Green Line
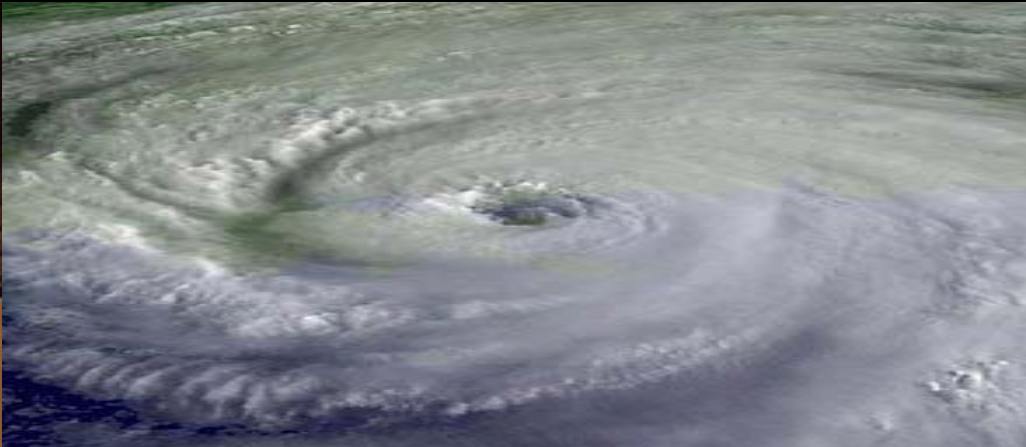
Modernisation

Cooling Box And Power Saving For Telecom

Presented by Gona Fahmi Amin

Alternative Energy

APR 2013

CLIMATE CHANGE

CONTENT

MARKET DYNAMICS & CHALLENGES
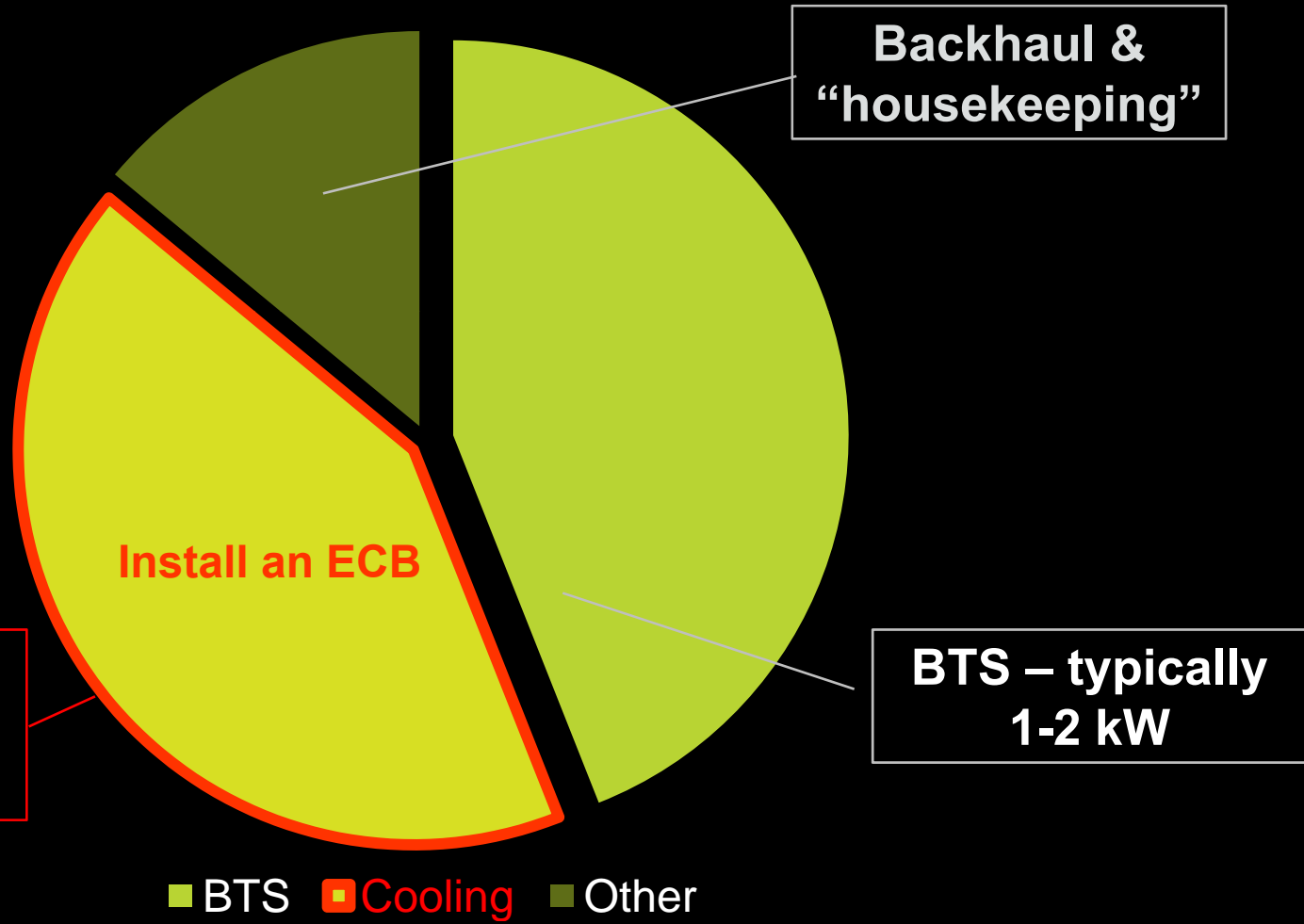
MARKET TECHNOLOGIES

SOLUTIONS & CONTROL

CONTENT

MARKET DYNAMICS & CHALLENGES

SITE POWER CONSUMPTION BREAKDOWN

The objective of the ECB is to reduce the Active cooling & use Passive or Free! cooling to make large savings in OPEX costs.

Backhaul & "housekeeping"

Install an ECB

BTS – typically 1-2 kW

COOLING – With Aircon 2-4 kW

■ BTS   ■ Cooling   ■ Other

WHAT IS PASSIVE OR FREE COOLING!

> No compressors

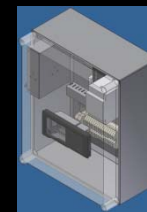> Uses External / Ambient Air

> Uses High Quality Filters and control
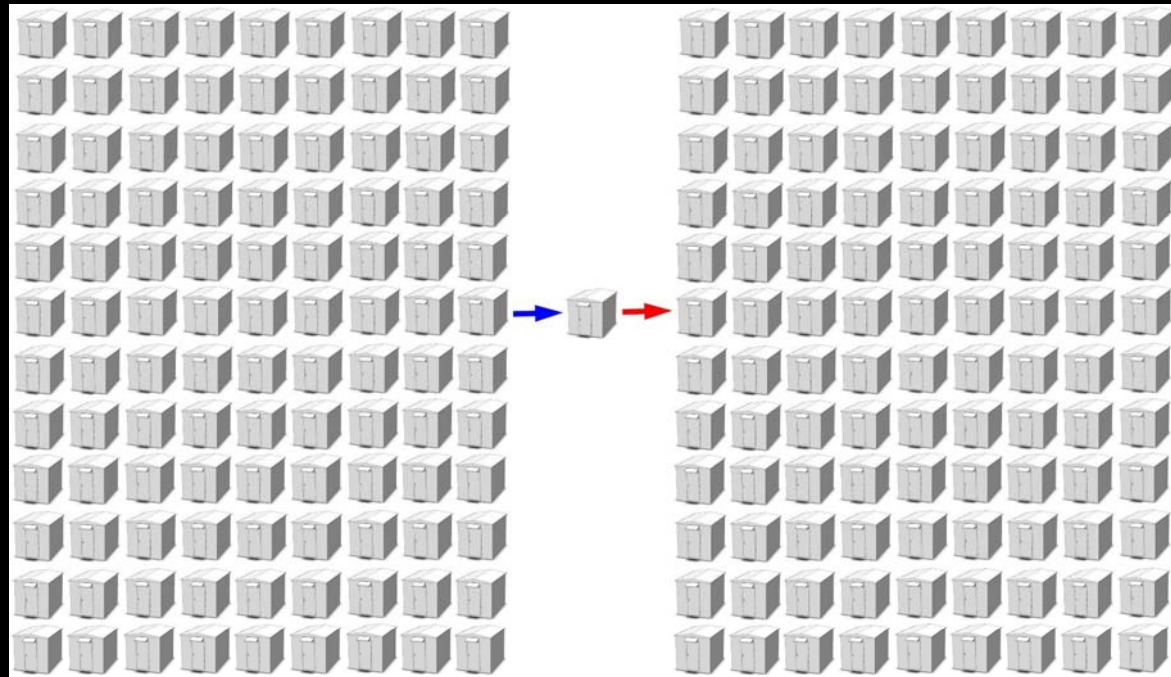
CONTENT

MARKET TECHNOLOGIES

PASSIVE COOLING

- **ECB Objectives**
  - To reduce energy consumption – OPEX SAVING

- **ECB installation**
  - Simple
  - Secure
  - Fast installation
  - Total Control

- **ECB Site Environment FREE COOLING**
  - Temperature
  - Humidity
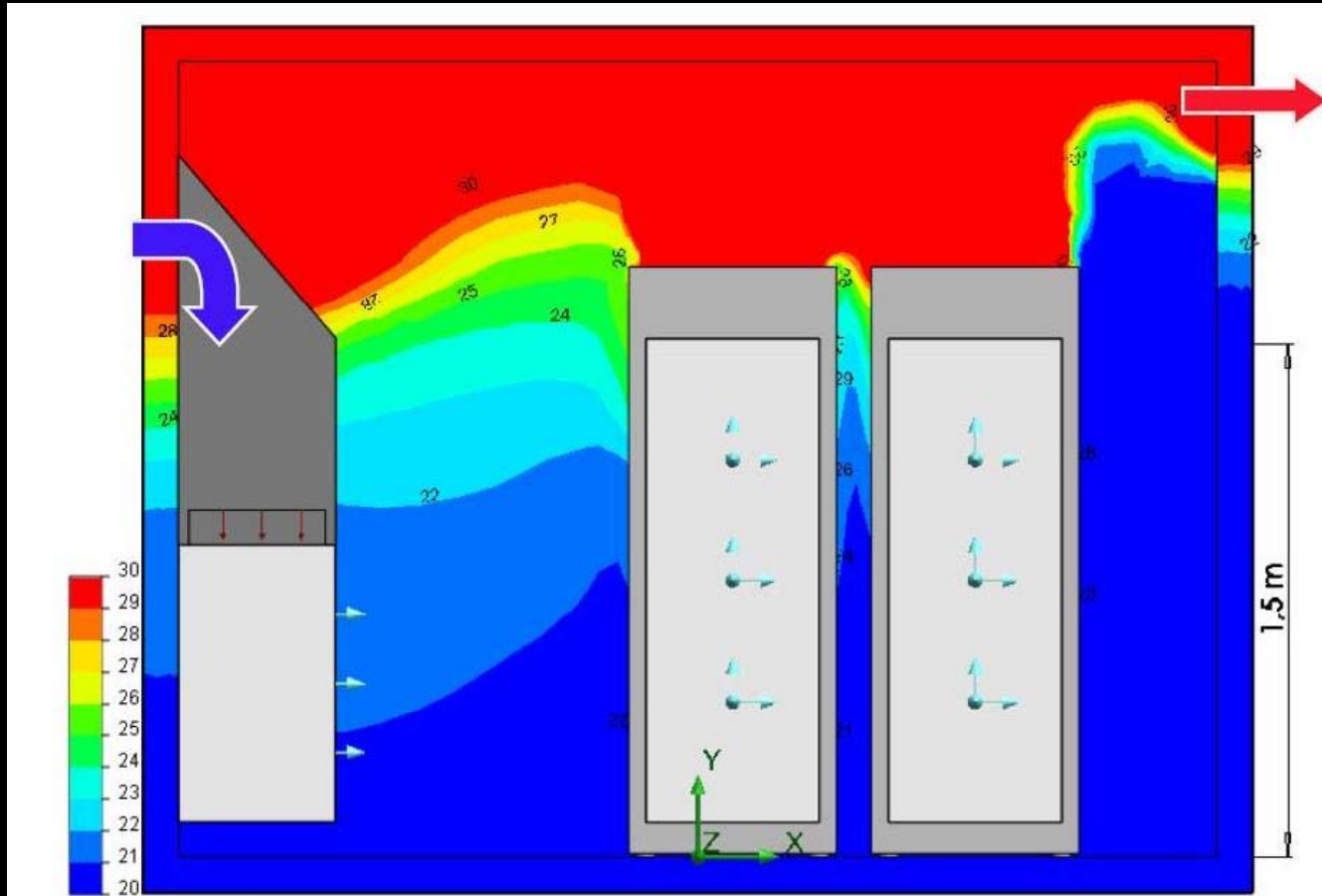 - Importance of Filtering
  - Control
  - Installation

COOLING METHOD

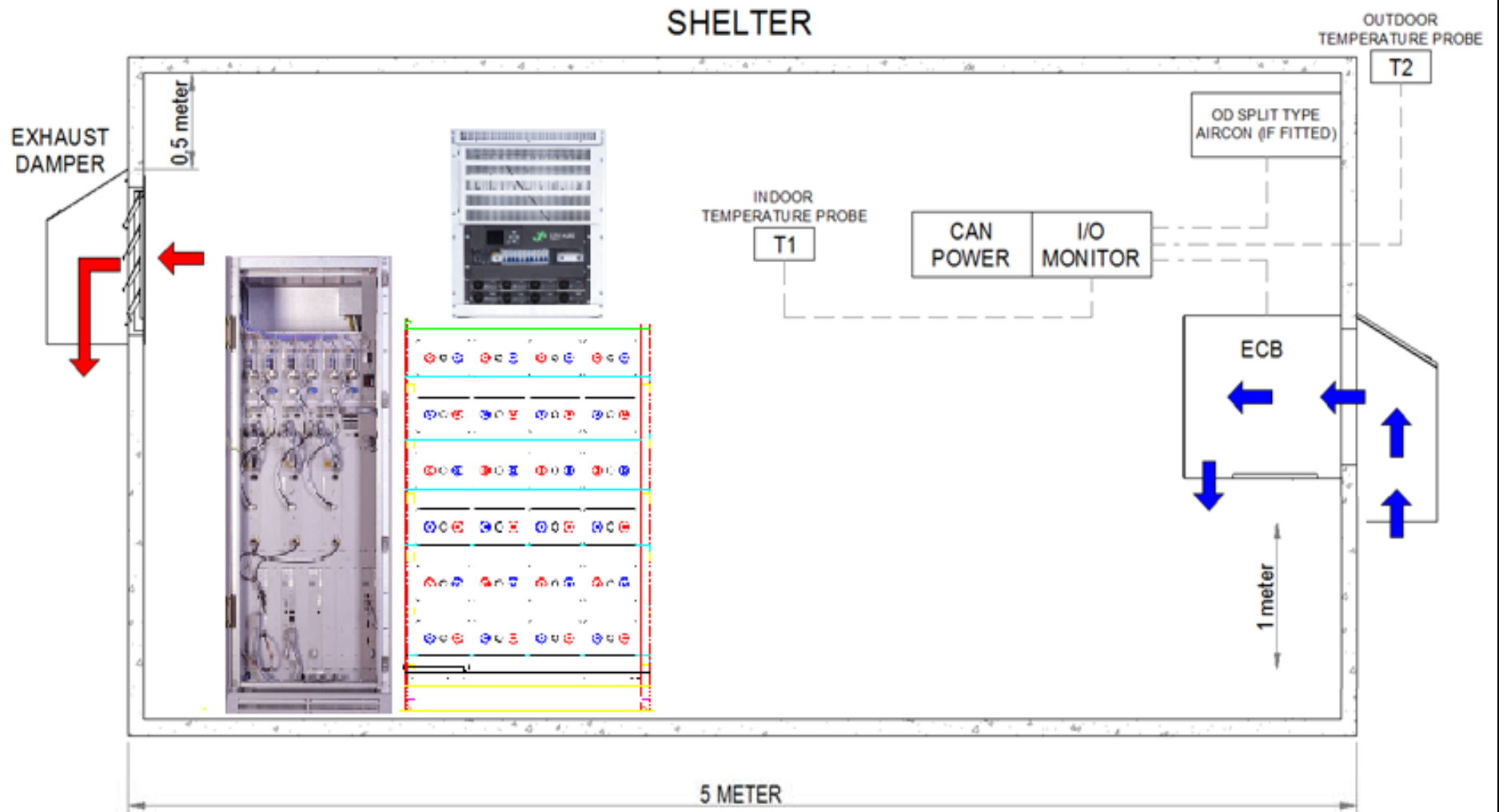Move as much air as possible to control Temperature / Humidity / Dust

Provides 50 - 100+ air changes per hour in a 22,5 m³ Shelter is possible
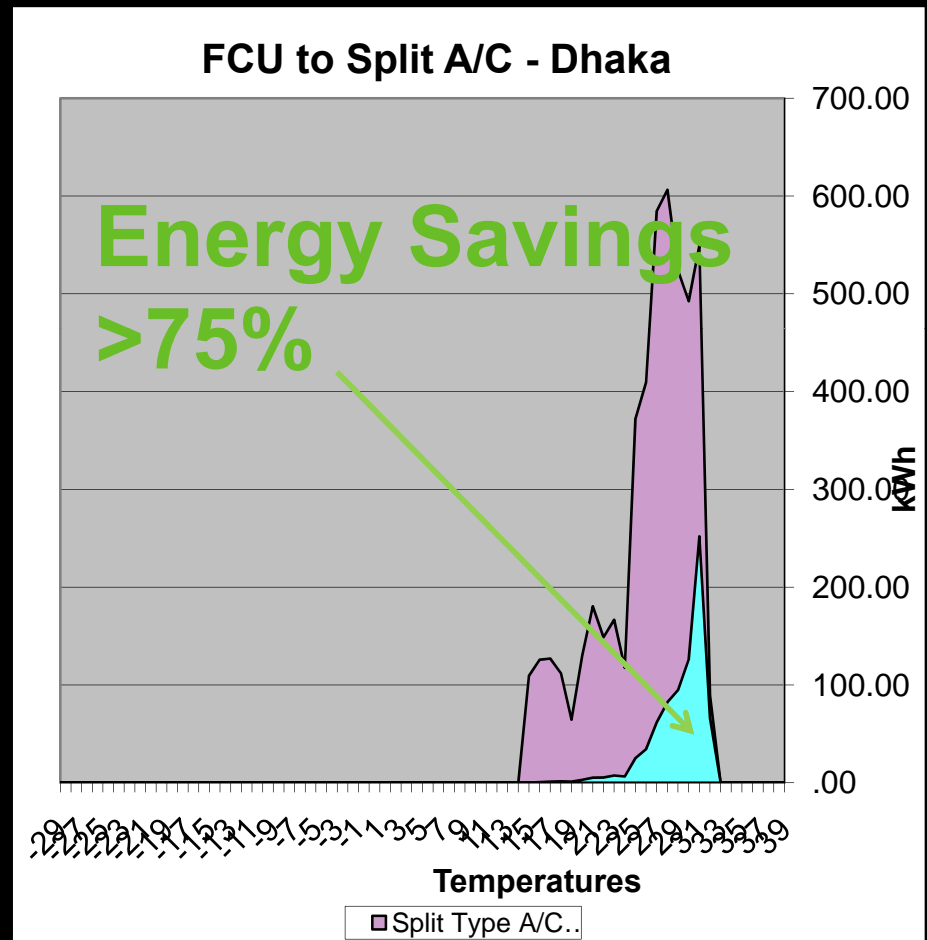
Thermal Profile - Cabin
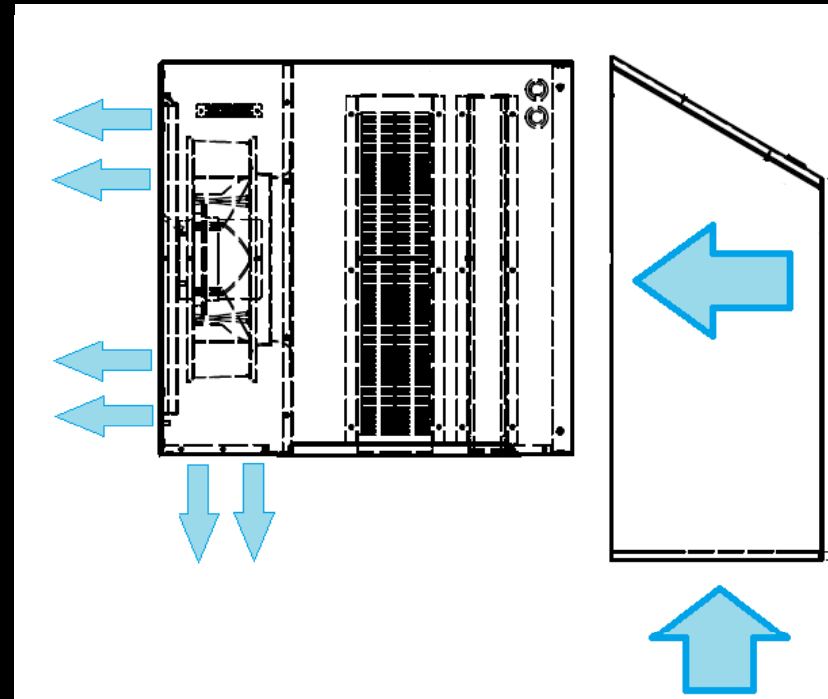
ECB – COOLING / MOUNTING OPTIONS

ECB - FREE COOLING & SAVINGS

➢ Energy Savings up to >75%*

➢ Dual Filter option

➢ High Capacity Fan

➢ Temperature & Humidity Control

➢ * savings are based on Heat Load, External Temp

FCU to Split A/C - Dhaka

Energy Savings >75%

(chart: kWh vs Temperatures; Split Type A/C.., y-axis .00 to 700.00)

ECB INLET BOX
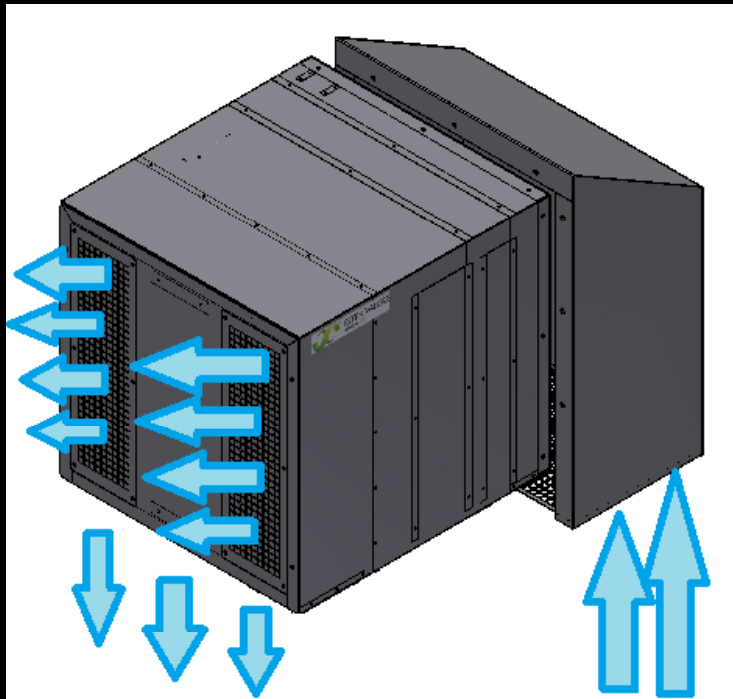
ECB SYSTEM KEY PARTS
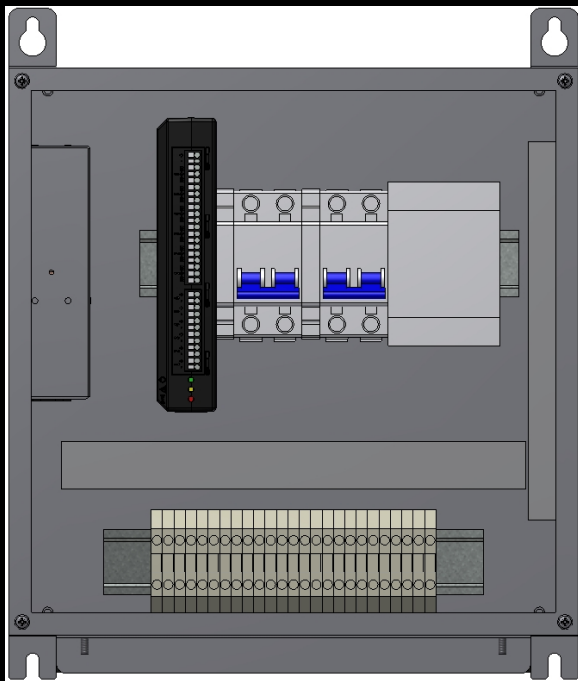
ECB Control box

- ✓ Mounting for all devices
- ✓ Connection for system control
- ✓ All Alarm outputs

ECB Interface box

- ✓ 2 temperature sensors
- ✓ 2 fan speed inputs
- ✓ 2 fan speed control outputs
- ✓ Up to 2 ACU control

ECB Display

- ✓ Push button panel
- ✓ SD card
  - ✓ Logging Data - 10K pts
  - ✓ Event Log - 10.5K evts
- ✓ System status

SMARTPACK CAN DEVICES

SMARTPACK DISPLAY / LOGGER

- ✓ WEB POWER INTERFACE / ACCESS
- ✓ SNMP / TCIP CONNECTIVITY
- ✓ 'E' ALARM EMAIL

ECB POWER CONVERTER

*CAN Power only used in stand alone systems

- ✓Delivers power to the CAN BUS for Can NODE add on's
- ✓DC Power System Isolation
- ✓Robust and Reliable

CAN NODES – SMARTPACK SYSTEM ADD ONS

ECB POWER CONVERTER

- ✓Delivers power to the CAN BUS for Can NODE add on's
- ✓DC Power System Isolation
- ✓Robust and Reliable

SMARTNIODE

- ✓ Protocol conversion (MODBUS and various proprietary protocols)
- ✓ SMS through GSM modem
- ✓ Callback through modem

ECB CONFIGURATION OPTION 1
– EXISTING EV POWER SYSTEM + ACU

ECB

✓ ECB Box

✓ Control Panel

✓ Damper

✓ Cabling

✓ Installation

+

Eltek Valere Power

✓ SP1 or SP2

✓ Or upgrade power system chassis or Smart pack controller for added features

+

ACU

✓ Max 2 separate ACU's

ECB CONFIGURATION OPTION 2
– STAND ALONE + ACU

ECB

- ✓ ECB Box
- ✓ Control Panel
- ✓ Damper
- ✓ Cabling
- ✓ Installation

+

ACU

- ✓ Max 2 separate ACU's

+

ECB Display (optional)

- ✓ Push button panel
- ✓ SD card
  - ✓ Logging Data
  - ✓ Event Log
- ✓ System status

ECB CONFIGURATION OPTION 3 – EXISITING EV POWER SYSTEM

ECB

✓ ECB Box

✓ Control Panel

✓ Damper

✓ Cabling

✓ Installation

ACU

Eltek Valere Power

✓ SP1 or SP2

✓ Or upgrade power system chassis or Smart pack controller for added features

ECB CONFIGURATION OPTION 4 – STAND ALONE

ECB

- ✓ ECB Box
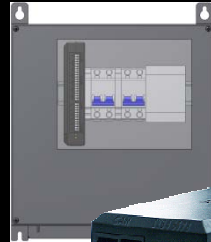- ✓ Control Panel
- ✓ Damper
- ✓ Cabling
- ✓ Installation

+

ECB Display (optional)

- ✓ Push button panel
- ✓ SD card
  - ✓ Logging Data
  - ✓ Event Log
- ✓ System status

ACU

ECB CONFIGURATION - DEFAULT

FAN START & MAX SPEED

DESIRED DELTA T CONTROL

ACU 1 ON POINT & EMERGENCY FAN CONTROL

HYSTERISIS CONTROL

ALARM

| ECB Default Settings			
Parameter	Setting		Description
	Min	Max	
Temp Set point	22°C	30°C	Min and Max set point to operate the Fan at the desired temperature
Fan Speed	0%	100%	Min and Max set point to operate the Fan at the desired Speed
Fan Min. In - Out Δ T	3°C		Differences between Indoor Temp - Outdoor Temp to run the fan.
Aircon On	36°C		Desired Temp to start the Aircon.
Emergency Fan	40°C		Desired Temp to start the Emergency Fan Mode.
S-Band	4°C		Differences in (Air-con set point - S band) to stop the Aircon & (Emergency Fan set point - S-Band) to stop the emergency Fan mode
Alarm Settings	On		Off
Fan Fail	<50%		>50%
High Temp	40°C		35°C

ECB MASTER DISPLAY & LOGGER

Back panel
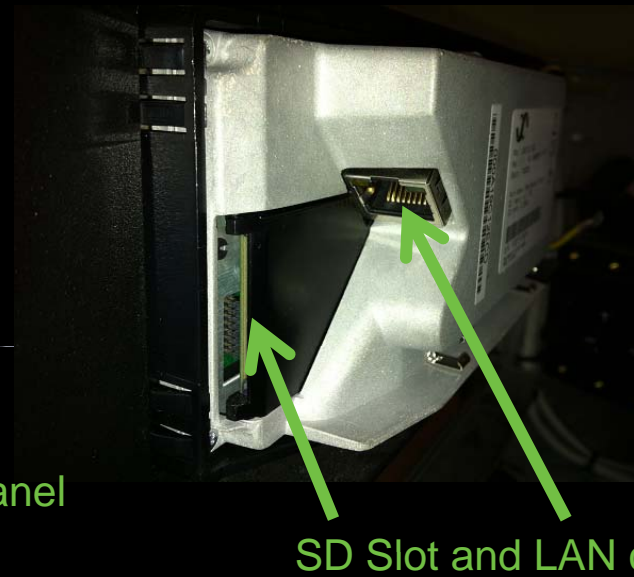
SD Slot and LAN connection

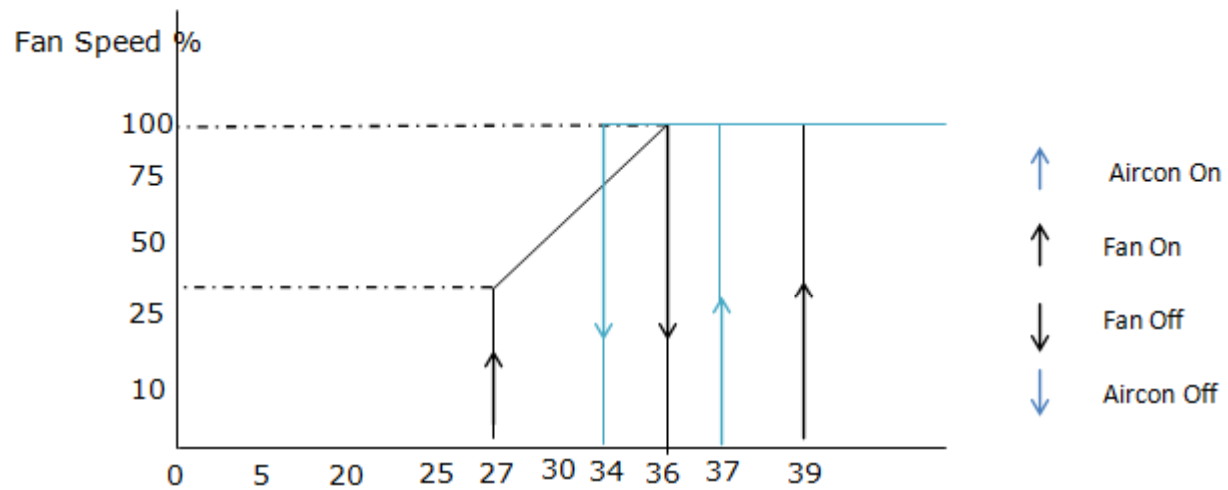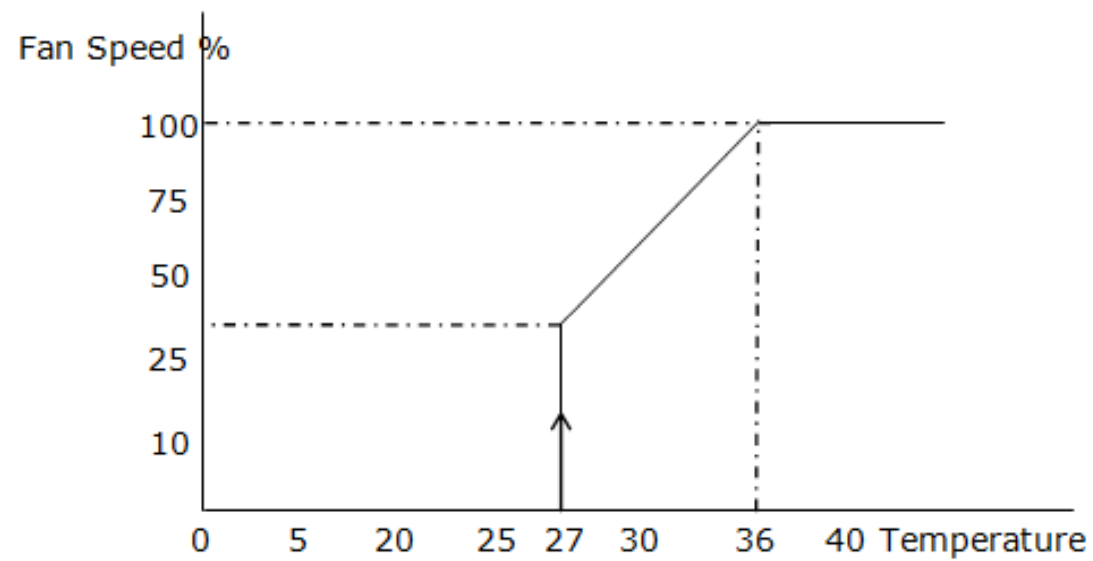Touch sensitive buttons

WEB INTERFACE

Remote access
with SP2

ECB & AIRCON

ECB ONLY

DUST CONTROL – Filter selection Low / Medium / High grade

								ASHRAE 52 - 76		
Fractional Efficiency Values										
Particle size	0.12	0.3	0.5	1	3	5	10	A Ave	E Ave	
Euro-Vest 4/5										
G1	-	-	-	-	-	5 – 30	50 – 70	= 60	0	Low
G2	-	-	-	-	5 - 15	15 – 35	50 – 80	= 70	= 10	efficiency
G3	-	-	-	0 – 5	10 – 20	25 – 45	70 – 90	= 82	= 25	Filters,
G4	-	-	0 – 5	0 – 10	20 – 30	40 – 55	80 – 95	= 93	= 35	Coarse filters
F5	0 – 10	5 - 15	15 – 25	30 – 40	65 – 85	90 – 95	97 – 99	97	45 – 50	Medium
F6	5 – 15	10 – 25	20 – 40	55 – 65	88 – 94	98	≥ 99	98	60 – 65	efficiency filters
F7	25 – 35	45 – 50	60 – 75	90 – 97	>99	= 100	= 100	99	84 – 87	High
F8	35 - 45	65 – 75	83 – 90	95 – 99	= 100	= 100	= 100	> 99	92 – 94	efficiency
F9	45 - 60	75 - 85	90 - 95	> 99	= 100	= 100	= 100	> 99.5	97 - 98	filters

> Select Filter type depending on site requirement

ECB DEFAULT FILTER
1ST LAYER CF-G4 / 2ND LAYER CF-F5

> **CF FILTERS – STD**

> First Filter: Type: Panel-G4-SP

> Filter area per element [m²] 1.1

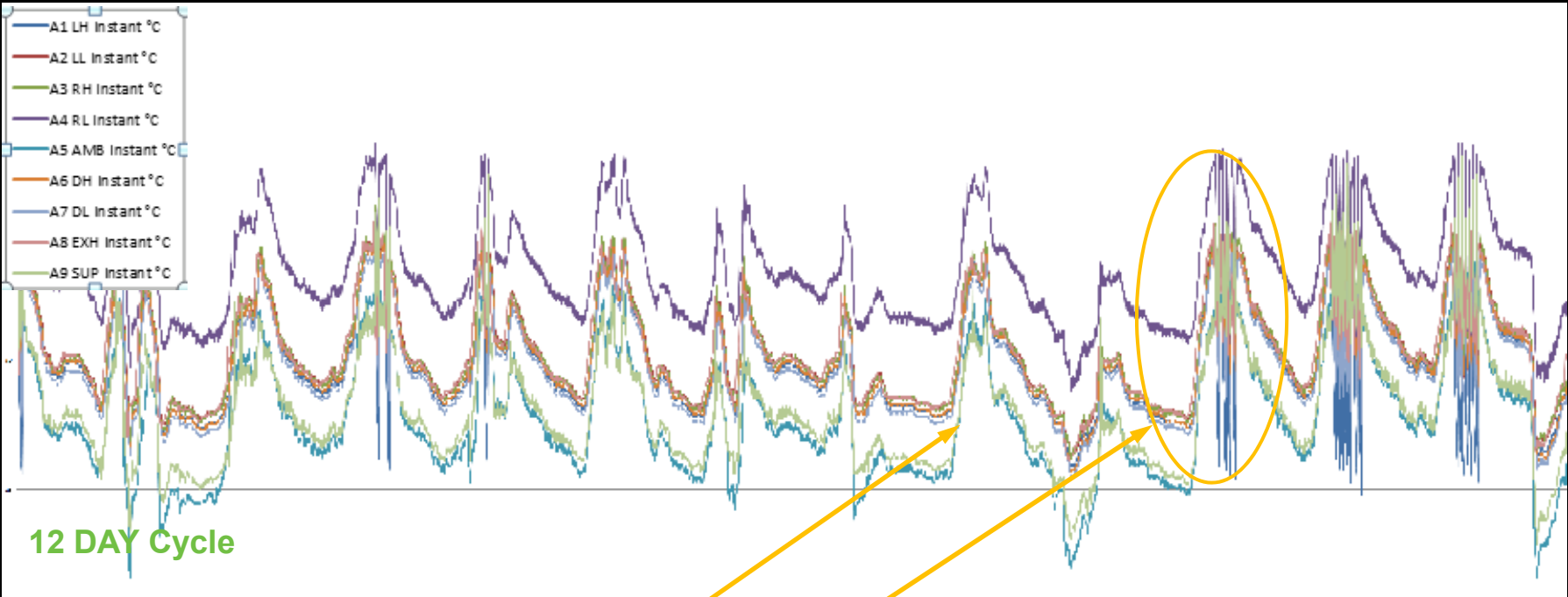> Second Filter: Type: Ecopleat F5 - 3GPF

> Filter area per element [m²] 8.2

> **EF FILTERS – OPTIONAL**

> First Filter: Type: Panel-G4-SP

> Filter area per element [m²] 1

> Second Filter: Panel-F5

> Filter area per element [m²] 6,5

> **EF series washable 3 to 4 times, reduction in filtration maybe noticed

ECB TEMP CONTROL– DELTA T CONSIDERATIONS

12 DAY Cycle

Date	Time	A1 LH Instant °C	A2 LL Instant °C	A3 RH Instant °C	A4 RL Instant °C	A5 AMB Instant °C	A6 DH Instant °C	A7 DL Instant °C	A8 EXH Instant °C	A9 SUP Instant °C	Delta T Instant °C
Average Temperature		31.18	31.89	32.02	34.71	29.25	31.77	31.24	31.97	30.19	2.51

HEAT LOAD
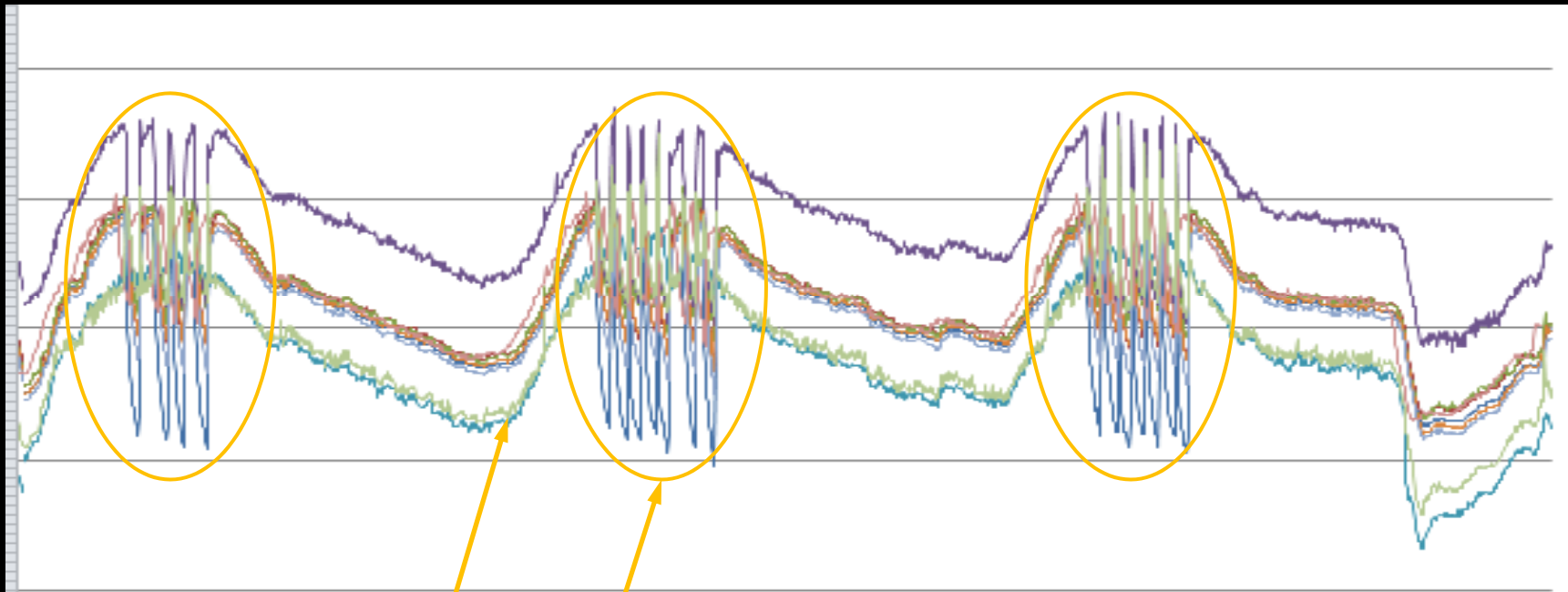**1800W**
(1500W=300W)

Rising Ambient

ACU

MAX Heat load temp – ie BTS

LOW DELTA T for Max Energy Savings

ECB TEMP CONTROL– DELTA T CONSIDERATIONS

Date	Time	A1 LH Instant °C	A2 LL Instant °C	A3 RH Instant °C	A4 RL Instant °C	A5 AMB Instant °C	A6 DH Instant °C	A7 DL Instant °C	A8 EXH Instant °C	A9 SUP Instant °C	Delta T Instant °C
	Average Temperature	31.18	31.89	32.02	34.71	29.25	31.77	31.24	31.97	30.19	2.51

HEAT LOAD
1800W
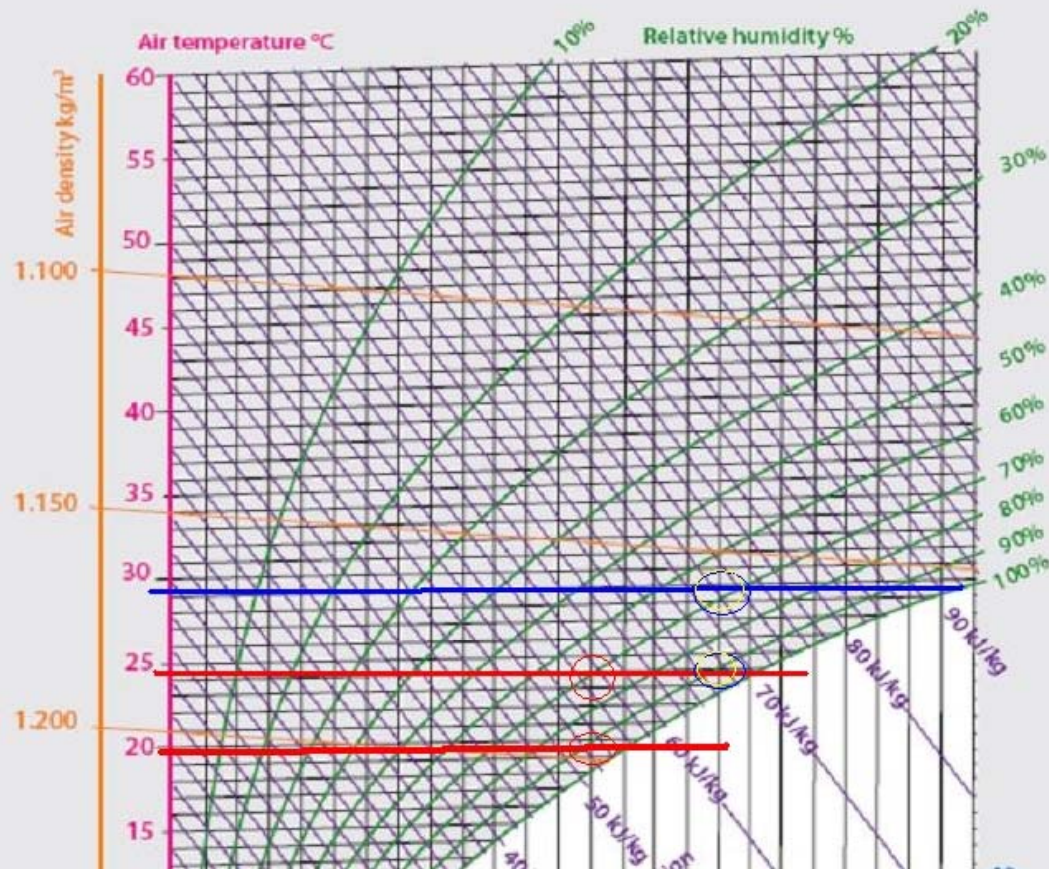(1500W=300W)

Rising
Ambient

ACU

MAX Heat load
temp – ie BTS

LOW DELTA T
for Max Energy
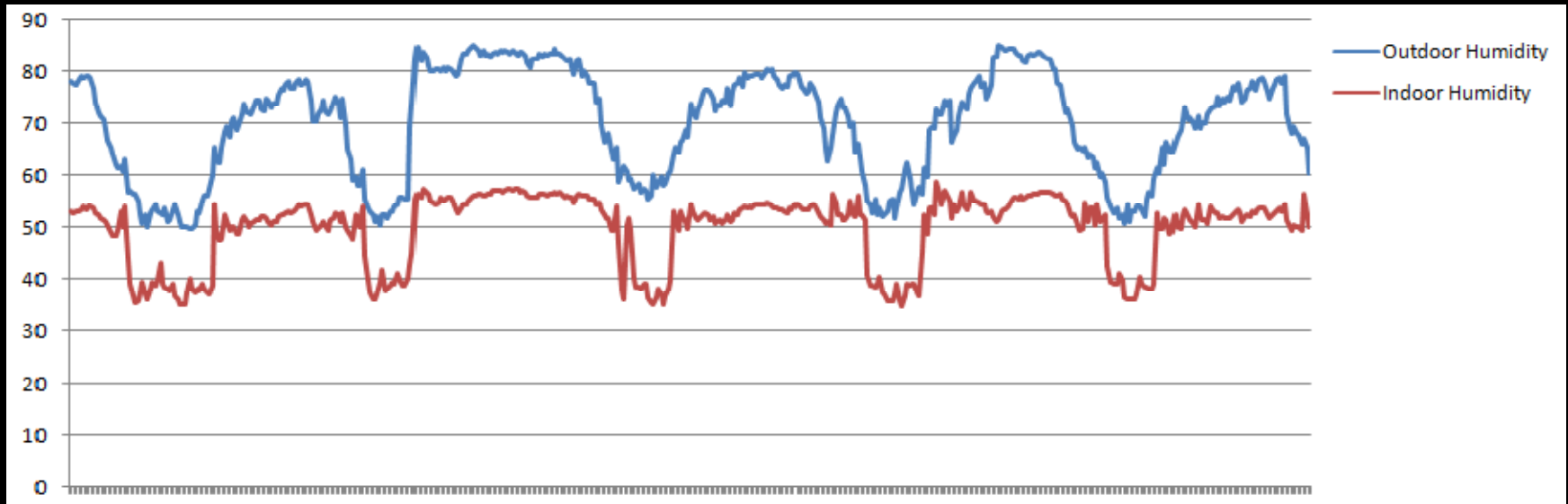Savings

HUMIDITY LEVEL CONTROL – RH% ENVIRONMENT

Mollier hx-diagram

FACTS

➤ Condensation forms when Humid air contacts with cold surface.

➤ Humidity will decrease when temperature increases.

HUMIDITY LEVEL CONTROL – RH% ENVIRONMENT

Internal Humidity track External Humidity

Average Humidity	70.0	49.8	-20.2	
5 Day data	Outside	Inside	Delta Humidty	

> **Delta T 3 deg C**

SUMMARY – KEY SYSTEM POINTS

1. Over pressure Free Cooling System with ACU and Genset control

2. G4 or F5 filter or Dual Mode - low pressure drop.

3. Data Logger and Alarm event recording (with SP2 Display / Logger)

4. No fixings displayed on the outside.

5. Single box solution for all sites with directional airflow for maximum cooling effect

6. IP rating of system solution installed >IP54* (Louver / Damper)

7. Site temperature control inside and outside temp monitoring

8. Filter block detector (std)

9. Humidity control, None condensing.

10. Pressure Damper with Bug traps

11. EV sites integrated solution with SP1 & SP2 controllers