

Shifts in Transport and Production

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Introduction

- Sustainability is the governing principle?
- Energy efficiency will be King
- Vehicle technology at top of S-curve of innovation
 - Not fit for purpose
 - Nor is the process by which personal transport service is delivered to society

The fuel cell vehicle

The fuel cell is not equivalent to an ICE

A fuel cell powertrain in an ICE vehicle creates artificial barriers to the successful implementation of fuel cells

These barriers are either reduced or eliminated if a car is designed around the characteristics of a FC

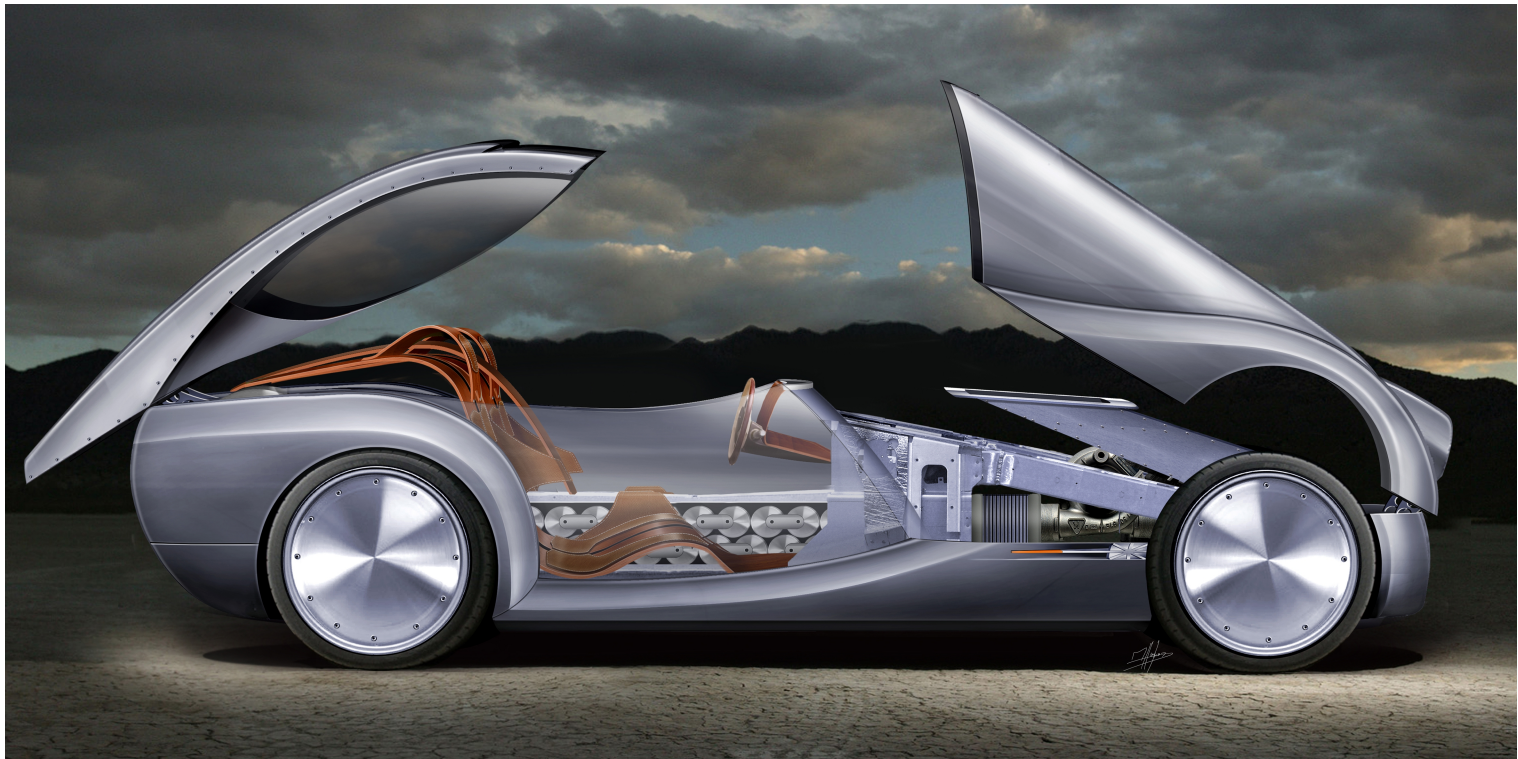
Vehicle architecture

- Decoupling constant and transient demand
 - Size the fuel cell for maximum constant demand
 - Regenerative braking, with focus on round trip efficiency
 - The significance of the regeneration is **not** the small amount of energy recycled - **but the implications for powertrain sizing**
- Mass decompounding

=>The Network Hybrid

The result:

LIFECar: 0-60 in 7 seconds, with a 22kW FC and c.150mpg equivalent



Opportunities

Strategies for vehicle provision to eliminate environmental degradation

3. Vehicle technology
5. Use patterns - public/private transport balance
7. Ownership model and business model

No vehicle architecture will lead to a sustainable transport system without a number of other complementary changes in policy and culture

Whole system design

- A step change achieved through a synthesis of existing technologies
 - none of which make overwhelming performance or economic sense on their own
- Then take WSD up a level - from technology to business strategy
 - ‘Aikido’ strategies
 - Focus on resilience not profit

EG: Sale of service

- Sale of product; the more goods sold, the more profit made
 - Rewards the maximisation of resource throughput
 - and then relies on regulation to control impacts
- A company that sells a transport service rather than vehicles:
has a financial interest in reducing cost and maintenance and increasing reliability, ownership cycle and product life, as well as energy efficiency
- Thus currently opposed interests of society and manufacturers are aligned

Implications

- Must extend model upstream into supply chain
- Inherently self-regulating
- The ‘problem’ of Longevity becomes a source of competitive advantage
- Changes economic impacts of design choices