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Rebuttle of Concept's report "Review of impact of trading conduct enforcement action on spot prices – addendum"

Haast Energy Trading Limit (Haast) welcomes that a review has been undertaken of our report "Critique of Concept's report "Review of impact of trading conduct enforcement action on spot prices"". .

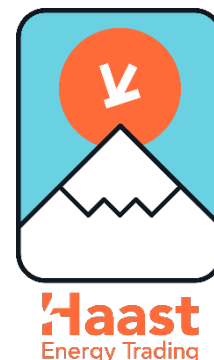
The limited timeframe to respond to the Concept Consulting's report "Review of impact of trading conduct enforcement action on spot prices – addendum" (the Concept Addendum) has meant we have been unable to review the new analyses Concept presented in the sections "Gas prices seem to drive thermal generation rather than vice versa" and "What if gas prices are completely excluded". If the Electricity Authority or MDAG would like Haast to undertake a full review we will need more time, otherwise we can provide feedback at the formal consultation stage.

We have not changed our views and conclusions about the Concept report, after reviewing the Concept Addendum. We remain of the view that, once corrected for modelling issues, the Concept Report (and Concept Addendum) does not support the hypothesis that there has been no structural shift from May 2017. Haast considers that while Concept has been fairly diligent in providing responses to all the points we raised in our critique of Concept's report, many of the responses are weak and/or misleading.

As an example, one of Concept's key arguments for why our significant Granger test demonstrating gas price drives electricity price can be ignored is that their monthly data found no evidence of Granger causality (our test was based on daily data). More importantly, since Concept's original analysis was also at the monthly level, they argue their Granger test is more relevant than ours. This is misleading. The use of a monthly Granger test means Concept has tested whether gas prices from a month ago help predict today's electricity prices; whereas their original monthly structural analysis tested whether concurrent gas and electricity prices are related, but where data has only been recorded once per month. The two monthly datasets Concept has used compare 'apples and oranges'. The daily Granger test is no less relevant to the question of whether gas price drives electricity price and, therefore, whether gas price should be removed from the monthly structural analysis than the monthly Granger test.

Before responding to Concept's critique, it is useful to reiterate why Haast considers it important to omit gas price from Concept's structural break model i.e., the model Concept used to conclude that electricity prices have not structurally increased since May 2017. The statistical effect of including any variable which is affected by electricity price is that it makes it 'too easy' to conclude there has been no structural break.¹ This in turn means we can't determine whether a *detected* structural break reflects a *true* structural break or the inclusion of the inappropriate variable.

¹ Statistically, this is because variation in electricity price which may be caused by a structural break is instead inappropriately explained by variation in (e.g.) gas price.



We do not agree with Concept's view that our analyses are insufficient to demonstrate that electricity price affects gas price

Concept disputes that our analyses demonstrate electricity price affects gas price.² We understand this is on the grounds that Concept considers Granger tests are not sufficient in of themselves to demonstrate causality. Instead, Concept suggests a real-world understanding of the system at hand is required.

We agree with this approach for understanding/testing causality, and emphasise our conclusion that gas price is affected by electricity price is not based solely on the output of the Granger tests as detailed in footnote 6 of our critique:

"We have not explored the reasons for this relationship in detail, but from a high level we think it is fairly intuitive that the NZ gas and electricity markets are heavily interconnected and a significant amount of the time gas fired power stations are the marginal price setter in both markets."

Our conclusion stems from an understanding of fundamental market structure that suggests a significant amount of the time gas fired generators are marginal in both markets,³ and the fact our Granger tests support this fundamental understanding.

We disagree that Concept's monthly analyses of whether electricity price causes gas price is superior to our daily analysis, or that it is inappropriate to use a daily Granger test to inform whether gas price should be removed from a monthly dataset

Concept claims that because the structural break model was applied to monthly data, it is necessary/appropriate to test for Granger causality on a monthly dataset. We disagree with this for several reasons:

- Concept's monthly analysis is clearly not sufficiently powerful to test whether electricity price affects gas price. This is evidenced by the fact that, unlike the daily Granger tests, the monthly analyses fail to demonstrate electricity price is caused by hydro storage – despite being widely recognised as a key driver of electricity price. This suggests the monthly data is not appropriate for testing whether electricity price Granger-causes gas price.
- We believe the most likely explanation for the poor performance of the monthly tests is the relatively small sample size. We disagree with Concept's claim that the 90 data points used in the monthly test is "far in excess of the sample size required to perform a regression with two independent variables". The sample size required for a given analysis varies widely depending on, amongst other things, the volatility of the relationship under assessment. We note electricity and gas markets are exceptionally volatile and, as discussed above, the monthly dataset was incapable of detecting a known cause-and-effect relationship.
- Concept claims it is not appropriate to reject the monthly structural break analysis based on a Granger test applied to daily data. We disagree. If today's gas price is affected by yesterday's electricity price (as demonstrated by the daily test), it seems reasonable to assume the monthly average gas price is also

² We refer to our analyses based on daily rather than monthly data.

³ We acknowledge that Concept have presented new analyses indicating that gas generation is generally negatively correlated with gas price. While a full analysis of these analyses is beyond the scope of this document, we note that such an overall negative correlation does not preclude electricity price or gas demand from positively influencing gas price.

affected by the monthly average electricity price (the essence of the data used in the structural break analysis). If so, gas price should not be included in the structural break analysis.



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The monthly data are clearly insufficient for the purpose of demonstrating Granger causality, whereas the daily data are both sufficient and appropriate.

We disagree that the use of uncorrected data in our Granger tests lead to a result which was not statistically sound

Concept asserts our Granger tests were not statistically sound on the grounds that the raw data were not stationary (a requirement of the Granger tests). We agree that input data should be stationary, but contend this was already the case (as assessed using augmented Dickey Fuller tests). The appropriateness of our testing procedure is further supported by the fact Concept's results after undertaking a procedure to improve stationarity were not materially different from Haast's.

We disagree that it would be inconsistent to include hydro storage in the structural break model if gas price is omitted

Concept's analyses indicates electricity price Granger-causes hydro storage. Based on this, Concept suggests it would be consistent to remove hydro storage from the structural break model in the same way that gas price was removed.

We do not believe it is inconsistent to include hydro storage in the structural break model for two reasons:

- Our own analyses found no evidence that electricity price Granger-causes hydro storage,⁴ and
- The reason for removing gas price was not simply that it was Granger-caused by electricity price, but rather it seemed logical to expect electricity price to materially affect gas price *and* a Granger test supported this hypothesis. In our opinion, it is less plausible to assume storage is materially affected by electricity price. Our understanding of the market fundamentals suggests the increased use of stored water when prices are high is small compared to the volatility of weather driven hydro inflows and therefore hydro storage is not materially caused by electricity prices.

Concluding remarks

We stand by the conclusions from our original critique of Concept's modelling.⁵

We believe there are sufficient grounds to conclude electricity price affects gas price; and for this reason gas price should not be included in the modelling. More importantly, because removal of gas price (or replacement with gas production) from the structural break model results in a significant increase in price since May 2017, we believe Concept's work does not support their conclusion that electricity prices have not structurally increased since this time.

We note we have not received a reply from MDAG or the Authority regarding why the scope of the report was limited to only focus on a May 2017 break point, or why the report did not investigate whether prices have structurally increased over recent years. We continue to believe a fulsome investigation of this

⁴ We are more than happy to share our analyses and/or help others replicate them.

⁵ We refer to 'Critique of Concept's report "Review of impact of trading conduct enforcement action on spot prices"'.



question will show prices have materially increased for reasons other than hydrology and fuel prices, and that the most likely explanation for this change lies in bidding behaviour and trading conduct.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Phillip Anderson', written in a cursive style.

Phillip Anderson
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