

Clean Coal Plants



Puertollano Spain
(300Mw)



Polk, Florida USA
(250Mw)



Wabash, Indiana, USA
(262 Mw)



Nuon, Buggenum,
Netherlands (253 Mw)

Clean Coal

There are many misconceptions about clean coal technology. Here are some of the most frequently asked questions and Coalworks' responses to them:

Q & A

Have commercial clean coal plants been built?

Yes, they have been built to commercial scale and are operating successfully. There is a web site called "Clean Coal Success Stories with these plant featured on the site" We also have listed some of these plants in the panel to the left with each button linking to a photo demonstrating the commercial size of the plants.

[CLICK FOR CLEAN COAL SUCCESS STORIES](#)

Cleaner electricity is being produced from these plants which are known as integrated gasification combined cycle power stations (IGCC plants) –see Gasification below.

What about their clean coal performance?

The Puertollano Plant which is the largest IGCC plant has published performance figures showing substantial reduction in CO₂ emissions and other pollutants compared with present technologies.

Carbon Capture and Storage occurs in the oil industry but has it been applied to the coal industry?

Yes, there is a large coal gasification plant in North Dakota sequestering CO₂ and piping it to Canada where it is sequestered in depleted oil fields. This large commercial plant has been operating CCS for several years. There is a misconception that the technology is unproven or untried and thus CCS research has commenced. It is not the technology that is in issue, it is the suitability of the sequestration sites and the improvement of existing technologies for sequestration that are targeted. In summary CCS works but specific sites require differing solutions.

GASIFICATION – THE KEY TO CLEAN COAL TECHNOLOGIES

Coal gasification is the process of converting coal to a gaseous fuel through partial oxidation. The coal is fed into a high-temperature pressurized container along with steam and a limited amount of oxygen to produce a gas. The gas is known as synthesis gas or syngas and mainly consists of carbon monoxide and hydrogen. The advantage is that when you gasify to produce syngas CO₂ can be captured as part of this process. Furthermore even without CCS emissions from gasification are much lower. Syngas can be used to produce electricity, gas, or synthetic fuels or major chemicals such as methanol, ammonia or urea. The synthetic fuels are purer than the fuels that are currently derived from petroleum because gasification allows removal of contaminants such as sulphur and nitrogen oxides. The IGCC plants featured above all use gasification and have superior efficiency to conventional plants meaning they emit less CO₂ per tonne of coal. Key advantages of Gasification:

- Cleanest of all coal based technologies
- Uses 30% to 40% less water
- Can remove contaminants such as mercury and sulphur
- Lowers SO_x and NO_x emissions
- A proven and reliable technology
- More direct route to making clean burning hydrogen

NEW GENERATION CLEAN COAL PLANTS

Conventional coal fired power technology which has operated at lower temperatures (called sub critical temperature plants) has advanced to the stage where super critical and ultra supercritical plants are now being introduced. These new generation plants have much higher efficiencies meaning that less coal is consumed per megawatt of electricity produced thus lowering CO₂ emissions. In addition more efficient techniques of reducing sulphur, SO_x, NO_x and mercury emissions are applied. The new Kogan Creek power station in Queensland is an example of a supercritical power station. In addition it has applied dry cooling in favour of water cooling to drastically reduce water usage. In March 2008 the CSIRO signed an agreement with China's thermal power institute to build a post combustion CO₂ capture n plant at Huaneng Beijing Co Generation Power Plant as a research project. This would also allow older power plants to be retrofitted and made "carbon capture ready".

SEQUESTRATION OF CO₂

Carbon capture and storage (CCS) is currently being demonstrated by a large commercial coal gasification plant in North Dakota at the Great Plains Gasification Plant which gasifies brown coal, captures the CO₂ and then sends it by pipeline for sequestration to a depleted oil reservoir in Alberta.

[CLICK FOR COAL – CCS- CO₂ SUCCESS STORY](#)

Oil and gas reservoirs are a prime target for sequestration but saline aquifers have also been identified as potential reservoirs which could chemically lock the CO₂ in solution if the conditions are right. For example a saline aquifer in sandstone would lock such CO₂ in like a sponge absorbing water.

COALWORKS CLEAN COAL STRATEGY

Coalworks has been promoting its coal due to its excellent gasification and low sulphur qualities making it attractive for users of clean coal technologies

Coalworks has also conducted testwork on briquetting coal which reduces moisture in an endeavour to lower the CO₂ emission footprint of the coal

Coalworks has commenced discussions with the NSW Government concerning the possible construction of an IGCC plant at Oaklands designed to lower CO₂ emission. Government advisers have singled out Oaklands as an ideal location for a power station and Oaklands coal is excellent for gasification and has low sulphur giving excellent potential for a clean coal power station

One of the candidates for sequestration sites are deep saline aquifers. The Oaklands Basin contains saline formations extending to at least 1300m depth, with significant mudstone sealing layers, and may therefore be suitable for carbon capture and storage.

COAL TO LIQUIDS POTENTIAL

A Coal to Liquids plant using gasification at Oaklands could be built which is capable of producing various chemicals e.g. methanol, ammonia and liquid fuels. Methanol has a number of uses including use as a blend with biofuels.

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