"hV2G" Integrated House-Vehicle-to-Grid solutions based on Building Science

WHAT IS THIS IDEA ABOUT?

House-Car's goals are to bring Electric Vehicles (EV's) into ordinary mainstream households, without busting the already overloaded Hydro Utility Grid or today's stretched family budgets, by integrating not just V2G but House-Vehicle-to-Grid solutions for maximum benefit.

INTEGRATED HOUSE-VEHICLE-to-GRID SOLUTIONS or *hV2G*

We propose to deliver Electric Vehicle DCS (design, components, services) that support Integrated House-Vehicle-to-Grid (hV2G) solutions based upon BUILDING SCIENCE. Our focus is on known solutions that RE-THINK and INTEGRATE the way we use energy for our homes and vehicles - not just "NegaWatts" - AND NOT just the mindless substitution of renewables for non-renewables.

Such an integrated approach can achieve a 2/3 reduction in the greenhouse gases produced by a family - often 10-20 tons per year. The lowest cost hV2G scenarios don't need PV arrays or urban wind turbines. The simpler Electric Cars are feasible if there is a parallel home energy strategy to make them economic.

Project deliverables include:
(1) Internet tools to show how to SAVE enough KiloWattHours to drive 50 miles daily.
(2) Demos of Sun-Wind EV charging stations - at (say) BioSphere Canada, and 5 Canadian sites.
(3) Creation & publishing of Child / Adult Book(s) "We are building a House-Car".

BACKGROUND - Improving the car is the biggest thing an individual can do to be green right now. We have to deal with mitigation of emissions to avert global climate catastrophe. Scientists are calling for an immediate 70-80% reduction in carbon emissions. The energy needed for our homes and cars can be significantly reduced, if we can put to work an approach called "House-Car" which integrates the heat & power used by the family, to SCAVENGE enough electricity to power a small 2 seat EV 50 miles daily.

INTRODUCTION - We need to (A) replace the gasoline commuter car with an EV (electric vehicle), and (B) implement major home energy retrofits to free-up enough electricity to power the new car, WITHOUT needing to increase utility grid loads, or having to cover the roof with solar photovoltaic panels, or tow a solar panel trailer along. It will help to choose a "Kilowatt-Thrifty" car depending on family needs (distances-loads-speeds) because a large electric SUV (highway capable) can use 3x more power than a small two-seater EV (neighborhood only). For longer trips pHEV's (plug-in hybrids) might be appropriate, with extra batteries for "city-electric-only" mode - but these are currently over twice as expensive as smaller EV's. The Swiss "SolarTaxi" provides much hands-on information – this small two-seater EV has just been driven around the world, without using a drop of gasoline – www.solartaxi.com.

APPROACH - The simplest House-Car scenario converts or replaces the commuter car for $7-12,000, and improves the family home for $5-10,000 more - an overall total outlay of $12-22,000. Renewable energy measures should not be necessary in the basic version of "House-Car" - therefore no solar panels, wind turbines, generators or PV panel trailers – at least not at first. With approximately 33% electricity savings (say 8 kilowatt-hours/day) by the family there need be no extra burdens on the utility grid, and NO MORE GASOLINE for commuting - so these improvements are actually expected to be cost-neutral. It is also worth noting that longer trips constitute only some 10% of passenger road vehicle use in North American cities today.

BENEFITS go beyond AFFORDABILITY - At today's prices the fuel savings can be used to finance the new car (or conversion of an existing car). Similarly, the savings in house space heating and cooling should offset the renovation costs. Ordinary mainstream folk can then afford to "Plug the Car into the House, and the House into the Car", so this approach is not just for big spenders. For an urban family spending (say) $2,000/year on heat and power for the house, they may spend another (say) $2,500/year on fuel for the commuter car. Other benefits of "House-Car" include lowering GHG's by about 60% (the greenhouse gases produced by a family can often total 10-20 tons per year - the car is the major culprit here). We are also doing something for our health through less pollution of our air, water, soil, and food systems.

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BACKUP POWER - Our cars could also provide reliable Backup Power to the home in storms, brown-outs and grid outages, and other emergencies. We could even begin to afford clean-air or cleaner-fuel technologies to heat and power our lives, for example much less reliance on nuclear and coal power.

COST TO UPGRADE THE HOUSE – spend $5-10,000 to save 8 kWh daily - enough to drive a 2 seat EV 50 miles. "House-Car" sets out to integrate the energy needs of the family house and car, without increasing the burden on the utility hydro grid. The home renovation scenario has already been feasible for several years - such as the home upgrades demonstrated for 5 homes in Saskatchewan by CMHC in 2002 - http://www.cmhc.ca/publications/en/rh-pr/tech/03-115-e.htm - "Case Studies of Major Home Energy Retrofits" - which achieved electricity use reductions of 20-40%. A renovation budget of $5-10,000 could provide heat and power savings - such that about 1/3 of the electricity normally used can be saved. The use of the correct space heating equipment and major electrical appliances, at a nominal incremental cost, can provide substantial energy savings at attractive simple payback periods.

ELECTRICITY SAVING - For a family that uses 24 kilowatt-hours of daily electrical power (costing approximately $2-4/day) that would mean that some 8 kilowatt-hours could be made available to charge the batteries in an electric car (EV), or the extra batteries in a plug-in hybrid car (pHEV). This conservation approach is often referred to as "NegaWatts", and is usually the least costly way to provide electricity. Otherwise we would require additional generating capacity, or have to turn to renewable energy technologies, such as roof mounted solar photovoltaic panels. About 12 square metres of solar photovoltaic panels (an array of 2 kilowatts peak output, costing some $20,000 today) would be required in order to harvest 8 kilowatt hours on a day with sufficient sunshine (as of early 2006, the average cost per installed watt for a residential sized system was about USD 6.50 to 7.50, including panels, inverters, mounts, and electrical items, but not including batteries. Today's PV system costs are nearer $10/watt installed).

REDUCED GREENHOUSE GAS EMISSIONS, and other impacts on Sustainability

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ERIA EcoSystems
Environmental Resourcefulness In Action

"Approaches & Technologies that Partner with Earth"

ERIA ECOSYSTEMS Inc is a renewable energy innovation, project-management and consulting company located close to Montreal. Our Associates include architects, engineers & other professionals from across Canada. In 1998 ERIA's founder Chris Ives pioneered the concept of "House-Car" (hV2G) - integrating the energy needs of both the family home and their vehicles. Building upon 40 years of design, RD&D, and project management in Housing, Energy, and Transportation, ERIA was founded in 2007 to offer integrated design and implementation expertise to make our communities more sustainable.

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