From: Cherry, Brian K
Sent: 2/28/2012 11:43:16 AM
To: 'nancy.ryan@cpuc.ca.gov' (nancy.ryan@cpuc.ca.gov)
Cc:
Bcc:
Subject: Re: More Info about Proterra & Electric Buses

Will do. I'm at the ISO today but will try to get it dine by COB.

From: Ryan, Nancy [mailto:nancy.ryan@cpuc.ca.gov]
Sent: Tuesday, February 28, 2012 11:41 AM
To: Cherry, Brian K
Subject: Re: More Info about Proterra & Electric Buses

This is really helpful. I'd like to set up a mtg to talk further with appropriate folks at your end since Proterra says they plan to do further bus trials in PG&E's service territory. Can you identify people? Also I'd like to pass on the technical part of this info to the ED staff working on the matter. Can you have someone on your end send me a sanitized version that you are comfortable having shared? Thsnks

Sent from my iPhone

On Feb 28, 2012, at 11:27 AM, "Cherry, Brian K" <BKC7@pge.com> wrote:

> Nancy - Steve Larson asked that I chat with you about Proterra. Prior to this, I asked my staff to look into it. I thought I'd share with you what I have before we chatted. Please do not forward this along to anyone. I am also happy to make Andrew Bell available to you for a more technical conversation. Let me know if you want to meet.
>
> **From**: Redacted
> **Sent**: Monday, February 27, 2012 04:35 PM
> **To**: Cherry, Brian K
> **Cc**: Keane, Dennis; Singh, Amrit P
> **Subject**: FW: More Info about Proterra & Electric Buses
>
> Brian -- here's the background information on Proterra that I found a couple of weeks ago. (The odd story about the Venezuelan equity investor is down at the bottom.) I have also just today spoken with Russ Garwacki at SCE, and he told me a little more about their experience with Proterra and the three buses currently in service for the Foothill Transit Agency:
>
> - Russ confirms that Marc Gottschalk (venture capital attorney and Cleantech Forum co-founder) is key contact
> - Foothill transit agency has two chargers and three buses; the typical power draw for one charger is 280 kilowatts

- So far, the agency is only using 1 charger at a time (the two chargers are side-by-side at a single location)
- They hope to get federal funding for 8-9 more buses - at that point, they might need to use both chargers at once
- Running both chargers at once would put them above 500 kW and trigger assignment to SCE's TOU-8 rate

FTA's current charging account is assigned to Edison's mid-sized commercial customer rate, GS-3. This rate has a maximum demand charge but does not include on-peak demand charges; it corresponds roughly to our Schedule A-10 rate - which we'd be able to offer bus agencies, too; as long as they stayed under 500 kW. The offer SCE is making in their recent advice letter would just give FTA and Proterra pretty close to the same deal under TOU-8 they are already getting under GS-3. The Option A" version of their TOU-8 rate has nearly the same structure as GS-3.

Russ confirms that Proterra does not want the transit agencies to have to pay demand charges at all, whether under GS-3 or TOU-8. So, they don't like the current bills under GS-3, and the TOU-8 "deal" won't make it any better. The real problem, Russ says, is that with so few buses using the charging station, the monthly load factor for the station is just 2-4%. (Typical load factors for ordinary commercial customers with loads this large are 40-60%, so there are 10-15 times as many kilowatt-hours to spread out the cost of the demand charge.)

Russ told me that FTA's current charging bills under GS-3 are running around 20-25 cents/kWh, because the load factor is so terribly low. This means FTA's electricity costs are just barely competitive with diesel, even after ignoring the capital cost of the buses and the charging equipment; this is not so bad for FTA (since they got the buses for free), but it's terrible for Proterra - how could they ever sell a bus on its own merits? Proterra is hoping that by increasing the number of buses sharing the two chargers, FTA will be able to improve their load factor and reduce the average charging cost.

From: Redacted

Sent: Friday, February 17, 2012 3:02 PM

To: Keane, Dennis

Cc: Redacted

Subject: More Info about Proterra & Electric Buses

Dennis -- here's quite a bit of additional information about Proterra. It's possible their charging stations could draw over 500 kW, although their own web site & marketing materials are pretty sketchy on such details. After looking at their marketing claims and the technical assumptions described in their promotional materials, I think Brian might want to share some of the following with Nancy Ryan:

- The Proterra technology is clearly in a very early stage of development and market adoption
- There is reason for concern about unusual demand spikes (spikes that Proterra doesn't want rates to pay for)
- Their business plan for selling the buses appears to assume electricity priced at 6-9 cents/kWh
- That would be quite low even if it was all off-peak charging - which this

clearly would not be

- ○ Their business plan also requires making a number of assumptions about transit agency operations
- ○ We're not public transit experts ourselves - it would probably help to get input from an agency or two
- ○ Additional information is needed to understand & possibly shape the characteristics of this prospective new load
- ○ Designing a rate now (without more information about the loads) would be putting the cart before the horse
- ○ A technical workshop could be helpful, w/input from transit agency operators or consultants as well as Proterra

Examples of questions that could be considered at a technical workshop: How big would the loads be at each charging station? How many buses and routes would be able to share each charging station? Confirm that each station will only charge one bus at a time? Other questions as might be raised by transit consultants.

Proterra - company web pages and marketing information: This set of pages shows how Proterra presents itself. The savings claims here is for "nearly $300,000 in fuel savings" over a 12-year vehicle life ($25,000/year), based on 40,000 miles per year of transit service and an assumed "U.S. average electricity rate" of 12 cents per kWh; here, they say the electric usage will be "about 2 kWh per mile." The web site promises, *"In the very near future we plan to post to this page a robust calculator that will allow you to generate your own cost savings based on routes chosen, miles traveled, local fuel costs, types of vehicles being replaced and a look into the carbon emission reductions achieved. We are working diligently on this calculator, please check back!"* There is no information here about capital cost of the charging stations, or how many buses and/or routes might share each station.

Product Overview - http://www.proterra.com/index.php/products
The bus - http://www.proterra.com/index.php/products/productDetail/C22/
Charging stations - http://www.proterra.com/index.php/products/productDetail/C23/
Savings claims - http://www.proterra.com/index.php/products/productDetail/C29/

Supply chain claims - http://www.proterra.com/index.php/proterrainaction
On "the Hill" - http://www.proterra.com/index.php/proterrainaction/actionDetail/C28/

News Coverage & Transit Discussion Forums: This set of pages includes news coverage and transit advocacy discussions of Proterra in particular and electric transit options more generally. In the MIT Technology Review article, the claimed life-cycle fuel savings are doubled from what was claimed earlier on the Proterra web site - to $600,000 ($50,000 per year). Electricity cost is assumed to be 18 cents per mile (which would mean 6-9 cents per kWh, at "2-3 kWh per mile") and is compared to a $1.00 per mile cost for diesel fuel. This would require 61,000 service miles per year (61,000 miles times $0.82 per mile savings = $50,000). In the discussion from the Portland Transport forum, another charging station vendor quotes prices of $200,000 for a 100 kW charging station, and $350,000 for a 200 kW station; this is followed by a discussion of how such stations might be sited on the Portland transit grid.

Treehugger - http://www.treehugger.com/cars/proterra-startup-will-make-electric-buses-that-charge-in-10-minutes.html

Electric Buses Get a Jump Start - http://www.technologyreview.com/energy/37829/?p1=A1
Ultra-Fast EV Charging - http://gm-volt.com/2011/06/27/is-fast-charging-for-evs-approaching-fast/
Portland Transport Forum - http://portlandtransport.com/archives/2011/10/the_electric_tr.html
Battery Supplier for Proterra - http://www.altairnano.com/Solutions_Overview

One further note - Proterra sometimes refers to charging buses for less than 10 minutes, "once per hour" - this might require 25 kWh of energy storage, and could be accomplished with a 200 kW charging storage. But they also refer to an operating range of "30-40 miles," which could require 100 kWh of energy storage; doing this in 10 minutes or less might require a 720 kW charging station (as referenced in one discussion). In the discussion from the GM-Volt forum, the Proterra battery technology is "estimated" at 8,000 to 25,000 lifetime recharge cycles - over a 12-year life, this would allow for up to no more than 2,000 recharge cycles per year; meaning, the buses would need to run 30 miles between recharge to log 60,000 miles/year. That would imply close to 100 kWh of energy storage per charging cycle - which would mean very large (and very expensive) charging stations.

Proterra Buses in operation: There appear to be just three Proterra buses currently in service in the U.S. They were delivered to Fooothill Transit Agency in the fall of 2010, and were paid for with funds provided by the American Recovery and Reinvestment Act. Nine more buses are apparently under contract (also to be paid for with federal funds), but the delivery date seems uncertain. The first three buses are being operated on FTA's Route 291, which looks to be a fairly simple eight-miles out, eight-miles back route (40 minutes each way) between the cities of La Verne and Pomona, with service at 20-minute intervals.

First three buses begin service- http://gigaom.com/cleantech/proterras-fast-charging-electric-bus-hits-the-road/
Foothill Transit Agency - http://en.wikipedia.org/wiki/Foothill_Transit
Foothill Transit newsletter - http://admin.foothilltransit.org/EAlertControls/Data/SEPT%202010.pdf
Foothill Transit route map - http://foothilltransit.org/SystemMap/
Route map for Line 291 - http://www.foothilltransit.org/BusSchedule.aspx?busnumber=291

Local press - http://www.insidesocal.com/pomonanow/2010/09/ecoliners-hit-streets-foothill.html
FTA operator - http://www.veoliatransportation.com/featured-stories/ecoliner-electric-bus

2009 Contract - http://file.lacounty.gov/compub/minutes/2004/cms1_139073.pdf
2010 Update - see below for description of agency staff project report
2011 Update - http://file.lacounty.gov/bos/supdocs/59813.pdf
2011 Status - http://showtimesdaily.com/fleetsfuels/more-proterra-battery-buses

I also found an FTA staff report from March, 2010 (it's a big low-quality .pdf file that was hard to download) which identifies certain "challenges" faced in the period before the buses were delivered. Chief among them, ***"The electrical charging requirements of***

the Ecoliner have proven to be an unexpected project challenge because of the electrical demand charges associated with charging the bus during peak hours. 'Peak hours' are determined by Southern California Edison (SCE) and impose additional charges on the end user for energy expended during these predetermined times. SCE's peak hours coincide with Line 291's peak vehicle demands; meaning, Foothill Transit Agency faces exaggerated energy costs."

Proterra's Current Leadership: Proterra was founded in 2004, by a longtime transportation engineer named Dale Hill. He is still with Proterra, either as "founder" or as chief technology officer. The current CEO is named David Bennett; he was hired in just three months ago (from Eaton Corp. - which I had not heard of before, but they bought up most of Westinghouse's electric distribution and control technology business lines in the early 1990s). The "chief business development officer and general counsel" (in sort of an odd dual role) is a Silicon Valley attorney and venture capitalist named Marc Gottschalk. He had been a partner at Wilson Sonsini Goodrich and Rosati, and helped found the Cleantech Open - a "leading force for accelerating clean technology entrepreneurs." It looks like it may be Mr. Gottschalk who's really running the company right now. Kleiner-Perkins recently became Proterra's lead investor (after certain problems emerged with their previous round of private funding; see below):

Executive Bios - http://www.proterra.com/index.php/Bios
Dale Hill - http://www.proterra.com/index.php/bios/biodetail/dale_hill/
David Bennett - http://www.proterra.com/index.php/bios/biodetail/david_bennett/
Marc Gottschalk - http://www.proterra.com/index.php/bios/biodetail/marc_gottschalk/
Cleantech Open - http://www.cleantechopen.com/app.cgi/content/about/index
Kleiner Perkins - http://www.proterra.com/index.php/about/aboutDetail/C15/

Proterra's Former Leadership: The company nearly went bankrupt in early 2011; it turned out that a major private investor in the company was running a Ponzi scheme, and using portions of the proceeds to meet financial commitments he had made to the company. Kleiner-Perkins played a major role in keeping them from going under. Here's a concise summary of the ensuing management changes:

> "Proterra's financial struggles date back to the last months of 2010. ***Proterra had slowed or stopped payments to suppliers as it waited for $8 million from its main source of funding, MK Energy and Infrastructure of Stamford, Conn. The company had already invested $20.4 million in Proterra. Then in January, Francisco Illarramendi was indicted on charges of defrauding hundreds of millions of dollars from pension funds of Petroleos de Venezuela, the state-run oil company.*** Unbeknownst to Proterra, those ill-gotten gains funded the $20.4 million investment. Illarramendi pled guilty and awaits sentencing."

And here:

> "Front office shuffling at Proterra began in July when the equity firm of Kleiner Perkins Caufield & Byers led a group of major investors, including a green-energy arm of General Motors, in a $30-million investment to keep Proterra alive. Proterra, which was an innocent recipient of the ill-gotten gains of its fraud-convicted major investor, came close to bankruptcy, and Greenville residents and the South Carolina Research Authority contributed $500,000 to help meet payroll

while Proterra waited for the new investment to close. When the deal was done, the Kleiner group, which effectively bought majority control, replaced Proterra founder Dale Hill on the board and stripped Granato of his title as CEO, although he temporarily remained president for a few weeks."

Proterra officials shocked - http://www.subchat.com/buschat/readflat.asp?Id=230422
Bus company deals with funding problem - http://www.journalwatchdog.com/business/1072-update-desk-proterra
Proterra finds new life - http://www.journalwatchdog.com/business/1174-greenvilles-gang-of-13
The bus stops here - http://www.journalwatchdog.com/business/1180-the-bus-stops-here
Proterra moves headquarters - http://www.journalwatchdog.com/business/1259-proterra-powers-on