

# **Issues in Drafting Trading Contracts for Hydrogen**

Craig R. Enochs

Craig R. Enochs cenochs@reedsmith.com Reed Smith LLP 811 Main Street, Suite 1700 Houston, Texas 77002 (713) 469-3884 phone

1

## **Topics for Discussion**

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

2

#### **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

3

3

#### **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

4

### 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

5

5

#### **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

6





Find the full text of this and thousands of other resources from leading experts in dozens of legal practice areas in the <u>UT Law CLE eLibrary (utcle.org/elibrary)</u>

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

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

First appeared as part of the conference materials for the 2020 Hot Topics in Gas and Power session "Hydrogen – How does it fit within current trading structures?"