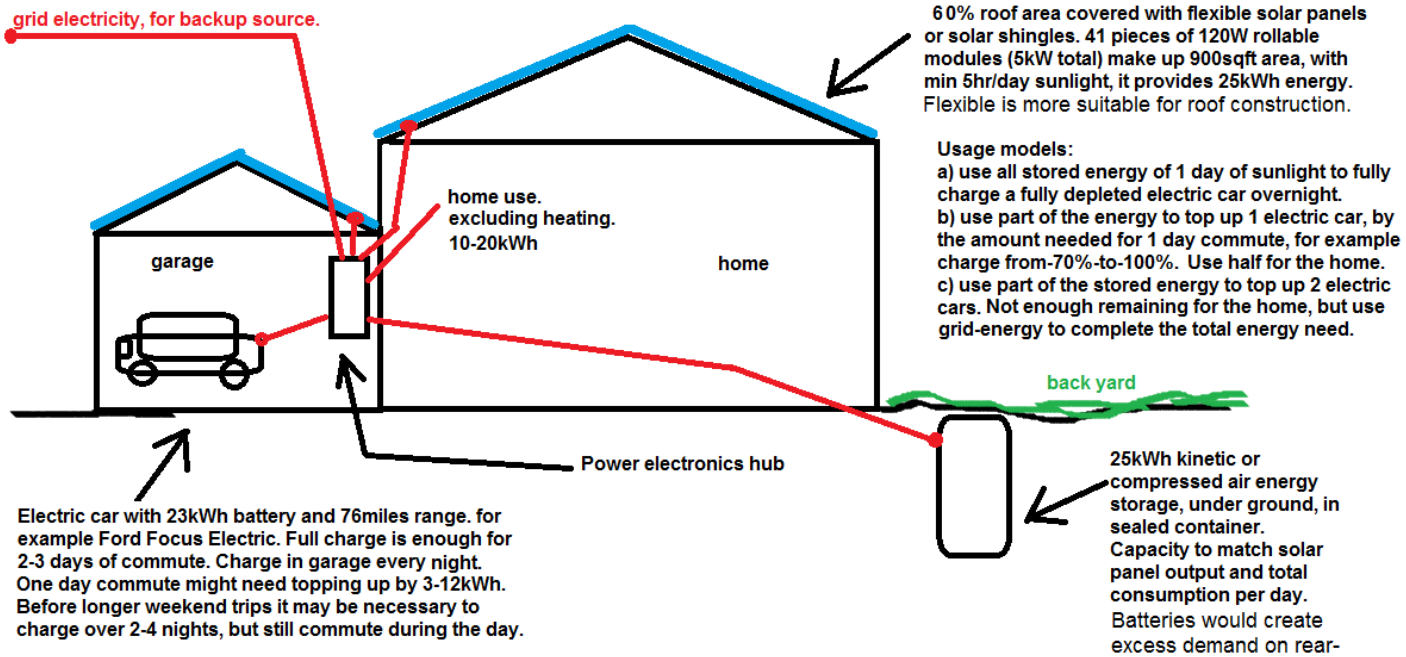
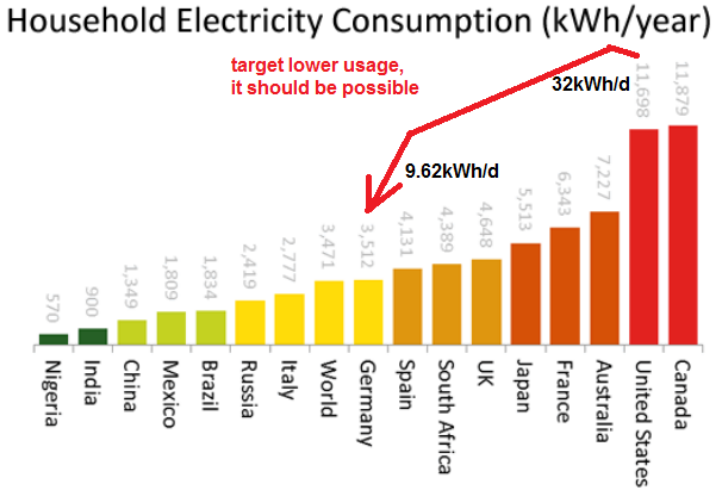
Different approach to reducing carbon emissions

Istvan Nagy December 2013, Buenos@opencores.org

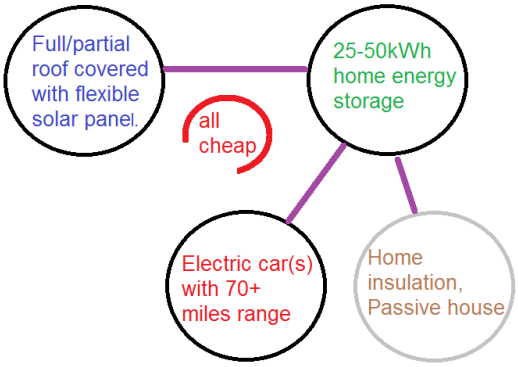
Many people consider electric cars and solar panels, but if we just look at one product on its own it is hard to see the real benefits of it, financially or environmentally. To solve this issue companies should provide complete solution including consultancy, and people would have to change their energy use habits including planning a few days ahead. This way people could tailor their home and transportation to meet both financial and environmental goals. The three main parts of a complete zero emission system are the home solar roof, the large home energy storage device and the electric car. The attached drawing is an example of an average small house in California, using current technology to achieve fossil fuel independence, by simply calculating and designing the relevant parameters together. Personal home and transportation design. The example uses solar energy for home and transportation, but still relies on gas or other sources for heating in the winter. Heating could also be included in the solar-electrical system by using the most modern home building and insulating techniques (Passive House standard). This would reduce the daily heating to 10kWh/day (an old house might be 100kWh/day), and require home storage devices (non-battery) to achieve 40kWh at $5k cost.



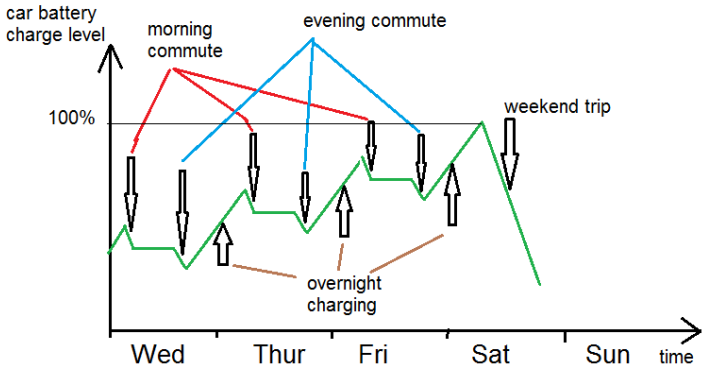
With today's technology, even 25kWh storage for a home is a challenge and big and expensive. After few years, 2-4 days of energy storage could become possible.



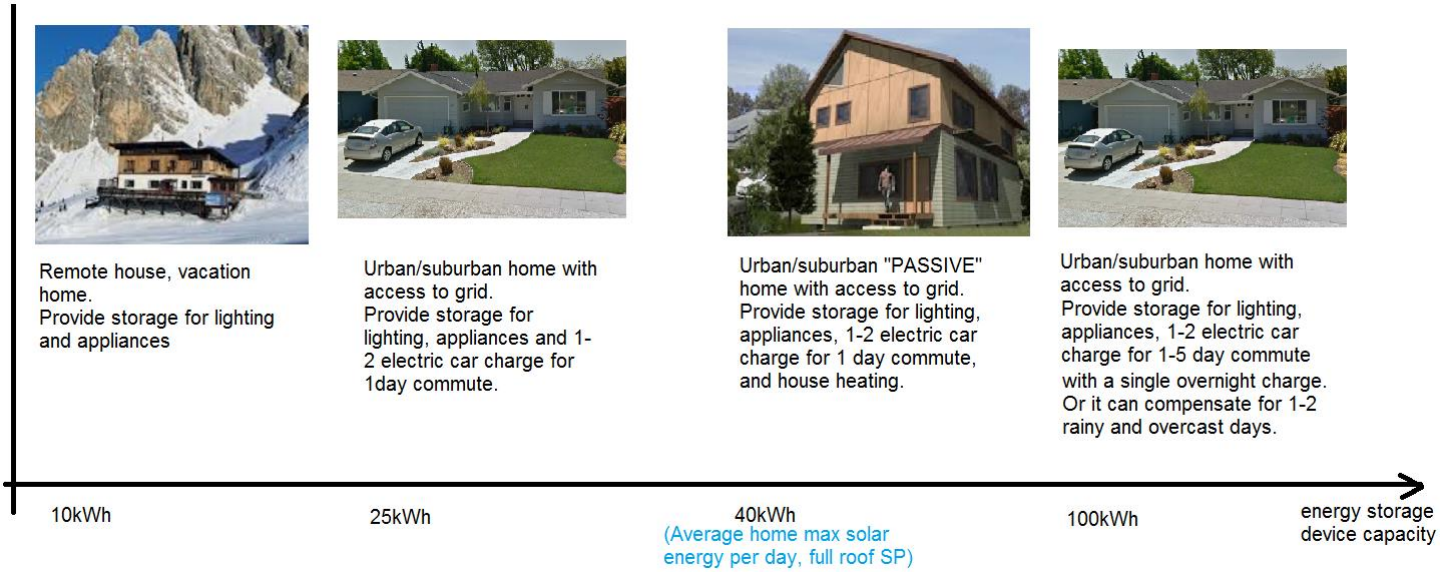
In the example 60% roof coverage on an average 1500sqft house provides the 25kWh energy need without heating, or 100% roof coverage provides 40kWh, including heating for a “passive house” with superior insulation. If heating is gas based, then it has 100% efficiency comparing to the efficiency of an electric-grid based electric heating that has losses in the heat-to-electricity power plant and in the electric grid. This can be a compromise, to accept fossil fuel for house heating in the winter, while not using fossil fuel for any other energy needs of a family (transportation and home electric). Passive houses are a novelty and for most people it is not an option in short term, therefore most people have to live with the compromise of sun+gas as energy source. If the whole energy consumption can be reduced to 40kWh/day then the family can run on 100% solar energy only. Even for an old house it is possible in the warmer half of the year. For a traditional house to achieve 100% solar even in the winter the house would have to be converted or retro-fitted to a (near) passive house. To do that it would require insulating walls and pipes, modifying the ventilation system with heat recovery and replacing windows and doors.



System requirements.



Partial charging or top-up of an electric car over multiple days.



How big energy storage device is needed for different applications.