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Prototyped CSIRO energy management system to power rail delivered to China

An energy management system prototype that has the potential to replace overhead electricity lines for trams has been built at CSIRO's Lindfield site in Sydney.

This first full-sized prototype unit is a result of a Rail Manufacturing Cooperative Research Centre (CRC) project involving CSIRO and the China Railway Rolling Stock Corporation (CRRC) which is looking into the use of supercapacitors to power light rail tram vehicles.

Traditional trams are powered by overhead electricity lines, which is referred to as a catenary system. A catenary-free rail system uses an on-board energy storage system to power rail, which requires high enough energy density to travel between tram stations and high enough power density, in the order of several megawatts, to enable rapid charging and then acceleration of the vehicle from the tram stop.

The prototype unit has been transported to China with the CRRC project team now working to manufacture the design. On a working tram, it is expected that each vehicle will require numerous energy management system units.

CSIRO's Electrical Machines Team Leader Dr Howard Lovatt said going catenary-free has many benefits for the rail industry.

"Eliminating the need for overhead electricity lines allows greater design flexibility thanks to fewer limitations on tram headroom and vehicle heights.

"It also means a reduction in construction and maintenance costs and the ability to store energy from regenerative braking back into the supercapacitor, which can further be used to power the tram," said Dr Lovatt.

CSIRO has partnered with CRRC on a suite of supercapacitor projects being overseen by the Rail Manufacturing CRC, an Australian Government Business Cooperative Research Centres Programme initiative that connects industry with Australian research institutions.

Initial project deliverables focus on developing the system architecture for cell balancing, charge and discharge profiles, and communications between the onboard system and the platform using commercially-available supercapacitors, which, unlike batteries, have the ability to charge and discharge very quickly for potentially 100,000 cycles.

For more information

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Rail Manufacturing CRC's CEO Dr Stuart Thomson said this project was an example of how developing new technologies and knowledge is enhancing the rail manufacturing industry's competitiveness.

"This project is a truly global collaboration which demonstrates the benefits of multinational organisations working with leading Australian research institutions," said Dr Thomson.

"Thanks to the collaboration with CSIRO since 2014, CRRC SRI has improved the technology of the traction system in catenary-free railway," said Mr Chen Kai, Deputy General Manager of CRRC Qingdao Sifang Rolling Stock Research Institute Co., Ltd.

CSIRO will continue to consult with CRRC on developing full scale system testing in an effort to assess the commercial feasibility of the technology.

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About the Rail Manufacturing CRC

The Rail Manufacturing CRC was established in 2014 and will operate for a period of six years, funded by the Business Cooperative Research Centres Programme of the Australian Government's Department of Industry, Innovation and Science. The Rail Manufacturing CRC fosters, sponsors and directs collaborative innovative research and commercialisation partnerships between key stakeholders in the rail manufacturing sector, looking to support the development of new products, technologies and supply chain networks to increase Australia's rail manufacturing capacity and competitiveness.

About CSIRO

CSIRO, the Commonwealth Scientific and Industrial Research Organisation, is Australia's national science agency and one of the largest and most diverse research agencies in the world. Its innovations contribute billions of dollars to the Australian economy every year. As the largest patent holder in the nation, CSIRO's wealth of intellectual property has led to more than 150 spin-off companies. For more information visit www.csiro.au

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