

MEMO

To: CARB Board Members

From: Sierra Club California

Re: Foundational Facts on Why Now is the Time for an Effective ICT Rule

Date: September 17, 2018

As you prepare to consider the Innovative Clean Transit proposed rule at your upcoming September Board meeting, we would like to provide you with some of the latest foundational facts related to zero emission buses. So many positive developments have occurred over the past two years its sometimes hard to keep up with the latest and remember where things are today.

So here is a summary of what we believe are some of the most important facts for you to keep in mind as a context for evaluating this proposed rule and police comments you may hear.

Rule Contents

The rule currently proposed has been in development for many years. It is the result of significant compromise and discussion. Ultimately, it does not require that transit agencies add buses to their fleets. Rather, it only requires that they phase in zero-emission buses as they purchase buses to replace older buses. Additionally, the rule is structured to allow access to incentive funds for early actors. The rule also allows more time for compliance to smaller agencies.

Bus Range

- According to a California Air Resources Board (CARB) Survey, 56% of California transit agency routes are 150 miles or less.
- Now the three top electric bus makers, New Flyer, Proterra and BYD all have 40' buses with ranges of at least 255 miles - one with a range of 350 miles.
- The ranges of buses have more than doubled in just the last three years and further increases are coming.
- EV batteries have decreased in cost 77% from 2010 to 2016
- **Conclusion – range is no longer an issue and will only continue to get longer at lower cost in the future.**

Charging Infrastructure

- Standards and interoperability are here today
 - **For depot charging**, all the leading electric bus makers except for BYD are using the J1772 CCS Type I standard. BYD has announced it will offer this as an option to customers in 2019.
 - **For overhead fast charging**, all the bus makers that offer overhead are now following the OPPCharge international standard which has been used in Europe for years for heavy duty vehicle overhead charging.
 - **Conclusion – De facto depot charging, and overhead DC fast charging standards are being used today allowing interoperability between chargers and buses from different companies.**

- Charging Infrastructure financial support
 - SCE and PG&E will install and fully pay for
 - Upgrades to the electrical infrastructure to the bus depot meter.
 - “Make readies” – i.e. trenching, installation of electrical cables and repaving from the depot electrical meter to the charger locations.
 - 50% of the cost of the chargers. (Combined with the Hybrid and Zero-emission Truck and Bus Voucher Incentive Project (HVIP) \$30,000 incentive / charger, all the cost of the depot chargers should be covered.)
 - SDG&E has filed an application with the CPUC that largely follows SCE and PG&E’s except they are proposing to fully pay for the chargers. Their application is expected to be approved in the first half of 2019. These three utilities cover 70% of the electricity service in the state.
 - Some transit agencies have already applied for and received grant awards from the Transit and Intercity Rail Capital Program (TIRCP) and Low Carbon Transit Operations Program (LCTOP) programs for charging infrastructure. E.g. San Diego MTS.
 - **Conclusion – there are sufficient financial support programs to pay for the majority if not all of the cost to install depot charging infrastructure.**

Electricity Costs

- According to CARB’s bus electricity cost analysis, the weighted average cost of electricity for the 5 largest utilities for managed depot charging is \$.12 / kWh. The average efficiency of a 40’ bus is 2.1 kWh / mile. The average miles per year per bus is 40,000. **Therefore, the average cost of electricity for a managed depot charged 40’ bus is \$10,080 / year.**
- **Low Carbon Fuel Standard (LCFS) support** – For the first six months of 2018, the market price per credit has been \$133. (In July, the price was \$170). At \$133/credit, the LCFS will pay out about \$13,300 / electric bus / year. If the CARB Board approves the updated program, that will increase to \$17,290 / year. This would pay for all the electricity fuel costs for an agency and provide an additional \$7,210 / bus / year to pay for other expenses.
 For those transit agencies that install solar, the portion of the electricity that they use to power electric buses will increase their LCFS revenue an additional 30% as well as lowering their electricity costs. If they could supply 25% of the electricity they use to power their electric buses this way, it would result in an average LCFS payment of \$18,585 / bus / year.
- It should be noted that several of the utilities are exploring new tariff designs that could further lower electricity costs for transit agencies.
- **Conclusion – LCFS funding will most likely pay for more than the annual cost of electricity for depot charged electric buses providing additional funds to pay for other expenses, increased service or allowing lower fares.**

Total Cost of Ownership (TCO)

- **CARB Study** - Informed by nearly 18 months of work from CARB’s ICT Transit Bus Lifecycle Cost Modeling Subcommittee, CARB staff presented the estimated cost of transition at the June 26, 2017 ICT Workshop. Their conclusion was that the total cost of

transitioning all of California's buses to battery electric zero emission buses by 2040 would produce a net savings of 2.6% or \$580 million when compared with a business as usual case assuming continuing to use CNG (compressed natural gas) fueled buses.

Were this study to be re-calculated using current assumptions, the results would be considerably better due to:

1. HVIP incentive funding was not included in the model and now provides \$150,000 / 40' bus.
2. LCFS revenues would increase by at least 30% or \$3,000 / bus / year.
3. All infrastructure costs were included in the model but now will largely be paid for with investor owned utilities' new programs described above and with the HVIP \$30,000 / charger incentive.
4. Other financial support programs such as the VW mitigation fund of \$130 million for transit, school and transit buses; the TIRCP and LCTOP were not considered in the model and are all now paying out in aggregate hundreds of millions of dollars to support transit.

UC Davis ITS Study - In October 2017, the UC Davis Institute for Transportation Studies (ITS) published a timely report entitled, "Exploring the Costs of Electrification for California's Transit Agencies".

This is a comprehensive, conservative and thoughtful study. It takes a snapshot look at costs in two periods. The Current Period (2016-2018) and in 2030.

In the executive summary, it states:

*"Agencies are also eligible for an additional \$1 to \$3.7 billion dollars in subsidies from the California's Hybrid Vehicle Incentive Program (HVIP) and Low Carbon Fuel Standard (LCFS). When these incentives are included, the cost of electrifying the entire fleet in the **current period** [emphasis added] is not statistically different from business as usual costs."*

*Further, it states: "Conclusions: A transition to electric buses increases annual expenditures as new investments in infrastructure are made. **Over time, electric buses are expected to deliver lower operating costs and lower lifetime costs compared to conventional powertrains.** [emphasis added]"*

Were this study to be re-calculated using current assumptions, the results would be considerably better due to:

1. The HVIP incentive funding was increased from the studies' assumption of \$95,000 / 40' bus to the updated program's \$150,000.
2. LCFS revenues would increase by at least 30% or \$3,000 / bus / year.
3. All infrastructure costs were included in the model but now will largely be paid for with investor owned utilities' new programs described above and with the HVIP \$30,000 / charger incentive.
4. Other financial support programs such as the VW mitigation fund of \$130 million for transit, school and transit buses; the TIRCP and LCTOP were not considered in the model and are all now paying out in aggregate hundreds of millions of dollars to support transit.

Conclusion – The total cost of ownership is positive today and will get better in the future. From a cash flow perspective, financial incentive programs will help pay for the higher costs of electric buses in the early years.

Agencies are ready to begin this transition – Current Adoption is high and increasing.

- 82% of California transit agencies with 50 or more buses now either operate Zero Emission Buses (ZEBS), have them on order or have been awarded grants to acquire them.
- 16 transit agencies (including 7 small agencies) have made commitments to 100% ZEBs by 2040, most of them by 2030. These agencies represent over 40% of the buses in the state.

This rule is needed now. It must not be weakened – there is no reason to. It is reasonable and is not an undue burden to small agencies who will be given seven years before they must start to transition. CARB cannot miss this opportunity to implement a rule that will encourage this reasonable, cost-effective transition to 100% zero emission vehicles by no later than 2040. With this regulatory push, the expectation is that this target will be significantly exceeded. This new rule will create a market, reduce the costs of electric buses and stimulate more rapid adoption in a virtuous cycle. It will grow our economy with more, good-paying jobs. The adoption of this rule will lead the way for the electrification of other forms of heavy-duty transportation and provide a model to other states.