Materials Innovations In An Emerging Hydrogen Economy
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Title: Global Perspectives Towards the Establishment of the Hydrogen Economy

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International Energy Agency (IEA) Estimations: Investments are 20% below (20,000 billion investment) needed to assure suitable supply during the next 25 years.

Next 40 years (World Oil Production)

3% 97%
45% of the OIL consumed in the US ➔ GASOLINE

AUTOMOBILE INDUSTRY IS EXTREMELY IMPORTANT
There are 600 million passenger cars in the world, 97% gasoline powered.

Source: worldmapper.com
The more dependent a country is on foreign fuel, the more interested it will be in an alternative source of power.

<table>
<thead>
<tr>
<th>Country</th>
<th>Amount imported</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>12,220</td>
<td>59.35%</td>
</tr>
<tr>
<td>Japan</td>
<td>5,097</td>
<td>97.61%</td>
</tr>
<tr>
<td>China</td>
<td>3,438</td>
<td>47.26%</td>
</tr>
<tr>
<td>Germany</td>
<td>2,483</td>
<td>94.41%</td>
</tr>
<tr>
<td>Korea, South</td>
<td>2,150</td>
<td>99.68%</td>
</tr>
</tbody>
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There is need for fuel independency

Energy Independency becomes a National Security Issue.
Other problems...

Environmental trends

Global Warming

Acid Rain

Investors’ concern for their company’s impact on the environment

The US Market
WHAT ARE THE ALTERNATIVES?
Alternatives:
Bio-diesel and Ethanol

Some agricultural products can be converted into fuel.

- Biodiesel required Diesel engines (less than 2%)
- Several countries, like Brazil, have invested in these technologies.

Their price is tied to that of the commodity.

Both technologies are food based products.

Competitive Analysis
CNG is substantially cheaper.

It is already distributed all over the world.

CNG is still a fossil fuel.

The technology is years old and it never took off in the US.
Although gasoline-powered, hybrids have a secondary electric engine that runs on recovered energy from braking. They save up to 50% in gasoline! They still depend on foreign fuel.
Alternatives: Hydrogen

Oil price dramatic increase
Oil’s imminent shortage
Rising environmental concerns

Need for a new energy carrier

- Available all over the globe
- Clean
- Fossil fuel independent
Introduction

Alternatives:
Fuel Cell & H2ICE

Fuel Cell cars

- Hydrogen consuming baterry
- Electric engine
- Zero emissions!

Internal Combustion

- Mature Technology
- Allow Bivalent Operation
- Near Zero emissions
There is a need for

The development of Technologies that allow the transition from fossil fuel to Hydrogen
Transition Plan

H2 Policies

- R&D Technology Development For transition
- Strategic Planning
- Education
- New Economic Model
- Safe & Efficient Systems
- Available
- Adequately Communicated
- Access to H2 @ Competitive Price

Introduction
WE HAVE TO CREATE A WAY TO GO BACK TO ECONOMICS

The Economy driven by Global Market

H2

The Economy driven by Politics

Source: Financial Times
THERE HAS TO BE CONSENSUS AMONG

ACADEMIA
GOVERNMENT
INDUSTRY
For a successful Implementation of the Hydrogen Economy, industry and future consumers have to:

- ACKNOWLEDGE HYDROGEN AS A VALID ALTERNATIVE TO GASOLINE
- HAVE ACCESS TO HYDROGEN AT COMPETITIVE PRICES
- WE NEED TO START TODAY TO DO THE TRANSITION
Alset Technology:

Alset is working on technologies for the transition to the Hydrogen economy:

- State of the art Technology for Internal Combustion of Hydrogen
- Hydrogen Production
Conclusion

LEADERSHIP ISSUE

THE UNITED STATES HAS THE CAPACITY TO LEAD THIS TRANSITION TO THE HYDROGEN ECONOMY

H2 ECONOMY SHOULD BE The Next Shared vision of America…
THANK YOU VERY MUCH

Be the change you wish to see

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