Background & policy context:

The report focuses on sustainable energy in transport. A sustainable energy source, energy carrier and engine technology taken together make up the energy chain. The Dutch Ministry of Housing, Spatial Planning and the Environment was interested in knowing what energy chain might form the basis of a sustainable energy supply to the transport sector.

Objectives:

The study deals with the technical potential of sustainable energy sources to reduce the use of fossil fuels in the long term (2050) by more than 80% compared to their use in 1990.

Methodology:

This was a literature review study.

Parent Programmes:

RIVM - National Institute for Public Health and the Environment, The Netherlands Environmental Assessment Agency (MNP), department Traffic and Transport (various projects)

Institute type: Research agency

Funding type: Public (national/regional/local)

Partners:

The Netherlands:

RIVM - Environmental Assessment Agency (now PBL)

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Key Results:

Biomass alone was shown to have insufficient potential to reach this goal where CO2 emissions are concerned. Fossil fuels combined with CO2 storage do have this potential, but only for a limited time period.

The technical potential of renewable solar/wind/water sources to reduce CO2 emissions is more than sufficient on a global scale. Besides, wind turbines and solar collectors can be located on arid lands,
precluding competition with food production and threats to biodiversity.

Further conclusions can be summarised as follows:

1. Other emissions than CO2 can, technically speaking, be reduced by more than 95% compared to 1990 levels; fuel-cell electric or battery-operated vehicles are not necessary for this because the emission reduction potential of the internal combustion engine too is still large.
2. A shift to sustainable energy will, in consequence, make a large claim on land, in which case CO2 capture will be precluded as an option for sustainability.
3. Under optimistic assumptions, the per kilometre costs of sustainable energy chains may be slightly lower than those of the reference energy chain ('fossil fuel + combustion engine').
4. External safety problems may occur if hydrogen is stored under pressure, although these can be eliminated using other means of transportation and hydrogen storage.

**Policy implications**

In cases where policy makers see land use in relation to competition with food production, drinking-water supply and biodiversity as important indicators for sustainability, it would appear obvious to focus attention in the long term on electricity or hydrogen from solar/wind/water. This is because of the large potential of renewable energy and the ability of wind and solar energy to be produced on wastelands and even in deserts, precluding threats to food production, drinking-water supply and biodiversity.

In the time that renewable energy production capacity is being built up, the underground storage of CO2 can be implemented to attain a reasonable CO2 emission reduction in the short term. Neither should biomass be precluded in the short term, since a transition to biomass combined with combustion engines in the transport sector is much easier to achieve than, for example, a transition to renewable hydrogen combined with fuel cells.

Documents:
- [Scenario's voor duurzame energie in verkeer en vervoer](#)

**STRIA Roadmaps:** Low-emission alternative energy for transport

**Transport mode:** Multimodal transport

**Transport sectors:** Passenger transport, Freight transport

**Societal/Economic issues, Environmental/Emissions aspects**

**Transport policies:** aspects

**Geo-spatial type:** Network corridors