

# OUR LITTLE SUSTAINABLE WORKPLACE

HARN BUILDING

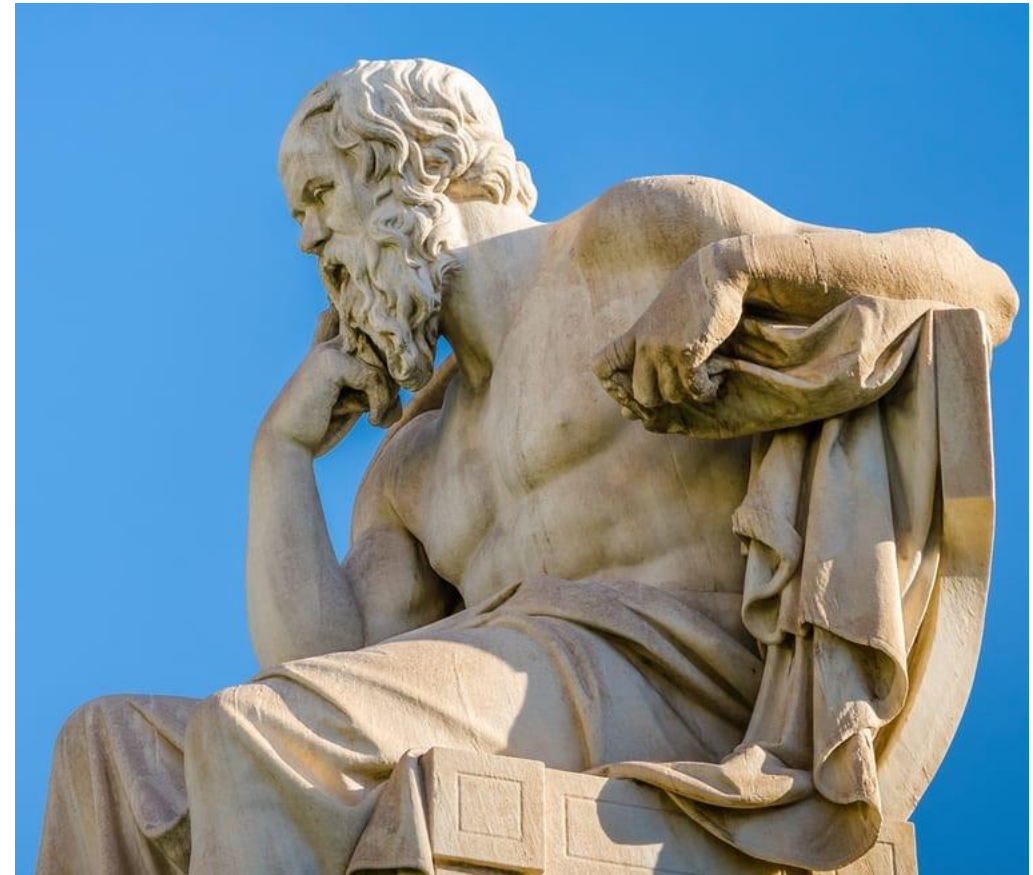
22 APRIL 2023

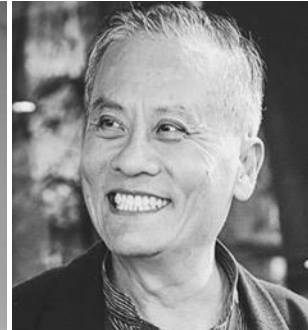




## “Workplace fosters Culture”

- Collaborative
- Playground – learning by playing
- Dare to think “out of the box”
- Go “Sustainability”
- Create “New Business”
- Sufficient Economy





Interior Design

Architectural Design

Landscape Design

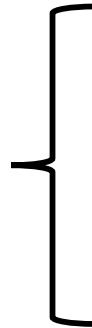
Structural Engineer







MEP

DGNB



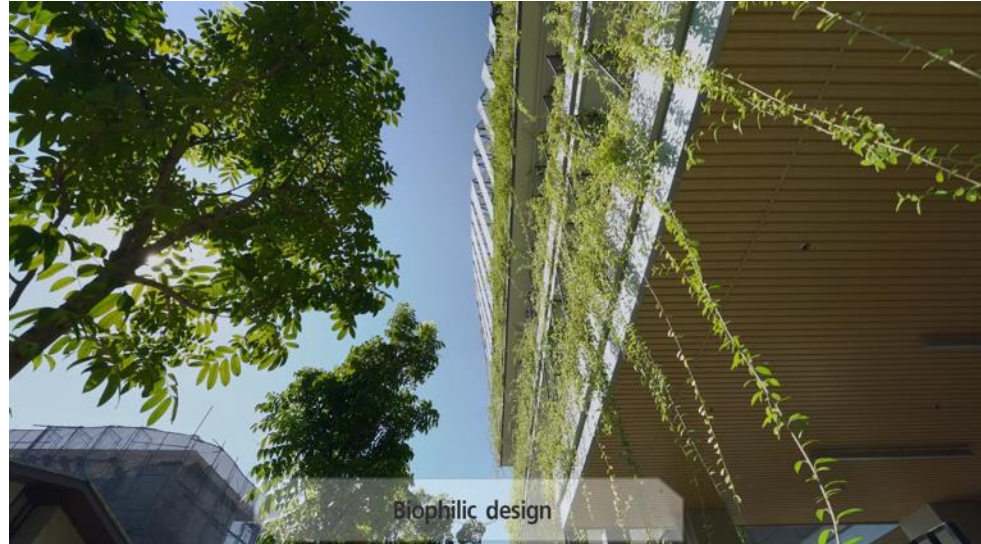
○ Well being



Criteria Quality	Share	Score	Overview status
 Environmental quality	Ecology	22.5%	<b>77.5%</b> Pre-evaluation
 Economic quality	Economy	22.5%	<b>66.1%</b> Pre-evaluation
 Sociocultural and functional quality	Socio-Cultural	22.5%	<b>61.9%</b> Pre-evaluation
 Technical quality 22,5 %	Technology	22.5%	<b>59.5%</b> Pre-evaluation
 Process quality 10%	Process	10.0%	<b>64.7%</b> Pre-evaluation
 Site quality	Site	0.0%	<b>85.5%</b> Pre-evaluation
<b>Total</b>		<b>100%</b>	<b>66.1% = DGNB Gold</b>

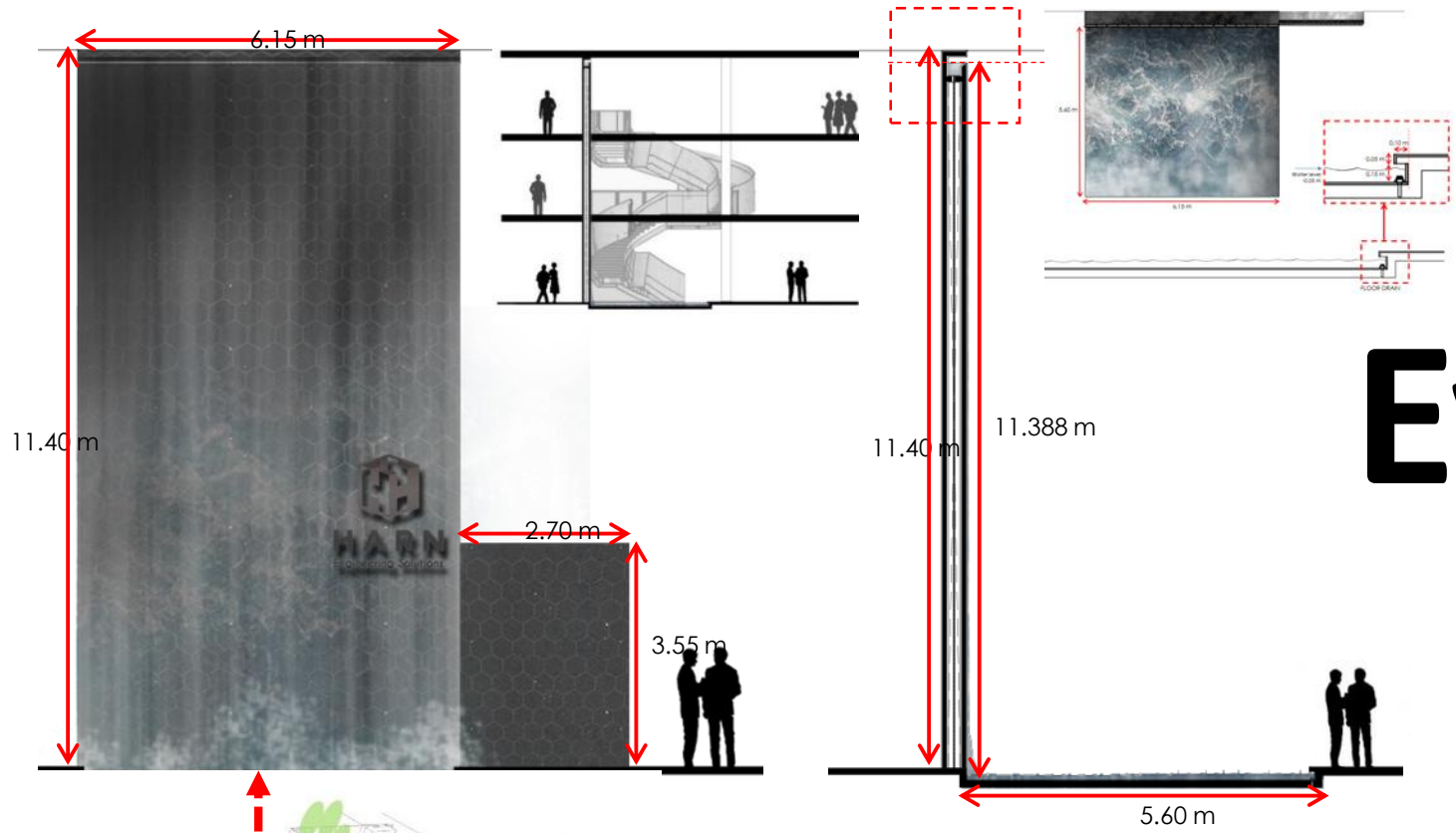
○ Energy  
○ Life cost cycle





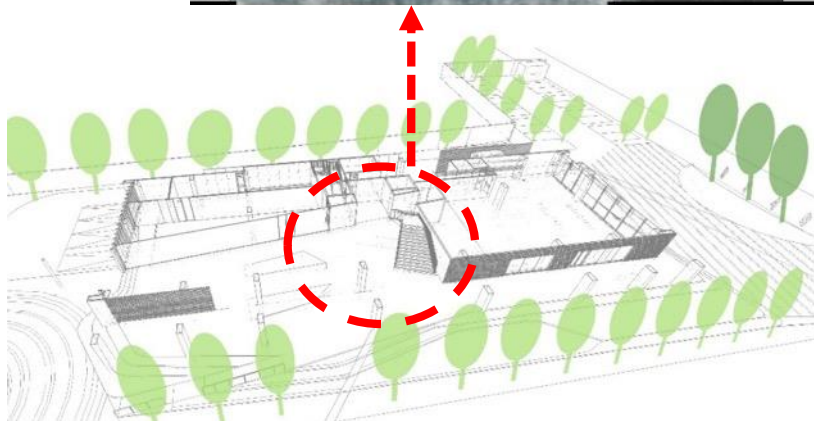
# Biophilic



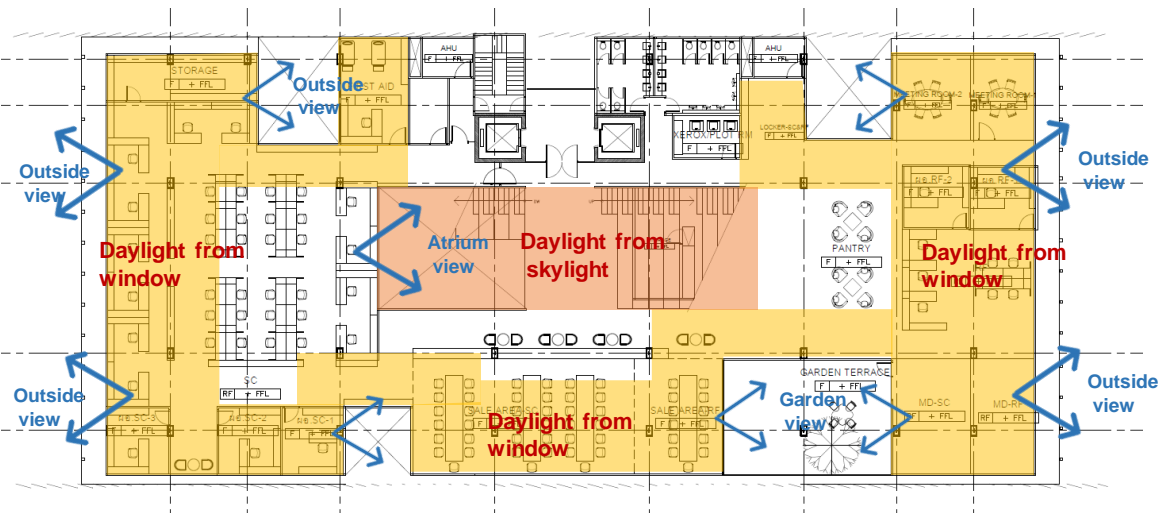
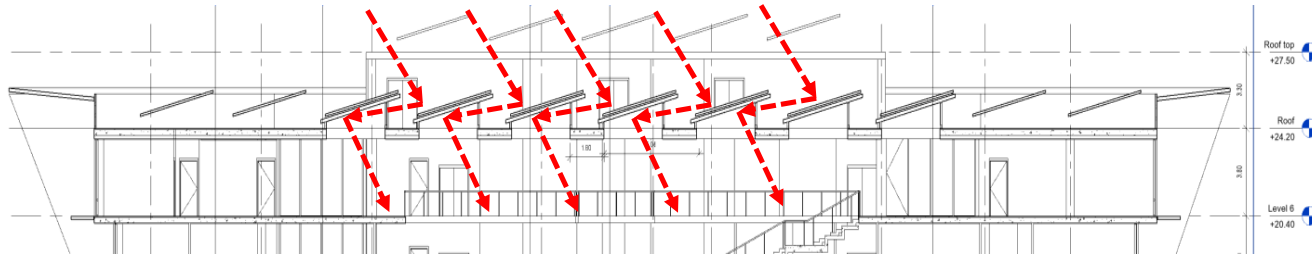


# Evaporative Cooling

Water feature to reduce ambient temperature and creating pleasant background noise.



# DAYLIGHT / VIEW



## Why?

- Daylight and view have significant impact on the occupant's health, mind and comfort. All working spaces have access to daylight and view.



# Optimized Wall/Glass Performance

- TRNYS 17
- Weather data for Bangkok
- West façade
- Simulation of only 1 m<sup>2</sup> of façade area
- Wall layers as design, SC = 0,5
- Operative room temperature = 25° C from 7am to 8pm from Monday to Friday

With Insulation	No Insulation		
102 208	143 171	kJ/m2a	
28.4	39.8	kWh/m2a	Thermal Cooling Energy
9.5	13.3	kWh/m2a	Electric Cooling Energy (COP: 3,0)
37.9	53.0	THB/m2a	Energy price per wall area
15.2		THB/m2a	savings
	177	THB/m2	Investment for 40mm insulation
	11.7	a	payback for 40 mm insulation

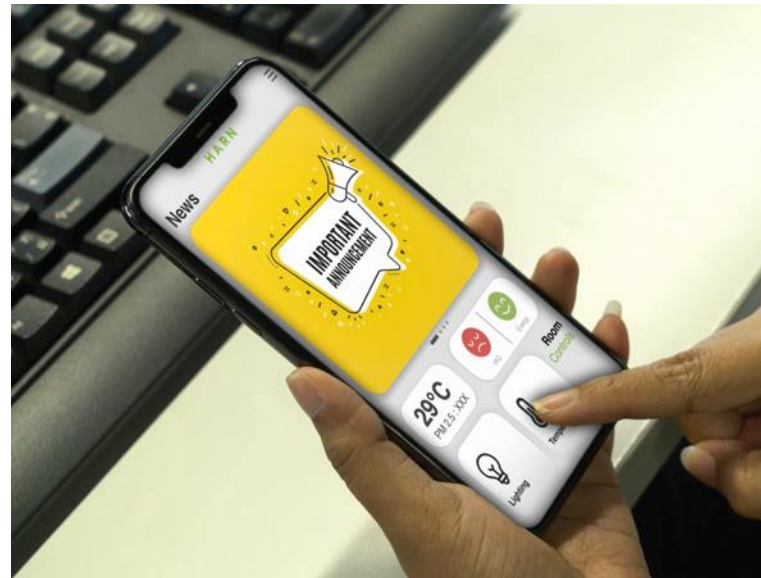
	Estimated (Insulation 150 mm)	Current Design with insulation 60 mm	Current Design with insulation 40 mm	Current Design without insulation
OTTV (BEC = 50)	33.9	34.7	35.1	38.6
TEC1.3 CLP (Full CLP = 30, BEC = 15)	21.9	21.5	21.4	19.9
TEC CLP	59.8%	59.7%	59.7%	59.4%
DGNB Total	66.8%	66.8%	66.8%	66.7%
Insulation price	-	331 bath/sqm	177 bath/sqm	-
Total Insulation Cost	-	363,107.00	194,169.00	-

With Insulation	No Insulation		
91 969	143 160	kJ/m2a	
25.5	39.8	kWh/m2a	Thermal Cooling Energy
8.5	13.3	kWh/m2a	Electric Cooling Energy (COP: 3,0)
34.1	53.0	THB/m2a	Energy price per wall area
19.0		THB/m2a	savings
	331	THB/m2	Investment for 60mm insulation
	17.5	a	payback for 60 mm insulation





# POE Light / IoT



# Energy

Design Target  
100kWh/m<sup>2</sup>-yr

Office  
Mall  
Retail  
Hotel  
Condo  
Hospital  
Edu  
Others

ประเภทอาคาร	การใช้พลังงานภายใต้แต่ละระดับความสามารถในการอนุรักษ์พลังงาน (kWh/m <sup>2</sup> -y)				
	Reference	BEC	HEPS	Econ	ZEB
อาคารสำนักงาน	219	171	141	82	57
อาคารห้างสรรพสินค้า	308	231	194	146	112
อาคารธุรกิจค้าปลีกและส่ง	370	298	266	161	126
โรงแรม	271	199	160	116	97
คอนโดมิเนียม	256	211	198	132	95
สถานพยาบาล	244	195	168	115	81
สถานศึกษา	102	85	72	58	39
อาคารทั่วไป	182	134	110	66	53

อ้างอิง : กระทรวงพลังงาน Ref: Ministry of Energy

หมายเหตุ : BEC = Building Energy Code

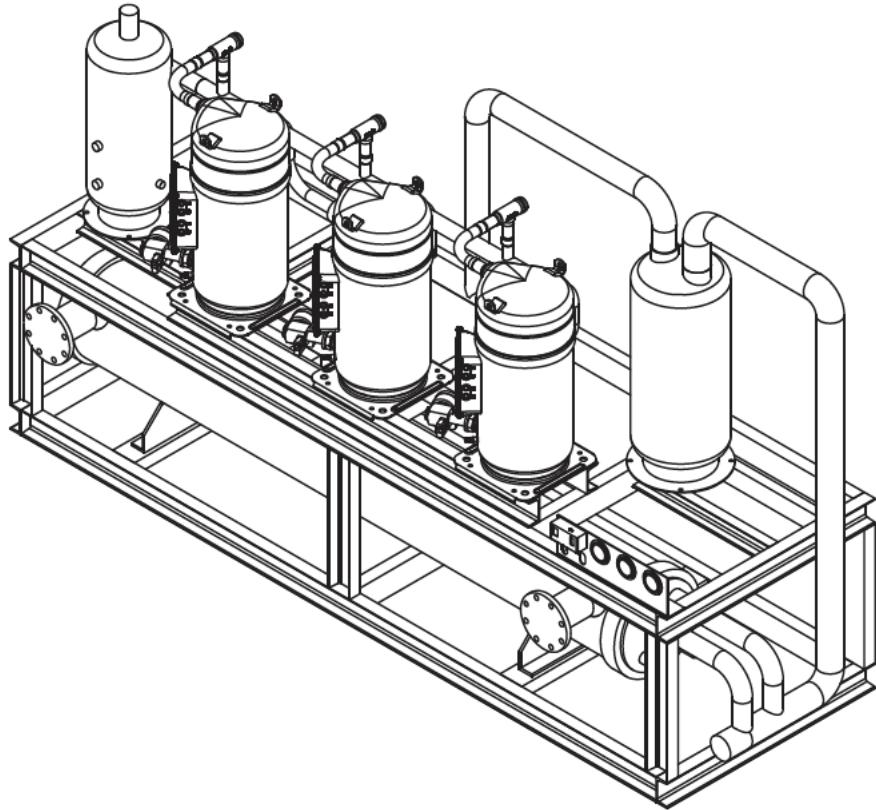
HEPS = High Energy Performance Standard

ECON = Economic Building

ZEB = Zero Energy Building



# Chiller



## Chiller Rack Scroll Compressor

	Description	Remark
Compressor Brand	BITZER	
Compressor Type	Scroll (Hermetic)	
Compressor Model	GSD80485VA	
Number of Compressor per Rack	3	
Evaporating Temp. (SST)	2 °C	
Condensing Temp. (SDT)	40 °C	
Total Cooling Capacity,	109.5 x 3 = 328.5 kW	
Refrigerant	R410A	Not Include
Power Supply	400V , 3 phase, 50 Hz	
Displacement (2900 rpm,50Hz)	77.2 m <sup>3</sup> /h	Per Unit
Displacement (3500 rpm,60Hz)	93.2 m <sup>3</sup> /h	Per Unit
Motor Voltage	380-420V , Y, 3 phase, 50Hz	
Max. Operating Current	81.0 Amp	Per Unit
Starting Current (Rotor Locked)	298 Amp	Per Unit
Max. Power Input	49 kW	Per Unit
Oil Charge	5.3 Litter	Per Unit
Motor Protection	SE-B3	Per Unit
Oil Heater	140 W	Per Unit
Refrigerant Out (Discharge Connection)	2. 1/8"	
Refrigerant In (Liquid Connection)	1. 5/8"	
Operating Condition		
- Power Input	26.0 x 3 = 78 kW	
- Current (400V)	43.5 x 3 = 130.5 kW	
Weight	1,350 kg	(Approximately)
Dimension (W x L x H)	1005 x 3138 x 1791 mm	(Approximately)
Water Inlet (Pipe Size)	4 Inch.	Flange
Water Outlet (Pipe Size)	4 Inch.	Flange

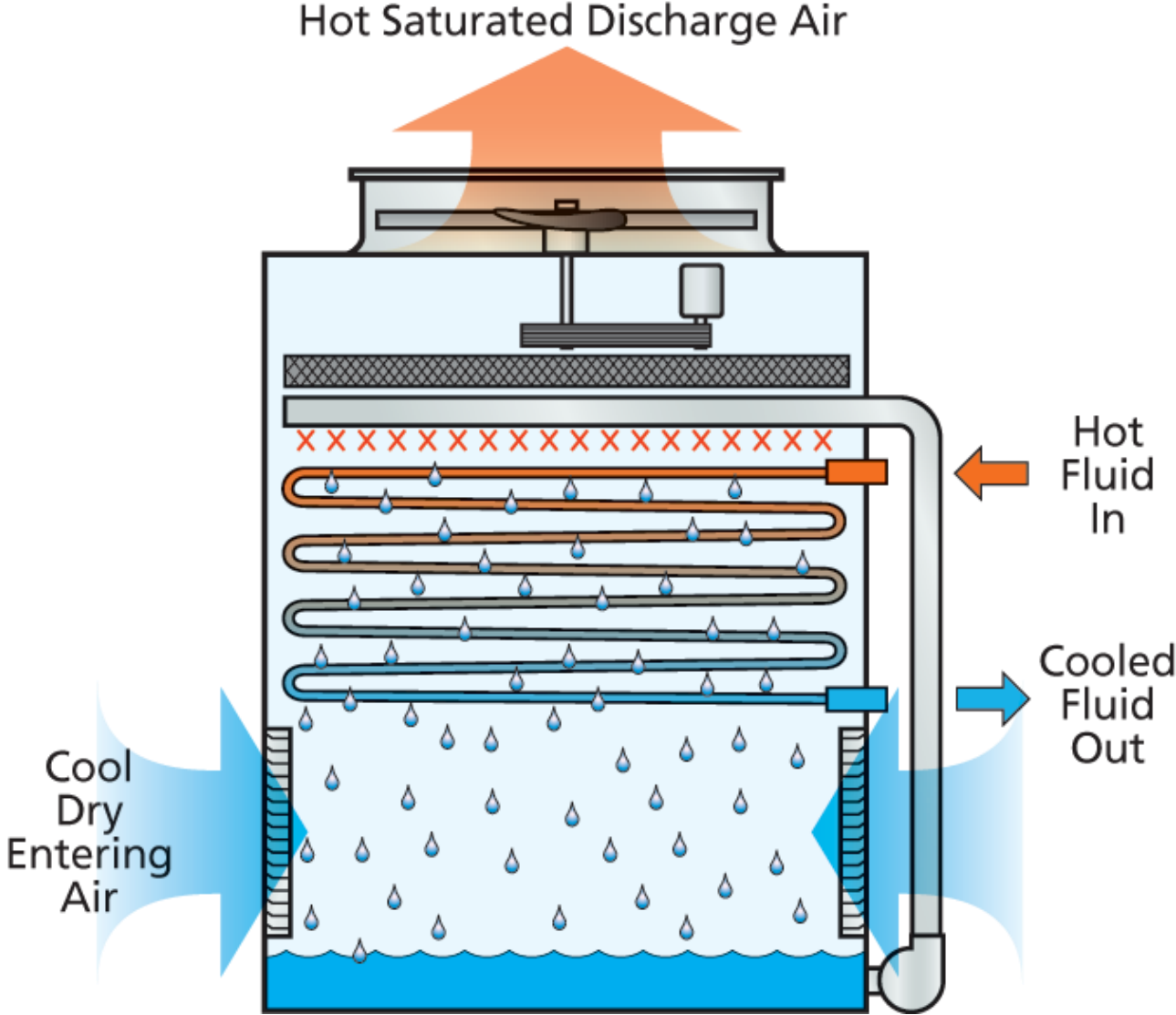
**EER 4.52  $W_{rt}/W_e$**



# Evaporative Condenser



4-5C Lower than Ambient  
=  
10-15% More Efficiency

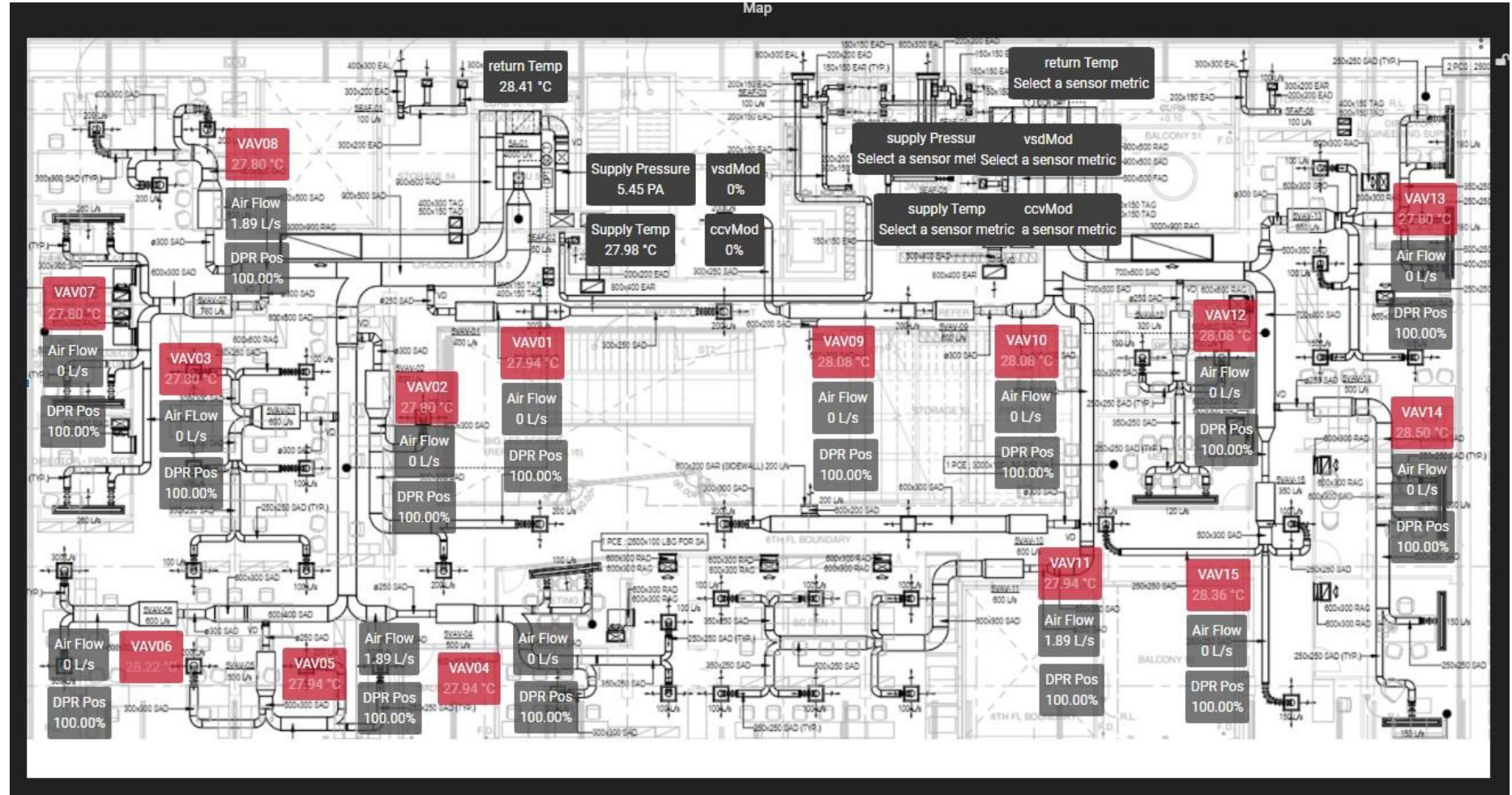


# Big Fan – Town Hall

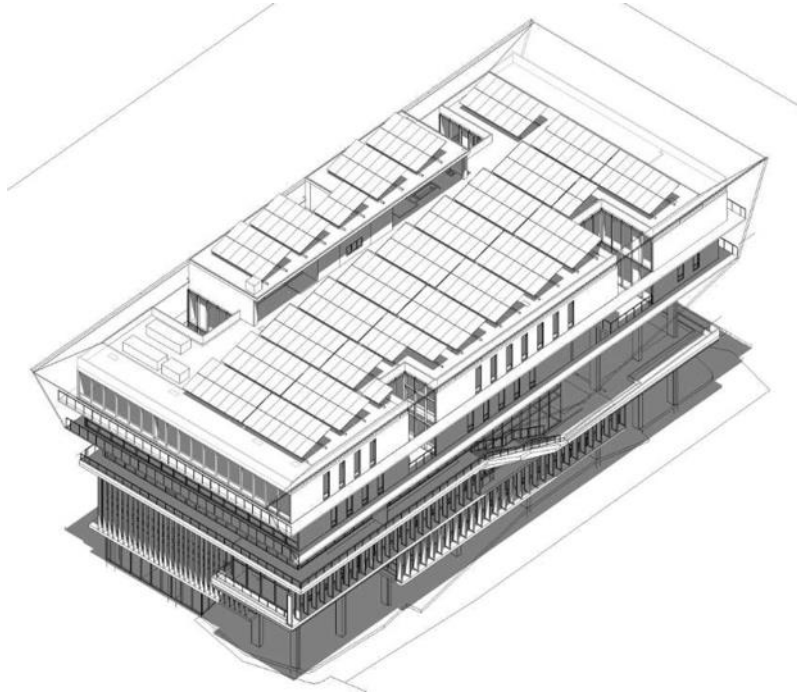
- Increase air circulation
- Greatly reduce AHU feed



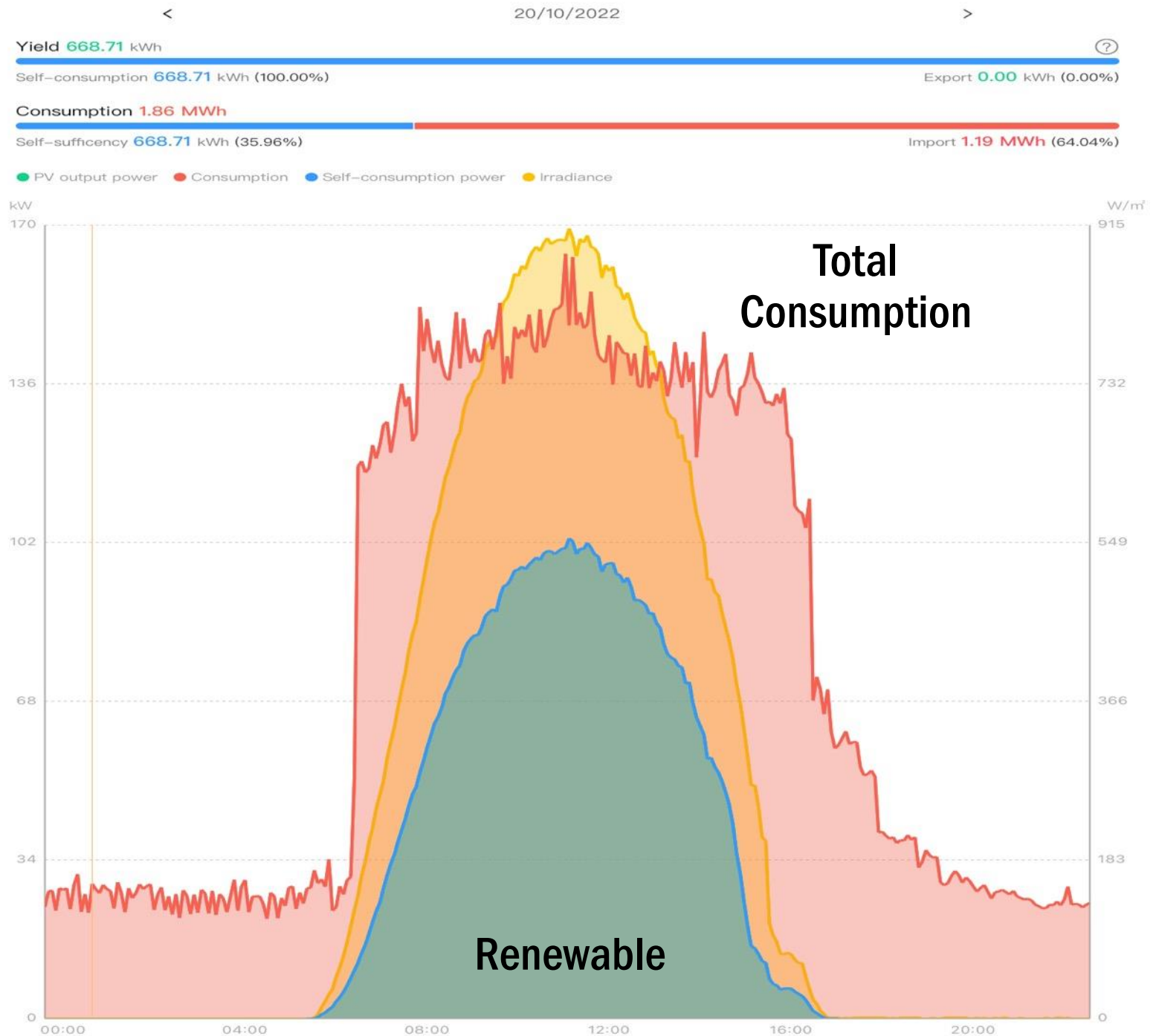
# BMS - Siemens



# Renewable Energy



- 130kW Solar Roof
- Well insulated roof and sides

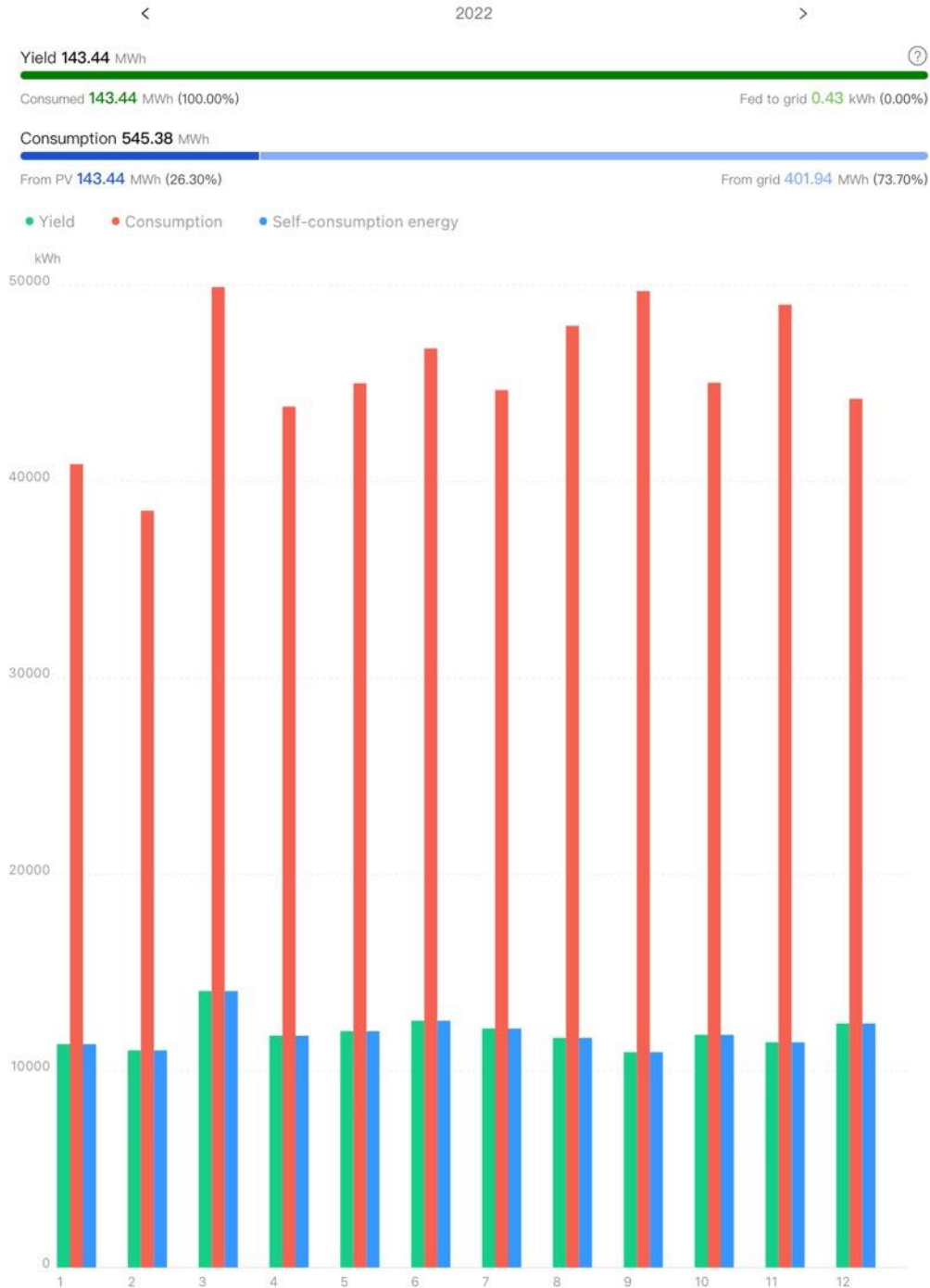


# Energy Consumption



Grid Consumption  
73%

Renewable  
27%



# 2022

61kWh/m<sup>2</sup>-yr

Design Target  
100kWh/m<sup>2</sup>-yr



# 61kWh/m<sup>2</sup>-y

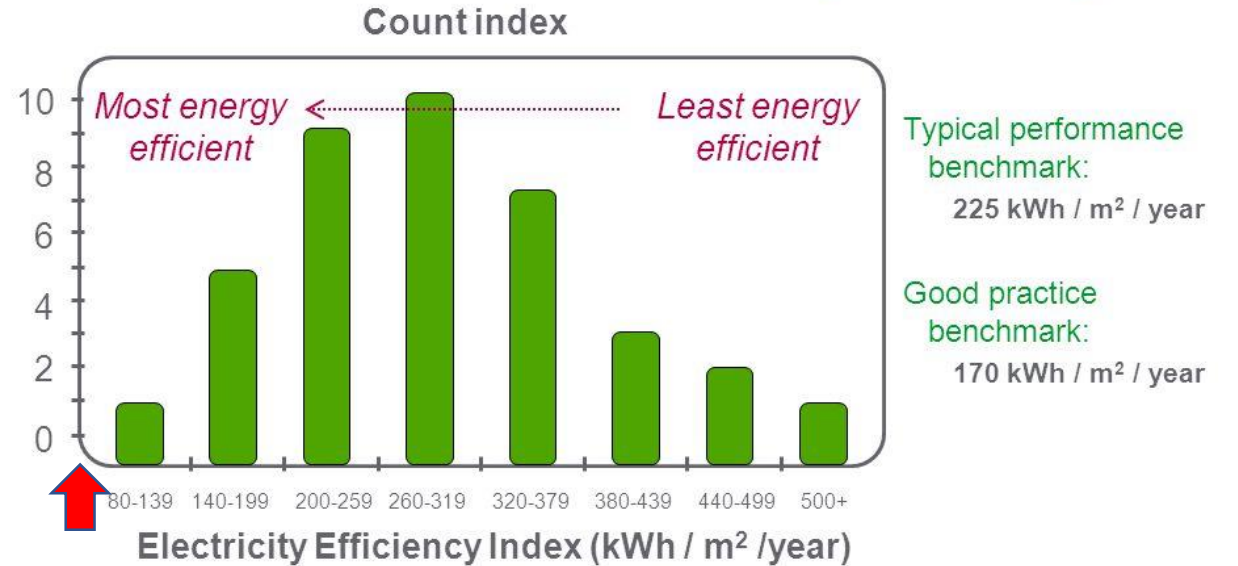
Office  
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Others

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## Benchmark for office buildings in Bangkok



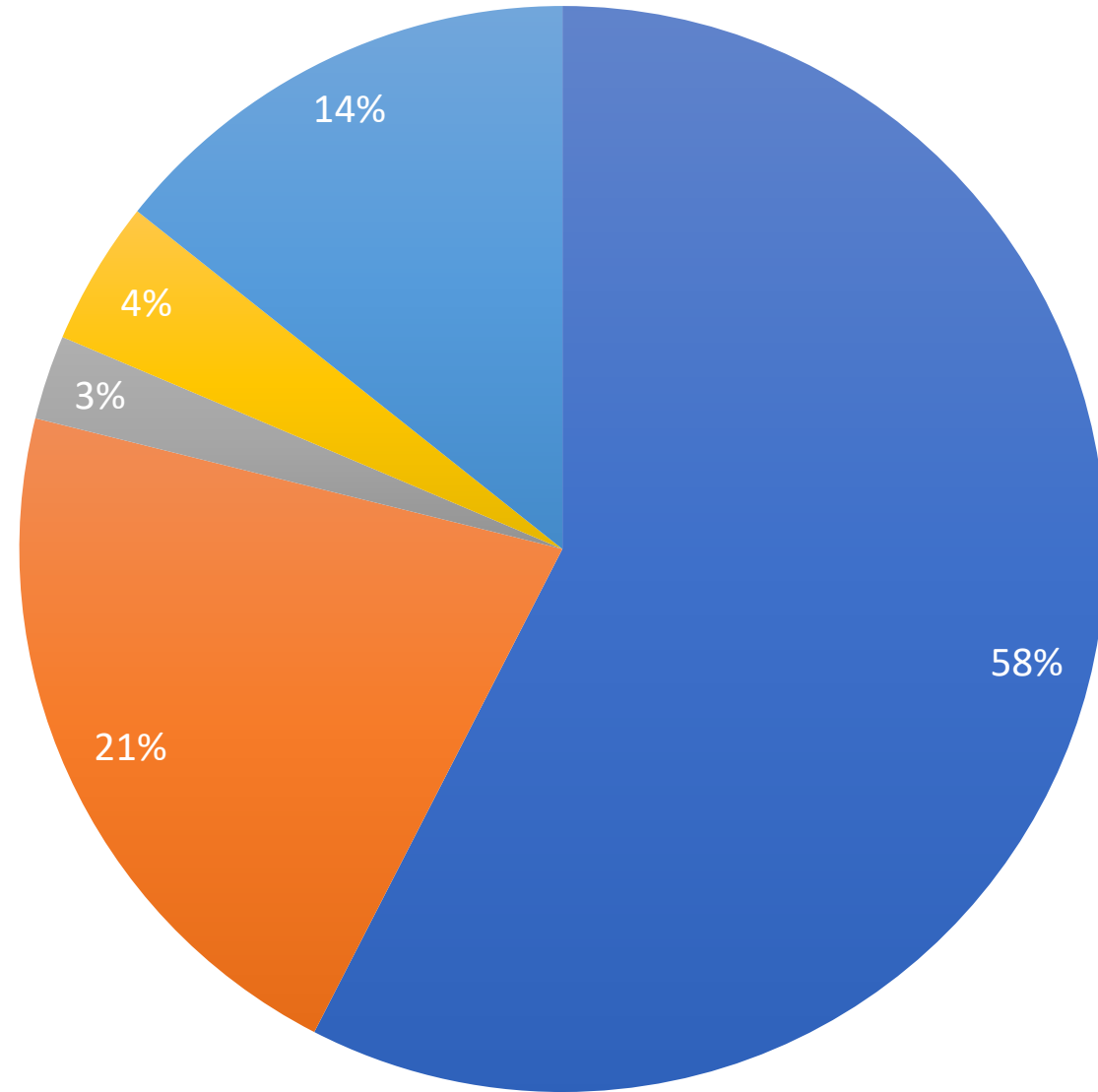
Source: Instructor Kornkamon Tantiwanit, Thammasat University

SchneiderElectric- Thailand-09/2009



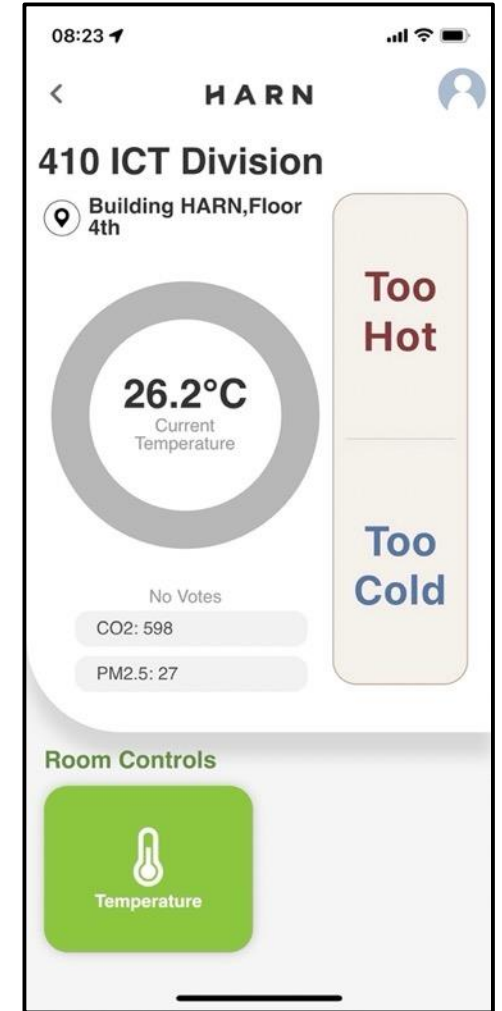
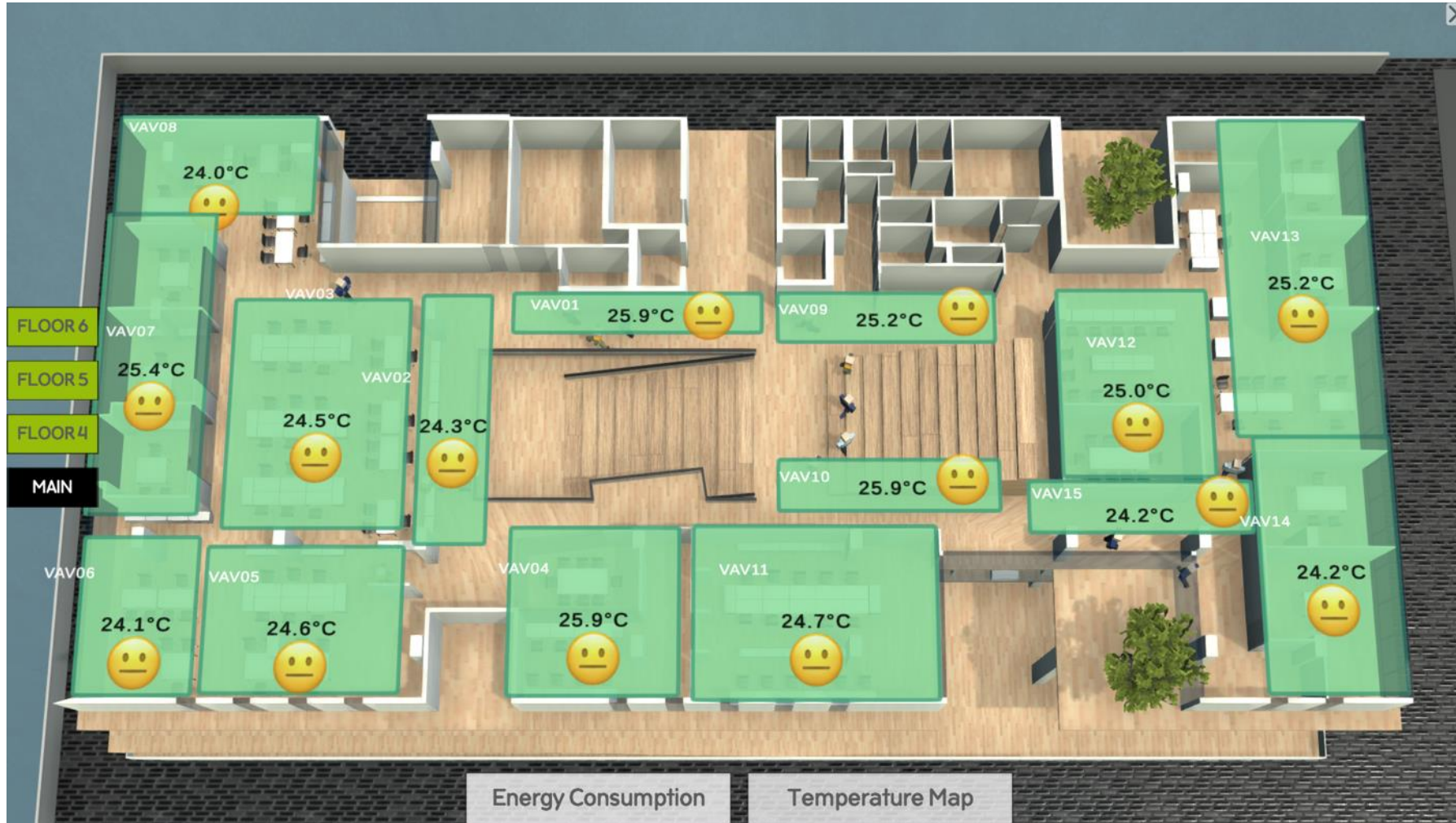


## ENERGY CONSUMPTION BY CATEGORY



■ CHILLER ■ AHU+A/C ■ LIFT ■ LIGHTING ■ OUTLET+IT+COMM+SANITARY

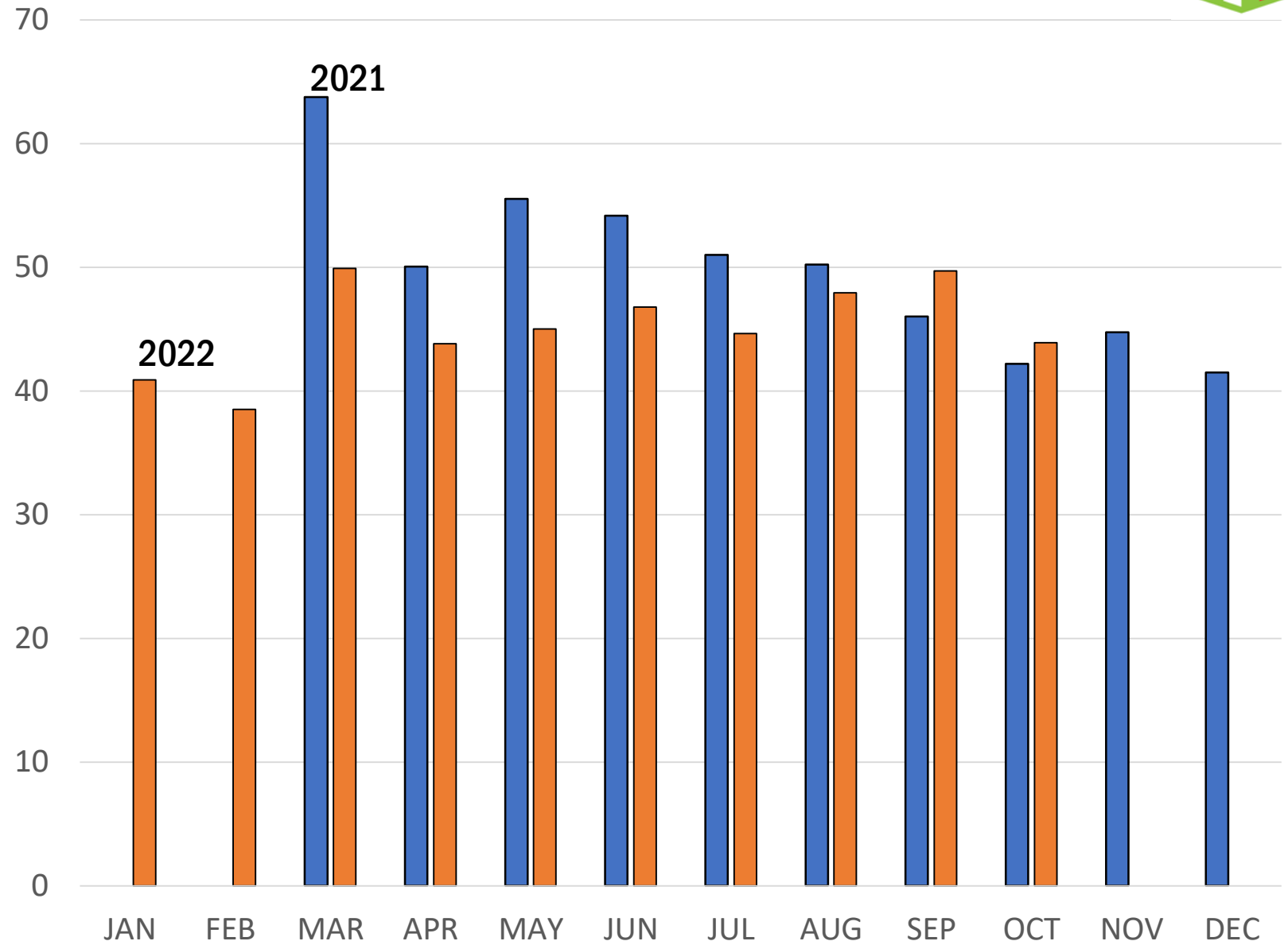
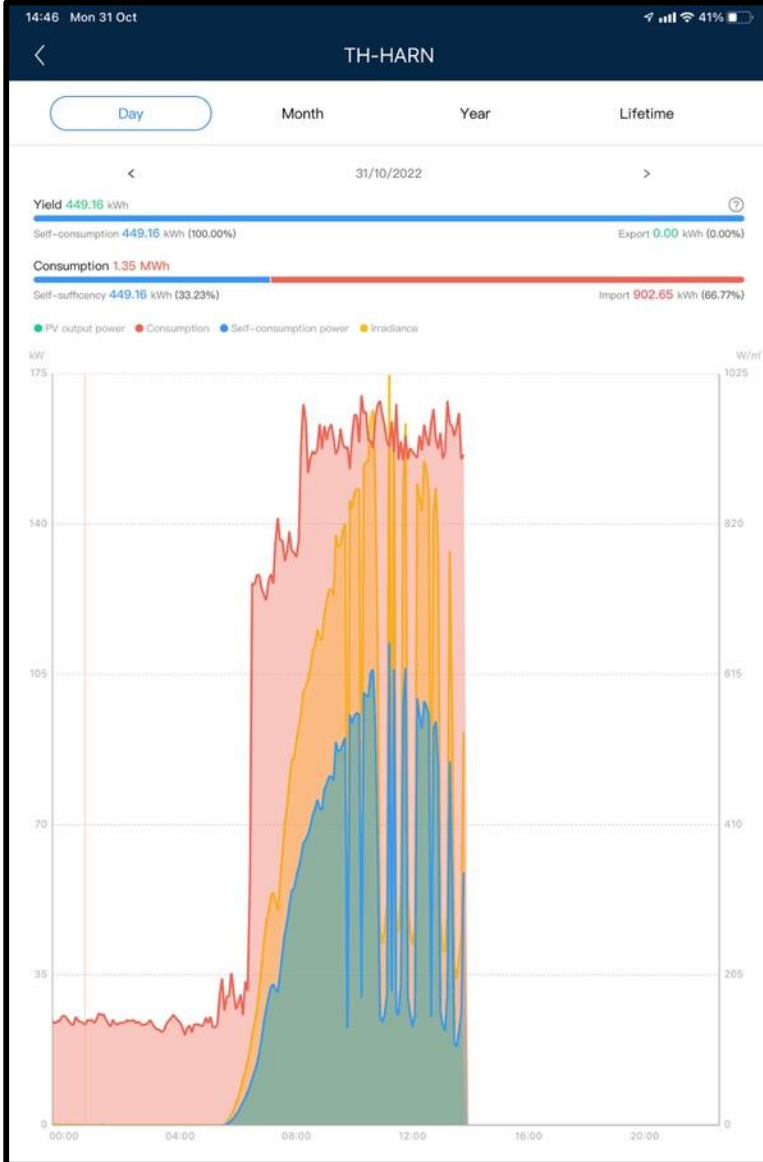
# Energy Conscious Culture



Mobile App



## 2021 VS 2022 TOTAL CONSUMPTION (MWh)



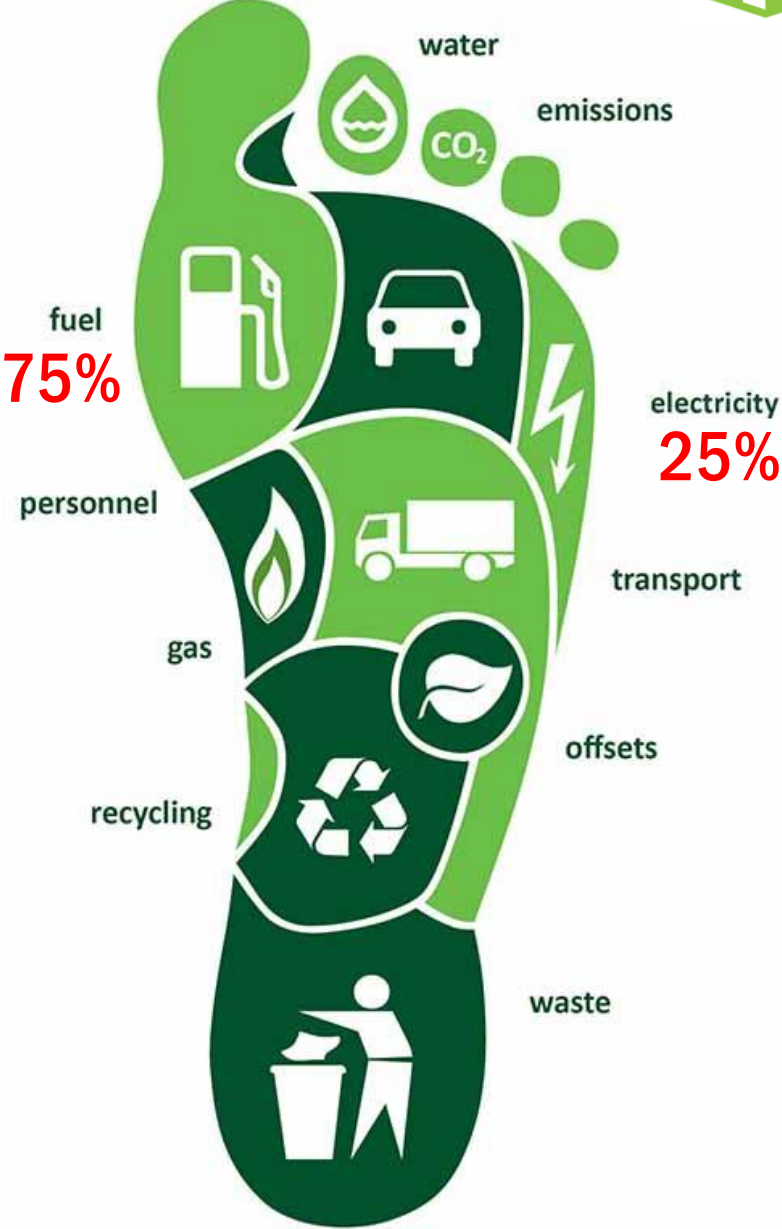


# Future Plan

# CFO

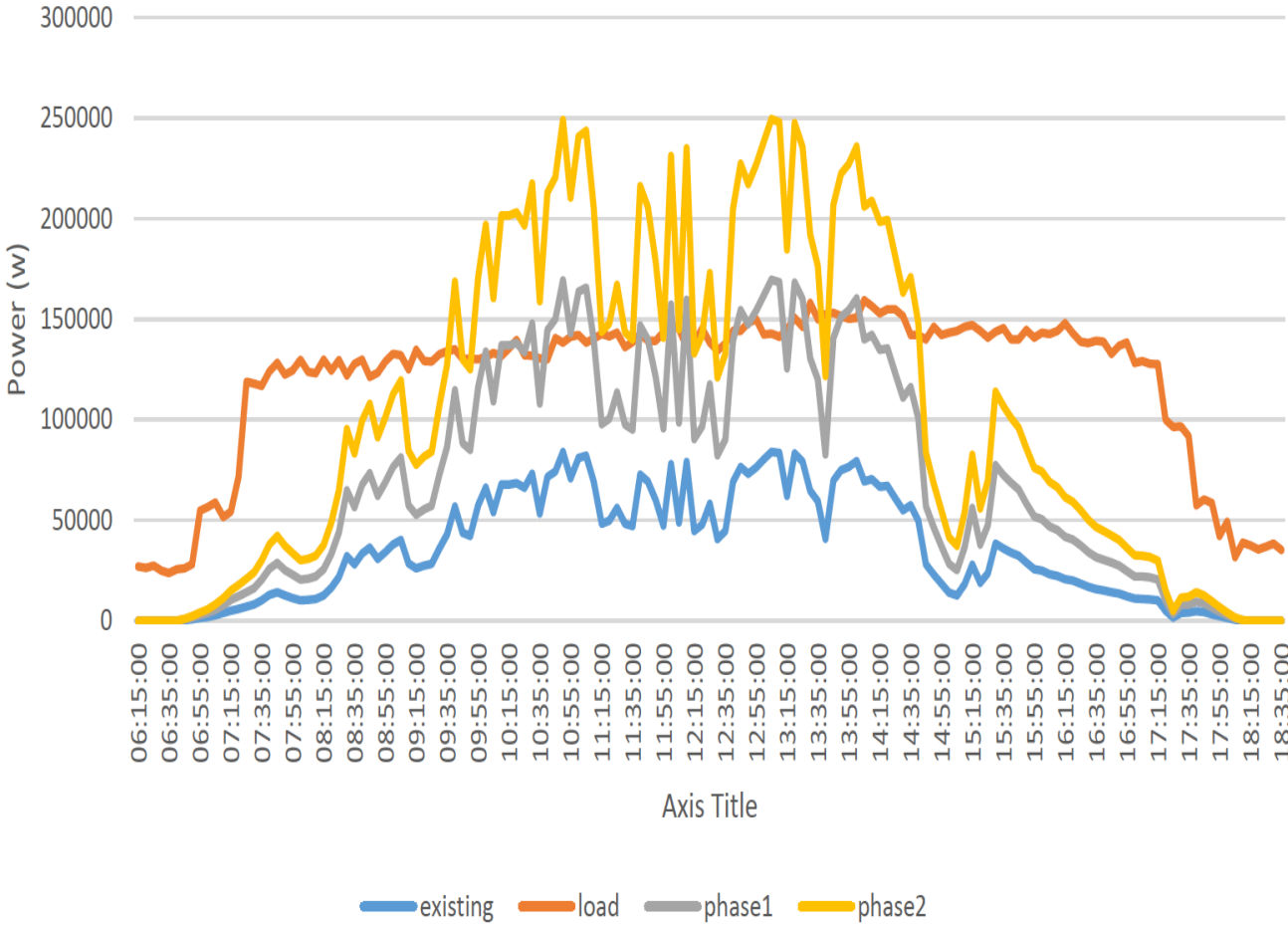


## the carbon footprint



**2022 Carbon Footprint**  
**1,060 TCO2e**

# Solar & BEV

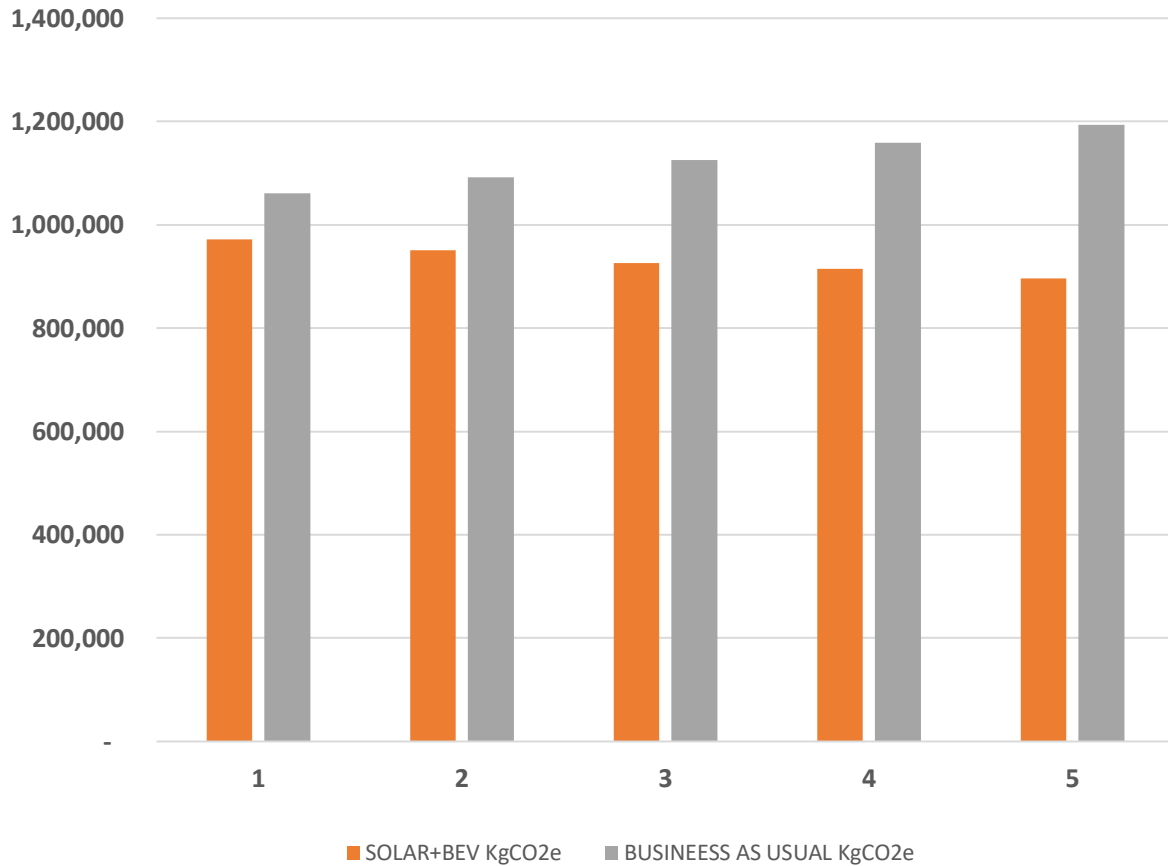


**130 + 170 = 300kW**



# CF & Expense Reduction

## CARBON FOOTPRINT (KgCO2e)



## HARN'S EXPENSES

