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MARS

Mars Birstall, Ammonia Project – Climate Change Statement

250607

Planning Statement

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Mars, Birstall

Climate Change Statement

1.0 Introduction

The purpose of this report is to clarify the approach to the proposed development in relation to the principles set out in Kirklees Council's development policies in relation to Climate Change.

The proposed site is:

Name of applicant/agent	Mars Pet Nutrition UK
Site Address	Mars Care & Treats Oakwell Way Batley WF17 9LU
Description of Development	The project briefly comprises; the installation of new process chilled water-cooling plant to replace existing aged infrastructure, improve efficiency and reduce reliance upon F-gas refrigerants by replacing with natural refrigerants to reduce global warming impact.

This report has been prepared in response to Climate Change Validations requirements as follows:

The Climate Change Statement should respond to the council's declaration of a Climate Change Emergency. It should demonstrate how the development contributes towards the transition to a low carbon economy.

Detailed guidance is set out on the council's website. The statement should at least include:

- *How a layout has been designed to minimise the consumption of energy e.g. orientation, connection to sustainable forms of transport, use of renewable/low carbon energy sources.*
- *How a building is designed to reduce energy consumption e.g. orientation, solar gain, insulation,*
- *renewable energy, waste minimisation, water management (including climate adaptation and resilience) and sustainable sourcing of materials.*

2.0 Design Approach

The proposed design is aligned to Mars Net Zero Carbon roadmap and 'Sustainable in a Generation Plan' which sets out the minimum targets and requirements for sustainability across the business. It responds to the demands of Climate Change and aims to mitigate the effects, and recognises adaptations required across its estate, processes and wider business for a changing environment - and focuses on the path to reduce carbon emissions. The scheme follows four key principles as follows:

HEALTHY PLANET

'To keep the planet healthy for people and nature, Mars follows a data-driven, scientific approach to reduce our environmental impact. Our efforts include a 2050 net zero emissions commitment, expanding our use of renewable energy, helping farmers cut water use while increasing crop yield, working to eliminate deforestation and evolving our product packaging to support a circular economy.'

THRIVING PEOPLE

'Our business, Associates and the communities where we operate will thrive for generations to come only if we help the millions of people who contribute to our success thrive as well. We are committed to respecting human rights throughout our value chain, starting with areas where we have the most influence, and where we can have the greatest impact on people's rights, opportunities and livelihoods via multiple programs and with key partners.'

NOURISHING WELLBEING

'Good nutrition, health and wellbeing are essential for billions of people and pets around the world to lead happier, healthier lives. These things are also key to our growth. We use our global reach to support the wellness of Mars Associates, enhance our products' quality and nutrition, and provide more people around the world with access to healthy meals.'

MATERIALS AND SUPPLY CHAINS

'We're focusing on key high-risk supply chains to tackle deforestation and meet the big challenges that require bold action. For example, we have created a deforestation-free palm supply chain by reducing our mill partners to fewer than 100 instead of 1,500. We're also improving traceability and empowering farmers to find more sustainable methods for growing cocoa, which is essential to our beloved chocolate brands. We have expanded our coverage of child labour monitoring and remediation systems in our cocoa supply chain, and we're the first chocolate company to support the Living Income Differential (LID) fee enacted by Côte d'Ivoire and Ghana. We have consistently purchased cocoa with the LID to support farmers while urging others to do the same. We also support traceability of the cocoa supply chain so that we can work toward fairer compensation for smallholder cocoa farmers.'

3.0 Climate Change Mitigation Measures

The following provides a response to the key questions posed in the Kirklees Council Planning Policy with a view to demonstrating the Environmental Climate Mitigation measures adopted in the proposed development.

The key project objectives are:

- To Replace F-Gas with natural refrigerant
Replacing F-Gas (Synthetic Refrigerants) systems with natural refrigerant systems to reduce global warming impact, futureproof site utilities, and enhance operational efficiency (Ammonia: 0 GWP).

- To Upgrade aging plant
Replace aging standalone F-Gas systems to improve reliability and reduce running cost/carbon footprint.

- To Centralise refrigeration systems
A centralised system enables maximum plant and distribution efficiency, and potential utilisation of waste heat in future.

- Unlock potential for low carbon heating (Electrification) as a future phase
Future potential to reduce steam consumption and gas boiler usage by harnessing waste heat through energy recovery.

Q1: What measures have been/will be taken to reduce the energy demand associated with your proposed development beyond the minimum required in Building Regulations?

The proposed new plant installations are intended to consolidate existing remote process chilled water installations into a new centralised provision, meaning inherent benefits in terms of energy efficiency and plant performance. The chiller plant compressor design & technology proposed for this solution has best in class in terms of efficiency & performance, and due to the nature of the site's process cooling demand (fluctuating cooling profile), the reciprocating compressor used offers superior performance due its improved part load performance. The process cooling plant offers a significant improvement over the existing legacy plant and equipment, meaning operational energy improvements.

The plant proposed achieves the following performance:

- Design condition COP (Line) of 'High temp' chiller (+6 °C): 4.91
- Design condition COP (Line) of 'Medium temp' chiller (+ 2 °C): 4.24

This is based on plant data provided by the manufacturer as follows:

(EER High temp chiller (+6 °C)):

Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for part load at given outdoor temperatures Tj

T_j = + 35 °C	EER_d	4.93	%
T_j = + 30 °C	EER_d	6.28	%
T_j = + 25 °C	EER_d	8.23	%

EER Medium temp chiller (+ 2 °C):

Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for part load at given outdoor temperatures Tj

T_j = + 35 °C	EER_d	5.04	%
T_j = + 30 °C	EER_d	6.40	%
T_j = + 25 °C	EER_d	8.16	%

Seasonal Energy Efficiency Rating (SEER) values are proposed as follows:

- SEER High temp chiller (+6 °C): 7.78
- SEER Medium temp chiller (+ 2 °C): 7.74

- SEPR High temp chiller (+6 °C): 9.40
- SEPR Medium temp chiller (+ 2 °C): 10.16

Note: SEPR (seasonal energy performance ratio for process chillers at high temp.)
(coolant in/out 12/7 ℃, cooling medium 30/35deg C), so adjusted for high/medium temp chiller circuits

Therefore, based on an average theoretical design COP of existing F-Gas chillers at 3.50 (a conservative estimate as it is not practical to accurately quantify the impact of age, wear and tear on actual current efficiency), and considering deterioration in COP due to the age and condition of existing installations - it is expected that plant efficiency can be further reduced by as much as 10-20%.

Therefore, based on design COP of new equipment at 4.24-4.91 for the two temperature systems respectively, we anticipate a conservative estimated 20% improvement in energy use as a minimum.

Q2: What measures have been/will be taken to limit the carbon consumed through the implementation and construction processes, e.g. by reusing existing on-site materials or sourcing materials locally?

Due to the specialist nature of the process cooling installations, some of the proposed new equipment must be sourced from outside of the UK, however all key manufacturers of the capital plant and equipment are registered to SBTI (Science based target initiatives) and have measures in place regarding their scope 1,2,3 emissions. This includes the key delivery partner GEA, and key supply chain Grundfos and Xylem (Pumps), ABB (Motor / Drives) and Danfoss (Drives).

Where practical materials are to be retained and re-used on site, including glycol distribution pipework with limited new interconnecting distribution mains in the yard area, connecting back to existing. In addition, glycol coolant will be recovered where practical within the existing system (subject to quality tests to be carried out on samples).

The installation will also utilise local workforce where possible to further benefit the carbon credentials of this scheme.

Q3: What measures have been/will be taken to utilise renewable or low carbon energy sources?

As the project is process driven, the opportunity for utilising renewable energy sources is limited, however the proposed installations do focus on the use of lower carbon energy sources, utilising electrical energy as the main driving force (i.e. non-combustion). The consolidation of remote plant installations into a centralised provision, along with the replacement of F-Gas chillers with new ammonia-based chiller plant, provides an inherent upgrade in performance and efficiency, which in turn translates into an overall reduction in power consumption (Typically this is 20-30% as discussed earlier in this statement), demonstrating a corresponding reduction in carbon footprint.

Additional carbon savings can be attributed to mitigated F-Gas leakage from the existing chiller systems, which at some level is inherent in all legacy refrigerant installations over the life of the equipment. The proposed solution also unlocks the potential for low carbon heating (Electrification) as a Future Phase of works, by harnessing waste heat through process energy recovery, to further reduce site steam consumption and gas boiler and bolster the carbon credentials of the project.

Considering the low energy and low carbon aspirations of the project, the process demand profile and energy requirements, the cooling solution adopted is considered most appropriate, to meet the low energy and carbon requirements of the project.

Q4: What measures have been/will be taken to ensure the building design and layout has been optimised to energy efficiency beyond the minimum requirements in Part L of the Building Regulations?

As this is a process driven project, and the majority of cooling is being provided for process cooling and not dependent on building design, Part L of the Building Regulations is not directly relevant, however the following efficiency measures have been adopted to promote efficient design:

- Consolidated approach to provide a common process cooling source to improve plant efficiencies and reduce overall energy use
- New systems proposed included expandability / adaptability and future heat recovery potential to further benefit the site energy demand
- Variable speed drives, pumping and compressors shall be adopted to react to variables is site demand
- Maximise the efficiency of pipework infrastructure by providing new pipe and storage insulation and minimising the length of pipe runs. Size pipes appropriately to reduce pressure losses and select efficient pumps and motors capable of variable flow solutions.

The above principles, coupled with the selection of plant and equipment which exceeds the minimum performance criteria (i.e. chiller COP and SEER values) shall all contribute to an energy efficient development.

Q5: What measures have been/will be taken to reduce potential impacts of flooding associated with your proposed development?

The proposed new plant is to be located on an existing hardstanding within the site area, and as such will not adversely affect the potential impact of flooding on the surrounding accommodation. The chiller equipment itself is skid mounted and self-bunded with no drainage discharge to surface water drains.

Q6: What measures have been/will be taken to reduce water stress associated with your proposed development? (e.g. Water retention and minimisation measures)

The proposed new installations pose a minimal water supply requirement, which does not exceed the existing legacy equipment installations and therefore does not present any additional water stress on the local infrastructure. All heat rejection design & technology proposed has minimal water consumption relative to alternative options available (e.g. Cooling tower), and for the vast majority of the year will not require a water supply to achieve the required process cooling load. Where adiabatic cooling is required (i.e. when ambient dry bulb is approx. 23 °C and running at high heat rejection load), modulating water control based on air RH% shall be utilised – which uses >50% less water than other adiabatic coolers. Oversized heat rejection coils surface areas will also extend 'dry mode' operation range further minimising water consumption. The proposed systems are non-notifiable under evaporative condenser / cooling tower act 1992, are legionella safe (i.e. no sprays or aerosols), and no water treatment chemicals will be required.

Q7: What measures have been/will be taken to provide biodiversity net gains?

The existing site is formerly a plant compound and hardstanding, and therefore the existing site biodiversity is extremely limited.

As the proposed site is limited, and less than the 25m2 minimum threshold of vegetation on site identified, mandatory BNG is not considered a requirement of this project.

Q8: What measures have been/will be taken to reduce air pollution associated with your proposed development?

As the proposed installations are adopting an all-electric cooling solution, there is currently no anticipated natural gas requirement for the project. The use of 'no combustion in operation' has been a requirement of the process cooling design, and as such should limit the impact of air pollution from the proposed new development. The

potential for Future Phase works to accommodate heat recovery to reduce steam consumption and gas boiler usage by harnessing waste further enhances opportunities to reduce air pollution from combustion sources.

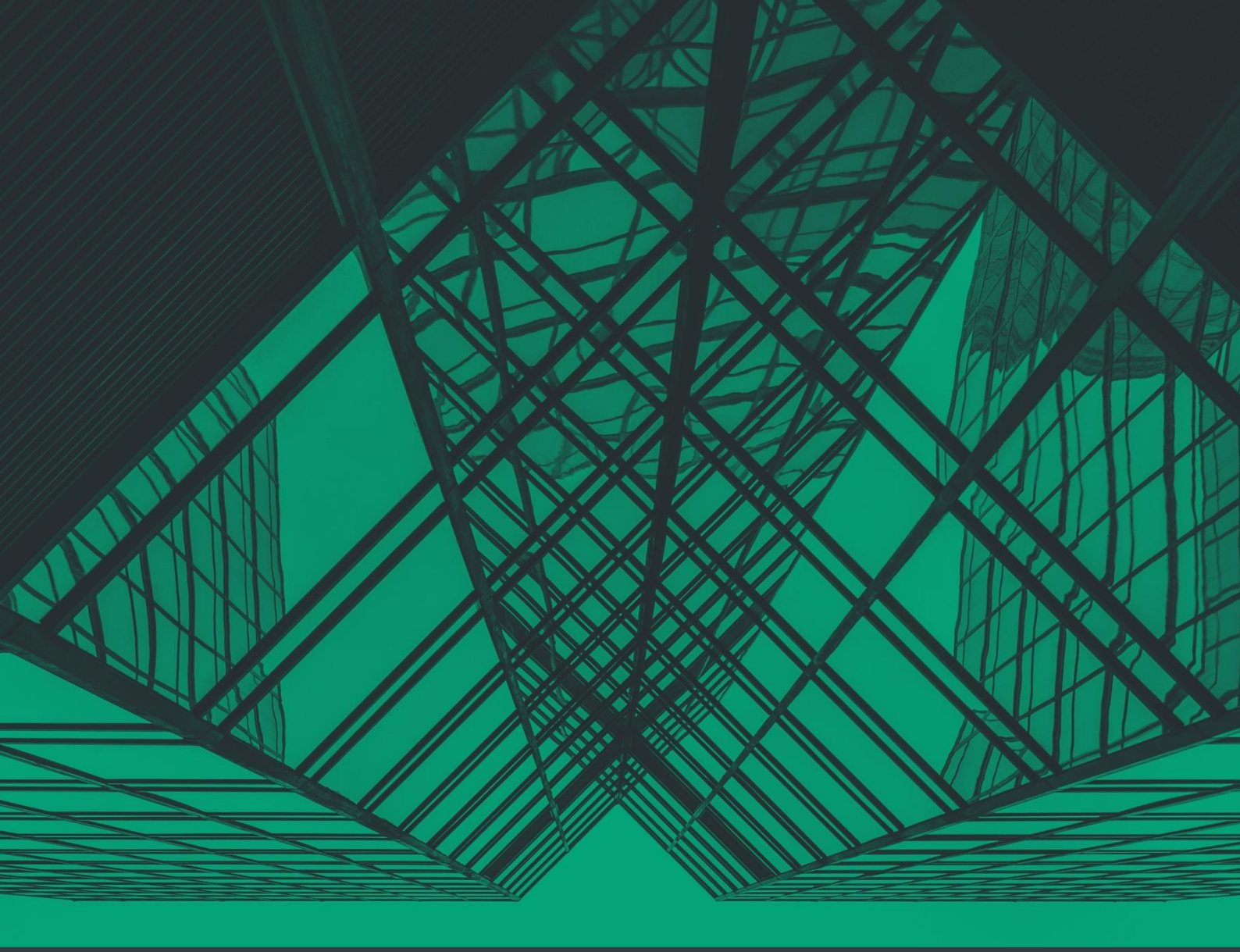
From an air quality perspective, the proposed installations are relatively low risk and do not require any form of odour abatement. From a performance perspective, the design focusses on the control of potential pollutants, with the inclusion of leak detection sensors and ventilation / extract systems which will be installed to prevent any potential ammonia build-up from a catastrophic leak – this is however unlikely due to the design arrangement of the new plant installations, and other protection measures. Process equipment ventilation is designed as per EN378 guidelines which defines a minimum of 4 air changes during normal operation and 15 air changes during emergency, within closed space containing ammonia refrigerant. The individual chillers have their independent ammonia systems (ultra-low charge ~50kg) confined within the respective circuits. Each chiller is housed in its own GRP enclosure, with each enclosure having duty/standby extract fans and a recirculation fan internally. A DSEAR risk assessment & plume modelling will also be used validate ventilation system designs prior to installation.

One of the key focuses of the project is to replace life expired F-Gas (Synthetic Refrigerants) systems which are due for replacement with natural refrigerant systems to reduce global warming impact and potential risk of air pollution.

4.0 Conclusion

The information provided demonstrates that the proposed new installations exceed current energy and carbon performance parameters and offer an operational benefit over the existing life expired installations that are due for replacement - and is therefore aligned to Kirklees Council requirements.

This displays a drive towards Climate Change Mitigation in line with the Clients own performance targets and reduces energy use and carbon production through proficient use of equipment and other design measures where practical. The development is also aligned to the other key drivers set out in the Local Authorities Climate Change strategy where applicable, considering biodiversity of the proposed site, minimisation of water consumption, flood mitigation and stress, and other control measures i.e. to reduce air pollution.



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+44 (0) 113 2470 709

leeds@cpwp.com

www.cpwp.com

Studio 23/24
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Leeds
LS2 7EY