

# 09

# ACARP RESEARCH PRIORITIES

## 2009 TIMETABLE

**May 20**

Deadline for submission of short proposals

**July 24**

Applicants notified of success in moving to second stage — full proposal is requested

**September 9**

Deadline for submission of full proposals

**Mid December**

Applicants notified of funding allocation, success/failure

### PROCESS

ACARP assists the Australian coal industry to develop and adopt technology and mining practice that leads the world. The program is entirely funded, owned and managed by the Australian black coal producers. These priorities have been developed by the five technical committees responsible for project development and selection. The categories to which these priorities relate are **Underground, Open Cut, Coal Preparation, Technical Market Support and Mine Site Greenhouse Mitigation.**

These priorities are not prescriptive but should act as a guide to the areas in which ACARP is seeking research proposals. Selection is a highly competitive process and therefore project quality is a key determinant issue.

ACARP is a collaborative program that utilises the experience and technical strength of both the coal mining industry and research institutions in solving technical problems and addressing issues of significance to the industry's long term future. Any proposed research project that is strongly supported by a mine site and is of interest to a number of coal operations is encouraged.

Safety remains a key driver in the program. It will continue to be the focus of much of the underground work and a significant component of the open cut and coal preparation programs.

### FORMAT

Short proposals are limited to 5 pages maximum and should be prepared under the following headings:

- Executive Summary
- Objectives
- Outcomes and Benefits
- Work Program
- Safety Implications
- Key Personnel
- Budget
- Support.

### HOW TO APPLY FOR FUNDING

Short proposals must include a Proposal Summary Sheet and should be emailed to ACARP at: **anne@acarp.com.au.**

The Proposal Summary Sheet, and further information, can be obtained from the ACARP web site [www.acarp.com.au](http://www.acarp.com.au) or by phoning ACARP on 07 3229 7661.

**The closing date for short proposals is Wednesday, 20th May 2009.**

# UNDERGROUND

The underground research requirements for 2009 cover two focus areas – welfare of community and employees, and profitability. The first includes health, safety, environment and community initiatives towards zero harm. The second goal incorporates improved productivity, increased automation capability, equipment and systems reliability and reduced costs.

## IMPROVED HEALTH AND SAFETY

- Clarification of key underground health and safety issues and management practices, including legislative best practice alternatives.
- Improving the management of principal/major/core underground mining hazards including gas, fires and explosions. Outburst research goals include efficient collection of data, more reliable detection of structures, improved gas drainage, education and training initiatives and improved outburst management protocols.
- Improving equipment operator interfaces (eg collision avoidance), greater automation and reduced exposure to vibration impacts, ergonomics and appropriate operator skills and practices. Reduce repetitive heavy manual handling, introduce lightweight materials and investigate technology to improve vision.
- Safe controls for, or the elimination by alternative technologies, of airborne contaminants (eg dust and diesel emissions) and noise exposure.
- Reviewing the adequacy and effectiveness of emergency response measures leading to practical solutions for industry implementation.
- Innovative processes to assist in the management of operator fatigue. This applies equally to the coal preparation and open cut areas.
- The development of simple, applied and practical risk management tools/approaches tailored for application in the Australian coal industry. This applies equally to the coal preparation and open cut areas.

## MANAGEMENT OF MINING CONDITIONS

- Improved efficiency and effectiveness in detecting anomalies and discontinuities, characterising ground conditions using innovative methods of drilling, exploration and remote sensing.
- Develop techniques and procedures to improve the effectiveness of ground control systems using monitoring systems, integrated real time models, industry wide analysis and improved designs.

## HIGHER PRODUCTIVITY MINING

- Improvements in roadway development systems and equipment.
- Application of remote control and automation processes to increase productivity and reduce operator exposure to hazards.
- Improved longwall systems reliability and performance.
- Innovative initiatives to improve logistics and training of operators, tradespersons and staff to build and maintain skills and competency for safer, more efficient mining systems and knowledge management.

## EQUIPMENT AND MINING SYSTEMS RELIABILITY

- Improvements to the design and uses of equipment to maximise safety, operability purpose, reliability, maintainability and energy efficiency.
- Increase the uptime of mining and services processes, including the application of predictive maintenance methods.
- Further improvements in the understanding and rationalisation of both low and high voltage electrical systems.

## IMPROVED HEALTH AND SAFETY

The industry is looking for direct or indirect improvements in health and safety across all mining and exploration operations. Areas of focus and interest for open cut mining are:

- Personal back and joint damage. A number of improvements have been seen in the areas of seating, suspension and vehicle ride, but continued development and new approaches are required to further reduce injuries of this type.
- Protection and removal of personnel from potentially hazardous situations such as working under highwalls and during loading of trucks.
- General improvement to the safety of mining and maintenance operations through novel procedural, operating, or equipment changes.
- Manual handling aids for operational and maintenance activities including elimination of human intervention through automated technologies.
- Innovative processes to assist in the management of operator fatigue. This applies equally to the coal preparation and underground areas.
- The development of simple, applied and practical behavioural safety management tools/approaches tailored for application in the Australian coal industry. This applies equally to the coal preparation and underground areas.

## INCREASE THE PRODUCTIVITY OF MINING SYSTEMS

A reduction in unit costs of production is a key driver for the industry. Some specific issues are:

- Implementation of automation for production systems.
- Enhancements to major mining equipment to enable decreased cycle times and increased utilisation.
- Innovations in operating techniques.
- Lower cost ways of fragmenting ground for optimum diggability and bucket filling.
- Development of innovative methods to improve coal recovery.
- Geotech stability of very high spoil piles and highwalls.
- Assessment of operator training effectiveness.
- Improvements in mine planning optimisation and visualisation tools.

## IMPROVEMENT IN THE EFFICIENCY AND RELIABILITY OF EQUIPMENT AND SERVICES

The industry believes that working with OEMs is of significant value and would also welcome projects that are supported by, or integrate with, OEMs:

- The application of alternative materials to high maintenance areas.
- Reliability engineering, including whole of asset approaches.
- Condition monitoring and its effective and useful integration.
- Innovations that help mine operators improve tyre life.
- Advances that help relate duty to work done across a range of equipment to define maintenance needs.
- Improved methods for reducing catastrophic equipment failures.
- Technologies that improve energy efficiency across the mine.

## IMPROVED GEOLOGICAL DEFINITION OF COAL DEPOSITS

For economic assessment reasons, it is essential that we have the best possible understanding and definition of the resources and reserves underpinning any mining operation.

- Development of advanced techniques to process and interpret geophysical data and the further development of geophysical tools.
- Development of techniques to better and more accurately determine the quality and quantity of the coal resource/reserve, particularly in near surface to moderate depth targets.

# COAL PREPARATION

The coal industry faces a range of high level sustainable development issues which, in the context of coal preparation research, translate to:

- Occupational health, safety and environmental improvements.
- Energy and water efficiency and usage improvements.
- Optimal resource/reserve recovery.
- Maximise the opportunities or survivability of the coal industry to market conditions.

Occupational health and safety is paramount and all efforts must be made to ensure continued improvement. Rejects disposal and tailings dams are of particular interest, from both environmental and water loss perspectives, noting that proposals for final rehabilitation of tailings dams should be directed to the open cut committee.

Proposals offering practical and commercially viable outcomes that can be implemented relatively quickly to provide ongoing benefits are especially encouraged. Topics of specific interest are listed below in four broad themes. Consideration will also be given to projects addressing the traditional areas of coal preparation improvement, such as efficiency optimisation, moisture reduction and cost reduction.

## GROWTH/SURVIVAL

- Reduce capital costs and construction times for new plants/expansions and simplify the circuits at the same /improved efficiency.
- Increase yield and tonnage throughput potential for existing plants; understand tipping points as feed rates are increased.
- Reduction of unit costs through economy of scale, improved throughput rates, increased availability and/or improved efficiency.
- Lower cost alternatives to flotation for fines circuits.
- Better correlations to obtain plant design parameters from bore cores, especially slim cores, to improve the envelope for design.

## METALLURGICAL EFFICIENCY

- Improved fines size separation efficiency.
- Improved circuit design; optimising cut-points to individual unit operations.
- Improved and comprehensive product accounting and reconciliation.
- Process efficiency improvements and measuring capability.

A project titled *The Intelligent Plant* (C11069) has developed a range of recommendations for improvements in this area. These are outlined in the project report which is available on request. Those considering proposals in this area are advised to obtain a copy from [anne@acarp.com.au](mailto:anne@acarp.com.au).

## OPERATOR ASSIST

Plant simplification and automation will reduce the amount of human operator time spent on routine tasks, allowing the limited skilled workforce to spend maximum time on value added activities. Suggested topics include:

- More and better sensors for critical plant performance parameters.
- Remote monitoring and process control capability.
- Autonomous equipment.

## SUSTAINABILITY

- Improved health and safety; improved procedures for, or elimination of, heavy organic liquids for float/sink testing and radioactive sources in plants.
- Energy efficiency to reduce plant CO<sub>2</sub> footprint.
- Reduce environmental impacts:
  - > improved reject and tailings management,
  - > alternatives to belt-press filters and tailings dams,
  - > stabilising tailings dams with a high proportion of clay minerals,
  - > reduce water consumption and increase water recycling,
  - > effect of dissolved salt build up on plant, product quality and separation processes.

# TECHNICAL MARKET SUPPORT

The technical market support committee will consider proposals addressing technical issues that significantly and demonstrably affect the value in use of Australian coals in current technologies, especially where the impact is acknowledged and supported by an industry advocate. This may include:

- Understanding the properties of Australian coals which impact on utilisation performance and market acceptance.
- Development of new test procedures and advanced characterisation techniques currently in use that may need to be adapted to coal.
- Understanding properties of coals from key competitor nations.
- Environmental and sustainable performance of coal taking account of current and emerging legislative regimes.

Proposals should clearly articulate:

- Industry needs and benefits.
- Knowledge of the current state of the art.
- Capability to make a meaningful contribution.
- Realistic timetable for completion.

The major markets for Australian coals are electricity generation and iron production, and it is anticipated that the majority of proposals will address these markets. Proposals addressing the use of coal in other industrial applications will also be considered where a significant benefit to coal producers can be demonstrated.

Proposals must be clearly distinguished from existing work elsewhere, including cooperative research centres directly funded by ACARP, and show a major benefit to coal producers to be considered for ACARP funding.

## THERMAL COAL

Technical issues of interest include:

- Combustion performance of blends of Australian and International coals.
- Trace elements, in particular factors affecting deportment/speciation behaviour, including:
  - > the impact of technology (eg hot/cold ESPs; wet/dry FGDs etc),
  - > the impact of other coal properties (ash, chemistry, chlorine, etc),
  - > the impact on ash utilisation potential.
- Environmental performance in use.
- Fine particulate emissions, especially PM<sub>2.5</sub>.
- Dust control, eg from coal handling and transport systems.

## METALLURGICAL COAL

ACARP is particularly interested in coke making processes as they impact on the value in use of Australian coals, with emphasis on the following points:

- Basic coking mechanisms in:
  - > conventional coke ovens, particularly as they relate to variable operating conditions.
  - > non-recovery/heat recovery coke ovens, particularly as they relate to coke quality relative to conventional coke ovens.
- Blend optimisation under different coke making regimes.
- Interactive effects in blends, particularly understanding the factors that influence coke strength.
- Understanding overseas work on alternative coke making processes, in particular the implications for the use of Australian coals.
- Impact of coal ash mineralogy on coke behaviour in the blast furnace.

Pulverised coal injection is of general interest.

Other smelting processes, while representing smaller markets, are also of interest. Proposals addressing the impact of coal properties on value in use in these processes will be considered.

# SUSTAINABILITY

**Proposals in this category will be considered by the underground, open cut or coal preparation committees, as appropriate.**

## MANAGEMENT OF MINE SITE ENVIRONMENT AND COMMUNITY ISSUES

In pursuit of sustainable development the industry is calling for research to enable it to continually improve its ability to manage environment and community issues. Research is needed to fill gaps in knowledge and to identify and respond to future issues such that stakeholders have confidence in the industry's ability to manage and reduce its impacts.

The industry would be pleased to receive submissions addressing the following topics:

### License to Operate

- Improved methods for the management and mitigation of the impacts of subsidence.
- Management of the impact of mining on aquifers and other water resources.
- Improved methods for managing biodiversity adjacent to, and in association with, mining.
- Improved methods for the prediction and management of dust and noise impacts generated by mining operations and associated infrastructure.
- The amelioration of overpressure, vibration and fumes generated from blasting or other operations on coal mines.
- Economic use or reprocessing of coal processing waste.
- Further understanding of community aspects of the sustainable development of the coal mining industry.
- Methods for the efficient reduction of fugitive greenhouse gas emissions.
- Improve the energy efficiency and productivity of all mining plant, equipment and systems.

### Effective Closure and Lease Relinquishment

- Sustainable methods for coal washery management with a focus on reduced environmental footprints.
- Soil profile development and carbon capture.

### Water

- Techniques to achieve more efficient use of water leading to reductions in usage.
- Improved understanding of the impacts of mining on receiving environments in streams.
- Principles of design for sustainable ephemeral stream diversion through previously mined areas.

# MINE SITE GREENHOUSE MITIGATION

Australian coal producers need to measure, control and report greenhouse gas emissions as part of the National Greenhouse and Energy Reporting Scheme (NGERS). ACARP seeks proposals that:

- Ensure the industry can accurately measure the emissions from both open cut and underground operations.
- Act to reduce these emissions.
- Address any future requirements.

Fugitive gases are the largest source of greenhouse gas emissions from coal mining operations and as such are the primary focus of ACARP priorities in this area. Measurement of greenhouse gas emissions and utilisation of captured methane have been identified as the areas of greatest potential impact.

## MEASUREMENT OF FUGITIVE EMISSIONS

It is critical for coal producers to be able to accurately determine their emissions and to know where improvements need to be made. The industry needs to understand the extent by source of mine site emissions and the uncertainty associated with these measurements, now and in the future. Proposals are sought to:

- Improve the reliability, accuracy and cost effectiveness of measuring, monitoring and reporting greenhouse gas emissions.
- Reduce the uncertainty of fugitive emissions measurement.
- Continue to develop verifiable industry practice methods suitable for use at individual mines to measure fugitive emissions from:
  - > open cut operations,
  - > operating underground operations,
  - > decommissioned underground operations.

## CAPTURE OF MINE GAS

ACARP is interested in projects addressing open cut or underground operations with the potential to:

- Reduce gas drainage costs.
- Maximise pre and post-mining gas recovery.
- Improve the quality and consistency of mine gas production.
- Assess and manage the impacts of gas capture.
- Address future fugitive emission reduction requirements.

## UTILISATION OR DESTRUCTION OF MINE GAS

Dilute sources of seam gas such as mine ventilation air are a significant challenge. Projects aimed at combusting or utilising dilute gas, or increasing the methane concentration to usable levels, in a cost neutral manner without the need for a supplementary fuel are encouraged. Commercial power generation technologies for high purity methane such as drainage gas are being increasingly adopted and are not seen as a high priority for further ACARP research.

## GENERAL NOTE

The use of coal in the context of sustainable development is a major strategic issue for coal producers and the capture and geological storage of CO<sub>2</sub> is likely to have an essential role in the future. As one of a range of industry responses, ACARP is a participant in various cooperative research programs.

As a result, the committee will only consider proposals addressing greenhouse gas emissions resulting from the production of coal, and will not fund projects that duplicate work covered by cooperative research programs.

# GUIDELINES

- All proposals must have a Proposal Summary Sheet attached. This is available from [www.acarp.com.au](http://www.acarp.com.au) or by emailing [anne@acarp.com.au](mailto:anne@acarp.com.au).
- Extraneous material such as company profiles, lists of publications etc will be detached and discarded.
- Proposals must be no longer than 5 pages (including the proposal summary sheet).
- Proposals are to be emailed to ACARP at [anne@acarp.com.au](mailto:anne@acarp.com.au)
- A copy of "Guidelines on the Preparation of Full Proposals" will be provided if a proposal progresses to the full proposal stage.

In preparing a proposal the researcher should consider the justification for the project:

- How will the results benefit the Australian coal industry?
- Should funding other than by ACARP be sought?
- Does the proposal address at least one of the priorities specified in this publication?

The proposal should:

- Clearly define the objectives of the research.
- Describe the benefits to coal producers from the research.
- Outline how the research will be carried out.

## FORMAT FOR SHORT PROPOSALS

Short proposals are ranked primarily according to the importance of the problem to the industry and the credibility of the proposed approach. Short proposals enable the ACARP committees to quickly gain a broad appreciation of these features.

Short proposals should be no longer than 5 pages (including the proposal summary sheet), and must include:

### Executive Summary

State the objective, outline the approach to be taken and state the outcome expected from the project.

### Clear Statement of Objectives

It is essential that the project objectives identify the problem to be solved. The objective should not be a précis of the work program, but a simple statement of what is to be achieved, eg develop a prototype machine, develop a technique, understand a mechanism.

### Expected Outcomes and Benefits

ACARP recognises that every research project has an element of risk, and not all projects will succeed. The risks and rewards in the project should be made clear. Proposals should indicate:

- The likelihood of success, and how the work fits within the priorities.
- Estimate the size and nature of the benefits of success, in dollar terms if possible.

## PROJECT ADMINISTRATION

### Australian Research Administration

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Brisbane Qld 4000  
PO Box 7148  
Riverside Centre Qld 4001

Phone 07 3229 7661  
Email [anne@acarp.com.au](mailto:anne@acarp.com.au)  
[www.acarp.com.au](http://www.acarp.com.au)

The outcomes that can be expected at the end of the project should be clearly stated. For example, if a new device is to be developed; is this project proof of concept; or will it produce an industry scale prototype?

### Brief Summary of the Work Program

There is no need for a detailed work program at this stage. The methodology the researchers will use to achieve the objectives, along with a technical justification, should be outlined. Points to cover include:

- Demonstrate a commitment to complete in a timely manner.
- Test procedures and facilities to be used.
- Whether this is a laboratory, pilot scale, or field demonstration project.

- The critical problems and how they will be solved.

### Safety Implications, If Any

The safety aspects of the proposed research must be clearly outlined:

- Any potential safety hazards in carrying out the research.
- Note the impacts of successful research on industry safety, health, environment and community performance.

### List of Key Personnel

The project leader should be noted. This person will liaise with ACARP and will be responsible for the preparation of all relevant reports as well as the technical direction and management of the project.

Do not include detailed CVs, references or publication lists.

### Budget

A detailed budget is not required at this stage, but proposals should demonstrate sufficient resources to ensure success. The total amount required, the funds requested from ACARP and funds from other sources should be indicated.

The budget should include:

- Number of man-days.
- Cost of man-days including overhead component.
- Consumables and equipment purchases.
- Travel to site and six monthly review meetings.

Proposals should be costed on a GST EXCLUSIVE basis. Projects submit invoices quarterly, for agreed progress payments plus any GST payable.

### Support

If individual coal producers are to meet part of the project cost, or provide host sites for testing or other in-kind support, it is the responsibility of the researcher to provide confirmatory letters of support from responsible company representatives. The project will not commence until ACARP is satisfied that this in-kind support will be realised.

# ACARP

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