

## Center of Competence IIEE, Efficient Energy Systems

### TOHYCO-Rider

#### Motivation

The development of zero emission vehicles drives the need for new types of energy storage systems. Economic as well as environmental aspects have to be considered in such storage systems. The characteristics of Supercapacitors have been rapidly improving over the last few years. This opens more and more fields of applications to this technology. So far, chemical energy storages (batteries) have been the standard source of energy in electrical vehicles. The two main disadvantages of batteries are their inability to supply or take up peak currents, and, their limited lifespan due to chemical effects. These two gaps can be compensated by Supercapacitors. A capacitor is able to supply high currents and has cyclability over 500'000. The Lucerne University of Applied Sciences and Arts has developed a device called "virtual-parallel" circuitry (VP) which allows the use of Supercapacitors in industrial applications. The use of an energy storage only by means of Supercapacitors in an electrical vehicle makes new operation concepts possible.

#### Description

The vehicle under development is a small bus for public transportation with 12 seats and a weight of 4 tons. The energy storage only consists of Supercapacitors. During daytime, the bus is planned to operate between downtown Lucerne and the museum of transportation in full electrical mode (zero emission), only with the energy provided by the Supercapacitor unit. This unit will be charged after every transportation cycle within 3-4 minutes. An inductive non-contact high-speed power charger (IPT) is used in conjunction with the Supercapacitor unit. It makes the vehicle a carrier of new astonishing technologies and releases it from the „chain“ of the charger cable, which used to be a major technological drawback of electrical vehicles. In the evening, the small bus replaces big buses serving the lines in the surroundings on hybrid mode.

#### Results

The vehicle called "TOHYCO-Rider" was introduced to the public as a prototype at the occasion of two press conferences which were held on June 25, and on December 13, 2002, as well as a television broadcast on February 5, 2003. The feasibility of this unique concept, combining supercapacitors and inductive power transfer of energy, was demonstrated. Thus, an important goal of the overall project could be reached. The scope and the complexity of the project, which was pursued as a research project turned out to be a real challenge. Many demanding problems concerning the auxiliary equipment of the bus had to be solved. The next stage of the project



#### Projectname

Hybrid Small Bus "TOHYCO-Rider" with Supercapacitors

#### Projectpartners

- HSLU T&A
- BFE
- KTI
- TR-Group Konsortium (20 Partner)

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