

Introduction to the Project

This research project initiated by the department of Energy Technology at Aalborg University was founded together with the European Regional Development Fund, grant number ERDFK-08-0011, for developing state of the art components for electrical vehicles (EVs) of the future. The project was organized in different work packages each involving research in different areas (Fig. 1). As a part of the project an Audi A8 with an internal combustion engine was converted into an EV, thereby making it possible to incorporate the different developed technologies on a real EV platform, the AAUDI.

A clear benefit of choosing a EV, is the removal of pollution from the city to the power plant outside the city. By using the power generated by renewable energy, the EV is by far more green than an ordinary petrol vehicle.

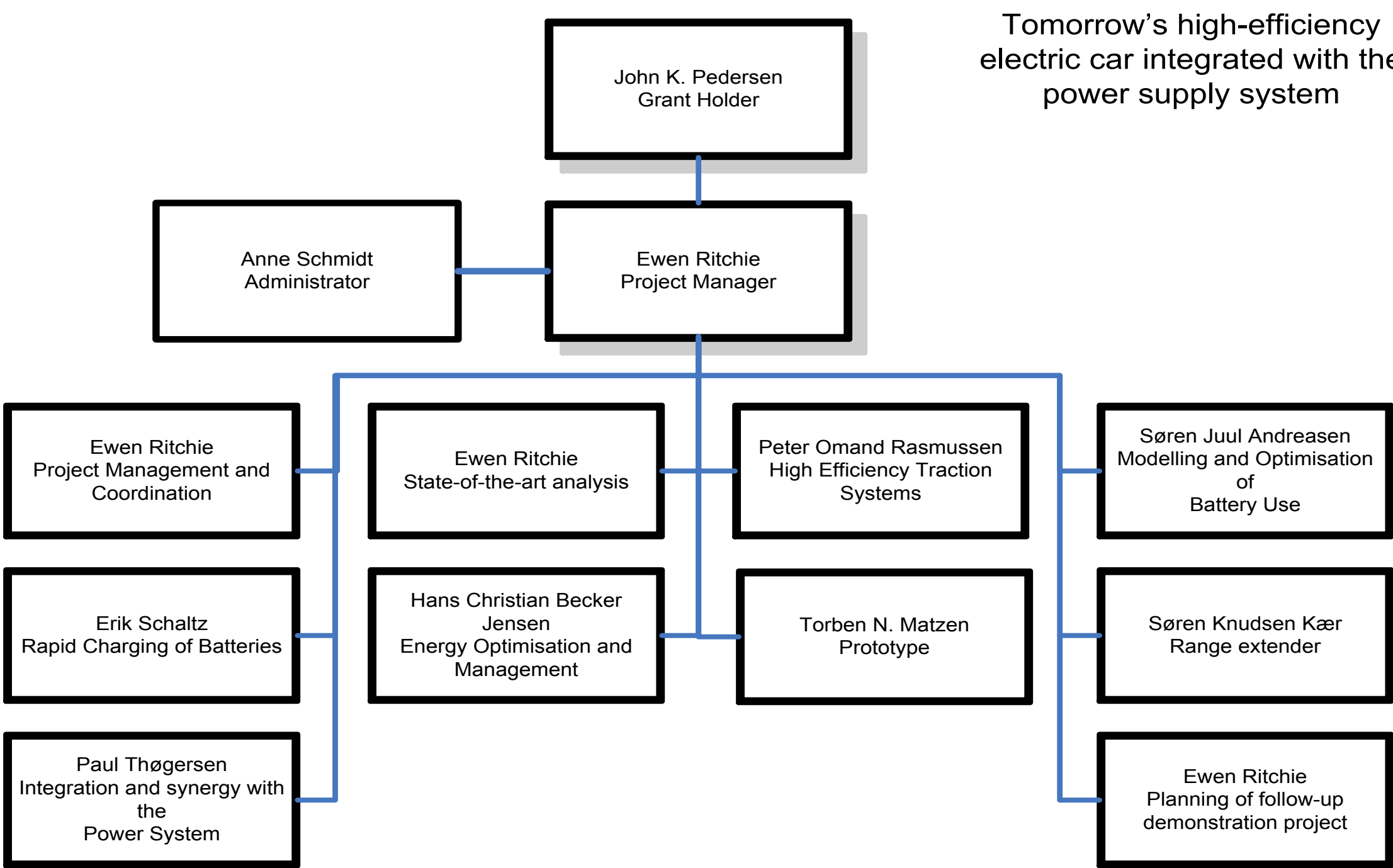


Fig. 1: Organisation chart.

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[3] Pillai JR, Bak-Jensen B. Capacity of Distribution Feeders for Hosting DER. CIGRE-ELECTRA 2013.

[4] Pillai JR, Huang S, Thøgersen P, Møller J, Bak-Jensen B. Electric Vehicles in Low Voltage Residential Grid: A Danish Case Study. IEEE PES Innovative Smart Grid Technologies (ISGT) Europe Conference 2012.

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[7] Pillai JR, Thøgersen P, Bak-Jensen B. Electric Vehicles to Support Large Wind Power Penetration in Future Danish Power Systems. IEEE Vehicle Power and Propulsion Conference 2012.

[8] Frandsen, T. V.; Rasmussen, P.O.; Jensen, K. K., "Improved motor integrated permanent magnet gear for traction applications," Energy Conversion Congress and Exposition (ECCE), 2012 IEEE , vol., no., pp.3332,3339, 15-20 Sept. 2012

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[10] Ritchie E, Leban KM. Student Learning Projects in Electric Vehicle Engineering. 20th International Conference on Electrical Machines, ICEM 2012 2012.

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[13] Frandsen T. V., Rasmussen P. O., Jensen K. K., Berg N. I., Holm R. K., Mathe L. and Matzen T. N.; Motor Integrated Permanent Magnet Gear in a Battery Electrical Vehicle; 2013 IEEE Energy Conversion Congress and Exposition; 15th-19th September 2013; Denver, Colorado, USA.

Electric Vehicle

The project studied the Plug-in Rechargeable Battery Electric Vehicle and its effect on the Electricity Supply System. Also a new battery and traction drive system was proposed and requirements for Public and Private Charging Stations were evaluated. As a part of the proposed traction and battery system, two state of the art traction motors including internal magnetic gears was developed and a 38 kwh 800 V battery pack was build and installed in the AAUDI platform. In order to control these components, a Motor Control Unit (MCU) Vehicle Control Unit (VCU) was developed and installed.

Methods for supporting the Electricity Supply System from the Electric Vehicle Battery were considered. Furthermore a method for extending the range before recharging, using PEM Fuel Cells was also proposed.

Performance

- 38 kWh
- 1200 Nm
- 128 kW



Fig. 2: AAUDI Prototype



Fig. 3: AAUDI Prototype

Research Results

The state of the art research developed in connection with the project has lead to numerous published papers, and international rewards. The papers can be found at the top right of the poster.

