

## **AUTO POWER ALTERNATIVES: ELECTRIC, HYBRID, and SOLAR -- Part Two: TODAY'S ELECTRICS AND HYBRIDS**

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**TESLA HAS BEEN IN THE LEAD** in the development of electric vehicles with their award-winning **MODEL S** (265 mi. traveling range) and their newer **MODEL X** (230 mi.) but the other manufacturers are rapidly catching up. Other electrics (pure electrics) include the **Toyota RAV-4**, **Nissan Leaf**, and others.

As pointed out in Part One, the major disadvantage of electrics has been their limited travel range before their batteries need recharging. And they have even more limited ranges in extreme weather, requiring high electric power usage by the heating or cooling system. Electrics also have poor acceleration (at least before the Tesla!) although that's changing very rapidly. Lithium-ion batteries have supplanted ni-cad batteries, and newer technologies are being explored all the time. Lithium polymer batteries are a hopeful development that promise to supplant lithium-ion technology. EV research primarily focuses on battery research and development.

A great deal of advanced technology research is going on with Tesla, the most innovative company involved with this type of technology. 'The "secret" to Tesla's vastly extended range is simple: the size of its battery coupled with its design of a flat slab floor, and more research is going on as we speak. Tesla is definitely where it's "going on." The Tesla advantage is that it is a one-vehicle (basically, despite the 2 models) start-up company and they have to resolve this battery size and driving range problem if they want to be successful. The cost factor will probably take care of itself over time as it usually does with any new technology.

- Other EVs include the **FIAT 500e** (87 mi. range): The **500e**, a **pure electric**, is like the **SMART ELECTRIC DRIVE mini SMART for TWO** (which is tinier). The only problem with such a small car is its lack of visibility and thus its **safety** in modern traffic situations. This is a disadvantage, along with the problem with all electrics, that they become sonically "invisible" (too quiet); -- although plans are being developed to provide them with some sort of low-level noise to let people know they're coming!
- **FORD Focus Electric** with a range of 76 miles
- **NISSAN LEAF** (84mi. traveling range)
- **Kia SOUL EV** (93mi.)
- **VOLKSWAGEN** has also come out with their electric vehicles and hybrids, including the **VW E-GOLF electric** (83mi.)

**HYBRIDS:** Chevrolet's **CHEVY VOLT** -- considered the leading electric car in the general consumer market -- is, in fact, a plug-in hybrid -- as is the 2014 **Toyota PRIUS**. Even Cadillac, Mercedes, BMW, and Porsche (!) have their hybrid autos. Researchers are developing fuel cells for use in hybrids. As important as electrics are, it is important to have an alternative power system in addition to electric, and so plug-in hybrids are, in fact, essential considering the lack of pervasive fast-charging options at the present!

**IN CONCLUSION:** The most highly developed alternate power vehicles today are hybrids, with electrics close behind, and solar still in the experimental stage of development, as we've discussed in Part One. EVs are not only in the marketplace of ideas, they're in the auto marketplace. Thank goodness for that!!

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**TESLA and other research:** "Detailed List of Electrics and Plug-in Hybrids" --PluginCars.com "We Are on the Verge of an Electric Battery Breakthrough" -- ThinkProgress "What Makes Tesla's batteries so great?" -- Torque News