

Energy efficient electrical connections

CSIRO consulting services

CSIRO offers consulting and training services for maximising efficiency of high amperage electrical connections.

We can deliver significant cost savings to energy intensive industries using high current electrical connections, such as aluminium, copper and zinc smelting.



David Molenaar delivering a training session.

The cost of energy losses

Industrial high current electrical conductors and connections are not perfectly efficient electrical contacts, and hence are a source of energy loss.

In aluminium smelting, power loss of approximately 10 per cent occurs through bus bar and associated electrical connections.

Significant cost savings can be achieved by improving energy efficiency of electrical contacts.

Reducing energy consumption

Improved connections can generate 20 millivolt savings for each reduction cell in a typical modern smelter with production of 500,000 tonnes per year.

- This is enough to power 7550 average Australian households.
- These energy savings can produce aggregate cost savings of more than A\$1 million per year.

A 20mV saving across all seven Australasian aluminium smelters would save enough electricity to power all the houses in a city the size of:

- Gladstone, Queensland
- Invercargill, New Zealand

Our suite of services

We have a suite of advisory services that identify energy saving solutions for industries using high current electrical connections. They include:

- specialist engineering design and review – purpose-designed solutions which provide optimal electrical efficiency to solve existing problems
- process audits – detailed review of existing plant component design and process conditions
- validation support – identification of the improvements which offer the “best return” to process conditions identified in the audit
- specialist training – for operational decision makers to improve efficiency of day-to-day plant management.

Reducing industrial carbon footprints

This service is a part of our strategy for carbon mitigation via technologies that reduce greenhouse gas emissions.

A 20 mV power saving for each cell in a typical aluminium smelter can result in an annual reduction of CO₂ equivalents which has the same effect as removing 5430 cars from the road.

Reducing power loss is the most effective way to reduce industrial carbon emissions associated with electricity use. This is especially so in countries which are highly reliant on coal-fired electricity plants.

Our services

SERVICE	CONTENT	DELIVERABLES
Specialist engineering design and review	Design and modification, providing a tailored solution to an identified problem.	<ul style="list-style-type: none"> ♦ Purpose-designed engineering solutions which provide optimal electrical efficiency and cost balance
Process audits	<p>Detailed review of existing plant design and process conditions.</p> <p>Detailed report with recommendations for tailored process improvements and assessment of potential impact on voltage and greenhouse gas emissions.</p>	<ul style="list-style-type: none"> ♦ Identification of low or no capital solutions ♦ Focus on short (<1 year) payback ♦ Potential savings >A\$1 million per annum per plant
Validation support	<p>Verification of possible benefits for implementation, via a targeted campaign of precise measurements.</p> <p>Assessment of benefits of each energy-saving opportunity identified in the process audit, conducted as a separate project.</p>	<ul style="list-style-type: none"> ♦ Expert advice on validation technique ♦ Cost benefit analysis ♦ Business case development
Specialist training	<p>Intensive training seminars for operational managers (crew leaders, process specialists, reduction line management, R&D support staff).</p> <p>Awareness sessions delivered to operational staff via 'tool box' meetings.</p>	<ul style="list-style-type: none"> ♦ Better informed operational decisionmaking ♦ Staff gain a rapid understanding of the fundamentals of maintaining efficient electrical connections



The CSIRO energy efficiency consulting service is led by David Molenaar. David is an experienced engineer qualified in mechanical, electrical and computing disciplines, and a recognised expert in the area of high amperage DC systems. He provides fundamental engineering solutions through practical process reviews and audits. He has developed and delivered training sessions for smelting, operational and R&D staff worldwide.

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FOR FURTHER INFORMATION

Minerals Down Under Flagship
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