

Gerab Energy Systems LLC

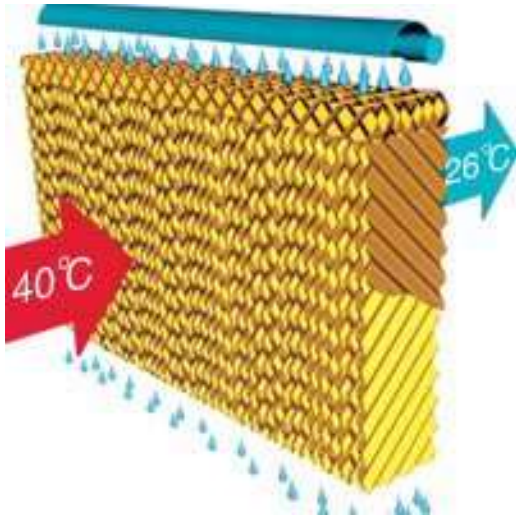
LEADER IN SUSTAINABLE TECHNOLOGIES
HVAC • LIGHTING • ENERGY SOLUTIONS



A subsidiary of Gerab Group



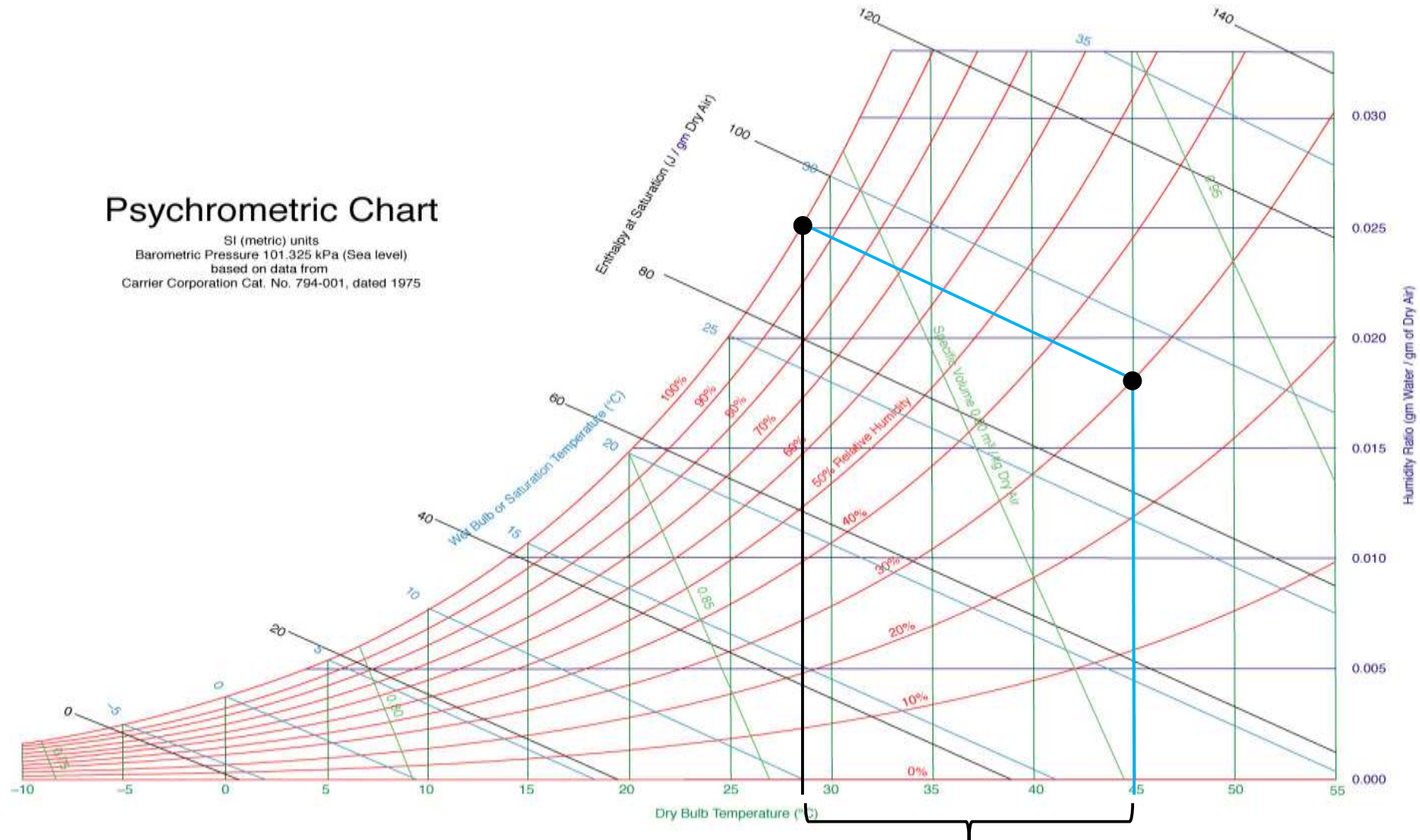


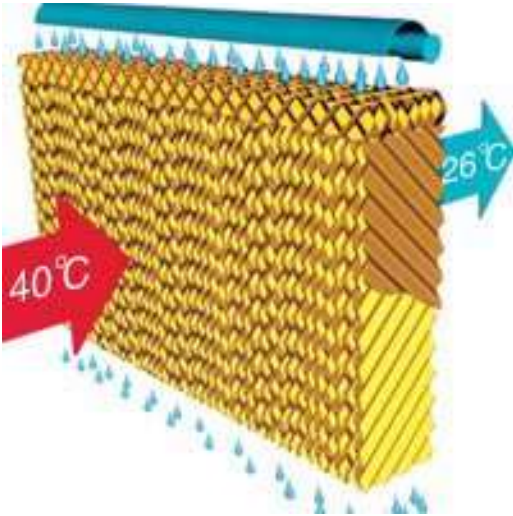


- Eco Shield works on basic principle of adiabatic cooling.
- Ambient air that is used to cool condenser is made to pass through wet cellulose pads.
- During this process the air passing through the wet cellulose pad absorbs moisture and drops temperature.
- Hence making condenser suction air cooler by up to 18 ° C.
- The cooler air increases heat transfer efficiency of the condenser resulting in drop in head pressure and decrease in power consumption.

Psychrometric Chart

SI (metric) units
Barometric Pressure 101.325 kPa (Sea level)
based on data from
Carrier Corporation Cat. No. 794-001, dated 1975





- Reduces Head Pressure.
- Increases the efficiency of the condenser.
- Protects the condenser from Dust Particles and sand.
- Reduction in condenser coil cleaning.
- Increases the life of condenser.
- Reduces chiller preventive maintenance.
- Decreases the power consumption



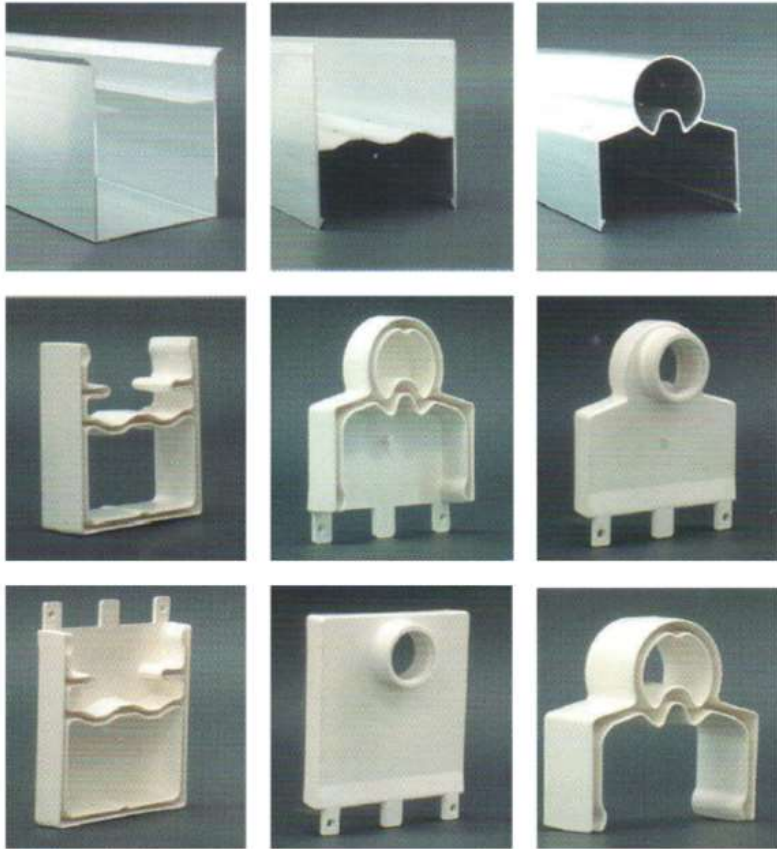
- Adequate Space Between the Cellulose Pads and condenser for maintenance activities



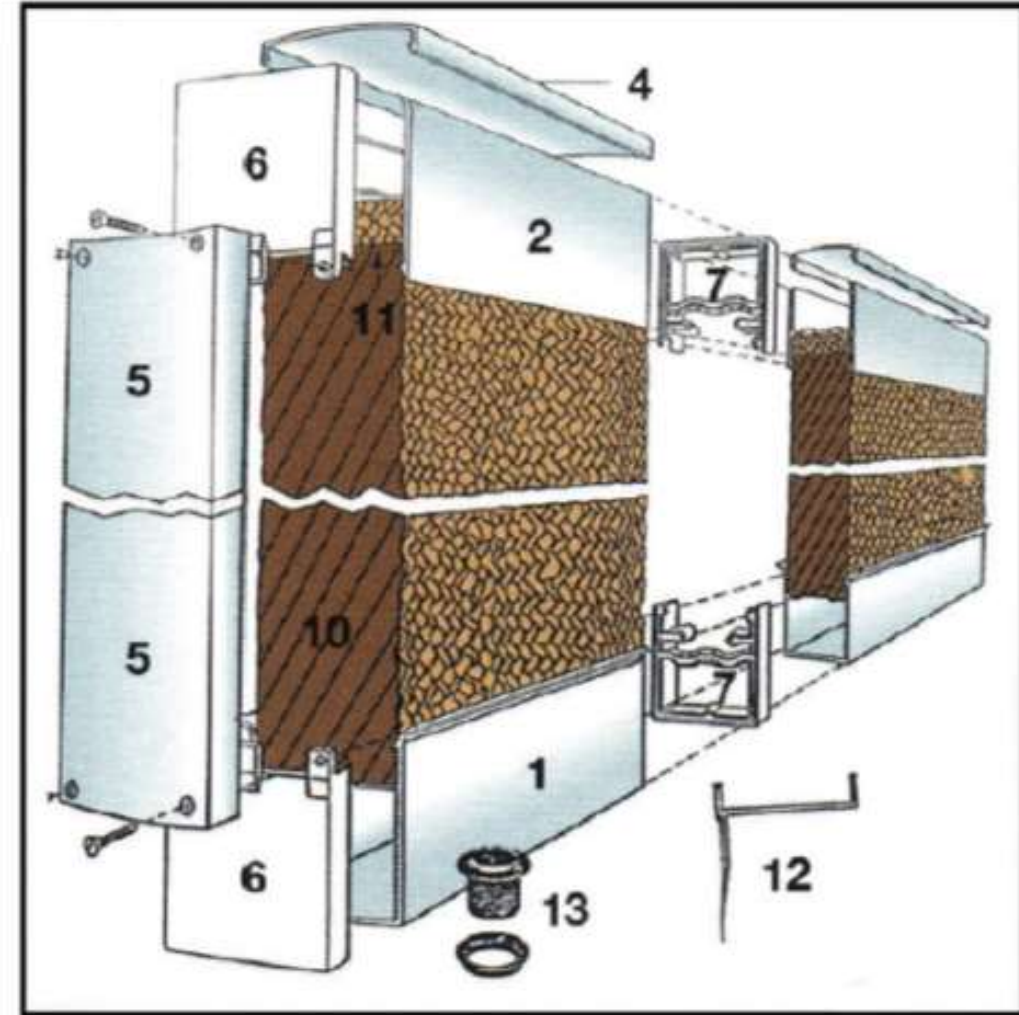
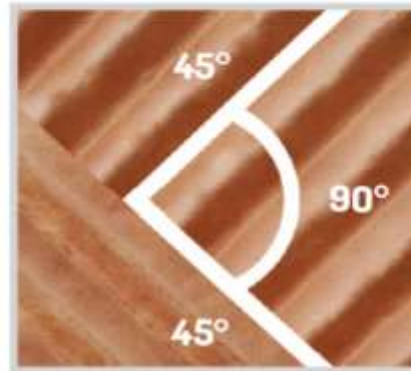
- New EcoShield controller comes with the following added benefits;
- 4 stage controller
- Humidity sensor Ambient and inside wetwall.
- Auto cut off if the humidity or temperature is not suitable or optimum performance.
- Auto Bleed system to avoid any accumulation of dust and minerals.



- New EcoShield pads are tailor made as per available height in order to have maximum air flow.
- The Evaporative pad is manufactured with special craft paper of pure cellulose, saturated with resins and treated in such a way as to guarantee a highly absorbent capability and outstanding mechanical strength.
- Option of full PVC pads
- Protection coating against shrinking and deteriorations caused by UV rays, fungi, bacteria and algae.



ANGLES 45° / 45°





- UV steriliser is installed in the water line in order to prevent growth of legionella bacteria and algae.



- The new logic controller (Siemens LOGO) is programmed for operations as below.
- The controller is programmed to run in Four stages as below.
- Stage 4 timer is activated only when the humidity inside the wet wall is below 60% and the ambient temperature is above 40 ° C.

	On Time	Off Time
Stage 1	150 Sec	90 Sec
Stage 2	120 Sec	120 Sec
Stage 3	60 Sec	180 Sec
Stage 4	180 Sec	60 Sec

Ambient Humidity	Timer
Below 30%	Stage 1
30% to 50%	Stage 2
50% to 75%	Stage 3
75% Above	Off

Ambient Temp	Timer
Below 24° C	Off
24° C to 30° C	Stage 3
30° C to 38° C	Stage 2
38° C Above	Stage 1



Tank Bleed and Chemical dosing ;

- Tank bleeding is programmed automatically after the pump has run for 12Hours. (This timing will be changed during the commissioning time based on site water quality).
- Same counter is used to periodically add chemical for treatment of algae and Legionella bacteria.

- DEWA – Hudeiba Customer Care Building
- Dubai Municipality - AL-Manara & Kifaf Center
- Federal Government - Securities & Commodities Building
- RAK Hospital
- Unilever
- RAFFLES School
- Dubai Maritime DMC
- Edition Hotel
- ENBD Offices and Data Centre
- Alain Mall



Dubai Municipality
AL-Manara Building



Securities &
Commodities Bldg.
Al-Rashidiya



Measurement and Verification Plan and Baseline report For Al Manara centre Dubai Municipality

M & V Conducted
and verified by :



Al Arsh

Facilities Management LLC

P.O. Box: 66756

Dubai – UAE



Eco-shield Adiabatic cooling system

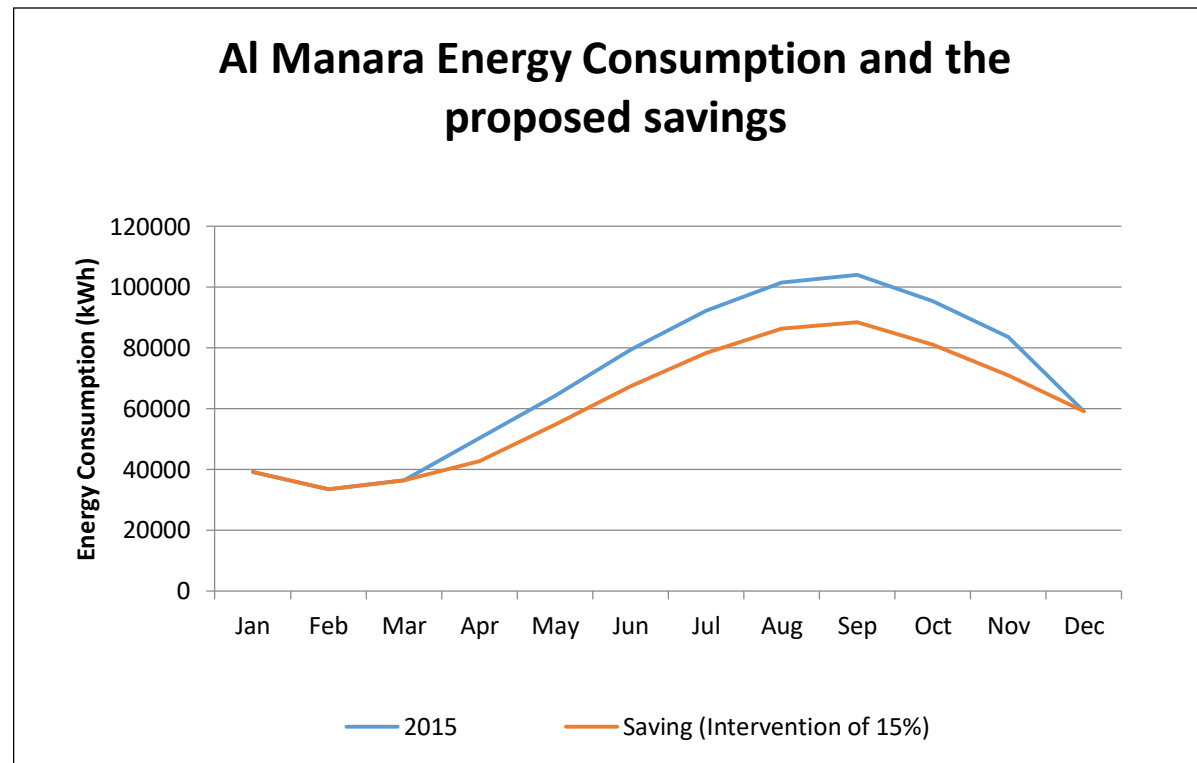
Al Manara centre

Dubai Municipality facility

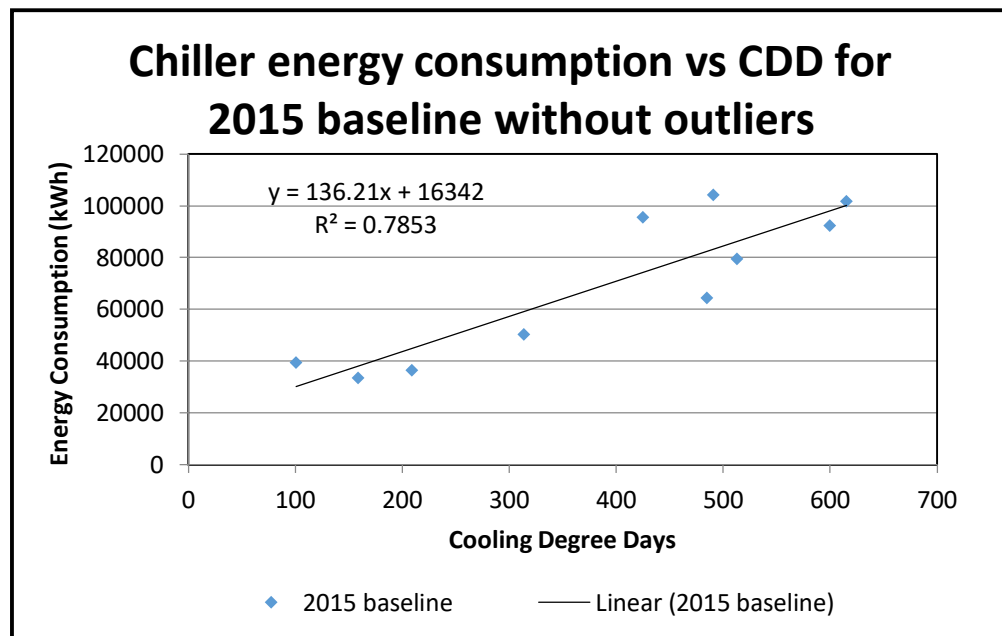
28th May 2017



kWh	2015	Saving (Intervention of 15%)	Proposed savings value
Jan	39226	39226	0
Feb	33444	33444	0
Mar	36335	36335	0
Apr	50307	42761	7546
May	64279	54637	9642
Jun	79375	67468	11906
Jul	92222	78389	13833
Aug	101537	86306	15231
Sep	104106	88490	15616
Oct	95434	81119	14315
Nov	83550	71018	12533
Dec	59139	59139	0
Total (kWh)	838953	738332	100621
Total (AED)	377529	332249	45280



The expected savings will be based on a flat rate of 15% for the savings period of 8 months, which excludes the winter period of December 2016 to March 2017. The proposed savings solution is shown in the figure below. The proposed energy saving values for the winter months are equal to zero as the energy consumption for the same months are assumed to be equal to the current energy consumption.

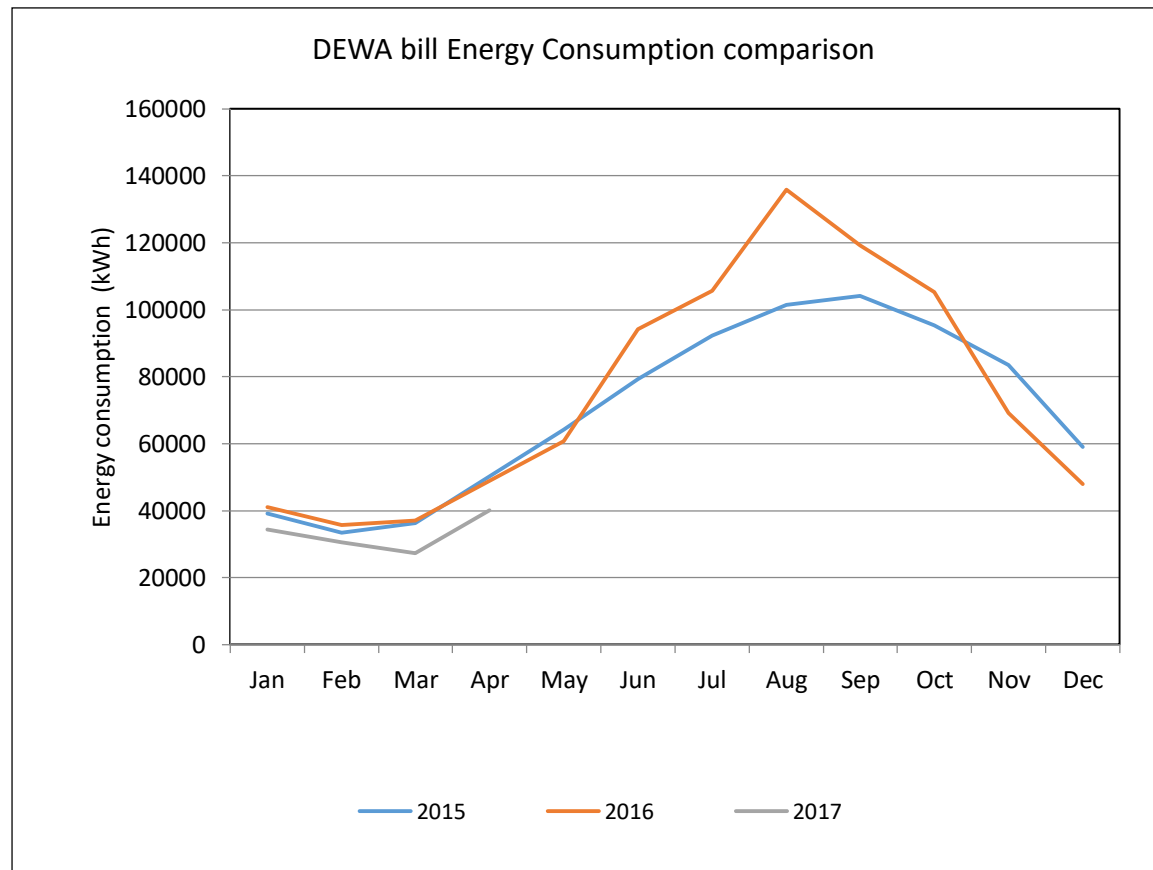


Month starting	18	kWh
01-01-2015	101	39226
01-02-2015	159	33444
01-03-2015	209	36335
01-04-2015	314	50307
01-05-2015	485	64279
01-06-2015	513	79375
01-07-2015	600	92222
01-08-2015	615	101537
01-09-2015	491	104106
01-10-2015	425	95434
01-11-2015	274	83550
01-12-2015	138	59139

Month	CDD 2016 - 2017	Baseline	Actual	Savings	% Savings
Dec-16	178	40586	48986	-8401	-21%
Jan-17	127	33639	35190	-1550	-5%
Feb-17	94	29145	31248	-2103	-7%
Mar-17	219	46170	27342	18828	41%
Apr-17	372	67008	40189	26819	40%

Using the following formula and the corresponding data the savings have been calculated to lead to the following table. The adjusted baseline is calculated by using the linear formula of $y = 136.2x + 16342$. The coefficient of determination (R^2) for the chiller energy performance and the cooling degree days is 0.785, which is a reasonable correlation. The x value is the corresponding cooling degree day's value for the corresponding months.

kWh	2015	2016	2017	Saving	% Saving
Jan	39226	41153	34408	6745	16%
Feb	33444	35693	30553	5139	14%
Mar	36335	36977	27342	9636	26%
Apr	50307	48861	40189	8672	18%
May	64279	60745			
Jun	79375	94149			
Jul	92222	105712			
Aug	101537	135904			
Sep	104106	119202			
Oct	95434	105391			
Nov	83550	69096			
Dec	59139	48986			



A direct comparison of the DEWA bills is provided below for the years of 2015, 2016 and until the month of April 2017. These bills were supplied by the client for the account of 2014402027, which has both chillers connected to it. The method of converting the account values to energy consumption values is done by dividing by a value of 0.45 AED/kWh.

Thank You