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The Dirty Little Secret about All-Electric Vehicles

By Dexter Wright

As Elon Musk doubles down with the debut of new and more affordable models of his Tesla all-electric vehicles at the Geneva Auto Show, there is a dirty little secret that once exposed, will burst the mythology of the all-electric car. There is a myth that the all-electric vehicle is more efficient than conventional vehicles and that big oil hates the all-electric niche carved out by Musk and others. The reality is that the all-electric vehicle is less efficient, and has a larger carbon footprint than a Ford F-150.

It is not because the Tesla vehicles are not well engineered; they are superbly engineered. The inefficiency is a function of where the energy for the all-electric vehicle is generated. Let us start at the beginning. There are only two reliable zero emissions methods for generating power. The first is hydroelectric powerwhich generates only 16% of the world's electricity; the second is nuclear power, which makes up only 11% of the world's electrical grid capacity. That means that 73% of worldwide electrical generation is from fossil fuels.

Looking at how the majority of electrical power is produced will give us the insight that could be embarrassing to the fans of all-electric vehicles. A fossil fuel fired power plant heats water into steam to turn a steam turbine which then turns a generator to produce power; that process is 37% efficient. That is to say 63% of the energy in a unit of fossil fuel is lost due to friction and other thermodynamic laws that have yet to be broken (or nullified by President Obama with an Executive Order).

But the power loss does not stop there. Between the power station and your local neighborhood charging station (which is harder to find than Hillary's classified e-mails) there is a stepdown station where the 440 voltage in the transmission lines is converted to 220 volts. Then the 220-volt electricity travels along power lines to a transformer which converts the power to 110 volts before going to your meter and finally going from your meter to your home charging station. Each step along the way there is significant power loss. The total loss from the original 37% efficient steam turbine and generator is 66%. That is to say that two-thirds of the power generated is lost from electrical resistance and attenuation along the miles and miles of transmission and power lines. Subtracting two thirds from the original 37% leaves only 13.7%. Yes, my friends, the all-electric vehicle is only 13.7% efficient. The pollution and carbon emissions are simply moved from the tailpipe to the smokestack.

How does that compare with a regular run-of-the-mill internal combustion automobile? According to the U.S. Environmental Protection Agency the efficiency of a typical car is 14% under city driving condition and close to 26% for ideal highway conditions. This means that those of us in a tax bracket that precludes buying an all-electric vehicle are polluting less than our neighbors with "Bernie" signs in their yards.

There is an additional little fact that Mr. Musk et al hope is not discovered; that is that most of the nuclear power stations in the U.S. will be shut down in the coming decades. The Department of Energy has no plans in the works to replace these zero emissions power plants. This, in combination with Obama's war on coal, is shrinking the power grid which is at this time is already nearing 85% capacity. Not much room for market growth of a new electrical appliance called a car.

On paper the all-electric vehicle is a good idea, but in practice, not so much. Given these facts, Big Oil should be behind the all-electric vehicle; if Big Oil cares at all. The better idea is to continue along the lines of hybrid vehicles which can exploit the "sweet spot" of an engine and achieve significantly higher fuel efficiency and lower emissions than either the conventional internal combustion vehicle or the all-electric vehicle. Whether a series or a parallel hybrid vehicle, the fuel efficiency of a hybrid is superior to the all-electric vehicle. The electric car will just have to wait until major advancements in the area of power generation are achieved, but until then, the numbers just don't add up, so I will smugly drive my Ford F-150 knowing that I am more fuel efficient than that all-electric vehicle with a Bernie bumper sticker on it.