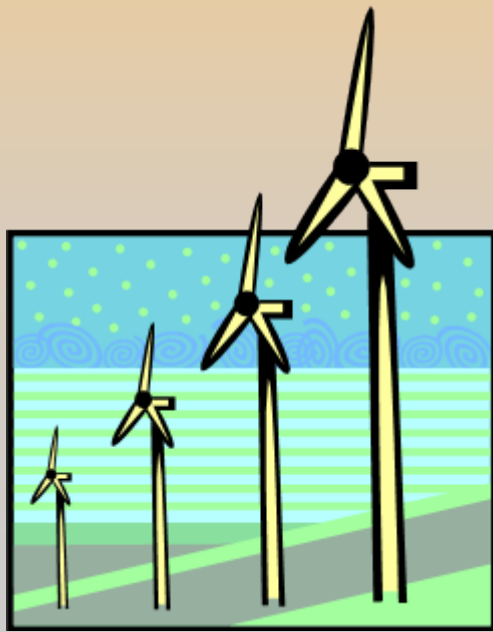




Mike Brace,
Manager, R&D Engineer

EPT





EVs, BEVs, PHEVs...it can be so confusing!



Making sense of the Alphabet Soup.



★ BEV

– Battery powered **Electric Vehicle**





★ NEV

– Neighborhood Electric Vehicle



★ HEV

– Hybrid powered **E**lectric **V**ehicle





★ PHEV

– Plug-in Hybrid powered Electric Vehicle



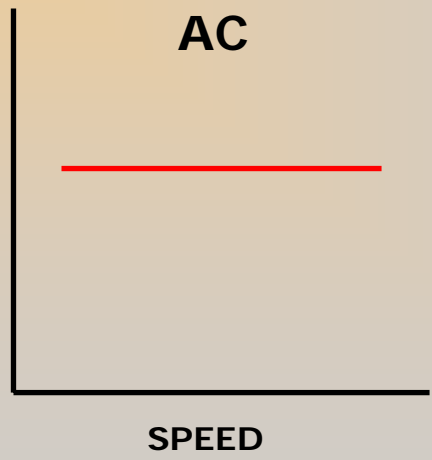
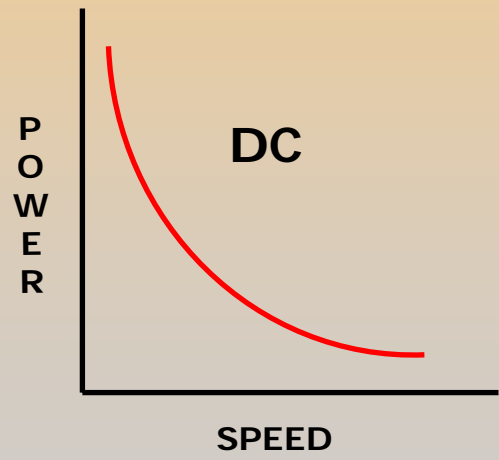
★ GEV (V2G)

– Grid-powering Electric Vehicle (Vehicle to Grid)

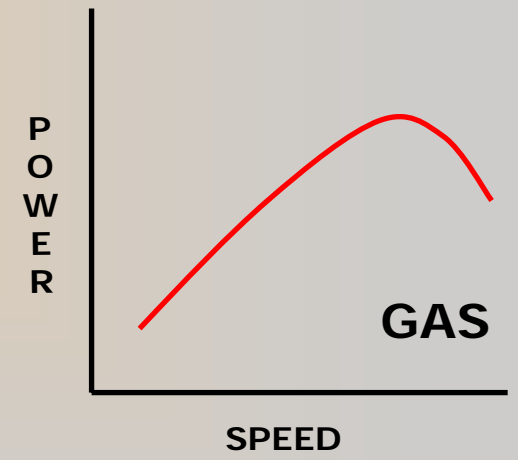


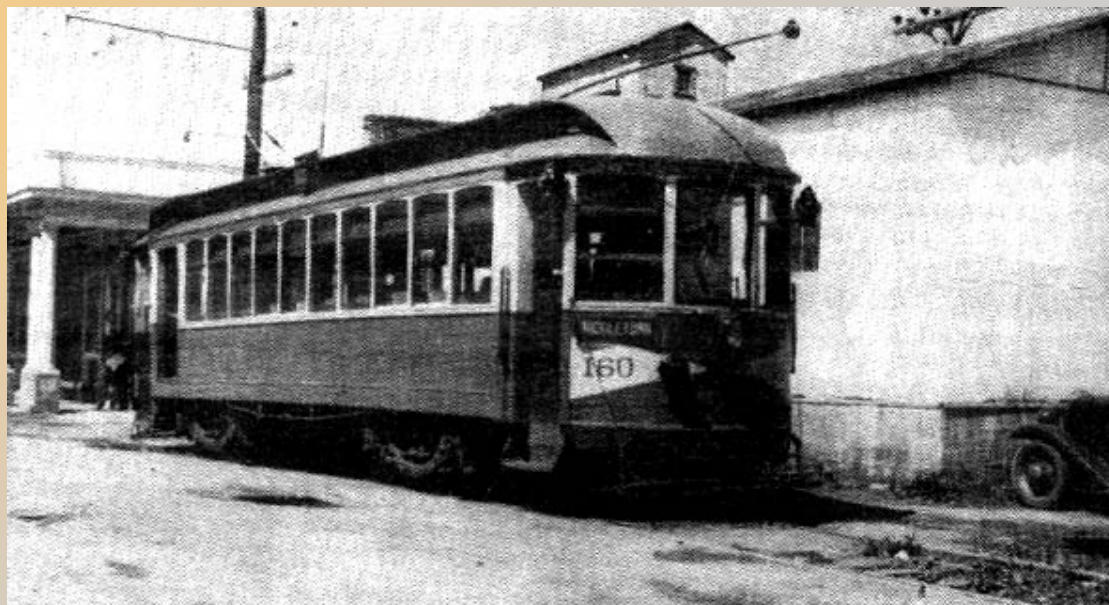


Electric power



Gas power





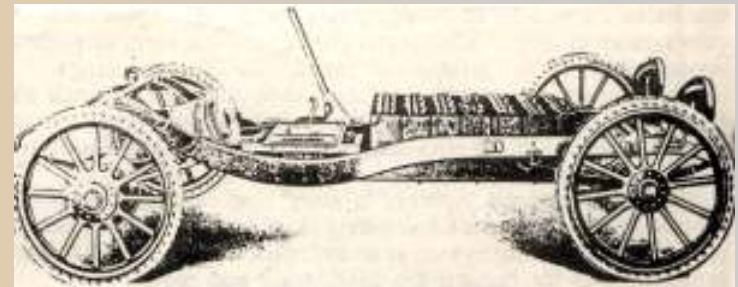
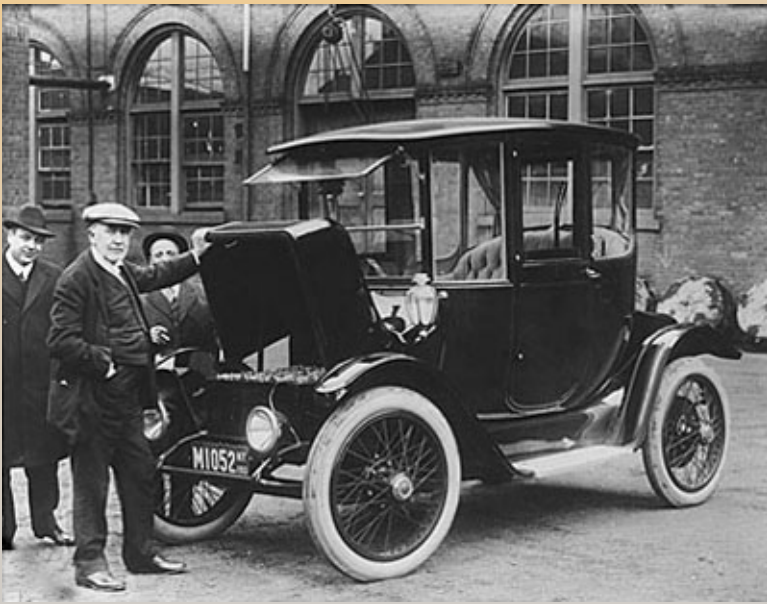
A Brief History Lesson

At the turn of the 20th Century more than 2/3rd of the self-propelled vehicles were electric!



It didn't take long...

1912 Detroit Electric

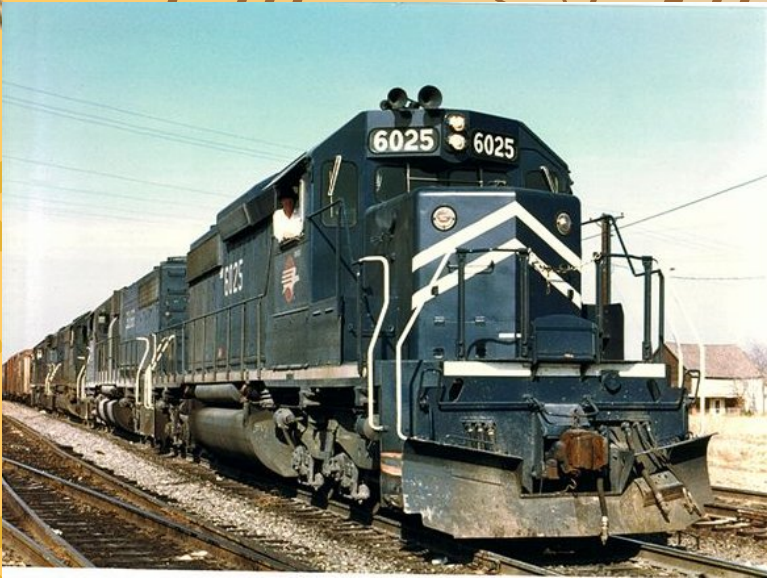


This rare picture shows what the underside of an electric car really looked like. There is a huge bank of storage batteries connected by heavy cables to a powerful driving motor mounted just in front of the rear axle. Since the car went slowly and usually travelled on paved city streets, the tires could be solid so the female driver never had to contend with a flat or blowout. The car is illustrated below



I'd put my money on solar energy. I hope we don't have to wait till oil and coal run out before we tackle that.

-Thomas Edison, in conversation with Henry Ford and Harvey Firestone, March 1931





**What
can we
expect
?**





Air Quality and Public Health Suffer From Poor Transportation Planning

Source: [Chicago Tribune](#)
[Mar 04, 2008]

SYNOPSIS: *Lack of sidewalks and bike paths make it dangerous to students to walk even a few blocks to school; instead they take the bus. Of course, forget about using bikes & NEVs...*

Stanford Study Finds Health Risks with Increased Ethanol Use

Source: [San Francisco Chronicle](#)
[Apr 19, 2007]

SYNOPSIS: *Study shows that the city would experience a 9 percent increase in the rate of ozone-related respiratory deaths -- 120 more deaths per year -- compared with what would have been projected in 2020 assuming continued gasoline use.*

"Ethanol is being promoted as a clean and renewable fuel that will reduce global warming and air pollution," Mark Z. Jacobson, the study's author and an atmospheric scientist at Stanford, said in a statement. "But our results show that a high blend of ethanol poses an equal or greater risk to public health than gasoline, which already



Health Cost of San Joaquin Valley Air Pollution Talled

Source: [LA Times](#)
[Apr 04, 2006]

SYNOPSIS: The lion's share of those costs -- an estimated \$3 billion -- is tied to 460 smog-related deaths each year.

Appeal of Hybrid Cars Continues to Grow

Source: [Rochester Democrat and Chronicle](#)
[Jan 20, 2006]

SYNOPSIS: Compared with a standard sedan of similar size, one of the best-selling hybrids, the Toyota Prius, produces 5,203 fewer pounds of carbon dioxide, a greenhouse gas; 2.4 fewer pounds of nitrogen oxides, which contribute to ozone; and 2.6 fewer pounds of hydrocarbons, the soot that turns ozone to smog.



Plug-In Cars Could Increase Air Pollution, Contends USA Today

Source: [USA Today](#)
[Feb 26, 2008]

SYNOPSIS: The NRDC calculus shows that a plug-in charged from a power plant burning the dirtiest type of coal still has an overall pollution level less than a conventional gasoline car.

The NRDC calculus shows that a plug-in charged from a power plant burning the dirtiest type of coal still has an overall pollution level less than a conventional gasoline car. But it would produce 11% more greenhouse gas emissions than a regular, non-plug-in hybrid, according to Luke Tonachel, vehicles analyst at the NRDC and co-author of the group's report on plug-ins. The report was produced jointly with the non-profit Electric Power Research Institute.



We cannot solve the problems we have created with the same thinking that created them.

-Albert Einstein