

## **ENERGY – Prosperity, Security and the Environment**

By Jim MacInnes  
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**ENERGY** underlies three converging challenges facing America today: prosperity, security and the environment. This is according to a 2011 IEEE-USA national energy policy committee report. *(Much of the information contained here is reproduced with permission from the IEEE-USA national energy policy committee.)*

*“Electricity is a key enabler in addressing these challenges. We will need an integrated approach to: 1) increasing energy efficiency; 2) transforming transportation; 3) greening the electric power supply and, 4) building a stronger and smarter power grid. Established and new energy technologies must be applied at an unprecedented scale, and on an accelerated schedule. Bold actions and significant energy infrastructure investments are needed.”*

The Institute of Electrical and Electronics Engineers (IEEE) is the world’s largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. They have been involved in the electricity industry for over 125 years.

Here, we will talk about their first two recommendations: increasing energy efficiency and, transforming transportation.

According to this IEEE-USA report, we must first work toward improving energy efficiency by:

- Promoting education and user awareness of energy efficiency opportunities
- Promoting capital investment in energy efficient technologies and processes
- Developing, commercializing and using efficient electric technologies for transportation systems
- Promoting the use of secure, high-speed communications networks and information technologies to substantially improve access to information, controls and efficiencies.
- Developing system designs and technologies to further reduce energy losses in power generation, transmission and distribution.

Today, more than 96 percent of the energy used for transportation comes from oil. While oil will continue to be a major fuel for decades, our ability to substantially reduce its use is essential to address challenges to national security and economic prosperity. A radical transformation of the transportation sector is needed; not only to reduce our dependency on oil, but also to reduce transportation related emissions.

To this end, the IEEE-USA policy committee proposes a two-pronged effort: first, to electrify transportation, focusing on plug-in electric and hybrid technologies (such as the Chevy Volt) and second, to pursue replacing conventional fuels with alternative fuels, particularly bio-fuels. However, as we look toward incorporating alternative fuels, we need to focus on those that have a high Energy Return on Investment (EROI), unlike corn-based ethanol.

Electric motors are inherently more efficient than internal combustion engines and they do not consume energy when vehicles are stationary. They can also recover normally wasted energy from braking. The introduction and widespread use of EV's could reduce per-vehicle petroleum consumption by 50 percent, or more.

Electrifying the transport sector will also reduce greenhouse gas and other emissions even with the current US power generation fuel mix, which consists of 44% coal, 22% natural gas, 20% nuclear, 7% renewables, 6% hydropower and 1% other.

Natural gas powered transport also offers the possibility of further reducing oil consumption particularly for fleet vehicles.

The IEEE-USA policy recommendations are clear.....we must begin weaning ourselves off of oil as a transport fuel. In our next report we'll look at how high oil prices will increasingly wreak havoc on our economic prosperity, especially if we don't start consuming less of the stuff.

*Jim MacInnes has worked as a power engineer for the company that designed and construction managed the Ludington Pumped Storage facility. He is a licensed professional engineer in Michigan, a member of the IEEE Power and Energy Society and the International Society for Ecological Economics. He served on the Great Lakes Offshore Wind Council and was named as a Michigan Green Leader by the Detroit Free Press. He holds BSEE and MBA degrees from the University of California.*