PERSPECTIVES ON BROWN COAL
THE NEWSLETTER OF BROWN COAL INNOVATION AUSTRALIA
August 2014 : Special Edition

BCIA 2013/14 research and development project grants

DICE PROJECT

- $1,000,000 funding for *'Victorian Direct Injection Carbon Engine (DICE) development – derisking and small scale development';* submitted by **Commonwealth Scientific and Industrial Research Organisation (CSIRO)**. Project participants include **MAN Diesel & Turbo Australia Pty Ltd**, **Exergen Pty Ltd**, **Ignite Energy Resources Pty Ltd**, **AGL Loy Yang Pty Ltd** and **Energy Australia**.

This project is a significant progression of earlier BCIA-funded research and will inform development plans for commercial production of the world's first direct injection carbon engine (DICE) powered by water-based lignite slurry; within the next three years. The research program is targeting a step-change in fuel cycle efficiency which will enable a 48 - 50 per cent reduction in CO2 emissions compared with existing Victorian brown coal-fired power plants. The initial laboratory-scale research funded by BCIA achieved excellent ignition and combustion results from lignite slurries prepared by hydrothermal treatment and also addressed a range of technical issues related to fuel production and coal engine interactions.

The new research program includes development of an adapted engine design by MAN Diesel & Turbo, the world's largest manufacturer of stationary diesel engines, and testing of 20 tonnes of micronised refined carbon (MRC) from Victorian brown coal in a pilot-scale engine facility located in Japan. The increased efficiency of the direct injection carbon engine powered by lignite water fuel can be achieved at one fifth the unit capacity of proposed new low emissions coal fired power plants; thereby substantially reducing the capital costs of low-emissions brown coal energy in the near term. The direct injection carbon engine also offers the potential for increased operational flexibility to support peak load electricity demand and supply from intermittent renewable energy; thereby supporting a higher penetration of renewable energy supplies.

The DICE research plan encompasses an initial risk definition and mitigation project to address remaining technical uncertainties for the low ash Loy Yang lignite coal to be utilised in the integrated engine test program. Aspects to be covered include the fouling tendency of the lignite slurry under laboratory test engine conditions and optimisation of lignite water fuel preparation procedures. Successful completion of the risk assessment will facilitate a second-stage 30 month research project encompassing fuel production for DICE tests, engine facilities development and research on logistics, standards and fundamentals R&D. The latter stage is expected to provide MAN and coal fuel providers with key performance data which would facilitate commercial scale demonstration of the DICE technology.