

Environmental Licensing Programme
Office of Environmental Sustainability

10th December 2021

SSE plc
SSE Generation Ireland Ltd.
Great Island CCGT
Campile, New Ross
Co. Wexford
Ireland

To Whom It May Concern

SSE Great Island: Industrial Emissions Licence Review P0606-04

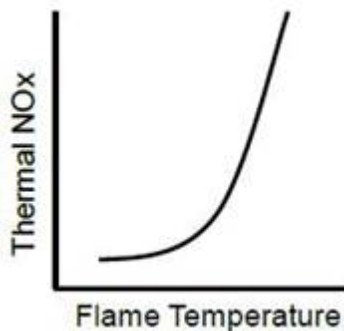
In order to clarify certain items in the licence application, SSE have collated the following information:

- 1, *Please define an output load or operational parameters for when the dry low NOx (DLN) operation is effective and a justification for this selection.*

NOx formation in GT systems has 2 main sources:

- **Fuel NOx:** influenced by the Nitrogen present in fuel.
- **Thermal NOx:** influenced by Nitrogen present in ambient air and highly dependent on combustion temperature.

Most of the NOx in GT's are caused by thermal NOx. The most important parameter boosting thermal NOx is combustion temperature. Thus, DLN systems will try to lower flame temperature for reducing NOx formation.



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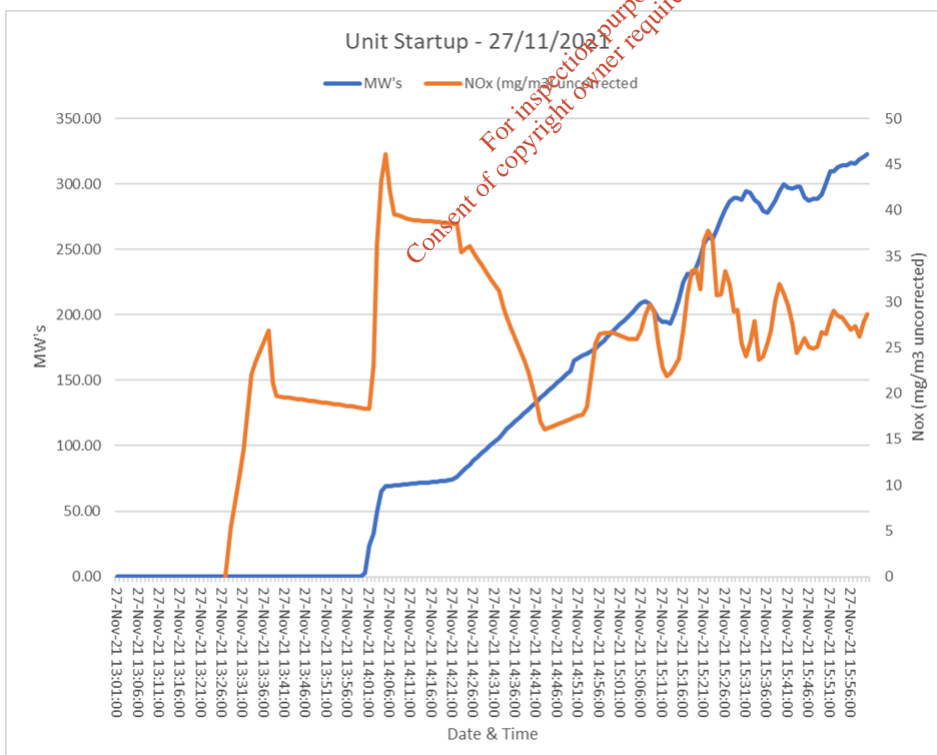
The Combustion system used in Great Island consist of a combination of diffusion flame with a pre-mix flame as follows:

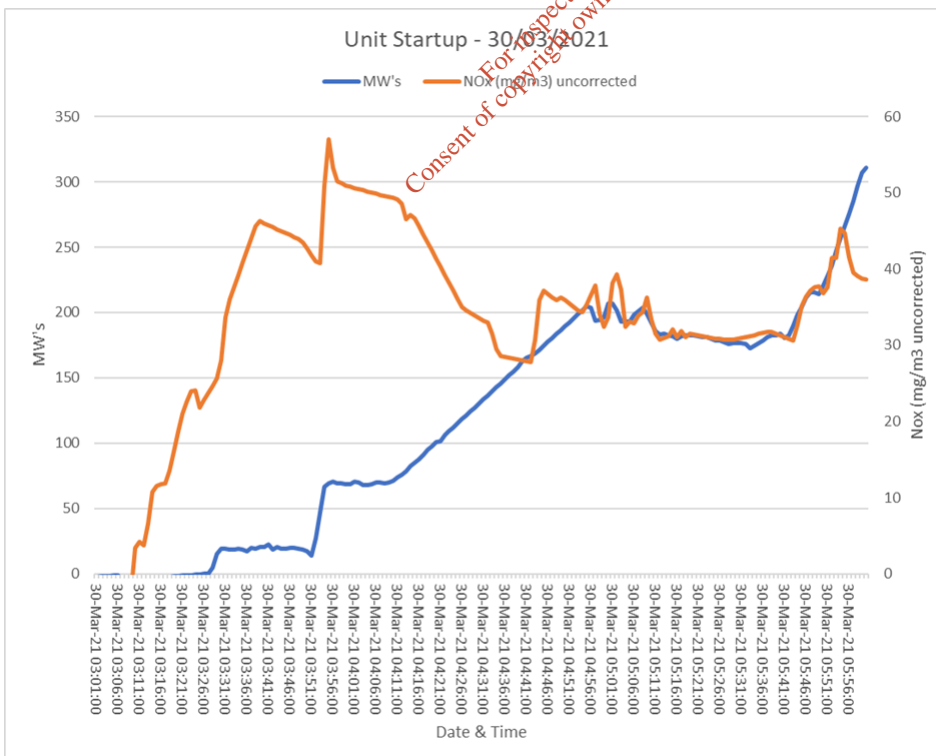
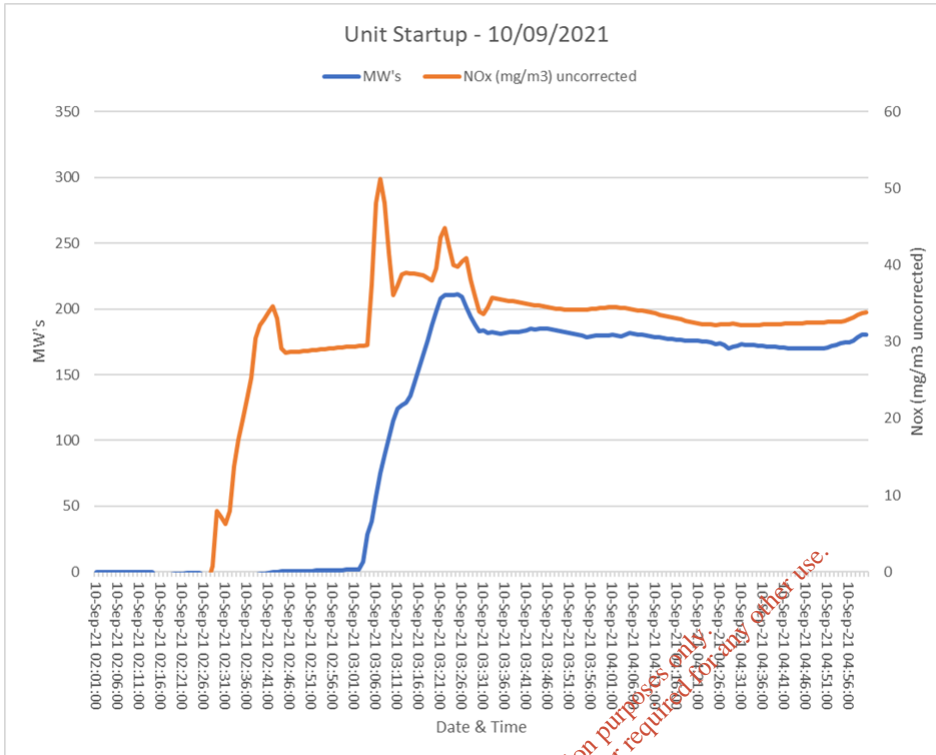
- Diffusion flame gives stable combustion by using a fuel rich combustion. However, high flame temperature is produced.
- Pre-mixed flame is achieving a lean combustion mixture, leading to lower flame temperature, but also unstable flame. Therefore, diffusion flame is required.

The DLN system achieves its best performances when the GT is operating from mid to high loads. At low loads higher diffusion flame ratio is necessary for ensuring flame stability. DLN therefore is operational from first flame on Start-up but the DLN systems focus is flame stability until the GT reaches mid to high loads and then its focus moves to ensuring lower NOx formation.

2, Please provide a profile of NOx emissions from start-up to full load for the turbine operating on natural gas.

Three random start-ups from 2021 are profiled below, please note the NOX value has not had the confidence interval removed.





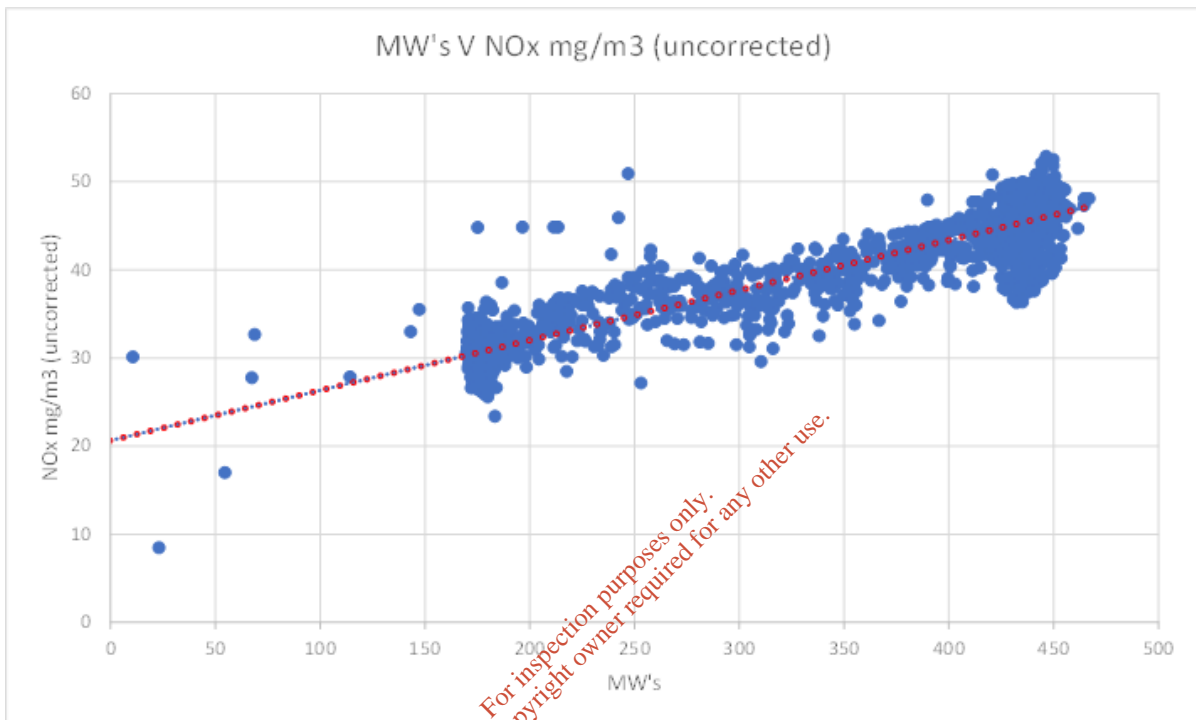
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MW's plotted against NOx (hourly averages) over a three month period. Please note the NOx value has not had the confidence interval removed.



Yours sincerely,



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