UNIVERSAL DESTINATIONS & EXPERIENCES UK PROJECT

Former Kempston Hardwick Brickworks and adjoining land, Bedford

Energy Statement

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UNIVERSAL DESTINATIONS & EXPERIENCES

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1 INTRODUCTION

1.1.1. This Energy Statement has been prepared on behalf UDX, who is seeking planning permission for the construction and operation of a Universal Entertainment Resort Complex (ERC), and associated development, in Bedford. The proposal is sponsored by the Department for Culture Media and Sport ("DCMS"). The Department for Transport ("DfT") and its associated arm's-length bodies have assisted in the development of the highways and rail related elements of the proposal with Bedford Borough Council ("Bedford BC"). The proposal intends to provide sufficient information to enable the Secretary of State for Housing, Communities and Local Government ("MHCLG") to consult on and consider making a planning decision.

1.1.2. The Site is located south-west of Bedford, Bedfordshire and is broadly to the east of the A421 and west of the Midland Main Line and is on the former Kempston Hardwick brickworks and agricultural land. The Site is divided into four main land areas referred to in the planning proposal as the Core Zone, Lake Zone, West Gateway Zone, and East Gateway Zone. The proposed ERC lying within these zones would allow a theme park and associated uses including retail, dining, entertainment; visitor accommodation; sport, recreation, leisure and spa facilities; venues with conference and convention spaces; associated services and uses for any operational or administrative functions; utilities generation, storage, collection, treatment, and processing facilities associated with the ERC; vehicle and cycle parking, maintenance and servicing and transportation hubs; access routes and circulation spaces; landscaping; utility infrastructure; and use of land necessary to support construction.

1.1.3. The planning proposal also includes a series of infrastructure improvements including:

- A new A421 junction;
- An expanded railway station on the Thameslink/Midland Main Line at Wixams;
- Improvements to Manor Road; and
- Improvements to certain other local roads.

1.1.4. It also safeguards land for a potential new railway station on the proposed EWR Bletchley to Bedford line, should this come forward in the future.

1.1.5. Capitalised terms that are not defined within this document shall have the same meaning as set out in **Appendix 0.1: Glossary and Acronyms (Volume 3)** of the Environmental Statement (ES) (**Document Reference 4.0.1.0**).

1.1.6. The Site is 268 hectares (ha) and centred approximately at National Grid Reference TL025442. The Site plan is shown in the **Site Location Plan (Document Reference: 1.6.0).**

1.1.7. The Proposed Development is described in **Chapter 2: Description of the Proposed Development (Volume 1)** of the ES **(Document Reference 2.2.0)**.

1.1.8. This Energy Statement outlines the energy strategy and efficiency measures planned for construction of the Proposed Development, taking into account national and local policy requirements.

1.1.9. UDX intends to install advanced energy-efficient systems to optimise energy performance throughout the Site and is committed to use low carbon energy centres for the generation of heating and cooling. Additionally, UDX seeks to pursue Leadership in Energy and Environmental Design (LEED) Gold Certification for Cities and Communities[1], as a framework for incorporating energy efficiency and sustainability in the design and operation of the Proposed Development.

[1] U.S. Green Building Council. (2024). *Guide to LEED Certification: Cities and Communities*. https://www.usgbc.org/tools/leed-certification/cities-communities

2 POLICY AND REGULATORY FRAMEWORK

2.1.1. The national and local policies outlined below provide a foundation for identifying the energy strategy requirements to be addressed by the Proposed Development.

2.2 NATIONAL POLICY

2.2.1. National Planning Policy Framework (NPPF) 2024[2] – The NPPF sets out the UK Government's planning policies and framework for development in a sustainable manner in England.

In summary, this means the planned buildings, commercial development and associated infrastructure must:

a) Support the national planning objectives across social, environmental, and economic themes; and

b) Accord with local plans and planning requirements for sustainable development, as specific to the area in which they are to be delivered.

2.2.2. Heat and Buildings Strategy 2021[3] – This strategy sheds light on government's approach to low-carbon heating and energy efficiency as part of the Clean Growth Strategy and the Ten Point Plan, ensuring a consistent and coherent approach across various supply chain markets, buildings and occupancy types, and that robust plans with targeted financial supports to achieve carbon budgets and lay the foundations for Net Zero buildings in the UK by 2050. The strategy sets out the vision for Large and complex commercial and industrial buildings on the pathway to be Net-Zero:

- Developing and consulting on a mandatory framework for performance-based energy ratings for commercial and industrial building over 1,000 m^2;
- Identifying low-carbon heat networks as playing a substantial role in the decarbonisation of heat in any Net Zero scenario, with the Climate Change Committee advocating for 18% of UK heat to be sourced from heat networks by 2050;
- Committing £338 million of funding towards a new Heat Network Transformation Programme to bring together several interrelated heat network projects, including the implementation of local authority zoning by 2025; and
- An ambition that by 2035, no new gas boilers will be sold.

2.2.3. Future Buildings Standard 2025[4] – The Future Buildings Standards will come into force in England in 2025 (date to be announced), with the consultation having ended in March 2024 on changes to Part 6, Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for non-domestic buildings and seeking evidence on previous changes to Part O (overheating).

[2] National Planning Policy Framework (NPPF) (2024). [Online] accessed at: National Planning Policy Framework - GOV.UK

[3] Heat and Buildings Strategy (2021). [Online] accessed at: https://www.gov.uk/government/publications/heat-and-buildings-strategy.

[4] Future Homes and Buildings Standards (2023). *Consultation* https://www.gov.uk/government/consultations/the-future-homes-and-buildings-standards-2023-consultation/the-future-homes-and-buildings-standards-2023-consultation

2.2.4. The 2025 Future Buildings Standards aims to set even more ambitious requirements for energy efficiency and heating for non-domestic buildings. These standards will be in line with meeting the UK's trajectory towards 2050 net zero target and will mean no further work will be needed for new buildings to produce zero carbon emissions as the electricity grid decarbonises.

2.2.5. Key aspects of the Future Buildings Standards include:

- Setting performance requirements for new buildings that ensures they are 'zero-carbon ready,' with high fabric standards, efficient lighting and minimum standards for pipework insulation aligning with CIBSE CP1 best practice;
- Supporting the expansion of heat networks contingent upon tangible strides towards decarbonisation. Under the Future Buildings Standards, new developments can connect to existing or new heat networks, provided they integrate low-carbon technologies or utilise currently unused low-carbon heat; and
- For non-domestic buildings, a number of improvements and updates are proposed to the National Calculation Methodology used to assess building performance in non-domestic buildings.

2.2.6. Government is also committed to developing CO_2 emission standards for all heat networks across the country in the mid-2030s, regulated by Ofgem as the national heat network regulator, which will require the sector to transition to lower-carbon heat sources.

2.3 LOCAL PLANNING POLICY

2.3.1. Bedford Borough Local Plan 2030[5] - The Local Plan depicts the policies to meet the growth needs of Bedford borough up to 2030. The Local Plan 2030 aims to strike a balance between promoting economic growth, meeting housing needs, protecting the environment, and enhancing the overall quality of life for residents in the Bedford area.

2.3.2. This Local Plan identifies a series of objectives including the need to:

- Reduce energy consumption by consideration of building orientation, massing, and landscaping;
- Address climate change in design of buildings ensure resilient to future changes in climate conditions; and
- Consideration of district heating as a low carbon energy supply technology due to higher efficiencies in operation, compared to individual boilers.

2.3.3. The Proposed Development, will need to address:

- Policy 51S – Climate Change – "Development and use of land and buildings to address climate change, adapting to anticipated future changes and mitigating against further change by reducing greenhouse gas emissions"

[5] Bedford Borough Local Plan (2030). Accessed at: https://www.bedford.gov.uk/planning-and-building-control/planning-policy/local-plan-2030/local-plan-2030-overview

- Policy 54 – Energy Efficiency – In accordance with the Briefing note dated September 2022, this policy requires compliance with Part L of the Building Regulations that came into effect June 2022 requiring all new non-residential buildings must produce at least 27% less carbon emissions. It is noted that Future Buildings Standard in 2025 will introduce enhanced measures as part of the Government's commitment to achieving the UK's trajectory towards net zero by 2050; and
- Policy 55 – Renewable Energy – District Heating – "District heating consists of a network to deliver heat to multiple buildings from a central heat source. Heat is generated in an energy centre and then pumped through underground pipes to the building, which is usually connected to the network via a heat exchanger, which replaces individual boilers for space heating and hot water. This is a more efficient method of supplying heat than individual boilers and consequently, district heating is considered to be a low carbon technology".

2.4 LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

2.4.1. LEED provides a comprehensive green building certification program (similar to the UK BREEAM certification process), requiring developments to meet specific criteria and targets to improve sustainability and reduce environmental impacts. UDX is experienced in applying LEED requirements to development of resort locations worldwide with Universal Beijing Resort being the world's first theme park resort to earn a LEED Gold certification for Cities and Communities[6] and will target the same rigorous approach for the Theme Park aspects of the Proposed Development, with a focus on the following areas:

- Site – Selecting sites with access to public transit and amenities and develop sites with minimal impact to local ecosystems;
- Water – Conserving freshwater resources through reduction and recycling of non-potable water.
- Energy – Reducing emissions, improving efficiency, and shifting to clean energy;
- Materials – Prioritising circular, low-carbon, and healthy materials;
- Waste – Strive to limit waste in facility construction and operations; and
- Health and Wellbeing – Create healthy, vibrant spaces that promote wellbeing.

2.4.2. Additionally, UDX's own internal **Design Standards (Document Reference: 6.3.0)** for sustainability will be applied to the Proposed Development, consistent with the themes covered by the LEED framework.

2.4.3. Based on a review of national and local policy requirements for sustainable development the aspects covered by LEED criteria are considered to be aligned with these policies.

[6] https://www.universalbeijingresort.com/en/news/235.html.

3 CARBON TARGETS

3.1.1. In 2019, the UK government set a legally binding target to achieve net-zero greenhouse gas emissions by 2050. In 2021, it introduced a target to reduce greenhouse gas emissions by 78% by 2035 compared to 1990 levels.

3.1.2. UDX have detailed expertise and knowledge relating to their developments around the world and have access to full historic and live energy use and carbon emissions operational data for their similar facilities in relation to utility demands. UDX are supported by their consultant EXP U.S Services, Inc. (EXP) on these existing developments and EXP have used the significant data available to provide a detailed load analysis for the Proposed Development. This data has been used to evaluate the performance of a range of technologies for the energy centre.

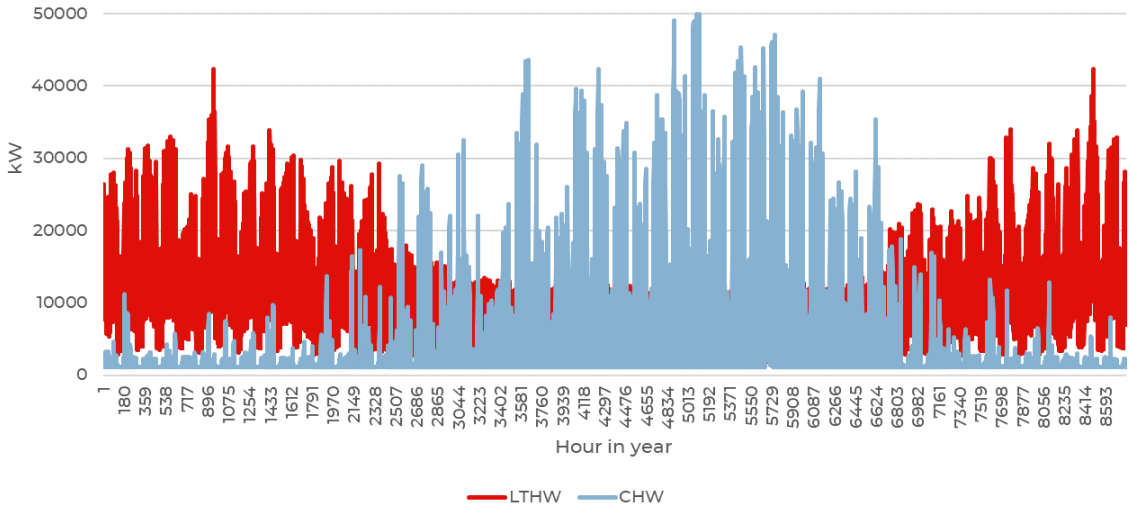

Figure 3-1: Estimated Annual Load Profiles for Heating and Cooling

3.1.3. It should be noted that the level of modelling and data analysis that has been undertaken for the Energy Strategy is proportionate to the level of information available for the design of the Proposed Development at this stage.

3.1.4. **Figure 3-2** illustrates that heat pump technologies are predicted to reduce ca. 80% less carbon emissions than the use of gas boilers and electric chillers. The whole life carbon is estimated to be 92% lower for heat pumps when considered over a 20-year period, as shown in **Figure 3-3**.

3.1.5. The Energy Strategy identifies plans to ensure the demand capacity for the Proposed Development Site will be fulfilled and provides a framework for improving energy efficiency and the provision of low carbon power supplies, to be considered further in the detailed design stage.

Figure 3-2: Estimated Annual Carbon Emissions (2030)

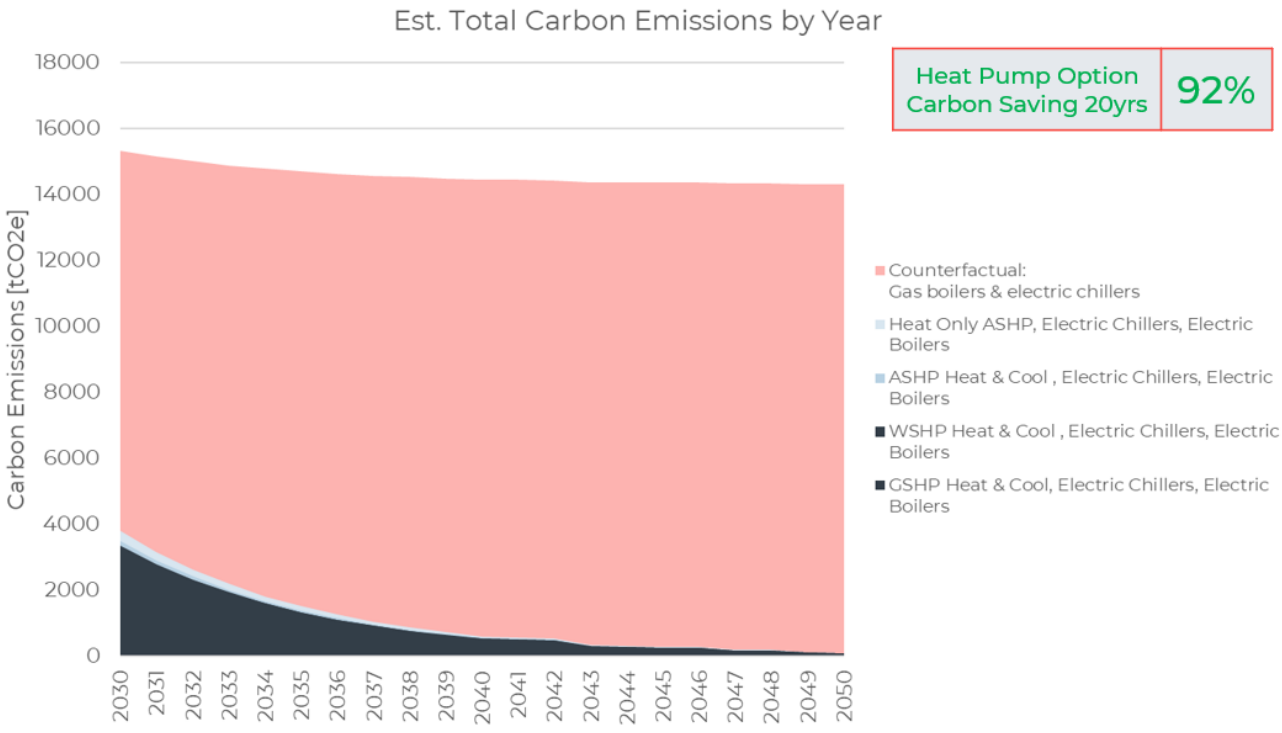

Figure 3-3: Whole Life Carbon Assessment

4 ENERGY STRATEGY

4.1.1. In accordance with the energy hierarchy shown in **Figure 4-1** the energy strategy seeks to use less energy, supply energy efficiently and use low and zero carbon technologies.

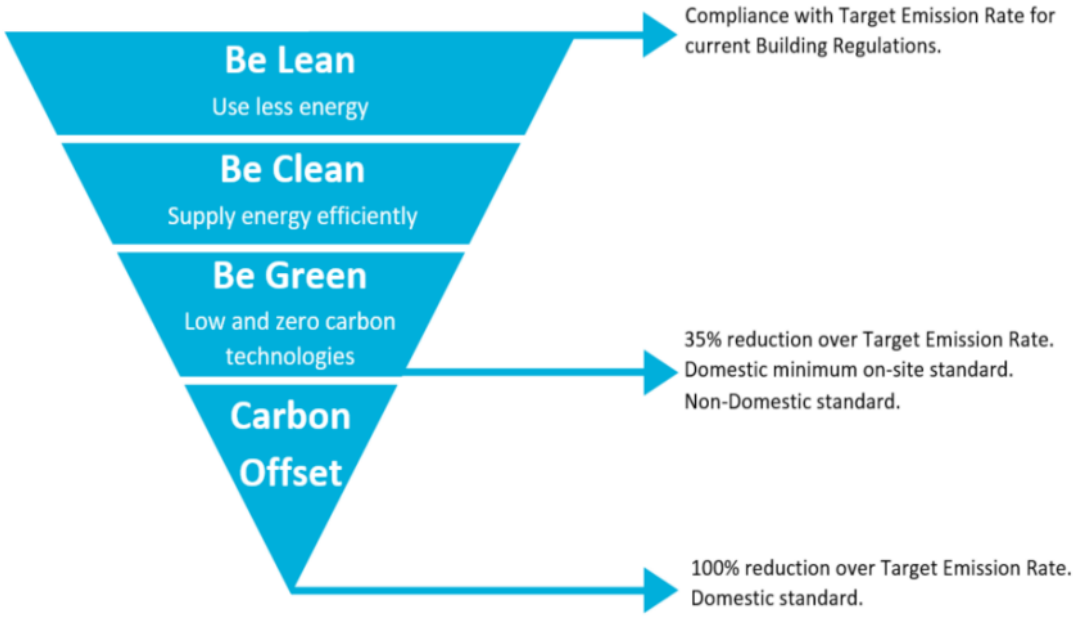

Figure 4-1: Energy Hierarchy

4.2 BE LEAN: REDUCE ENERGY DEMAND

4.2.1. The first step to achieving Building Regulations compliance and the targets outlined previously is to reduce energy demand. The measures associated with reducing demand can be termed as 'Energy Efficiency Measures.' The Proposed Development will incorporate several relevant energy conservation measures; the benefits of which are discussed below.

4.2.2. Further detailed design development will assess the exact specification and fabric values used in construction materials. In line with the energy hierarchy, a "fabric first" approach is to be utilised before consideration of on-site renewable energy generation.

4.2.3. In summary the following measures will be included to reduce the energy demands of the buildings within the Proposed Development:

- High performance building fabric;
- High performance glazing;
- Highly efficient technologies;
- Good levels of air tightness;
- Low energy lighting;
- Natural ventilation;
- Heat recovery;

- Energy storage systems; and
- Demand based intelligent controls.

4.2.4. A district heating and cooling network utilising low carbon technologies has been considered for the Proposed Development. Low carbon energy will be supplied from a more efficient centralised energy centre distributed by pre-insulated buried pipe networks to supply low temperature hot water and chilled water to the Proposed Development. A centralised energy centre can provide higher levels of resilience by taking into account diversity in thermal energy demands in heating and cooling systems which can help to reduce peak demands and consumption using heat recovery between systems.

4.2.5. Networks are to be provided with intelligent and demand response controls to minimise energy consumption and maximise energy efficiency. Heating and cooling systems are modulated to suit varying load requirements and can utilise thermal energy storage to decouple and smooth operational profiles. Variable volume distribution pumps ensure an efficient and added resilience can be provided by a ring main, enabling supply from two different directions.

4.2.6. Network Rail is committed to achieving zero carbon in 2050[7]. The expanded railway station at Wixams will be constructed in accordance with Network Rail's own low carbon commitments, which aim to feed in electricity from renewable energy sources.

4.3 BE CLEAN: SUPPLY ENERGY EFFICIENTLY

4.3.1. After energy consumption has been reduced through the application of energy efficiency measures, the next step is to consider how the energy demand can be most efficiently supplied using low carbon technologies, providing further reduction in carbon emissions.

4.3.2. The implementation of a district energy network servicing both heating and cooling loads introduces significant opportunity to maximise the efficiency of the energy centre supplying these loads through incorporating waste heat recovery. The Energy Strategy considers use of technologies such as 4-pipe heat pumps that can operate in simultaneous heating and cooling mode, allowing for the rejected heat from generation of chilled water (CHW) for the cooling network to be utilised in generating low temperature hot water (LTHW) for the heating network, significantly increasing the overall efficiency of the energy centre. This is possible in a system using air, water or ground source heat pumps and units may also switch between heating only or cooling only modes to meet changes in energy demands through year.

4.3.3. The energy centre will be an energy efficient building with intelligent control to maximise utilisation from the most efficient plant throughout the year, incorporating thermal storage, potential battery storage, and/or redundancy measures to ensure a fully resilient heating and cooling system supplying all buildings on the Proposed Development.

[7] Network Rail (2024) *A low-emission railway* https://www.networkrail.co.uk/sustainability/a-low-emission-railway

4.3.4. The LTHW and CHW will be supplied to the end load buildings via pre-insulated pipework forming heating and cooling transmission mains. This pipework is designed to minimise heat loss and is generally manufactured and installed to last for more than 50 years. Buried pre-insulated pipe networks also incorporate leak detection measures to allow for quick identification and rectification in the event of failure.

4.3.5. The overall heating system is intended to be compatible with low operational temperatures, enabling zero carbon technologies and allowing for further leverage of heat recovery opportunities. This aligns with CIBSE CP1 best practice guidance for design of efficient district energy networks.

4.4 BE GREEN: LOW AND ZERO CARBON TECHNOLOGIES

4.4.1. The centralised heating and cooling generation plant serving the Proposed Development is intended to be low carbon and sustainable. An initial technology assessment was undertaken by WSP to identify a short list of technologies that will be suited to serving the estimated thermal loads and align with this aspect of the energy strategy:

- Air Source Heat Pumps for Heating and/or Cooling;
- Water Source Heat Pumps;
- Energy from Waste;
- Solar Thermal Hot Water Heating; and
- Electric Boilers.

4.4.2. These renewable energy technologies are evaluated as summarised below with an outline of how they may be applied to the development. The specific mix of technologies for the Proposed Development will be determined at a later stage of more detailed design development.

Ground/Water/Air Source Heat Pumps

- ✓ Electric solution
- ✓ Highly energy efficient
- ✓ Net zero carbon technology
- ✓ Naturally occurring refrigerants

4.4.3. Heat pumps use electricity to turn low grade heat to a higher temperature typically suitable for providing heating and domestic hot water. They work most effectively when the source temperature (whether that is external air, the ground, or a large body of water) is at a relatively high temperature while the required output temperature is relatively low.

4.4.4. Some heat pumps can also be reversed to provide cooling or operate multiple circuits to provide cooling simultaneously with heating with incorporated heat recovery from the cooling system to maximise efficiencies.

4.4.5. Heat pumps produce no emissions at point of use and so do not have an impact on air quality in the locality. National Grid ESO are committed to the transformation of the electricity system and the ambition of operating for periods of 100% zero carbon by 2025[8]. This strategy will gradually decrease the carbon intensity of electricity until it becomes carbon-free and entirely powered by renewable energy sources.

4.4.6. Heat pumps efficiencies are measured by their Coefficient of Performance (CoP); that is the ratio of input electricity to the output of heat. The CoP of a heat pump can vary considerably depending on the local source temperatures and the temperatures of the heating/cooling distribution system. Air source heat pumps (ASHPs) generally operate with a slightly lower CoP than a comparable ground or water source heat pumps (GSHP/WSHP) due to the consistent temperatures available from the ground and water sources during peak winter periods.

4.4.7. For large scale applications such as the Proposed Development air source heat pumps are often more readily applicable due to the ubiquity of available heat in the ambient air, while the achievable capacity of ground and water source heat pumps is dependent on site environmental constraints within the development area. Further investigation into potentially available heat from bodies of water and ground sources in the development area will be undertaken at a later stage of design development to determine the viability of each of these technologies.

Energy From Waste

- ✓ High efficiency
- ✓ Waste heat utilisation
- ✓ Low carbon technology

4.4.8. Waste heat opportunities in the area have been identified including an existing energy from waste facility in the south of the Proposed Development. Energy from waste plants burn municipal solid waste to produce steam, which then feeds a turbine to generate electricity, ensuring the waste stream is efficiently utilised. The steam can also be used as a heat source, capturing waste heat, and improving the overall energy efficiency of the plant. This heat can be utilised to supply a heat network via transmission through efficient pre-insulated pipework.

4.4.9. Under the heat network zoning proposals which are expected to come into force in 2025, potential heat sources can be required to connect by Zone Coordinators. The Central Authority will provide support to Zone Coordinators to make these assessments. Zone Coordinators will finance and facilitate the investigation of the potential for recovering heat from local sources in the local refinement phase of the zoning process.

4.4.10. Energy from waste presents an opportunity for alternative or additional supply of high grade waste heat to the Proposed Development, potentially reducing the overall electrical demand of the Site while improving the efficiency of current and future local waste management systems.

[8] National Grid ESO Road to Zero Carbon Report https://www.nationalgrideso.com/future-energy/our-progress-towards-net-zero/road-zero-carbon-report/

Electric Boilers

- ✓ Electric solution
- ✓ Net zero carbon technology
- ✓ Highly modular and resilient
- ✓ No impact on local air quality

4.4.11. Electric boilers use electricity to heat water within the boiler directly. They are a highly versatile heating technology that are capable of significant modularity, allowing for instantaneous supply of heat across the full load demand profile of the network.

4.4.12. Electric boilers are highly resilient – they are relatively simple to run and maintain and can be connected to multiple electrical supply circuits to ensure redundancy in the event of failures in the energy supply system. As a result, electric boilers are increasingly being used as the preferred solution to provide peak and backup heat provision within energy centres.

4.4.13. As with other electric solutions electric boilers produce no emissions at point of use meaning they do not have an impact on air quality in the locality. National Grid ESO are committed to the transformation of the electricity system and the ambition of operating for periods of 100% zero carbon by 2025. This strategy will gradually decrease the carbon intensity of electricity until it becomes carbon-free and entirely powered by renewable energy sources.

Solar Thermal

- ✓ Net zero carbon technology
- ✓ No impact on local air quality
- ✓ Can be building or ground mounted

4.4.14. Solar thermal generation involves capturing solar radiant heat to preheat or heat water.

4.4.15. Correctly located and orientated, solar thermal systems can meet a proportion of the networks low temperature hot water dependent on the expected demand profile and available space for locating collectors.

4.4.16. A solar thermal system can work well in combination with several different heating solutions including electric boilers or heat pumps. Although this technology would be most effective during the summer months it is still capable of providing a level of heating load during the peak winter period and has potential for improving the overall efficiency of the wider heating solution.

5 CONCLUSIONS

5.1.1. The information provided in this Energy Statement has been prepared on behalf of UDX to support a planning proposal for the construction and operation of an Entertainment Resort Complex and associated development, on a Site to the southwest of Bedford, Bedfordshire; it sets out plans for delivering energy using low and net zero technologies and utilising waste heat recovery where practicable on the Site.

5.1.2. Building on a review of national and local policy requirements for energy, UDX's intention is to apply measures in line with low-carbon and future building standards, demonstrating that energy efficiency and reduction in carbon emissions within the Proposed Development lifecycle have been considered in development of the energy strategy.

5.1.3. UDX will use of low carbon energy centres including advanced energy-efficient systems to optimise energy performance and ensure thermal comfort via smart design strategies such as heat-pumps for heating and cooling generation, electric boilers, a high efficiency chilled water plant, and/or heating and cooling thermal stores. There may be future opportunities to utilise heat from 'recoverable' heat sources - such as surplus heat from industrial processes or energy-from-waste plants. Solar water heating may also be considered as detailed design progresses.

5.1.4. There may be a need for limited use of natural gas for delivery of heating and hot water needs for opening in Primary Phase Opening Year (2031) to ensure the Proposed Development can be served in the very unlikely scenario that sufficient electrical supply for electrification of heat is not available until the Full Build-out is completed. This would be a transitional arrangement, limited to 20MW thermal rated input and is contingent on electrical infrastructure and availability.

5.1.5. The energy strategy will continue to be refined in the design and delivery of the Proposed Development in accordance with the intent set out in this Energy Statement.

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