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CLIMATE IMPACT ASSESSMENT FOR VANTAGE DUB13 DATA CENTRE

Report Prepared For

Vantage Data Centers DUB11 Ltd

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1.0 CLIMATE IMPACT ASSESSMENT OF VANTAGE DATA CENTERS DUB13 FACILITY

Executive Summary

1.1 This report outlines the significance of greenhouse gas (GHG) emissions from the Vantage Data Centers DUB13 Facility in the context of Ireland's climate targets and in the context of the latest Climate Action Plan. It is noted that the Climate Action Plan (CAP24) was published in December 2023 and was approved by the government on the 21 May 2024.

1.2 An assessment has been carried out which has assessed the proposed development against the overall 2030 Carbon Budget, and more specifically, the Emission Ceiling for the Electricity Sector as set out under CAP24.

1.3 This report takes account of the updated information submitted in relation to Power Purchase Agreements (PPAs) submitted in response to Item 2 of the section 132 request. The Institute of Environmental Management and Assessment (IEMA) guidance note on "*Assessing Greenhouse Gas Emissions and Evaluating their Significance*" (IEMA, 2022) sets out that PPAs are an appropriate project-specific "Substitution" mitigation measure alongside measures such as adopting renewable technologies and reducing the carbon intensity of energy used. This report presents an updated assessment of climate impact, taking account of the applicant's commitment to engaging in a PPA for additional renewable energy generation.

1.4 The report also details the consistency of the proposed development (and the proposed mitigation) with the policies listed under section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended), including the current Climate Action Plan 2024.

1.5 In relation to the facility the average GHG emissions when using electricity from the national grid, in the absence of mitigation, based on the facility being in operation in 2026, are equivalent to:

- 0.08% of the national 2030 target,
- 0.83% of the Emission Ceiling for the Electricity Sector.

1.6 The average GHG emissions when using electricity from the onsite Multi-Fuel Generation Plant (MFGP), in the absence of mitigation, based on the facility being in operation in 2026, are equivalent to:

- 0.21% of the national 2030 target,
- 2.05% of the Emission Ceiling for the Electricity Sector.

Table 1 below sets out emissions associated with the proposed development on a year-on-year basis relative to the overall Carbon Budget and the Emission Ceilings for the Electricity Sector.

Facility	Year	Carbon Intensity (g CO_2/kWh)	Proposed Development CO_2 (tonnes)	Overall Carbon Budget (CO_2 Tonnes)	% of Development of Overall Cabon Budget	Electricity Emission Ceiling (CAP 23 and CAP 24) (CO_2 Tonnes)	% of Development against Electricity Emission Ceiling (CAP23/CAP24)
Vantage DUB13 Facility – Electricity From The Grid	2026	0.191	43529	40,000,000	0.11%	4,000,000	1.09%
	2027	0.168	38349	40,000,000	0.10%	4,000,000	0.96%
	2028	0.145	33218	40,000,000	0.08%	4,000,000	0.83%
	2029	0.123	28454	40,000,000	0.07%	4,000,000	0.71%
	2030	0.100	23323	40,000,000	0.06%	4,000,000	0.58%
				Average	**0.08%**	**Average**	**0.83%**
Vantage DUB13 Facility – Electricity From Onsite MFGP	2026	0.200	111,207	40,000,000	0.28%	4,000,000	2.78%
	2027	0.196	108,940	40,000,000	0.27%	4,000,000	2.72%
	2028	0.192	106,673	40,000,000	0.27%	4,000,000	2.67%
	2029	0.188	104,405	40,000,000	0.26%	4,000,000	2.61%
	2030	0.184	102,138	40,000,000	0.26%	4,000,000	2.55%
				Average	**0.27%**	**Average**	**2.67%**

- Based on a 100% IT load utilisation (worst-case for data centres) and an MFGP efficiency of 40.65%.
- The overall Carbon Budget, based on a five-year total (i.e. from 2026-2030) is 200,000,000 tonnes of CO_2. For the purpose of this assessment, the carbon budget has been divided evenly for each year (i.e. 40,000,000 tonnes of CO_2 annually).
- The Sectoral Emission Ceiling for the electricity sector, based on a five-year total (i.e. from 2026-2030) is 20,000,000 tonnes of CO_2. There is flexibility from year to year in that it could reduce each year in a linear fashion or each year could have the same total etc. Given that is not possible to predict year to year ceilings, for the purposes of the assessment, the overall sectoral emission ceilings for the electricity sector for the years 2026-2030 has been divided evenly for each year (i.e. 4,000,000 tonnes of CO_2 annually)

Table 1 CO_2 Emissions On A Year On Year Basis Relative To The Overall Carbon Budget And The Emission Ceilings For The Electricity Sector

1.7 The Applicant has entered into a Letter of Intent (LOI) with Nephin Renewable Gas Limited to provide Corporate Power Purchase Agreements ('CPPAs') for new renewable energy once permission is received. The Applicant can confirm that the LOI has been signed by both parties, These LOIs are capable of underpinning new renewable energy generation calculated to offset the energy consumed by the proposed development from the electricity grid and onsite gas generation. These arrangements, once planning is granted, will provide for:

- Corporate Power Purchase Agreements between the Applicant and Nephin Renewable Gas Limited.

- The establishment of new renewable energy generation projects by the Applicant's group, that will not be supported by government or consumer subsidies – these new renewable energy projects will be:
  - Located throughout Ireland;
  - Parallel development to the energy demand of the proposed development; and
  - In total, should see the collective annual generation match the data centre's annual electricity use.

1.8 Through these obligations, for every unit of energy consumed by the data centre, a unit of new renewable energy generation would be despatched to the wider electricity system to off-set it. This delivers the objective of operating the proposed development on an annual net energy zero basis that would support Ireland's overall climate targets.

1.9 Having regard to:

- the emission associated with proposed development relative to the Carbon Budget and the Emission Ceiling for the Electricity Sector; and
- the level of renewable additionality that will be provided under agreements between the applicant and Nephin Renewable Gas Limited,

it has been assessed that the proposed development would result in a minor adverse impact (based on IEMA Methodology).

Introduction

1.10 The energy generated by the national grid and associated GHG emissions to power the proposed development will fall within the scope of the EU Emissions Trading System (ETS) either indirectly as a result of electricity from the national grid or directly from onsite gas generation and onsite backup HVO generators (used infrequently when power from the grid is not available) and thus will require a Greenhouse Gas Permit in order to operate.

1.11 The proposed facility building will be powered from the onsite MFGP with support from the national grid where required. The applicant will accept a condition requiring engaging in a CPPA, providing for additionality of renewable energy delivery to match the energy demand of the proposed facility development. This assessment has been undertaken on the assumption of the use of power from the grid is used to power the facility and secondly assuming natural gas is used to power the onsite MFGP, thus ensuring that a worst-case assessment has been undertaken.

1.12 Recent changes to national legislation have also be addressed in this assessment in the context of GHG emissions associated with the development. The 2024 Climate Action Plan (CAP) (Government of Ireland, 2023) provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting Ireland on a path to reach net-zero emissions by no later than 2050. This is identified as the national climate objective in section 3 of the Climate Action and Low Carbon Development Act 2015 (as amended by the Climate Action and Low Carbon Development (Amendment) Act 2021) as follows:

"*3. (1) The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy…"*

1.13 CAP24 outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlines the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. CAP24 also detailed the required governance arrangements for implementation including carbon-proofing of policies and establishment of Sectoral Emission Ceilings and carbon budgets.

CAP24 has outlined the path towards the electricity target by 2030 of a 75% reduction in GHG emissions compared to 2018. The core measures set out in the CAP24 are outlined below in Table 2:

SECTOR	CAP 24
Renewable Electricity Share	Increasing the share of renewable electricity to 80%,
Onshore Wind	Indicative Onshore Wind Capacity of up to 9GW,
Offshore Wind	Indicative Offshore Wind Capacity of at least 5GW,
New Flexible Gas Plant	New Flexible Gas Plant of at least 2 GW,
Solar	Indicative Solar PV Capacity of 8GW.

Table 2 CAP24 Core Sectoral Targets

EU Legislation

1.14 In order to meet the commitments under the Paris Agreement, the European Union (EU) enacted '*Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030, contributing to climate action to meet* *commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013*' (the Effort Sharing Regulation).

1.15 GHG emissions from electricity generation used to power data storage facilities in Ireland, either from the national grid or from onsite generation (where the thermal input is greater than 20MW), are included in the ETS. Thus, they are not included in the Effort Sharing Regulation which covers all non-ETS emissions and thus any necessary increase in electricity generation due to data storage facility demand will have no impact on Ireland's obligation to meet the EU Effort Sharing Regulation[1].

1.16 These Regulations aim to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading System (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS and thus includes GHG emissions from transport, residential and commercial buildings and agriculture. Ireland's obligation under the Regulations is a 30% reduction in non-ETS GHG emissions by 2030 relative to its 2005 levels.

1.17 The EU, in May 2023, published Directive (EU) 2023/959 Amending Directive 2003/87/EC Establishing A System For Greenhouse Gas Emission Allowance Trading Within The Union And Decision (EU) 2015/1814 Concerning The Establishment And Operation Of A Market Stability Reserve For The Union Greenhouse Gas Emission Trading System. As part of this Directive, the cap on emissions has been tightened again to reduce emissions covered by the EU ETS by 62% by 2030 compared to 2005.

1.18 As outlined in European Commission publication "*Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*" (EC, 2013) the assessment of the impact of the project on climate should be context specific. Within the context of global or EU-wide emissions, the GHG emissions associated with the project are small. The approach that has been adopted at EU level is the EU Climate and Energy Package. In this regard, this publication (EC, 2013) has stated that:

"The EU Emissions Trading System, the backbone of the EU mitigation effort, which sets a cap on emissions from the most polluting sectors including over 11,000 factories, power plants and other installations, including airlines. By 2020, the cap should result in a 21% reduction relative to 2005 levels. The EU ETS covers about 40% of all EU emissions." (EC, 2013).

1.19 The ETS is a "cap and trade" system where an EU-wide limit, or cap, is set for participating installations. Thus, the geographical location of a given development within the EU is not relevant as there is only one EU-wide target which is applicable to the ETS and thus the cumulative direct and indirect climate assessment of relevance in this context is the GHG emissions associated with the EU under the ETS. When viewed in this context, on an EU-wide basis, where the ETS market in 2023 was approximately 1,064 million tonnes CO_{2eq}, the impact of the emissions from the proposed development, from electricity generation from the national grid, will be less than 0.006% of the total EU-wide ETS market.

1.20 As shown in Figure 1, the ETS has had mostly a year-on-year reduction trend (with the exception of 2020 due to COVID) since 2007. As outlined in the EU publication "*The EU Emissions Trading System in 2020: trends and projections*" (EU, 2020), the European Union's energy system is decarbonising rapidly. The report states:

[1] Available at: https://ec.europa.eu/clima/policies/effort_en

"*Total ETS emissions from stationary installations declined by 9.1% between 2018 and 2019, the largest drop in a decade, driven by a strong decrease in coal use for power production*" (EU, 2020)

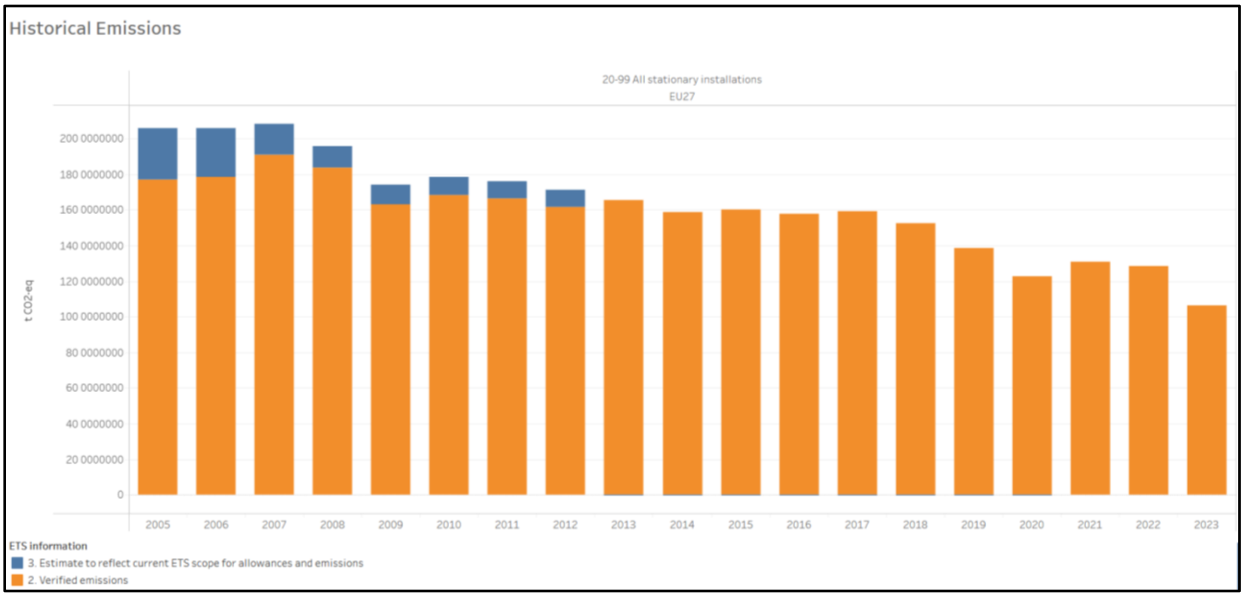

Figure 1 Historical ETS Verified Emissions 2005 – 2023

1.21 The European Topic Centre on Climate report entitled "Trends and projections in the EU ETS in 2020" (ETC, 2020) in reference to additional electricity capacity states:

> *"In the revised ETS Directive 2018/310, Article 10(c) now requires that "where an investment leads to additional electricity generation capacity, the operator concerned shall also demonstrate that a corresponding amount of electricity-generation capacity with higher emission intensity has been decommissioned by it or another associated operator by the start of operation of the additional capacity". This clause aims at ensuring that overall electricity generation capacity becomes less carbon intensive over time."*

1.22 The report (ETC, 2020) further indicates that the reduction in GHG emissions is predicted to continue up to at least 2030 due to current policies in place. As shown in Figure 2, both the energy industries and "other industries" are predicted to decrease significantly by 2030.

Figure 3.1 EU ETS historic and projected emissions between 2005 and 2030 for EU-27, by inventory category

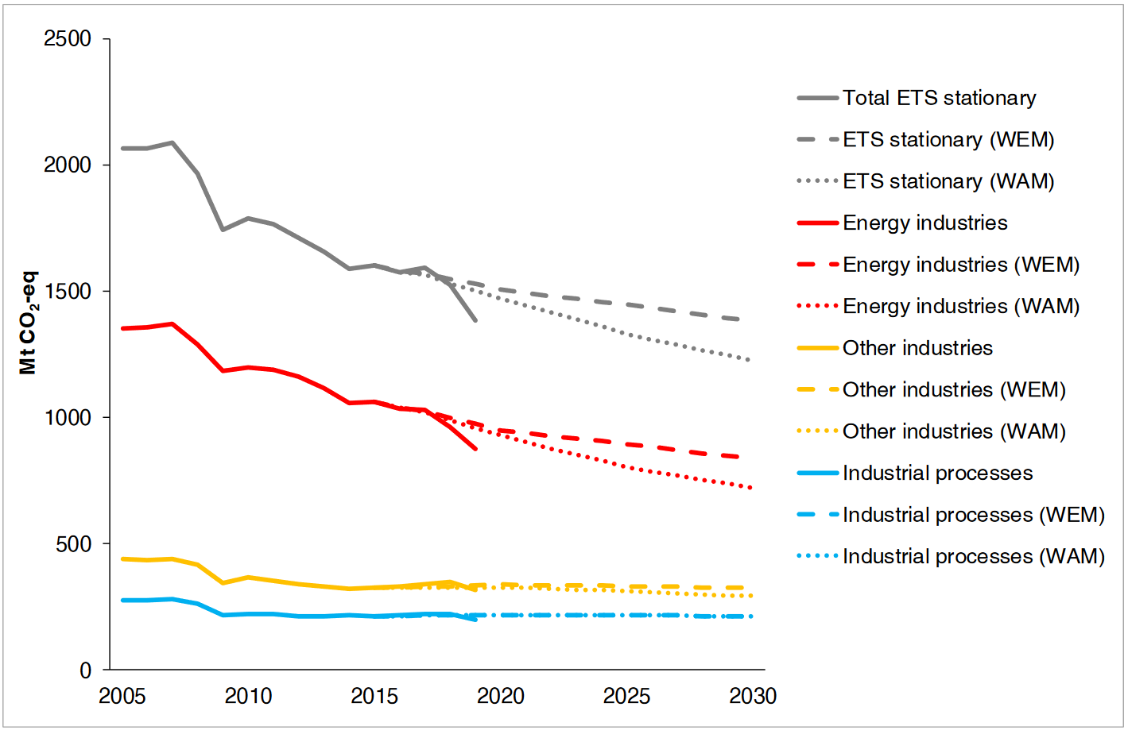

Figure 2 Historical ETS Verified Emissions & Project Emissions 2005 – 2030 (WEM = with existing measures, WAM = with additional measures)

1.23 The European Climate Law[2] was published in 2021 as part of the EU's "Fit for 55" legislative package where the EU has committed to a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 levels by 2030, the Effort Sharing Regulation has also been strengthened with increased ambition by the year 2030. The regulation[3] for Ireland increases the GHG emission reduction target from 30% to 42% relative to 2005 levels. Thus, it is likely that the actual emissions reduction by 2030 will be greater than the projections outlined in Figure 2.

<u>National Legislation</u>

1.24 The Climate Action and Low Carbon Development Act 2015 (as amended) outlines a series of specific actions including:

- To make a strategy to be known as the 'National Long Term Climate Strategy' not less than once in every five-year period with the first to be published for the period 2021 to 2035 and with each subsequent Strategy covering the next three five-year carbon budgets and also include a longer-term perspective of at least 30 years;
- To adopt a system of carbon budgets which will be determined as part of a grouping of three five-year periods calculated on an economy-wide basis, starting with the periods 2021 to 2025, 2026 to 2030, and 2031 to 2035;
- To introduce a requirement for Government to adopt "sectoral emission ceilings" for each relevant sector within the limits of each carbon budget;

[2] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law')
[3] Regulation (EU) 2023/857 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, and Regulation (EU) 2018/1999

- To request all local authorities to prepare climate action plans for the purpose of contributing to the national climate objective. These plans should contain mitigation and adaptation measures that the local authority intends to adopt;
- Increasing the power of the Advisory Council to recommend the appropriate climate budget and policies;
- Requiring the Minister to set out a roadmap of actions to include sector specific actions that are required to comply with the carbon budget and sectoral emissions ceiling for the period to which the plan relates; and
- Reporting progress with the CAP on an annual basis with progress including policies, mitigation measures and adaptation measures that have been adopted.

1.25 The Long-term Strategy on Greenhouse Gas Emissions Reduction 2024, published in August 2024, outlines a range of policies and strategies to address GHG emissions. In relation to electricity the Government commits to the full decarbonisation of the electricity system by 2050 by means of a range of measures including flexibility, grid expansion and increase in renewable power capacity.

1.26 The first carbon budget programme was published in November 2021 and comprises three successive 5-year carbon budgets. In relation to carbon budgets, the Climate Action and Low Carbon Development Act 2015 (as amended) states 'A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')'. The carbon budget is to be produced for 3 sequential budget periods with the third carbon in draft format. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. The total emissions allowed under each budget is set out below in Table 3, as well as the average annual reduction for each 5-year period.

Period	Mt CO_2eq	Emission Reduction Target
2021-2025	295 Mt CO_2eq	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2eq	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2eq	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 3 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

1.27 The Sectoral Emission Ceilings were published in July 2022 for each Sector as shown in Table 4. It should be noted that 5.25 MtCO_2eq of annual emissions reductions are currently unallocated on an economy-wide basis for the second carbon budget period (2026-2030). These will be allocated following a mid-term review and identification of additional abatement measures. The electricity sector emitted approximately 10.5 MtCO_2eq in 2018 and has a carbon budget of 40 MtCO_2eq between 2021-2025, 20 MtCO_2eq between 2025-2040 and a ceiling of 3 MtCO_2eq in 2030.

1.28 The CAP24, published in December 2023 and approved by the government on the 21 May 2024, reiterates the Sectoral Emission Ceilings and outlines the current status across key sectors including electricity, transport, built environment, industry and agriculture and outlines the various broadscale measures required for each sector to achieve the decarbonisation targets. CAP24 also details the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Advisory Council and greater accountability to the Oireachtas.

Sector	Baseline ($MtCO_2e$)	Carbon Budgets ($MtCO_2e$)		2030 Emissions ($MtCO_2e$)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, CAP24 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	68				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	**-**	**295**	**200**	**-**	**51**

Table 4 Sectoral Emission Ceiling 2030

1.29 In relation to the scenario where the Proposed Development is powered by electricity from the national grid, the national fuel mix will decrease in carbon intensity as the grid reaches the 80% in renewables predicted for 2030 (see Figure 3 below). Therefore, the powering of the facility from the national grid will allow for a reduction in the GHG emissions associated with the proposed development over time. It has also been assumed that the facility utilisation will be 100% which is worst-case as 80% load is the assumption in the DECC report entitled "*Summary of Analysis to Support Preparation of the Sectoral Emissions Ceilings*" (DECC, 2022) which has an average load factor of 80% for data centres as shown in Figure 5.

1.30 In relation to the scenario where the Proposed Development is powered by the onsite MFGP using natural gas, natural gas will decrease in carbon intensity as outlined in the report "Pathway to a Net Zero Carbon Network by 2045" (GNI, 2024) with a prediction of 6.5 TWh biomethane, 1.3 TWh hydrogen and overall demand falling from 56.8 TWh in 2028 to 46 TWh in 2032. Therefore, the powering of the facility using natural gas will allow for a reduction in the GHG emissions associated with the proposed development over time.

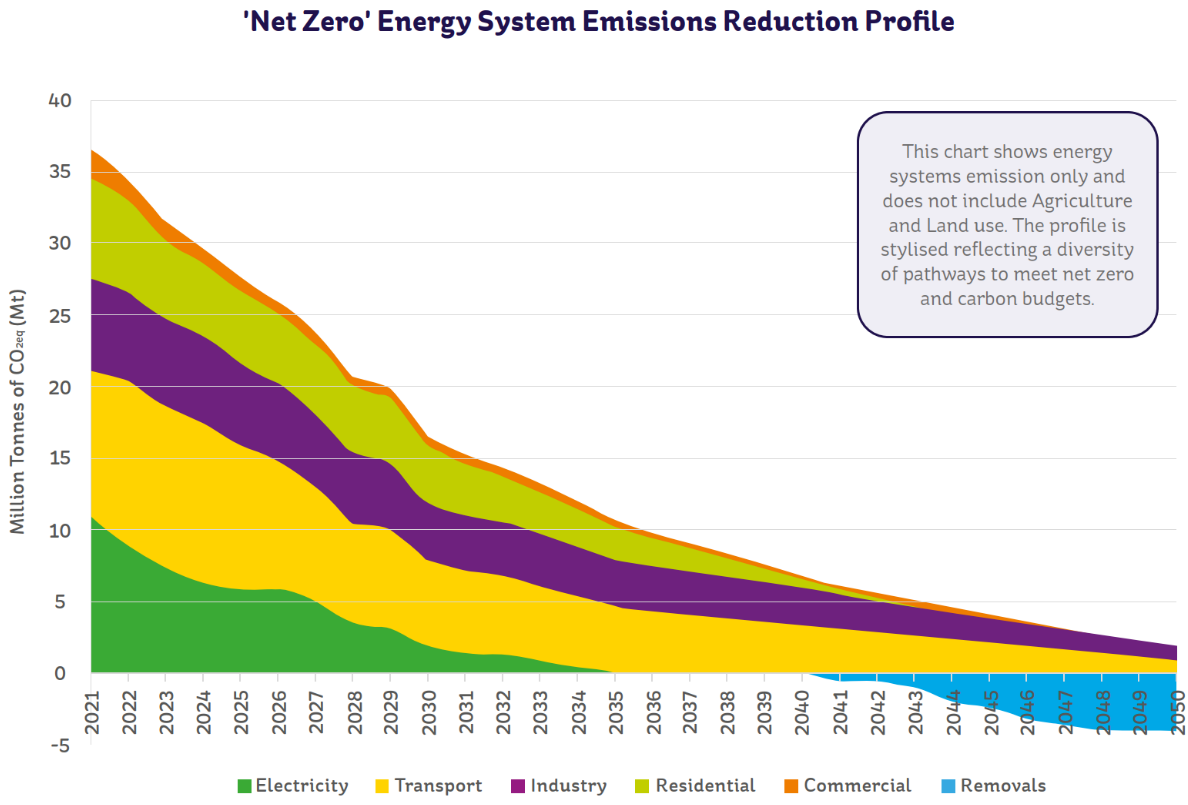

Figure 3 Net Zero Energy System Emissions Reduction Profile (UCC / MaREI) (ESB Networks, 2023)

1.31 The proposed development will have a maximum operational energy demand of 26 MWelect (for assessment purposes). The proposed development will ramp up its energy consumption over a period of several years. The development is therefore not capable of consuming its maximum energy capabilities until the proposed development becomes fully operational.

1.32 For the purposes of this assessment, the commencement of operations year of 2026 has been assigned. Table 5 below sets out the total GWh (operating at maximum annual energy consumption) and the fuel usage.

Facility	Anticipated operational year	Maximum annual energy consumption (for assessment purposes) (absolute worst case)	Estimate annual energy consumption GWh – (reasonable worst case)	Fuel
Vantage DUB13 Facility – Electricity From National Grid	2026	26 MWelect	228 GWh	Electricity
Vantage DUB13 Facility – Electricity From Onsite MFGP (Natural Gas)	2026	26 MWelect (64 MWthermal)	231 GWh	Natural Gas

Table 5 Proposed Development (Electricity From National Grid & Natural Gas) – Vantage Data Centers

1.33 In accordance with the methodology outlined above, the emission calculations reflect the actual GHG emissions associated with electricity / natural gas in the relevant year of operation and has taken into account the estimated annual energy consumption per Table 5.

1.34 Thus, for Year 2026, the GHG emissions from electricity and natural gas will be based on the expected GHG emission rate in 2026. The expected values for each year from 2025 to 2030 is shown below in Table 6.

1.35 The GHG emission factor of electricity is based on current reported levels (Year 2023) with the assumption that the GHG emission factor will decrease in a linear fashion to reach 100 gCO_2/kWh by 2030 in line with government policy as shown in Table 6 below. The GHG emission factor of natural gas is based on current reported levels (Year 2023) with the assumption that the GHG emission factor will decrease in a linear fashion as the use of biomethane increases to account for 12% of overall gas demand by 2030 in line with the report "Pathway to a Net Zero Carbon Network by 2045" (GNI, 2024) as shown in Table 6 below.

Year	Electricity Note 1 (g CO_2 / kWh)	Natural Gas / Biomethane Note 2 (g CO_2 / kWh)
2025	214	200
2026	191	196
2027	168	192
2028	145	188
2029	123	184
2030	100	180

Note 1 Based on a carbon intensity of 259 g CO_2 / kWh in 2023 and assuming linear interpolation to 100 g CO_2 / kWh by 2030.
Note 2 Based on a carbon intensity of 204 g CO_2 / kWh in 2024 and assuming linear interpolation to 180 g CO_2 / kWh by 2030.

Table 6 Carbon Intensity of Electricity And Natural Gas From 2025 - 2030

1.36 A number of conservative approaches in this reasonable worst-case assessment are as follows:

- It was assumed that the data centre will operate at 100% utilisation on an annual average as a worst-case whereas a 60% - 80% load factor is likely to occur in reality.
- It is assumed that net zero electricity would not be achieved until 2050, whereas recent data from the ESB and UCC/MaREI suggests that this is likely to be achieved by 2040 at the latest as outlined in "*Networks For Net Zero – Delivering the Electricity Network for Ireland's Clean Electric Future*" (ESB Networks, 2023).
- UCC / MaREI have also separately published the report "*Our Climate Neutral Future – Zero by 50*" (UCC / MaREI, 2021) which details how the energy system can achieve net zero by 2050 by using technologies, concepts and interventions will already exist today. As shown in Figure 4, the report predicts that the energy system will be dominated by renewable energy in 2050.
- Although the pathway may vary somewhat depending on future policy decisions, it is likely that net zero electricity (shown in green in Figure 3) will be achieved by 2040.

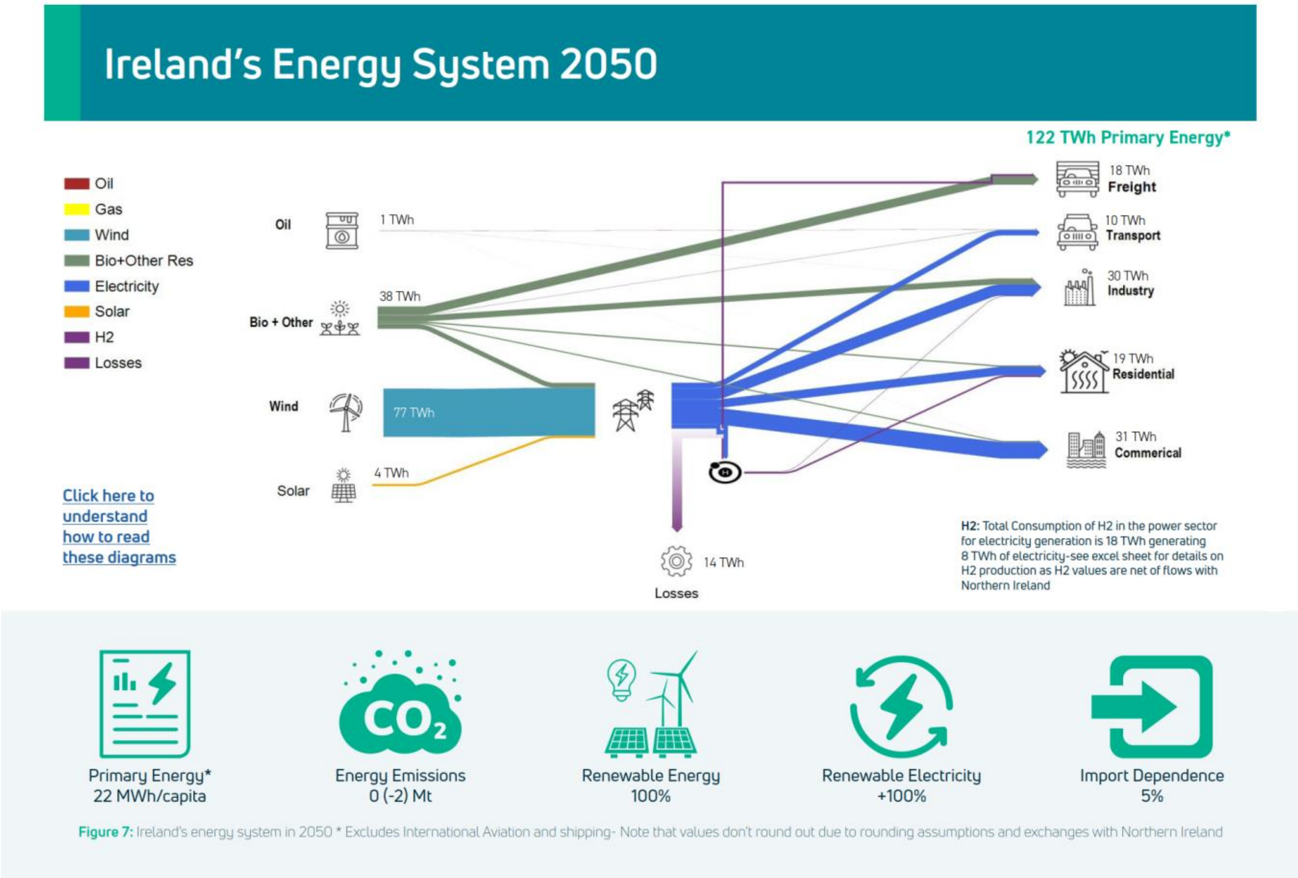

Figure 7: Ireland's energy system in 2050 * Excludes International Aviation and shipping- Note that values don't round out due to rounding assumptions and exchanges with Northern Ireland

Figure 4 Ireland's Energy System 2050 (UCC / MaREI, 2021)

1.37 Specific to the Electricity Sector, CAP24 sets out that "*Delivery and integration of onshore and offshore wind and solar PV is the best-performing mitigation measure to deliver emissions abatement at scale and at speed. Already under the first Climate Action Plan in 2019, reaching 70% renewables by 2030 provided the core of emissions reduction in the sector. Increasing renewables to 80% of demand under Climate Action Plan 2021 and beyond this to the CAP23 capacity targets of 22 GW of wind and solar achieves a further 16% emissions reductions over the first two carbon budgets. No other supply side measure comes close to the emissions abatement achieved by the early and rapid deployment of unprecedented wind and solar capacity*".

1.38 The DECC publication "*Summary of Analysis to Support Preparation of the Sectoral Emissions Ceilings*" (DECC, 2022) outlines the assumptions which have been used to derive the Sectoral Emission Ceilings. The "proposed scenario" (Figure 5) adopted by DECC takes into account the EirGrid Generation Capacity Statement for 2020-2029 which set out a median overall demand in 2029 of 1,250MVA for Data Centre and Large Industrial User Demand by 2029[4].

1.39 With a growth rate of 65% - 70% in electricity demand by 2030 inherent in the DECC analysis, the assessment undertaken for the Sectoral Emission Ceilings has concluded that the 2030 target of 3 Mtonnes of CO_2eq is attainable as shown in Figure 6 below.

[4] https://www.eirgridgroup.com/site-files/library/EirGrid/All-Island-Generation-Capacity-Statement-2020-2029.pdf

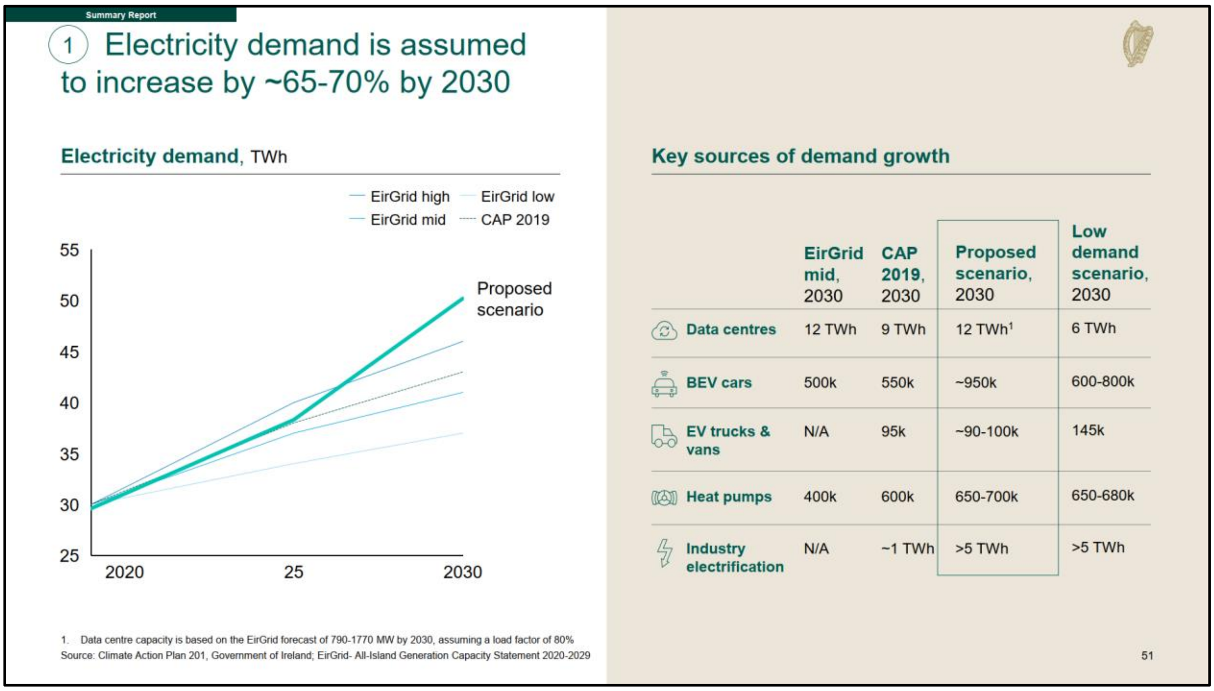

Figure 5 Electricity Demand Assumed In Establishing Sectoral Emission Ceilings (DECC, 2022)

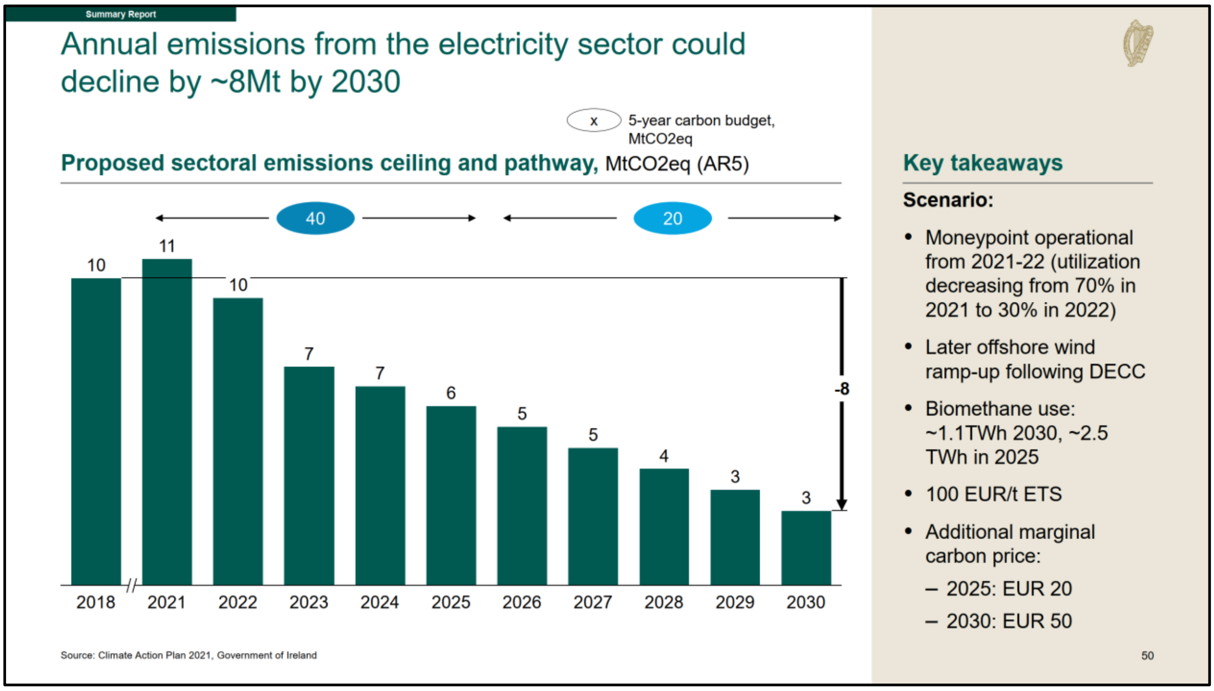

Figure 6 Proposed sectoral emissions ceiling and pathway 2018 to 2030 (DECC, 2022)

1.40 In relation to natural gas, the recent publications Ireland's National Biomethane Strategy (DECC, May 2024) and Biomethane Energy Report (Gas Networks Ireland, Sept 2023) have highlighted the potential for biomethane to replace a significant fraction of natural gas used in the network. A target of 5.7 TWh per annum by 2030 had initially been set in the 2023 GNI report which is 10% of national gas demand. An updated report by GNI published in 26 June 2024 entitled "Pathway to a Net Zero Carbon Network by 2045" (GNI, 2024) has refined these figures with a prediction of 6.5 TWh biomethane, 1.3 TWh hydrogen and overall demand falling from 56.8 TWh in 2028 to 46 TWh in 2032 and by 2036 the prediction is for 10 TWh biomethane, 6 TWh hydrogen and overall demand falling to 40.4 TWh. The report also predicts, by 2045, that the breakdown will be of 14 TWh biomethane, 30.1 TWh hydrogen and overall demand of 44.1 TWh (with zero natural gas). Thus, Gas Networks Ireland has predicted that by 2050 the gas supply will have an overall net zero impact on climate.

1.41 The EPA has recently reported that the 2023 energy industries GHG emissions have decreased from 10.08 Mtonnes in 2022 to 7.8 Mtonnes in 2023[5] which is a record 21.6% reduction. Comparing the 2023 reported data to the projected data undertaken for the Sectoral Emission Ceiling in Figure 6 indicates that the actual emissions are slightly higher to the target value in 2023. In order to comply with the 2021-2025 target annual reductions of 10.3% are required in 2024 and 2025.

1.42 As shown in Table 7, in relation to the development (which is assumed to be fully in operation in 2026) the GHG emissions, based on electricity from the national grid, are equivalent to 0.08% of the overall 2026-2030 carbon budget; 0.83% of the electricity sectoral ceiling 2026 - 2030 and 0.005% of the ETS 2030 Stationary Installations Cap based on the average emissions over 2026 - 2030. Also shown in Table 7, GHG emissions, based on electricity from the onsite MFGP using natural gas, are equivalent to 0.27% of the overall 2026-2030 carbon budget; 2.67% of the electricity sectoral ceiling 2026 - 2030 and 0.015% of the ETS 2030 Stationary Installations Cap based on the average emissions over 2026 - 2030.

1.43 It has been assumed that the facility utilisation will be 100% which is worst-case compared to the assumption in the DECC report (DECC, 2022) which has an average load factor of 80% for data centres as shown in Figure 5.

Scenario	Total CO_{2eq} Emissions	% Of 2026-30 Carbon Budget	% Of 2026-2030 Electricity Sectoral Ceiling	% Of EU ETS 2030 Cap
Vantage DUB13 – Year 2026 – 2030 (228 GWh)[1] - Electricity	166,873	0.08%	0.83%	0.005%
Vantage DUB13 – Year 2026 – 2030 (228 GWh)[1] – Natural Gas	533,363	0.27%	2.67%	0.015%

Note 1 26MW is equivalent to 228 GWh based on 100% IT load utilisation

Table 7 GHG Emissions Associated With The Development

Uncertainty In Relation To The Proposed Development

1.44 It has been assumed that the facility utilisation will be 100% which is worst-case. The proposed development will have uncertainty associated with it which will impact on the calculated GHG emissions. The factors which will be important include:

- Year of opening,
- Phasing of operations,
- Operational load,
- Changes to the electricity grid.

1.45 The factors outlined above have been reviewed below to determine their underlying uncertainty into the future. As a general principle, a reasonable worst-case

[5] https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/EPA-Provisional-GHG-Report-Jul24-v6.pdf

assessment has also been applied in the EIAR as shown by the following approaches below:

- Year of opening: This has been assumed to be 2026 (first full year of operation) as a conservative assumption. There is no possibility of an earlier operational date but a later date is possible. GHG emissions will be higher when an earlier operational date is assumed as later dates will have a high percentage of renewables in the national grid. Hence, an opening year of 2026 is conservative.

- Phasing of operations: The assessment assumed 100% operation of the entire Proposed Development in Year 2026. In reality, there will be a ramp-up period with 100% operation not occurring some period of time later.

- The assessment assumed a continuous 100% operational load for the data centre development, however annual average load is likely to be closer to 80% (as outlined in the recent Department of Environment, Climate and Communications [DECC] publication "*Summary of Analysis to Support Preparation of the Sectoral Emissions Ceilings*" (DECC, 2022). Thus, the assumption of 100% operations will overestimate GHG emissions in the early years of the project particularly for Years 2026 and 2027. Secondly, the assumption of 100% operational load will likely overestimate GHG emissions by approximately 20% every year.

- It is acknowledged that due to delays in decision making and logistical delays that the opening year may move beyond Year 2026. However, by assuming Year 2026 as the opening year it will be a conservative assumption. Each year the percentage of renewables in the national grid is likely to increase in line with government policy. As a results, the GHG emissions associated with the use of electricity from the national grid are likely to decrease on a year-by-year basis.

- As the Sectoral Emission Ceilings and Carbon Budgets have targets set for 2030, the assessment has predicted future GHG emissions for this year. Information on future GHG emissions, beyond 2030, from electricity will be naturally uncertain as it will depend on many factors including the percentage of renewables in the grid, the fossil fuel mix (gas, oil, coal) and the average wind speed. Thus, the assessment approach and the use of the 2030 target is conservative to allow for this uncertainty.

- a GHG emission rate of 100 gCO_2/kWh has been conservatively assumed for the national grid in 2030 which is higher than the SEAI[6] predicted 92.9 gCO_2/kWh for 2030.

Assessment Of Significance

1.46 The Institute of Environmental Management and Assessment (IEMA) guidance note on "*Assessing Greenhouse Gas Emissions and Evaluating their Significance*" (IEMA, 2022) states that **"***the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050"*.

1.47 The assessment aims to quantify the difference in GHG emissions between the proposed project and the baseline scenario (the alternative project/solution in place of the proposed project). This is based on calculating the difference in whole life net GHG

[6] Private communication from SEAI- dated 12th October 2023

emissions between the two options. During the assessment IEMA recommend use of a reasonable worst-case scenario rather than an absolute worst-case scenario.

1.48 The 2022 Guidance (IEMA, 2022) document identifies three principles:

1. When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;

2. Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and

3. Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

Principle 1

1.49 The project will replace activities which have a higher GHG profile. Data storage facilities represent a significantly more efficient means of data storage when compared to a distributed model of enterprise data storage by individuals and companies (or 'enterprise sites').

1.50 Data centres are more energy efficient than enterprise sites due to comprehensive efficiency central to the design of the proposed development. In a June 2020 report, the International Energy Agency noted: *"Hyperscale data centres are very efficient large-scale cloud data centres that run at high capacity, owing in part to virtualisation software that enables data centre operators to deliver greater work output with fewer servers. The shift away from small, inefficient data centres towards much larger cloud and hyperscale data centres is evident in the shrinking share of data centre infrastructure in total energy demand..."*[7].

1.51 A study published in 2020 by Science[8] Magazine, found that while cloud computing productivity has grown globally by 550% between 2010 and 2018, energy consumption rose in tandem during the same period by just 6%, demonstrating the energy efficiency improvements of the industry, most notably by hyperscale data centres.

1.52 A report from IEA entitled "Data Centres & Data Transmission Networks (IEA, 2021) found that while global internet traffic surged by more than 40% in 2020, this strong growth in demand for data centre services continues to be mostly offset by ongoing efficiency improvements for data centre infrastructure as shown in Figure 7.

[7] IEA Data Centres and Data Transmission Networks – June 2020
[8] Masanet, Eric; Shehabi; Arman, Lei; Nuoa, Smith, Sarah; Koomey, Jonathan; "Recalibrating global data center energy-use estimates", Sciencemag.org, February 28, 2020, Vol. 367, Issue 6481; ("Expressed as energy use per compute instance, the energy intensity of global datacenters has decreased by 20% annually since 2010….").

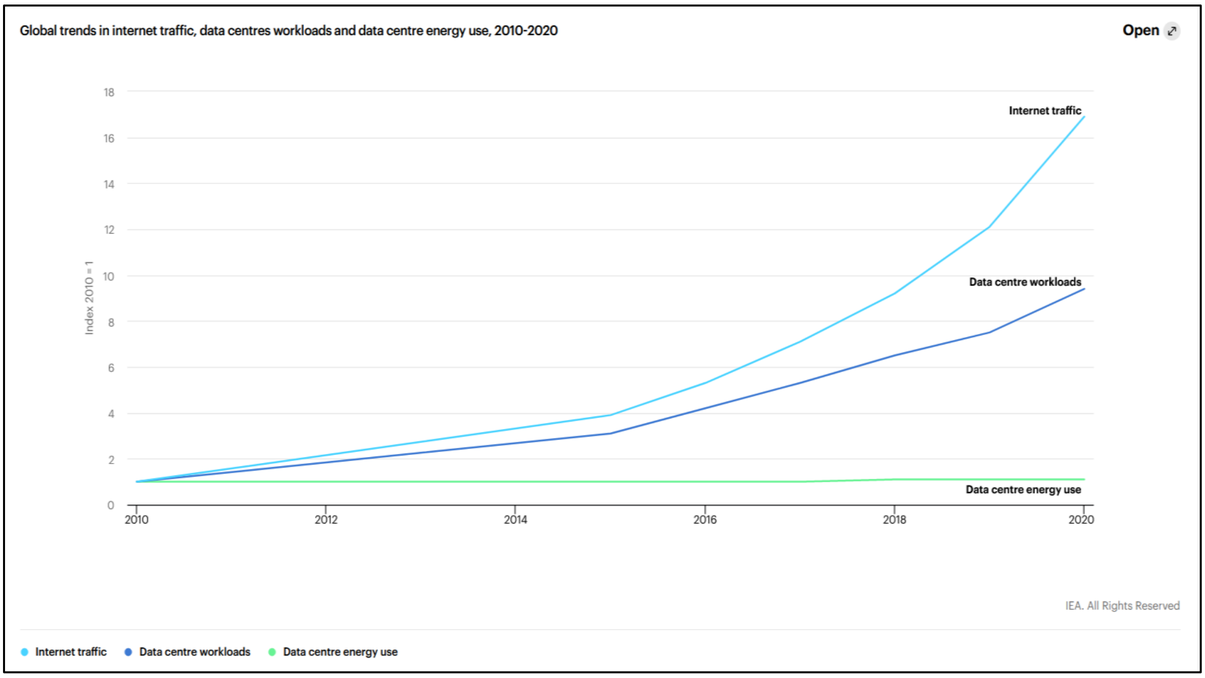

Figure 7 Global Trends In Internet Traffic, Data Centres Workloads & Data Centre Energy Use, 2010 – 2020 (IEA, 2021)

Principle 2

1.53 A range of mitigation measures, during both the construction and operational phases, will be employed which is in line with "best practice" as outlined in IEMA (IEMA, 2022) including:

- The installation of solar panels – Roof Mounted Solar PV are proposed for the Administration block,
- Internal and external lighting will be provided by high-efficiency, low energy LED luminaires,
- High Efficiency HVAC System – mechanical HVAC system will minimise energy associated with space conditioning,
- Cooling System – chilled water would be produced by premium efficiency air-cooled chillers,
- Direct Drive EC Fans – all air supply and extract systems serving the data module rooms will be provided with high efficiency direct drive fans giving a 10-20% power saving over centrifugal fans,
- It has been calculated that the heat captured from the data centre will be between 25°C and 30°C. The Applicant is supportive of the development of a waste heat recovery and district heating scheme and have reserved space on site to accommodate the associated plant should a design be feasible. The design and construction of the Data Centre buildings to accommodate waste heat supply is contingent on the existence or the parallel development of a waste heat receptor system,
- The backup generators units are specified to run on Hydrotreated Vegetable Oil (HVO),
- Construction machinery will run on Hydrotreated Vegetable Oil (HVO), and
- Climate Neutral Data Centre Pact signatory. Vantage and the end-customers has been a certified member of the Climate Neutral Data Centre Pact.

Principle 3

1.54 The applicant will implement measures in line with "best practice" as outlined in IEMA guidance (IEMA, 2022).

1.55 The Applicant has entered into a Letter of Intent (LOI) with Nephin Renewable Gas Limited to provide Corporate Power Purchase Agreements ('CPPAs') for new renewable energy. The Applicant can confirm that the LOI has been signed by both parties. These LOIs are capable of underpinning new renewable energy generation calculated to offset the energy consumed by the proposed development from the electricity grid and onsite gas generation. These arrangements provide for:

- Corporate Power Purchase Agreements between the applicant's group and Nephin Renewable Gas Limited.

- The establishment of new renewable energy generation projects by the applicant's group, that will not be supported by government or consumer subsidies – these new renewable energy projects will be:
    - Located throughout Ireland;
    - Parallel development to the energy demand of the proposed development; and
    - In total, should see the collective annual generation match the data' centre' annual electricity use.

1.56 Through these obligations, for every unit of energy consumed by the data centre, a unit of new renewable energy generation would be despatched to the wider electricity system to off-set it. This delivers the objective of operating the proposed development on an annual net energy zero basis that would support Ireland's overall climate targets. Any associated additional renewable energy supply would also increase energy security through indigenous energy sources.

Criteria for Determining the Significant of Effects

1.57 The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. In relation to climate, there is no project specific assessment criteria, but the project should be assessed against the recommended IEMA (IEMA, 2022) significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered:

- **Major or moderate adverse impact (significant):** A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the net zero trajectory by 2050 or sectoral based transition to net zero targets, results in a significant adverse effect.

- **Minor adverse impact (not significant):** A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050.

- **Negligible Impact (not significant):** A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant.

- **Beneficial Impact (significant):** A project that causes GHG emissions to be avoided or removed from the atmosphere has a beneficial effect that is significant. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.

Assessment

1.58 Using the methodology outlined in the IEMA Guidance (IEMA, 2022) the significance can be assessed by a comparison between the GHG emissions of the project with the thresholds in Table 4 and Table 5 above. The significance of the development is outlined in Table 8 below based on this comparison with the overall carbon budget and the emission ceilings for the electricity sector. As shown below, based on the IEMA Guidance (IEMA, 2022) methodology, the impact of the project is **minor adverse** for both electricity from the national grid and using natural gas to power the onsite MFGP.

1.59 Also included in Table 8 is the significance of the assessment when compared to emission under the Emission Trading System which has set a cap for 2030 based on the approach set out in IEMA guidance (IEMA, 2022). Again, as shown in Table 8, based on the IEMA methodology, the impact of the project is **minor adverse**.

Facility	% Of Carbon Budget 2026 - 2030	Significance (Based On Thresholds In Table 4 & 5)	% Of EU ETS Cap	Significance (Based on IEMA Methodology)
Vantage – Year 2026 – 2030 (228 GWh) – Electricity From National Grid	0.08%	Minor Adverse	0.005%	Minor Adverse
Vantage – Year 2026 – 2030 (228 GWh) – MFGP Using Natural Gas	0.27%	Minor Adverse	0.015%	Minor Adverse

Table 8 GHG Emissions Associated With The Development

1.60 Table 9 shows the significance of the project when compared to the overall Carbon Budget and the Emission Ceilings for the Electricity Sector based on the approach set out in IEMA guidance (IEMA, 2022). The assessment is presented both prior to and post mitigation. As shown in Table 9, the impact of the project prior to mitigation would be deemed to be a moderate, significant, adverse impact for both the electricity from the grid and from the onsite MFGP. Although the project prior to mitigation is better than the "do-nothing" scenario of enterprise computers, the impact would still be significant in the absence of appropriate mitigation.

1.61 Also presented in Table 9 is the impact post mitigation. As outlined above the project will use "best practice" adaptive design measures (solar panels, rainwater harvesting, facilitating district heating, commitment to the Climate Neutral Data Centre Pact, etc.) and by using long term power purchase agreements. With the implementation of these measures the impact of the proposed project, in line with the IEMA methodology (IEMA, 2022), is reduced to a minor adverse, non-significant impact both the electricity from the grid and from the onsite MFGP.

Facility	% Of Electricity Emission 2030 Ceiling	Significance (Prior to mitigation)	Significance (After mitigation)
Vantage DUB13 – Year 2026 – 2030 (228 GWh) – Electricity From National Grid	0.83%	Moderate Adverse	Minor Adverse
Vantage DUB13 – Year 2026 – 2030 (228 GWh) – MFGP Using Natural Gas	2.67%	Moderate Adverse	Minor Adverse

Table 9 GHG Emissions Associated With The Development

1.62 In relation to the facility (2026 - 2030) the average GHG emissions, in the absence of mitigation, based on electricity from the national grid are equivalent to:

- 0.08% of the national 2030 target,
- 0.83% of the Emission Ceiling for the Electricity Sector.

1.63 In relation to the facility (2026 - 2030) the average GHG emissions, in the absence of mitigation, based on electricity from the onsite MFGP using natural gas are equivalent to:

- 0.27% of the national 2030 target,
- 2.67% of the Emission Ceiling for the Electricity Sector.

1.64 The Institute of Environmental Management and Assessment (IEMA) guidance document – Pathways to Net Zero - Using the IEMA GHG Management Hierarchy (Nov 2020) revised the IEMA GHG Management Hierarchy as shown in Figure 8 below to include CPPAs under the category of “substitution” within the Hierarchy:

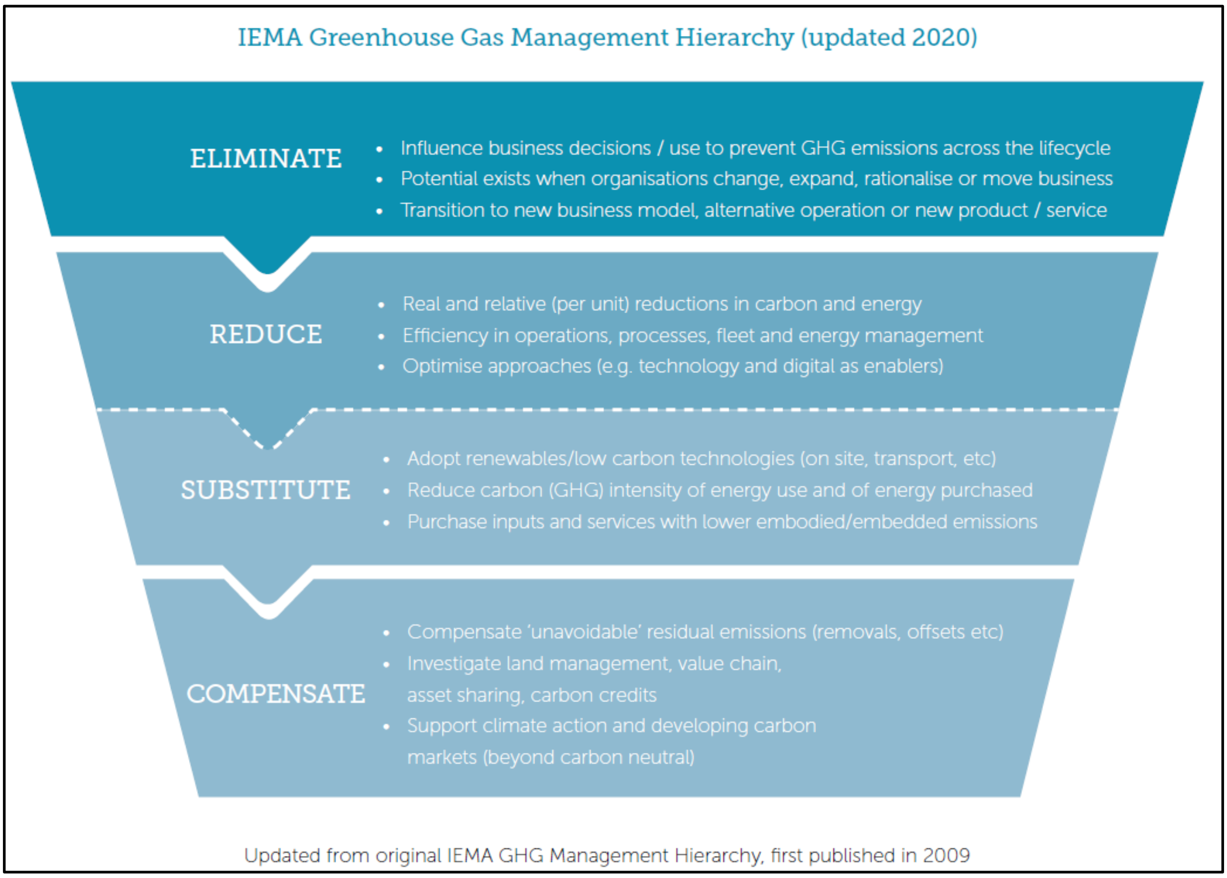

Figure 8 IEMA Greenhouse Gas Management Hierarchy (IEMA, 2020)

1.65 In relation to the use of CPPAs, the IEMA 2020 guidance states, on Page 5, the following:

"Purchased green electricity tariffs (also green gas) are increasingly being considered within net-zero approaches. In earlier versions of the Hierarchy these tariffs only appeared within COMPENSATE. This is still the case for market-based approaches that use certificates where additionality or quality thresholds are poor, or hard to substantiate. The hierarchy does now allow for higher quality energy tariff purchases within the SUBSTITUTE line, reflecting developing practice and some improved purchasing arrangements (e.g. higher quality procurement or quasi-investments via power purchase agreements)."

1.66 Thus, CPPAs are now recommended by IEMA (IEMA, 2020) as an appropriate project-specific "*Substitution*" mitigation measure alongside measures such as adopting renewable technologies and reducing the carbon intensity of energy used.

1.67 For further clarity on the position of IEMA regarding CPPAs and mitigation, the *IEMA Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition* (IEMA, Feb 2022) has recently stated, on Page 9, that:

"GHG mitigation is best achieved by taking a planned and focused approach following the IEMA GHG management hierarchy principles."

1.68 Consideration of the alternative should also be made, with the rising demand for data storage there is a requirement for this service. Section 01.52 noted that the use of large-scale data storage facilities, such as the proposed development, represent a significantly more efficient means of data storage when compared to a distributed model of local data storage. Therefore, the alternative to large scale data storage centres will have a likely more significant impact than the proposed development.

1.69 IEMA states that a minor adverse impact is a project that is compatible with the budgeted, science based 1.5°C trajectory – as shown in Figure 5 the energy demand projections include for an increase in data centres and this has been "budgeted" into future projections which align with the 1.5°C trajectory. The project also must comply with up-to-date policy and 'good practice' reduction measures to achieve that target has a minor adverse effect. With a reduction in residual emissions through best practice and the implementation of a series of adaptive design measures, the net impact of the Proposed Development is not significant. Given that the use of electricity to power the facility will achieve net zero by 2050 and the commitment to meet all interim fossil fuel derived GHG emissions associated with the proposed development by the purchase of Corporate Power Purchase Agreements (CPPAs) the predicted impact to climate is deemed to be ***indirect, long-term, negative and minor adverse***. Thus, the impact of the Proposed Development, in line with the IEMA methodology (IEMA, 2022), is a ***minor adverse, non-significant*** impact.

1.70 The CAP24 states that "*The overarching objective of managing electricity demand growth is to ensure, through a combination of energy efficiency and flexible electricity demand, that economic growth can be supported by low-carbon or no-carbon energy demand growth".* As previously detailed, the Applicant will entered into CPPAs for new renewable energy that will, subject to receipt of a grant of planning, match the amount of energy consumed by the data centre from the electricity grid or the multi-fuel generation plant. By entering these CPPAs the proposed development will align with this CAP24 overarching objective of "low-carbon or no-carbon energy demand growth". The CPPAs will provide the support needed to build out the element of the excess capacity needed and further contribute to Ireland meeting its energy policy targets.

<u>Compliance With Section 15 of the Climate Action & Low Carbon Development Act (Amended) 2021</u>

1.71 Section 15 of the Climate Action & Low Carbon Development Act (Amended) 2021 states that:

1. "A relevant body shall, in so far as practicable, perform its functions in a manner consistent with:

a) the most recent approved climate action plan,

b) the most recent approved national long-term climate action strategy,

c) the most recent approved national adaptation framework and approvedsectoral adaptation plans,

d) the furtherance of the national climate objective, and

e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."

1.72 The Proposed Development is aligned with the above mentioned plans, strategies and objectives as outlined below. In relation to 15.1(a), under Section 13.3.2.9, the 2024 CAP states:

> *"The EU ETS is a cornerstone of the EU's policy to combat climate change and it is a key tool for reducing greenhouse gas emissions cost-effectively The EU ETS operates on a "cap and trade" principle. The cap is an absolute limit on the level of emissions across the EU ETS marketplace, and all participants must either reduce their emissions in line with their emission allowance, or purchase permits from another market participant that has excess emission allowances to trade. The EU ETS is an important mechanism to drive emissions reductions in Ireland. Revisions for the EU ETS proposed under the EU Fit for 55 package were formally approved in April 2023 and include significant changes that aim at strengthening the decarbonisation incentive in industry. EU ETS emissions are set to reduce by 62% (previously 43%) compared to 2005, further tightening the cap on all participants. In addition, while industrial emitters currently receive a proportion of free allocation of emissions permits, the updated EU ETS will see free allocation for many industries phased out from 2026, adding further upward pressure to the carbon price" (2024 CAP, page 189),*

1.73 Thus, the indirect electricity emissions and the direct emissions from the MFGP and backup generators will both require greenhouse gas permits under the ETS in order to operateand thus the GHG emissions associated with the Proposed Development will be in line with Section 13.3.2.9 of the 2024 CAP which stresses the importance of the EU ETS in reducing industry GHG emissions.

1.74 In relation to 15.1(b), the Long-term Climate Action Strategy was published on the April 2023 and updated in June 2024. In relation to electricity, the Government commits to the full decarbonisation of the electricity system by 2050. In relation to the EU ETS, the Long-term Climate Action Strategy states that "*A strong price signal, as part of a reformed EU ETS, including progressively more restrictive rules on how many allowances will be available within the EU ETS, is expected to drive decarbonisation over the coming decade by increasing the cost to firms in the EU ETS of doing nothing to reduce their emissions"*(DOECC, 2023).

1.75 In relation to data centres, the Long-term Climate Action Strategy states that "*Energy demand, including data centres, will be expected to operate within sectoral emission ceilings and further signals will be required to locate demand where existing or future electricity grid is available and close to renewable energy generation. Research and* *development in energy storage and flexibility (such as a science challenge to industry) will be required to put Ireland on a pathway to net zero-carbon data centres*” (DOECC, 2023).

1.76 The Proposed Development is in line with this strategy as the electricity associated with the project, due to the commitments in the 2024 CAP, will reduce in line with national policy and in line with EU policy as outlined in the EU Climate Law (EU, 2021) which has outlined a legally binding target to obtain net zero GHG emissions by 2050.

1.77 In relation to 15.1(c) national and sectoral adaptation plans and 15.1(e) “adapting to the effectsof climate change on the state”, a detailed flood risk assessment has been completed for the Proposed Development and adequate attenuation and drainage have been designed to account for increased rainfall in future years. Thus, the granting of permission for the Proposed Development will not be inconsistent with the national and sectoral adaptation plans.

1.78 In relation to 15.1(d) the national climate objective, the 2024 CAP has stated that:

“The Climate Action and Low Carbon Development (Amendment) Act 2021, requires Ireland to achieve a 51% reduction in GHG emissions by 2030 (relative to 2018 levels), and net-zero emissions by no later than 2050”

1.79 Thus, the Proposed Development aligns with the national climate objective as the Proposed Development will be within the EU ETS which is the cornerstone of the EU’s objective to reduce GHG emissions by at least 55% by 2030 (compared to 1990) and to achieve climate neutrality by 2050. As outlined in the EU Climate Law (EU, 2021) under the Item (13): “*The EU ETS is a cornerstone of the Union’s climate policy and constitutes its key tool for reducing greenhouse gas emissions in a cost-effective way.”*