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TRANSFORMING TRANSPORTATION WITH ELECTRICITY: A CONVERSATION

A Powering the People Conversation
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A Conversation**

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Transforming Transportation with Electricity – A Conversation

Electric vehicles of many types are on a slow but steady path to market share. Those who use them already appreciate their lively performance, affordability, and environmental benefits.

Moderator: **Tony Earley**, Chairman, Chief Executive Officer, and President, PG&E Corp.

Conversants: **Alan Perriton**, President and Chief Operating Officer, VIA Motors; **Dale Bryk**, Director of Energy and Transportation, Natural Resources Defense Council; **Debbie Korenek**, Division Vice President, CenterPoint Energy.

Tony Earley: I admit to bringing several perspectives to a discussion of electric vehicles. First, as someone who sits on the board of Ford Motor Company, I believe that EVs represent a great technology. They're not just specialty products; they're a key part of this country's and the world's energy and transportation future.

As a large-scale purchaser of these vehicles at PG&E, I bring another perspective to this evolving market. PG&E has over 2,000 electric vehicles and over 1,000 of them are pure electrics.

I am also a purchaser personally. I took delivery of a Ford C-Max Energi Plug-In-Hybrid just last week and can't wait to fly home and take it for a spin.

Finally, as the CEO of a California utility, I appreciate what electric vehicles can do for the environment and for our customers. The Bay Area has some of the highest penetrations of hybrids and electric vehicles in the country, and we expect that to continue. So PG&E is preparing for this next generation wave of electric vehicles by monitoring and managing the impacts they will have on our infrastructure, which could involve upgrading some of our local distribution system. Planning ahead will become even more important as we think out of the box and look at transportation applications not just on our roads, but in everything that moves.

Things are changing fast. Two years ago there were only a couple of specialty EVs. Today, every auto manufacturer is producing different types of electric vehicles – different designs for different needs. At PG&E, one of the breakthroughs that we’ve had is moving to hybrid electric bucket trucks. These are standard diesel drive bucket trucks, but their hydraulic lifts are driven by electric motors. The crews love them – they don’t have to yell instructions to the guy down on the ground over diesel noise. They’re environmentally attractive because customers don’t have to put up with a diesel engine idling outside all day. And they have a two-year payback because they’re not using diesel fuel as they sit and idle all day.

We have a terrific panel, so let’s get started. Alan Perriton is the President and Chief Operating Officer of VIA Motors. Dale Bryk is Director of Energy and Transportation at the Natural Resources Defense Council. And Debbie Korenek is Division Vice President at CenterPoint Energy. Alan Perriton, I’ll start with you. A lot of us may not know much about VIA Motors, so please tell us a bit about your target market and the business model you’ve developed.

Alan Perriton: VIA Motors has had a perfect partnering relationship with PG&E for over four years. Here’s how that happened. VIA started out by designing and developing power components but, early on, we decided to get into the auto sector ourselves. First, we asked, “what vehicle sector consumes a big share of the fossil fuel used in the coun-



Tony Earley - Chairman, CEO, & President, PG&E Corp.

try and is one where we wouldn’t have to compete against the majors?” – the Fords, the Chryslers, the General Motors, the Toyotas – because the price of entry into this market is pretty dramatic. We identified the light duty vehicle market – the full-size pick-ups, the full-sized vans. That vehicle class (which includes automobiles, light trucks, and motorcycles) represents about 60% of all of the fuel that’s consumed by the auto industry in the U.S. And no one was electrifying those vehicles. We said, that’s our target market.

Second, we asked, “who uses those vehicles?” We looked at utilities and telecoms – major fleet users. We identified companies that understand life-cycle cost and have a high motivation to reduce cost. For example, your company, PG&E. By converting its 3,500 or so pickups to electrified extended range vehicles, fuel costs will drop from about \$12 million to \$2 million per year. That’s a huge motivator! So fleet vehicles became our logical customer base.

Also, we're focusing on a principle we call export power. Electric vehicles – I'm thinking first of fleet vehicles –

are not just modes of transportation, they are also mobile power plants. With export power:

- These vehicles can power communities in storm relief efforts; and
- These vehicles can provide power to linemen that are working to fix the grid.

There's a huge opportunity to provide mobile power when people – either the workers themselves or the residents of a community – can't plug into the grid itself.

Another opportunity is storing power. There are 250 to 300 million vehicles on the road in the United States today. If just 10% were electric vehicles, whether fully electric or plug-in hybrid, you've got the ability to store power in those vehicles. And if the vehicles are not using the power, they can plug in and sell power back to the grid. So there are two really good reasons to have an export power capability function.

Earley: Dale Bryk, I know NRDC is very engaged in trying to understand the environmental consequences of EVs. What are NRDC's thoughts on electric vehicles?

Dale Bryk: We think electric vehicles are going to be a huge part of the solution both for reducing pollution and for

EVs are a key part of this country's and the world's energy and transportation future.

getting us off oil. Electric vehicles are already cleaner than gasoline-powered vehicles, and they're going to get a lot cleaner because

we are replacing existing power plants with cleaner generation.

We don't agree with the op-ed Bjorn Lomborg published in *The Wall Street Journal* a few months ago, because he played fast and loose with his facts. But we do think that it matters what type of generation produces the electricity.

A big underlying question is what will be the regulatory framework and the business models for the utility of the future? How do we develop more solar and other distributed generation in the mix? What about dynamic pricing? How do we do this in the smartest way, so those things complement each other?

Earley: Have you thought about how the market will develop over the next decade?

Bryk: All the things people have been talking about are going to be drivers: energy security, the environment, and the economy. People buy an electric vehicle for many reasons: because they love it, because they're a technology geek; or simply for the pride of owning a sophisticated, clean, and modern machine. Plus, energy security is more and more of an issue. The billion dollars a day we spend on imported oil could better be spent here at home. Also, you know that (Superstorm) Sandy is not going to be the last time that people wake up and say, "We really want

to do something.” Buying an electric vehicle is something that people can do.

But, honestly, a dollar a gallon – that’s the equivalent cost of electricity to power a vehicle. To me, that’s the biggest driver. Until now we haven’t had viable alternative transportation fuel choices in this country.

Earley: Debbie Korenek, CenterPoint has done some great work in electric transportation. You’ve got a clean air technology program. Why did CenterPoint start that program, and who are you working with to help deliver it?

Debbie Korenek: We started that program in 2001 primarily because Houston is a non-attainment region under the Clean Air Act. Working with our business customers, we realized that meeting environmental standards was challenging for them and that we could help them drive down emissions. CenterPoint doesn’t sell electricity – we are a wires and delivery utility in the restructured Texas market. Instead, we *deliver* electricity to customers on behalf of 100 different retail electric energy suppliers. Since we don’t sell energy, we’re in a good position to act as a kind of educator and facilitator. Most of our activity has been B-to-B (business to



Alan Perriton (VIA Motors), partially hidden; Deborah Korenek (CenterPoint Energy); and Dale Bryk (NRDC)

business), working with businesses, local airport systems, and port authorities. So far, our focus has been electric forklifts, compression stations, electric cranes and, now, this new generation of electric vehicles.

ICF International has been our partner since the beginning. ICF helped us develop an approach to the clean air technology program: What are the right technologies? Who are the right customers? What are the right priorities? That approach helped us launch our first marketing activities with customers.

The workhorse has been the forklift program. Think about an electric forklift – it replaces diesel and propane! Forklifts are typically in inside areas, so you’ve got noise, you’ve got fumes. ICF helped us identify the technologies and we’ve evolved that partnership to the point that they actually execute that program for us now under a performance contract. So the more customers they convert from fossil

fuel to electric equipment, the better off they are.

Another important dimension that ICF brought to the table was their work with the ENERGY STAR program. They helped us approach the Texas Commission on Environmental Quality to gain access to TERP (Texas Emissions Reduction Plan) funds, which provide grants for reducing emissions. We got electric forklifts and some off-road vehicles to qualify for TERP funds and obtained about \$4.5 million in grants for our business customers. That's made a huge difference!

Earley: One of my pet peeves is when you're in a plane waiting for take-off, you see all these vehicles dragging baggage carts around and they're never far from a potential charging station.

Korenek: We've worked very closely with Continental Airlines (now United) to look at electrification opportunities. We collaborated with the Electric Power Research Institute, which provides a lot of our technical capacity. Continental was very, very committed not only to improving their carbon footprint and their environmental impact, but they also had employee concerns. Employees had complained about the noise, the fumes, and the safety aspects of the ground support equipment. Continental really got excited about electrification! Their employees saw how well the electric baggage carts worked and would line up to get the electric baggage carts.

Southwest Airlines is expanding at Houston's Hobby Airport, building an International Terminal. So, we're going to look at electrification opportunities with Southwest too.

Earley: When you read the popular press you get the idea that EVs just aren't being embraced by the public. What is your reaction to that Alan?

Perriton: Here's my reaction: once you drive an EV, you simply won't want to go back. Like Tom Kuhn (President of EEI), I have a Volt. I've been driving it for about eight months and I've got 9,500 miles on it. It has a nine-gallon tank to supplement the electric drive. I've been to the gas station four times in those

nine months. That's less than 36 gallons, so on average I'm spending \$1 a day – \$30 a month – to charge the vehicle at night, compared to the \$300 a month I would have spent on gas. So there's that financial benefit, plus there's the excitement of the electric drive.

Earley: It's the technology that's built into these cars too. My new C-Max has programmed into it that every 18 months it will automatically run the fuel tank down to 1 gallon because you don't want fuel sitting in there longer than 18 months!

Korenek: We've made the business case for electric vehicles, but I agree – the surprise is the fun of driving them. We have several Volts in our fleet and I love driving them. They're quiet. They're efficient. I

*Electric fleet vehicles are not
just modes of transportation -
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think customers will see them not just as something different, but as fun and exciting, and also as doing something good for the environment.

Bryk: As people see the electric fleet vehicle that comes to fix the pipe on their street, it becomes the new normal. Not a future thing – a today thing. We’re seeing a normal start up lag, but I think we are getting to the tipping point pretty quickly.

Earley: I’ve found that when you drive one of these vehicles, there’s a lot of interest in them. People come up and talk to you. When I was at DTE Energy, I drove my Ford Escape plug-in 250 miles to a conference where I was speaking. I convinced the desk clerk at the motel where I was staying to let me charge the car with an extension cord from the lobby. When I came out in the morning there was a crowd around the car and I spent 20 minutes talking about it. There was that much interest!

Alan, will you talk a bit about the capabilities of the VIA Motors vehicle as a power source? Can you export power for 10 minutes? 20 minutes? What kind of capabilities do you have?

Perriton: You can export power as long as you want. You do have a limited capacity in the onboard battery. Our truck that you’ve seen has a 22.5 kWh battery and that will give you about 40 miles of range. But if you’re using the battery specifically to export power, you can park the vehicle and just export off of the battery charge. When the charge is used up, the engine can drive the generator to charge the battery. Imagine the vehicle is parked

at your house and the house goes dark because the grid goes down. You can use the vehicle to power the house and a half a dozen of your neighbors’ houses as long as you keep putting gasoline in the tank. So, technically, you can export power for as long as you need the power.

Earley: Do you think there are applications beyond the utility industry?

Perriton: Yes. Let’s take building contractors – or anyone that needs power and can’t plug into the grid. That could mean remote areas or areas where the power is out. There are no limitations. You may have an arc welder you want to plug in to a 220 outlet – fine. Or you may have a skill saw that needs 110 volts – fine. You’ve got that mobile pass right there at your fingertips. Incidentally, part of the innovation of the vehicle is that you have what is effectively an iPad built into the console that is mobile; you can take it out and move away from the vehicle and operate the vehicle remotely. It’s just another innovation – it allows you to remote-operate the vehicle and all of the power that is in it.

Earley: Debbie, what about your work with seaports? How has that gone?

Korenek: It’s been very successful. We’ve worked with the Port of Houston. They did a major expansion with their Bayport Container and Cruise Terminal, with the first terminal opening in 2007. Port electrification has several components, but primarily, they move cargo – to and from ships, to other transport modes, and to markets. One of the first projects we did with the port of Houston was with the big ship to shore cranes.

As we were working on expansion plans for their Bay Port facility, they wanted that to be their premier green terminal in terms of its impact on the environment. They were focused on power and energy consumed, as well as the wetlands impact. So electrification became part of our planning. We started by providing electrification opportunities for some of their cargo handling – but are looking at all opportunities, such as a fleet of plug-in hybrids for their on-road needs.

Now the port is looking to bring in cruise ship terminals. So they built that electricity infrastructure, even though it's not being used yet. This is a 20-year build-out plan. Ships that will come in can immediately switch from diesel to the electric grid to meet their power needs.

In collaboration with EPRI, we are providing continued technical assistance, not just looking at the day-in and day-out, but planning for the future. A lot of opportunities have greater paybacks if you plan them from the pre-construction phase. We think there's great potential not just for the Port of Houston, but for some of the smaller ports in our area.

Earley: In talking to those folks, are the savings they're seeing substantial?

Korenek: The energy savings make the business case work. But, also, it's the positive employee impacts they realize – less noise and higher safety go hand-in-hand, because employees can hear each other better. Also, the electric cargo moving vehicles are faster. If you can unload a ship's cargo faster, cleaner, and with lower emissions, you bring more ships in, get

the work done quicker, and increase cargo movement. It's efficiency. Houston will be able to capitalize on the Panama Canal expansion. Really, electrification is readying that port to be a frontrunner in clean and efficient cargo handling.

Earley: Dale, have you at NRDC thought about applications you'd like our industry to target environmentally.

Bryk: Yes, I have. I live near the water's edge. There's American Stevedoring across the way unloading trucks, and the cruise ship terminal is right next-door. They could both operate smoother and more electrically, but it's a struggle asking businesses to change infrastructure. This requires making an investment. But the paybacks and all the other benefits are there, so I think it just takes getting in front of the right people.

Earley: You make a good point. The business case seems to be a no-brainer, so how do we get past the barriers and the resistance?

Bryk: It's the same with my work on the energy efficiency side with buildings and appliances, even though efficiency is clearly the cheapest option. Why *don't* we make that investment? Sometimes it's "I'm not used to those choices," or "I'm making the operating cost decision, not the capital investment decision."

Part of it is mapping out the whole chess game, knowing who the players are, what their motivation is, and making that transparent. I think this is an area where we have a great story to tell. We just need to get those facts out there.

Earley: Yes, for a lot of people upfront costs are really important. And this is quite true in the car market. You know, a battery for a gasoline engine might cost you \$100 to \$200. For a regular hybrid, it's maybe \$1,000 or \$2,000. A plug-in hybrid, you're at \$8,000. And for an all-electric you're at \$15,000 for the battery itself. What could we do to reduce the cost of batteries to the customer?

Perriton: Well, your numbers are right on. The EV battery is the most costly component in the vehicle. Four years ago, when the Volt first came out, the kilowatt-hour battery cost was in the \$1400 to \$1500 range. That number is now down in the \$700 range. In two or three years we should see the cost below \$500 per kilowatt-hour. Some of that is a function of production volume. When you're in start-up mode of a brand new industry and a brand new manufacturing process, your start-up costs are heavy. They'll come down.

It's the same with other power electronics, whether it's the converter, the charger, or an export panel. The cost curve will come down as volume expands and suppliers amortize their capital costs over the volume. The battery chemistry is also going to drive it down. Part of our logic in going after the fleet market was to give ourselves a window of time to bring down component costs. Then, when we go to retail, a year and a half or two years later, we have the benefit of not having such a high sticker price for that upfront purchase.

Earley: Another issue is the residual value of those batteries. Do you ever wonder why you can lease that luxury car for not much more than a standard car? Part of it

is the residual value, so you're only paying for the differential.

Debbie, is your company focused on ways to use these electric vehicle batteries in some way that might effectively reduce the cost because they have residual value?

Korenek: I think that's a key component – developing that residual market. With the forklift market getting a little more mature, we're seeing that the battery has market value at the end of its forklift life. And that's certainly helped our business case. Between the incentives buyers get from the state and then some residual value, they're essentially getting a very, very good deal on that equipment.

Earley: Dale, let me go to a sensitive issue. A number of your environmental people don't want to see more electricity generation of any kind. We've had 30 years of energy efficiency and load growth has declined markedly, in some places approaching zero. But if we start electrifying large parts of the transportation sector, which could happen in the next decade or two, we're going to use more electricity. How should we work through that issue?

Bryk: Well, almost everyone wants to drive. Everyone wants lights and heat and air conditioning and other conveniences. We have to get that power from somewhere. What are the choices? Electrifying the transportation sector is certainly better than oil.

Using oil and natural gas for transportation is fraught with issues; bio-fuels too. I think we can have natural gas-fueled vehicles and advanced bio-fuels that are sustainable – not corn ethanol – but there's a lot of work to do there too.

To me the easiest, best road is electric, because we know what clean electricity looks like. We know how to get there and we're already on our way.

When you're using super-off-peak power at night to charge vehicles, you're not building new resources. The policy framework that we employ will determine how big of a win-win it will be to have the electricity resource support the transportation sector, because there's a huge amount of value we're not getting out of our existing electricity system.

Where the utilities are – in terms of having a different business model – matters. If utilities are saying, "I want to be in the game as the 21st century utility;" that, "I want to be delivering all of these benefits to my customers," then we can work toward similar goals.

Earley: As we work to change our business models, are there policy areas that industry should focus on? Alan, as you developed the model for your business, were specific policies important?

Perriton: Yes. In fact the \$7,500 federal tax credit that is now available for alternative propulsion or electrified vehicles was in fact precipitated by VIA. Several years ago, a then-relatively-unknown Senator by the name of Barack Obama, in combination with Senator Orrin Hatch of Utah, sponsored legislation that resulted in the \$7,500 tax credit. Now we have several states that offer tax credits as well, California being the most prominent of them.

Whatever model car you happen to like, soon you will very likely be able to get an electric version of that. If you drive it, you will love it.

That adds approximately another \$12,000 of credits. Is that going to be there forever? No. But in a few years, we should be able to bring the cost curve

down where the retail electric vehicle is not as expensive to purchase.

There are other benefits at the state level. In California and in Utah, where I live, and in several other states, electric vehicles can drive in the diamond lane. When California allowed electric vehicles to drive in the diamond lane, Volt sales quintupled.

Earley: That's a very real benefit. If you're trying to get from San Francisco to a meeting in Palo Alto in the morning, you better be in that diamond lane or you'll be late. (Laughter) We're getting near the end of our hour, so I'll give each panelist an opportunity to either tell me what I didn't ask that I should have, or to make any final observations. Dale, let's start with you.

Bryk: We need policies that drive us in the right direction. Some are specific to electric vehicles, like time-of-use rates. There are others around metering, cost allocation, and simply educating customers.

But I don't want to lose sight of the broader framework, such as an incentive structure for utilities to pursue energy efficiency, renewables, and distributed generation. We believe you have to have revenue decoupling and performance incentives. That's the biggest take away for me.

Korenek: Well, I think for us it's just continuing to see things work well. That's what's really important in a B-to-B business market. Customers want to see success stories. We need to get out there and tell the stories, whether it's the Volt and other great EVs, or cranes at the ports, or a fork-lift at a Wal-Mart distribution center. We need to work hand-in-hand to make sure customers know what the options are, and that this isn't fantasy, but a real business decision that can improve their workplace, their bottom line, and the environment. It will be most effective for customers to tell other customers why this makes sense.

Perriton: Let me just address this with a question. How many of you have a smart phone? Raise your hands. Virtually everybody. Now, how long has the smart phone been around? Ten years. All right, and here we are, with virtually 100% adoption of the smart phone. And this is no longer just a voice-to-voice exchange. It has a whole lot of capabilities built into it.

To me we're just at the early adopter stage for electric vehicles. And, as a sophisticated audience, we need to try it. It's word of mouth that sells a brand and its product. Because of the excitement that comes from driving and owning an EV, because of the advantages that come from it, you should all go out and test drive an electric vehicle – plug-in hybrid or pure electric, extended or limited range. Just experience it. That, in itself, will be part of the culture change, the game change, that will pull a significant number of us away from internal combus-



Alan Perriton - President & Chief Operating Officer, VIA Motors

tion, fossil fuel burning vehicles to those that are fun to drive, friendly to the environment, and a good business decision.

Earley: Let me challenge all of you. At some point you're going to go out and look for a new vehicle. Make sure you look at one of these electric vehicles. Whether it's an all-electric or whether it's a plug-in or a hybrid, these are great products. Whatever model car you happen to like, you will very likely be able to get an electric version of it. If you drive it, you will love it, whether you buy one or not. But why *not* buy one? □

About IEE

IEE is an Institute of The Edison Foundation focused on advancing the adoption of innovative and efficient technologies among electric utilities and their technology partners that will transform the power grid. IEE promotes the sharing of information, ideas, and experiences among regulators, policymakers, technology companies, thought leaders, and the electric power industry. IEE also identifies policies that support the business case for adoption of cost-effective technologies. IEE's members are committed to an affordable, reliable, secure, and clean energy future.

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