



A COST EFFECTIVE, ENERGY EFFICIENT SOLUTION FOR THE HEAT OF THE TROPICS

Graha Kencana Building in Jakarta, Indonesia

With a hot and humid tropical climate, cooling is one of Indonesia’s largest energy demands. On average, 50% to 60% of a commercial building’s electricity expenditure is used for air conditioning.¹

“Since we installed the Hitachi Variable Refrigerant Flow system, the building’s annual electricity costs decreased by 20% to 30%. It was a smart investment!”

The Graha Kencana office tower is a great example of the move towards greener buildings. By replacing its outdated air conditioning with Hitachi’s SET FREE Variable Refrigerant Flow system, the Graha Kencana tower has made significant energy savings, and has benefited from numerous other positive effects.



Gustaf Stevanus Rotinsulu
Graha Kencana Building Owner

Solution & Application



VRF



OFFICE

Key outcomes

- ✓ **Maximized Cost Efficiency** — VRF has enabled substantial savings on cost by reducing energy consumption and the frequency of maintenance. Easy centralized control from the building manager's office creates more opportunities for energy-saving optimization.
- ✓ **Environmental Performance** — Graha Kencana is more environmentally-friendly, using less energy to fulfill the same demand for cooling. Additionally, the building is now using R410A instead of R22 refrigerant, thus eliminating ozone-depleting emissions.
- ✓ **Uncompromised Comfort** — Air conditioning is now exceptionally quiet, resulting in higher satisfaction amongst building occupants. A progressive installation ensured minimal disruption to tenants.

Issues to be addressed

With an average annual temperature of 27.6°C², cooling is required throughout the year in the Jakarta area. Previously, the Graha Kencana building was using aging water-cooled packaged units, which required dedicated air handling unit (AHU) rooms on each floor. This system was problematic for a number of reasons:

- Poor energy efficiency, resulting in higher operations costs.
- Constant maintenance, spare parts were difficult to procure, and the water piping needed regular leak repairs and cleaning.
- Reliance on ozone-depleting R22 refrigerant, which has been increasing in price as it is being phased out in accordance with the Montreal Protocol.
- Disruptive noise, as the AHU rooms were on each floor, which disturbed adjacent occupants.

Key stakeholder requirements

The Building Owner — required a reliable and durable system future-proofed to perform over the course of many years. Switching from water-cooled units to a VRF system induced significant non-negligible retrofitting, but the high energy efficiency of Hitachi VRF will allow the Graha Kencana to save on operational and maintenance costs well into the future.

Our solution

A combination of Side-Flow and Top-Flow compact outdoor units from the SET FREE range was selected for optimum performance and efficiency.

Top-Flow outdoor units were installed on the roof of the building, delivering air conditioning to major parts of the building. Side-Flow units were installed on the 2nd floor balcony, which connect to the ground floor indoor units. This flexible combination leverages the building space to optimize the refrigerant piping layout, limiting the need for retrofitting work. For simplified and discreet integration, 46 of the 51 indoor units are ducted concealed types with high static pressure up to 180Pa.

For the Graha Kencana building, SET FREE system provides:

- **Energy Efficiency** — By modulating the compressor speed (inverter) and refrigerant flow in each outdoor unit, the system can adapt to fluctuations in energy demands (such as in meeting rooms which are busy at certain times of day), minimizing any unnecessary usage.
- **Reliability** — Hitachi's **original Scroll Compressors** are synonymous with superior reliability. As a leading pioneer of Scroll Technology since 1983, our experience and expertise in manufacturing ensures excellent quality and durability.
- **Outdoor Installation** — The use of outdoor units on the roof and balcony eliminated the need for AHU rooms on each floor, freeing up space for other applications. Additionally, the retrofitting work was done progressively over the weekends, minimizing disruption to building occupants during installation.
- **Quiet Indoor Units** — Noisy AHU rooms have been replaced with discreet ducted units, which produce noise levels as low as 42dB(A).

(1) *Smart, efficient and sustainable energy solutions in Indonesia, Key opportunities for Swedish companies and technologies* (June 2017). Team Sweden. <https://www.business-sweden.se/globalassets/energy-sector-business-opportunities-in-indonesia-.pdf>

(2) <https://en.climate-data.org/asia/indonesia/jakarta-special-capital-region/jakarta-714756/>

GENERAL INFORMATION

Customer

Graha Kencana

Location

Kebon Jeruk area, Jakarta province, Indonesia

Project

Retrofitting air conditioning in an entire building

Date of installation

Progressive installation in 2017/2018

SYSTEM DESCRIPTION

Total Cooling Capacity 346HP

Outdoor Units

Top-Flow, Heat Pump type

- Combination: 12HP+14HP+18HP
- Combination: 12HP+8HP



Side-Flow, Cooling-only type

- Single: 6HP



Indoor Units

Ducted High External Static Pressure

16 x RPI-FSNQ

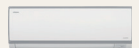


Ducted High External Static Pressure

30 x RPI-FSNQH

Wall Hung

4 x RPK-FNQS



Centralized Controllers

Central Station

PSC-A64S



7-Day Timer

PSC-1AT

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