CiNER Glass Ltd

CiNER Rassau

Energy Statement

Contents

- An automated warehousing facility for the storage and distribution of glass bottles;
- Utilities building which includes plant space, workshops and waste materials store;
- Back up fuel storage facilities, main entrance security lodges and associate weighbridge;
- External hardstanding for the storage of materials, parking and loading; and,
- Landscaping to the eastern side of the proposed facility.

Figures 1 and 2 below illustrate the proposed built form and the proposed site layout of the CiNER facility.

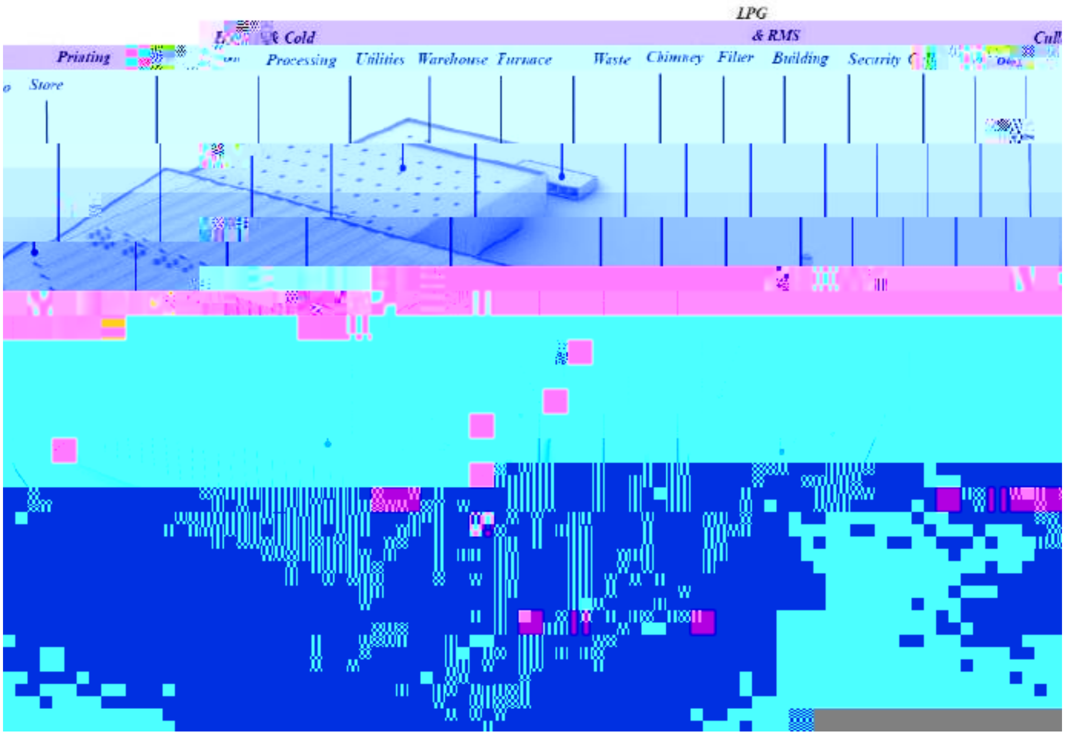


Figure1 Proposed built form of the Dragon Glass Manufacturing Facility.

Figure2 Proposed site layout of the Dragon Glass Manufacturing Facility.

1.3 The Application Site

The application site extends to an area of approximately 21.5ha and is located

2 Solar Power

2.1 Systems Overview

The Applicant has undertaken studies into various solar panel options for the proposed development during RIBA Stage 2. Studies explored three photovoltaic

Glass Solar Panels/Solar Glazing. Each of the options explored assessed the same principle of a PV module which includes the converting of sunlight into electricity to be used for on-site operations.

Table 1 below provides a summary of each of the solar panel options outlined above.

Table 1: Solar Panel installation summary table.

Technology	Solar Panels	Kalzip Solar Panels	Plate Glass Solar Panels/Solar Glazing
Description	Flat panels comprised of PV modules	Curved or shaped panels comprised of PV modules	Glazing panels with integrated PV modules
Cost	High cost but financially justifiable over lifetime. Estimate ~ £75,000	Greater than solar panels due to customisation required for shaping.	Very high cost, however, dependent on number of windows proposed.
Payback	6-12 years	15-20 years	12+ years
Degradation	~1% per year	~1% per year	~1% per year
Lifetime	20-25 years	20-25 years	20-25 years
Maintenance	Regular sample washing required	Self-cleaning	Regular window washing
Grants/Gov Support	No grants/gov funding available	No grants/gov funding available	No grants/gov funding available
Example Image			

The assessment undertaken determined that rooftop solar panels were the most suitable option due to the architect6 326.g.38 360.29 0.48 28.68 re f38 3605ned that

3 Furnace Heat Reclaim

The proposed development would necessitate the installation of two glass furnaces which would use a combination of natural gas and electric smelting, required to control the supply of molten glass to the production lines. Furnaces would use a lot of residual heat from the burners to feed back into the system to reduce energy wastage. Although residual heat would be utilised, a significant quantity of combustion by-product (heat) would be exhausted into the atmosphere via the two 75m chimney stacks. Heat reclaim systems would harness an amount of the heat energy which would be lost to the atmosphere to heat internal areas of the proposed development.

Due to the process-based nature of the furnaces, any reclaimed heat from the flue

as set

out in Policy DM 4 of the LDP. The Applicant considers heat reclaim systems to

through necessary operational activities.

Two heat reclaim systems are considered as part of this Energy Statement, with the positive and negative aspects of each system outlined below.

3.1 Organic Rankine Cycle Systems

Systems Overview

An Organic Rankine Cycle (ORC) system utilises an intermediate thermal oil system to extract heat from the flue gases. This high temperature thermal oil subsequently used to superheat a silicon-based fluid which is passed through a turbine which generates electricity for use in the building. This hot fluid is subsequently circulated through a series of recuperators and condensers, which transfers any remaining heat to a water system for use in the building. Cooled silicon-based fluid is circulated back to the initial thermal oil heat exchanger to repeat the process, resulting in continued electricity and hot water generation.

The electricity generated through the ORC could be used to offset the utility electricity consumption of the proposed development. Due to the proposed high electricity use within the proposed development, there would be no opportunity to export this electricity to the grid, as advocated under LDP Policy DM 4.

The hot water generated in the final stages of the system would be of a very low grade, however, with the use of a water source heat pump, this could be harnessed

Table3: Qualitative HR Assessment

Advantages	Disadvantages
Quantity of heat recovery available is expected to be sufficient to meet the peak heating demand of the system, therefore no addtional boilers or heat pumps are required.	No electricy production.
Possibility to connect to district heating system to provide benefit to local community.	Overall annual furnace heat recovered is low.
Ability to vary the amount of heat recovered from the flues means that additional heat rejection equipment is not required.	
Low initial upfront costs for the complex equipment, pipework, pumping and controls.	
Facility can take advantage of a decarbonising electricity grid to reduce carbon footprint over time.	

3.3 Furnace Heat Reclaim Conclusions

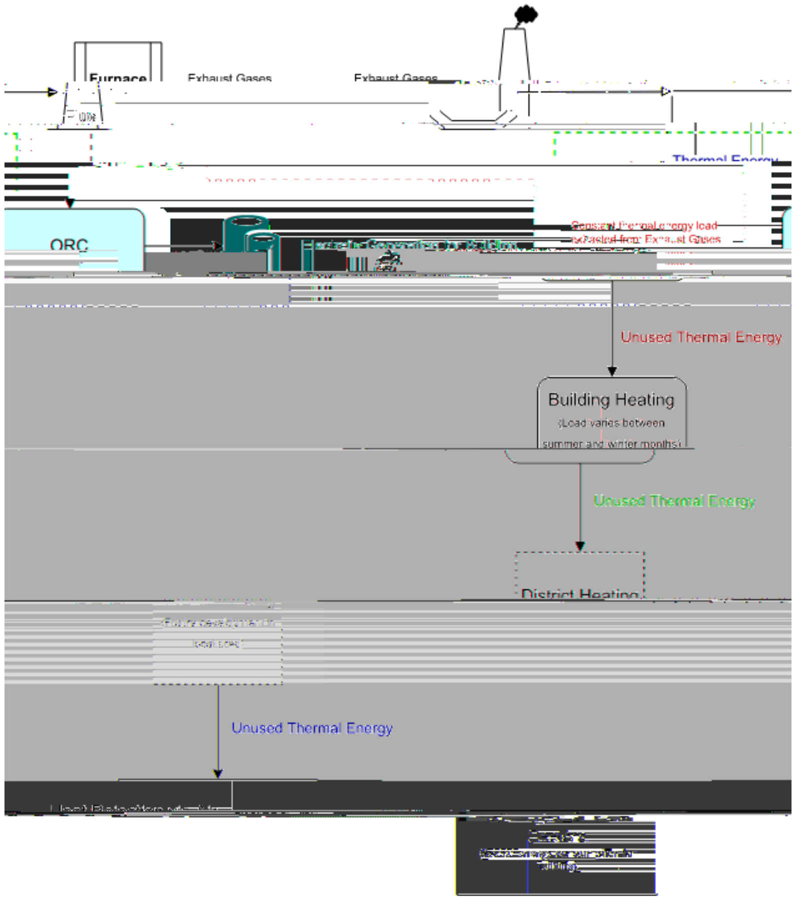
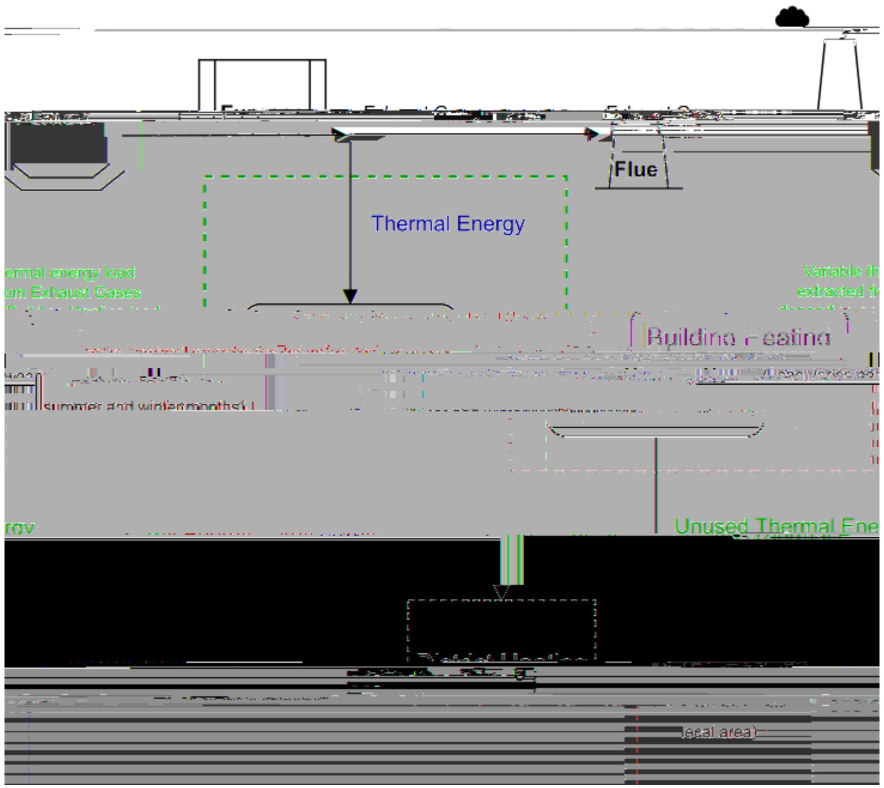
In comparing both the ORC and HR systems, the ORC system demonstrates the greatest potential for energy reclaim from the furnaces in the proposed facility which evidences potential year-round heat load. If the installation (and operation) of the cooling towers or adiabatic coolers could be mitigated by a high building load, then the ORC system would become more viable. However, the heating load of the proposed development would be very low in the summer, and there would be a constant high electrical load. As such, the ORC system would be required to run additional cooling equipment (which in turn consume additional energy), minimising the effectiveness of its installation.

The HR system would provide an option to vary the heat extracted from the flues, and any surplus heat would be rejected automatically by the flues without needing to run any additional cooling equipment.

We note that, whilst there is no district heating system currently available, there is intention in the future to progress such a scheme. The heat recovery system will be configured to allow future connection to this system once it becomes available, and details of this interface will be outlined during the following design stages.

Table 4 below illustrates the energy flow of the two systems, and justifies the rationale why the HR system
the ORC system for the proposed development, and therefore HR would be progressed into the next design stage.

Table4: Heat reclaim energy flow diagram.

ORC System	HR System
	

4 Alternative Sustainable Design Principles

5 Conclusion

This Energy Statement has set out the renewable and low/zero carbon technologies considered during the design of the proposed development by the Applicant in accordance with Policy DM 4 of the LDP.

The Applicant has considered that the installation of 500m^2 of roof mounted solar panels is not feasible and therefore has not been pursued. However, heat recovery systems constitute the preferred option for renewable and low/zero carbon technologies and have been progressed to the next stage of the design.