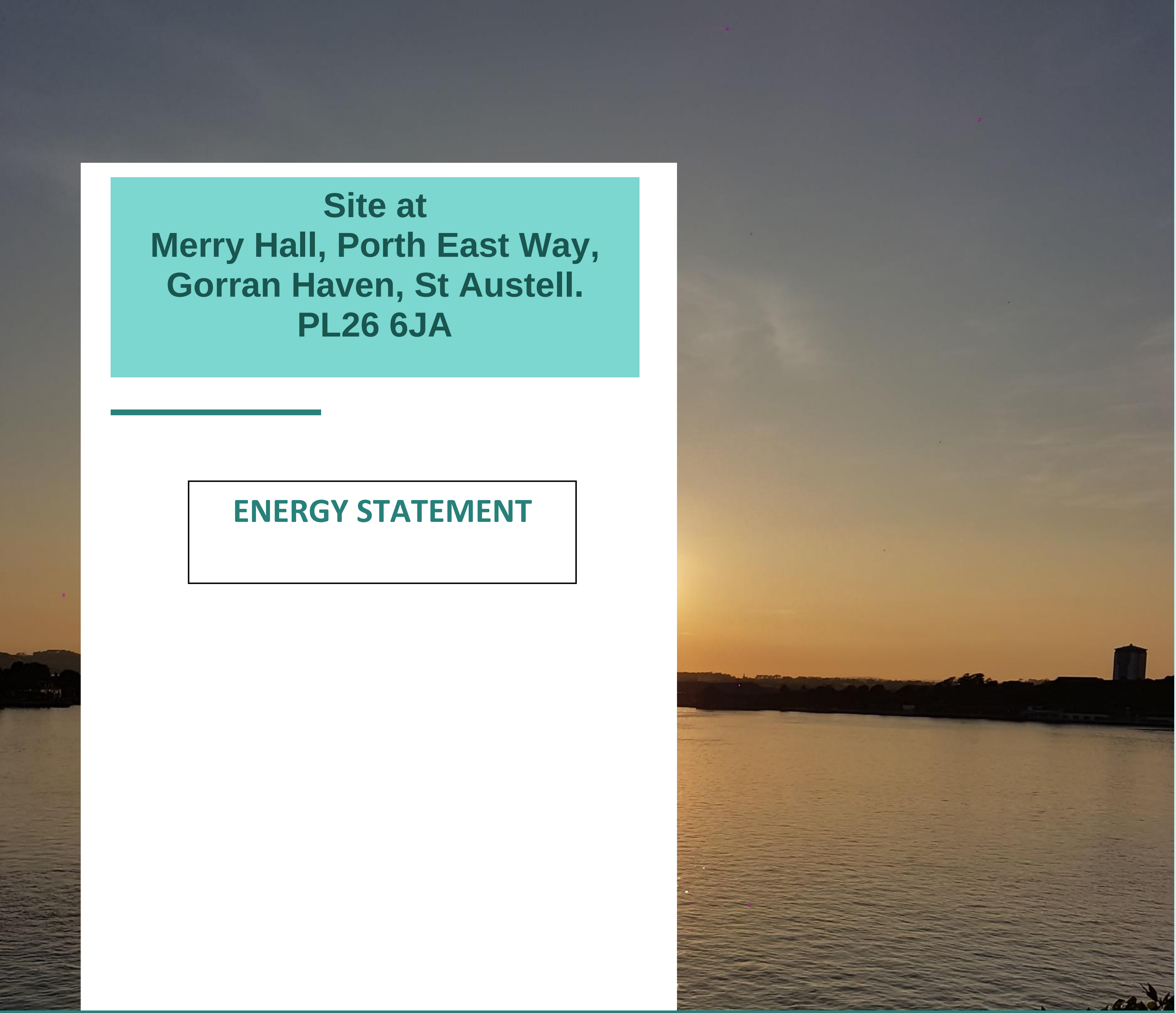

Site at
Merry Hall, Porth East Way, Gorran Haven, St Austell. PL26 6JA

ENERGY STATEMENT

29th November 2023

ENERGY COMPLIANCE LTD
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1. POLICY

The relevant planning policy that is pertinent to this energy statement is:

The Cornwall Local Plan and its

Climate Emergency Development Plan SEC1

2. INTRODUCTION

Energy Compliance Ltd. has been instructed by Mr. Andrew Webb to prepare an Energy Statement in support of the proposed development in Gorran Haven, Cornwall. The development is a single detached home.

The development has been assessed using the Standard Assessment Procedure (SAP 10) against building regulations 2021 edition and in consideration of policy SEC1. SAP is the Governments approved methodology for assessing the predicted energy consumption and Carbon Dioxide (CO_2) emissions for new dwellings. Results are derived in respect of floor area and consider energy use (kWh/m^2/yr.) and associated CO_2 emissions (kg.CO_2/m^2/yr.) from the following:

- Space heating / Cooling
- Hot water
- Ventilation
- Lighting
- Auxiliary pumps and fans
- Energy generating technology.

3. PROPOSED DESIGN SOLUTION

The proposed design for this development places a strong emphasis on energy efficiency through a "fabric first" approach (outlined in the improvements below). Our insulation standards exceed the requirements of the 2021 Edition of Part L1A. We've significantly minimised thermal bridging by incorporating design details that curtail heat loss at junctions. Additionally, a low design air permeability has been ensured to minimise heat loss through the building's structure, necessitating a dedicated focus on air tightness during the construction phase to ensure construction quality.

The commitment to constructing an airtight building has prompted careful consideration of the ventilation strategy. To address this, our client will install Mechanical Ventilation with Heat Recovery (MVHR) systems to the dwellings. This approach not only reduces the risk of condensation but also fosters a healthy living environment, it also necessitates the dwelling to be highly airtight (as defined in Part F of the building regulations)

Our sustainability efforts extend to lighting, with the incorporation of low-energy lighting solutions (high lumens per watt) and water conservation measures, including water-saving showers.

For heating and hot water needs, we are implementing an Air Source Heat Pump system, the showers will be a mix of electric to benefit from the onsite renewable energy generation and direct supply from the heat pump with waste water heat recovery. Furthermore, provisions will be in place for electric car charging to align with modern eco-conscious transportation needs.

The dwelling will undergo a thermal dynamic analysis to evaluate the risk of overheating. This analysis aims to ensure that overheating is unlikely to occur; however, if it does, it will equip us with the means to address and alleviate the issue.

In summary, this design results in a **97.58%** improvement over the regulation TER (Target Emission Rate) and an average **90.21%** improvement against the Target Primary Energy Rate (TPER).

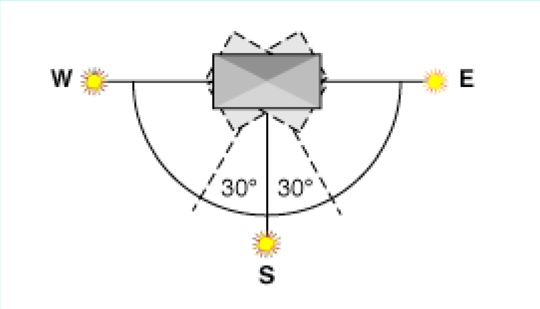
<u>Energy Hierarchy approach</u>, below we have bullet pointed the key areas of improved envelope design performance:

- Low fabric u-values go far beyond the guidance set out in Part L 1A.

    1. Floor u-value 0.11 W/m2k – 31.25% improvement over Part L1 Limiting fabric parameters.
    2. Wall u-value 0.14 W/m2k – 46.15% improvement over Part L1 Limiting fabric parameters.
    3. Roof u-value 0.12 W/m2k – 25% improvement over Part L1 Limiting fabric parameters.
    4. Window u-value 1.1 W/m2k 31.25% improvement over Part L1 Limiting fabric parameters.
    5. Door u-value 1.0 W/m2k 37.5% improvement over Part L1 Limiting fabric parameters.
    6. Air Permeability 2.5m3/m2/hr 68.78% improvement over Part L1 Limiting fabric parameters.
    7. Resulting in an average overall 39.99% improvement over **<u>Part L1 2021</u>** Limiting fabric parameters.

Passive solar design and providing a benign site microclimate both enhances the energy and environmental performance of buildings. The buildings have good access to solar radiation and daylight, with a site which itself is pleasantly warm and sunny, with good shelter from the wind.

The main orientation of the building should be within 30° of south and this building is. Buildings oriented east of south will benefit from the morning sun, those orientated west of south will catch the late afternoon sun – which can help delay the evening heating period. These buildings sit perfectly within these best practice guidelines, maximising up to 75% of the solar energy striking the glass and converting it into thermal energy.
Solar radiation can provide a considerable proportion of a building's heating requirements.



4. RENEWABLE ENERGY TECHNOLOGY CONSIDERATIONS

BIOMASS & Community Biomass

Biomass heating typically involves burning organic materials such as wood, crop residues, or other plant-based materials to generate heat. While biomass is a renewable energy source because it relies on organic matter that can be replenished, it is not considered a fossil fuel. Fossil fuels, like coal, oil, and natural gas, are derived from ancient organic material that has undergone geological processes over millions of years, and their combustion releases carbon that has been sequestered for an exceptionally long time. Biomass, on the other hand, releases carbon that is part of the current carbon cycle, as the plants consumed for biomass are typically grown and harvested within a shorter timeframe. Therefore, biomass is considered a renewable and carbon-neutral energy source, in contrast to fossil fuels. However, it is essential to manage biomass resources sustainably to maintain their environmental benefits. To cater for the unlikely event of Biomass downtime the central biomass boiler is typically supported with mains gas boilers to ensure the system is always operational. In most developments the biomass boiler is sized to provide enough heat for the majority of the year, with the mains gas boilers actually providing additional energy as required.

This technology often offers a solution, however for the following reasons it has been rejected.

- **Maintenance and Storage Requirements**: Biomass heating systems require regular maintenance and storage for fuel, which can be more demanding than other renewable energy sources like solar or geothermal and air source heat pumps. This can increase the operational complexity and cost of a sustainable housing project.
- **Carbon Emissions:** While biomass is considered carbon-neutral over the long term, its combustion still releases carbon dioxide (CO_2) into the atmosphere. Inefficient or poorly managed biomass systems can emit more CO_2 than they offset by replacing fossil fuels. This can be especially problematic if the biomass is transported over long distances, increasing its overall carbon footprint.
- **Air Quality:** Biomass combustion can release particulate matter, carbon monoxide, and other pollutants into the air, which can have adverse effects on local air quality and human health, particularly in densely populated areas.

HEAT PUMP (air) SELECETED TECHNOLOGY

For this development, opting for traditional individual air source heat pump technology, the initial design is based around separate units, one for the heating and one for the domestic hot water. Specifically, air-to-water low-temperature heat pumps stand out as the optimal heating solution for new homes or construction projects. When integrated with underfloor heating or low-temperature radiators, this configuration offers several benefits, including enhanced energy efficiency and aligning with future sustainability goals, such as the elimination of gas boilers by 2025.

Elaboration:

1. **Individualized Heating Solutions:** Implementing traditional individual air source heat pumps within the development allows for precise control and customisation of heating in each home. This individualisation ensures the residents can maintain their desired comfort levels while optimising energy usage.

2. **Air-to-Water Heat Pumps:** Air-to-water low-temperature heat pumps are particularly well-suited for residential settings. They operate by extracting heat from the outdoor air and transferring it to a water-based heating system within the home. This technology efficiently provides both space heating and domestic hot water.

3. **Energy Efficiency:** When paired with underfloor heating or low-temperature radiators, air-to-water heat pumps operate at peak efficiency. These heating methods distribute warmth evenly throughout the living spaces, reducing the energy required to maintain comfortable temperatures. This energy efficiency translates into cost savings for homeowners.

4. **Future-Proofing:** The decision to install air-to-water heat pumps aligns with future-proofing objectives. With the planned eradication of gas boilers, this heating system choice ensures that the

dwelling remains compliant with evolving environmental regulations. It positions the development as environmentally responsible and forward-thinking.

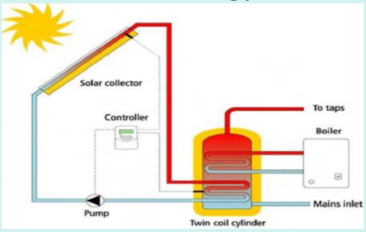
5. **Reduced Carbon Footprint:** By eliminating reliance on gas boilers, this development minimises its carbon footprint. Air source heat pumps, especially when powered by renewable energy sources, contribute to a substantial reduction in greenhouse gas emissions, making the project more environmentally sustainable.

6. **Resident Comfort:** The integration of underfloor heating or low-temperature radiators not only reduces energy consumption but also enhances resident comfort. These systems provide consistent and gentle heat distribution, eliminating cold spots and drafts.

In conclusion, the selection of traditional individual air source heat pump technology, particularly air-to-water low-temperature heat pumps combined with underfloor heating or low-temperature radiators, is a well-considered choice for this development. It aligns with energy efficiency goals, aids in future-proofing against changing regulations, reduces the carbon footprint, and prioritises resident comfort, making it an excellent fit for sustainable and forward-thinking housing projects.

SOLAR THERMAL

While this technology holds the potential to reduce carbon emissions at a reasonable expense, integrating it into current systems presents considerable costs and intricacies compared to alternative technologies. As a result, the decision has been made to forgo the adoption of solar thermal technology.



CHP (Combined Heat and Power)

Given the limited heat demand and the absence of nearby CHP stations, coupled with the prohibitive cost associated with micro-CHP units, the feasibility of this technology is compromised.

WIND POWER

Small Scale Wind Turbines

Wind turbines effectively harness the kinetic energy of the wind and convert it into electrical power. These turbines can vary in size, spanning from compact domestic units generating a few hundred watts to massive offshore installations boasting capacities of up to three megawatts (MW). However, before contemplating the integration of this technology, a comprehensive examination of factors such as wind speed, turbulence levels, and potential noise disturbances is imperative to ascertain its suitability for the specific application. The available space afforded may not be sufficient for the safe and effective installation of wind turbines. The return on investment for small-scale wind turbines can be long, especially when compared to other renewable energy options. The prolonged payback duration is not in harmony with the financial objectives of this particular development.

Regrettably, this particular renewable energy resource is deemed unfit for further consideration within the scope of this report.

PHOTOVOLTAIC PANELS (PV) SELECETED TECHNOLOGY

Few power-generation technologies exert such a minimal impact on the environment as photovoltaic systems. By quietly converting light into electricity, PV technology neither releases air pollutants nor generates hazardous waste. It eliminates the need for transporting or burning liquid or gaseous fuels. Furthermore, PV derives its energy from the free and abundant source of sunlight.

At present, our client is meticulously assessing the financial feasibility of incorporating battery technology. However, their present allocation of resources primarily focuses on advancing the fabric-first approach and refining systems for heating and hot water supply. It remains conceivable that they might entertain the idea of introducing photovoltaic battery storage at a later time to further elevate the overall quality of the property.

DISTRICT HEATING NETWORKS

Unfortunately, there are no such networks in the vicinity, therefore this is not an option.

5. EMBODIED CARBON

Reducing embodied carbon, which refers to the carbon emissions associated with the manufacturing, transportation, and construction of building materials and components, is crucial for mitigating the environmental impact of construction projects. Here are several measures that our client is contemplating to reduce embodied carbon:

1. **Material Selection**
   - Choose low-carbon or carbon-neutral materials: Prioritising materials with a lower embodied carbon footprint. Considering options like recycled materials, reclaimed wood, or carbon-sequestering materials like engineered wood products.

2. **Efficient Design:**
   - Optimise building design: Design buildings with efficient use of materials in mind, minimising waste. Employ design strategies that reduce the need for energy-intensive materials, such as excessive steel or concrete.

3. **Local Sourcing:**
   - Source locally: Endeavouring to select materials and components from local suppliers to reduce transportation-related carbon emissions. Supporting local industries can also have economic benefits.

4. **Reuse and Recycling:**
   - Promoting reuse and recycling: Whenever feasible, reuse materials or components from existing structures. Ensure that waste materials are recycled rather than sent to landfills.

5. **Sustainable Transportation:**
   - Choose transportation wisely: Using more energy-efficient transportation methods when moving materials to the construction site.

6. **High-Quality Construction:**
   - Ensure proper installation: High-quality construction practices can extend the lifespan of materials and reduce the need for replacements, which, in turn, lowers embodied carbon.

7. **Digital Technologies:**
   - Implement Building Information Modelling (BIM): BIM can optimise designs, reduce waste, and improve project coordination, leading to reduced embodied carbon.

8. **Life Cycle Assessment (LCA):**
   - Conduct LCAs: Perform a life cycle assessment of building materials and systems to understand their full environmental impact, including embodied carbon. This informs better decision-making.

9. **Sustainable Certification:**
   - Seek certifications: Look for certification programs like LEED (Leadership in Energy and Environmental Design) or BREEAM (Building Research Establishment Environmental Assessment Method) that encourage low embodied carbon materials and practices.

10. **Green Procurement:**
   - Encourage green procurement: Work with suppliers and contractors who prioritise low-carbon materials and environmentally responsible practices. This can create demand for greener products and materials.

11. **Educate and Collaborate:**
   - Foster collaboration: Engage architects, engineers, builders, and suppliers in discussions about embodied carbon reduction. Encourage knowledge sharing and best practices within the construction process.

By giving the above close consideration to these measures, our client can significantly reduce their embodied carbon, contributing to the broader effort to combat climate change and create more sustainable built environments.

6. TRAVEL PLANNING

Our client is actively exploring options to reduce the carbon footprint of this development while also considering the impact on local traffic and transportation infrastructure. In pursuit of these objectives, they are currently considering a family travel planning strategy, which may include the following measures:

1. **Understand Family-Specific Requirements**: Researching Cornwall Council's guidelines for travel plans, focusing on elements that are particularly relevant to families. This could include safety, accessibility, and facilities for children.

2. **Site Analysis with a Family Focus**: Evaluate the proposed site with their family's needs in mind. Look at existing transport links, safety of roads and walkways, proximity to schools, parks, and family amenities.

3. **Family-Centric Objectives**: Setting objectives that cater to your family's lifestyle. For example, ensuring safe walking routes to schools, easy access to public transport for family outings, or creating a family-friendly cycling environment.

4. **Practical Strategies and Measures**: Develop strategies that suit their family. This could include applying for permits for school drop-off points, planning for sufficient parking space for family vehicles, or creating safe bike storage areas.

5. **Impact Assessment for Families**: Assess how their family's travel patterns might affect local traffic and transport services, and plan ways to mitigate any issues, such as carpooling for school runs.

6. **Monitoring and Adjustments**: Planning to monitor how well the travel strategies are working for their family and be ready to adjust as their family grows or needs change.

7. **Engage with Local Families and Community**: Talk to other families in the area and engage with community groups to understand and address common travel concerns.

Our client will continue to collaborate with Cornall Council to ensure that their development align with local transportation policies and strategies.

7. PROPOSED DESIGN SUMMARY

- **97.58% reduction** over Part L Building regulations.
- Highly efficient **Air Source Heat Pump** delivering heat and hot water.
- Low u-values delivering good thermal fabric efficiency versus Part L1 Limiting fabric parameters 2021.
- Low u-value double glazed and triple windows and highly insulated entrance doors.
- Elevated levels of thermal bridging performance/efficiency achieved.
- **Low air permeability**
- **Efficient and affective Mechanical Ventilation with Heat Recovery (MVHR).**
- LED lighting.
- Effective use of solar gain.
- Extra daylight provided to reduce the need for artificial lighting.
- Consideration to travel planning.

8. Climate Emergency DPD SEC 1 Policy Check Summaries

The following is the output summary taken from the Climate Emergency DPD calculation tool.

3 - INPUT SAP (10.2) DATA

CORNWALL COUNCIL

Etude

SAP Conversion Tool V2.0

Climate Zone: 4 South West England

	Results			
	Space heat demand	**Total energy use**	**Renewable generation**	**Renewable deficit**
	$kWh/m^2_{TFA}\cdot yr$	$kWh/m^2_{GIA}\cdot yr$	% total energy	kWh/year
	Required values:			
	<30	<40	100%	0
EXAMPLE	*30.0*	*33.4*	*107%*	*0*
	29.2	15.5	131%	0