

Committee(s):	Date:
Markets	30 November 2016
Subject: Smithfield Market – Condenser Water Cooling System - Update	Public
Report of: The City Surveyor (Report no. CS396/16)	For Information
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Summary

This report provides a summary of progress on the City's trial to increase the operating temperature of Smithfield Market's Condenser Water Cooling System, which provides cooling to the Market Tenants' refrigeration equipment.

For the past few years the cooling system has been set to operate at 20°C. Following an abortive start in June 2016 due to hot weather, the trial to increase the temperature setting in 1° steps resumed in mid-October and has currently reached 23°C. So far, there have been no material reports of fridge problems. Further increases to 24° then 25°C are planned this month and early December, provided no widespread fridge issues arise. If the fridges operate successfully at 25°C, this temperature will remain the permanent setting.

Recommendation(s)

Members are invited to note the contents of this report.

Main Report

Background

1. The Market's condenser water cooling system removes waste heat from 120 tenants' refrigeration units in East, West and Poultry Markets and dissipates it to the atmosphere via five cooling towers located in the Poultry Market. The system is operated and maintained by the City Corporation as Landlord.
2. Over the last few years the City Corporation has undertaken a programme of works to improve the water circulation in the three Markets and remove dirt contamination in the system. As a result performance has significantly improved.
3. The cooling system was originally specified to provide water to Tenants' fridges at 30°C. Over the years this was gradually reduced and for around the last five years has been set at 20°C. This was done to assist fridges at a time when there were issues with water flow, dirt contamination, system balancing, and Tenants' condenser under-sizing. Following completion of its remedial works, the City now wishes to increase the temperature to reduce its operating costs and the risk of breakdown and has commenced a trial to evaluate the impact, if any, on Tenants' fridges of increasing it.

Current Position

4. Following an agreement reached with the Smithfield Market Tenants Association (SMTA), the trial to increase the operating temperature of the cooling system commenced on 20 June 2016, when the temperature of the water supplied from the cooling towers to the Tenants' fridges was increased from 20°C to 21°C. On 20 July 2016 it was raised a further degree to 22°C. The changes are made by resetting a control display on the City's Building Management System, which in turn automatically selects the number of cooling tower fans required to operate.
5. As a result of reported fridge problems arising in the hot weather at this time, particularly affecting North-East quadrant, the trial was suspended on 22 July, and the temperature reset to 20°C. Although the cooling towers cannot normally maintain this temperature during hot weather, in cooler spells and typically overnight, they may do so for brief periods, giving some respite to fridges.
6. The fridge problems that were experienced are partly explained by fine scale accumulation (or 'furring') on condenser internal surfaces which impairs heat transfer, and clogged water strainers, which reduces the water flow. Action was taken to deal with both of these and resulted in an improvement. In some cases, problems will have been exacerbated by undersized fridge condensers (see para 11 below).
7. Further problems were reported in September during hot weather, as has been the case in previous years. However, since October the system has settled down and reports have ceased.
8. It was agreed with the SMTA that the temperature trial could resume from mid-October. The temperature setting was therefore increased to 22°C on 18

October. As no problems were reported, it was raised a further step to 23°C on 31 October. It currently remains at this figure.

9. A single comment was received from one of the Tenants' maintenance contractors on 2 November that some fridge difficulties had been experienced, however no further details have been provided and no formal complaints received from Tenants.

Proposals

10. Due to electrical issues with the fans on cooling tower nos. 2 and 3, these towers had been manually set on their high speed fan settings by the Market Maintenance Department, to ensure cooling was available if needed. This caused the water to be over-cooled below its 23°C setting on colder days. For this reason the trial did not produce valid results between 31 October and 10 November. This issue has been addressed and the water supply has been holding a steady 23°C since then. It is therefore proposed that the next increase to 24°C will be applied on 21 November and the final step to 25°C on 5 December 2016.
11. Officers will continue to monitor the system closely and investigate any problems reported. If there is any widespread issue then the trial can easily be suspended and temperature control reset. However, any fridges still experiencing problems after condensers have been cleaned are likely to be those on the City's 'at risk' list (currently 12 in total) drawn up in 2014, and for these the answer should be for Tenants to upgrade their fridge condensers with larger capacity units (as already done for 2 fridges which were originally on the list), rather than the cooling system having to operate at a lower temperature to compensate for this.
12. By next summer East and West main condenser water pumps will have been replaced with higher capacity pumps. It is hoped that it will not then be necessary to reduce the system temperature in hot weather, but the option to do so will remain if needed. Once this work is completed, it is also planned to send a further reminder to those Tenants with 'at risk' fridges.

Other work to the cooling system

13. On the evening of 9 September a small diameter branch pipe within disused stall 214 in the Poultry Market suffered a fracture causing a loss of water, depressurisation and several fridges around the Market to trip. Market Maintenance Department engineers were called in and were able to isolate the defective pipe and stop the leak.
15. In response to previous incidents, measures to improve resilience of the system by the City are continuing. The second, back-up, water softening unit and water hardness monitor have now been installed on the cooling system. These are monitored by the Building Management System and initiate alarms in the event of a failure.

16. A new alarm panel for critical cooling system alarms has now been installed in the Market Security office. This provides rapid notification of a pump, water softener, or make-up unit failure or high water temperature. A response procedure is being prepared to accompany this.

Corporate & Strategic Implications

17. The system supports the meat trade at Smithfield Market and the following Strategic Aims:
 - To provide modern, efficient and high quality local services and policing within the Square Mile for workers, residents and visitors with a view to delivering sustainable outcomes.
 - To provide valued services to London and the nation.

Implications

18. The cooling system operated by the City provides a critical service for Tenants' refrigeration equipment. A failure of the system could potentially expose the City to claims from Tenants for loss of product.
19. Operating the system at a higher temperature will reduce strain on the City's cooling towers and the risk of breakdown, as well as reducing operating costs. Whilst Tenants' fridges will have to run slightly longer, consuming more power, 25°C is felt to be a reasonable compromise, and still within their technical specification.
20. Officers will continue to monitor the system closely, investigate any problems reported, and take further action as appropriate.

Conclusion

21. The trial to increase the water operating temperature of the cooling system is continuing and has currently reached 23°C. So far, there have been no material reports of problems. Further increases to 24° then 25°C will follow, provided no widespread fridge issues arise. If the fridges operate successfully at 25°C, this temperature will remain the permanent setting.

Background Papers

Report of the City Surveyor 'Smithfield Market – Condenser Water Cooling System – update' to Markets Committee, July 2016 (Report ref. CS210/16).

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