

# SMART COOLING PERFORMANCE MEASUREMENTS ON CHILLER NO.10



**RTA, Dubai**

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Prepared by



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## Executive Summary

Smart Cooling System (SCS) at RTA office has been evaluated by S4P to compare the performance of the chiller when the SCS is “ON” against when it is “OFF”.

Data from outdoor condition is also taken to fully analyze the chiller’s performance. Measurements were done on the period from 1<sup>st</sup> October at 16:00hrs to 2<sup>nd</sup> October at 16:00hrs where the SCS was “OFF”; while on the period from 2<sup>nd</sup> October at 16:00hrs to 3<sup>rd</sup> October at 16:00hrs the SCS was “ON”. These two periods where measurement was done had very similar outdoor conditions, specifically with a variance in CDD of 1.4% thus allowing for a fair comparison.

It was found out that the kW/Ton value of the measured chiller improved by 20% when the Smart Cooling System was ON. The monetary savings however account for 11% as tonnage demand was higher on the 3<sup>rd</sup> of October. This translates to a measured daily savings in electricity consumption at 649kWh/day and monetary savings of 289AED/day with water consumption of 3,5m<sup>3</sup> per day.

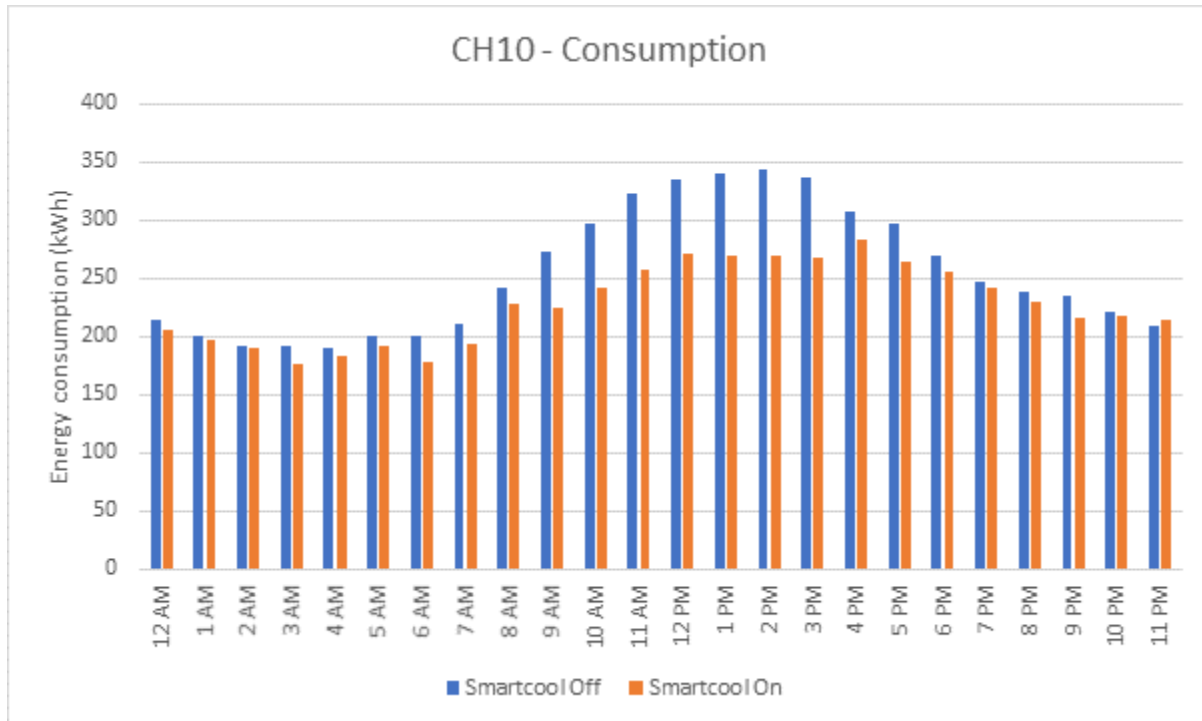
## Attachments

Attachment 1. Electric Power Consumption Comparison at Smart Cooling System “On” vs “Off”

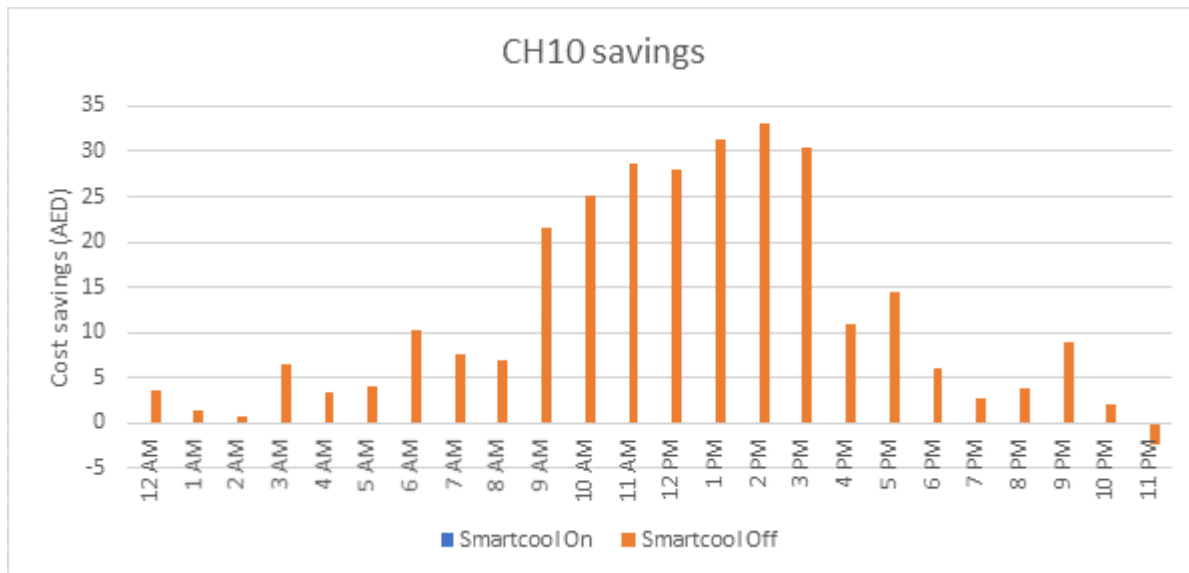
Attachment 2. Monetary Savings on Hourly Average if Smart Cooling is “ON”

Attachment 3. Hourly Smart Cooling Performance on kW/TR between SCS “OFF” and “ON” conditions; against outdoor condition.

**Attachment 1. Electric Power Consumption Comparison at Smart Cooling System “On” vs “Off”**

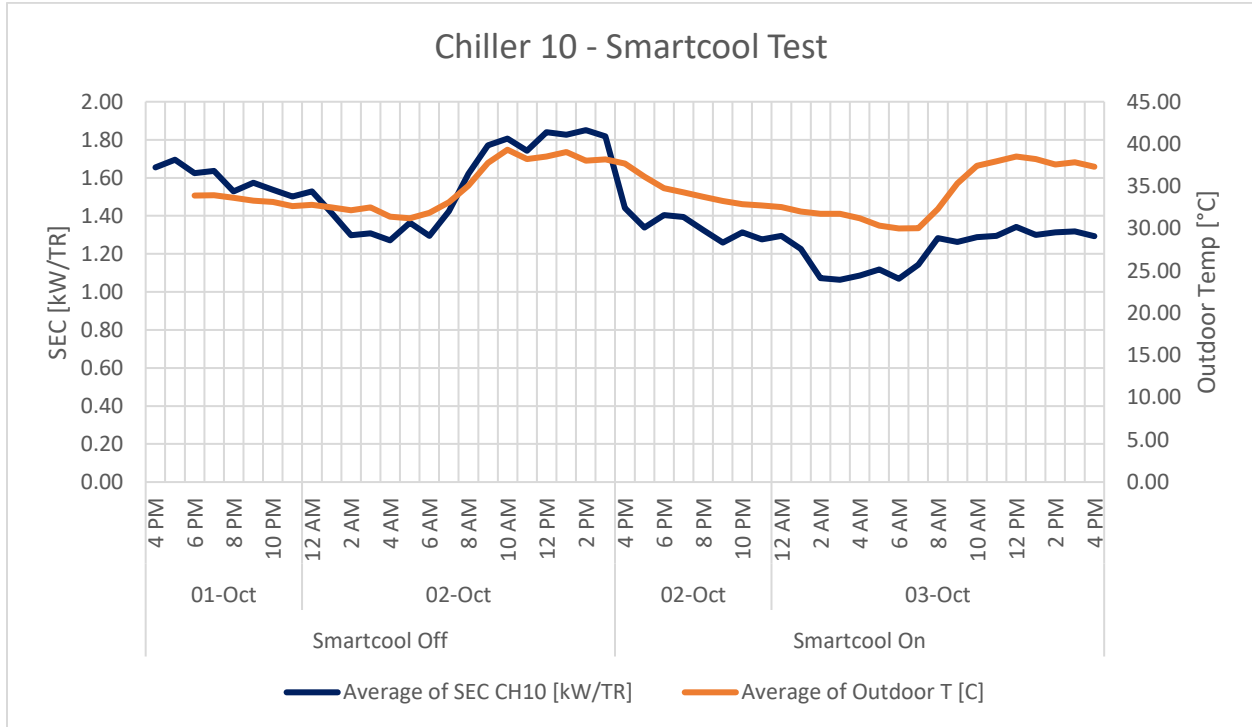


**Attachment 2. Monetary Savings on Hourly Average if Smart Cooling is “ON”**

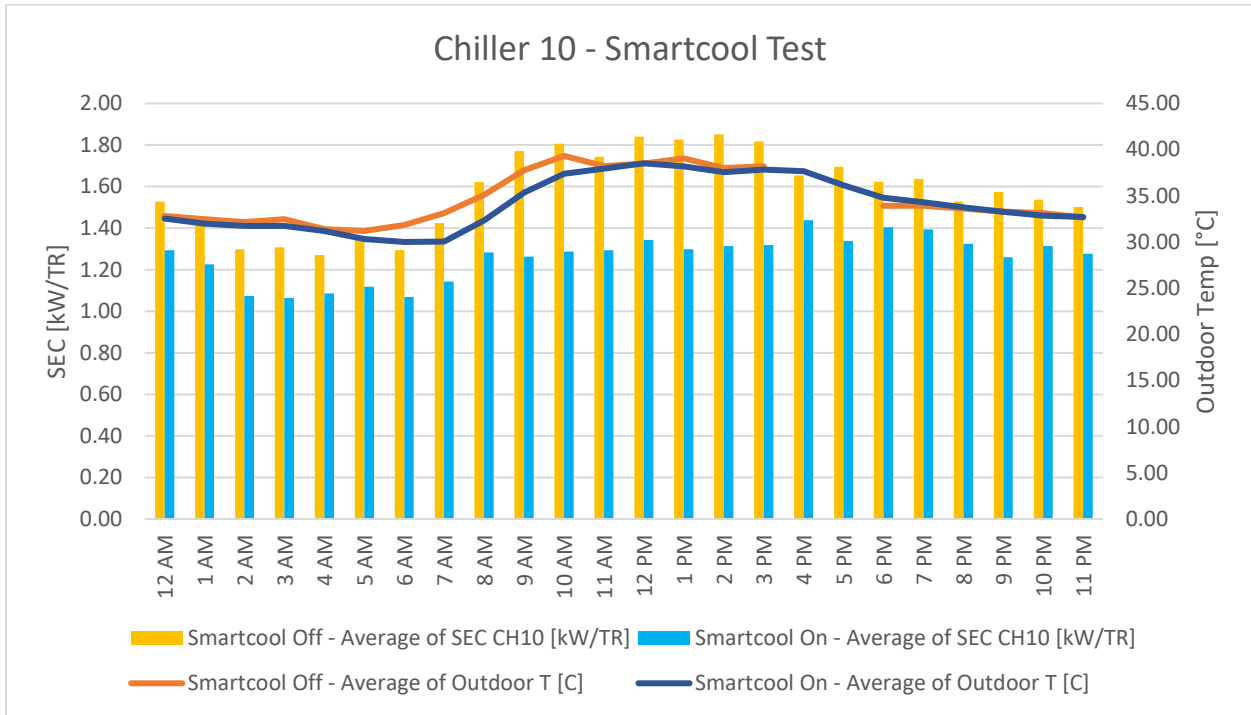


### Attachment 3. Hourly Smart Cooling Performance on kW/TR between SCS “OFF” and “ON” conditions; against outdoor condition.

The periods of SCS “OFF” and “ON” are on identical outdoor conditions. These two periods where measurements were done were identical, thus makes a fair comparison.



SEC comparison						
Row Labels	Average of SEC CH10 [kW/	StdDev of SEC CH10 [kW/	Count of SEC CH10 [kW/TR]			
Smartcool Off	1.58	0.23	1439			
Smartcool On	1.26	0.16	1441			
<b>Grand Total</b>	<b>1.42</b>	<b>0.26</b>	<b>2880</b>			
Ho: $\mu_1 = \mu_2$ Ho: $\mu_1 \neq \mu_2$						
<b>Two sample T test</b>						
T value	42.96	$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$	Two sample T test shows Smartcool changed the efficiency [SEC] of CH10 with a confidence level of 99%			
deg freedom	1438					
p value	0.00%					
<b>Comparison values</b>						
Significance	99%					
T value	2.58					
p value	1.00%					
<b>Improvement (</b>	<b>20.31%</b>					



Temperature comparison				
Row Labels	Average of Outdoor T [C]	StdDev of Outdoor T [C]	Count of Outdoor T [C]	
Smartcool Off	34.67	2.80	1439	
Smartcool On	34.18	2.82	1441	
<b>Grand Total</b>	<b>34.41</b>	<b>2.82</b>	<b>2880</b>	
Ho: $\mu_1 = \mu_2$				
Ho: $\mu_1 \neq \mu_2$				
<b>Two sample T test</b>				
T value	4.71	$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$	Two sample T test shows that with 95% confidence, day 1 was 0.49°C hotter than day 2	
deg freedom	1438			
p value	0.00%			
<b>Comparison values</b>				
Significance	99%			
T value	2.58			
p value	1.00%			
<b>Change (%)</b>	<b>1.42%</b>			