Can the Yellow School Bus Go Green?

Sam Gandhi and Ken Irvin
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Sam Gandhi:
The yellow school bus is turning green. Electric buses now run cleaner than diesel. There's potential for them to help manage electricity demand and to reduce vehicle emissions. It's called vehicle-to-grid technology. The new buses store and draw power, but a regulatory battle could stifle innovation. Who can benefit from this technology, and how can companies, utilities, and school districts navigate the opportunities and challenges? We'll find out in today's podcast.

Ken Irvin:
School buses on average only operate about four hours a day. By using electric school buses, we can leverage that availability of the school bus for the other 20 hours a day to sell energy back into the grid. Buses having a capability like that can also sell capacity. That can be a source of revenue for school districts and communities as well. There's a multitude of constituents that benefit from electric school buses.

Sam Gandhi:
From the international law firm Sidley Austin, this is The Sidley Podcast, where we tackle cutting-edge issues in the law and put them in perspective for business people today. I'm Sam Gandhi.

Hello and welcome to episode eleven of The Sidley Podcast. Today we focus on electric school buses and their potential to help transform how we manage electricity demand. I'm joined by Sidley partner Ken Irvin, and he joins us from his home in Virginia. Ken is the coleader of Sidley's global Energy practice and represents clients on wide-ranging matters involving the wholesale electricity and gas markets. He has extensive experience representing businesses in investigations and regulatory proceedings before the Federal Energy Regulatory Commission, or FERC. Ken, thanks for being on the podcast today.

Ken Irvin:
Sam, thanks for having me. It's great to speak with you today.

Sam Gandhi:
Electric buses seem like a win/win. It's a far greener way to transport kids to school and a novel new source of storing or drawing power. So, Ken, why is this idea coming to the fore now, using buses as an energy resource as well as obviously using them for transportation?

Ken Irvin:
I think there's a confluence of beneficial reasons why electric school buses are coming to the fore now, not the least of which is the environmental positives about electric school buses. Electric school buses obviously displace the use of diesel school buses, and diesel exhaust, as clean as we make it today, still contributes to smog and air pollution. There are other advantages to electric school buses. In the long run, they're cheaper to own and operate because there's less moving parts, there are less maintenance requirements, and then really the part about this that captured my fascination, there's the possibility of using the electric school bus as an energy storage device, basically a big yellow rolling battery that can supply energy to our electric power grid.

Sam Gandhi:
I get the idea of a giant battery, but how does it store power to the grid?

Ken Irvin:
So, the key attribute here is engaging bidirectional inverters with the school buses so that the school bus can not only draw electricity or what I might call energy from the grid to charge up its batteries, as well as to supply that energy back into the grid. The bi-directionality allows the school bus both to draw electricity as well as to be a source of electricity when called upon by the grid operator.

In this regard, a school bus can supply electricity when we have, for example, peak demands. In the afternoon when everybody is returning home from work, firing up air conditioners, turning on TVs and computers and all of the other electrical appliances, there's a spike in demand. That's a peak in the wholesale energy market. School buses can supply that short-term burst of energy needed to supply that peak and meet that

demand, and in so doing, not only do they satisfy the safety and the reliability requirements, but they would displace the use of thermal units, something that might burn natural gas or oil or some kind of other nonrenewable resource.

Sam Gandhi:
This sounds kind of expensive. How are the school districts able to really, and the municipalities, really able to afford becoming a bidirectional inverter? How do they get the equipment to really be able to discharge that power?

Ken Irvin:
Well, that's where the advantage of being an energy resource can really come to bear and help the economic case of owning electric school buses. Interestingly enough, school buses on average only operate about four hours a day. School buses are obviously essential to providing education. You have to get the kids to the classroom at least in normal times, outside of pandemic times, and in certain areas, you know, it's absolutely essential to have a school bus because people can't walk or bike to school otherwise. So, we need the school bus, it's a necessary investment for the school district to have a school bus, but they're only using it about four hours a day, so the bus otherwise sits idle.

By using electric school buses, we can leverage that availability of the school bus for the other 20 hours a day to sell energy back into the grid. There's the peak shaving opportunities I've talked about where we're just supplying electricity. There are other electricity products that a school bus can also sell to the grid. These are what we in the power business call ancillary services or frequency control or other types of electrical products that are used by grid operators to compensate for other renewable energy supplies that are coming into the power grid.

If I could elaborate a bit on that, using renewable energy resources draws a lot of attention and discussion because of the intermittency of those resources. Solar depends on the sun, and cloudy days don't generate as much as bright, sunny days. Wind also depends on the sun, because you need wind to cause the turbines to spin, and that variability is what we in the power business call intermittency. That intermittency can happen frequently, and you know, to some degree, unexpectedly, and that sudden

change in electrical generation from renewable resources can cause a grid operator who doesn't have the necessary tools, and electricity, as we all know, supply and demand have to balance every increment of time, otherwise we have blackouts.

So, batteries, storage devices, among other things, can provide a way to manage intermittency. When wind or solar generation decreases, energy can be drawn from the batteries to make up for it. That's how we solve for the intermittency. Having that tool, that facility allows us to deploy even more renewable and displace use of other thermal units, units that would depend on fossil fuels to make electricity.

So, there's a benefit in the sense of the environmental attributes, there's a benefit in terms of reliability. It allows a more certain, steady amount of renewable energy to be used, and then in the case of school districts, school buses that are able to plug into the grid and sell these electricity products create a stream of revenue that helps offset the cost of acquiring and maintaining the fleet of school buses.

Sam Gandhi:
You know, Ken, we've seen a lot of not just school buses but police cars, other types of modes of transportation in which they're using CNG or compressed natural gas as an alternative. Obviously that may not be generating more power for others, but is that a cheaper alternative, and why are electric school buses more efficient than that way?

Ken Irvin:
Compressed natural gas offers a lot of the same advantages that electric school buses do in terms of environmental attributes, at least to the degree that natural gas is better for air pollution than say diesel is. You know, I recall the former CEO of El Paso Corporation being a big proponent for converting gases from diesel to natural gas fuel because of the cleaner emissions. Burning natural gas essentially creates water, and you know, diesel exhaust, as well as we clean it up, is still an air pollutant and it still offers health issues. Anybody who has ridden in the back of a school bus will be familiar with that.

So, there are similar attributes, environmental positives that come from using natural gas in place of diesel, but you get even better, even more

environmental positives from using electricity, especially where that electricity maybe is generated by renewable energy, stored in a battery that is your school bus, and then available to help deal with the intermittency, the variability of renewable energy.

It's not just school buses where this idea of using vehicles as energy storage resources applies. It's well understood to work well for delivery fleets. Amazon, for example, is investing heavily in acquiring a fleet of trucks and delivery vans and buses that will run on electricity and work in our marketplace similar to school buses. I just happen to find the school bus idea fascinating because of that four hours a day of use of a school bus.

There's another aspect of this that I think is also interesting, and that's what we've seen in the pandemic times where everyone is relying on distance learning, remote learning, and access to the internet. Places like the city of Austin have recognized that broadband access is not uniformly enjoyed, and so their buses, their school buses are equipped with Wi-Fi and are able to act as a mesh network, and so they've been able to deploy their electric school buses into local neighborhoods and create a local Wi-Fi network so that students can have access to the broadband necessary to enable distance learning.

Sam Gandhi:
So, beyond the environmental advantages of swapping out diesel for electric buses, who really benefits here from a business or an operational perspective? Other than the school districts presumably, who gets the benefit of this?

Ken Irvin:
To my assessment, there's a lot of constituents who benefit. Obviously the local electric distribution utility sees an advantage in it, and here in Virginia and in other places we've seen where the local distribution utility partners with the state, partners with the school district to help underwrite the development and deployment of electric school bus fleets. The electric distribution utility sees this as increased amount of electric load, as well as sees the advantage of the ancillary services that I've mentioned before.

This is also helpful to the school districts and the communities that have to buy the fleets because electric school buses have less moving parts, require less maintenance, there's no transmission, there's no fuel oil. There's just less maintenance overall, and in this case you're getting a brand new bus outfitted with all the latest safety features in a way that's safe and dependable and very easy to drive, the same as your school bus drivers would already know how to drive.

There's also benefits to the grid operator. Because these resources are big batteries and they're mobile, they can be deployed in a network capability. School buses obviously return to base every day, but they don't have to return all to the one same spot. They could deploy to multiple spots. They could deploy after power lines get downed by weather to a local area and be a resource that plugs in in your neighborhood to help shore up lighting and availability that might be met by standby generators using fossil fuel, for example.

So, there's a multitude of constituents that benefit from electric school buses.

Sam Gandhi:
You're listening to The Sidley Podcast and we're speaking with Sidley partner Ken Irvin about the use of electric school buses for grid energy storage. Ken is the coleader of Sidley's global Energy practice and represents clients on wide-ranging matters involving the wholesale electricity and gas markets.

So, Ken, electric school buses may prove to be a solution that helps stabilize the energy grid, and they lower pollution, and they make them safer for the environment and children going to school. I mean, this seems like a complete no-brainer. What are we missing, and what are the obstacles to setting this in motion around the country?

Ken Irvin:
Well, like so many things with our move in the direction of renewable energy, regulation can be both a helpful matter, like wind in your sail, or it can be an obstacle. In this case, the role of the federal regulator and the role of the state regulator get intertwined here.

The idea that the resources, the electric school bus as an electric storage resource are making sales to the grid, those are wholesale transactions that typically are viewed as subject to the Federal Energy Regulatory Commission's jurisdiction. Enabling that is something that FERC has been focused on keenly, and just this last Friday, actually, FERC's order directing grid operators to open up their markets, make them more accessible for batteries and other types of storage devices, was affirmed by the D.C. Circuit Court of Appeals. That order from FERC is seen as a landmark. The chairman at FERC, Neil Chatterjee, is of the opinion that FERC Order 841, as they call it, will be something seen as monumental as FERC's other orders establishing our competitive energy and natural gas markets today, and the D.C. Circuit's decision strongly endorsed FERC's actions, that it's well within the authority of the federal regulator to act, and it doesn't trespass state authority.

Of course, the state regulators were concerned and they're not happy with that outcome. State regulators like to maintain their local control of resource mix, their local control of what the market looks like in their state or their local jurisdiction, and there are some people who read the decision on Friday as allowing FERC to regulate as far down as the distribution utility, which is something new and novel.

But in my view, this Order 841 and the court's affirmance of it is very positive for mobile energy storage, vehicle-to-grid technology, or V2G as they call it. I think the only way that we're going to see school buses and other resources become a sizable enough aspect of our energy markets is to have a federal market for it, to have a wholesale market where people manufacturing vehicles can say, okay, or people buying fleets can say, okay, here's a predictable source of revenue, and I'm going to be able to tap into that in a way that normal underwriting can understand. So, having clear, strong federal guidance and rulemaking in this area I think is enabling.

There are people on the other side of this issue, another regulatory challenge goes to net metering programs. In most states, we have provisions where the state utility regulator has allowed individual homes and offices to use behind-the-meter generation as a way to offset demand for electricity, and to the extent that that behind-the-meter generation makes more electricity than that house or office uses, that electricity is

treated as sold back to the distribution utility. This is what we call net metering.

Sam Gandhi:
Ken, I understand FERC has now recently spoken again on this issue.

Ken Irvin:
Yes. FERC, at its July 16th open meeting, unanimously rejected a petition by the group known as the New England Ratepayers Association. NERA had asked FERC to assert jurisdiction over the wholesale component of net metering transactions, that is the sale by the end user back to the utility, and the petition asked FERC to apply the wholesale rate for those transactions, not the retail rate as is currently done in most jurisdictions. At its open meeting July 16, FERC's chairman said that the petition did not identify a specific controversy or harm that the FERC should address in a declaratory order. The other commissioners, McNamee and Danly, also concurred, explaining that this was definitely not a merits decision, but FERC just declining at this point to take action on the PDO.

Overall, I think this is good news for the future development of behind-the-meter generation and net metering programs, including the school bus as an energy storage resource, because changes here on the net metering could have disrupted investment decisions, underwriting decisions, and change to how investors see the potential for this market. In this case, I think FERC got it right and I think that's helpful.

Sam Gandhi:
Ken, one question I have for you is that, is there a state or is there a local authority or set of regulations that you think are doing this in a way that would be a model for federal regulations? Is anyone doing this the right way?

Ken Irvin:
Carmel, Indiana has done a successful project. Here in Virginia I think Dominion Energy has done a very admirable job of teaming up with the state of Virginia, and Dominion aims to have the largest fleet of electric buses deployed in a state in the next several years, so that all seems positive.

In more metropolitan areas like New York or Connecticut, in the metro area there, I would think you'd find a lot of interest in this. The governor of New Jersey I would think would be very interested in it, for example, and school buses or other types of transportation could satisfy his desire for having electricity free from natural gas in the long haul.

Sam Gandhi:
And so, let's assume that we figure out the regulatory complications and we start doing this. What are the business opportunities that are out there for businesses to be using electric buses?

Ken Irvin:
That's a great question, Sam. You know, I'd like to believe that in due course at least we'll solve all the regulatory and find a more stable and certain way to get school buses and other mobile storage, more V2G energy storage into the marketplace. I've talked about ancillary services. I've talked about energy.

Another energy project, another electricity product is capacity. Capacity is like a call option, it's the ability of a resource to make electricity when dispatched, and buses having a capability like that can also sell capacity. Like a call option, capacity resources get paid a call option premium, so they get a steady stream of payments that obligate the resource to be available when called. That can be a source of revenue for school districts and communities as well.

Operating reserves is yet another electricity product. The ability in certain circumstances to be available to goose the energy market, the wholesale grid with energy to help other resources come online. You know, interestingly enough, thermal power plants require electricity to start up. It's not like your lawnmower where you pull a cord and the engine fires up and you're making electricity. No. It takes electricity to start a generator in a lot of cases, so batteries can be that resource, and pairing batteries with thermal units as a way to provide black start capability is important.

Right now there's a deployment of batteries at gas-fired generation to provide that resource, but that battery otherwise sits there stable, doing nothing else, and imposes a cost that might be mitigated or amortized over other uses by making it a battery. When you need a battery, you call in the

school bus, it comes by, and it helps you start your power plant up, and then the school bus goes about its business otherwise. Or maybe the school bus is parked overnight at the power plant and it stays there and gets charged up directly at the power plant.

So, there's a lot of evolution to our thinking about these resources on the grid. I don't think that this is necessarily revolutionary thinking, it's more evolutionary thinking, but it is a very useful step in a direction that will allow us to leverage technology and allow us to use more distributed resources, better protection against disruptions, and better reliability by being distributed, and it has all the environmental attributes we've talked about.

Sam Gandhi:
Ken, as we speak today, we're seeing all-time low oil prices in the world. How do current energy markets affect the urgency of getting these regulations approved?

Ken Irvin:
You know, here today, this summer we're seeing an incredibly unusual natural gas market, the demand destruction caused by the quarantine orders, the activity of dumping supply caused by the oil-producing nations, OPEC, and Russia and the like, have led to natural gas prices that are unusually, abnormally low. As market fundamentals return to more ordinary levels, gas prices will resume and the attractiveness of renewable energy versus gas-fired generation will find a more ordinary, more attractive balance than you might see if you looked at gas prices today or in the month of June, for example.

A key aspect here is your window, how long a time period are you looking at as you're thinking about underwriting, do I want to do electric school buses or not? The trouble with commodity markets is there's usually a lot of volatility in the near term. Certainly we're seeing that in oil and gas, and so people ought to look beyond that and look at the long pull and see, you know, five, ten years, how is this going to work? Because electric vehicles will have a durability that will last that long. You may need to update and maintain the batteries, but the rolling stock has a lot less moving parts. As I said, there's no transmission, there's no radiator, there's none of the corrosiveness that comes from using liquid fuels, so this rolling stock of a

battery could be with us for 10, 20, 50 years, and over that pull you'll see the economics work out very nicely.

Sam Gandhi:
Ken, so what role does public policy play in the development of this market?

Ken Irvin:
The energy market is definitely susceptible to public and political influence, right? We saw that early on in the Trump administration where there was a push to try and sustain coal-fired generation, and you know, there's some merit in that in the sense of employment levels. A coal-fired power plant employs a lot more personnel than a gas-fired power plant, a lot more personnel than a battery resource. So there's certain understandable reasons why you'd like to see those resources available, but on balance, attributes of renewable generation, of storage as a means for supplying energy I think offer more attractive benefits for our economy at whole. You need to transition to that marketplace and that transition needs to be managed so that we have reliable energy, and the dislocations caused by the transition are managed with care and attention and sensitivity.

But it's definitely something that becomes a kitchen table issue, it becomes part of politics, and politics and regulatory uncertainty make underwriting difficult for investors. So, that's why, you know, I like to see people think of it in terms of five, ten-plus years because that's usually how long it takes to repay capital expenditures, the capital outlay necessary to do what is essentially an infrastructure type of investment here. Investing in battery-powered school buses represents transitioning a whole fleet from diesel fuel to new buses, and that's, depending on the size of the school district, a dozen buses to 200-plus buses, so it's an investment, and it will require underwriting.

Sam Gandhi:
Thank you, Ken. I appreciate the work on this.

Ken Irvin:
Yeah. No. Happy for the opportunity. This is terrific. I think you're onto something here. These things are very interesting and I hope they find a nice audience. I'm grateful for the opportunity.

Sam Gandhi:
You've been listening to The Sidley Podcast. I'm Sam Gandhi. Our Executive Producer is John Metaxas. You can hear more episodes at sidley.com/sidleypodcast or subscribe on Apple Podcast or wherever you get your podcasts.