

# Towards sustainable m



There is a buzz about a hydrogen fuel-cell car that would solve much of our environmental and political issues. This futuristic view, however, neglects the large obstacles to overcome and the environmental problems of the present. Is it wisely to bet our horse-powers on hydrogen or do we have other options?

Given the limited nature of our petroleum reserves, the importance of alternative fuels will almost certainly increase. The environmental threats continue to grow and while worldwide demand for mobility continues to grow rapidly, fewer and fewer crude oil deposits are discovered. The mobility of people and goods is one of the key drivers of the world's economy and must therefore not be allowed to depend exclusively on oil. These are the main reasons why many see a great future in the fuel cell cars. The fuel cell engine technology satisfies demands for a substantial reduction of CO<sub>2</sub> emissions in the transport sector. It is more powerful and it reduces traffic noise. Hydrogen is mainly produced through the electrolysis of water or natural gas and as a by-product of the chemical industry. So hydrogen is merely a storage-medium for energy. For it to be truly environmental friendly, the energy required for its production should come from renewable energy sources as hydroelectricity, wind or solar power.

However, there is a problem. The existing infrastructure of filling stations for conventional fuels can't be used for hydrogen. Billions have to be spent to create this infrastructure while the uncertainties about safety, transport and production are still enormous. These uncertainties enlarge the 'chicken and egg' problem that confronts any new technology, wherein the manufacturer awaits an infrastructure - and vice versa. The radical approach of change is very sexy, indeed, but it is not very practical. Perhaps it is more wisely to look at solutions that are right under our noses.

## Fuelled by alcohol

Today bio-alcohol, or bio-ethanol, is probably the most used non-fossil alternative transport fuel in the world. Brazil is using it since the 1930's, and Sweden has recently introduced bio-ethanol to the mass market. To most students, using alcohol as car-fuel just doesn't seem right, but from an environmental and oil dependence perspective it gives tremendous opportunities. BioEthanol can be created out of many different sugar containing sources like wheat, straw, maize and of course sugar-beet. Because BioEthanol is created out of plants, it has a so-called 'closed cycle'. Therefore in comparison with fossil fuels, bio-ethanol shows lower emissions and it improves environmental performance of road transport. BioEthanol can be blended directly in petrol, up to a mix of 20%, without engine modifications. Vehicles designed to operate on BioEthanol are called Flexible Fuel Vehicles and can function on either conventional gasoline, ethanol, or a combination of the two within the same tank. Therefore, BioEthanol can rely on the existing infrastructure which means the car user isn't confined to limited refuelling infrastructure during market introduction. Bio-fuels provide an alternative to fossil fuels, but at present BioEthanol costs and prices are 2 to 3 times higher than the gasoline and diesel costs and prices. Based on the current rapid technological developments we can expect competitive pricing in about 5 years, till then, the market introduction of BioEthanol relies heavily on fuel taxation approaches and other government support.

## The hybrid

Another important development concerning car transport is the hybrid technology. A hybrid car is powered by both an internal-combustion engine and an electric motor, thus combining the

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power and speed of a petrol fuelled car with the little noise and efficiency of an electric car. The hybrid car has a slightly higher purchase price, but it consumes less petrol and gives more options. The great thing about this engine technology is that it can be combined with the BioEthanol Flexi Fuel Tank technology. This way, great environmental progress can be made while using the existing infrastructure. More important, it is proven technology and it gives car users more options and more power. The latter may be the very solution of the "chicken and egg problem".

## A broader perspective

Dr. Harry Geerlings is associate professor at the Erasmus Centre for Sustainability and Management. His work is focussing on the relation between transport, its external effects and spatial planning. Dr. Geerlings is also a staff member of the Netherlands Research School for Transport, Infrastructure and Logistics (TRAIL). Dr. Geerlings himself is quite sceptical about the current approach of fuel cell technology and he expects greater results from bio fuels and hybrids because they use the current dominating technology. Other countries surrounding us are much further in these developments. In Germany it is very normal to use bio fuels and in Sweden they have a substantial amount of Flexi Fuel-Vehicles. "From a knowledge economy perspective, I think we are missing a lot of chances."

But what is the use of an environmental friendly car when you're constantly stuck in traffic? According to Dr. Geerlings, there is none! That's why the introduction of alternative fuels has to be seen in a greater perspective. Mobility has always been characterised as a success story of continuous growth. But we have neglected the negative sides of mobility, one of these is congestion.

Dr. Geerlings points out that it is absolutely pointless to focus only on clean and efficient cars because this will only lead to a greater demand of mobility which eventual leads to more congestion. "You have to tackle the challenge of sustainable mobility from different perspectives." This can be done through:

- Influencing the amount of mobility
- Creating a model-shift (using less polluting forms of transport)
- Introducing new technologies
- Spatial planning

First of all we have to decrease amount of mobility by influencing the demand side. This has to happen though pricing-methods.

"Mobility is much too cheap. For instance, there are students who use the car each morning to go to the University while they have access to free transport."

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The negative aspects of mobility affect the civil society while the benefits are exploited by the companies. Of course companies are doing a lot to do something about it; BMW probably has more people working on environmental friendly technologies than TNO. Different spatial planning can also create great benefits. Multi functionality of spaces and putting inferior functionalities of space underground, like transport and parking, are only a few examples. Unfortunately, this is a long process. In this process the economic interests often prevail over the social and environmental aspects. An example of this is the future use of our agricultural space. Project developers will probably jump in and build whole new neighbourhoods, which will only lead to more demand for mobility and more congestion.

Do we still have a chance to reach the Kyoto-goals? "Absolutely not! Especially when it comes to traffic and transport. This is mainly because of the tremendous growth of mobility versus our weak legislation. We can do a lot more if we really want it. Many of the norms we use are much lower than what is technical already feasible. The government should be more ambitious." It should try to create a level playing field through cooperation between private and public institutions in which it sometimes will have to be stringent and use pricing-mechanisms to stimulate innovations.

At the moment we value the economic and social aspects of mobility so much that we risk becoming the "dirty boy" in the EU. On the long term this could mean that other countries will close their borders for our Dutch freight carriers. Clean transport is therefore of great importance for the position of the Netherlands as a distribution country. <