

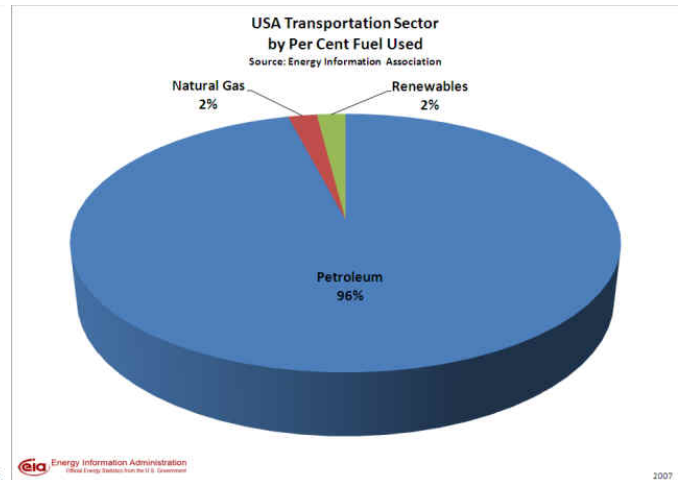
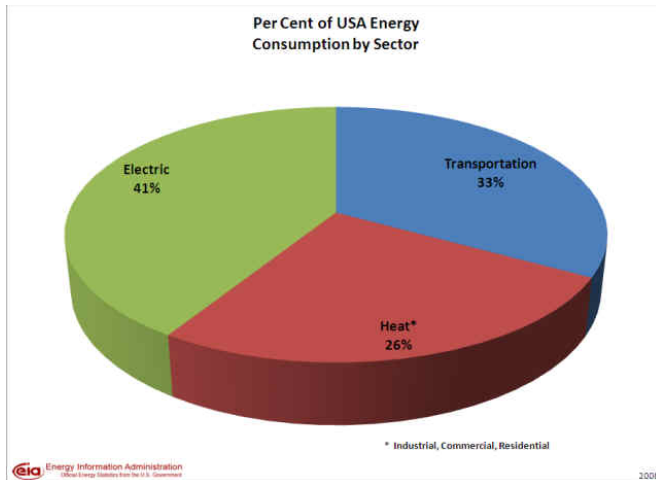


Energy Transitions

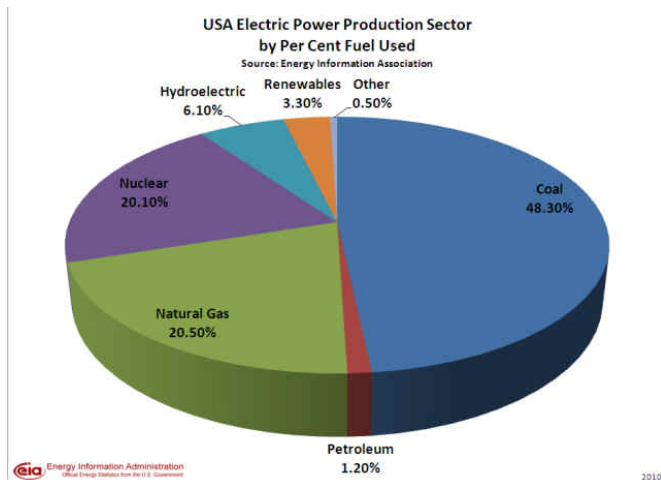
Congressional Sustainable Energy EXPO + Forum, Washington, D.C. -- May 27, 2010

Abstract: Why Hydrogen?

Speaker: Bill Shank, Founder, Energy Transitions



In the United States 33% of our energy consumption is for transportation. Of that 33% segment, 96% of the energy is derived from petroleum products and **63% of the oil used is imported.** MSNBC 3/31/10 Compare that to the 41% of the USA's electric energy consumption.



That 41% is derived today primarily from coal, nuclear, hydroelectric and natural gas – resources that we basically control within the borders of the United States. Only 1.2% of our electric energy comes from petroleum. It should be clear that for a variety of reasons related to the economy, our security, jobs creation and the environment **we should focus on a transition for transportation energy consumption from petroleum to electric power.** As noted on the chart to the left, only 3.3% of our electric power comes from “renewables.” We can transition to using more electric power

initially by using our own fuel resources, such as natural gas to produce electricity. For example, various reports state that the energy available from natural gas deposits in the United States can provide ample supplies for the next 100 years. In addition, hydrogen, the most abundant element in the universe, can be derived not only from renewable sources, but from natural gas. **Hydrogen is an energy carrier.** In conjunction with a fuel cell, it is used to generate electricity. This is technology that exists today. Google it! It is being used not only for various primary and backup power applications but for motive power (transportation) in fork lifts, buses and automobiles. There is a plan in place to deploy 600,000 fuel cell cars on the highways with over 1000 refueling stations to service them by 2020. But those highways are called Autobahns! Could they not also be called Interstates? How many jobs would that produce?



Energy Transitions

There are many options for producing hydrogen. Hydrogen is a national industry, with production plants within 60 miles of every major U.S. city that are producing 20+ billion kilograms of hydrogen - the energy equivalent of 491 million barrels of oil/year. Hydrogen is “produced” by unlocking the chemical bonds in the molecules that form substances such as methanol, natural gas and propane – as well as water. One way to produce hydrogen is to break water apart through electrolysis. Another approach is to liberate the hydrogen by "reforming" fuels such as natural gas or methanol. Even when using natural gas, well-to-wheel CO2 emissions are about half of that from a gasoline vehicle. By making hydrogen from many different sources, every region of the world can produce its own fuel, which is good for the environment and the local economy. What would that do for the international peace initiative? Think about what it would be like if every region could produce their energy – and no one region was dependent upon another for energy. Would that not reduce international tensions?

Electric vehicles can carry around a lot of weight if they are dependent strictly upon batteries, even with some of the newer battery technologies that are appearing on the market. Studies from major manufacturers have shown that an electric vehicle powered by a hydrogen fuel cell will be more efficient overall than an electric vehicle that also has to carry around the weight of its batteries as well as its passengers. Electric vehicles using batteries are a transition step – but the ultimate goal should be hydrogen powered electric vehicles.

In summary:

- Hydrogen is a well known gas
- Hydrogen is a great *Energy Carrier*
- Hydrogen does not produce harmful emissions
- Hydrogen can be produced virtually anywhere with a reformer
- Hydrogen and reformer technologies are available now
- Hydrogen can be produced without harmful emissions
- Hydrogen can be converted any time into electricity by a “**Fuel Cell**”

It is the position of Energy Transitions that we all must become smarter with regard to energy generation and consumption, and a shift to electrical energy, especially with respect to transportation, is a major, important step to achieving that goal.

Let’s not be a slave to petroleum fuels. As President Lincoln once said about another form of slavery:

“The dogmas of the quiet past are inadequate for the stormy present and future. As our circumstances are new, we must think anew and act anew.”

And so must we. We need to look at this old issue in a new way, not simply for today but to make our tomorrows more rewarding, more fulfilling, and more compelling because of the change we make today. With your help, we can think anew and act anew on the issue before us today.”