park free of charge in publicly owned pay areas such as parking meters or pay garages.
- **EV Manufacturer's Tax Credit**: Manufacturers of qualifying EV or EV components receive a tax credit based on the cost of producing the EV or its components.

B. Making EV Ownership More Convenient:

- **EVs Able to Use HOV/HOT Lanes**: This grants EV drivers the ability to make use of high occupancy vehicle (HOV) lanes if they are driving alone or high occupancy toll (HOT) lanes without paying a toll.
- **NEV Road Access**: This policy allows neighborhood electric vehicles (NEVs, typically along the lines of golf carts) access to local surface streets, generally those with speed limits below 35 or 40 mph.
- **EV Access to Carpool Parking**: This policy gives EV drivers access to dedicated carpool parking spaces even if not used for carpooling.
- **Exemption from Emissions Testing**: Many urban areas require vehicles to undergo emissions testing to help meet EPA regulations on levels of criteria pollutants. Exempting EVs which have very low or zero tailpipe emissions adds convenience and saves money for EV owners.
- **Financing for EVs/EVSE**: Because of higher capital costs for EVs, alternative financing mechanisms that rely on fuel and maintenance savings provide ways to increase adoption. Examples of innovative financing for EVs and EVSE include performance contracting and Property Assessed Clean Energy (PACE) financing.
- **Promoting Multi-Family EVSE**: This makes it easier for residents of multi-family housing units and homeowners associations (HOAs) to install charging stations.
- **Fine for Taking EV Parking**: This imposes a set fine on any non-electric vehicle that is improperly parked in a parking space reserved for EV charging.

C. Regulatory Support:

- **Clean Car Standards**: The Clean Car Standards adopted by California and originally thirteen other states require a minimum level of sales (0.5% in 2013 and rising to 15% by 2025) of zero emission vehicles (such as EVs).
- **Permitting for EVSE**: This policy establishes a standardized permitting system for EVSE at the state level and allows municipalities or counties to opt in if they so choose.
- **Electric Vehicles Included in State Bid**: The state bid is a price agreement between state governments and vehicle manufacturers that allows states to receive lower prices on the purchase of large number of vehicles. These lower prices are also available to local governments interested in purchasing vehicles using the state bid.

7. Conclusion

SWEEP and UCE appreciate the opportunity to submit these comments. If the Commission has questions about the analysis or policy recommendations described herein, please contact the following individuals for additional information or resources:

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