

Hydrogen Economy

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A brief view of Hydrogen Economy

What happened in the world?

The situation in China

Two main public goals

- environmental quality, especially the reduction of greenhouse gas emissions,
- energy security: enhance national security by reducing the nation's dependence on fuels imported from insecure regions of the world.

Questions to be solved

- Energy demand. In what situations would the use of hydrogen offer the greatest economic advantage? The greatest environmental and security advantage?
- Energy supply. How should hydrogen be produced from primary resources, such as coal, methane, nuclear, and renewable energy (solar, wind, and so forth)? What environmental consequences and trade-offs arise from its production from each resource?
- Logistics and infrastructure. How can a storage-and-delivery infrastructure best connect the demand for hydrogen with its supply and ensure the public safety?
- Transition. How can the mature, highly integrated energy system make the transition to a hydrogen economy?

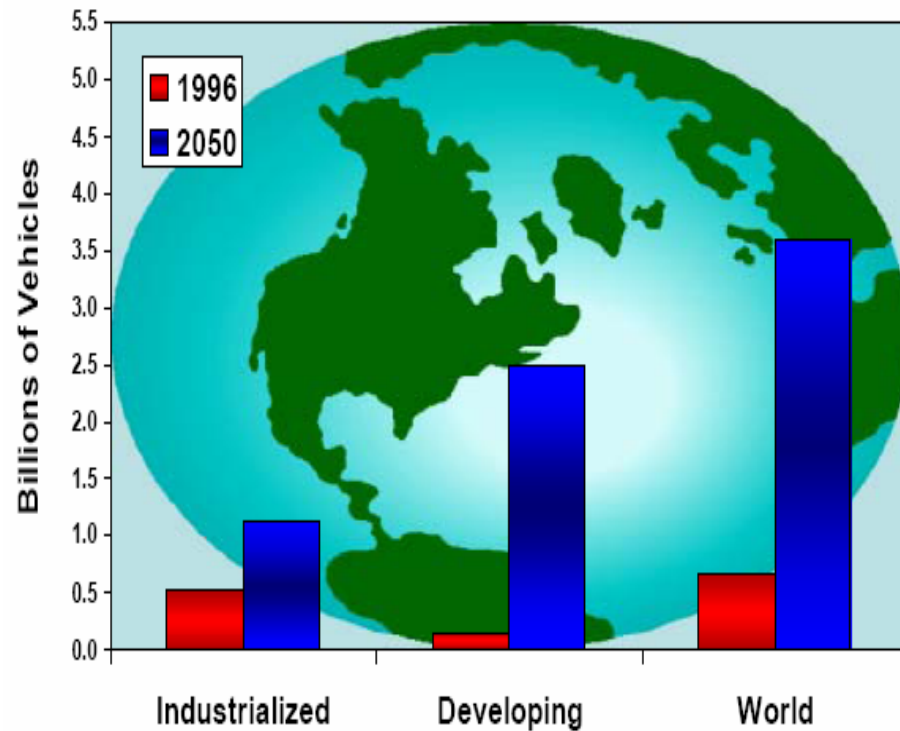
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Why transportation sector?

... the Number of Vehicles in the World Is Growing



Source: EE Analytic Team

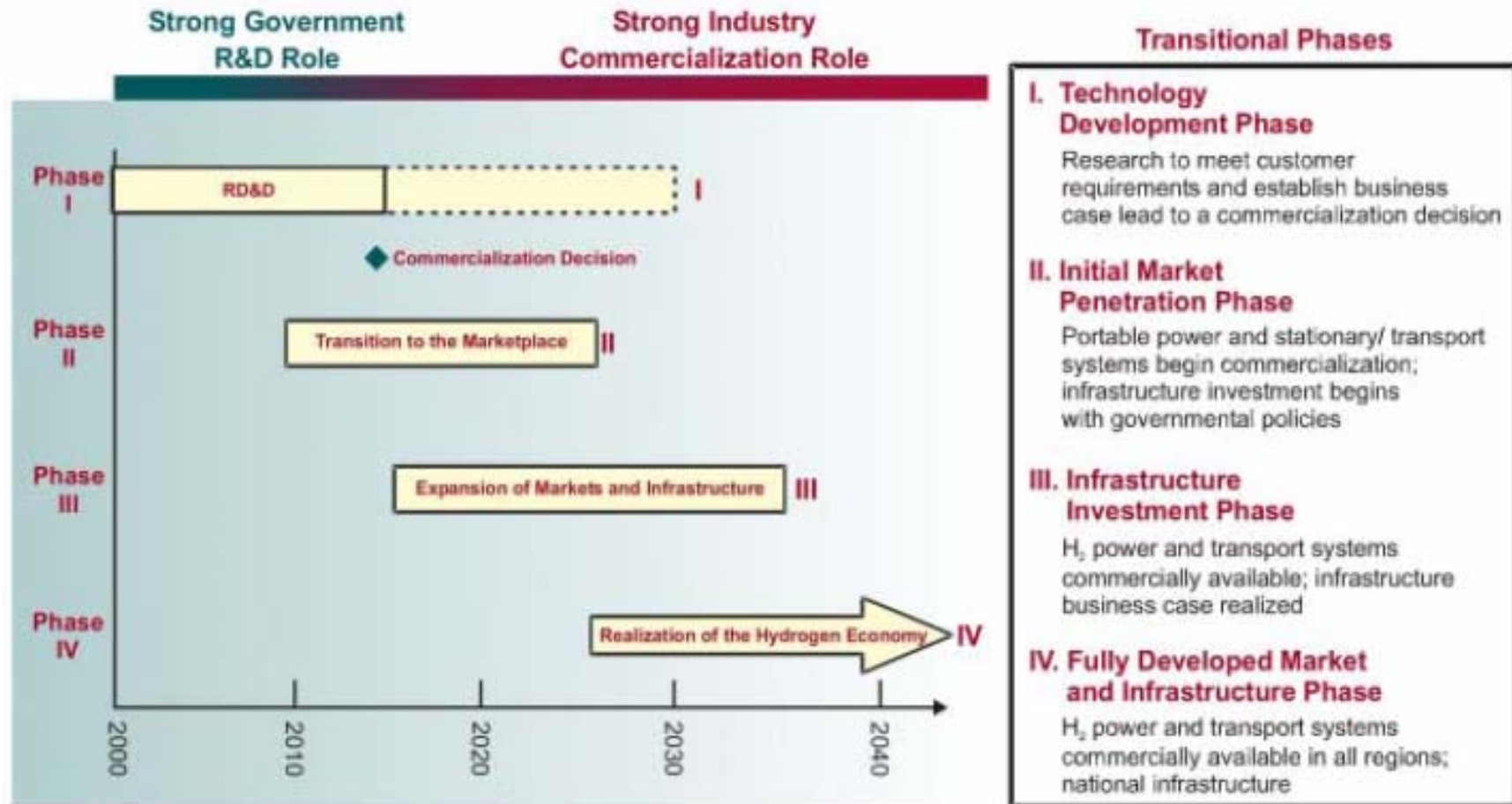
Many countries have concerns about energy and environmental security related to transportation/mobility

America: one of the founders of Hydrogen Economy

- President Bush, during his State of the Union Address, pronounced a \$1.2 billion jump-start to the hydrogen economy.
- In 1996: federal congress passed the Hydrogen Future Act and funded \$1645 millions
- FreedomCAR and Fuel Partnership established: DOE, Daimler-Chrysler Corporation, Ford Motors Company and General Motors Corporation, BP...

Source: www.google.com

Roadmap of USA transit to Hydrogen Economy



Source: DOE Hydrogen Program review

Japan

- WE-NET: 1993~2001, utilization of hydrogen, develop core technologies indispensable for construction of a hydrogen network
- JHFC: 2002~2004, fuel cell demonstration program and the demonstration study of hydrogen fueling facilities for fuel cell vehicles.

International Partnership for the Hydrogen Economy



Russian Federation



USA



Canada



Iceland



Japan



South Korea



China



India

IPHE Partners' Economy:

- Over \$35 Trillion in GDP, 85% of world GDP
- Nearly 3.5 billion people
- Over 75% of electricity used worldwide
- > 2/3 of CO₂ emissions & energy consumption

IPHE Vision:

"... consumers will have the practical option of purchasing a competitively priced hydrogen power vehicle, and be able to refuel it near their homes and places of work, by 2020."

- Secretary Abraham, April 2003

United Kingdom



France



Germany



Italy



Australia



Brazil



Norway

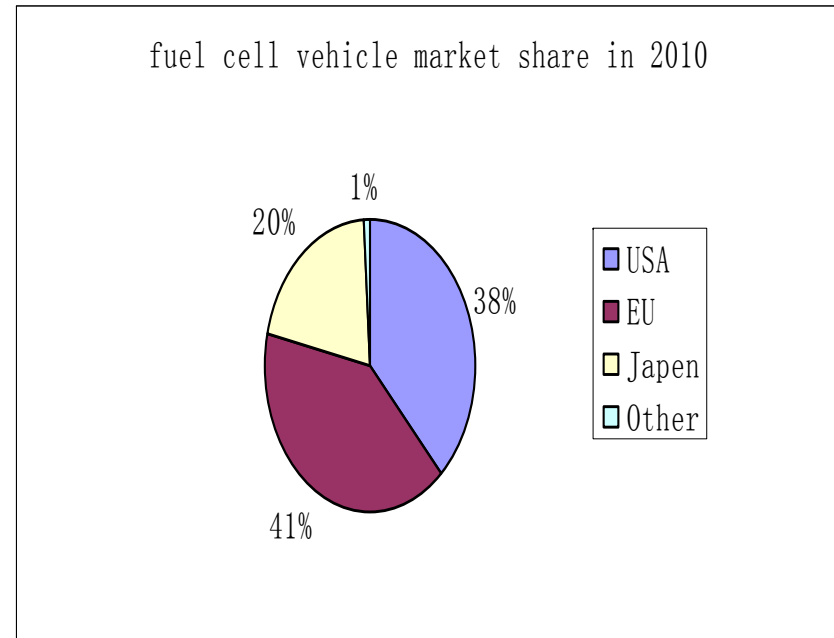


European Commission



Possible fuel cell vehicle market in 2010

- Total number: 40000, all over the world
- Market share:
 - USA: 38.0%
 - EU: 40.5%
 - Japan: 20.3%
 - Other: 1.2%



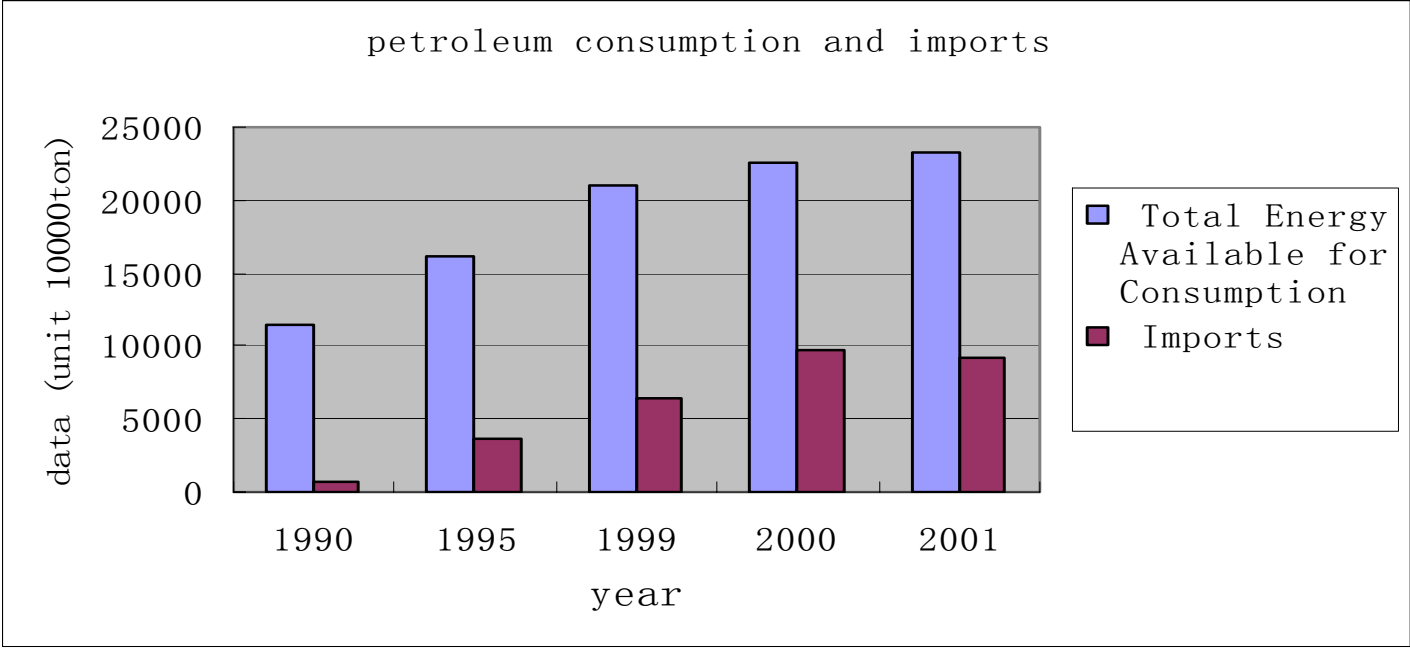
Source: <http://www.china5e.com>

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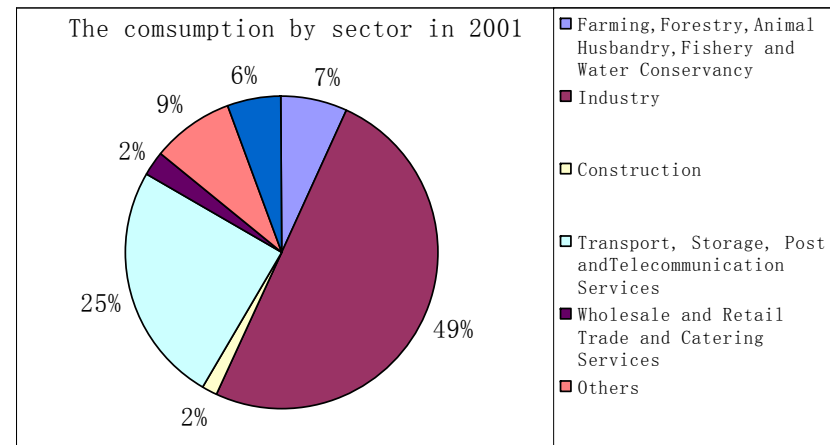
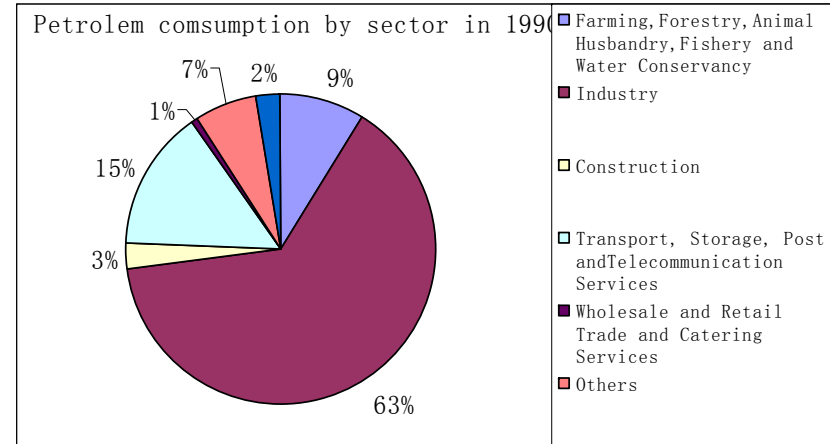
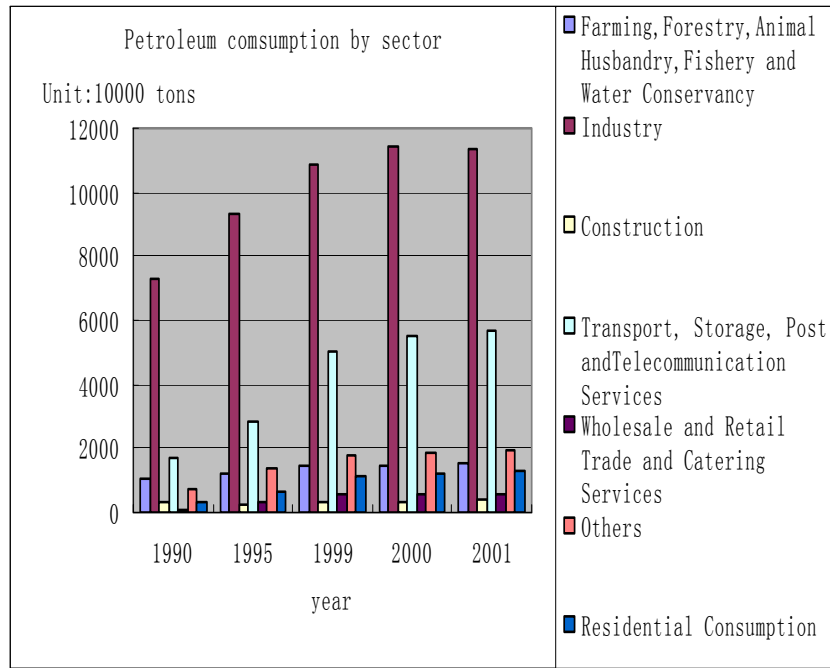
The situation in China

The status of coal based energy and limited oil and natural gas resources increase the uncertainty in terms of resource supply



Source: China Statistic Yearbook, 2003

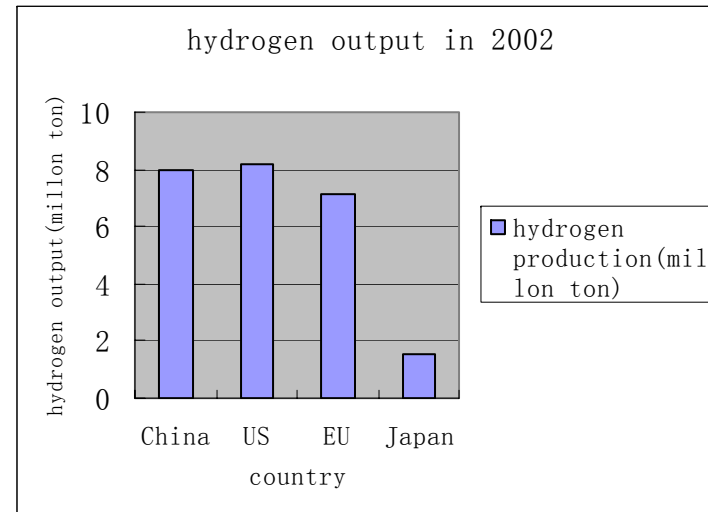
The transport sector is the a lavishes petroleum consumer and grows quickly



Source: China Statistic Yearbook, 2003

The advantages of China to develop fuel cell vehicles

- China is one of the biggest hydrogen producers in the world
- Hydrogen used to be the power of the shuttle and spacecraft, and China has technical advantages in these field
- The automobile industry and the support systems are not maturely developed



Source: <http://www.china5e.com>

What sub-market in China?

- Limitations for the commercialization of fuel cell vehicles
 - High cost: 400000~1500000 USD
 - Support systems
 - Security question
- The Bus sector: not highly limited by cost; fixed route; easy to refuel
- 2000~2030: The bus in China will grow at ratio 5%

Data source: <http://www.china5e.com>

R&D and demonstration projects

- The hydrogen energy research has been listed into the national important basic theory research items(973 Project)
- 863 magnificent automobile patent program, 0.38 billion RMB
- The government want to buy 12 fuel cell bus in the world and will build demonstration projects in Beijing and Shanghai
- The 2008 Olympics here are shaping up as a milestone test for Chinese hydrogen and fuel cell technologies

Thank you!