Washington State Energy

In the Pacific Northwest, we have an energy policy that acknowledges multiple values. We ensure our energy system meets the needs of citizens, especially vulnerable populations, while reducing dependence on fossil fuels. Washington State's policy is to improve the efficiency of transportation energy use. Washington also builds on its clean electrical grid to meet greenhouse gas (GHG) limits and environmental requirements. Attention is focused on transportation efficiency and technology.
http://www.futureenergyconference.com/2010/FECWA-Presentations/1A_Hammerschlag.pdf

Under Washington State Senate Bill 6001 (WA SB 6001), reduction in the state's GHG is targeted to fall to 25% below 1990 levels by 2035.

Energy Solutions for Washington State

How this is to be accomplished is problematic. We know the Federal Government has been unable to directly intervene to solve climate change for two reasons: (1) the US is not the only source for atmospheric carbon concentration, and (2) the costs appear to exceed current available, and politically conceivable, budget authorizations.
http://climatesolutions.org/events/americas-energy-challenge-steven-koonin-dr.-steve-koonin-department-of-energy

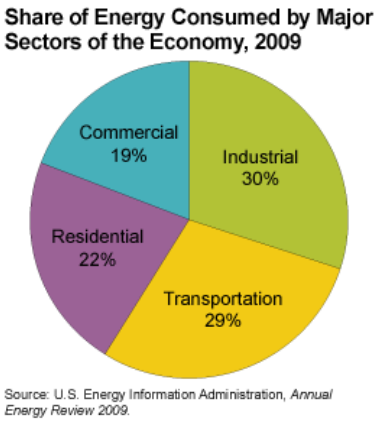
Where then can we turn? The current daily US demand is for the use of 19.5 million gallons of carbon-based fuels. Relief appears achievable through intervention by industry (given sufficient regulation or profit incentives), or local Government and utilities. Many political and business consensus activities take substantial time and resources. Private property owners who favor making more immediate energy decisions can initiate their own energy mitigation in the use of carbon-based fuels.

A Look at Residential Energy

When considering all US energy demands, we find that residential consumption is 22%. However, households also consume energy for transportation.

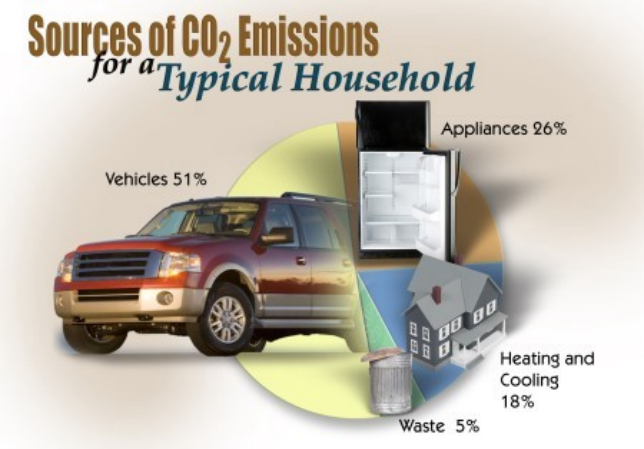
Energy consumed in the transportation sector consists of 28% for cars and 30% for light trucks, or 29% as shown in the figure to the right. Since the commercial and industrial sectors also consume energy from the transportation sector, the household use portion is estimated to be approximately 9%.

As a consequence, the national household share of total US energy consumed, including home and car, is about 31% (22% + 9%).
http://www.eia.doe.gov/energyexplained/index.cfm?page=us_energy_use



Doing Home Energy Better – The Renewable Gas Tank

The US Department of Energy (DOE) has compiled emission sources per household.



Surprisingly 50% of household carbon emissions are due to transportation. It should be noted that each pound of gasoline converts to 3 pounds of CO_2 during combustion. With an average of about 2 cars per family in 2009, it's easy to accept that (on average) half of our household energy is used for personal transportation.

In multiple car households from 1990 through 2009, the average travel per driver per year was about 12,000 miles. In 2009 alone, the average miles traveled per family were 22,000. (See T 8.7, http://cta.ornl.gov/data/chapter8.shtml)

DOE link: http://www.fueleconomy.gov/feg/climate.shtml

The Household Energy Question

When searching for effective ways to reduce overall household energy consumption, we recognize that our homes are remodeled or rebuilt somewhat infrequently. Our vehicles are replaced with far greater frequency. These facts are pivotal to understanding why the kind of energy we use for transportation is so important. An individual's choice of vehicle can help reduce the total energy consumption used for transportation.

Manufacturers are offering more vehicles to the petro-fuel vehicle owners that achieve higher miles per gallon (mpg) ratios. In addition, one can leave the gas pump forever and simultaneously save energy consumption per mile and reduce carbon in the environment by changing to renewable fuel energy.

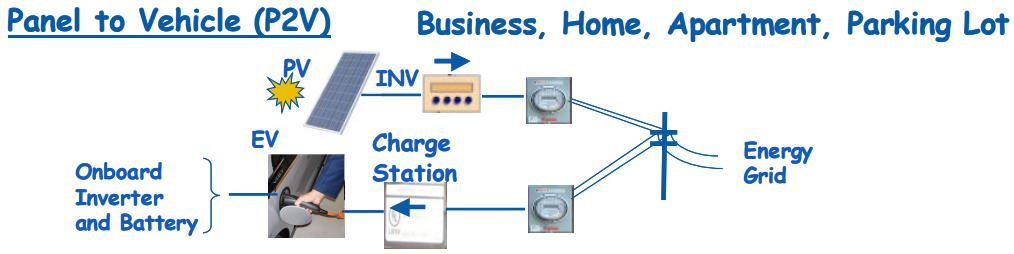
Home Generation – A Climate Solution

We've known for 100 years that electric motors are 3 times more efficient in creating motion than are internal combustion motors. For the electric vehicle, this efficiency reduces energy demand by a factor of 3, while limiting carbon release to that of the utility supply source. We can calculate the energy in a gallon of gasoline to be 36.6 kWh. When replacing a 30mpg motor, we achieve 30 miles of travel with 1/3 of this energy (12.2 kWh).

To assure this is clean energy, this amount of 12.2 kWh is within the practical range of home rooftop solar power, or Photovoltaic (PV), daily generation. In this arrangement, an electric vehicle (EV) traction battery becomes a solar renewable gas tank. This configuration offers an option to dramatically cut carbon and other emissions, while using zero net energy from the electricity grid. According to DOE figures, replacing one gasoline or diesel vehicle with an EV charged from home-generated renewable energy (such as PV) is an energy-leveraged climate solution that reduces carbon energy and carbon release by 25% per household. Coincidentally, this is the target posed by WA SB 6001. In addition, replacement of the second fossil burning vehicle achieves a "50% climate solution," exceeding the goal set by Clean Energy 2030 for 38% reduction in transportation oil consumption.
http://www.treehugger.com/files/2008/10/google-clean-energy-2030-renewable-energy-climate-change-plan.php

Doing Home Energy Better – The Renewable Gas Tank

This solution is not just a forecast for the future. It is not dependent on transportation advances or energy technology breakthroughs. It is not dependent on political and business consensus. This can be done now.



Cost considerations

The cost of an EV is offset by an available $7,500 federal tax credit as well as a WA sales tax exemption. The cost of the PV installation is reduced by a 30% WA tax credit against PV costs, offset by fossil fuel savings, plus utility credit for energy generated and connected to the electricity grid, plus 75% WA sales tax exemption in 2011. After a payback period of less than 10 years, rooftop PV energy becomes a source for positive income for the household, since it is currently not treated as taxable income. Many panels installed today are guaranteed for 20 years, and can last for 30 years.

This is not only a climate solution but also an affordable one that can evolve into a sustainable household solution. If adopted on a large scale, this solution will relieve carbon concentration in the atmosphere, and reduce carbon-caused acidification of the world's oceans.

Utility Grid Capacity

Compared to the total number of cars (250 M) for all US households, the number of EVs in 2011 is insignificant (less than 0.1%). However, a pertinent question is: "What is the capacity of the national electricity grid to support EV charging?"

A study was conducted in 2007 to assess these grid impacts. The results were compiled and reported for 12 geographic regions. Their existing regional infrastructures were found to be adequate if plug-in EVs replaced 84% of the existing "Light Duty Vehicle" (LDV) fleet – cars, pickup trucks and sport utility vehicles.
http://www.ferc.gov/about/com-mem/wellinghoff/5-24-07-technical-analy-wellinghoff.pdf

Towards a National Transportation Energy Policy

"Electrification of our transport sector is, of course, is not just a step forward to decarbonize our American society, it means much more in terms of national security and preservation of national wealth." This is the outlook of the Electrification Coalition, which lobbies for legislation favoring the establishment and expansion of a "Grid Enabled Vehicle" (GEV) fleet.
http://www.electrificationcoalition.org/

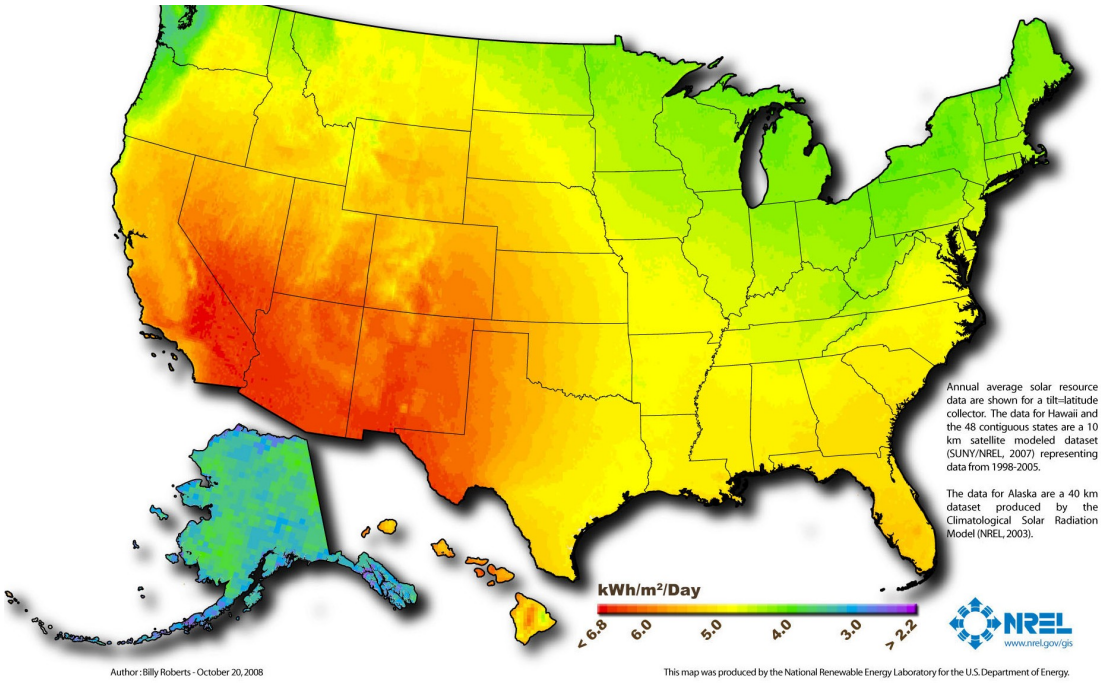
Environmental Sustainability is addressed in addition to an in-depth look at national economic parameters in the Coalitions "Fleet Electrification Roadmap". Emissions from the combustion of petroleum in 2009 accounted for 43 percent of the total US energy-related CO_2 emissions, representing a significantly larger share than emissions from coal use.
http://www.electrificationcoalition.org/reports/EC-Fleet-Roadmap-print.zip

Doing Home Energy Better – The Renewable Gas Tank

Energy Leadership in Washington

There is growing recognition that this household option is inherently viable in the Northwest region. A climate solution consisting of electrified transportation supplied from renewable solar energy is easily recognized as viable across the rest of the Country since:

- solar resources are more abundant at lower latitudes;
- electricity costs are higher; and
- electric utilities are more dependent on coal generation.



Policy Recommendation

Tax treatments that allow homeowners to depreciate PV energy and EV purchase costs will offer the same advantage now permitted for business improvements, accelerate homeowner investment, expand job creation, add air quality protection, as well as provide CO_2 stress relief for climate and seas.

At Scale

In King County Washington, the total number of owner-occupied homes in 2009 was 425,000. After reducing this number by 50% for those not having favorable roof profiles (212,000), and by a further 50% for the remaining homes needing roof replacement (excludes PV panels), approximately 100,000 PV candidates remain. For net zero energy with EV charging of 1 car, a 3 kW panel installation is typical in King County to charge a 24 kWh battery overnight.

The resulting total renewable capacity for household EVs in lieu of gasoline, assuming all candidates choose PV installation for EV charging, is 300 MW. This power capacity produces 300 M kWh of energy per year, meaning 25M EV trips of 30 miles. This would prevent the combustion of 25M gallons of gasoline per year, eliminating the creation of 500M lb of CO2.