Attachment G: Replies to issues raised during the Zoom conference Tuesday the 20th of April 2021.

This Zoom conference was attended by:

- Mr. Ken Davey
- Manaia Halafihi: CEO - Ministry of Agriculture Food and Forestry (MAFF)
- Tevita Tukunga: Dr. Tevita Tukunga - Director for Energy Department
- Sione Lui Tausinga: Department of Energy

Issue raised requiring a response

Does the Tongatapu electricity grid support the feed-in of the 25million kWh/year of electricity set out in the baseline economic model (Attachment B) and what consultations have been undertaken with Tonga Power Limited (TPL)?

Replies provided

The name-plate generation capacity of the proposed biogas plant

- The name-plate electrical generation capacity of the proposed biogas plant is 3MWe. However, this is merely a means of sizing the biogas plant.
- This 3MWe name-plate capacity does not define the potential electricity generation capacity or how the biogas fuelled Combined Heat and Power (CHP) package can be configured.
- A 3MWe CHP package can operate at 95% availability, which is 8,322 hours/year, or a larger CHP generation package can operate for fewer hours throughout the year. Either option can feed the same amount of electricity into the grid.

Consultations undertaken with TPL and benchmark documents used

- There has been extensive consultations with Tonga Power Limited (TPL) in relation to the proposed 3MWe plus biomethane biogas project.
- Numerous face to face meetings, Zoom meetings, and email exchanges with both Seti Chen: CEO and Nikolasi Fonua: Strategic Development and Engineering Manager have supported the consultation phase.
- The latest TPL business plan that was developed in 2020 and the 2020 TPL Annual Report have been used as benchmark documents.

The Tongatapu grid

- The Tongatapu grid is currently supported through 14.3MWe of diesel fuelled generation.
- Total electricity generation on Tongatapu in 2019/20 was just short of 63million kWh of which 55.8millon kWh was billed to customers. Line losses and parasitic losses on Tongatapu totalled just over 7.1million kWh in 2010/20.
- In 2019/20 the total renewable generation across all 4 of TPL's Island Grids was only 9.3million kWh.
- As can be determined from the above, even allowing for the continued rollout of intermittent renewable electricity generation assets on Tongatapu, such as PV and wind, there will be ample unmet capacity to displace diesel generation and accommodate the feed-in of the 25million kWh/year established in the baseline economic model (Attachment B).

End of life diesel generators

- As part of the 14.3MWe of diesel fuelled generation on Tongatapu, there are 4 x 1.4MWe diesel generators that will require major reconditioning or replacement between 2023 and 2025.

- It's expected that the biogas plant will be implemented before 2025 and therefore it's possible that a biogas fuelled CHP package can be implemented to negate the need to recondition or replace all or some of these diesel generators. This will represent a significant saving for TPL and this is something that can be investigated through the detailed planning, engineering, and consent authority approval phase.

How the biogas fuelled generation package would be used

- The biogas fuelled CHP package would be sized, arranged, and operated to provide optimised grid support for the Tongatapu grid inclusive of voltage regulation, frequency control, and peak demand response.
- The exact configuration of the biogas fuelled CHP package would be determined during the detailed planning, engineering, and consent authority approval phase in full cooperation with TPL.
- The grid interactive electronics package that will form part of a modern, best-practice, biogas fuelled CHP package will be far superior to the current diesel generation assets: some of which have been in-service for approximately 20 years. This superior grid interactive electronics package will enable the CHP's to interact with the Tongatapu grid in a far more effective an efficient manner.

Biogas storage

- The biogas plant configuration established in the feasibility study has been specifically designed to accommodate large amounts of biogas storage within the advanced covered lagoon element. This storage will enable the biogas fuelled CHP package to operate in the required grid supportive manner.

Feed-in-tariff

- The US14cents/kWh feed-in tariff used in the baseline economic model equates to about Tongan, 32senti/kWh. This feed-in tariff is supportive of TPL's objectives of holding its 'Lifeline Tariff' at 65senti/kWh.

Strategic reserves

- A SWOT analysis within the business plan sets out the vulnerability of having just one bulk diesel storage tank installed at the Popua Power Station. The business plan states:
- 'In case of catastrophic damage to the present tank due to a disaster (e.g., earthquake, fire etc.), the power station does not have any redundancy plan for storage of fuel for generation of electricity'.
- The Hybrid Tropical Grass silage clamp, which is an essential element of the biogas project, will provide a significant, high-security strategic reserve that will support the biogas plant and, by extension, the biogas fuelled CHP generation package. This will ensure continued operation even under the most adverse conditions.