



# Electrifying Commercial Fleets: Unique Challenges and Solutions

## Key Takeaways from Cleantech Forum San Francisco Panel on January 20, 2021

### Panelists:

**Tony Brasil** – Branch Chief, California Air Resources Board

**Steve Heckerth** – Founder & CEO, Solectrac

**Michael Roeth** – Executive Director, North American Council for Freight Efficiency

**Alf Poor** – CEO, Ideanomics

### Moderator:

**Craig Irwin** – Managing Director, Roth Capital Partners

Public consciousness of electric vehicles has been growing by leaps and bounds, led by the startling success of car maker Tesla. In 2020, the Palo Alto firm sold nearly a half million of its sleek all-electric cars.<sup>(1)</sup> That's still far behind the millions sold by behemoths such as GM and Ford, but Tesla is quickly moving into the mainstream with competitively priced EV sedans.

As the prime mover in the electric car space, Tesla is forcing the hand of traditional combustion vehicle makers, who are ramping up production of their own fully electric models to compete. Few, however, recognize the imminent revolution in another, huge EV space – commercial and specialty vehicles, trucks, tractors, and transit vehicles such as buses.

Cleaner options for trucks are coming, and none too soon. Emissions from heavy-duty vehicles have risen by 2.6% annually since 2000. There are tens of millions of trucks today on the road doing long-haul, short-haul delivery, people moving and dozens of return-to-base circuit tasks such as garbage collection and package delivery. <sup>(2)</sup>



Thus, the growing imperative to “deep decarbonize” the trucking business. At a recent forum, leaders from the environmental, freight, agriculture and EV infrastructure worlds met to discuss these important topics. The challenges facing the conversion of the heavy-duty commercial vehicle sector are big, but so are the rewards, some of which already are being realized.

“We’ve been active since 2018 in China,” said Alf Poor, CEO of Ideanomics. “That gives us a really interesting perspective because the EV industry in China is way ahead of the rest of the world. North America and Europe are starting to ramp up and become interested.”

“China’s involvement was really one coming at it from an angle that we all appreciate, which is they have some of the world’s densest population and most polluted cities, so they’ve been putting a lot of government capital behind infrastructure investments and development of the EV industry,” Poor said.

The key to developing the EV market in China has been political will and subsidies, Poor explained. The other major change has been improvements in the technology itself, specifically smaller batteries, a trend backed by

government support.

“The size of the battery and the cost of the battery has been prohibitive for most,” Poor said. “Now we’re starting to get to the point where we’re starting to see the cost of the battery power coming down to make it viable on a commercial level.”

While the technological advances have been notable, progress on the commercial side in the United States has been moving in distinct stages, said Michael Roeth, executive director of North American Council for Freight Efficiency.

“When we talk about total cost of ownership, there are segments where the electric truck is really valuable and some would say are on parity with diesel or gasoline now,” Roeth explained. “Then there are other segments that are really difficult. There could be trucks that are operated 24/7, which virtually have no time to charge, or they’ve got long distances to traverse, or maybe very disparate routes where coming back to base just never happens.”

Nevertheless, progress is being made, particularly in obvious wins such as heavy trucks in ports and smaller class trucks in short haul e-commerce delivery.

“All that’s coming together at this time where — and I’m going to say for some — electric trucks make a lot of sense now” Roeth said. “Then as they keep getting improved and the work continues, I think it’ll naturally scale into some of those other segments where it’s just not there quite yet.”

The industry is really focused now on electric trucks, Roeth said. “We’ve seen the opportunities come with lower battery costs and the recognition of other benefits of electric trucks. We are also seeing dramatic learning in putting in the needed charging infrastructure,” he said.

On the regulatory side, in clean-air policy leader

California, much is being driven by an executive order by that state's governor to move all trucks and transit to zero emissions by 2045, said Tony Brasil, branch chief of the California Air Resources Board, as well as requirements on manufacturers to make zero-emission trucks available starting in the 2024 model year.

"Early on, the goal was to electrify last-mile delivery categories with the idea of having the fleets purchase the vehicles," Brasil said. "We realized several years ago that we first need the vehicles to be built and supported for people to buy them, and so we actually did the manufacturer regulation first. Now we're pursuing a fleet strategy to make that happen."

California is building on previous experience, dating back to 2002, requiring zero emission for buses, Brasil said. Now that market has taken off. "It's because the total cost of ownership is very interesting already," he said. "Again, it looks like it'll look better than conventional. I'm sure the rest of the market is looking at that as an opportunity as well."

The industry is "excited" about total cost of ownership, but upfront investment is key, said Poor. "That's why the state-based subsidies and other things are very useful. They help the manufacturers bring the technology to market quicker, and then they help the commercial fleet operator digest and absorb some of that additional costs there," he said.

The payoff is not decades away, Poor said. "Many of the folks see, particularly between years six to 10, it's a very big margin of total cost of ownership benefit to the fleet when they switch to electric-powered vehicles versus primarily diesel in the commercial sector," he said.

Ultimately, however, one of the big items to cover is infrastructure and infrastructure support, Brasil added.

"Having a filling network so that you don't have to have a return-to-base operation would greatly enable the market and also cover the same concerns that

you have with light-duty, even if you have a return-to-base operation, if you know you have a safety net of somewhere you can extend your range for the day," he said.

And to that the falling cost of renewable energy and the picture changes dramatically, said Brasil. "It could be a win-win-win scenario, but that's a major undertaking," he said. "It's not something that happens overnight. There's planning and cooperation to make it happen."

The low-hanging fruit in truck EV conversion is in the agricultural industry, notes Steve Heckerth, CEO of electric tractor make Solectrac.



"One of the great things about electric tractors is that we have maximum torque at zero RPM," Heckerth said. "While a diesel engine doesn't come up to maximum torque until 2,000 or 3,000 RPM. Right off the line in the operating speed of tractors, we can pull a diesel that's twice the size because we have instant torque, and they have to wait to get up to speed."

Plus, EV tractors only use energy when moving forward. "For example, during grape harvesting, you have 10 minutes where workers are filling the bins on the trailer, and then you have 10 seconds when the tractor is using energy to pull the trailer forward to harvest more grapes in the next spot. It can operate for a week on a battery pack," Heckerth said. "I don't see any barriers really. It's really just a mindset that we've been

stuck with for the last 120 years that fossil fuel is the only thing to use, but now we've got solar energy that's cheaper. We can create the rural fleet infrastructure by installing solar and wind power in the field to charge electric tractors where they are used."

Renewable and clean energy will be important as the world finally tackles climate change, said Poor.

"There is a lot that needs to be done there. Hydrogen, hopefully, we'll deliver on the promise that it has so it can deliver some of the long-haul capabilities as well. We're in an interesting phase" he said.

A lot of people talk about the fact that not all of our grids are producing energy from clean sources, he said.

"The misconception is the EV industry is completely clean. It isn't. It's way, way better than burning fossil fuels, but wherever there's industry, there's a carbon footprint," Poor said. "That's one of the things I think people should understand as well. This infrastructure is going to have a carbon footprint and the more programs

you can have to help offset that, like tree planting, the better." Still, the future is bright, Poor concluded, based on the experience of Ideanomics in China and elsewhere.

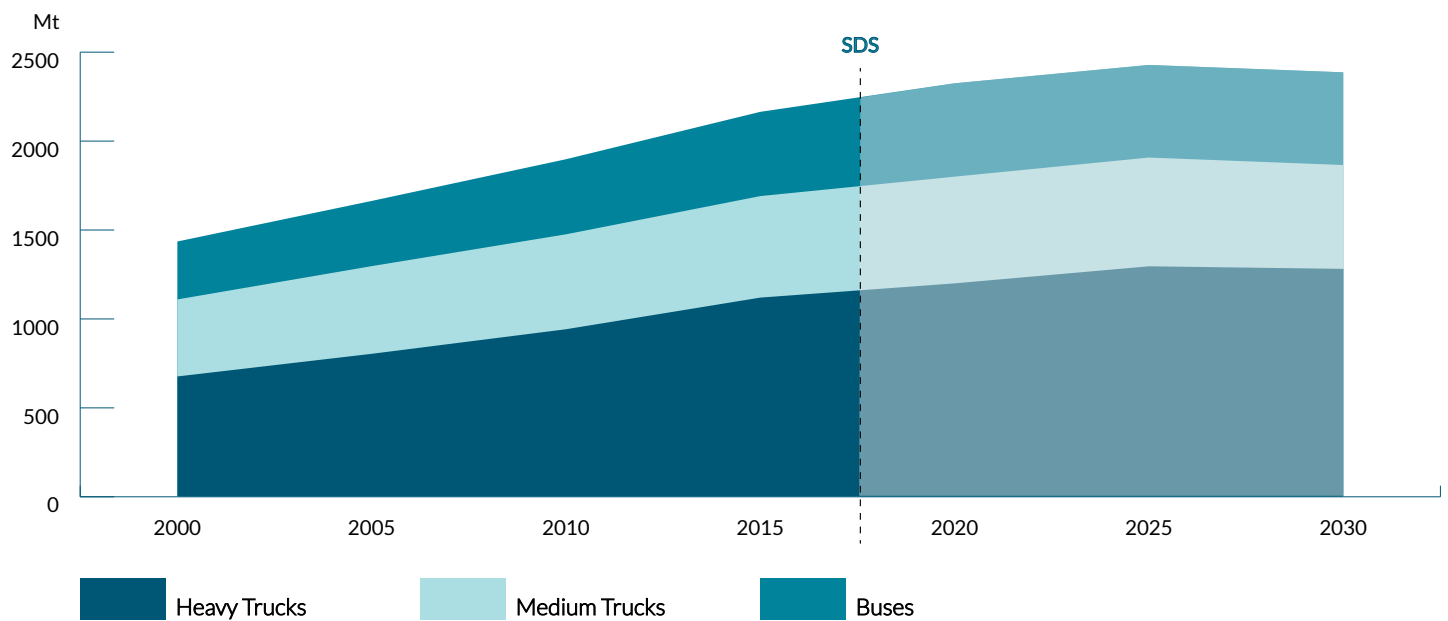
"What I tend to see is that it's very easy for the commercial side to adopt overnight charging for most of their vehicles' use," Poor said. "Those that need to do the charging during the day, mining operations, others where the torque requirements are really heavy and the batteries do drain quite fast, they're using peak shaving, purchasing wholesale overnight electricity.

"Those are a few of the things I've seen that I expect to cascade in some form or another out of Asia and across North America and Europe as commercial EV takes off," he said.

(1) <https://ir.tesla.com/press-release/tesla-q4-2020-vehicle-production-deliveries>

(2) <https://www.iea.org/reports/trucks-and-buses>

### CO2 emissions from heavy-duty vehicles in the Sustainable Development Scenario, 2000-2030



Source: IEA, CO2 emissions from heavy-duty vehicles in the Sustainable Development Scenario, 2000-2030, IEA, Paris (Metric Tons) <https://www.iea.org/data-and-statistics/charts/co2-emissions-from-heavy-duty-vehicles-in-the-sustainable-development-scenario-2000-2030>