

# EVangelists: Putting the electric cart before the power generation horsepower?

Opinion piece

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One of the most recognized patterns in current well-to-wheel analysis is the differentiation of localized power generation sources and supply chain contributions to the overall carbon footprint of vehicles. Experts like [Kelly Senecal](#) rightly point out that in many cases, the power grid is dirtier than a hybrid, even when vehicles manufacturing energy sources are responsibly developed.

What may not be getting enough attention in news and analytical interests is the grid scale readiness as well as the existing light vehicle fleet. Even if consumers adopt the current OEM targets of electrification whereby battery-electric vehicles (BEVs) represent over 30% of sales, the existing fleet will have a significant number of vehicles using conventional fuels. By 2030, less than 20% of the existing fleet would have the option to use grid power at all — let alone operating on it solely. All of these above numbers are before the new US Environmental Protection Agency (EPA) rules come into play.

The latest EPA rules are attempting to triple the number of BEVs sold. The average price differential of \$1,200 between a BEV and internal combustion engine (ICE) vehicle quoted by the EPA is not readily found on the marketplace. Furthermore, recent consumer studies show that only 39% of BEV owners feel that charging infrastructure is sufficient. Current domestic charger installation rates are projected to hit about 12 million units by 2030, so that number would also need to triple.

In a recent client call, I discussed a nine-month wait time on electrical transformers, which will be required not only for charging stations but for the dealership networks, as well. OEMs will need to look into localized grid readiness for understanding their sales capacity at the dealership and whether they will be able to properly service these vehicles. The grain-oriented electrical steel market, which is the only source for electrical transformers, is stagnant. Facilities that produce this type of steel are not being built.

Some environmentalists have begun to look at the ecosystem-level impacts of the mineral requirements for this proposed future. To facilitate all the new electric vehicles (EVs) and upgrades to the grid, it is often postulated that at 30% BEV production, humanity will need to mine an amount of copper that is equal to all the copper ever mined in human history. Each vehicle produced with a different amount of materials than a vehicle being scrapped equates to some activity around mineral processing.

Human rights interest groups are also becoming more vocal about the conflict mineral sourcing issues. Beyond the questionable labor strategies, there are issues with tribal lands, watershed depletion and the secondary community impacts that come from business mistakes and/or negligence.

So, in the above small glimpse into the EV transition, the immediate trade-offs at a planetary level seem marginal at best. Near-term production of EVs and grid-level improvements will require significantly higher energy consumption. Even if we magically flip the grid to 100% renewables today, there is a fleet of 287 million registered ICE vehicles in North America that still require fuels. In that hypothetical scenario, we address less than 20% of the problem with extensive resource use and dubious impacts to communities, ecosystems and economies. Overall, people are asking "is this the best we can do?"

In quiet corners of labs, in aviation holding tanks and even in farmyards a quiet but potent revolution has started. Some may look to the recent EU debates on e-fuels or even the previously lobbied ethanol bills as the starting point of biofuel's innovation cycle, but the longer-range history of this story is nearly as old as the ICE itself. Rudolf Diesel worked with peanut oil in his days of engine development and is quoted in some works as a believer in a future when vegetable oils might displace significant amounts of petroleum demand.

Sustainable fuel research has a variety of feedstocks, processes and end products all competing to gain a proper foothold in the marketplace. Some biofuels are coproducts of a production process, while others require significant

technological oversight. While the means, feedstocks and regional economics of these fuels all vary widely — the list is growing on the GREET model of well-to-wheel emissions.

While the number of evaluated fuel sources grows, the regulatory environment and the laws of physics remain unchanged. Our current regulations have pointed OEMs toward BEVs as a way to ignore any emissions culpability of their products. For compliance purposes, building batteries and electric motors is the safest route to assuage government administrators accused of living in ivory towers. Meanwhile, the physics of biofuels retains a foothold in aviation and agricultural communities. Energy returned on energy invested (EROEI), profits, distribution and immediate implementation have all been successful in some communities. Carbon is being put back into the soils of agricultural communities, and forestry waste is being utilized for a secondary product stream. Farmers see their energy investments yielding three times their input in some well managed scenarios.

Sizable reductions of emission footprints can be achieved with competitively priced alternative fuels currently on the market. For current ICEs based on diesel or gas there are a range of options for just about any configuration — and even the potential for engines that run on multiple fuels. So, in the arena of availability, we have enough options to change the fuel ecosystem. Even the material requirements of alternative fuel engines have a strong growth pathway for reliability.

Inexpensive autogas (propane) vehicles are already sold in EU countries at a price no BEV can currently meet profitably. For a renewable autogas fuel, carbon footprint shrinks by an estimated 90% — beating grid-level power in many cases. For emerging markets with highly sensitive price points, even the cost of airbags can significantly change overall market volumes. BEVs would need to beat the cheapest vehicles produced, not just meet pricing in established market segments.

Some consumers who drove BEVs returned to ICE-based vehicles because the convenience of electrification is severely lacking. Forgot to charge overnight and have a meeting on the other side of town tomorrow? Hope you find an open charger and left enough time in your schedule. Convenience is why your local grocer sells small packages of food more often than you see containers in bulk. Anyone can sign up for a Costco membership and individually bag small portions of food. However, there is a willingness to embrace the additional effort that is required for a given benefit. For groceries, it might be two-to-three times the cost for conveniently packaged portions, but consumers continue to pay for that immediate time win-back.

While futurists seem to all agree that "BEVs are the future," our society perpetually operates in the "right now."

- Right now we have millions of vehicles running on conventional fuels.
- Right now we have alternatives to these fuels.
- Right now we can see performance and emissions benefits from up-fitting existing on-road vehicles.
- Right now BEVs are not a silver bullet for emissions.
- Right now our regulatory stance does not promote small bio-fuel operations.
- Right now OEMs are listening to Wall Street.
- Right now consumers believe BEVs are not always better.

With all the above taken with any levity, what does this mean for the future of electrification? We need more intermediate solutions and we need them to succeed.

Beyond what it means in terms of automotive timelines, we should also consider the optics of common consumers. Because if all organizations are heading toward a solution that does not actually solve the stated problem that justifies electrification — people will know beyond a doubt that the premise lacked integrity.

When this happens, particularly within a culture focused on freedom and integrity, no amount of pressure or incentives will work in the long run. In my military career, we named this status: "Rushing to Failure." Remember that in all things people always have a choice, despite what those in power legislate.

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