
Energy efficient building and energy saving products

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JOINT VENTURE DIVISION

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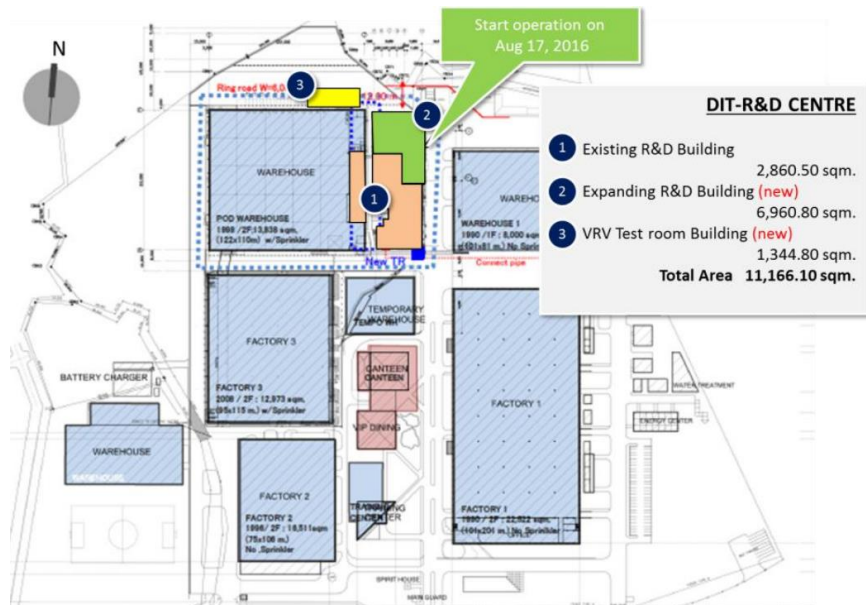
Daikin Industries (Thailand) Ltd. Research & Development Centre



Thai Green Building Institute
TREES-NC; Thai's Rating of Energy and Environmental Sustainability
for New Construction and Major Renovation

Project details

The Research and Development Centre consists of 3 buildings.
No.2 building is assessed on the basis of TREES-NC.

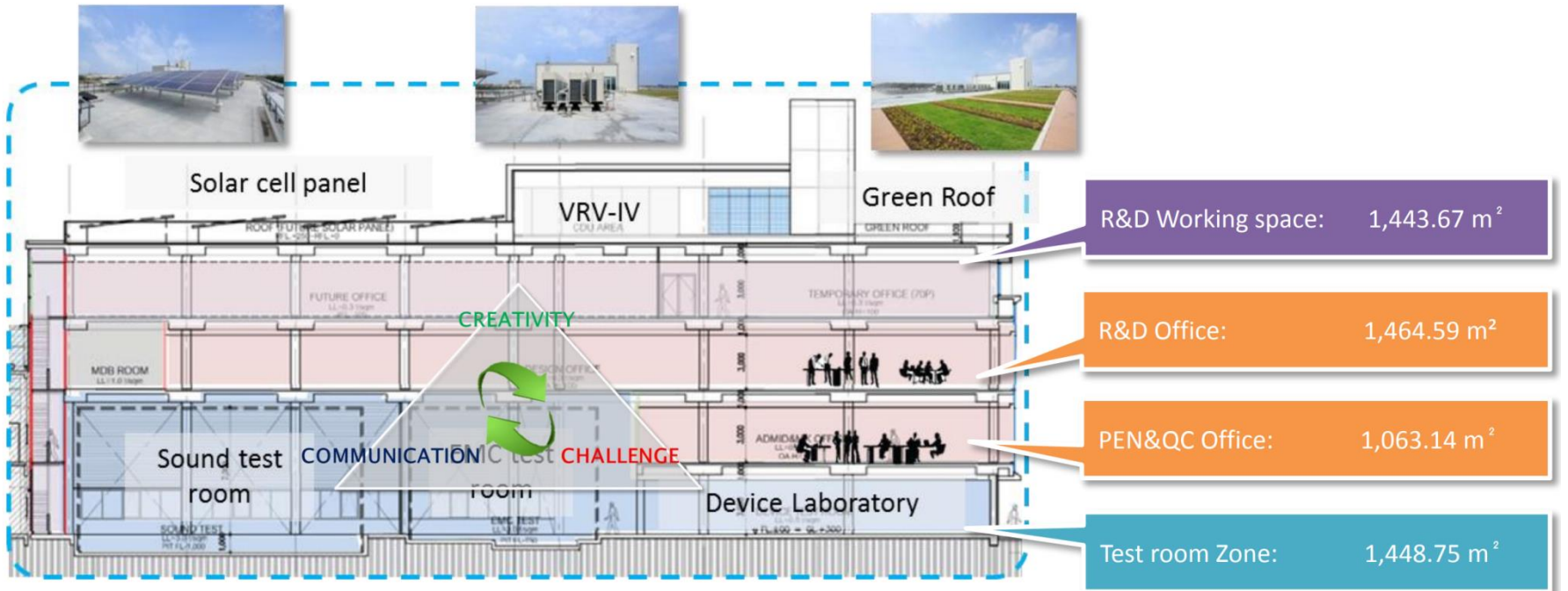
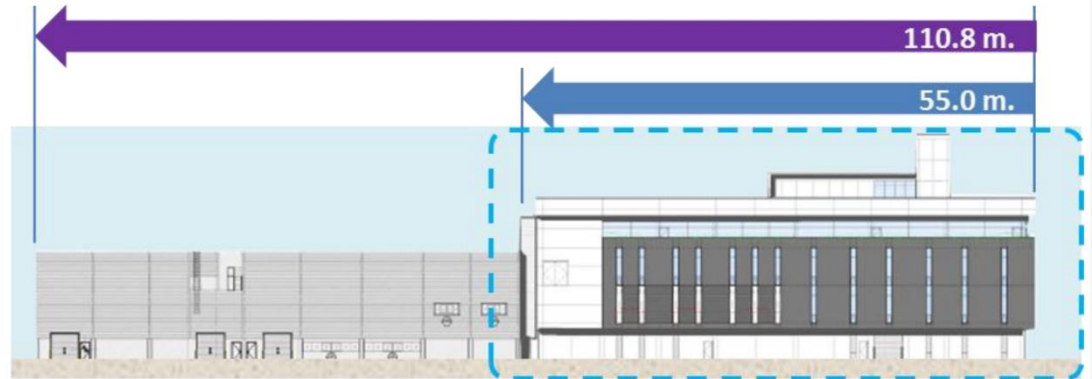
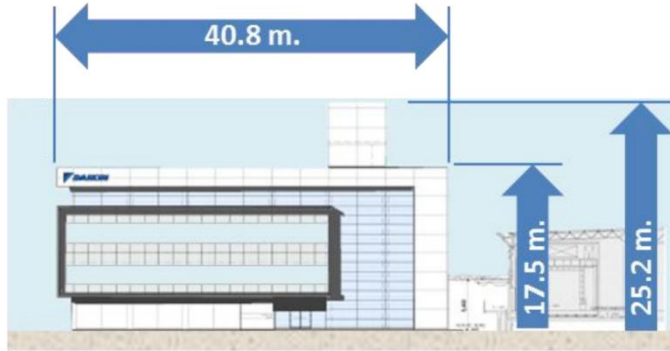


Project Name
Floor Area
Number of Storey

Research and Development Centre
6,960.80 sq.m.
4 Floor

Project details

[H25.2 x W40.8 x D55.0 m.]



Highlights (Green Building criteria)


“Energy efficiency”

It can reduce energy consumption by as much as 43.1% and exceed the highest standard requirement (41%).



Building Envelopes

Selection of material for building envelopes system mainly considers the heat transferred to the building.
 The material should be able to prevent high heat using the fewest glasses and have more insulation.
 For the front of the building that uses lots of glasses, it is usually located on the north which faces the lowest temperature.
 The glass helps to reduce 70% of heat to the building and has low reflection rate to the nearby buildings according to Thailand Green Building Standard (TGBC) (OTTV less than standard building 19% and RTTV less than standard building 19%).



Air Conditioning System

Daikin VRV-IV is used in the building because of the quality of energy saving, low noise operation, less installation space and environmental friendly refrigerant R410a.

43%
saving

Lighting system

1) Natural light for public zone




2) LED type for all lighting



Lighting system

LED bulbs are used in the building which saves 18% of electricity comparing to using the general light bulb. In the central hallway, natural light is used to reduce the use of lighting system during daytime.



Solar Cell

Using Solar Energy For Renewable Power

Solar Rooftop is the second energy source for this building. It is designed as the On Grid system which generates energy along with the main power source. The highest power distribution is 30kW and the highest renewable rate is 15%.

Highlights (Green Building criteria)

“Energy efficiency” Design a building envelop system that reduces the amount of heat entering the building.



Building Envelopes

Selection of material for building envelopes system mainly considers the heat transferred to the building.

The material should be able to prevent high heat using the fewest glass and have more insulation.

For the front of the building that uses lots of glasses, it is usually located on the north which faces the lowest heat.

The glass helps to reduce 70% of heat to the building and has low reflection rate to the nearby buildings according to TREES (OTTV less than standard building 19% and RTTV less than standard building 45%)

Highlights (Green Building criteria)

“Energy efficiency” Use natural light in the hallway area. Use high performance (LED) bulbs for all area of the building.

Lighting system

1) Natural light for public zone



2) LED type for all lighting

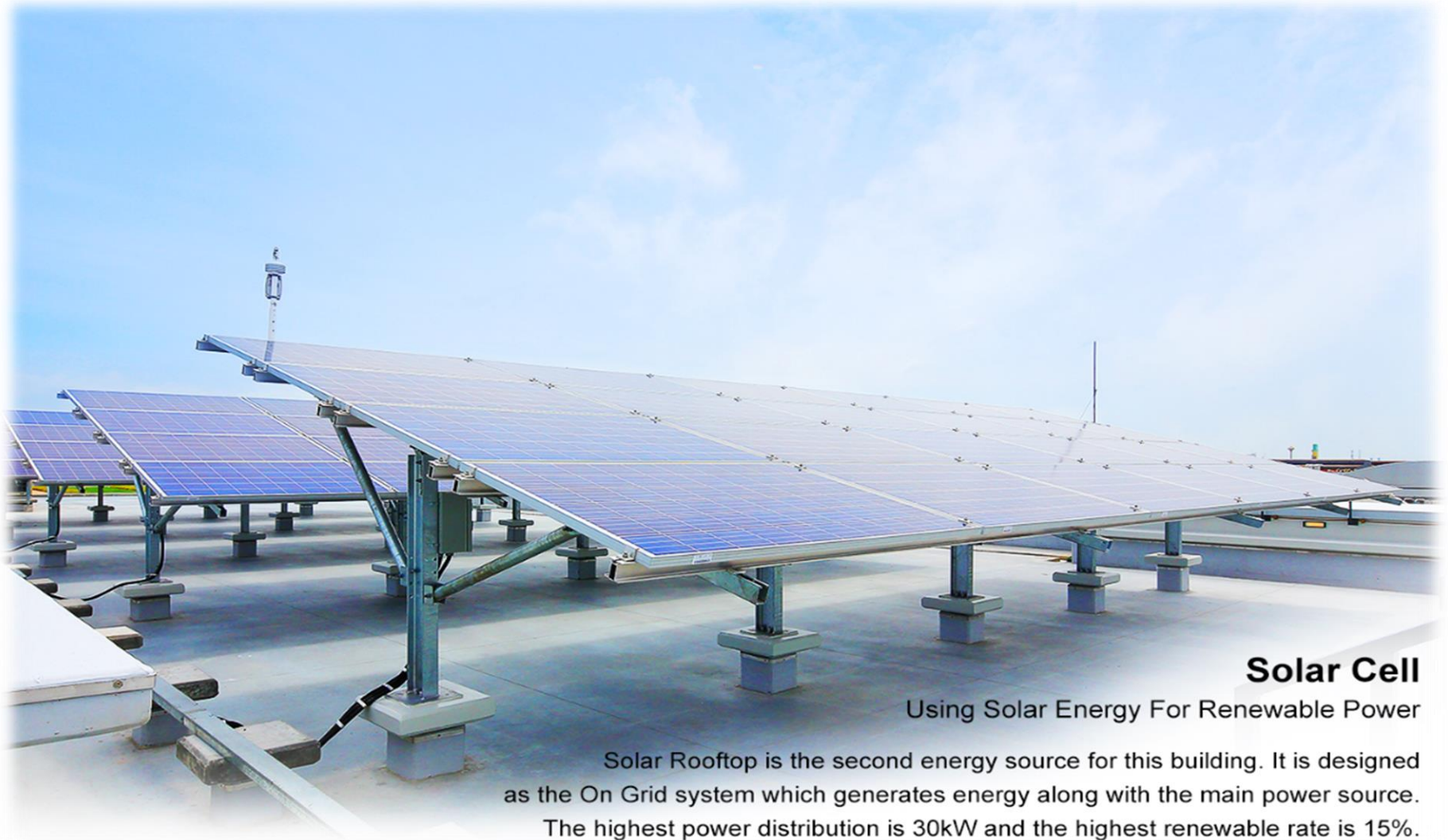


Lighting system

LED bulbs are used in the building which saves 18% of electricity comparing to using the general light bulb. In the central hallway, natural light is used to reduce the use of lighting system during daytime.

Highlights (Green Building criteria)

“Energy efficiency” Install a renewable energy system from solar cell (30kW).



Solar Cell

Using Solar Energy For Renewable Power

Solar Rooftop is the second energy source for this building. It is designed as the On Grid system which generates energy along with the main power source. The highest power distribution is 30kW and the highest renewable rate is 15%.

Highlights (Green Building criteria)

“Energy efficiency” Use High efficiency of air conditioning system.



Air Conditioning System

Daikin VRV-IV is used in the building because of the quality of energy saving, low noise operation, less installation space and environmental friendly refrigerant R410a.

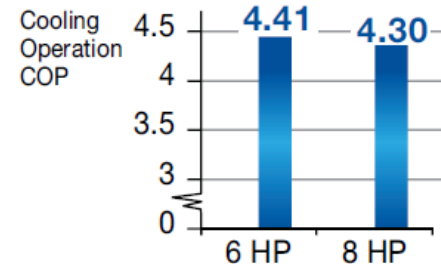
Highlights (Green Building criteria)

“Energy efficiency” Use High efficiency of air conditioning system.

Air Conditioning system



Higher Coefficient of Performance (COP)



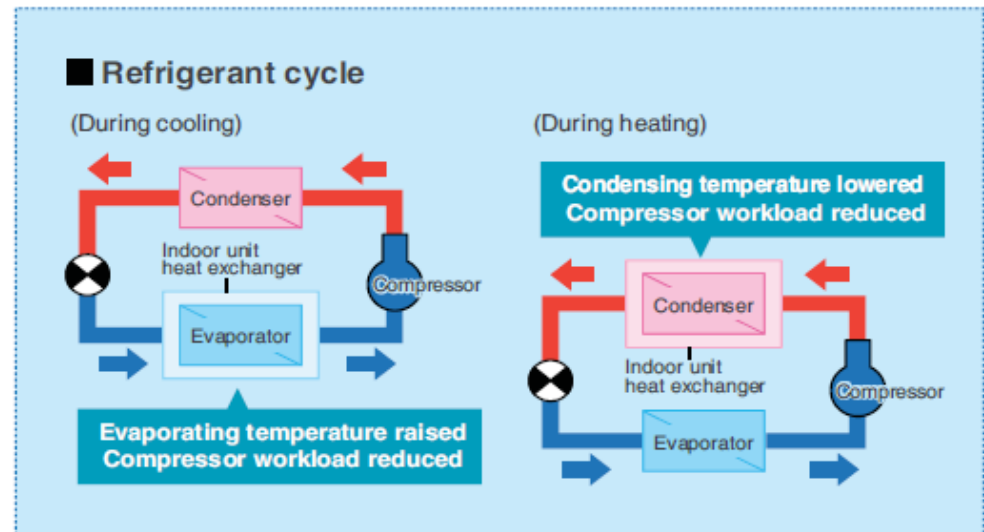
Reference building COP = 3.22

Customise your VRV system for optimal annual efficiency

The new **VRV IV** system now features VRT technology. VRT automatically adjusts refrigerant temperature to individual building and climate requirement, thus further improving annual energy efficiency and maintaining comfort. With this excellent technology, running costs are reduced.

How is energy reduced?

During cooling, the refrigerant evaporating temperature (T_e) is raised to minimise the difference with the condensing temperature. During heating, the condensing temperature (T_c) is lowered to minimise the difference to the evaporating temperature. Compressors work less, and this reduces power consumption.

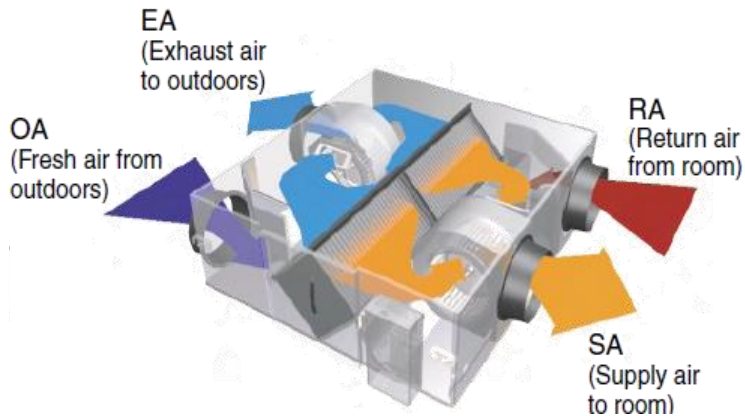


Highlights (Green Building criteria)

“Energy efficiency” Reduce the workload of air conditioning through the HRV

Ventilation system

HEAT RECLAIM VENTILATOR — VAM SERIES



Total heat exchange ventilation

This unit recovers heat energy lost through ventilation and curbs room temperature changes caused by ventilation, thereby conserving energy and reducing the load on the air conditioning system.

Enthalpy efficiency drastically improved by employing thin film element! (VAM-GJ model)

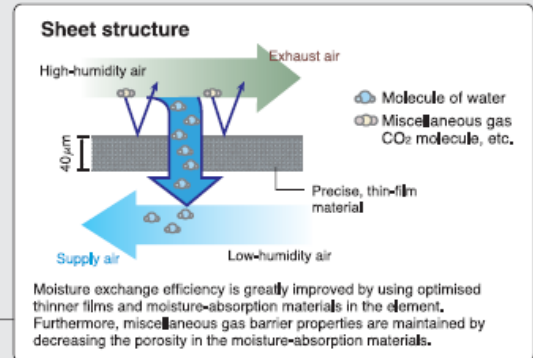
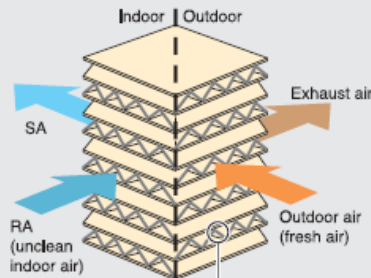
Due to the thinner film...

- Decreases the moisture resistance of the partition sheets drastically.
- Realises more space for extra layers in the element, resulting in increased effective area that supply and exhaust air can be exposed to.

Moisture absorption increased by approx. 10%!

23%

Thickness of the partition sheet
40 μm



Highlights (Green Building criteria)

“Verification to confirm energy saving” There is a powerful monitoring system and Excellent Energy management system.

Energy Monitoring

Monthly Energy Usage: 9,407 kWh (100%), 12.65% (12.65%), 4.65% (4.65%), 7.33kWh (7.33%), 3.24kWh (3.24%), 5.51kWh (5.51%), 4.13kWh (4.13%), 8.5kWh (8.5kWh), 9.5kWh (9.5kWh), 16kWh (16kWh), 9.5kWh (9.5kWh), 16kWh (16kWh), 9.5kWh (9.5kWh), 16kWh (16kWh)

4th Floor

Air Conditioner Status

Off : 10 Units On : 29 Units

Status	Image	Temp	Set Temp	Fan Step
FCU-40101		24.4	25.0	H
FCU-40102		24.8	25.0	L
FCU-40103		27.2	25.0	H
FCU-40104		24.9	25.0	M
		29.5	25.0	

Owner Developed

Central Control

Remote Access

ITM Connection, LAN, INTERNET, Computer, Mobile phone

Daikin Solution

Intelligent Touch Manager (ITM) (4020P-29 units), Automatic Control, I/O SYSTEM, Lighting, Sensor

SVM

ITM Plan Display

SERVER

COMPUTER FOR MONITORING SYSTEM (MS), Display Monitor, LAN, S485, Air Cond. Controlling System, Lighting System, Ventilation System, Reception, SOLAR ROOFTOP System

Building Energy Management System

For the highest efficient of energy management , this building installs building energy management system. It controls the operation of main equipment such as air-conditioner, airflow system and lighting system. All these equipment are controlled and handled by Daikin product (Intelligent Touch Manager) and Monitoring software is installed to monitor and verify the result of energy saving as designed.

Scoring

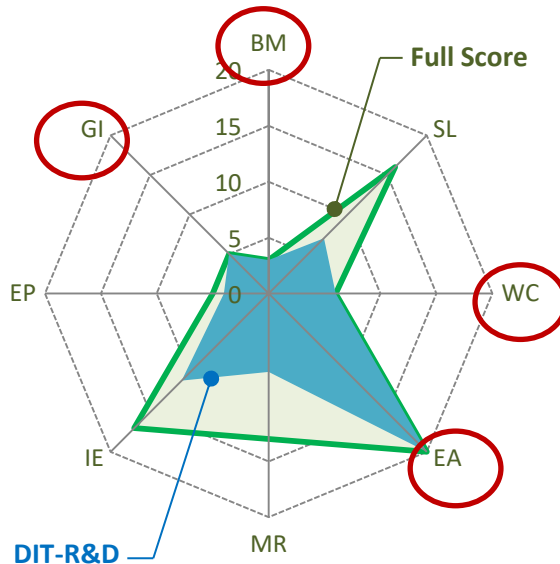
TREES-NC There are 8 criteria for assessment. The scores are very different depending on the importance of each criterion. And the total score is 85 points.

Evaluation on each topic scored are two types, one is Prerequisite topic and another one is Topics are measured at the score level which must meet all the Prerequisite topic then able to assess the score. The score level will be the award level, divided into 4 levels; Platinum, Gold, Silver and Certified At Platinum level is the highest level.

< Award Level >



< Platinum award >



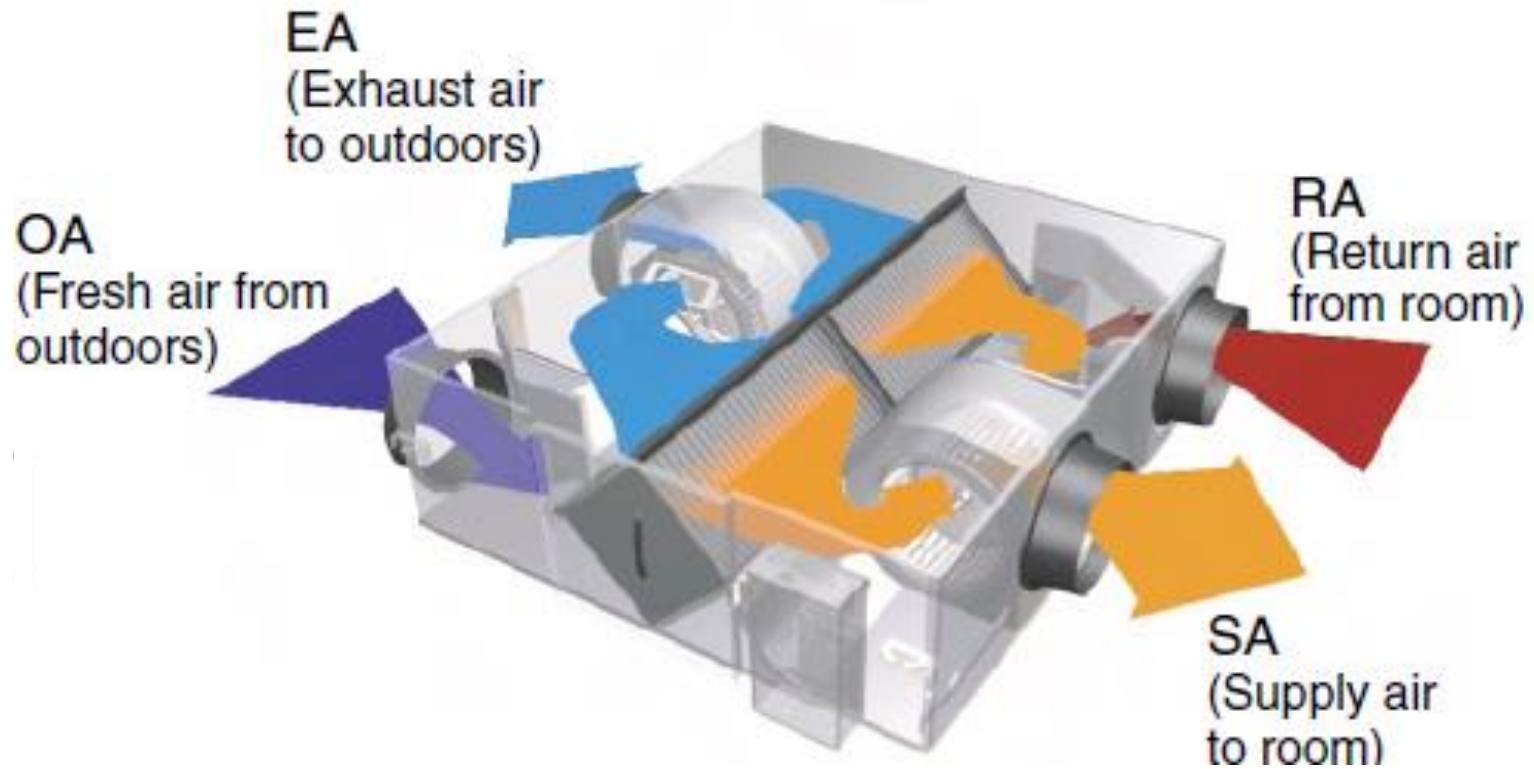
< Evaluation Criteria >

Items	Full Score	R&D Centre
BM (Building Management)	3	3
SL (Site and Landscape)	16	7
WC (Water Conservation)	6	6
EA (Energy and Atmosphere)	20	20
MR (Materials and Resources)	13	7
IE (Indoor Environmental Quality)	17	11
EP (Environmental Protection)	5	4
GI (Green Innovation)	5	5
Total	85	63

This project can get full score in 4 criteria. The rating score is 63, which is rated at Platinum level.

Energy saving product

VAM series

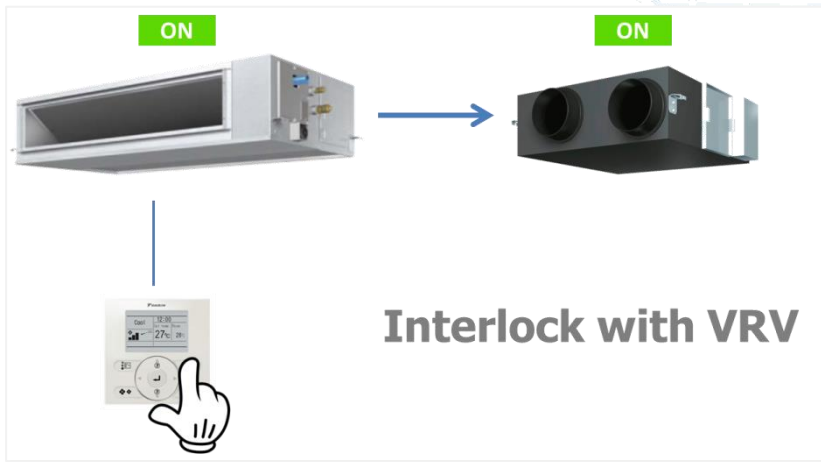
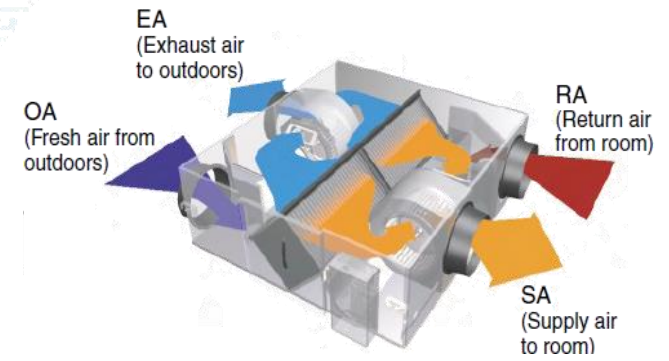
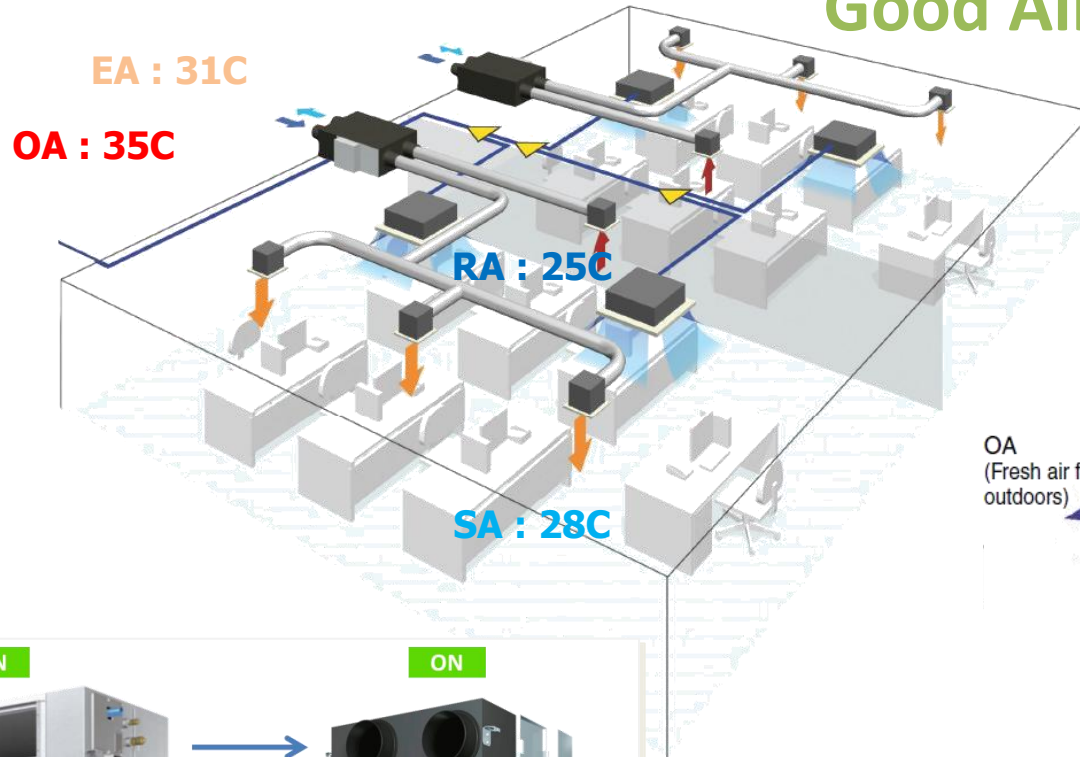


Heat exchange ventilation

- Recover heat energy lost through ventilation and curbs room temperature changes caused by ventilation, thereby conserving energy and reducing the load on the air conditioning system

Energy saving product

Good Air Indoor Quality



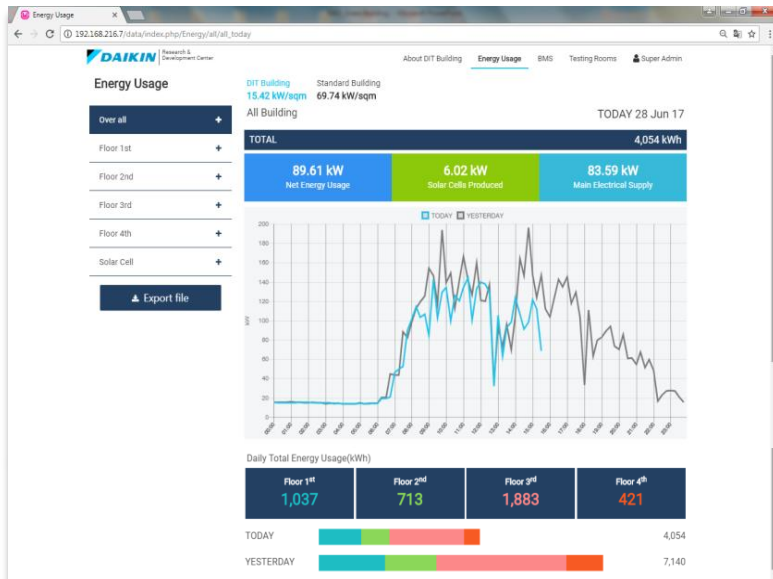
The Daikin HRV (Heat Reclaim Ventilation) unit recovers heat energy lost through ventilation and maintains a comfortable and clean indoor environment.

VAM : 150 CMH – 2,000 CMH

Remote monitoring system

“Verification to confirm energy saving” There is a powerful monitoring system and Excellent Energy management system.

Monitoring system via the Internet



<Grouping by Load>



Lighting



Receptacle



Air conditioning



Ventilation

<Status of Air Conditioning and Lighting>

Floor 3rd | CO₂ 636.67 ppm



Remote monitoring system

Airnet maintenance is about a network contract of equipment. **Remote Monitoring** of VRV system 24 hours. Provides “Prompt response” for emergency, “Prediction” of breakdown and “Energy management”.

ADVANTAGES



24/7
Remote
monitoring



For
emergencies
PROMPT RESPONSE



Preventing
Breakdowns
Long Product Life



Energy
Management
Savings

[FAULT MANAGEMENT (WEB / APP)]



[ENERGY MANAGEMENT]



Thank you