CSIRO is working to reduce the cost and improve the efficiency of carbon dioxide capture and storage so it is a viable option in the future.

Carbon capture and storage

Carbon dioxide capture and storage (CCS) technologies have the potential to make deep cuts in Australia’s greenhouse gas emissions from coal-fired power stations. CSIRO is working to reduce the cost and improve the efficiency of CCS so it is a viable option in the future.

Research is focused on deploying large-scale demonstration projects that will lead to substantial reductions in emissions and provide a pathway for industry to adopt the technologies on a commercial scale.

With significant activities in both capture and storage, CSIRO has a strong track record in both the underpinning science of CCS and working with industry on demonstration projects.

Post combustion capture

Post combustion capture (PCC) technology could reduce emissions from coal-fired power stations by more than 80% per unit by capturing carbon dioxide (CO₂) from flue gases.

CSIRO has partnered with industry and government in the development, commissioning and operation of four PCC pilot plants – three in Australia and one in China – with more planned for roll out.

This work is supported by an extensive laboratory research program aimed at the development of novel solvents, ionic liquids and novel processes that are applicable in Australia.

CSIRO’s extensive PCC research and pilot plant program will lead to the staged development, demonstration and implementation of new and more cost-effective capture technologies.

Storing CO₂ underground

CSIRO CO₂ storage research is finding ways to safely and economically store CO₂ underground. CSIRO has committed significant resources and research to find suitable storage sites and has developed existing monitoring technologies for storage systems.

CSIRO is involved in Australia’s first underground CO₂ storage project – The Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC) Otway Project – located in south-west Victoria.

The project looks at one of the world’s most comprehensive monitoring and verification programs for CO₂ storage and is demonstrating that CO₂ can be safely transported, stored and monitored in the deep subsurface under Australian conditions.

Approximately 40,000 tonnes of CO₂ has already been successfully injected into the earth’s surface and scientists have demonstrated that the CO₂ has been successfully contained.

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CSIRO is developing safe and cost-effective ways to store carbon dioxide deep underground.

CSIRO is researching and developing technologies to improve the safety, efficiency and environmental impact of coal mining and to accelerate the deployment of low emission coal-based power technologies.
The use of automation in the mining industry also has a positive impact on safety. Massive machines, noise and dust are all present at the mining face and increased automation means people can be removed from these hazardous areas without compromising production levels.

Improving mining efficiency and safety

In 2006-07 Australia exported more than 64 million tonnes of thermal and met coal worth more than $11 billion. With such high production levels, even small improvements in efficiency and productivity can have very high dividends.

The adoption of CSIRO-developed longwall automation technology has the potential to create significant production gains for the Australian coal sector.

Austalian Coal Technology Research Program show that the recent downturn resulted in 3 million tonnes of coal being removed from the Australian market, representing a 10 per cent increase in the coking rate.

CSIRO's longwall mining operation resulted in a production of an additional 415,000 tonnes of coal per year and a 25 per cent increase in the coking rate.

CSIRO's longwall mining innovation and technology are now being transferred to other countries.

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Safer, more efficient and lower impact environment coal production

CSIRO is working with industry, research organisations and government to develop innovative technologies that will reduce greenhouse gas emissions and contribute global warming.

Working with industry research organisations and government, CSIRO's coal technology research covers the entire coal value chain.

High efficiency, low-emission energy from coal

High efficiency, small scale power systems

Using coal as a feedstock, The Direct Injection Coal Engine (DICE) and the Direct Carbon Fuel Cell (DCFC) have the potential to deliver electricity, hydrogen and direct carbon sequestration. The DICE technology delivers relatively low greenhouse gas emissions when compared with conventional coal-fired power stations which operate at around 38 per cent.

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Coal is Australia's largest export and a major contributor to the nation's prosperity. It is the primary fuel for power generation worldwide and provides more than 80 per cent of Australia's electricity supply.

Coal is however a major contributor to the nation's greenhouse gas emissions. Current coal-based power technologies account for more than one-third of Australia's emissions.

CSIRO's coal technology research is focused on maintaining the benefit that Australian coal provides to the world and working towards the avoidance of environmental impacts of coal mining and coal-fired power generation.

With coal use worldwide projected to increase significantly over the coming decades, it is imperative that we overcome the challenges to meet this projected increase in use.

CSIRO's gasification research program is focused on developing innovative technologies which aim to deliver high efficiency, low emission energy from coal.

CSIRO is also examining how it can contribute to existing high efficiency and low emission power generation technologies such as integrated gasification combined cycle (IGCC) plants. By applying its expertise to these technologies, CSIRO can make significant improvements in capital and operating costs; and to integrate these developments into next generation high efficiency, low emission coal power systems that will produce electricity with low emissions and capture the carbon dioxide in a form that can be stored permanently.

CSIRO understands these research projects are not stand-alone. The research requires the development of a number of complementary technologies that provide alternative routes to coal-fired power generation including coal to liquids (CTL). CSIRO's research is focused on direct CTL conversion, in which coal is converted to methane and a signifi cant high temperature and pressure to produce crude oil. This product is then further refined to achieve high grade fuel suitable for transportation.

Our work aims to achieve outcomes through emerging CCS technologies by improving process efficiency and maximizing fuel yields. CSIRO is committed to working with industry, researchers and government to achieve these goals.

CSIRO is also bringing its skills to bear on another of the key areas for automation in underground coal mining – the development of core roadway infrastructure.

CSIRO's expertise in fuel cell technology is now being brought to bear on another of the key areas for automation in underground coal mining – the development of core roadway infrastructure.

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