



## Reference report: Vehicles with fuel cell range extender

The automotive supplier Magna Steyr, based in Graz, Austria, has developed a drive concept that combines the advantages of fuel cells and batteries. ARADEx provides the DC/DC conversion technology for integrating the fuel cell in the drive system!

### The key facts

- + Combination of a 15 kW battery and 3 kg hydrogen stores with 700 bar each for fuel cell storage tank
- + Long range with zero emissions
- + Fast refueling with hydrogen is possible
- + Prevention of noise pollution due to quiet drive
- + Waste heat of the fuel cell is used to heat the interior
- + Technology for connecting the fuel cell comes from ARADEx

### The project

Range too short, charging times too long – the modified van from Magna clears up common prejudices against electric vehicles. This is achieved with an electrical drive that is supplied by a combination of a battery and a plug-in fuel cell system. Proton Motor Fuel Cell, a partner of ARADEx, contributed the fuel cell system and also provided a solution for efficiently connecting the fuel cell system to the battery-supported DC link in the form of VECTOPOWER technology from ARADEx.

### The challenge

Driving comfort should be the same as with conventional combustion engine vehicles. To meet this demand, optimized solutions for range, power, fueling time, and efficiency had to be developed.

## The implementation

For the drive concept of battery and fuel cell, the four-wheel vehicle was equipped with two electrical motors: The motor on the front axle supplies 75 kW of power with a torque of 280 Nm, and the motor on the rear axle supplies 50 kW with a maximum torque of 200 Nm. A 15 kW lithium-ion battery and also tanks for 3 kg of hydrogen at 700 bar are used for power stores. When only battery power is used, the vehicle achieves a range of approx. 60 kilometers without having to be recharged. However, thanks to the fuel cell, 60 km is not the end of the road: An optimized power management guarantees that the battery is not discharged during driving and thus the range of the vehicle does not depend on the battery. The entire driving energy is provided by the energy stored in the hydrogen, while the battery merely covers the peak outputs and absorbs the recuperation energy. This increases the range to 500 km – without recharging!

The recharging has been optimized as well: It only takes two minutes to fill the hydrogen tanks, no longer than refueling a diesel vehicle. The batteries do not have to be externally charged, since they are also charged by the recuperation energy.

For optimum integration of the fuel cell with its naturally fluctuating voltage level in the drive system, DC/DC technology from ARADEX is used. This adjusts the fluctuating, lower voltage of the fuel cell, which allows for an efficient use of the hydrogen energy.

The design of the drives with batteries and plug-in fuel cell hybrids allows the dimensions of individual components to be adapted to specific applications.

## The DC/DC converter allows an efficient integration of the fuel cell in the energy system.



DC/DC converter: Customized variant of VP5000.

## Interested? Give us a call:

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