

**TROUTMAN
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Bringing Renewables to Wall Street Tackling the Challenges to Investing in Renewable Technologies

**Kevin C. Fitzgerald
Managing Partner
Washington, D.C. Office**

September 18, 2008



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This Just in from Washington

- On Tuesday night, the House approved H.R. 6899 – Comprehensive American Energy Security and Consumer Protection Act
- The bill rolls back roughly \$18 billion in oil industry tax breaks to fund an array of renewable energy and conservation programs.
- H.R. 6899 includes:
 - **Federal Renewable Electricity Standard:** The bill requires electric utilities to provide an increasing annual percentage of their electricity using renewable energy resources from 2.75% in 2010 to 15% by the year 2020.
 - **Renewable Energy Tax Credit:** The bill extends the placed in service date of the production tax credit for one year (through the end of 2009) for generating electricity from wind; the credit is modified and extended through the end of 2011, for generating electricity from other qualifying sources, including geothermal; closed-loop biomass; hydropower; landfill gas; and trash combustion facilities and creates a tax credit for marine renewables.
 - **Solar Energy and Fuel Cell Investment Tax Credit:** The bill extends and modifies the tax credit for commercial solar energy and fuel cells through the end of 2016. It increases the credit limitation for fuel cell property from \$500 to \$1,500 per half kilowatt of capacity. Additionally, the bill expands eligibility so that public electric utilities will qualify for the tax credit. This provision is estimated to decrease revenues by \$621 million over ten years.



Senate Action on Energy

- It isn't clear how the House bill would fare in the Senate.
- Under a proposal by Senate Majority Leader Harry Reid (D-Nev.), the Senate would vote on a Democratic energy package, a Republican bill, and a bipartisan compromise crafted by a group of 20 senators.
- The House bill will likely be one of three measures the Senate may consider.



Renewables:

A Growing and Viable Industry

- Global investment in renewable energy surged 60 percent to \$148 billion in 2007.
- Investment in 2006 was \$70.9 billion, a 43 percent increase over 2005.
- The renewable energy sector is expected to grow to \$450 billion in 2012, and up to \$600 billion by 2020.

Sources: Reuters, United Nations Environment Programme and New Energy Finance Ltd.



Global Renewable Energy Development



Hydropower (2005)
① China
② U.S.
③ Canada
④ Brazil
⑤ Russia

Geothermal (2006)
① U.S.
② Philippines
③ Mexico
④ Indonesia / Italy

Wind (2006)
① Germany
② U.S.
③ Spain
④ India
⑤ Denmark

Solar PV (2006)*
① Germany
② Japan
③ U.S.
④ Spain
⑤ Italy / Netherlands

CSP (2006)
① U.S.
② Spain

Biomass (2006)
① U.S.
② Brazil
③ Philippines
④ Germany / Sweden / Finland

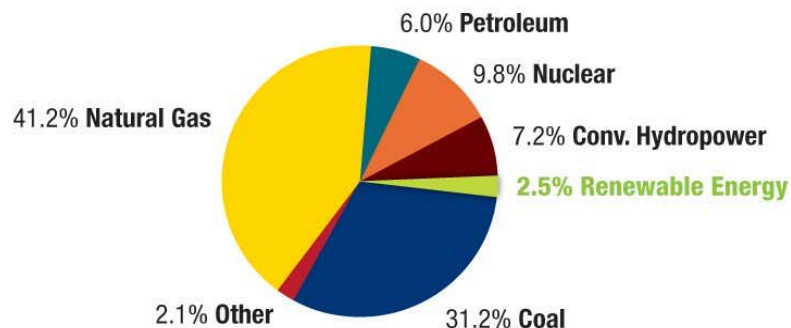
* Grid connected

Source: Department of Energy, "Renewable Energy Build Out: Progress to Date and the Path Ahead", EPRI Summer Seminar, August 4, 2008.



Status of Renewable Electricity in the U.S.

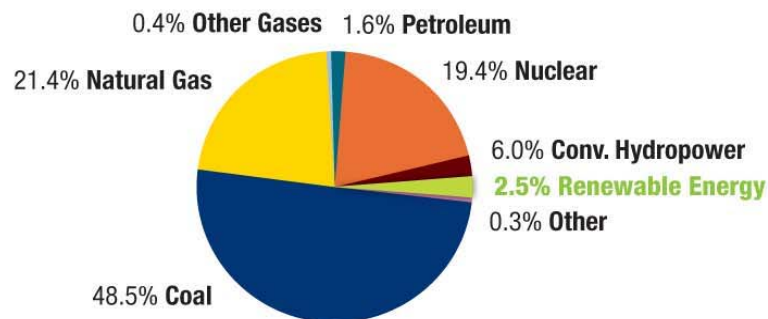
U.S. Electric Nameplate Capacity (2006): 1,076 GW



U.S. Renewable Capacity: 27 GW



U.S. Electric Net Generation (2007): 4,160 billion kWh



U.S. Renewable Generation: 103 billion kWh



Other includes: pumped storage, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels and miscellaneous technologies

Source: Department of Energy, "Renewable Energy Build Out: Progress to Date and the Path Ahead", EPRI Summer Seminar, August 4, 2008.

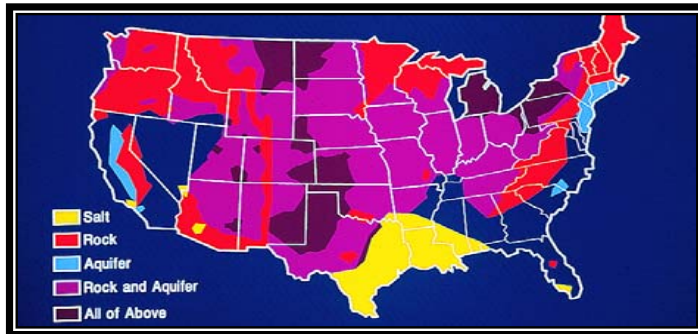


Impediments to the Growth of Renewable Power

1. Loss of Renewable Tax Incentives
2. Historic State Regulatory Structures
3. Intermittent Nature of Renewable Power
4. The Distance Between Renewable Resource and Load Centers
5. Interconnection and Capacity on the Transmission Grid



Technological Sea Change: Underground and Above Ground CAES Demonstration

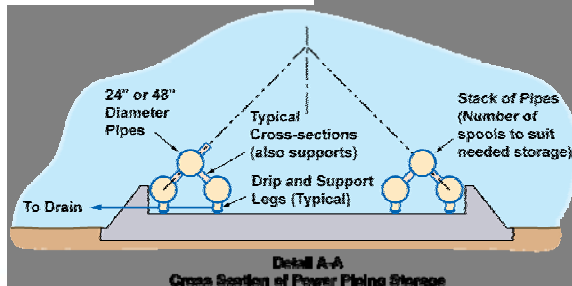
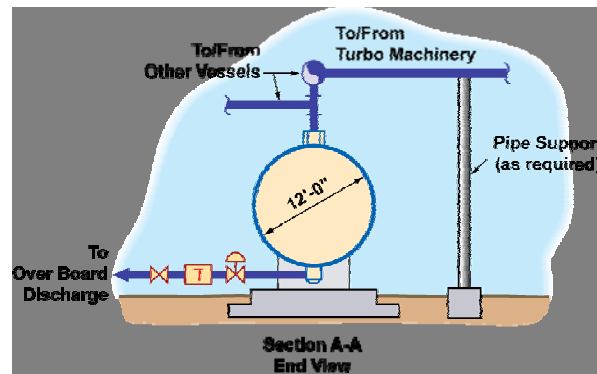


• Underground CAES

- Assess and Demonstrate Porous Rock/Aquifer Storage
- Plant Size: Above 300 MW
- Advanced Design and Performance Assessment
- Proceed to Demo Plant Based On Results from Phased Approach

• Above Ground CAES

- Assess Economic Feasibility of Pipe and/or Vessel Based Above Ground Air Storage
- Plant Size: 10MW To 20MW With 2 To 3 Hours Of Storage
- Design & Performance Assessment
- Proceed To Demo Plant Based On Results from Phased Approach



Source: EPRI



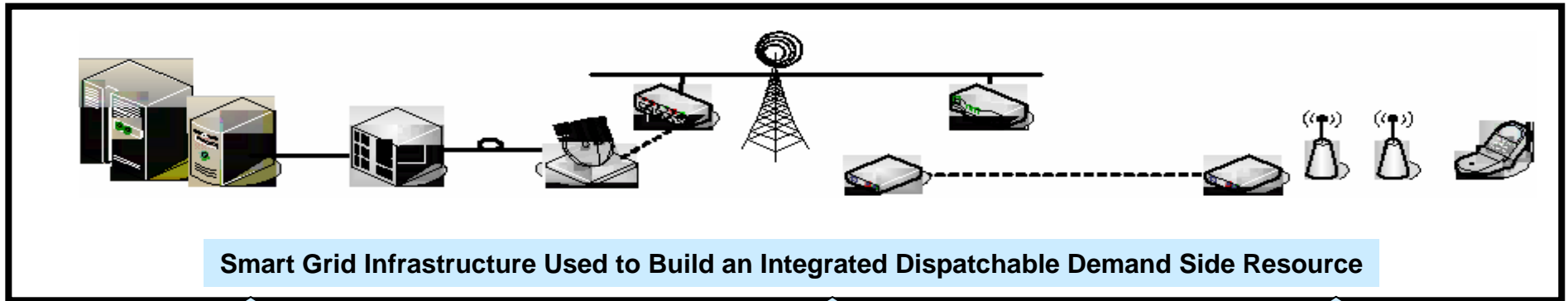
Technological Sea Change II: Battery Storage

- A "megawatt-class" sodium-sulfur battery attached to American Electric Power's grid in Charleston, W.V.



Technological Sea Change III: Smart Grid Demonstration

Enabling Efficiency, PHEV, Distributed Renewable and Reducing Peak Demand



Substation/Feeder DER Integration

C&I Customer Demand Response & DER Integration

Test Sites
C-4-EMCS
Connectors

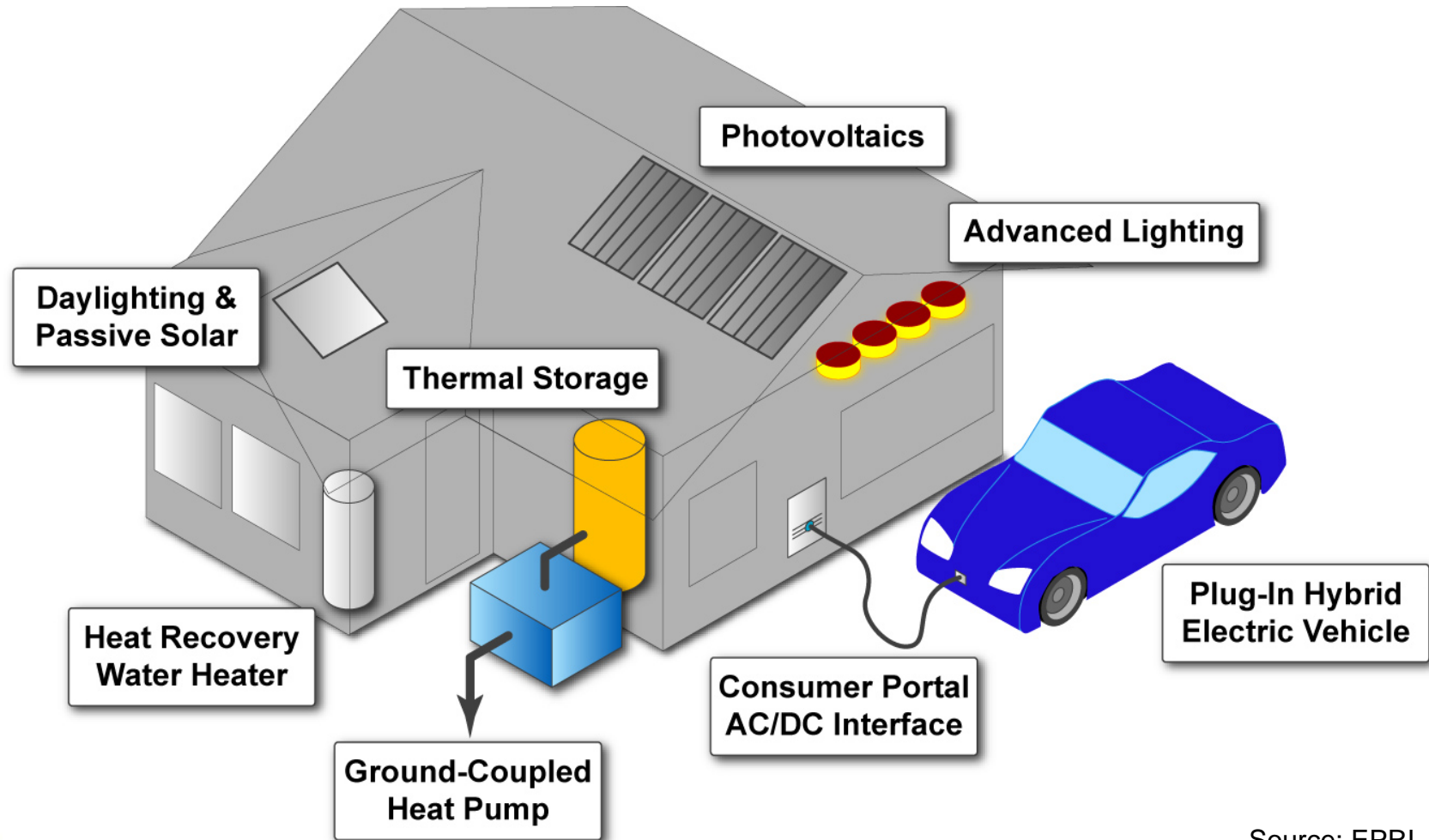
Residential Customer Demand Response & DER Integration

Integration of Distributed Power Generation, Storage and Demand Response Technology Using EPRI's IntelliGrid Architecture

Source: EPRI



Technological Sea Change IV: Public Hybrid Electric Vehicles and Local Energy Networks



Source: EPRI



Four Evolving Infrastructures



Source: EPRI



Kevin C. Fitzgerald

Managing Partner

Troutman Sanders, LLP

401 9th Street, N.W., Suite 1000

Washington, D.C. 20004

202-274-2955

kevin.fitzgerald@troutmansanders.com

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