FUTURE BATTERY INDUSTRIES CRC

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Regional synergy from new battery supply industries in the greater Kwinana Industrial Area

The Sustainable Engineering Group at Curtin University are world leaders in the development of industrial symbiosis programs. They have previously worked together with the Kwinana Industrial Area (KIA) in the development of the internationally recognised 'Kwinana Industrial Symbiosis program'(KISP) conducted between 1997-2007.

The KISP program was developed in response to significant environmental (air emissions) and resource efficiency problems (industrial water shortages) then being experienced in the Kwinana Industrial area. This KISP program developed 106 different resource synergies and by-product exchanges between 27 different industries in the KIA.

KISP resulted in Kwinana gaining a reputation as the World's largest and most successful example of industrial symbiosis (regional synergy) development. The benefits of these synergies in Kwinana went well beyond the conventional business case with enhanced resource security and efficiency, lower operational costs, reduced landfill disposal, and significant improvements in stakeholder engagement and satisfaction.

The program researched the wide range of drivers and barriers to the implementation of these symbiosis exchanges which involved a diverse range of stakeholders (e.g. companies, business, regulators, community).

Battery supply chain refineries in the wider KIA are expected to provide further opportunities for the development of enhanced resource efficiency and by-product exchanges in the KIA. In the 13 years since an Industrial Symbiosis review and detailed materials flow analysis was conducted, the KIA has also grown considerably to include the Rockingham Industry Zone and the Australian Marine Complex. This area is referred to as the Kwinana Industrial Zone (KIZ).

This PhD project will focus on updating the material flow analysis of current production in the KIZ and investigate the potential for lithium battery supply chain related symbiosis exchanges within the KIZ. The PhD will be focused on updating the existing synergies in KIA by including the current and proposed battery supply chain refineries and determine drivers (e.g. increased revenue through lower operation cost, reduce risk/liability, existing environmental regulations), barriers (e.g. distance between industries, availability of recovery technologies) and trigger events (e.g. resource scarcity, good examples from the previous synergy projects, avoiding

import by obtaining local resources) that are required for implementing these new synergies. The project will also cover the expanded KIZ including waste to energy processes.

The approach applied to identify, evaluate, and implement synergy opportunities includes the following steps: mass flow analysis of new refineries; finalisation of resource synergies; planning and organisation; (preliminary) assessment; feasibility studies; and implementation/continuation. This will be primarily a desktop-based research project gathering data from industry, government and other sources. It will include, a survey of resources within KIA, workshops for identification of opportunities (and continue further discussions with the KIC CEO and industry representatives to review previous synergies).

This PhD is fully funded with a student stipend and is to commence soon. Interested candidates are asked to contact Prof Michele John, Director, SEG, with their CV's.

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This PhD is part of the Process Legacy Project, a Future Battery Industries CRC project. The project seeks to determine the opportunity to maximise economically viable co-products and minimise repository use, all within a regulatory acceptable framework. Discovery and highlighting synergy within existing and future industrial complexes allow by-product utilisation. Development of new co-products could revitalise third party industries such as construction and infrastructure within a sustainable context.

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