Strategic automotive technologies: the eco-friendly revolution

By Frank Owarish, Ph.D., Computer Science, Executive Director International Institute for Strategic Research and Training (think tank)

www.strategicresearch.info/default.aspx

From evolution to revolution

- Transportation systems have been key to human progress and is the basis of the modern civilization hinging on the Industrial Revolution
- The invention of the internal combustion engine was an absolute turning point; even today its use is crucial despite significant development of other technologies powering cars, trucks, buses

Quantum leap

- US and UK are driving forces
- The Ford Model T-1
- Mass production
- Development of new models
- Abundance of fossil fuel
- Growth in usage

Fast forward to the 70s

- Problem with the availability of fossil fuel
- Necessity is the mother of invention: the Japanese approach: smaller (than American) cars with enough room; improved aerodynamic design resulting in greater fuel efficiency

Concern about the environment

- Negative effect of growing usage of fossil fuels
- Awareness of the negative effects of such usage leading in some area to decree stricter carbon emission rules (e.g. California)

Significant contribution of Japanese automobile companies

- Honda and Toyota came forth with the so-called hybrid technology making less use of fossil fuel alternating with the use of electrical technology
- The big traditional companies 'skeptical' of this approach
- The 'Insight' and the 'Prius': pioneer hybrids

Hybrid technology

- Cost is a factor
- However with rising fuel cost, hybrid became cost-efficient
- Honda and Toyota kept on refining the hybrid technology

Meanwhile …

- Lee Iacocca led the redesign revolution at Chrysler: K cars
- GM and Ford went for SUVs: use was all right while fuel was on the cheap, but with rising cost of fuel these companies faced difficulties; GM had to be bailed out by the US Government while it faced bankruptcy; Ford on the other hand decided to go hybrid and diversify producing its own models which became very popular (no need for bail out)

With growing concern about CO2 emission

- Other companies also adopted the use of hybrid technology proven to be reliable and cost friendly

Diversification

- Significant efforts were made at diversification with the use of natural gas and clean diesel impacting not just cars but also buses and trucks

Research

- Pure: many universities expanded research on transportation systems
- Applied: specialized institutions emerged
- R&D: many companies found it worthwhile to expand their Research and Development effort at times with government subsidy or tax breaks.
- Read more: International Journal of Automotive Technology

University of Michigan Transportation Research Institute

- The University of Michigan Transportation Research Institute is dedicated to achieving safe and sustainable transportation for a global society. With a multimillion-dollar research program, broad faculty expertise, and multiple collaborators, UMTRI is committed to interdisciplinary research that will ultimately increase driving safety and further transportation systems knowledge.

www.umtri.umich.edu

MIT

- The future of vehicular transportation propulsion, fuels and emissions: research and professional education

http://web.mit.edu/professional/short-programs/courses/future_vehicular_transportation.html

International Institute for Strategic Research and Training

- Project on new aerodynamic device for cars, trucks and buses: a new generation of eco-friendly transportation systems

www.strategicresearch.info/default.aspx

ASUA (Japan)

- Environmental consciousness
- Specific driver education leading to improved driving technique branded the Eco-drive Technique; read more:
- ASUA,Inc.
- *www.**asua**.ne.jp/english/*Cached
- Similar
- The theory and practice of EcoDrive got its start in *Japan*. *Asua* company founder Hiroshi Maji theorized that stress, an intrinsic part of the urban driving ...

The Alliance of Automobile Manufacturers

- Is the voice for a united auto industry, committed to developing and implementing constructive solutions to public policy challenges that promote sustainable mobility and benefit society in the areas of environment, energy and motor vehicle safety.

www.autoalliance.org

The Alliance of Automobile Manufacturers

- The Alliance of Automobile Manufacturers, the leading advocacy group for the auto industry, represents 77% of all car and light truck sales in the United States, including the BMW Group, Fiat Chrysler Automobiles, Ford Motor Company, General Motors Company, Jaguar Land Rover, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche, Toyota, Volkswagen Group of America and Volvo Cars North America.

Meanwhile, the manufacturers themselves have been active

- GM Volt: "With its ingenious propulsion system, unlike traditional hybrid cars, Volt lets you drive on pure electricity for your everyday commute and seamlessly switches to gasoline for longer trips. In fact, owners who charge regularly are averaging more than 900 miles between fill-ups."

Nissan Leaf

- "The Nissan LEAF® is 100% electric. That means no gas. None. So forget about the cost of a gallon, and say hello to freedom from the pump. Because the only time you'll be going to the gas station is whenever you need to put air in your tires."

The C-Max

- "The C-MAX Hybrid and the C-MAX Energi Plug-In Hybrid offer two distinct choices that maximize style, power and efficiency. The main difference between the C-MAX Hybrid and the C-MAX Energi is the plug-in capability, the latter offering the option of plugging for a recharge. Both models feature a 2.0L hybrid I-4 power train combined with an electric motor, and can operate in electric mode up to 85 mph."

TESLA

- "**Tesla Motors, Inc.** is an American automotive and energy storage company that designs, manufactures, and sells electric cars, electric vehicle powertrain components and battery products."

- Source: Wikipedia

Tesla

- "Tesla first gained widespread attention following their production of the Tesla Roadster, the first fully electric sports car.[8] The company's second vehicle is the Model S, a fully electric luxury sedan, and its next two vehicles are the Models X and 3."
- Source: Wikipedia

Toyota

- Implementation of the fuel cell technological revolution:
- http://www.toyota.com/mirai/

MDI

- Cars that run on ‘compressed air’
- http://zeropollutionmotors.us/

The sky is the limit 1

- Ford has stirred up the truck industry with the all new F-150 truck that replaces the steel body panels with lightweight aluminum to shed weight=more performance and better fuel efficiency=also the only light truck in the industry with an available CNG/propane powered V8 engine

- Source: www.slashgear.com/tags/ford

The sky is the limit 2

- The 2015 Green Transportation Summit and Expo (Portland, Ore) showcased a variety of alternative fuel vehicles (AFVs)
- Propane-fueled Blue Bird School Bus powered by Ford 6.8 liter engine using ROUGH CleanTech's autogas fuel system
- CNG-powered F-550 Ford truck
- CNG-powered Freightliner Cascadia featuring dual tanks
- American Power Group: Freightliner Columbia glider with a dual-fuel diesel/liquefied natural gas system

Conclusions

- Human creativity is endless!
- Looks like the environmentalists may have less to worry about the future
- About the damage already done: here again there are solutions being worked on!