Two Farm Bill Research Initiatives Promise New Markets, Transmission, and Annual-scale Firming Storage for Diverse, Large-Scale, Stranded Renewables as Hydrogen and Ammonia

- GW-scale* renewables generation, transmission, ‘firming’ storage
- GW-scale* electrolyzers make hydrogen from renewable-source electricity
- Potential: all USA energy from renewables -- requires new markets
- Potential: supply all USA energy from renewables -- requires new markets
  - Only a third of 15 million tons / year ammonia fertilizer = 5 million tons hydrogen = 40,000 MW nameplate wind
  - Only a third of 120 billion gal / year gasoline = 40 million tons hydrogen = 500,000 MW nameplate wind

*GW=1,000 MW Nameplate

Section 9019: RURAL NITROGEN FERTILIZER STUDY
- Anhydrous ammonia (NH3) made from renewable-source hydrogen + atmospheric nitrogen
- USA consumes ~15 million tons of NH3 per year; <60% imported, from offshore natural gas
- Potential: H2 demand for NH3 synthesis = 3 million tons / year
- NH3 is a high-density hydrogen carrier, storage medium, and fuel
- Internal combustion engines and combustion turbines run well on NH3
- “Assess feasibility, identify alternative processes, program recommendations”
- “… report to Congress … no later than 18 months from the first meeting of the Task Force”
- “… identify the key technical and economic barriers to producing commercial-scale quantities of nitrogen fertilizer from renewable energy sources”
- Appropriation: Senate Farm Bill recommends authorization of $1 M

Farm Bill status
As of March 27, only the Senate Conference Committee members have been named:
- Debbie Stabenow (D-MI)
- Kent Conrad (D-ND)
- Saxby Chambliss (R-GA)
- Thad Cochran (R-MS)
- Tom Harkin (D-IA)
- Patrick Leahy (D-VT)
- Blanche Lincoln (D-AR)
- Richard Lugar (R-IN)
- Charles Grassley (R-IA)
- Max Baucus (D-MT)
- Pat Roberts (R-KS)

Section 9022: RESEARCH AND DEVELOPMENT OF ALTERNATIVE ENERGY
- Directs program and funds to Colorado Renewable Energy Collaboratory: NREL, UC Boulder, Colorado State University, Colorado School of Mines
- Energy crops, biofuels, storage and conversion, fuel cell technologies
- “Develop storage and conversion technologies for wind- and solar-generated power for small-scale and utility-scale generation facilities…”
- “Research fuel cell technologies for use on farm, ranch, and rural applications…”
- Could include hydrogen pipeline transmission and firming storage in solution-mined salt caverns
- Appropriation: Senate Farm Bill recommends authorization of $225 M

This renewables-to-hydrogen pilot plant would require:

- Add to “(a) (i) and (9), or in a new (a) (10): “Begin design of a pilot plant to demonstrate technical and economic feasibility of transmission and firming storage of wind and other renewables as gaseous hydrogen fuel by pipeline.” It should have a mandatory minimum Farm Bill approp of $500K to $1M
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