

# The Challenge of Financing Hydrogen Projects



ATTORNEYS AT LAW

*Presented by:*  
**Ed Einowski, Partner**



# Current State of Hydrogen Funding

- Existing Sources of Hydrogen Funding:
  - Government grants and incentives:
    - ARRA incentives: ITC grant, fueling infrastructure tax credit, fuel cell manufacturing tax credit
    - R&D grants: e.g., DOE \$41.9m investment in fuel cell technology
    - May, 2009 announcement of major cut in DOE funding for hydrogen powered vehicles
    - Focus remains on facilitating development of technology rather than subsidizing market price

# Current State of Hydrogen Funding

- Venture capital:
  - VC Investment of \$2.6 billion in 2009 in cleantech, decline of 50% over 2008
  - Share of dollars going to alternative fuels declined from 13% to 8%
  - Share of dollars going to energy/electricity generation declined from 30% to 18%
  - Number of VC investments in energy efficiency increased by 11% (\$593.3m, or 22% of total)

# Current State of Hydrogen Funding

(continued)

- Some market capitalization:
  - Has remained fairly constant, with approximately \$1 billion in market cap at present
  - Largely unchanged from prior years
- Abu Dhabi 420 MW natural gas to hydrogen to electricity and carbon capture plant delayed due to undisclosed technical issues

# Current State of Hydrogen Funding

(continued)

- Scale of investment vs. other renewables:
  - 2009: 10,000 MWs of wind farms built, representing an investment of over \$20 billion at the height of the recession

***Why the difference?***

## Why the Difference: Market Fundamentals

- Wind energy is generally more expensive than alternative fossil fuels:
  - Approximately \$2m/MW of installed capacity to build; compared to \$1.5m/MW for natural gas
  - Average capacity factor of 30%+/-, compared to 90%+ for natural gas
  - Market price equalized by extensive use of PTC, ITC and ITC Grant

## Why the Difference: Market Fundamentals

(continued)

- Infrastructure and market for wind energy already exists:
  - Transmission and interconnection is ready to receive product (although restrained in many areas)
  - Large existing base of customers and electricity powered devices with need for electricity
  - Mix of resources allows higher cost of wind to be blended, softening the price impact to users

## Why the Difference: Market Fundamentals

(continued)

- Wind farms produce energy
  - Inefficient conversion of wind energy into electricity
  - But since no direct costs associated with wind as fuel, the inefficiency of conversion does not prevent winds farms from competing if subsidized

# Why the Difference: Market Fundamentals

(continued)

- Hydrogen is a storage medium, not an energy source
  - Price and efficiency of converting other fuels to hydrogen thus a key issue
  - Lack of existing infrastructure, customer base and hydrogen powered devices adds to the price problem

## Why the Difference: Market Fundamentals

(continued)

- Alternative electric industry storage approaches:
  - Natural gas peaker plants – expensive but cost effective for reliability purposes
  - Compressed air storage – greater efficiency of conversion in and out, thus lower price to end user
  - Hydro pump storage – used historically since the 1930s

## Leveling the Playing Field

- End user price subsidy: PTC for hydrogen?
  - How big would it need to be compared to the existing PTC?
  - Politics of greater subsidy: could it pass?
- National or state RPS mandates
  - Given cost issues, how to make the case in light of alternatives
- National carbon tax or cap and trade
  - But alternatives such as wind will benefit even more due to cost advantages

## Solving the Price Equation

Capital Facilities Costs + Infrastructure Costs +  
Operating Costs – Subsidy = Per Unit Cost

### *The Solution:*

Per unit costs must either be near the per unit costs of alternatives or the product must have inherent advantages that overcome the cost difference