

OUR CAR AS POWER PLANT

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TABLE OF

CONTENTS

THE VISION	PAGE 7
REASONS TO BELIEVE	PAGE 8
OUR CARS	PAGE 13
100 YEARS OF CAR DEVELOPMENT	PAGE 14
ENERGY EFFICIENCY FROM A TO B BY CAR	PAGE 18
FUTURE DEVELOPMENTS IN TRANSPORTATION	PAGE 22
NUMBER OF CARS WORLDWIDE	PAGE 25
OUR ENERGY SYSTEM	PAGE 31
TOWARDS INTEGRATED ENERGY SYSTEMS	PAGE 32
ELECTRICITY SYSTEM WORLDWIDE	PAGE 36
POWER-SYSTEM EFFICIENCY	PAGE 40
FUEL CELL CARS	PAGE 45
THE FUEL CELL	PAGE 46
THE FUEL CELL CAR	PAGE 50
HYDROGEN	PAGE 52
HYDROGEN STORAGE	PAGE 55
FUEL CELL CAR FOR TRANSPORT	PAGE 57

THE FUEL CELL CAR AS POWER PLANT	PAGE 63
CAR-PARK POWER PLANT	PAGE 64
CAR-PARK POWER PLANT ENERGY SYSTEM	PAGE 67
THE FUTURE	PAGE 71
CARS CAN TAKE OVER POWER PLANT CAPACITY	PAGE 72
FUTURE ENERGY- AND TRANSPORT SYSTEMS	PAGE 75
FUTURE CITIES	PAGE 80
THE CHALLENGES	PAGE 87
TECHNOLOGICAL CHALLENGES	PAGE 88
SYSTEM CHALLENGES	PAGE 92
WHY IT WILL HAPPEN	PAGE 97
FUEL CELL CARS WILL COME	PAGE 98
IT IS OUR CAR!	PAGE 99
REFERENCES	PAGE 101
SUMMARY	PAGE 105
ABOUT THE AUTHORS	PAGE 106



THE »»»» VISION



Fuel cell cars: efficient and clean transportation AND clean and efficient production of electricity, heat and water.



Fuel cell cars can provide more efficient and cleaner transportation. However, we use our cars for transportation only 5% of the time. So when parked, the fuel cell in the car can produce electricity from hydrogen. Cleaner and more efficiently than the current electricity system – with useful ‘waste’ products heat and fresh water. The produced electricity, heat and fresh water can be fed into the respective grids or be used directly in our house, office or the school of our kids. The required hydrogen can be produced from gas (natural gas, biogas) or electricity (hydro, wind, solar, etc.). In the end these fuel cell cars can replace all power plants worldwide. As a result, the ‘car as power plant’ can create an integrated, efficient, reliable, flexible, clean, smart and personalized transport-, energy- and water system.



REASONS TO BELIEVE

The change towards a sustainable transport and energy system is ongoing and inevitable. Our cars become more efficient, clean and safe. A major trend is electric driving. We see this trend in electric bikes, fork lifts, scooters and the car also. Electric cars with battery packs to store electricity for driving. Such an electric car has two main limitations. Driving distance is limited, between 100 and 300 km. And the charging time of batteries is too long. About 8 hours for normal charging and above 10 minutes for fast charging, which is longer than the 1 to 2 minutes to fuel your tank now. Of course for many of our transport needs this is not a problem, but to drive to your work, going on holidays and visiting clients or friends, it is not that comfortable.



For that reason hybrid cars are entering the market. Electric driving, batteries and an electricity-producing engine using gasoline, diesel or ethanol. But the energy efficiency of the present car engines is not very good, about 25 to 40%. Therefore many car manufacturers are developing the fuel cell car. A PEM fuel cell (Polymer Electrolyte Membrane or Proton Exchange Membrane) that can produce electricity using hydrogen. The efficiency to produce electricity with a PEM fuel cell from hydrogen is about 60%. Of course we have to produce hydrogen, for example by reforming gas into hydrogen. We can produce hydrogen from gas with an efficiency of 70-80%. So, with a fuel cell we can produce electricity from gas with an efficiency of about 45%. This is a higher efficiency than the system efficiency of our electricity production, which is below 40%.



We use our cars only for a very limited time. If we drive 20,000 km per year with an average speed of 50 km per hour, the time we use our cars is 400 hours – less than 5% of the time. Our car, a major asset for us all, that we use less than 5% of the time? So what else can we do with our car; when it is parked? Once we build fuel cells into cars it is possible to produce electricity, with a high efficiency. That is interesting; the fuel cell in our car has a capacity of 100 kW, which is more than sufficient to produce all the electricity for about 100 European houses. So our future fuel cell cars can produce all the electricity that we need – with a better energy efficiency than the present power plants.