NEPHIN ENERGY LTD. SUBMISSION ON IRELANDS SECURITY OF ENERGY SUPPLY REVIEW (28.10.22)

1. INTRODUCTION

Nephin Energy Ltd ('Nephin') holds a 43.5% interest in the Corrib gas field and is Ireland's largest domestic producer and supplier of natural gas. The Corrib gas field, a subsea development located 83km off the Mayo coast produces some 30% of Ireland's gas demand and is forecast to be in production into the mid 2030's. Daily production is currently some 39 GWh per day.

Nephin is committed to making a meaningful contribution to Irish society, the Climate Action Plan and the nation's energy security. As such, we welcome the opportunity to contribute to the public consultation on the Review of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems ('the Review') which was published on 19th September 2022 and prepared by CEPA LLP ('CEPA').

Nephin is a member of the Irish Offshore Operators' Association (IOOA) and we are in agreement with the full IOOA submission on the Review. In this document, we present additional points not carried in the IOOA submission and, most importantly, we address what we believe is a major shortcoming of the Review, namely the exclusion of 'Additional Gas Reserves from Existing Exploration Licenses' from the short list of Gas Mitigation Options. This is item 8 from Table 6.1 of the Technical Analysis document.

2. FEEDBACK ON THE REVIEW

We present a number of points on the methodology with remarks on how these points may impact the findings. We suggest that these issues be addressed prior to finalizing the recommendations on Security of Supply.

Methodology - Baseline

The Review methodology looks at the impact of a range of potential demand and supply-side disruptions (Shock Scenarios) on our ability to meet the nation's energy requirements and makes recommendations on how the impact of these disruptions can be mitigated.

A key assumption in the Review is that all of the Government's targets around the development of the Irish energy system will be met. In addition, the Review has assumed a low growth in gas demand forecast to 2030 as a means to model the Government's stated decarbonization policies. Consequently, the Review has not examined the impact of potential delays in the Government's planned 5 GW offshore wind program and other renewable projects to 2030. Nor has the Review

modeled any potential increase in the gas demand over and above the assumed low case demand profile.

In our view, this is a serious shortcoming in the Review methodology and it detracts from the validity of the security of supply shock modelling outcomes, particularly in the case of Scenarios 1 to 3. This shortcoming is recognized by CEPA who highlight that if the assumptions were not met it would likely have an impact on the shock modelling[i] conclusions. Indeed, their concern has already been borne out as EirGrid's most recent 10-year capacity generation report[ii] highlights an ~12% increase in energy demand by 2031 compared to last year's prediction. In addition, it is now generally accepted that we will likely fall short of our renewable energy targets for 2030 given that the offshore wind framework is not yet in place.

A more robust approach would have been to assess the situation based on a range of gas demand forecasts (low, middle, high) and a range of Program for Government outcomes (delayed, on target, accelerated). This would have delivered a more comprehensive understanding of the shock impact, particularly in Scenarios 1 to 3.

Time Horizon of the Review

Security of Supply is a long term issue which is intricately linked with the Climate Action Targets to 2050. We would therefore expect that a review such as this would cover the longer term to 2050 to ensure that any proposed mitigations will not be undersized or inappropriate for the post 2030 period and that any Capital Projects resulting from this Review are flexible enough to cover longer term considerations. We note that other reviews pertaining to the Climate Action Targets[iii] have previously covered longer periods to 2040 and 2050 and we are surprised that this was not the case in this instance.

Mitigation Options – Level of Detail

The level detail supporting the long and short list is coarse and is more suitable to a conceptional discussion rather than the type of feasibility assessment required now in order to prepare a robust set of proposals for consideration. Areas that have not been addressed include permitting timelines and environmental impact considerations, lead times to attract investors for commercial options and lead times to secure governmental approval to invest in non-commercial options e.g. Floating LNG FSRU (back-up) .

Mitigation Options - Feasibility Of Deployment

The Review has proposed 19 mitigation options to the Security of Supply conundrum. This long list is split in to 11 Gas Options and 8 Electricity Options. The list includes an assessment on the feasibility

of deployment and a short rationale as to whether or not an option should be carried in a short list for implementation. We have the following comments:

- The feasibility of deployment of all gas options is assessed to be the same, i.e. possible. We find this surprising and see it as a significant weakness of the Review.

  For example it assesses the probability of implementation of additional indigenous biomethane which is a relatively low capex endeavor already being implemented on a pilot scale by GNI to be the same as the implementation of additional electricity storage using pumped hydro, a significantly higher capex endeavor and an immensely more complicated project. Both are classed as Possible by 2030.

  We would have expected that a review such as this would have used the generally accepted methodology of proved (90% probability), probable (50% probability) and possible (10% probability) or some other quantitative method to assess the probability of implementation of the various mitigation proposals. This type of approach would have allowed the Department of the Environment, Climate and Communications ('the Department') to rank the mitigation options more rigorously.

Mitigation Options – Technical Maturity of Green Hydrogen

Both the Gas and Electricity short listed mitigation options include green hydrogen projects. These are injection of green hydrogen generated from curtailed wind into the gas network and conversion of an existing CCGT to hydrogen. Generation of green hydrogen is an immature industry with significant hurdles to be overcome before it can be assumed that it is available for deployment at scale. In our view, whilst it is acceptable to propose green hydrogen in the longer term as a potential contributor on energy security, it is too immature to be carried in a short list for 2030. The fact that green hydrogen has significant implementation challenges has been highlighted by CEPA in the Review.

Mitigation Options – Cost Benefit Analysis

A Cost Benefit Analysis (CBA) is a useful tool for assessing proposed and existing government policies[iv]. Previous energy and climate change studies have use the technique to inform their findings. For example, the 2018 Long Term Resilience Study 2018[ii] by EirGrid and GNI included a CBA as did the SEAI 2011 study on Residential and Small-Business Energy Efficiency Improvements [iv]. In addition, the ESRI carried out a CBA on the EU 2020 climate package when the European Commission[v] omitted to do so. Consequently we are very surprised that a Cost Benefit Analysis was explicitly excluded from the Review scope. Given the complex nature and high cost of some of the mitigation options we would recommend that a CBA be carried out prior to any recommendations being made by the Department.

3. ADDITIONAL GAS RESERVES FROM EXISTING EXPLORATION LICENSES

Gas Prospects

Irelands offshore gas fields have supplied the Nation with a continuous and significant supply of indigenous low carbon energy since 1978 and are forecasted to do so until the 2030's. These fields have contributed greatly to the national development having fostered the building of the GNI gas network, enabled the building of gas fired power stations; engendered a comprehensive understanding of the Irish Offshore, supported the growth of our Applied Geoscience competence and reduced our dependence on imported coal, oil and gas. The economic impact has been immense.

The gas long list includes the mitigation of additional Gas Reserves from Existing Exploration Licenses – i.e. the development of new gas reserves through exploration. There are a number of exploration prospects in the Slyne Erris Basin which could be developed through the Corrib infrastructure. Several of these prospects are the result of the Governments 2015 Atlantic Margin Exploration round which was organized and managed by the Department. Several others were identified in previous license rounds.

Typical sizes for these prospects are in the order of 1 to 1.5 Bscf (Mean Success Value) with probability of success in the order of 20%. Maturation timelines, made up of exploration drilling followed by appraisal and development drilling and tie-in to Corrib, are in the order of 8 years placing them in production within the Review window. Gas production rates in line with the Corrib history are achievable with declining production continuing into the 2040's. In addition to successfully mitigating the nations gas security of supply conundrum, development of one of these prospects would bring additional economic benefits[vi] including significant employment estimated at over 300 jobs per annum, Gross Value Added (GVA) of up to €1 billion and over € 2 billion in taxes (corporation and income).

CEPA View on Gas Prospects

The Review's technical assessment is and we quote[vii] 'there are currently several existing offshore exploration licenses, but exploration activity has generally been low. While delivery of gas from existing exploration licenses is possible, this has not been included in our modelling as it remains uncertain and is unlikely to be of a significant magnitude relative to Irish gas demand requirements' unquote.

In our view this assessment is grossly incorrect on all counts as follows:

- Exploration activity following the 2015 Licensing Round was high, with an increased number of Companies active in the Atlantic Margin, a corresponding increase in acreage under license,

additional seismic acquired, two wells drilled in the Southern Porcupine Basin and a number of wells in planning by Companies who have since left following the Program for Government commitment to end new licenses for exploration. In short, the statement that exploration activity has generally been low is wrong.

- The probability of success of exploration prospects is typically assessed using regional geological studies, interpreted seismic data and accepted petroleum engineering principles. In the Irish context, the data underpinning the understanding of the Irish offshore is supported by the various competent authorities and has been used by iCRAG and SEAI for various studies. Probability of success estimates for the various prospects using this data is typically in the order of 20%. The Review assessment that additional gas is possible yet uncertain implies very low probability which is not supported by the studies to date.
- The successful development of a Corrib like prospect has the potential to reproduce the Corrib performance of up to 350 mmscf/d – a figure that previously accounted for 60% of the Irish gas requirement. Given that the future gas requirements are expected to reduce as gas is displaced by successful offshore wind projects, we believe that the remaining prospects have the potential to contribute significantly to the Irish gas demand requirements contrary to the opinion of the Review.

Comments on Exclusion from the Short List

The Review has excluded Additional Gas Reserves from the short list for two reasons which we believe are mistaken.

First Reason: The Review asserts that additional domestic production of natural gas above forecasted demand could result in Ireland being locked into a high-gas energy market. In our view it is very unlikely that production from a new declining gas field would move levels above forecasted demand and if this transpired, then it could be managed in a number of ways such as (a) reducing imports; (b) exporting excess via virtual reverse flow; (c) curtailing production; (d) closing the field and maintaining the gas as strategic reserves; (e) closing the field and ceasing production. Suitable concepts could be stipulated in the licensing terms.

Gas should not be seen as an inhibitor in the drive towards energy transition. Priority dispatch (which represents the hierarchy by which energy sources are exported to the grid), ensures renewables will always have priority over natural gas for electricity generation. Given that electricity generation from renewables will be prioritized over natural gas, there will always be an incentive to install renewable infrastructure. In 2017 for example, when Corrib reached peak production, there was a record amount of wind capacity (532MW) installed in Ireland.

Gas will remain a component of the Irish Energy System for the full transition period. How quickly it is displaced depends on the rollout of the decarbonization program. Both the Long Term Resilience Study 2018 by EirGrid / GNI and GNI's Vision 2050[iii] show gas continuing beyond 2040; and to 2050 if CCS is implemented. In the absence of indigenous supply, this gas will be imported from the UK. Gas from the UK has a higher greenhouse gas intensity than indigenous supply and contains a portion of fracked gas due to the UK's imported LNG component. In addition, there is always the risk of a supply shock from the UK. Failure to continue indigenous production over the transition period represents a lost opportunity to fortify Ireland against supply shocks from the UK.

Second Reason: unknown volume of any potential additional natural gas discoveries.

As discussed in Section 3, the volume of potential additional natural gas discoveries can be estimated using recognized geoscience methods utilizing the significant amount of subsurface data that has been gathered in the last 40 years. That CEPA failed to appreciate this is somewhat surprising.

Nephin's View

We strongly believe that the exploration and development of indigenous gas resources (additional gas reserves from existing exploration licenses) should be an immediate priority for implementation. This activity should be included in the short list of mitigations in this Review, and any future review. This approach is supported by EirGrid and GNI in the 2018 EirGrid/GNI Long Term Resilience Study [iii] which highlights that development of a new gas discovery would reduce our import dependency and diversify gas supplies, thereby strengthening security of supply.

We recommend that the Program for Government commitment to end new licenses for exploration be revised to allow for continued exploration within tie back distance of the Corrib infrastructure with a view to maximizing the possibility of extending indigenous production rather than relying on foreign imports. This view is supported by The Irish Academy of Engineering[viii] who have recommended that the government remove the disincentives to the development of additional gas resources in the vicinity of the Corrib field. Such an approach will help minimize exposure to external shocks, reduce emissions by replacing higher emissions gas imports, reduce our exposure to fracked gas and support the growth of renewable energy. In addition, this option can be implemented at no financial risk or cost to the State and will deliver significant additional economic benefits [v] as outlined above.

Maximizing the use of Existing Infrastructure.

Both long and short list gas mitigation options include Floating LNG and underground gas storage. Kinsale Southwest is reviewed for gas storage whilst a leased Floating LNG FSRU system is proposed. Both of these concepts will be less efficient than a new indigenous gas development and both will

need to be state funded. A new, privately funded indigenous gas development will, in contrast, generate significant revenue for the state.

However, as stated in the Review and fully accepted by the E&P Industry, exploration is generally a high risk activity (some 20% probability of success in the case of the Slyne Erris Basin) and fall back options will always need to be considered. Nephin Energy recognizes this and has commenced studies with external advisors on the potential of the Corrib infrastructure to act as a hub for (a) LNG import / distribution or (b) gas storage and (c) other renewable energy streams. In our view, studies such as these are essential to ensure that the existing infrastructure associated with the Irish gas fields continues to play a key role in helping to ensure a secure energy system for Ireland. In the longer term, these studies may be expanded to cover hydrogen storage.

4. THE QUESTIONS

Q.1: Are there any other security of supply risks that you can identify in addition to those set out in Section 6?

In addition to those risks carried in the IOOA response we believe that the following risks need to be addressed.

- Slippage of base line assumptions. There is a risk that the baseline assumption that the CAP 2021 sector specific targets are not met and that the baseline is incorrect.
- Gas demand growth is greater than modelled. There is a risk that the assumption of a low growth in gas demand to 2030, consistent with the Government's stated decarbonization policies is not met and gas demand is higher than modelled.
- Slippage in implementation of mitigation options. There is a risk that implementation of the mitigation options are delayed for various reasons (more complex than envisaged in the Review; lack of funding, regulatory delays etc.).

Q.2. If there are other risks that you have identified, could you outline some mitigation options to address the risk(s)?

- We recommend that the Review outcome be reassessed assuming a range of gas demand forecasts (low, middle, high), a range of Program for Government outcomes (delayed, on target, accelerated) and a more thorough analysis of project timelines.

Q.3. Are the five shock scenarios that were considered, and the additional scenarios related to the Russian invasion of Ukraine, sufficiently broad?

- We agree with the IOOA response.

Q.4. Do you have any additional mitigation options that you think should be considered?

- We agree with the IOOA response. We wish to add the following points.
- We strongly recommend that exploration and development of indigenous gas resources (additional gas reserves from existing exploration licenses) be implemented as part of any package on security of supply for gas and electricity.
- We recommend that the Program for Government commitment to end new licenses for exploration be revised to allow for continued exploration within tie back distance of the Corrib infrastructure.

Q.5. Which gas supply mitigation options, if any, should be considered for implementation?

- We agree with the IOOA response.

Q.6. Which electricity supply mitigation options, if any, should be considered for implementation?

- In line with IOOA, we have no views to present on this question.

Q.7. What measures should be considered on the demand side to support security of supply of electricity and gas?

- In line with IOOA, we have no views to present on this question.

Q.8. Do you have any views on how the mitigation options should be implemented?

- Mitigation – Review Reassessment as per Q2.

  We suggest CEPA issue a 'Post Consultation Review Update' along the lines suggested in Q2. This would commence once the Department has complied all the responses to this consultation and should be delivered within a short timeframe (say 4 months). This could be combined with the IOOA response given to Q.10.

- Mitigation – Inclusion of exploration and development of indigenous gas in security of supply packages.

  We suggest that all Energy Security of Supply assignments include an assessment of indigenous gas mitigation potential in the Terms of Reference and that appropriate subsurface and petroleum engineering consultants are engaged for this section of the review.

- Mitigation – Revision to the Program for Government to allow for continued exploration within tie back distance of the Corrib infrastructure.

  We recommend that the Department prepare an appropriate revision for inclusion in the Program for Government prior to the year end.

Q.9. Do you support the policy measures proposed in section 8 of the consultation paper?

- We agree with the IOOA response.

Q.10. What further tools and measures do you think would contribute the most to Ireland's energy security of supply?

- We agree with the IOOA response. We include the recommendations from Q.2 and Q.8 as additions to the IOOA response (1) that the Review outcome be reassessed assuming a range of gas demand forecasts (low, middle, high), a range of Program for Government outcomes (delayed, on target, accelerated) and a more thorough analysis of project timelines and, (2) that CEPA issue a 'Post Consultation Review Update' to the Review following implementation of this 'range' approach.

5. CONCLUSIONS AND KEY MESSAGES

Nephin is committed to making a meaningful contribution to Irish society, the Climate Action Plan and the nation's energy security. We welcome the opportunity to contribute to the public consultation on the Review of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems. We have contributed to the IOOA response to the consultation and support that response in full.

In this submission, we have taken the opportunity to make Nephin specific observations on the Review and, most importantly, to make the case for a revision to the Program for Government to allow continued gas exploration in the offshore area within tie-back distance to Corrib and we recommend that this revision be implemented. We strongly believe that increasing Ireland's indigenous gas production will greatly improve our security of supply and facilitate the nation's transition to net zero.

We stress that gas is not an inhibitor in the drive towards energy transition. Priority dispatch (which represents the hierarchy by which energy sources are exported to the grid) ensures renewables will always have priority over natural gas for electricity generation and consequently, there will always be an incentive to install renewable infrastructure. In 2017 for example, when Corrib reached peak production, there was a record amount of wind capacity (532MW) installed in Ireland.

We disagree with CEPA's assessment that any benefit of exploration ''is unlikely to be of a significant magnitude relative to Irish gas demand requirements'' and we highlight that various studies have indicated that there are a number of prospects within tie back distance of Corrib of sufficient size to deliver gas production rates similar to those of Corrib which has previously contributed 60% of Ireland's gas demand. The probability of success for these prospects is in the order of 20% with development timelines in the order of 8 years. Successful development of an exploration find would allow continued indigenous production into the 2040's. In addition to enhancing security of supply,

development of one of these prospects would bring significant additional economic benefits to the country.

We believe that the Corrib infrastructure can play a key role in helping to ensure a secure energy system for Ireland. With this in mind, Nephin has commenced a series of studies with external advisors on the potential use of the Corrib infrastructure to act as a gas and /or renewable energy hub in the future.

We have identified a number of shortcomings with the Review and have made recommendations as to how these could be corrected. This includes confirmation on the feasibility of deployment of the proposed mitigations, reassessment of the mitigations assuming a range of gas demand forecasts (low, middle, high), a range of Program for Government outcomes (delayed, on target, accelerated) and a more thorough analysis of project timelines. We support the IOOA suggestion for inclusion of a Cost Benefit Analysis. We recommend that the Review be extended to cover the longer term to 2050.

We thank the Department for the opportunity to provide feedback and we are available for further discussion should that be required.

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[i] Box 2, Technical Analysis of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems Non-Technical Report.
[ii] EirGrid_SONI_Ireland_Capacity_Outlook_2022-2031.pdf (eirgridgroup.com)
[iii] Long Term Resilience Study 2018 by EirGrid and GNI Long-Term-Resilience-Study-2018.pdf (gasnetworks.ie) and Vision 2050: The future of the gas network in Ireland presented by GNI to the Code Modification Forum 16/10/2019
[iv] Economic-Analysis-of-Residential-and-Small-Business-Energy-Efficiency-Improvements.pdf (seai.ie)
[v] A Cost-Benefit Analysis of the EU 20/20/2020 Package | ESRI
[vi] Value of the Indigenous Oil and Gas Industry to Ireland - IOOA
[vii] Footnote 13 page 23 of Technical Analysis of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems
[viii] http://iae.ie/publications/europes-energy-crisis-implications-for-ireland/