

14 November 2017

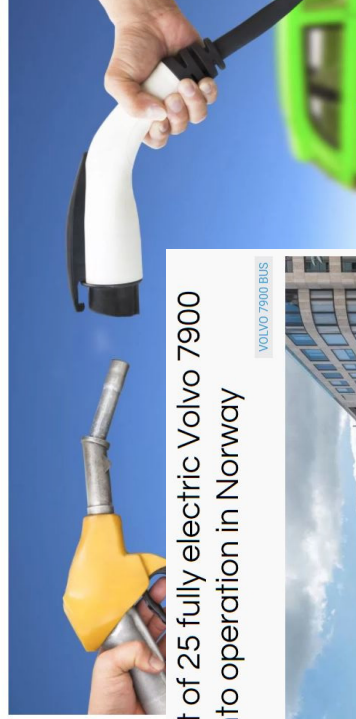
IPMI Europe
Prague Seminar

Precious Metals and Mobility

by: Bodo Albrecht

California is now also considering a ban on gas and diesel-powered cars

Fred Lambert - Sep. 26th 2017 9:27 am ET @FredLambert



ELECTRIC CARS

A new large fleet of 25 fully electric Volvo 7900 buses is going into operation in Norway

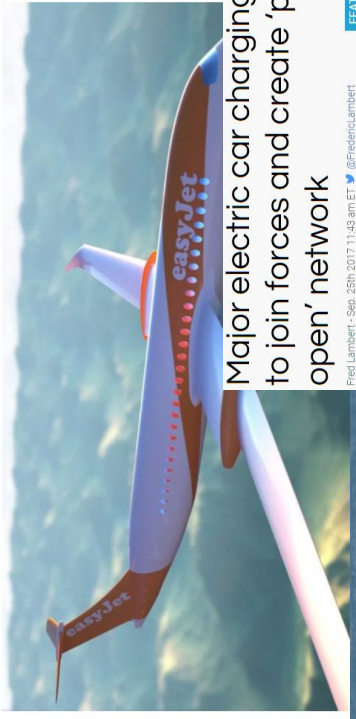
Hayle Keastelo - Sep. 27th 2017 11:15 am ET



VOLVO 7900 BUS

Electric airplane startup and easyJet join force to bring all-electric aircraft to market

Fred Lambert - Sep. 27th 2017 8:37 am ET @FredLambert



FEATURE WRIGHT ELECTRIC

Major electric car charging networks in Europe to join forces and create 'pan-European open' network

Fred Lambert - Sep. 26th 2017 11:48 am ET @FredLambert

FEATURE ELECTRIC CAR CHARGING ALLEGO FORTUM

Vacuum-maker Dyson confirms working on an electric car to launch in 2020

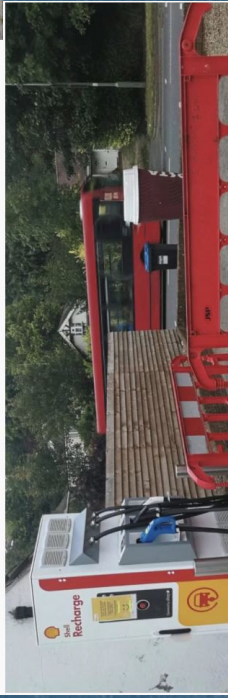
Fred Lambert - Sep. 26th 2017 1:10 pm ET @FredLambert



FEATURE ELECTREK

First look at Shell's new electric car charging stations being deployed at its gas stations

Fred Lambert - Sep. 27th 2017 2:09 pm ET @FredLambert



ELE



ABB jumps on board to build biggest battery factory in Europe planned by former Tesla execs

Fred Lambert - Sep. 26th 2017 2:34 pm ET @FredLambert

NORTHVOLT

Automotive – Biggest Consumer of PGMs

Pt



40%

Pd



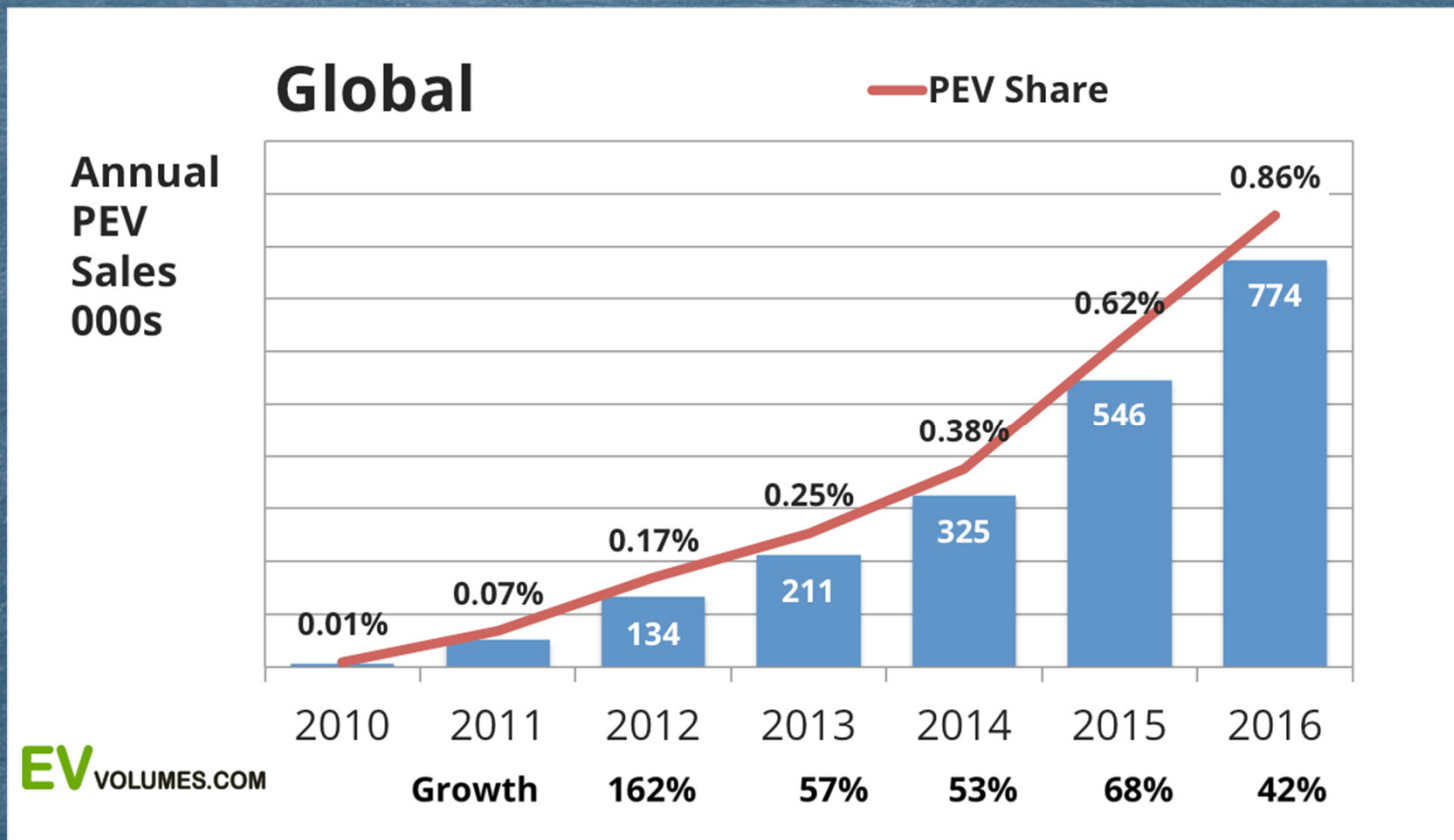
75%

Rh

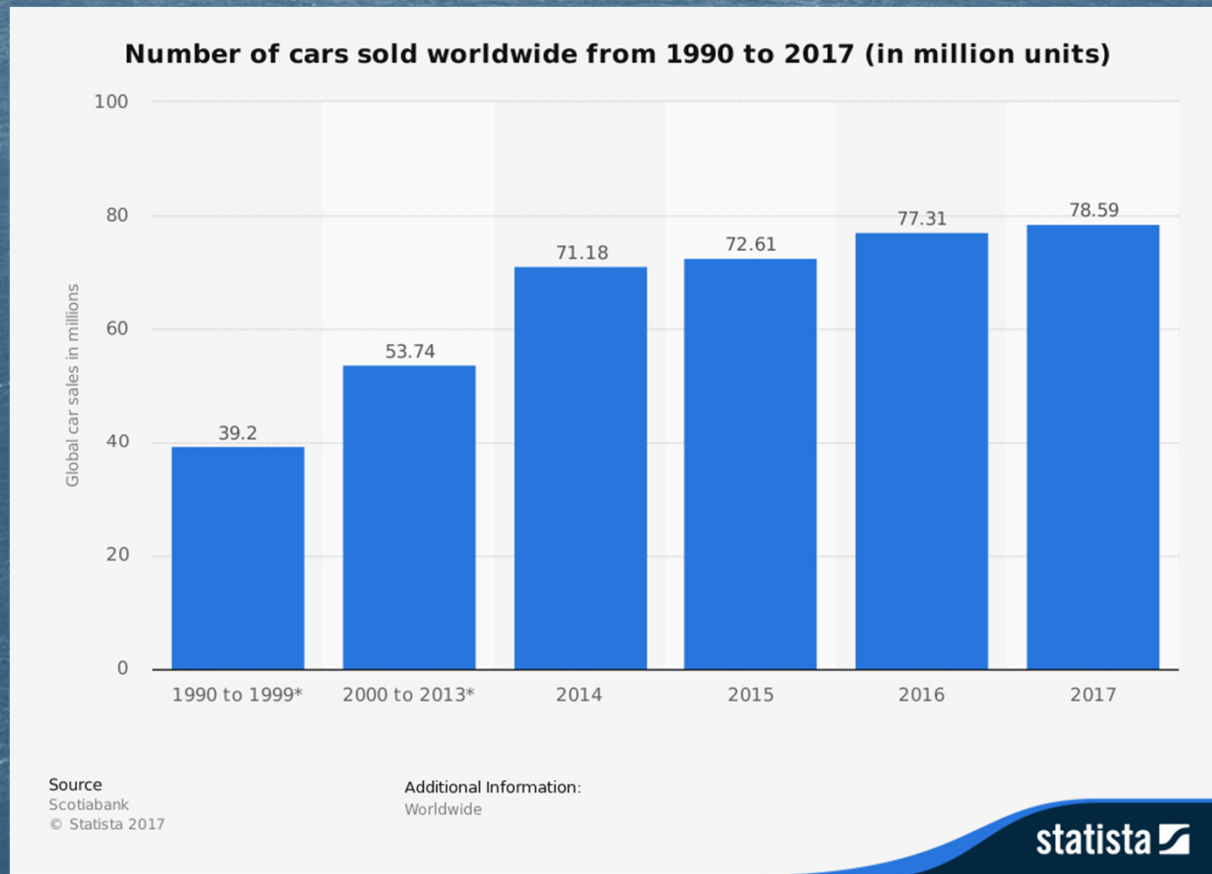


75%

EV Sales growing each Year



Still not a lot...



BEV vs. FCEV



Hybrids – the Gateway Drug



Politics vs. Reality



Bans on Gasoline powered Cars

2025



2030



2040

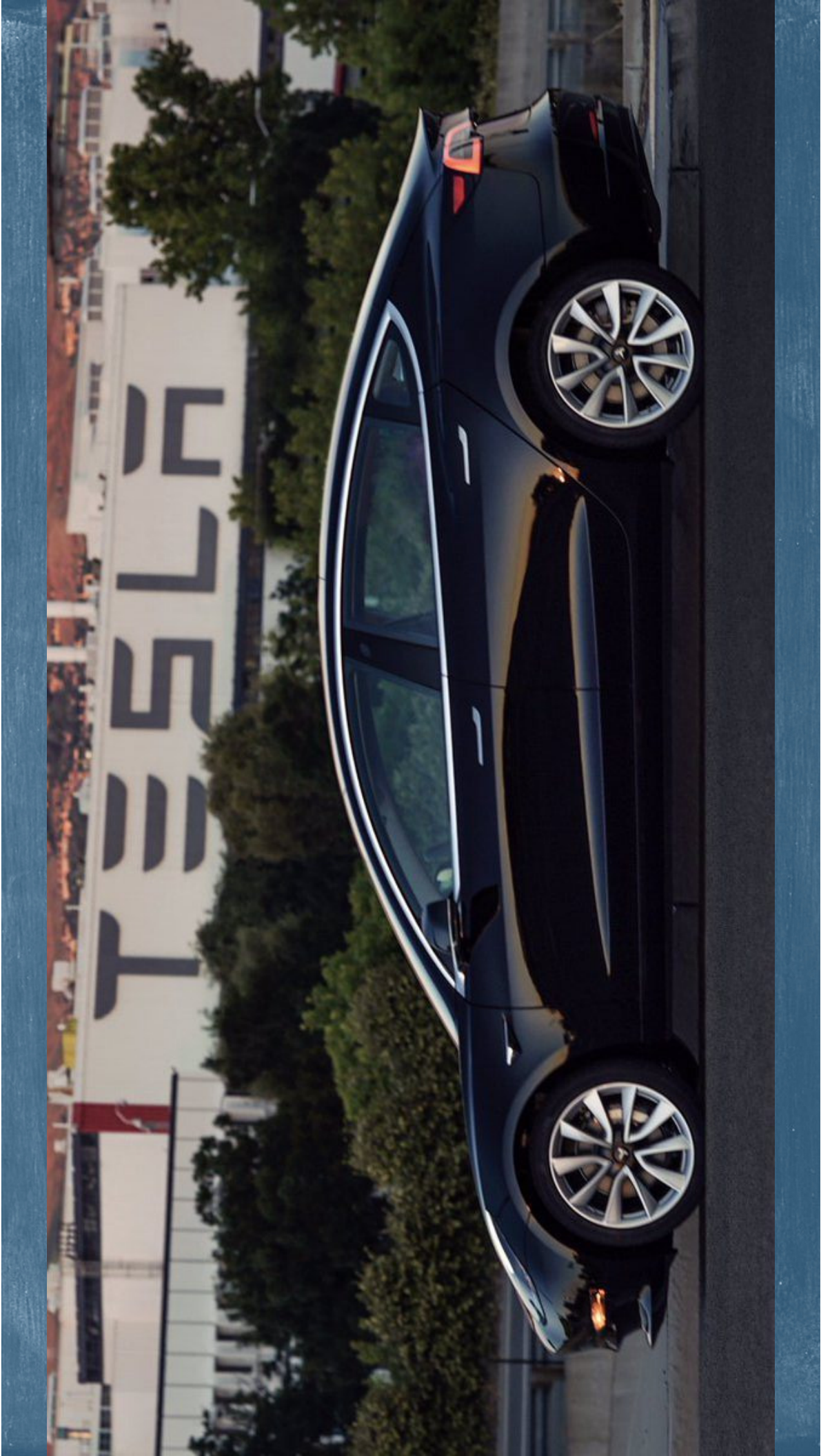


Setting goals



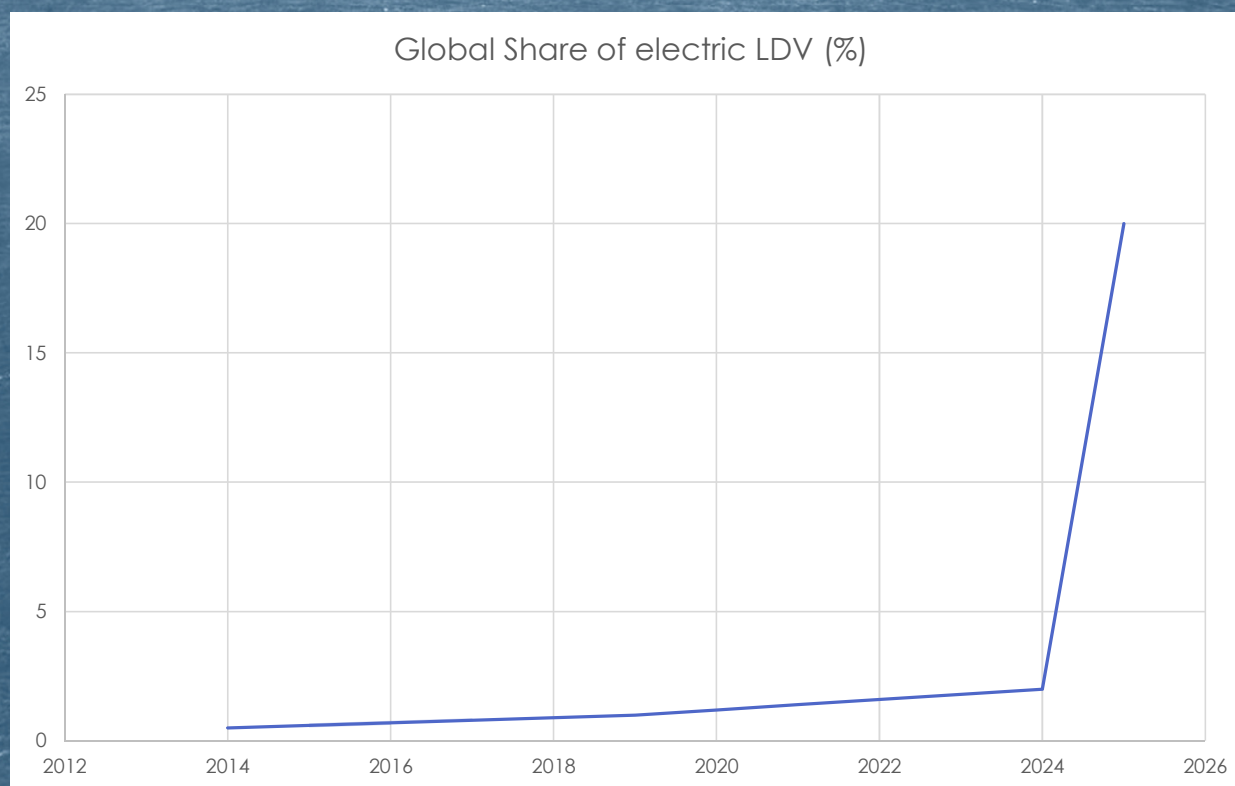
It's complicated







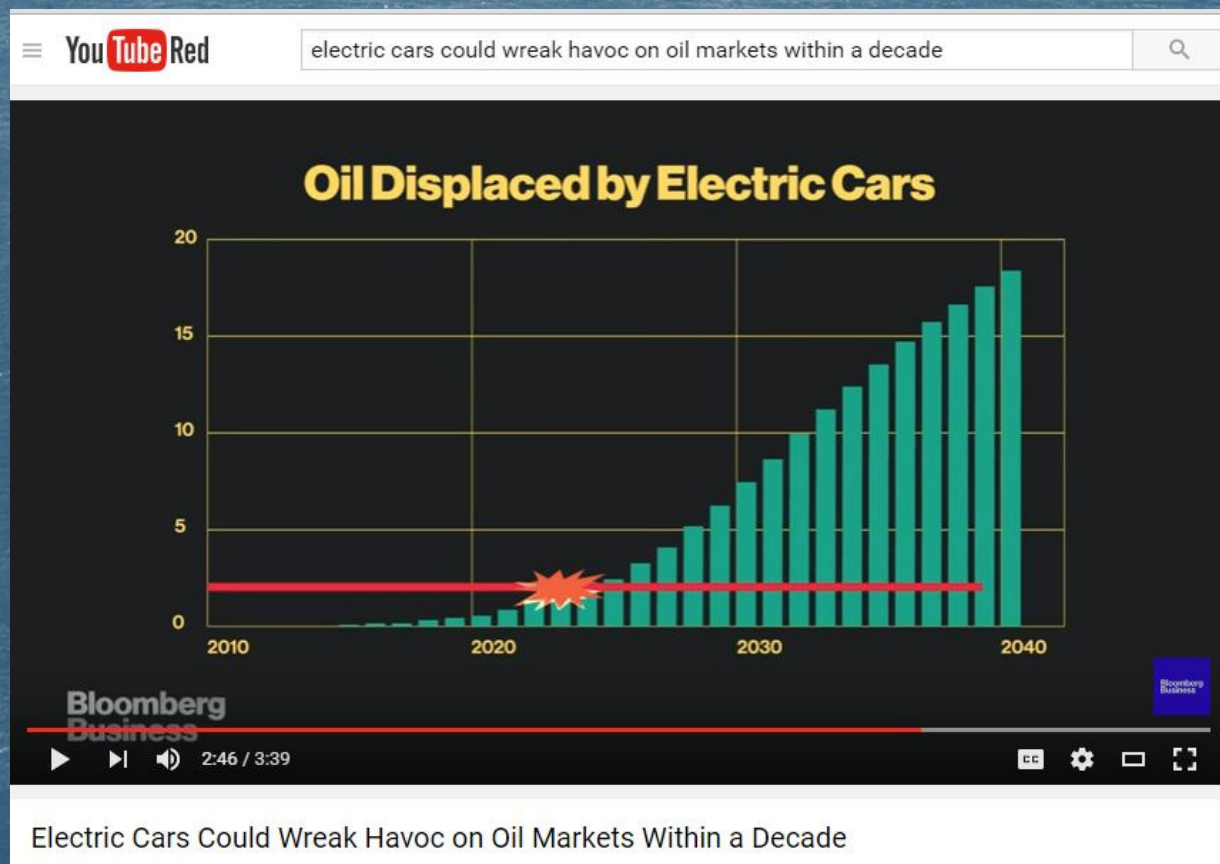
When charts are failing us



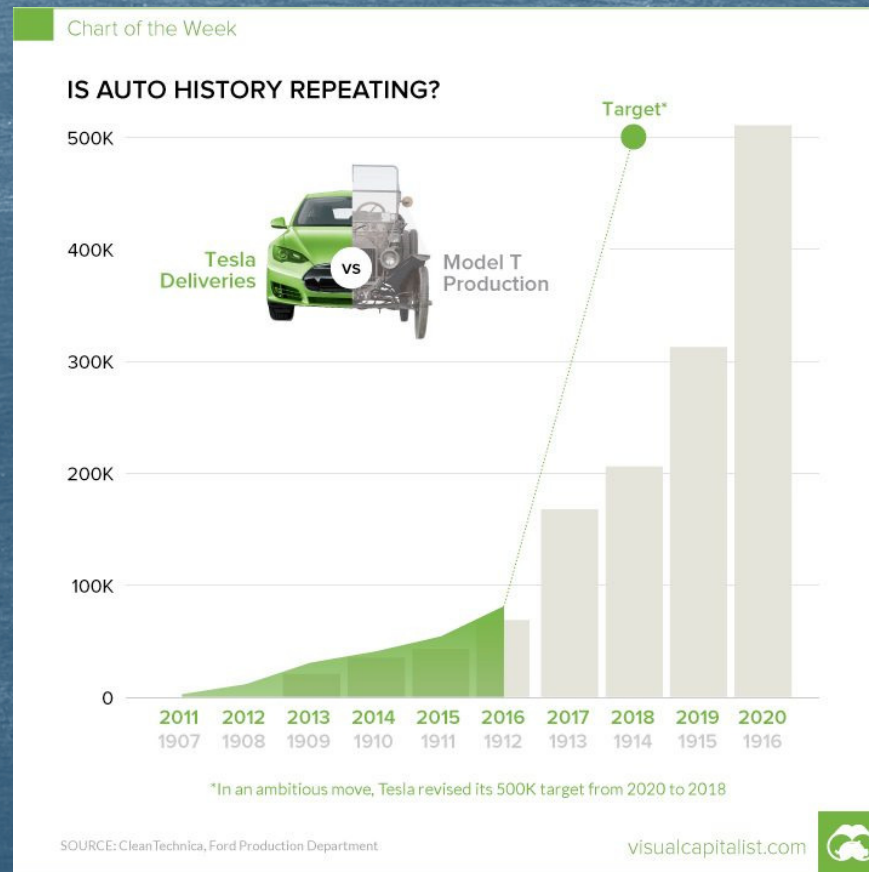
The Tipping Point



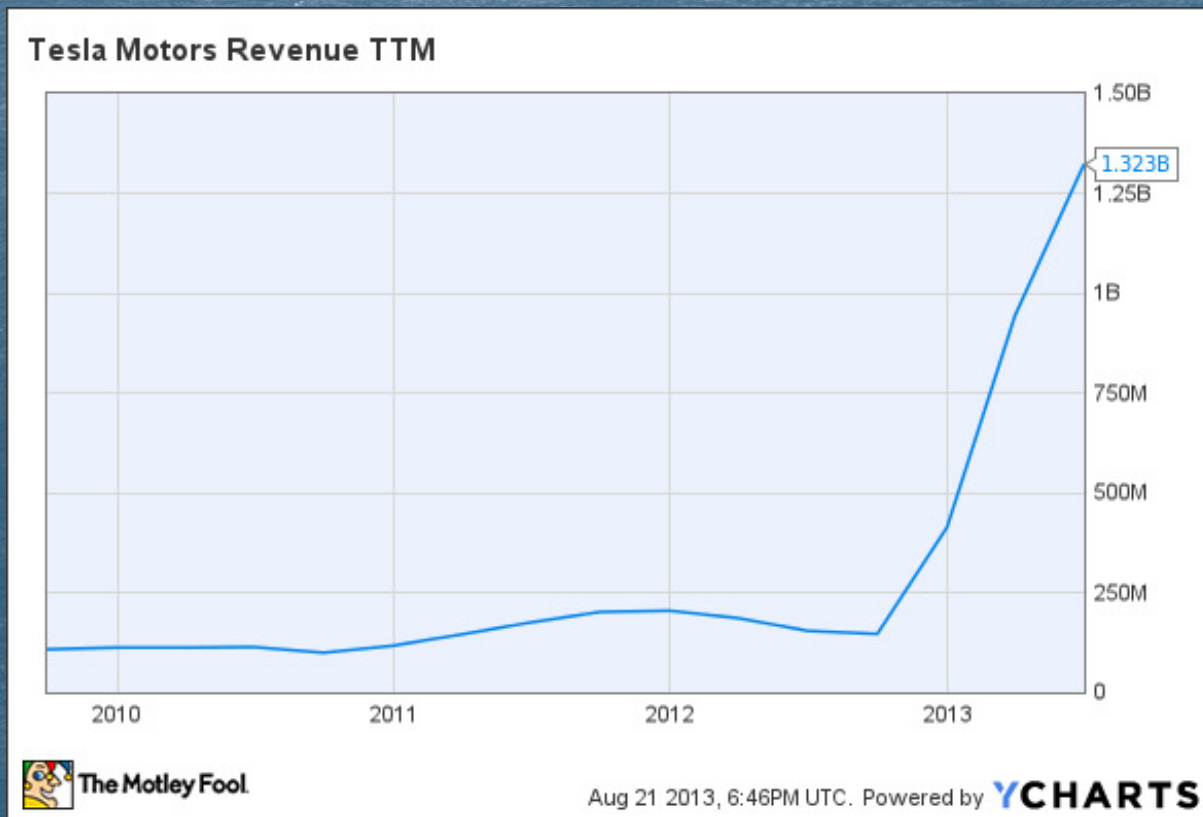
Also Bloomberg



Disruptive Technologies - A faster Horse



Tesla Revenues



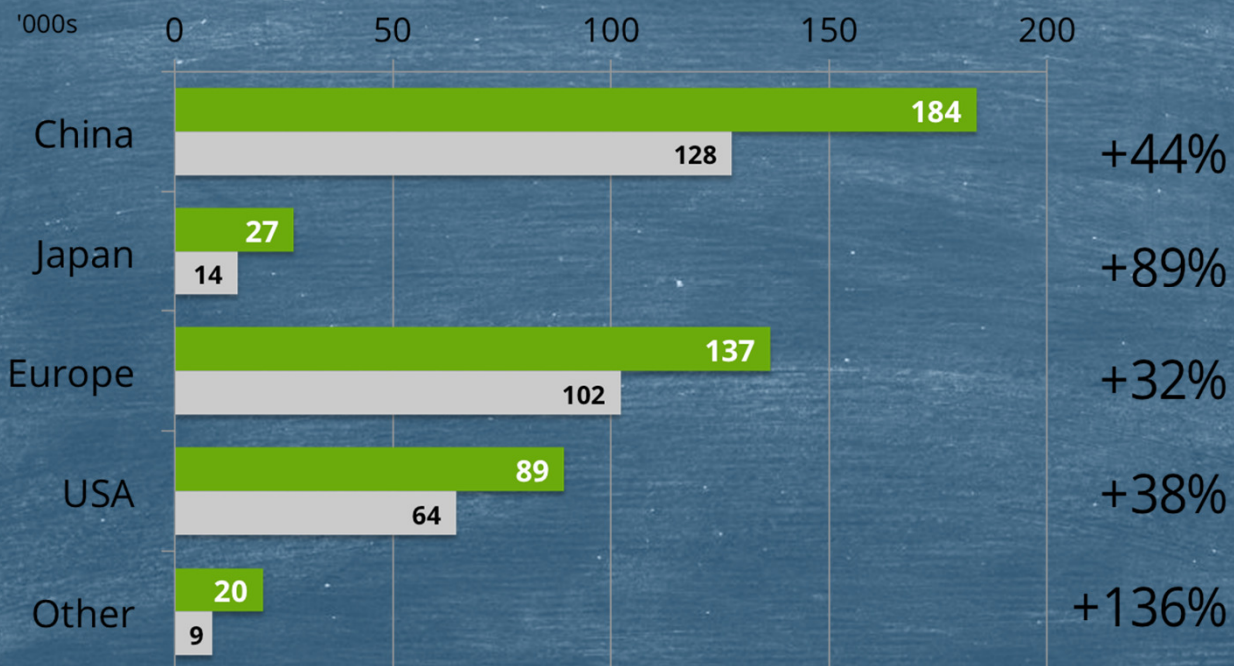
Putting things into perspective

Plug-in Sales and % Growth

■ 2017-H1

■ 2016-H1

EV VOLUMES.COM



Black Swans



The new Normal





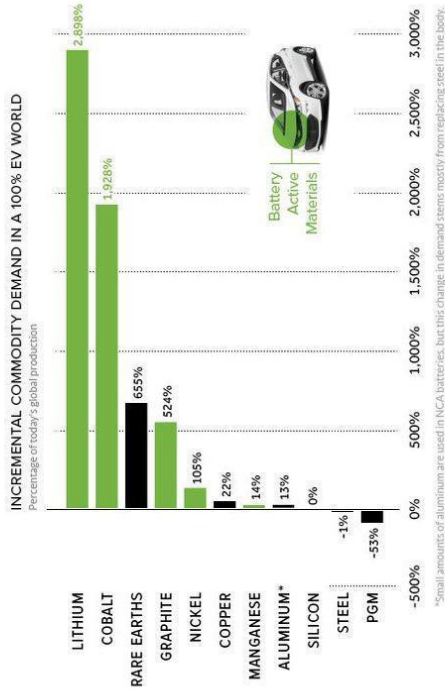
THE MASSIVE IMPACT OF EVS ON COMMODITIES

How commodity demand would change in a 100% EV world



EXECUTIVE SUMMARY

UBS recently tore-down the Chevy Bolt, the world's first mass-market electric vehicle (EV) with a range well above 200 miles. They gained key insights into how increased EV adoption could affect commodity demand, particularly in materials used in batteries.



*Small amounts of aluminum are used in NCA batteries, but this change in demand stems mostly from replacing steel in the body.

Material differences in EVs will have a big impact on demand.



STEEL
Batteries are heavy, so aluminum must be substituted for steel where possible.



NICKEL
Used in both NCA and NMC cathodes, the >\$20 billion nickel market would more than double.



PGMs
Used to reduce emissions in gas powered vehicles, PGMs could be the **biggest casualty** of mainstream EV adoption.

LITHIUM/COBALT
In a 100% EV world, these initials are essential. **Better supply chains** will be necessary, as well.

A turning point from the inside out.

MIRAI

Hydrogen refueling

Hydrogen refueling pressure: 70 MPa

Refueling time: Approx. 3 minutes.

2015



2017

30g



2020

5-8g



IPMI Symposium: Precious Metals and Mobility



16.-18. April 2018
Menlo Park, NJ – USA

Speakers:

- Established Car Companies
- Electric Vehicle Producers (Battery and Hydrogen)
- Fuel and Energy Producers
- Analysts and Industry Experts
- Panel Discussions
- Visit to Edison Museum, EV Display



bodo@bodoalbrecht.com
+1 (908) 419-8146

Questions?

