DEWS CTS 19478/17

DIRECTOR-GENERAL BRIEFING NOTE

DDG ……BB…….. ……..Endorsed Dated 21 / 07 / 2017

SUBJECT: Energy Edge Report – Ultra-Supercritical Coal Power Station in North Queensland

☒ROUTINE ☐URGENT ☐CONFIDENTIAL

☐ Approved ☐ Not Approved ☐ Noted ☐ Further info required (see comments)	Director-General _____ Date ___/___/___ Comments:

Requested / Instigated by: DDG-E Action required by: N/A

RECOMMENDATION

1. It is recommended the Director-General **note**:
   - the Energy Edge R~~r~~eport (the Report) (**Attachment 1**) identifies that an ultra-supercritical (USC) coal-fired power station could only be commercially viable under scenarios with sustained high wholesale prices and no threat of a carbon price over the life of the plant;
   - the Report identifies a range of risk factors in relation to the development of a USC plant, including high carbon emissions, the exposure to export-parity coal-prices and the possibility of the asset becoming stranded;
   - other studies by the Minerals Council of Australia (MCA) and Townsville Enterprise Limited (TEL) have considered the deployment of a USC plant and a coal-fired power station in North Queensland respectively;
   - the recent assesment by the Australian Energy Council (AEC), questioning the case for building a new coal-fired power station in North Queensland.

BACKGROUND

Energy Edge Report

2. DEWS engaged Energy Edge in early 2017 to develop the R~~r~~eport to understand the feasibility of the introduction of a USC Coal fired power station to be located in the Galilee Basin in North Queensland.
3. The R~~r~~eport compares the Net Present Value (NPV) and internal rate of return (IRR) of the USC plant under a range of scenarios. The R~~r~~eport looks at the viability of the USC plant under:
   - low, medium and high electricity price scenarios
   - scenarios with carbon pricing
   - scenarios with export parity coal prices in North Queensland (because of the high level of exports from mines in the region).
4. The USC plant is only viable under the high price scenarios, where the wholesale price is maintained at $75 per MWh. Under the base high price scenario, the NPV of the USC plant is $1.683 billion, with an IRR of 16.4 per cent. One of the high price scenarios assumes export parity coal prices, which significantly reduces the profitability of the plant. Under this scenario, the NPV reduces to $734 million (56 per cent lower than the base high price scenario) with the IRR reduced to 9.9 per cent.
5. The R~~r~~eport identifies that once a carbon price of $40 per tonne of CO_2 is considered, the USC plant becomes unviable. This scenario uses an underlying wholesale price of $50 per MWh. Under this scenario, the NPV of the USC plant is reduced to $359 million with the IRR reduced to 3 per cent.
6. The R~~r~~eport also considered the deployment of USC with carbon capture and storage but this type of plant was not viable under any of the scenarios considered.
7. In general, the R~~r~~eport highlights that there are significant risks associated with the development of a USC plant in North Queensland. The plant would have high carbon emissions and would be exposed to the introduction of carbon pricing in the future or the threat of introduction. This would impact the ability of the plant to obtain finance or maintain value over the life of the plant.

Author	**Branch Approval**
Name: Andrew Burnett Position: Director Section: C&P Tel No: 3199 4947 Date drafted: 19/7/17	Name: Phil Richardson General Manager Branch: C&P Tel No: 3199 4901 Date Endorsed: 20/07/17

8. Further, there is a significant risk of the asset becoming stranded due to changing market conditions and the potential for the plant to be exposed to export parity coal prices.

Limitations of the Report

9. While the Report considers a range of wholesale pricing scenarios, these are not modelled scenarios but reflect nominal prices over the study period. As such, the analysis does not account for potential changes in the market over time. Further, the Report does not assess the impact of the deployment of the USC plant on electricity prices in Queensland.
10. In addition, the Report does not outline key inputs to the analysis including capital costs or financing costs. These are critical assumptions in understanding the viability of the USC plant.

MCA Report

11. In June 2017, the MCA released a Report comparing the costs of a USC plant with other technologies. The Report quotes headline levelised cost of energy (LCOE) figures for a USC plant at between $40 and $78 per MWh.
12. However, these figures were developed using capital costs that included a range of discounts, including the use of brownfield (existing) sites as opposed to a new development and the use of specialised equipment (sourced from Asia). These capital costs represent a discount of 20 to 25 per cent on current market expectations.
13. Considering there have been no USC plant constructed in Australia to date, it is unlikely that such a plant could be delivered at the discounted rates quoted in the MCA Report. With undiscounted capital costs, the lower bound LCOE of a USC plant is likely to be around $80 per MWh.

TEL Report

14. In 2014, TEL commissioned a study into the feasibility of a combined agriculture and energy project in North Queensland. As part of this, a stand-alone coal-fired power station was considered.
15. The study was undertaken at a time when there were still expectations of significant demand growth in Queensland out to 2040. This demand growth was expected to encourage investment in new baseload generation. Given the demand conditions, wholesale prices were expected to rise from $80 per MWh in 2020 to around $100 per MWh by 2030.
16. Even given these favourable demand and wholesale price projections, the assessment concluded that the power station would be a “break even” investment.
17. Subsequent assessments by the Australian Energy Market Operator indicate that demand growth in Queensland will be limited in the period out to 2030. This significantly reduces the opportunity for market-driven investment in baseload generation.

Australian Energy Council assessment

18. On 20 July 2017, the AEC released an analysis regarding the construction of new, dispatchable generation in the National Electricity Market and specifically, whether a new coal-fired power station could be justified in North Queensland.
19. The assessment highlighted that North Queensland has more than 800 MW of scheduled generation and a further 800MW in semi-scheduled and non-scheduled generation. In addition, evening demand peaks are typically around 880 MW with a maximum peaked demand of 1458 MW in February 2017.
20. Overall, the AEC concludes that there is not a pressing commercial case for the construction of a coal-fired generator in North Queensland.
21. The AEC assessment also highlighted key challenges associated with the development of new coal-fired generation including long-term carbon risk, risks associated with changing market conditions over the life of the plant and the lack of operational flexibility in a market that is seeking more dynamic response.

ATTACHMENT

- Attachment 1: Energy Edge Report

Author	**Branch Approval**
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DEWS CTS [CTS No.]

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Requested / Instigated by: DDG-E Action required by: N/A

RECOMMENDATION

1. It is recommended the Director-General:
   - **note** the Energy Edge report (the Report - **Attachment 1**) identifies that an ultra-supercritical (USC) coal-fired power station may be commercially viable, but only under scenarios with high wholesale prices and no threat of a carbon price over the life of the plant.
   - **note** the Report identifies a range of risk factors in relation to the development of a USC plant, including high carbon emissions, the exposure to export-parity coal-prices and the possibility of the asset becoming stranded.
   - **note** other studies by the Minerals Council of Australia (MCA) and Townsville Enterprise Limited (TEL) have considered the deployment of a USC plant and a coal-fired power station in North Queensland respectively.

BACKGROUND

Energy Edge Report

2. DEWS engaged Energy Edge to develop the report to understand the feasibility of the introduction of a USC Coal fired power station to be located in the Galilee Basin in North Queensland.
3. The report compares the Net Present Value (NPV) and internal rate of return (IRR) of the USC plant under a range of scenarios. The report looks at the viability of the USC plant under :
   - low, medium and high electricity price scenarios (these are not modelled scenarios but reflect nominal prices over the study period);
   - scenarios with and without carbon pricing; and
   - scenarios with and without export parity coal prices in North Queensland (because the high level of exports from mines in the region).
4. The USC plant is only viable under the high price scenarios, where the wholesale price is $75 per MWh. Under the main high price scenario, the NPV of the USC plant is $1.683 billion, with an IRR of 16.4 per cent. One of the high price scenarios assumes export parity coal prices, which significantly reduces the profitability of the plant, with the NPV reducing to $734 million (56 per cent lower than the base high price scenario) with the IRR reduced to 9.9 per cent.
5. The report identifies that once a carbon price of $40 per tonne of CO_2 is considered, the USC plant becomes unviable. This scenario uses an underlying wholesale price of $50 per MWh. Under this scenario, the NPV of the USC plant is reduced to $359 million with the IRR reduced to 3 per cent.
6. The report also considered the deployment of USC with carbon capture and storage but this type of plant was not viable under any of the scenarios considered.
7. In general, the report highlights that there are significant risks associated with the development of a USC plant in North Queensland. The plant would have high carbon emissions and would be exposed to the introduction of carbon pricing in the future or the threat of introduction. This would impact the ability of the plant to obtain finance or maintain value over the life of the plant. Further, there is a significant risk of the asset becoming stranded due to changing market conditions.

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MCA Report

8. In June 2017, the MCA released a report comparing the costs of a USC plant with other technologies. The report quotes headline levelised cost of energy (LCOE) figures for a USC plant at between $40 and $78 per MWh.
9. However, these figures were developed using capital costs that included a range of discounts, including the use of brownfield (existing) sites as opposed to a new development and the use of specialised equipment (sourced from Asia). These capital costs represent a discount of 20 to 25 per cent on current market expectations.
10. Considering there have been no USC plant constructed in Australia to date, it is unlikely that such a plant could be delivered at the discounted rates quoted in the MCA report.

TEL Report

11. In 2014, TEL commissioned a study into the feasibility of a combined agriculture and energy project in North Queensland. As part of this, a stand-alone coal-fired power station was considered. The assessment concluded that the power station would be a “break even” investment.
12. However, the study was undertaken at a time when there was still expectations of significant demand growth in Queensland out to 2040. This demand growth was expected to encourage investment in new baseload generation.
13. Subsequent assessments by the Australian Energy Market Operator indicate that demand growth in Queensland will be limited in the period out to 2020. This would reduce the opportunity for market-driven investment in baseload generation.

RISKS

14. Given the Government’s position on coal-fired generation, there is a risk associated with the commissioning of a report of this nature, particularly given the report identifies conditions under which a USC plant could be viable.
15. This risk is alleviated by the fact that the USC plant is only viable under a limited set of highly favourable condition and the fact that the report highlights a range of significant risk factors associated with the deployment of a USC plant.

ATTACHMENTS

- Attachment 1: Energy Edge Report - Ultra-Supercritical Coal Power Station Valuation and SWOT Analysis

Author	**Branch Approval**
Name:	Name:
Position:	General Manager
Section:	Branch:
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Date drafted:	Date Endorsed:

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Requested / Instigated by: DDG-E **Action required by:** N/A

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8. Further, there is a significant risk of the asset becoming stranded due to changing market conditions and the potential for the plant to be exposed to export parity coal prices.

Limitations of the Report

9. While the Report considers a range of wholesale pricing scenarios, these are not modelled scenarios but reflect nominal prices over the study period. As such, the analysis does not account for potential changes in the market over time. Further, the Report does not assess the impact of the deployment of the USC plant on electricity prices in Queensland.
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ATTACHMENT

- Attachment 1: Energy Edge Report

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