

COAL MINE METHANE SUCCESS STORY

Demonstration Scale RTO, With Partial Connection to a Working Coal Mine

Centennial Coal Company Limited Mandalong, NSW, Australia

OVERVIEW OF COAL MINE METHANE PROJECT:

Centennial Coal has been proactive in developing a greenhouse gas abatement strategy. A demonstration scale Regenerative Thermal Oxidiser (RTO), which processes 12.5 m³/s (45,000 m³/h) of Ventilation Air Methane (VAM), has been constructed at its Mandalong mine site, north of Sydney in NSW, Australia. This has been made possible with funding from Centennial Coal, Coal Innovation NSW and parallel R&D through Corky's Sustainable Energy. The RTO has been designed with increased safety and operability in mind. The RTO design including tower height, refractory mass and internal brick web thickness maximises capacity, while minimising any chance of flash back to the mine. Maintenance requirements are also low, due to the temperature control systems preventing brick fluxing (melting).

This RTO has been designed and installed as if it was to be hard connected to the ventilation fan. This allows for a repeatable design to scale up to commercial scale (10 times the capacity)— including functional safety, quality assurance measures to meet Mandalong mine standards and maintenance requirements in this type of environment. Commissioning and experimentation are to commence early this year (2013). This system provides a reduction of US \$875,000 pa in Australian carbon tax liability.

ESTIMATED ANNUAL EMISSION REDUCTIONS: 36,050 MTCO₂E

PROJECT DETAILS

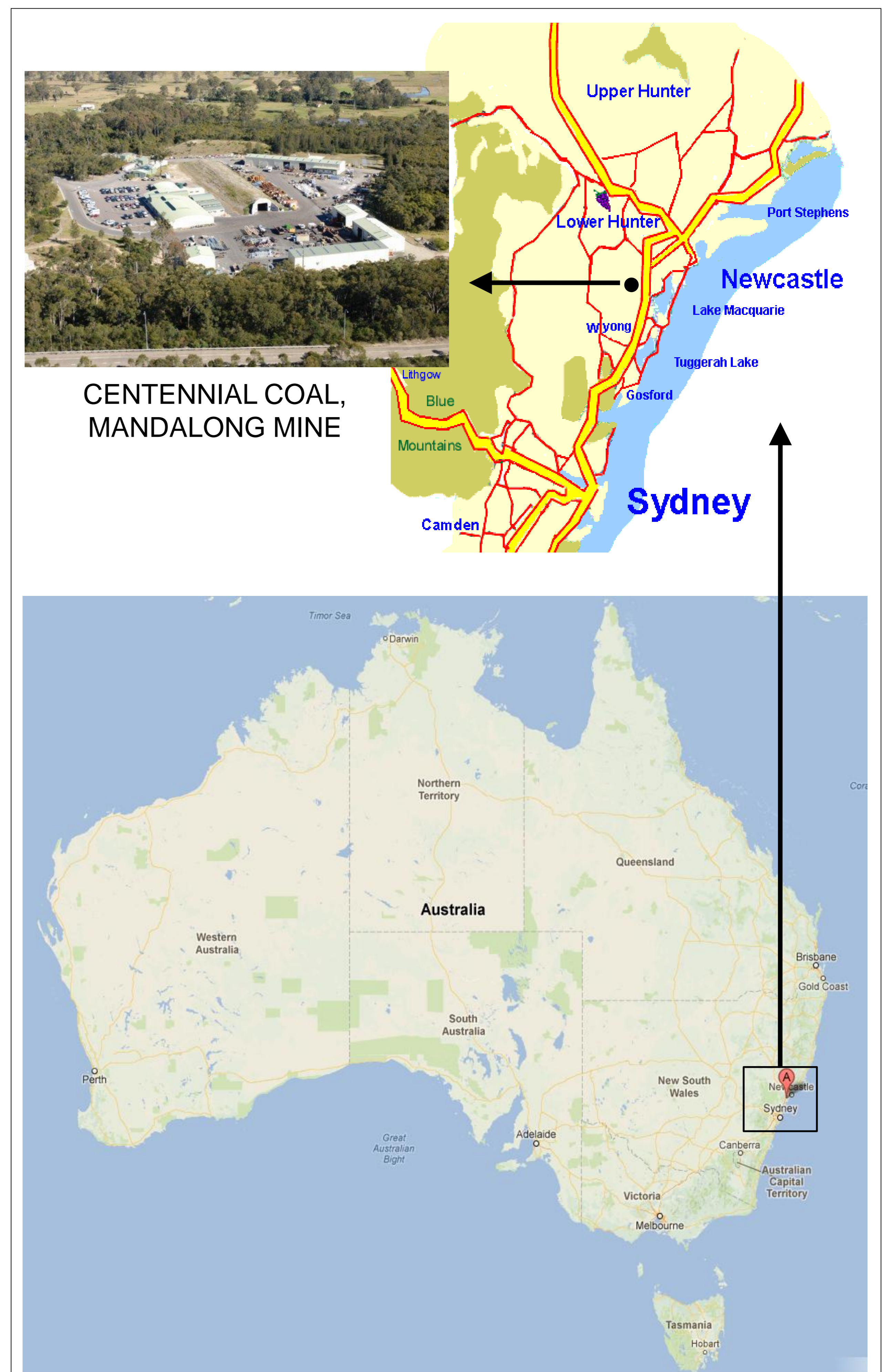
- Name of Project:
DEMONSTRATION SCALE RTO, WITH PARTIAL CONNECTION TO A WORKING COAL MINE
- Name of Mine:
CENTENNIAL COAL, MANDALONG MINE
- Type of Ownership: **PRIVATE**
- Project stakeholder(s) involved in project's design, development, and implementation:
**CENTENNIAL COAL COMPANY,
COAL INNOVATION NSW,
CORKY'S SUSTAINABLE ENERGY**

MINE INFORMATION

- Mine owner (name of company):
CENTENNIAL COAL, MANDALONG MINE
- Parent company: **BANPU PUBLIC COMPANY LIMITED**
- Status and type of mine: **ACTIVE UNDERGROUND**
- Mining Method: **LONGWALL**

PROJECT FINANCES

- Actual capital costs: **US\$4.2 M + \$1.1 M PARALLEL R&D**
- Estimated operation and maintenance (O&M) costs for fully implemented project: **US\$ 60 k pa**
- Projected Return on Investment (ROI): **5.5 years (18.5%)**



INSTALLED TECHNOLOGIES

Corky's Patented RTO – also known as Ventilation Air Methane, Regenerative After Burner (VAM RAB), and Safe Connection Duct (left to right)



HIGHLIGHTS / LESSONS LEARNED

Highlights include developing a “functional safety case” for the “safe connection duct” which connects the RTO to the coal mine ventilation fan. This duct contains various safety mechanisms including vents, barriers and dilution louvres. It was advantageous to construct and assemble the duct off site for testing the venting and dilution mechanisms. Experiments on the smaller scale pilot plant demonstrated the importance of thermal mass, RTO height and rapid venting to add factors of safety by rapidly dissipating any pressure rise and absorbing heat. The factor of safety has been increased greater than 100 times the tolerable risk level specified by Centennial.

It is important to develop a design assurance process prior to the design and construction of an RTO on a working coal mine. This project has also emphasised the importance of the design team to collaborate with the mine operations workforce and mine regulators, and allowing this team work to achieve the common goal of greenhouse gas abatement.

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