



Energy Insights -- February 2012

Monthly Briefing on Energy Issues and Trends

New Book Cites Significant Innovation Requirements for a Low-Cost, Low-Carbon Energy Future

Early in his presidency, President Obama joined with other world leaders in pledging to cut carbon dioxide emissions by 80 percent over the next 40 years. While no binding agreement materialized, a new book *Unlocking Energy Innovation: How America Can Build a Low-Cost, Low-Carbon Energy System* explains what it would take for the U.S. to achieve this "80 in 40" goal.

Authors Richard K. Lester and David M. Hart, Professors at MIT and George Mason University, respectively, outline a plan to meet this goal which would require replacing or radically upgrading much of today's energy infrastructure to improve energy efficiency and replace fossil fuels.

This would involve an unprecedented level of innovation -- in technology, business modeling, and government and institutional policymaking -- to transform the U.S. energy system. According to the authors, this innovation could successfully unfold in three waves:

1) Increase energy efficiency now. Buildings currently account for about 40% of total U.S. energy use and 70% of all electricity use. Although technological advances are likely in the longer-term, energy efficiency options for heating, cooling, lighting, insulation and appliances are available now. According to the National Research Council, the U.S. could reduce energy use in buildings by 20 to 30% over the next two decades just by installing today's energy efficient technologies -- which would significantly reduce carbon emissions.

Energy efficiency is the most cost-effective climate change mitigation opportunity. It has been estimated that a cumulative investment of \$440 billion over the next twenty years could produce annual savings of \$170 billion in reduced energy costs.

2) Deploy large-scale, low-carbon technologies over the next two decades. The second wave of innovation would involve the "decarbonization" of fuels, as about 85% of today's energy consumed comes from fossil fuels.

Increased use of natural gas will play a key role in reducing carbon emissions, but not at the magnitude required to meet the 80% reduction goal. Replacing the entire fleet of U.S. coal plants with efficient natural gas-fired plants, for example, would reduce U.S. carbon dioxide emissions by only 22%.

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Instead, decarbonization will require rapid rates of adoption of most, if not all, low-carbon supply options such as solar, wind, nuclear, geothermal and advanced biofuels as well as carbon capture and storage. This will increase electricity's role in the economy as most low-carbon technologies are better suited to electricity generation than to the direct production of heat or other forms of energy. As a result, electricity demand would nearly triple between now and 2050.

In one decarbonization scenario, the authors calculate that 120,000 megawatts of new, low-carbon electric generating capacity would be required annually -- double the capacity installed in 2001, the peak year for U.S. capacity additions. Wind and solar would comprise 60% of U.S. installed electricity generation capacity by 2050.

3) Create breakthrough technology advances through research investment. The third wave of innovation would result from research advances in carbon neutral biofuels, advanced solar, fusion, and the creation of "sensible cities", all of which would require steady research investment.

The authors assert that the U.S. does not yet have the framework in place to drive the above innovation waves which will require significant public and private sector commitment and coordination. Now is the time to start to achieve a sustainable and secure energy future "because the pace of change in such a large, vital and complex system is inevitably slow."

The book is available at [MIT Press](#).

U.S. Energy Market Projections Show Increased Supplies, Lower Emissions

The *Annual Energy Outlook 2012* released by the U.S. Energy Information Administration (EIA) contains the following long-term projections:

Domestic crude oil production expected to grow by more than 20% over the coming decade. Domestic crude oil production increased from 5.1 million barrels per day in 2007, to 5.5 million barrels per day in 2010. Over the next 10 years, continued development of tight oil combined with the development of offshore Gulf of Mexico resources are projected to increase production to 6.7 million barrels per day by 2020, and will remain above 6.2 million barrels per day through 2035.

U.S. dependence on imported petroleum liquids projected to decline primarily from: growth in domestic oil production; an increase in biofuel use, and more modest growth in transportation sector demand. Net petroleum imports as a share of total U.S. liquid fuels consumed is projected to drop from 49% in 2010, to 38% in 2020, and 36% in 2035.

U.S. production of natural gas expected to exceed consumption early in the next decade. The U.S. is expected to become a net exporter of liquefied natural gas (LNG) in 2016, a net pipeline exporter in 2025, and an overall net exporter of natural gas in 2021. This outlook reflects increased use of LNG in markets outside of North America, strong domestic natural gas production,

reduced pipeline imports and increased pipeline exports, and relatively low natural gas prices in the U.S.

Increased use of renewable fuels and natural gas for electricity generation. The natural gas share of electric power generation is projected to increase from 24 to 27% by 2035, and the renewable share to increase from 10 to 16% over the same period. Over the next 25 years, the projected coal share of overall electricity generation is projected to fall to 39%, well below the 49% current share because of slow growth in electricity demand, continued competition from natural gas and renewable resources, and the need to comply with new environmental regulations.

Energy-related carbon dioxide emissions to remain below 2005 levels for decades. Emissions are projected to fall more than 7% below 2005 levels in 2020, and will stay below 2005 levels through 2035. Emissions per capita will fall by an average of 1% per year from 2005 to 2035, as growth in demand for transportation fuels is expected to be moderated by higher energy prices and Federal fuel economy standards. Electricity-related emissions are projected to be tempered by efficiency standards, state renewable portfolio standards, environmental regulations and competitive natural gas prices that dampen coal use.

The *Annual Energy Outlook 2012*, prepared by the statistical and analytical agency within the U.S. Department of Energy, is available at www.eia.doe.gov

NRC Advances Next-Generation Reactor Design

In December, the U.S. Nuclear Regulatory Agency (NRC) approved a new nuclear reactor design by Westinghouse Electric. Known as the "AP1000" reactor, the new design ensures safety through simplified, passive security functions. For example, if the AP1000 were to lose electric power for its cooling system, it would automatically cool down by use of natural forces of gravity and convection. A reservoir above the reactor would hold water for cooling. In an emergency leading to loss of power, valves would open, allowing water to fall onto the reactor.

Utilities in Georgia and South Carolina have been waiting for design approval to move forward with construction plans. Southern Company plans to construct two AP1000 reactors at its Vogtle plant in Georgia and the SCANA Corp. plans to build two reactors at its Sumner plant in South Carolina.

Although the U.S. will have only a handful of such reactors, more than 200 are being planned worldwide in China, Russia, India and elsewhere. It has been 34 years since the NRC has issued a new operating license for a U.S. nuclear reactor.

Global Investment in Clean Energy Set Record in 2011; U.S. Outpaced China

According to Bloomberg New Energy Finance, global investment in clean energy in 2011 reached a new record of \$260 billion, up 5% from 2010 and almost five times the amount invested in 2004. The U.S. topped China for the first time since 2008 with total clean energy investment surging to nearly \$56 billion, up 33%. A major portion of the U.S. increase was due to the now expired federal

loan program. Another contributor, the production tax credit for renewables, is set to expire at the end of 2012.

Overall, solar technology investments surged 36%, nearly doubling the \$75 billion spent on wind power. Other large investment categories included smart grid, power storage, efficiency and advanced transport technologies.

Massachusetts Among Top 10 States for LEED Green Buildings

The U.S. Green Building Council released its 2011 list of top 10 states for LEED-certified commercial and institutional green buildings per capita. The District of Columbia leads the nation with more than 31 square feet of LEED-certified space per person. Massachusetts came in seventh with 2.0 square feet of LEED-certified space per person. Other top states include: Colorado, Illinois, Virginia, Washington, Maryland, Texas, California, New York and Minnesota.

LEED is the internationally recognized mark of green building excellence and energy efficiency. Over 44,000 projects are currently participating in the commercial and institutional LEED rating systems, comprising more than 8 billion square feet of construction space in all 50 states and 120 countries.

New Hampshire PUC Nominations

Robert Scott and Michael Harrington were nominated to the New Hampshire Public Utilities Commission (PUC). Governor Lynch also nominated current PUC Commissioner Amy Ignatius to serve as the commission's chairperson.

Since 2003, Scott has served as the Director of the Air Resources Division at the state Department of Environmental Services, which is responsible for managing the state's programs related to the protection of New Hampshire's air quality. Harrington has been a senior regulatory advisor to the PUC since 2007. Prior to that, he filled an unexpired term as a PUC commissioner for one year. Harrington worked at the Seabrook Nuclear Power Station from 1983 until his appointment to the PUC in 2004. He also served as a state representative from 2000 to 2004.

President Obama Nominates FERC Commissioner

President Obama nominated Tony Clark to the Federal Energy Regulatory Commission (FERC). Tony served as the senior member of the North Dakota Public Service Commission since 2000. He is the immediate past President of the National Association of Regulatory Utility Commissioners. Mr. Clark has held a number of statewide positions in North Dakota and is a former state legislator. He earned a B.S. in Political Science and History Education from North Dakota State University and an M.P.A. from the University of North Dakota.

Do You Know?

Electricity powers nearly all new products that come to market? In fact, the share of electricity used by appliances and consumer electronics in U.S. homes has nearly doubled since 1980.


U.S. homes now have, on average, almost 25 electronic products -- 99% of which must be plugged in or recharged.

Source: U.S. Department of Energy, Energy Information Administration; Edison Electric Institute

About the New England Energy Alliance, Inc.

The New England Energy Alliance is a coalition of energy companies and trade associations advocating to ensure the availability, reliability and affordability of future energy supplies which are vital to the region's economic growth and prosperity. Formed in 2005, the Alliance works to balance public debate about solutions to New England's energy infrastructure by providing information on the region's energy needs and the resources, technologies and policies needed to meet those needs.

Please visit www.newenglandenergyalliance.org for more information on the Alliance.

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