

Energy Storage Solutions For Future Mobility:- ECP White Paper

Workshop Background

Transportation represents a key contributor to CO₂ emissions (~18% - Australian Climate Change Council, 2015) along with other gaseous and particulate pollutants. Whilst improvements in the efficiency of the internal combustion engine, phasing out of diesel cars and initiatives such as biofuels may assist in reducing emissions and combatting peak oil, new technologies are required to meet our 2030 emission targets - 26% less than 2005 levels (Australia's Emissions Projections, Australian Government 2016) particularly given population growth. Tomorrows' transportation power sources are likely to be a mix of technologies, however, lithium based battery powered electric vehicles are particularly prospective given that they are estimated to release just ~6 g CO₂ / km as opposed to new vehicles ~184 g CO₂ / km (Australian Climate Council 2015) and are proven today as being technically feasible in low volume production by manufacturers such as Tesla, Nissan and BMW amongst others. Whilst prospective, significant issues of a technical, financial and societal nature currently hinder battery electric vehicles seeing wide spread adoption (Andwori et al, Renewable and Sustainable Energy Reviews, 78, (2017), p 414) and research is required to address numerous limitations:

- Electrical storage is expensive - (current \$750 per kWh - target \$150 USD per kWh)
- Electrical density is low (and heavy) - (current ~1 kW / Kg - target 150 kW / Kg)
- Charging is slow (notwithstanding now failed concepts like 'better place' swap and go)
- Recharge infrastructure is not in place
- Social acceptance of battery cars is low
- End of life considerations

According to Australian Lithium, Australia produced around 40% of world's lithium (2015) and has the third largest reserves behind Chile and China yet we are at risk of missing out on the \$2 trillion battery supply chain through an inability/reliance to value add to the mined raw product prior to export.

Given the opportunity described above, it would appear sensible that Australia considers taking strategic steps to become a global powerhouse in energy storage solutions for battery electric vehicles amongst other applications. In saying this, however, investment into battery research globally both through government grants and commercial entities is considerable and the IP landscape crowded. Determining exactly where best Australia should invest as an integrated research intervention (technical, business, societal) across the broader energy storage value chain remains a key issue and question to answer. The ECP white paper was proposed to undertake a strategic review with the goal of contributing to the thinking behind this question. The output of the ECP white paper will help to inform future RMIT investment decisions both in terms of project focus areas, capability development (collaboration) and infrastructure.

The workshop will consist of key note thought provoking presentations from organisations such as FORD, CAPXX and CSIRO, followed by round table discussions to probe questions surrounding research opportunity, collaboration and engagement.