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Dear Kevin

Crown Hotel - Barangaroo, Sydney

This letter records the expected overall cooling system COP for the Crown Hotel project proposed to be reflected in BASIX certification for the project, following discussions between the Department of Planning and Arup.

### Background

Background to the proposal is that the centralized Fan Coil Unit (FCU) system that provides cooling to residential apartments connects to the Barangaroo District Central Plant and therefore would perform more efficiently than the systems prescribed in Basix.

As discussed and recorded in minutes for the meeting conducted on the 5<sup>th</sup> of February, 2014 between the Department of Planning and Infrastructure, Crown and Arup the following approach has been agreed:

***“Central district plant provides chilled water to the building for cooling. In order to account for the benefit of higher COP’s associated with these systems compared to the maximum available in Basix, Crown/Arup to provide COP of cooling plant to be included in assessment. It was agreed that COP was based on a static COP figure in the same way that Basix allows for static COP’s when doing their calculations for conventional system inbuilt in the tool. Departmentt of Planning to include benefit of higher COP in Basix.*”**

As a result, the COP as calculated below is intended to allow the project to incorporate the benefit of a central district plant in the assessment.

### Method / Assumptions

The calculation is based on assumptions in line with information provided on the attributes of the FCU system being designed and developed by AECOM which are the services consultants.

The system within the Crown building comprises a outside air tempering unit provided from a central AHU (Air Handling Unit), a chilled water loop that recirculates cold water provided by the Barangaroo District Central Plant and the FCU fans which supply air into the conditioned space.

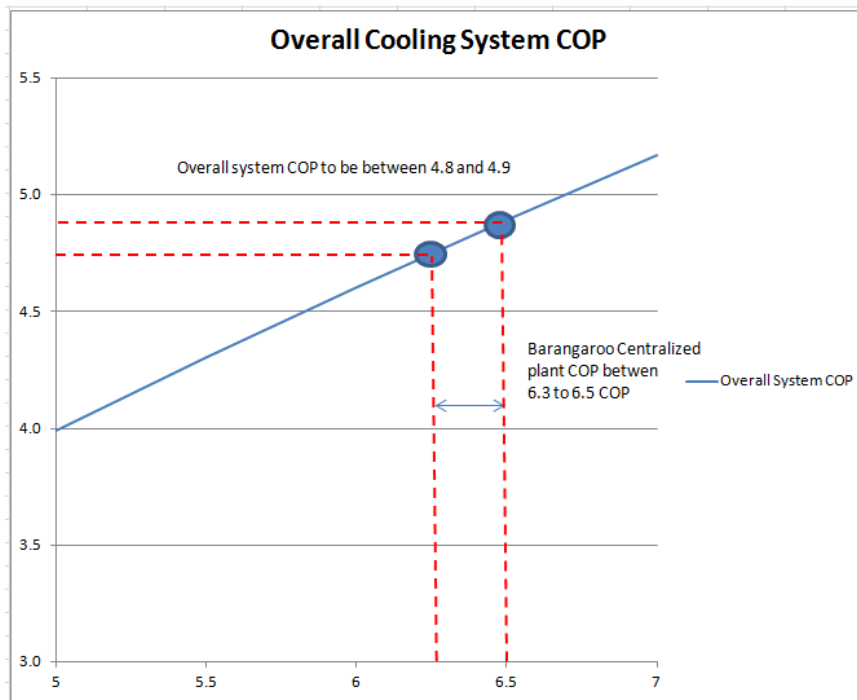
The design of the system is based on the following figures below:

<b>Fan Coil Unit Cooling System</b>	
<b>Outdoor air unit</b>	
air flow	23,000 L/s
pressure	350 Pa
Motor Efficiency	90%
Motor Power	<b>8.94 KWe</b>
<b>Chilled Water Pump</b>	
flow	40 L/s
pressure	360 Kpa
efficiency	65%
Motor Power	<b>22.15 KWe</b>
<b>Fan Coil Unit</b>	
Flow	125,000
Pressure	250 Pa
Motor Efficiency	70%
Motor Power	<b>44.64 KWe</b>
<b>Total FCU system power draw</b>	<b>75.73KWe</b>

The Barangaroo District Central Plant (DCP) will provide 1,500 KW of cooling capacity to the site. The COP of the DCP will likely operate in the 6.3 to 6.5 ranges. Based on the above this would result in the following results:

A - Total System Cooling Capacity	<b>1,500 KW</b>
B - FCU system power draw	75.73 KWe
C - DCP power draw (COP 6.3-6.5)	230 .8 to 238.1 KWe
D - Overall system power draw (B + C)	<b>306.5 to 313.8 KWe</b>
E - Overall system COP (A / D)	<b>4.8 to 4.9</b>

The chart below illustrates the relationship between overall system COP as DCP COP varies.



As Basix only recognizes overall system COP's up to 4.5, it would be required that an algorithm is entered into the calculations which allows for higher COP's.

The other advantage of the proposed FCU system which may not be captured by Basix is the fact that the proposed system uses fans with VSD (Variable Speed Drives) drives. This results in further efficiencies which traditional non VSD FCU system do not provide as a conventional FCU system is based on fans running at constant speed drawing higher amounts of energy.

Yours sincerely

Alex Rosenthal  
Associate

cc Haico Schepers, Arup  
Josef Seidler - Crown  
Jason Redgrave - Crown  
Kristjan Young -Crown