Supplementary Submission No 28a

INQUIRY INTO DEVELOPMENT OF A HYDROGEN INDUSTRY IN NEW SOUTH WALES

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H2P HYDROGEN2POWER

Hydrogen Hybrid Upgrade to Coal Fired Power Stations by Hydrogen2Power(H2P)

Introduction…

Coal is formed mainly from dead plant matter submerged in swamp environments is subjected to geological forces of heat and pressure. Over time, the plant matter transforms from moist low-carbon peat to coal – an energy and carbon-dense black or brownish/black sedimentary rock. Coal itself has a wide variation in properties in line with its classifications of lignite; sub-bituminous, bituminous or anthracite.

Black coal because it is older has a higher carbon content and therefore during combustion is a heavier polluter.

Coal has been a mainstay in electricity production both in Australia and internationally for decades and has continued to be a major supplier post the Snowy Hydro system's construction in the 1950's, coal combustion however is a main contributor to global warming and has major negative effects on human health and the environment. In NSW, electricity generation via coal fired power stations is the highest emitter of Co2 gas ahead of diesel transportation.

Locally Australia has transitioned some of its coal fired power stations to the use of brown coal due to its lower emissions however given its current short supply locally, Australia faces the possibility of sourcing brown coal from overseas as a means to meeting emissions targets. Current debate amongst electricity generators has focused on a cost benefit analysis relating to the higher operating costs of using brown coal and reduced efficiency vs other means by which emissions can be reduced during the electricity production process. Currently the use of renewable resources for electricity generation is more expensive than coal and the removal of existing coal power generation infrastructure due to inefficiencies is likely to see an increase in electricity cost in the short term for consumers.

Emissions controls have favoured the use of lignite (brown coal) to achieve carbon and NOx reduction, but the use of brown coal requires a lower combustion temperature. This lower combustion temperature has a direct correlation to reduced power production and in some commercial examples is creating a marginal commercial reality for coal fired power operators.

Source

Australian Government

Department of Industry, Science, Energy and Resources

Total electricity generation in Australia in 2019 was around 265 TWh. This figure includes all electricity generation, including by power plants and generation for own use by businesses and households.

Fossil fuels contributed 79% of total electricity generation in 2019, including coal (56%), gas (21%) and oil (2%).

Renewables contributed 21% of total electricity generation in 2019, specifically hydro (5%), wind (7%), and solar (7%). The share of renewable energy generation increased from 19% in 2018.

About 14% of Australia's electricity was generated outside the electricity sector by business and households in 2018–19.

In NSW in 2019 80.8% of power generation is via coal.

The use of brown coal in power generation produces approx 90kg per tonne of carbon emissions whilst limiting efficiency to approximately 50% when compared to black coal.

The addition of our Globo Hydro Power™ technology will see black coal with reduced emissions to approximately 81kg per tonne of carbon and a resultant increase in generation of approximately double the electricity compared to brown coal.

Hydrogen2Power Introduction to the Globo Hydro Power™ Technology.....

The Globo Hydro Power™ Coal Fired Power Stations Upgrade Project is proposed as a solution to the current operating problems associated with coal fired power stations as the inclusion of hydrogen into the combustion process permits:

1/ Higher temperature combustion resulting an increase in the output of electricity;

2/ An enhanced combustion burn as hydrogen can assist ignition, flame velocity and spread causing a more complete burn and lessening of carbon emissions, and

3/ Creation of NH3 (ammonia) from the burning of nitrogen with hydrogen that becomes combustible and limiting of NOx emissions.

This technology brings for the major benefit that Australia's significant reserves of black coal can be used whilst still reducing emissions during the combustion process. This will provide a significant certainty to the coal industry that it can remain a viable employer arising from the generation of power in NSW and across Australia.

Plus , by utilisation of our patented technology means the coal will not have to be pre-cleaned.

The Product…

The project is a scalable project in line with the capacity of any power station with results of an increase in efficiency of approximately 10% in the output of electricity.

A 1% improvement in the efficiency of a conventional pulverised coal combustion plant results in a 2 – 3% reduction in CO2 emissions. In addition, there can be significant reductions in NOx, SO2 and particulate matter.

Most favourably, the project permits sub-bituminous coal of the energy content of 21.0 GJ/t to be used instead of brown coal of the energy content of 10.2 GJ/t resulting an increase in the output of electricity. Up to 10% thermal efficiency gains are planned.

Government Funding…

The Globo Hydro Power™ Coal Fired Power Station Project is seen as a collaboration between the technology holders of Globo Hydro Power™, H2P, the NSW Government and the coal fired power station owners and their operators.

Initial funding will be required to prepare a detailed and scope of works and develop a fully worked implementation plan.

The initial seed funding will be needed to enable a line of employees and key consultants to consult or get in order to quantify the scope of works!

Summary...

The Globo Hydro Power™ Coal Fired Power Stations Upgrade Project is designed to maximise the efficiency of existing/in-use systems by increasing the amount of energy that can be extracted from a single unit of coal.

The technology is not proposed to be in competition with the renewable energy sector but rather a supporting player in reducing emissions whilst sustaining an existing industry.

NSW Government could benefit from this technology. Once the technology is active in NSW coal fired power station other states will show interest in solving their 'burning of black coal' issues. IP royalties could potentially feed back to the NSW Government as it takes on accolades for raising up an NSW innovation.

The technology could also solve the black coal issues for many countries and could potentially be recognised as an Australian innovation with IP royalties returned to Australia, from all over the world!

Special Notations…

Source
NSW Electricity Strategy

It is also appropriate to note that the generation of electricity can release substances that are harmful to human health, including but not limited to particulate matter (PM), nitrogen oxides (NOx)and sulfur oxides (SOx). Each year, according to the Health Risk Assessment report 201311 overall air pollution leads to 520 premature deaths and 1,180 hospital admissions in Sydney, and an estimated $6.4 billion in health costs in the NSW Greater Metropolitan Region.

The electricity sector contributes 88 per cent of SOx emissions and 53 per cent of NOx emissions, as well as 5 per cent of direct particulate matter (PM 2.5) emissions in the Greater Metropolitan Region. SOx from power stations mix in the atmosphere to form secondary particles and produce close to 20 per cent of fine particle pollution at Richmond in Sydney's north-west each year.

Coal-fired power stations in NSW have controls to filter direct particle pollution under existing regulation but no comparable controls for NOx or SOx. Historically, SOx from power stations have been regulated by limiting sulphur content of the coal burnt, rather than by regulating emission standards. Coal-fired power stations located in all three major generating regions – the Upper Hunter, Central Coast and Lithgow – are likely contributors to fine particle levels in the Greater Metropolitan Region.