

Why Not Hydrogen: Introduction

- With oil at \$60/bbl and availability near the peak, new energy sources are needed now.
- With climate change clearly increasing, carbon emissions must be reduced urgently.
- These mean adopting best current practice, not waiting for R & D, which is uncertain.
- There is huge scope for energy savings, but here only energy supply is considered.

Match Energy Quality to End-Use

- For heating, supply heat - preferably co-generated with electricity.
- For transport, supply liquid fuels.
- For electricity, supply electricity - if thermal then preferably co-generated with heat.
- Renewable electricity saves most carbon emissions by displacing fossil fuels from thermal power plants.

Heating of Buildings

- Energy quality of hydrogen is needlessly high for heating - which wastes energy.
- Large-scale central CHP has high electricity efficiency and high heat efficiency.
- This means ample heat for DH supplied at high Thermodynamic Heating Efficiency - eg 300%.
- Biomass fuels - eg chips and pellets - can be used in such plant and in individual boilers.

Fuel for Transport

- Electricity to tank efficiency of hydrogen is only about 50% and cannot be improved.
- Bio-ethanol can be made from home-grown feedstocks, and approaches carbon-neutral.
- E20 can be used in conventional vehicles and E85 in Flexible Fuel Vehicles.
- Tank-to-Wheel efficiency of ICE-hybrids (Prius) approaches that of Fuel Cell hybrids.

Electricity Management

- Electricity peaks can be met by varying the ratio of CHP plants, with hot water storage.
- Output of wind turbines can be predicted to within 10% up to 36 hours ahead.
- Wind electricity could be used to synthesize carbon-neutral ethanol, when available.
- Electricity can be stored as hydro, pumped storage, or compressed air storage.

Import of Carbon-Neutral Energy

- Volumetric energy density of wood pellets is about 1.3 x that of liquid hydrogen.
- Volumetric energy density of ethanol is 2.3 x that of liquid hydrogen.
- Both can be stored and shipped in conventional containers, ships and wagons.
- Conversion facilities are relatively simple and low cost - for developing countries.

Thank you

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