

Tesla-Rev 2

By John Benson

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1. Intro and Tidbit

This is a serious paper with a silly beginning. Those that read many of my posts know that I live in Livermore, California. Livermore is known for many things: leading edge research (Lawrence Livermore National Lab, Sandia National Lab and many spin-offs), wineries, wind turbines, oil and coal. Regarding the oil, we actually have a small oil field just northeast of Livermore as you start on the "back road" up to the Altamont Pass wind resource area. Regarding the coal, read the second paragraph below.

Regarding the wineries, go through the link below for a map of the wineries.

<https://www.lvwine.org/amass/documents/map/12/2019%20Map%20inside%20Brochure.pdf>

You will see from the above linked map that the "main-street" for many of our wineries is Tesla Road. So what is Tesla Road named after, maybe the EV? No, although we have a million square-foot warehouse for Tesla Inc. in Livermore, Tesla Road is named for the coal mining town of Tesla, California, southeast of Livermore on Tesla Road (see the link below). My wife's great uncle, Valentine Fath, worked in the Tesla Coal Mines, and now resides in Livermore's Catholic Cemetery (a few times a year my wife visits him and other relatives to place flowers).

<http://teslacoalmines.org/>

This paper is really about a minor subject and a major subject. The former is one of the most important individuals in the history of the U.S. Electric Utility Industry, and the major subject is, you guessed it, Tesla, Inc.

2. Nikola and Friends

Tesla, the Coal Mining town was named after Nikola Tesla, I have seen many good documentaries about the struggle between Thomas Edison and George Westinghouse, and the pivotal role Nikola Tesla played in this war. There will be an upcoming movie on this subject "The Current War" this October. A trailer is available through the link below.

<https://news.yahoo.com/watch-trailer-electrifying-film-current-war-194647324.html>

Nikola had many interesting events in his life. In order to keep this section brief, these are listed below as bullets. To read Nikola's whole story, go through the link in the reference here.¹

- Even though Nikola would revolutionize the electric utility industry in the U.S., he was Serbian.
- Nikola originally worked in the Electric Utility Industry as an engineer with the Continental Edison Company in Paris (yes, that "Edison").

¹ Wikipedia article on "Nikola Tesla", https://en.wikipedia.org/wiki/Nikola_Tesla

- In 1884, he came to the U.S. when his manager, Charles W. Batchelor, moved back to the U.S. from Paris, and took Nikola with him. Mr. Batchelor was a close associate of Thomas Edison.
- Nikola worked at the Edison Machine Works, and helped deploy electric service in New York City.
- Tesla quit Edison's company after six months, and began developing his inventions privately under a new company, Tesla Electric Light & Manufacturing.
- During this period Tesla developed the AC induction motor, AC transformers and most other AC technology.
- In 1888 George Westinghouse became familiar with Nikola's inventions. Westinghouse licensed Tesla's patents and then hired him.
- In 1893 Westinghouse started offering a complete polyphase AC system as the "Tesla Polyphase System."

3. Tesla Inc.

Now, we will move from one eccentric genius to another, Elon Musk. What the latter genius has done is truly remarkable. The following are the U.S. EV sales / delivery numbers for Tesla, Inc. These start in 2012, because that is when the first deliveries of the Model S, first EV of the current product range, began.

- 2012, 2,650
- 2013, 17,650
- 2014, 16,689
- 2015, 25,416 (First Model X EVs added)
- 2016, 47,119
- 2017, 50,139 (First Model 3 EVs added)
- 2018, 191,627
- 1st Quarter 2019, 29,900 U.S. deliveries, 63,000 worldwide deliveries
- 2nd Quarter 2019, 53,975 U.S. deliveries, 95,200 worldwide deliveries (CNBC, confirmed by Elon's Tweet at 1:30 PM 7/2/19).

This growth is not something that a vehicle manufacturer would be able to do without major advances. The following are descriptions of these innovations by Tesla.

Nothing but pure BEVs: No internal combustion (IC) vehicles, no hybrids, no range extended EVs, not even any fuel cell powered vehicles (which Elon refers to as fool's cells), just battery electric vehicles. This greatly simplifies the design and components that must be built or procured.

First Luxury EV: The Model S in 2012. This vehicle was so revolutionary that Motor Trend named it the car of the year in 2013. Its performance and safety features

exceeded any other luxury sedan at any price. The fact it was the first EV luxury sedan and was competitively priced with other mid-range luxury sedans was simply amazing. Also look at the above delivery numbers, and note that until mid-2015, the Model S was the only vehicle that Tesla made. From 2012 through 2013 Tesla increased deliveries by 666 percent.

No Dealers: Although this has kept Tesla out of several states, they do not use dealers for sales or service (only Tesla-owned stores). One major reason they don't need dealers is described in the next paragraph.

All Tesla cars since the Model S are fully connected: and have over-the-air upgrades and software fixes. Their vehicles are specifically designed to make a large majority of functions software implemented, and thus a Tesla needs limited service other than over-the-air (see the web page linked below). Also BEVs have less than 2% of the moving parts as compared to an IC vehicle.

<https://www.tesla.com/support/car-maintenance>

First Luxury SUV: The Model X. This was loosely based on the Model S, but was a full midsize 3-row SUV. A major innovation was the "Falcon-Wing" rear doors.

Leading Performance Mid-sized Sedan: The Model 3. The August issue of Motor Trend has a comparison test of the Model 3, vs. two IC-powered sedans that it had previously recognized as being excellent drivers (a.k.a. performance) sedans: the BMW 330i and the Genesis G70. The Model 3 won easily. Why? *"...the Model 3's boundary-pushing tech was expected. But it was the revolutionary driving experience that pushed it over the top."* Also its measured performance (acceleration and handling) blew the others away. *"Driving seems new and novel again. The way it reintroduces driving enthusiasm to a driving enthusiast is remarkable."*

Major sales in international markets: Tesla is getting about 50% of its sales now in Europe, China and other off-shore locations. For a company that shipped its first competitive vehicle seven years ago, this is amazing. Furthermore, its deliveries are about to jump off the map by the end of the year (next paragraph).

Gigafactories 1 and 3: The one non-standard components that BEVs need in huge quantities are batteries. Tesla and Panasonic built Gigafactory 1 to make sure that sufficient batteries were available to fuel the rapidly accelerating production.

Gigafactory 3 is in Shanghai, China, and is scheduled for completion at the end of this summer. For a factory that broke ground in January, 2019, this is remarkably fast. If Tesla meets this goal and starts production late this year as planned, worldwide production will take a major jump as Tesla feeds vehicles into the fastest growing BEV market in the world.

The image of Gigafactory 3 below is from drone footage. This and the above information came from the source referenced here.²

² Fred Lambert, Electrek, June 24, 2019, <https://electrek.co/2019/06/24/tesla-substation-to-power-gigafactory-3-production/>

