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20 December 2021

## NZGP1 Long-list Consultation

Mercury welcomes the opportunity to provide feedback on Transpower's Net Zero Grid pathways project (NZGP1). We are broadly supportive of the overall approach.

*Transmission investment planning should be strategic and sufficiently flexible to accommodate future generation investment and demand*

In its role as national grid owner, Transpower has decades of experience in planning new transmission investments to coincide with anticipated changes in supply and demand. Given the long lead times associated with designing, consenting and constructing such assets, it is not easy to strike the right balance between “overbuild” and “underbuild.” For example, the Wairakei-Whakamaru C Line project was a major enabler for the Te Mihi and Ngatamariki geothermal power plants, with Ngatamariki commissioned in 2013 and Te Mihi following suit in 2014. The C Line was commissioned shortly after Te Mihi but received regulatory approval in 2009.

Such a measured approach was appropriate in an era of relatively little generation investment and flat demand. Mercury considers that our electricity system has entered a new phase where generation supply and demand are likely to increase in scale and relatively quickly. If the Government's decarbonisation goals, in particular the target of net zero carbon emissions by 2050 (in which electrification of the economy using renewable electricity generation is set to play a key role), the country needs to build the equivalent of a new wind farm every nine months. The arrival of new technologies such as solar PV and batteries which can be deployed much faster than traditional generation exacerbates the situation. We need to plan for scenarios including a step change in scale and speed of renewable generation investment along with demand growth as carbon intensive sectors such as transport and process heat look to use renewable electricity in place of fossil fuels.

While in this context an incremental approach may no longer be fit for purpose it is equally important not to swing to wholesale overbuild of transmission. There is scope for “no/low regrets” work. The critical issue is how to determine the extent of this.

The challenge for Transpower will be to ensure that the grid has sufficient capacity so that the grid does not become an impediment to decarbonisation while at the same time ensuring that grid development can respond flexibly as generation and load evolves. For example, it is possible that biomass may take a larger share of process heat than expected, or that Tiwai may not close as expected in 2024. In this regard there are technologies emerging, such as batteries, that can be deployed rapidly and at scale, which can release capacity on the existing grid and also enhance the capacity of new investments. We are encouraged that Transpower is looking at such options.

We favour Transpower using its process for short listing projects to transparently make the case for how bigger build options might be more efficient than incrementalism in specific instances (for example, factoring in lead times, market impacts of repeated construction outages, capex spend across several project stages vs. fewer stages, etc.). It will also be important to include some well justified optionality in plans where relevant, such as towers that can be easily restrung with higher capacity conductors, and/or the ability to step up to 400 kV when needed. A further consideration for project scoping will be the ever-increasing demand for infrastructure build in the country, the associated skilled workforce required, and the supply chain disruptions caused by Covid-19 (and/or similar shocks) which will likely

continue to impact in the coming years. This will mean that major programmes of work will become even harder to ramp up and ramp down flexibly in response to changes in the external environment.

#### *Consideration of the lower North Island from Haywards to Bunnythorpe*

Mercury agrees with the project scope covering the HVDC, central North Island and Wairakei ring to 2035. Looking at these assets holistically is appropriate. However, the lower North Island from Haywards to Bunnythorpe is also important given the significant amount of renewable generation that is currently connected and could be connected in the future. It seems to us that there is a risk of this part of the grid backbone becoming a transmission bottleneck in the future.

#### *Alternatives to transmission*

Mercury considers alternatives to transmission (for example, batteries) are important as they provide flexibility in location, timing and use case. They can be built or installed faster than conventional poles and wires which have long lead times. Transmission alternatives are often easier to tailor to particular situations and likely, in some cases, to be cheaper and easier to scale up or down as required. They may also be easier to plan for, consent and build. Crucial to encouraging transmission alternatives is committing to offering long term contracts as happens in other jurisdictions like Australia (for example the investment in the Hornsdale Power Reserve was underpinned by a 10-year contract to provide 70 MW of capacity to the South Australia System Integrity Protection Scheme). One-to-five-year contracts are too short for investments in transmission alternatives to be fairly compared to transmission on a like for like basis.

#### *Consider consequential network impacts of investment decisions*

It is important to consider the integrated network when planning for core grid upgrades. Mercury supports active consideration of the 110 kV and 220 kV network interactions as part of these upgrades to avoid the likelihood of 110 kV network issues hamstringing 220 kV flows. For example, the 110 kV bottleneck through Mataroa mentioned in the consultation paper has been discussed for some years. Another example is the introduction of the Arapuni bus split, which only became permanent several years after the commissioning of the North Island Grid Upgrade project.

Therefore, a long term 110 kV grid strategy may be warranted as part of this core grid workstream. This strategy could then consider the advantages and disadvantages of various tactics to relieve issues on the 110 kV system, be they through system splits, special protection schemes, 220 kV upgrade or other means. The preferred tactics could then be deployed as part of the major grid upgrades that Transpower embarks on.

#### *Long-list cost and benefit analysis*

We understand that once Transpower has completed a cost and benefit analysis of its long list it will consult again on its short list. Prior to this, we would welcome the opportunity to review and provide feedback on the high-level cost and benefit analysis of the long list projects including the outage impacts during proposed commissioning. These details would enable the wider industry to better understand the high-level trade-offs inherent to the long list options and assist Transpower more ably in developing its short list.

Yours sincerely



Phil Gibson  
**General Manager Portfolio**



## Appendix One: Consultation Questions

Consultation Question	Mercury Response
<p>1. Is our need description for this investigation reasonable? (section 1.1)</p>	<p>Mercury agrees with Transpower's need description but would like to add that it supports a holistic approach being taken to ensure that the impacts on all other areas of the grid are captured.</p> <p>For instance, the HAY to BPE corridor should be included as part of the assessment. Increased north flow from the HVDC (as per the long list options and scenarios) and the potential for new regional generation development is likely to put stress on this part of the grid.</p> <p>Another issue that MCY would like to highlight is the possible lack of consideration given to the 110 kV system. From previous experience, the industry has seen that the potential benefits of major work on the 220 kV network can be handicapped by the issues on 110 kV network. For example, the introduction of the ARI bus split after the North Island Grid Upgrade project and then ongoing issues with the BPE_MTR circuit.</p>
<p>2. Should Transpower be looking to enable investment in new generation and demand ahead of when that generation or demand is confirmed? (section 1.1)</p>	<p>Mercury is of the view that transmission investment on the grid backbone, where implementation timeframes and market impacts are significant, will have to be appropriately ahead of generation and demand. New generation (e.g., solar) and load development (e.g., electric boilers) can be deployed much faster than transmission enhancements.</p> <p>To minimise regrets on major transmission investment, Transpower should also look at options where the investment can be staged to add future capacity with generation and/or load growth. For instance, ensuring new transmission towers on backbone circuits can support future conversion to 400kV, duplexing/triplexing or reconductoring to higher capacity.</p>
<p>3. Are our long-list options (B1 and B2 in Table 3.1) to meet the overall need for this investigation, reasonable? (section 3.1)</p>	<p>Mercury understands the need to provide HVDC options in comparison to AC options. However, our view is that a point-to-point HVDC solution for the middle and lower NI lacks flexibility in terms of interconnectability of new generation and load in the region. This should be a major consideration due to the potential of generation development available in the lower and central North Island.</p> <p>In addition to lack of flexibility, there are numerous technical issues that need to be considered with this option as well (e.g., interaction with existing power electronics, power quality issues etc.)</p>
<p>4. Are our long-list options for enhancing capacity of the HVDC reasonable? (section 3.2)</p>	<p>General comment on Q4, Q5 and Q6:</p> <ul style="list-style-type: none"> <li>- All short term (NTS etc.) options should be considered in conjunction with long-term transmission options. The short listing and</li> </ul>



	<p>analysis should be carried out for a combination of short term and long-term solutions.</p> <ul style="list-style-type: none"> <li>- The details developed under the short-listing process will also be useful for the industry to get a better understanding of cost, delivery time and capacity/transmission benefits. We would welcome the opportunity to review and provide feedback on the high-level cost and benefit analysis of the long list projects prior to short listing.</li> </ul> <p>Options C1-C3 result in a higher capacity into Haywards at a similar delivery timeframe. The transmission corridor between HAY and BPE should not be neglected as a combination with options C1-C3, especially as increased generation development in the region could result in further constraints.</p>
5. Are our long-list options for enhancing capacity of the CNI 220kV corridor reasonable? (section 3.3)	<p>The solution for the CNI corridor should be decided with a clear understanding of the long-term strategy of the HVDC link. This corridor will service the new HVDC capacity post Tiwai and other SI generation development.</p> <p>Also see comments in Q4 regarding the HAY to BPE corridor.</p> <p>Have ways of inducing additional power flow through the Taranaki corridor (e.g., series capacitors or duplexing HLY-SFD) been considered by Transpower? Additional power flow on the Taranaki corridor would reduce loading on both the CNI and Wairakei Ring circuits.</p>
6. Are our long-list options for enhancing capacity of the Wairakei Ring reasonable? (section 3.4)	<p>The NTS options in this region provide some good short-term options considering the advanced stages of the new generation development projects in the region.</p> <p>Considering the potential generation development in the CNI, Bay of Plenty and Hawkes Bay, this region could be the next major bottleneck for the grid. The previous WRK C line upgrade was sized to fit the short-medium term generation development in the region, and appears to have little remaining capacity to accommodate additional growth.</p>
7. Are there other criteria we should consider when evaluation our long-list of options and reducing it to a short-list? (section 4.1)	<p>Compatibility between options/solutions for the HVDC, CNI and WRK Ring (and the underlying 110kV system).</p> <p>A factor that should be given consideration is whether the options enhance the ability of generation and load to cost effectively connect to the grid. For example, HVDC (or even 400 kV AC) circuits are likely to be cost prohibitive for generation and load to connect to.</p>
8. Is our process for developing relevant scenarios reasonable? (section 5.2)	Yes
9. Are our proposed NZGP1 demand forecasts reasonable? (section 5.4)	Yes – as previously consulted on.



10. Is our proposal to identify base scenarios and sensitivity scenarios reasonable? (section 5.5)	<p>In general, yes, we consider that it is a good idea to have base scenarios and sensitivity scenarios.</p> <p>We consider that the prospect of Tiwai remaining (or an equivalent Southland load entering) should be at least considered.</p> <p>We believe that Transpower should be transparent in making the output of the scenarios available, so that parties can understand the key drivers of cost benefit analyses, and other processes that follow.</p>
11. Is our process for identifying potential generation scenarios reasonable? (section 5.5)	Yes
12. Is our approach to determining an appropriate number of scenarios reasonable? (section 5.5)	Yes
13. Is our choice of scenarios to include in our analysis reasonable? (section 5.6)	Yes
14. Is our set of sensitivity scenarios reasonable? (section 5.7)	Yes
15. Is our approach to determining the weighting for each scenario appropriate? (section 5.8)	<p>Yes. We note that all scenarios/forecasts will be wrong, so the solutions should ideally result in positive outcomes over a range of possible scenarios. Transpower should remain flexible throughout the process (as it has been through the lower South Island/ CUWLP upgrades) and evolve its solutions as the future evolves.</p>
16. Would interested parties support the use of a discount rate for investment Test analysis, closer to Transpower's current WACC? (section 5.9)	Yes
17. Are there any other costs or benefits we should consider in our investment analysis? (section 5.9)	<p>A further consideration for project scoping will be the ever-increasing demand for infrastructure build in the country, the associated skilled workforce required, and the supply chain disruptions caused by Covid-19 (and/or similar shocks) which will likely continue to impact in the coming years.</p>

