



“The Electric Car” Buyers Guide – for the rest of us

Version 2008-1.0

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1 – Revision History

This section, in upcoming updates, will include a summary of all revisions made since the prior version of this report and now included in this current version. Because this is the first version of this report there are no revisions.

Version 2008-1.0 – this report

Version 2008-2.0 - updates - TBD

2 - Introduction – Why Publish these Reports?

In these reports, we will identify plug-in electric car (including hybrid) options, that will help break your oil addiction, satisfy real usage requirements and seem to be not recognized by major car review sites. Here is why 2008 is the year to seriously consider such a personal transportation purchase option.

It is already 2008 and we do not have to remind you that in terms of our personal transportation, we are addicted to oil, with 60% of it coming from OPEC and other non-OPEC Petro-dictator states. Fuel pricing is totally out of control and our national dependence on fuel and the related "petro-politics" is getting more and more disturbing. Any relief of this situation, with the solutions proposed thus far by our government, are truly decades away. And last but not least the environmental effects of burning fuel in our cars has now been proven to be detrimental to our planet.

The history of the Petro-Dictators continual increase of oil prices proves the "First Law of Petro-politics," which states that the price of oil and the pace of freedom always move in opposite directions in oil -rich petro-list countries. According to this Law, the higher the average global crude oil price rises, the more free speech, free press, free and fair elections, an independent judiciary, the rule of law, and independent political parties are eroded both in the petro-countries and around the world. Some of you may or may not be bothered by these global issues. In the U.S. there are also devastating effects of high oil prices, such as, our costs to continue making a living if we have to drive to/for work, cost of goods that are transported, transportation itself and our freedom to enjoy our beautiful country via its roadways is eroded due to high fuel costs. Politically, our ability to maintain our moral high ground and do what is right in the world is seriously compromised due to adverse effects of petro-politics.

So, have we presented any reasons that you also feel strongly about that may finally push you to do something in your own small way about our oil addiction? If yes, how about "unhitching your own wagon" from oil and examining what "real use" electric cars are available for purchase some time this year?

When the Honda Insight and Prius hybrids came out in 2000, showing real reductions in fuel usage and associated pollution, were you unsure of making a purchase? We were as well and the fact is the current hybrids just don't cut it. Today we want to purchase a specific type of electric car to help solve the fuel dependence problem, a car that serves a real world purpose in our current lives and satisfies a couple of additional specific requirements. In these reports we'll call such an electric car an "EC" (defined in detail under the ['Electric Car' Defined section](#)). For us to make a purchase these additional requirements are essential and it seems, after surveying other potential consumers who seriously would purchase a vehicle in 2008, they agree.

And to be perfectly clear, we will define our group of fed up consumers to be "limited risk early adopters" - not "immense risk taking early adopters" and certainly not what the car industry would call "regular consumers". Our smaller purchasing group, however, is what got the Prius to where it is today - a profitable car for Toyota. Yet most of us won't purchase a Prius because they provide fuel consumption benefits at the price of being anemic performers as well as not being plug-in capable, meaning you do not have true freedom and control because you can not "charge up the car at home or work via an extension cord". However, success of the Prius, (during 2000 to end of 2007 ~900,000 Prius sold - 1

out of every 10 cars sold by Toyota is a Prius.), proves the market can push the industry in the right direction for our country both in the marketplace and by forcing other manufactures to develop hybrid cars, (there are roughly 12 hybrid car models available today).

Purchasing an EC at this time may be limited to a few "limited risk early adopters" who live in relatively [warm climes](#) and who do not mind the spending a bit more money when compared to a traditionally powered car. However, at some point in time we need to prime the pump like Prius initially did for those consumers accepting its major compromises. Compromising in other feature and operational areas may be acceptable to our group of consumers. In trying to replace petrol with electricity, compromising features may be acceptable to our group of consumers. With these considerations we have found some interesting electric cars that may fit our needs that you can buy today. They range from all electric lithium ion battery cars to plug-in electric hybrid conversions. We will break it all down, explain their technologies in non-nerd terms and give you the pros and cons of what is available out there.

Even though these ECs may satisfy MOST of the same requirements as the latest fuel sipping gas or diesel counterparts available today, **they are more expensive at this specific time and simple return on investment calculations make pay back unattractive.** So if you are looking to make a decision based solely on financial pay back - STOP READING THIS REPORT – PLEASE REQUEST A REFUND. However, if you are like us and feel there is more at play here with this type of car purchase ... then read on ...

For the "rest of us" non-hobbyists out there who are not interested in personally converting our cars to electric, we still want to contribute in some way to lowering our own fuel oil purchases (and dependence) even though the financial merits may reveal that the pay-back may not be optimal. Of course purchasing an EC at this early stage does make an ideological stand. So are you ready to take the plunge?

So, have you done any homework yet? Have you reviewed the ~15 hybrid cars from the major carmakers and the many electric cars and their materials on the Internet? Cars from major carmakers without plug-in capability use less fuel only during city driving and yet few web sites mention this key omission. And the current potentially acceptable solutions are either unknown, due to little marketing, or require a custom solution like a person or a small company to convert a traditional car to electric - some of the latter options may be acceptable risk for our purposes. When reviewing sites devoted to the electric cars available, were you surprised that almost all of the Internet material is geared toward hobbyists and eco-blogger-geeks? And consumer car-buying guides don't help you because most options available are obscure and are currently flying below the radar. With this spotty information, consumers need tools to help them wade through the eco-geek morass to identify a car that will make a difference, has acceptable risk and fits their needs.

After considerable research, we were surprised that no one has yet created a consumer friendly non-biased report with lay person-targeted evaluations of what is really available today to the interested consumer like ourselves. That is the Mission of our reports. Boil down the technical jargon and wade through the little-known/reviewed options to find a couple of gems in the rough available for purchase this year which at least in our own personal way will take a big step to wean us from oil addiction.

OVERALL IMPRESSIONS - For this first release of our reports in 2008, we think one should look at [Category D](#) for the best compromise of risk and satisfying performance for all-electric EC choices. Cars in this category are not plug-in hybrids, which give the car owner the most usage flexibility with their extended range supplied by their ICEs (internal combustion engines). Secondly we would look at the [Category A](#)

conversions for plug-in EC choices although desired performance is lacking with the choices available. Of course in a perfect world Category A would contain the best choices that do not require conversions – but unfortunately in 2008 we are not yet there. For those of you who want to get a car sooner rather than later, and want the best price performance AND are willing to accept radical looks and a much higher amount of risk, **Category E #2** choice is the one to examine for your needs. Most of all what we hope to show that buying an electric car in the next 6-9 months doesn't mean you have to settle for a glorified golf cart – as you will see there are electric car choices with style and performance. The future car options are only going to get better, with more affordable, stylish and less compromising candidates to help you ditch your petro-dictator supplied oil guzzler.

REQUIRED LEGALESE - Please only **use this information only for entertainment purposes at your own risk** - There is no warranty expressed nor implied and we are not liable for any of your past, present, nor future actions. Should you have a conversion company perform these modifications to your car as they promised, they could still damage any number of components in your vehicle causing it to no longer function. Even if it appears to function properly your actions may cause it to self-destruct with collateral damage to surrounding properties other than your vehicle.

By utilizing these recommendations in an attempt to enhance national security, reduce gas consumption, vehicle "emissions", your carbon footprint, or smog, **you agree to do so at your own risk & peril**. If you do not agree with these terms, please request a full refund for these reports.

WARRANTY OF RATED VEHICLE CONVERSIONS – we have listed as much warranty related information from both carmakers, conversion companies and consumers that was available to us at time of publication, **however you MUST DO YOU OWN HOMEWORK** - In performing some of these modifications you may void your warranty with the vehicles manufacturer.

GETTING THE WORD OUT - If you have friends, family and/or peers that you know feel similarly regarding this topic, please feel free to forward them our web-site address or URL <http://electric-cars-today.com>.

3 - Glossary of Terms One May See In Today’s “Geek Literature” And Unfortunately In These Reports

The terms listed in this section unfortunately need to be defined as a necessary evil to properly describe today’s electric car market, which follows the lead from the marketing of today’s traditional cars. They are not listed in alphabetical order; rather they are listed in order of importance to the goals of these reports. With today’s cars getting imbued with all sorts of new computer controlled systems from antilock brakes, traction control to navigation and entertainment, the onslaught of acronym marketing wars has begun way before the advent of modern electric cars.

IOHO – in our humble opinion

This means – it is just our opinion. We are certainly not the first word or the final word in this subject matter and we certainly do not consider ourselves industry-leading experts. We hope we captured the current opportunity accurately and translated the confusing morass of web reporting and blogging (comments about a subject with a string of other comments about the comments, etc) in order for more Americans to pull the trigger and purchase an all electric EC or plug-in EC as soon as possible.

a.k.a. – also known as

TinyURL

This is a great way to shorten big long web link addresses that when formatted in documents or cut and pasted in e-mails may get corrupted – we use this method exclusively in this report. In most cases we will leave a short URLs as is – long ones that may get disturbed due in the creation of this report, will be replaced by a tinyURL.

If you are concerned in any way about where our tinyurls may take you, you can enable the PREVIEW FEATURE in your browser, so prior to taking your browser to a landing web page, you will see where the link will go – if it looks acceptable to you then you can click on to continue. ENABLE PREVIEW FEATURE IN YOUR BROWSER -> <http://tinyurl.com/preview.php?enable=1>

Electric Car - EC

“EC” as defined for the purposes these reports is a “superset” term which includes, **3 or more wheeled** vehicles, which should have **plug-in** capability to re-charge its onboard batteries, can have alternative onboard charging and drive systems, such as with a hybrid electric vehicle ([PHEV](#)) and **can be driven safely on highways at highways speeds**. However a hybrid EC **must be able to drive in battery-electric only mode** for some reasonable amount of range to be considered an EC. An EC can also be an all electric or [BEV](#) if it has enough usable range. [Our definition of an EC](#) is limited and we readily admit our desire for US drivers to switch to “our type of ECs” is ideologically and politically driven. WE RECOGNIZE THAT OUR DEFINITION IS DIFFERENT THEN THE ONE INDUSTRY USES.

The Rest of the Glossary Omitted for these Preview Pages

4 - The EC or Electric Car Defined and Rating Criteria

The "ECs or electric cars" to be considered and evaluated in these evolving set of reports **must be available to purchase during the publishing year of these reports and have the following characteristics or criteria**, for which they will be rated in terms of how each vehicle satisfies each of these criteria. Cars we deem as potential "game changers" that are either not available yet or fulfill almost all of these criteria will be in most cases listed under the appropriate category, however, some may not be rated in this version of the report.

A – Occupants and Cargo

The car must carry at least a driver and an occupant and have at least enough cargo room beside the two occupants to carry 4 grocery bags

B – Plug-in a must

The EC must be able to plugged-in for charging at any location, home, work, such as an 220 VAC single phase electric dryer power outlet at home or work, rest stop or a 110 VAC standard outlet roadside general car service station. This requirement implies all dual voltage charging equipment is built-in onboard the car. Some carmakers will undoubtedly try to save money by putting 220 VAC in a separate home only charger. This plug-in requirement is the kingpin of our evaluation - this allows the car owner to charge their car by either simply using their local power company electricity at lower off-peak rates over night and/or through a combination of their own creative sources of electricity such as solar or other means at their disposal.

Homeowners can supply electricity in very different and creative ways, besides getting it from the traditional power company owned grid. And very soon, if grid power is required, EC owners will be able to charge up their vehicles at the most cost effective times of the day. For example 3-4 manufacturers already sell Zigbee compliant smart metering devices (<http://tinyurl.com/3kyek8>) that allow a homeowner to know when electric power rates are at the lowest rates best suited to turn on the car charger – eventually these types of devices connected to an electric car's smart charger will allow the charger to turn on by itself when lowest power rates are detected. In addition, many states are either already allowing or considering allowing homeowners to sell electrical power back to the power company from their fully charged vehicle and/or from your home based solar, wind or whatever power generation, creating an interesting financial benefit not considered in most return on investment analyses. Additionally for reference, using the national off-peak average of ~\$0.10/kWh, it will cost ~\$1.00 to charge up a fully depleted 10 kWh battery pack.

C – Performance

For the EC to be an attractive purchase option to a wider early adopter market, it must be able to perform on the highway at speeds up to at least 75 mph (for passing) and city on various road surfaces/conditions and grades with similar in performance to a SPORT COMPACT, not like a golf cart or sometimes call "[neighborhood electric vehicle](#)" or NEV. Number of wheels is not a constraint - "cars" with 3 wheels will be evaluated if this requirement and all others are satisfied. Of course handling is part of this criterion and some 3 wheelers have a distinct disadvantage in this area due to potential "tipping over" in aggressive turning maneuvers, if center of gravity of the car and geometry of the wheels is not optimum.

Cars may do well in the next two categories, but have anemic performance, and as a result do poorly for this criterion. You will notice that we do not consider NEVs as ECs so we do not review or rate them (they are not highway legal due to the under 40 mph speed restriction of these vehicles). This is because we feel that they do not address the core needs of the current pent up demand of early adopters in the market today.

D – Average Commuting Driving Profile – Real World Usage

EC carmakers to date only publish range data for their cars performing relatively unrealistic [EPA drive cycles](#). However, for ECs the range driving in various real-world conditions is one of the key factors in rating cars that meet our requirements. EC must be able to deliver respectable performance while driving a practical "**average commuting driving profile**" consisting of city and highway, gradual and steep hills, acceleration needs, braking, etc. (for a real driver style, not like that of your "granny") and have a usable range minimally for a full average daily commute with some emergency reserve. At this time this profile has not been defined in the same detail as the EPA's Drive Cycles but almost all car review test drivers seem to have the similar subjective definitions for this **more demanding but more realistic driving profile**.

Because PHEVs have a gas burning engine as a backup but BEVs do not, our required range for 2008 BEV cars is ~double the average of 78 percent of Americans in 2007, who drove less than 27 miles per day, plus a 20 mile emergency reserve. This profile assumes at least a couple "snappy" jackrabbit starts – obviously any more starts at high torque and acceleration will drain the battery pack faster and will decrease the BEV range, and for a PHEV in blended mode (both [ICE](#) and EV), decrease fuel economy. This driving profile dictates that an EC must be able to handle road and terrain conditions that may include up to 30% mountainous terrain, (requiring 100% operation in mountainous may limit available vehicle range far below our minimal requirement).

If the car is a **battery electric or BEV EC**, the range should be **~80 miles total miles** driving a **real world average commuting driving profile** per full charge.

For a **PHEV EC on electric only mode** (or EV only) **driving this profile** on a full battery charge, it should deliver **~40 miles range** and in a **blended mode** (both ICE and electric are used) it should deliver **~100 miles range** with an average of **100 mpg** using its fuel. (This EV only range number would not make our EC a PHEV-40, because, the PHEV-XX applies to the less aggressive EPA drive cycles – see below)

This criterion is different but related to the next one in that this one attempts to evaluate the real world range usefulness for commuting ONLY for the car in question, where the next criterion evaluates the cars range overall in all conditions and overall energy efficiency.

E – Range, "Energy Economy", Overall Energy Efficiency

For an EC, non-ICE or [EV only mode](#) range is very important – so for rating vehicles for this criterion, we ask a set of questions, starting off with, how long can the car go driving a real world Average Driving Profile without using a drop of fuel? Also on the highway, what is the range and fuel economy and lastly, in the city, what is the range and fuel economy?

Some cars we have evaluated have poor estimated Average Commuting Driving range, but good city stop and go range and very good highway range (driving the easier [EPA drive cycles](#)), due to their inherent design - so they would get a lower rating in this range/energy efficiency

criterion. However cars that would rate high in the Average Commuting Driving Profile criterion should be capable of good highway range and as a result get a rating in this criterion.

To get the highest ratings for 2008 vehicles for this criterion they should meet or exceed the Average Commuting Driving Profile range, deliver more range under less aggressive driving such as for the Combined EPA City/Highway drive cycles and be generally energy efficient. In our individual reviews we will tend to focus on the Average Commuting Driving Profile range and not on what the carmaker suggests which in most cases is closer to the range while driving EPA drive cycles.

Below we summarize all the range and mpg requirements, IOHO, for 2008 ECs.

- A 2008 PHEV EC running in [blended mode](#), driving an “[Average Commuting Driving Profile](#),” should deliver an average of **100 mpg for ~100 miles of range**. Of course the PHEV will get considerably more range at lower fuel economy when the battery pack is depleted and the car runs primarily on the ICE in this blended mode.
- If this 2008 PHEV EC car is running in [blended mode](#) and driving an easier [EPA type drive cycle](#), it should deliver an average of **100 mpg for ~160 miles of range**. Usually the carmakers claim this number in their marketing materials.
- and -
- A PHEV EC in 2008 running in [EV only](#) mode, driving an [Average Commuting Driving Profile](#), should deliver **~40 miles of range**. For 2008 this range is estimated from carmaker data – no cars for 2008 have provided this data.
- **PHEV-50** is what we are looking for in 2008 offerings. If this PHEV car is running in [EV only mode](#) and driving an easier [EPA type drive cycle](#), it should deliver **~50 miles of range**, making it a PHEV-50. Usually the carmakers claim this number in their marketing materials.
- For a truly useful BEV EC in 2008, it should be able to deliver, while driving the [Average Commuting Driving Profile](#), **~80 miles of range**.
- If this BEV car is driving an easier [EPA type drive cycle](#), it should be able to deliver **~100 miles of range**. Usually the carmakers claim this number in their marketing materials.

We do not feel it is correct to develop “mpg numbers” for all ECs for easy comparison by consumers due to the fact that ICE mpg is different than “converted electric to mpg” for energy density of battery based systems – too many flaws – the company Hybrids Plus does a good job explaining why -> <http://hybrids-plus.com/ht/faq.html#toc5>

That is why we state above, that for comparisons of ECs, only BLENDED MODE mpg, both ICE and electric is used so real gas is really consumed, makes sense to compare.

For you eco-geeks out there – we acknowledge we are not using the complete calculations and conversions for the REAL TOTAL COST OF A KILOWATT OF POWER (known as “well to wheel”) to a gallon of fuel for a true comparison. By the same token when one claims mile per gallon for a traditional ICE car they do not consider the costs for the fuel from “well to wheel” either.

WE ALSO ACKNOWLEDGE THAT WE DO NOT INCLUDE THE COST OF KILOWATT-HOUR in fuel economy ratings because electrical power cost at specific time of day for charging is rarely the same throughout the U.S. We are trying to compare apples to apples not determine absolute cost

to consumer, society and the world at large. For more information on this calculation, use these links: “Well to Wheel” info - <http://tinyurl.com/5eum3q> and Tesla analysis <http://tinyurl.com/3qadjd> and MPGe - <http://tinyurl.com/678267>

This rating criterion also tries to incorporate an assessment of **overall car efficiency**. Coasting a car shifted into neutral removes a majority of the power train losses from the picture leaving two forces that make up the total drag slowing the car down; the **air drag force** and the **tires rolling resistance drag force**. The actual equations are beyond the scope of our reports and can easily be found through our links provided below.

For most cars, the **air drag** force and **rolling resistance** drag force are about equal at 40 miles per hour. That is why NEVs type cars can look like barn doors or Snoopy’s doghouse and still be reasonably efficient.

However, at 60 mph, in most average cars, air drag is 70% of the total force on the car and rises to 80% of total force or the resulting fuel consumption when the car speeds up to 80 mph. Here is why aerodynamic shapes are a big deal for highways ECs – the only electric cars we feel will make a big difference in breaking our oil addiction.

In the tires rolling resistance drag force equation, a car’s weight greatly affects the amount of this tires rolling resistance drag force on a car. At slower speeds lowering tire drag force does more to improve efficiency than at highway speeds due to the greater effect of air drag at higher speeds. For example at 40 mph, cutting rolling resistance in half decreases drag force by 300% or improves fuel economy by 33%. At 60 mph, cutting rolling resistance in half increases mpg by 18%, at 80 mph increases mpg by 11%. More info at <http://tinyurl.com/5lxc24>
Car weight also plays a roll in efficiency in another area unrelated to tires and aerodynamics – amount of power required to bring a car up to a certain speed increases with increasing car weight.

As mentioned above the air drag force represents greater importance at highway speeds, and with ECs, which have lower power train losses than most traditional cars, aerodynamic efficiency or the minimization of drag is a more important design factor than for traditional ICE cars. Drag force or the force that pushes against the car due to wind grows much greater as speed goes up (as the square of speed) – so at highway speeds of 55-80 mph, this force slowing down a car is quite significant.

Please skip the next couple of paragraphs if you are not interested in an “Aerodynamics-lite discussion”.

The two geometry/shape related factors of equal contribution that make up drag force are **Frontal area, Fa**, or the area the car takes up if you say flatten it into a wall and **the Coefficient of Drag or Cd**, which represents the efficiency to airflow of the car shape. While designers pay attention to the overall shape of the automobile that helps define the **Cd**, they also consider that reducing **the frontal area, or Fa**, of the shape, equally helps reduce the drag force. Simplified, the **Car Drag Force in lbs = Car geometry factors x Fluid factors. Car geometry factors are equal to Cd x Fa** Just for illustration, **Fluid related factors** are equal to .5 x Mass Density of Air x Speed x Speed (speed car is traveling squared)

To evaluate car aerodynamic efficiencies, engineers will use a combined number of Fa times Cd or CdFa known as **Drag Area**. Both the Cd and CdFa for some commonly known cars and one new one are listed in the table below.

Car	Cd – Coefficient of Drag	CdFa – Drag Area (in sq. ft.)
'08 Corvette ZO6	.34	7.6
'09 Nissan GT-R	.27	6.8
'99 Lotus Elise	.29	6.35
'04 Toyota Prius	.26	6.29
'99 Honda Insight	.25	5.1
'96 GM EV1	.195	3.95
'08 Aptera Type 1	.11	2.42 (estimated using 22 sq. ft as Fa)

Aptera has one of the lowest Drag Areas we have ever seen in 2 person or more cars. When multiplied by car speed squared, the drag force for the Aptera at highway speeds will be significantly less than the Lotus Elise.

More info: <http://tinyurl.com/5hc9mj> and <http://tinyurl.com/nx32c> and <http://tinyurl.com/3ytu7n>

If left up to our main report writer, an Aeronautical Engineer, every car in our review would receive a detailed aerodynamic evaluation, however, for the current state of sparse ECs available in 2008, this type of evaluation would really be futile.

Let's just say for 2008, we are lucky to get a couple of reasonable choices in most categories we have evaluated and, candidates with poor aerodynamic efficiency, will mean less range at highway speeds for those cars. Yes, Aptera Type 1 does represent a very efficient package for highway speed transportation – but we do have to evaluate the whole package of features verse its competitors in its own category.

F – Comfort

To enable a reasonable number of early adopters to actually be able to displace an ICE car in their family with one of our suggestions, these cars must have some basic level of creature comforts, i.e. 2 comfortable seats, sound, air vents, heat, a/c-option, 12v DC power outlet(s), easy to use controls, easy to adjust mirrors, glass and interior surface angles minimizing glare and opening windows.

G – Safety

The EC must be as safe as today's sport compact in all driving situations including aggressive ones and especially in an event of a crash from any direction - cars classified as motorcycles still need to be tested to meet all "reasonable" car crash tests and safety by the carmaker and fully disclosed – independent non-biased third party test result validation would be our preference, however, some latitude needs to be granted at this early stage for this industry.

H – Warranty and Service

EC must be warranted for a reasonable length of time and serviced by a company or companies who will be a reasonable distance away from the car owner and be around for the lifetime of the car.

I – Re-Generative Braking and Alternative Energy capturing and/or generation

Car must be capable of recovering (recharging the onboard batteries) from the action of braking – called in techie-geek jargon "Regenerative Braking" or regen. When one brakes an [ICE](#) traditional car, large amounts of heat are created at each brake to slow the car down – using this energy in an EC for charging the batteries just makes sense and is a requirement. Refer to Glossary section above; at this point in EC development we are not requiring ECs to have regen systems tied into the braking system for variable high regen charging rates although this is preferred for higher energy recovery.

Solar cells covering a vehicle's roof and/or body surface are a nice idea and should only be considered as a feature to augment a re-gen braking system where "real quantities" of energy can be transformed in battery charging.

J – Charging and Operating Temperatures

Car must be able to be charged and operate at least for a short amount of time in temperatures ranging from 32 degrees to 120 degree Fahrenheit, (we are specifically excluding the requirement of being an all-weather/clime vehicle because this requirement may at this time disqualify many vehicles available in 2008)

Point Rating System and ECs defined

Only cars, which satisfy these above requirements, are called ECs and will be evaluated.

We may list cars in our 5 categories below, but not rate them, either because they are not available during the year of this report and/or they are quite close to being acceptable choices if the carmaker makes some improvements in future production releases.

For each criterion, we will assign a numerical value where 0 is lowest, meaning in this category this car was not acceptable, and 5 means vehicle delivered 50% of what is required for this criterion and finally a 10 means the car delivered 100% of what is desired for this criterion **for the specific time period this report covers - subsequent update versions of this report may include revised ratings for the identical vehicles due to new offerings/features in a specific category.**

These requirements we have specified, imply a lot of detailed technical requirements for the cars we want to consider and evaluate. Through the course of our specific model evaluations we may delve into these details – attempting to make them as easy to understand as possible, however if we do not explain these details to satisfy some of you, you will find this information available through links provided in our [Section 12](#). [Additional Resources](#) of these reports and/or via Web Search engines of your choice.

5 - The Categories of Cars that may satisfy our Requirements

The categories are listed in the order of risk to the consumer – in other words – IOHO, the vehicles we list in the top categories are the most desirable and lowest risk to the customer, and the lower categories contain the cars that have the most risk to the consumer.

The year listed for the car model is related to the specific model available to U.S. consumers not necessarily when the car model was first available elsewhere.

A – PHEVs - Hybrid Electric Cars from Major Car Manufacturers which either have plug-in capability or need to be retrofitted for plug-in capability

Hybrid electric cars, with various hybrid electric gas engine configurations from major carmakers, have been on the market since 2000 and represent the lowest risk to the consumer when compared to all electric cars available as of the last two years. They come with good safety features and fairly reliable mechanics. Their benefits, when all cars are fairly and equally considered, are limited. From the fuel economy standpoint, there are benefits from hybrids, however from the pollution or emissions standpoint, some hybrids may pollute just as much as or more than the “Partial Zero Emissions Vehicle” (PZEV) cars. For example, the PZEV rated 2009 Ford Focus, got an EPA Green Vehicle Guide rating of 9.5 out of 10 for low pollution and 8 for greenhouse gas emissions (higher numbers are better) with a fuel economy of 24/35 city/highway. For comparison, the Chevy Malibu Hybrid gets a fuel economy rating of 24/32 (worse highway) and a 6 out of 10 for air pollution (worse on pollution) and 8 out of 10 for greenhouse gases. Non-hybrid Toyota Corolla gets better fuel economy at 28/37, however scores 7 for air pollution and 9 for greenhouse gases. (More info at - <http://www.epa.gov/greenvehicles/Index.do>)

When plug-in capability is added to these hybrids, then the benefits of these cars far outweigh all gas counterparts in terms of efficiency and our all-important goal of breaking our oil addiction.

Due to the current state of batteries and their “fueling” or charging technologies, the available all-electric cars still can’t match the range and peace of mind for the driver of a plug-in hybrid electric car (PHEV). A PHEV EC is currently the best compromise due to its ability to be charged anywhere with an 110 VAC outlet, get petrol anywhere and, when the batteries get excessively discharged due to driving conditions, range, etc, the fuel based gas, diesel or bio-diesel engine kicks in the get you home.

However, there is only one PHEV car available in 2008 that has close to our preferred balance between electric and traditional fuel based engine power, even though this car is a series hybrid and has lower performance than we would like to see – the [Aptera Everywhere](#). We prefer what some call a “[electric heavy](#)” or “battery heavy” [Series-Parallel Full Hybrid](#) arrangement where there is great flexibility in delivering power, most of the heavy lifting is done by the electric power train that gives great performance, due inherent instant torque and overall efficiencies of both today’s AC or DC electric motor designs. The traditional fuel power plant does the battery charging and occasional power assist when the parallel hybrid capability is available. We do list below, for our lowest risk, [Category A](#) that is the best compromise cars available today that have the mandatory plug-in capability.

Lastly, as far as the traditional fuel based ICE part of the hybrid, for even better fuel economy and performance, we are all getting pretty excited about the introduction, perhaps in 2009 or 2010, of clean, smooth, quiet "torquey" and powerful diesels able to burn bio-diesel or burning **cellulosic ethanol based bio-diesel** which can be made from many types of waste vegetation and not impact our food supply. More information mentioned in the Glossary section above and <http://tinyurl.com/3tz7q9> and <http://tinyurl.com/5hp9fr>

RechargeIT.org Map of both OEM and converted plug-in PHEVs (and BEVs) where the cars - <http://tinyurl.com/63uv5f>
Go to this link for "Where the PHEVs are (mostly Priuses)" -> <http://tinyurl.com/4jfmvy>

B – BEVs - Battery only Electric Cars from Major Car Manufacturers

Major carmakers are aware of the niche appeal of a BEV, due to their limited range when these ECs are driven in real world situations. Our more realistic Average Driving Profile based range numbers, you will see below in the ratings, justifies their hesitancy to enter this market again (EV-1, Toyota RAV4, Honda Insight). When they feel they can sell 150-200 mile range BEVs (almost double [our requirements for 2008 BEV ECs](#)) driven in the real world for a reasonable price, then they will pull the trigger. However, we must recall how the major carmakers mis-calculated and missed the boat that the Toyota Prius has sailed away on, because many, not all, American consumers **will compromise** their car requirements to break their oil addiction, especially when gas prices are at an all time high and will only go up in the future.

RechargeIT.org Map of both OEM and converted plug-in BEVs and PHEVs where the cars are including RAV4 EVs - <http://tinyurl.com/63uv5f>

C – PHEVs - Hybrid Electric Cars from Small New unproven Car Manufacturers which have plug-in capability

The reason we have placed this Category above Category D is that even though these ECs represent a higher risk, being PHEVs allows them to deliver considerable advantages to the consumer in terms of usability in their daily lives.

D – BEVs – Battery only Cars from Major Car Manufacturers or Converted by Small New Unproven Smaller companies into Electric Cars

At least in this category the platform cars for conversion are cars from major carmakers with all of the immense engineering, safety and testing investments already made.

As a reference, there are over thousand private party home conversions, some, which if they were in production for sale to the general car buyer could meet our "EC" requirements listed at this website -> <http://www.evalbum.com>

RechargeIT.org Map of both OEM and converted plug-in BEVs and PHEVs where the cars are - <http://tinyurl.com/63uv5f>

E – BEVs – Battery only Electric Cars from Small New Unproven Manufacturers

Highest risk category of ECs to the consumer but category where some real innovative products are emerging.

End of Preview Pages