

**COOPERATIVE RESEARCH CENTRE FOR SUSTAINABLE  
RESOURCE PROCESSING 2  
(CSRP2)**

**OUTLINE EXTENSION PROPOSAL**

**DRAFT February 2009**

**EXECUTIVE SUMMARY**

The Co-operative Research Centre for Sustainable Resource Processing (CSRP) will bid for a six year funding extension in the Commonwealth Government's 11<sup>th</sup> CRC selection round in March 2009.

CSRP has delivered significant education, research and technology developments for the minerals industry and CSRP2 will take these achievements to the next stage – practical implementation in the field.

Notwithstanding the current turmoil in the global economy, the worldwide demand for mineral-based products will, in the medium and longer terms, continue to increase exponentially due in particular to the ongoing modernisation of developing countries. This is good news for metal and mineral resource-based businesses and for major mineral exporting countries like Australia. Meeting this demand will be good for the global economy and will improve social equity by providing material goods to an increasing proportion of the world's peoples.

However, there are serious constraints to meeting this demand.

*As demand continues to grow and ore grades continue to decline, and if production and utilisation efficiencies continue to improve all as currently forecast – then well before 2050, production of mineral-based products will be limited by access to energy, to water, to allowable GHG emissions and to land for waste disposal. In other words, desirable business growth in the current paradigm will not be sustainable.*

Sustainability issues need to be built into business decisions and not seen as an add-on cost – in exactly the same way that incorporating safety issues is a normal part of doing business. To make sustainability issues an automatic part of our decision making process requires commitment from all levels of business and a willingness to give employees and consultants room (i.e. time and money) to explore these issues in project development and in operations.

## ***CSRP2 Proposition***

CSRP has added value to the Australian (and global) minerals industry in a number of areas. The total value of CSRP's research output has been estimated (by RMDSTEM) to be in excess of \$450 million dollars. CSRP2 will take various outputs from CSRP and develop them further to a point where full implementation is self-sustaining. In addition CSRP2 will also develop technologies in new areas of research which were identified in the first stage of CSRP:

### **Program 1 – Sustainable Operations**

- 1.1 SUSOP® SD management technique
- 1.2 GHG reduction options
- 1.3 Influence public policy, regulations and standards to support SD initiatives

### **Program 2 – People Resources**

- 2.1 Postgraduate and undergraduate support program
- 2.2 Retaining and exploiting the knowledge of late career professionals
- 2.3 Schools program (including the CRCA Award-winning Science Teachers program)
- 2.4 Training courses for SUSOP®

### **Program 3 – Mine to Metal Optimisation**

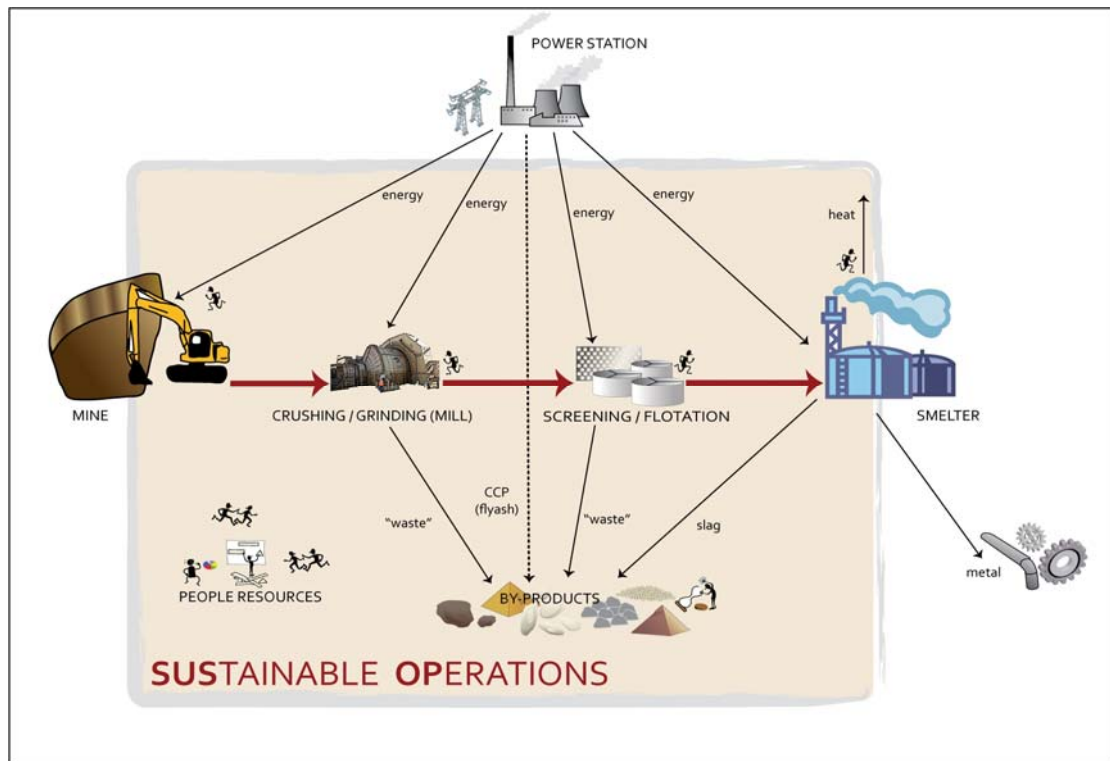
- 3.1 Fundamental comminution models
- 3.2 Mine to Mill optimisation
- 3.3 Mill to Smelter optimisation

### **Program 4 – Utilisation of Mineral By-products**

- 4.1 Low GHG concretes (including geopolymers, granulated slags, coal combustion products (ash), Bayer residues)
- 4.2 Bauxite residues for construction and agricultural uses
- 4.3 Mineral processing by-products (minor elements, sulphide wastes, mineral sands, etc.)

The specific objectives of this research program are:

- To develop the Sustainable Operations (SUSOP®) SD Management Techniques (set of tools and methods) for implementing beneficial change in existing minerals industry businesses and for designing new operations in accordance with Sustainable Development principles;
- To attract, develop and retain appropriately qualified and skilled people to the mineral, metal and related industries;
- To optimise the production chain from mine to mill to smelter, to minimise the overall ecological impact of mineral and metal production whilst maximising the value of the mineral resource; and
- To demonstrate beneficial uses of mineral-based by-products from a variety of sources and for a range of applications.



**Figure 1:** The Scope of CSR2 is shown diagrammatically in the figure above: from the condition and properties of the ore leaving the mine to the condition of the concentrate entering the metal production stage and from energy input from the power station to the beneficial use of by-products.

CSR2 will be structured to ensure that achievements of the past five years can be adopted by the end users in an on-going manner. CSR2's mission is to deliver key outcomes which will enable the mineral resources industry, a vital part of the Australian economy, to:

- achieve enduring value,
- maintain its licence to operate,
- lower its technical and financial risk,
- lower its costs and improve its value,
- contribute to its ongoing technical viability, and
- enhance its reputation as a good corporate citizen with strong social responsibility.

### *Participants in the bid and contributing strengths*

This is a proposal strongly driven by the industry and CSRP2 will harness the proven R&D talent in Australia's world class centres of excellence, together with selected overseas research organisations, which will enhance a multi-disciplinary, innovative team covering the value chain from mine site through to metal production and utilisation of currently wasted by-products.

A broad range of industry participants in CSRP has shown clear commitment to supporting the extension to CSRP2. These participants range from major global corporations to niche specialists in the industry covering many mineral commodities.

The proposed research cohort will continue working together to enhance what CSRP has achieved: a multi-disciplinary, innovative response to the technical challenges posed by sustainable development. CSRP2's research providers will include Curtin University (involving its Centre of Excellence in Cleaner Production and Australian Sustainable Development Institute) and the University of Queensland (involving its Sustainable Minerals Institute, in particular the Julius Kruttschnitt Mineral Research Centre and the Centre for Social Responsibility in Mining), augmented by specialist groups from Murdoch University (Institute for Resource Technology), the University of Cape Town (Centre for Minerals Research), the University of Newcastle, the University of Ballarat and the University of Technology, Sydney (Institute for Sustainable Futures).

Finally, CSRP2 outcomes and strategies will be linked to user needs and will build closely on the outcomes and successes of CSRP but with a clear sustainable development driver amplified by the integrated technical programs – a natural extension of the technology outcomes from the first stage of CSRP. CSRP2 will take many of the research outcomes of CSRP and undertake substantial development activities to maximise uptake and value to end users in the near, medium and longer term.

The great innovative potential in sustainable development comes from the need for total systems thinking, addressing stretch targets and the imperative to find economically attractive and socially acceptable ways to get there. A combination of incremental and breakthrough innovation in CSRP2 can deliver such outcomes.