9. 21
Heat Distribution
It is proposed to incorporate a Combined Heat and Power (CHP) unit providing part of the space heating, Low Temperature Hot Water (LTHW) and steam demand, and approximately 50% of the electrical demand of the Proposed Development. Operation of the CHP plant will result in CO_2 emission savings of about 4,400 tonnes CO_2/year. This equates to approximately a 17% savings in CO_2 emissions over the “be lean” scheme. CHP technology converts natural gas into both electrical power and heat in a single process at the point of use. CHP is highly energy efficient (70-90%, compared to 40-45% efficiency for conventional electricity generation from power stations) due to the utilisation of the waste heat by-product of the electricity generation process and minimal distribution losses due to its close proximity to the load.

9. 22
The use of a Combined Cooling Heat and Power (CCHP) in the Proposed Development has been assessed but found to be less feasible than the use of CHP.

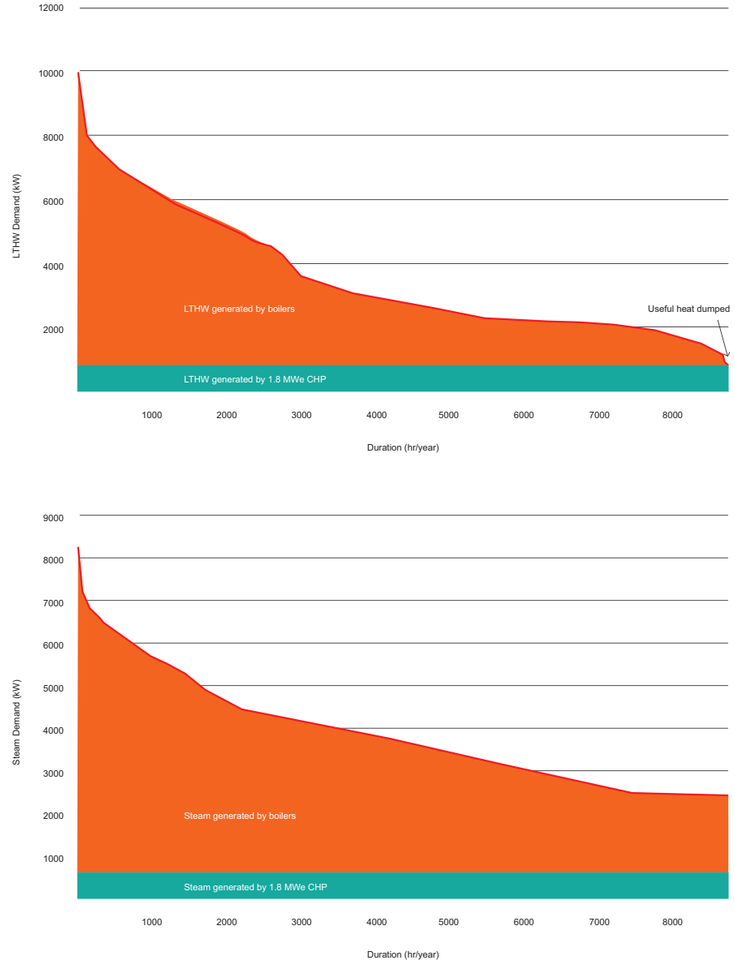

Fig 9-16. The graphs show the annual LTHW and steam demand respectively for the building. The CHP performance has been overlaid to indicate the heat recovery, dumping and top-up for the CHP option. The green areas on the graphs represent heat recovered from the CHP.

Orange areas represent when the heat recovered from the CHP is insufficient to meet the demand and LTHW and steam boilers are required to make up the difference.

The red areas of the graph indicate when there is insufficient demand for waste heat and heat from the CHP plant is dumped. The CHP plant has been sized to achieve the best balance between heat recovered and heat dumped. If the size of the CHP plant is increased, the amount of heat reclaimed is increased but at the cost of dumping more heat, reducing efficiency.

9.0 Sustainability
Energy - Be Green

9. 23
Low and Zero Carbon Technologies
To further reduce CO_2 emissions an analysis of the use of renewable energy technologies for the Proposed Development has been undertaken and Photovoltaic (PV) arrays have been identified as feasible. PV panels offer the chance to generate electricity from solar energy.

9. 24
It is proposed to integrate PV cells into the roof framing. The UKCMRI building has a vaulted structure that encloses the upper plant levels. It is proposed to install approximately 1,700m² of PV arrays (with a minimum efficiency of 15%) on the south facing area of this roof. This area ensures optimal orientation and is free of any overshadowing from plant enclosures, risers, etc. The proposed PV array will provide part of the Proposed Development's electricity requirements therby dispacing a total of 125 tonnes CO_2/year. This equates to approximately 0.6% savings in CO_2 emissions over the "be clean" scheme.

9. 25
PVs will provide green energy and at the same time, act as visual features showcasing renewable technologies to the local community. Incorporation of the proposed energy strategy will result in approximately a 31% saving in the total CO_2 emissions over the baseline scheme. This corresponds to 9,950 tonnes CO_2/year savings.

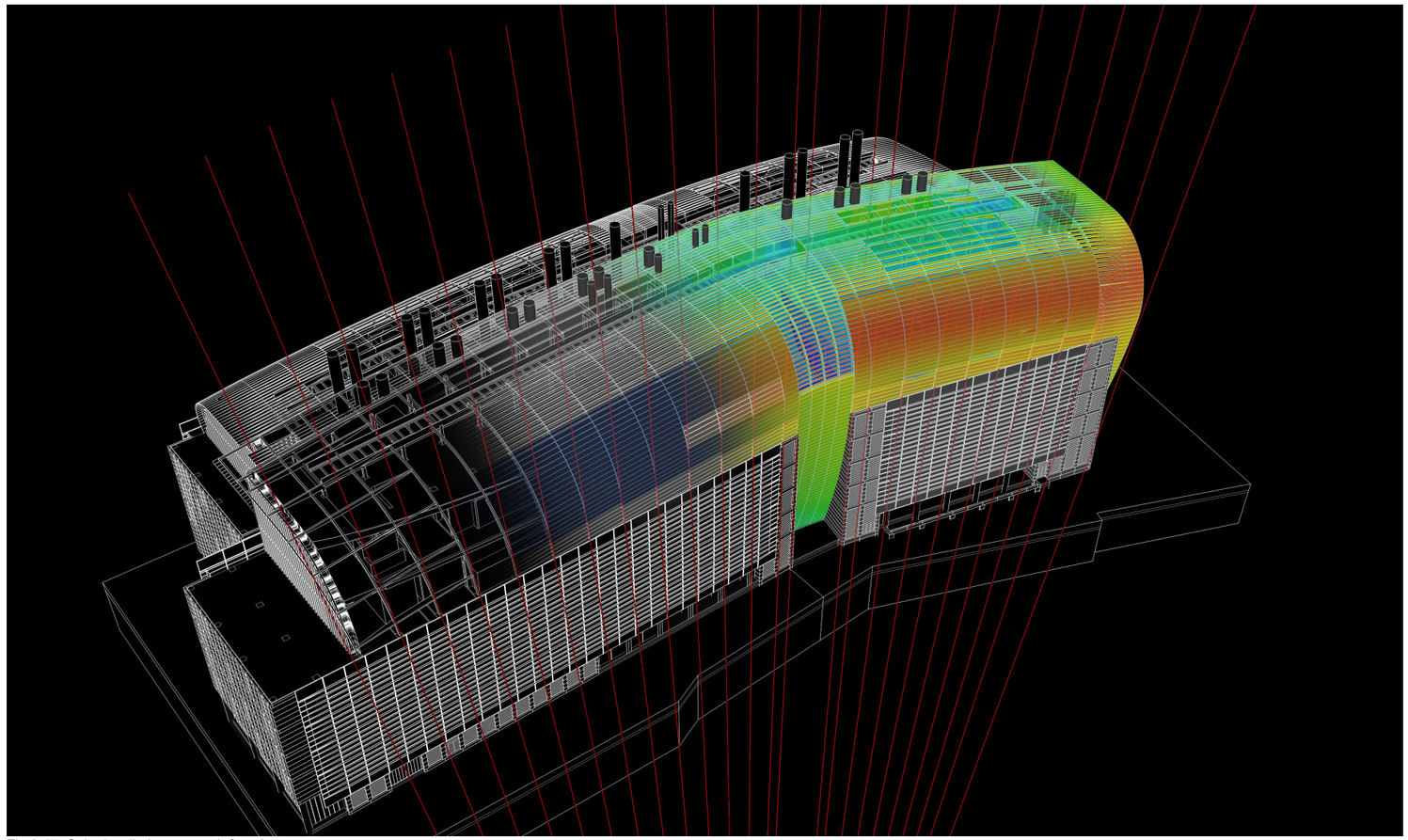

Fig 9-17. Solar irradiation on south façades

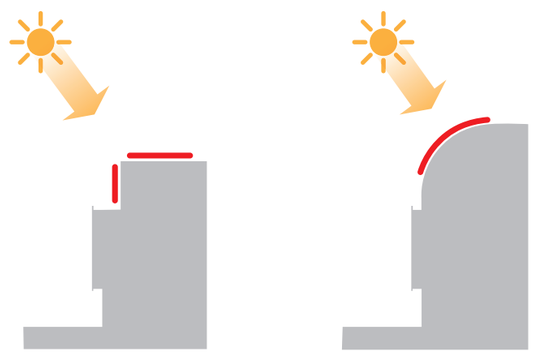

Fig 9-18. Shape of roof helps with eficient layout of PVs