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Issues in Drafting Trading Contracts for Hydrogen

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Topics for Discussion

- Overview of hydrogen
- Analysis of key concepts in Master Agreements
- Other issues to consider

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Hydrogen Background

- Most abundant element in the universe, present in all animal and vegetable tissue
- Incredibly abundant in the atmosphere
- Bonds easily to a wide range of other elements and compounds
  - Attractive from a pollution standpoint: when released into atmosphere, bonds with oxygen to form water; if combusted, a small amount of nitrogen oxide.
  - However, almost never exists in other than molecular form
- Relatively easy to separate from molecules using electric, industrial or chemical processes
- Has roughly 1/3 the energy density of gas

Hydrogen Background

- Commercial uses
  - Ammonia (when added to nitrogen, provides most of the fertilizer used globally)
  - Margarine (when added to unsaturated fats and oils)
  - Methanol (when added to carbon dioxide)
  - Industrial coolant (due to its low density, low viscosity, and the highest specific heat and thermal conductivity of all gases)
  - Large number of announced projects globally, most relating to greener production of hydrogen for existing industrial uses rather than using hydrogen as a fuel

Hydrogen Background

- Use as a fuel
  - Technically not a source of energy, unlike fossil fuels, but a very efficient carrier of energy
  - Its energy can be released in a combustion process but is more efficient when used with a fuel cell
  - Fuel cells used with an electric motor are **two to three** times more efficient than internal combustion engines running on gasoline
  - Hydrogen has been contemplated as a motor fuel for decades because of its relatively dense energy content and lack of polluting emissions

Hydrogen Background

- Three classifications of hydrogen

1. **Green** hydrogen: produced using electricity generated entirely from renewable sources
   - Not projected to be cost-competitive until 2045
2. **Grey** hydrogen: produced using fossil fuels
   - Cheapest to produce, forms 95% of presently produced volumes
3. **Blue** hydrogen: produced using natural gas, potentially sourced from biogas; carbon emissions are stored underground or otherwise mitigated

Title search: Hydrogen – How does it fit within current trading structures?

Also available as part of the eCourse
Hot Topics in Gas and Power

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2020 Hot Topics in Gas and Power session
"Hydrogen – How does it fit within current trading structures?"