Carnot Innovations

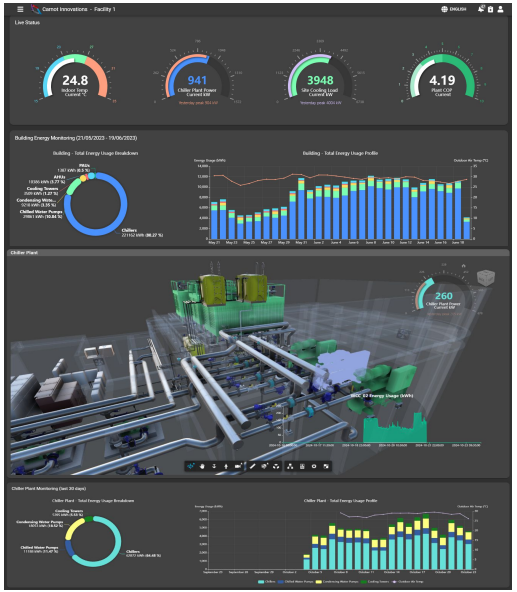
Carnot AI - Predictive Governance for a Smarter Hong Kong

About Carnot AI

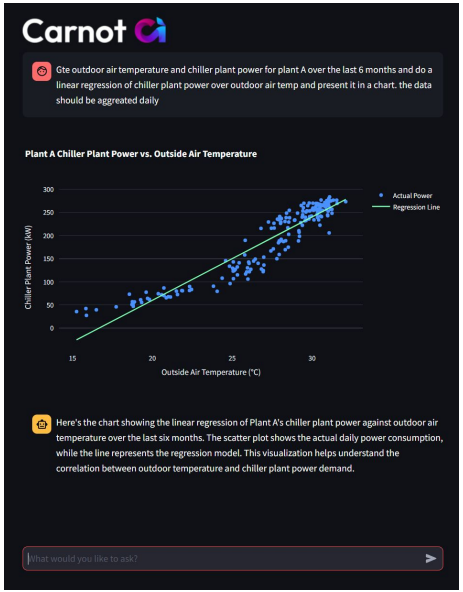
Carnot

The Carnot AI is an advanced and mature artificial intelligence model that seamlessly integrates data analysis, predictive capabilities, fault detection, and a Large Language Model to deliver comprehensive insights into complex systems. While currently widely leveraged for energy-saving initiatives in Hong Kong, its versatility extends to various applications, such as traffic management and Smart Building. The highly customizable dashboard with recommendation provides detailed visual information, enhancing decision-making processes and empowering organizations to respond effectively to dynamic challenges.

Examples:

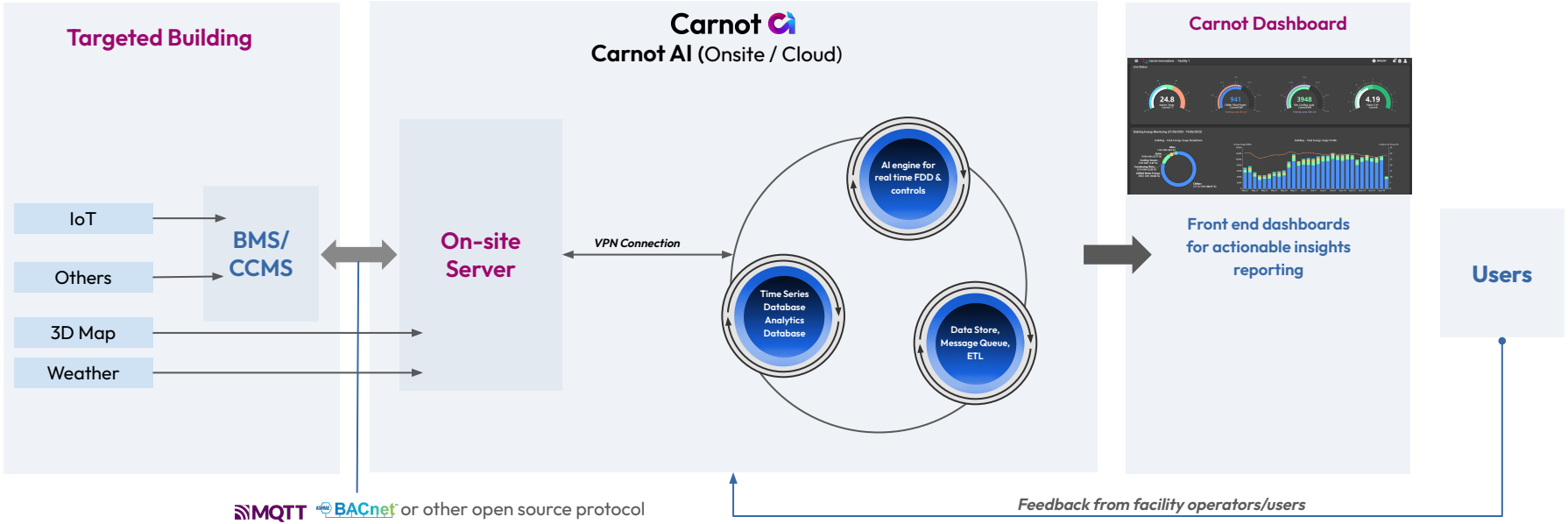


The Carnot 3D Dashboard



The Carnot LLM Model

The IT structure



Connection and Security

An onsite server will be established to seamlessly integrate with the CCMS/ BMS. This setup will facilitate the continuous transmission of both live and historical data to Carnot AI. The AI will analyze this data, predict trends, and generate optimized parameters to fine-tune the operation.

Our solution support Onsite Version for high security consideration or Cloud Version with VPN connection. Meanwhile our application of **ISO 27001** is in progress and is expected to be qualified in 3rd season 2025.

Proposed Usage

The Carnot AI can be used for:

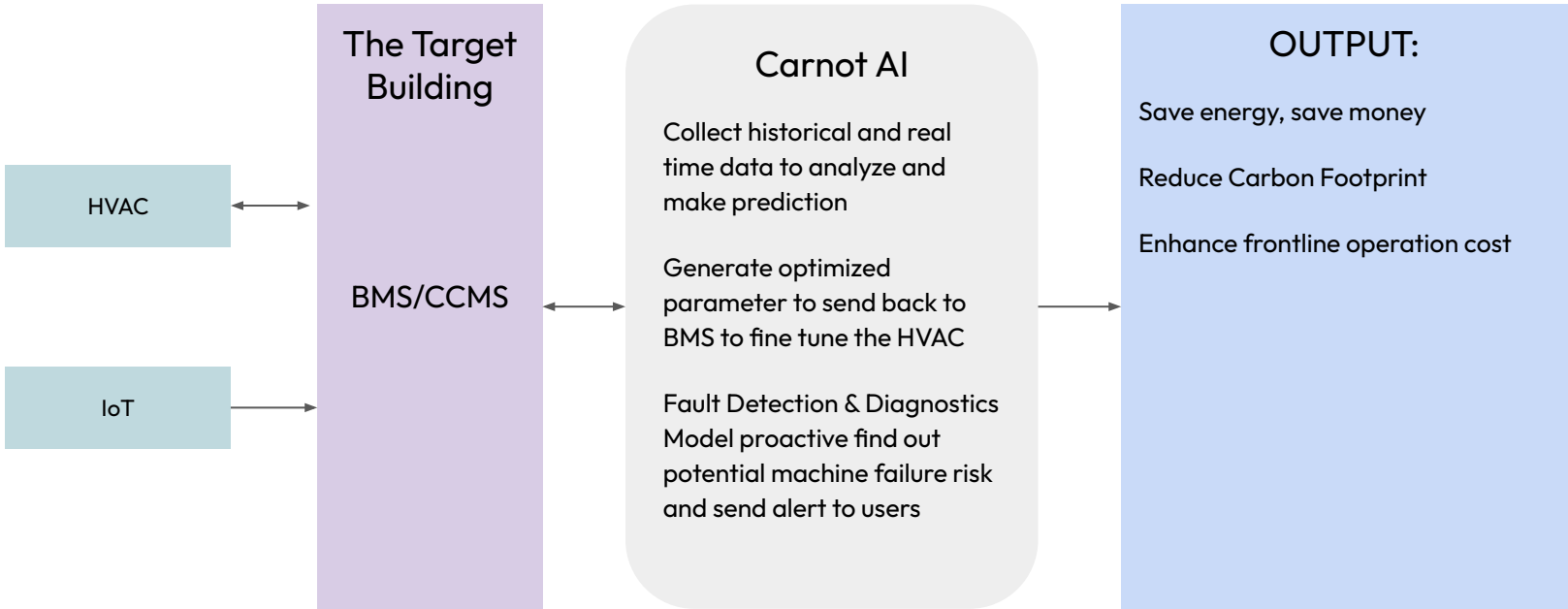
1. Chiller Plant Optimization to save energy

2. Traffic Flow and Infrastructure Management

3. Predictive Maintenance and Energy Consumption Anomaly Detection

1. Chiller Plant Optimization to save energy

1.1 We already have **> 100** completed building energy saving projects in Hong Kong, including airport, MTR station, hospital, university, data centre, commercial building, etc.



1. Chiller Plant Optimization to save energy

Achievement (based on over 100 project results)

Man Power

-50% Maintenance Effort

Carbon Footprint

-20% in Carbon Emission

Energy Consumption

-$400k HKD saved per annum

Awards

Hong Kong ICT Awards 2021 香港資訊及通訊科技獎

green building award 2023 環保建築大獎

PropTech Excellence Awards 2024

GS1 Hong Kong | IoT

IOT DATA HACKATHON 2025

2. AI Traffic Flow and Infrastructure Management

2.1 Real-time Anomaly Detection for Traffic Management

INPUT:

In-road sensors

Traffic cameras with vehicle counting capabilities

Public transport GPS

Carnot AI

Analyzes real-time traffic speed, volume, and occupancy data from sensors.

Instantly detect anomalies that signify an accident, a broken-down vehicle, or the start of unusual congestion.

OUTPUT:

Fast incident response,

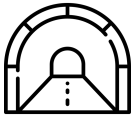
More accurate real-time traffic information for the public,

Proactive rerouting suggestions through government apps.

Enables traffic control centers to act preemptively, reducing the economic and social costs of traffic jams

2. AI Traffic Flow and Infrastructure Management

2.2 Predictive Maintenance for Transport Infrastructure:



INPUT:

Vibration, strain, and temperature data from sensors on bridges, tunnels, and highways

Carnot AI

The AI predict potential structural fatigue or failures weeks or even months in advance

OUTPUT:

Ensures the safety and reliability of critical infrastructure, minimizing disruptions from emergency repairs.

Shifts maintenance from a costly, reactive schedule to a more efficient, predictive model, extending asset lifespan and optimizing maintenance budgets.

3. Predictive Maintenance and Energy Consumption Anomaly Detection

3.1 Predictive Maintenance for Essential Building Services:

INPUT:

Vibration, temperature, and energy consumption data from lifts, escalators, water pumps, and HVAC systems

Carnot AI

The Carnot AI can predict impending failures through analyzing the input data

OUTPUT:

Increases the reliability and safety of essential services for residents and public servants, reducing downtime and inconvenience.

Reduces emergency repair costs, extends the lifespan of expensive equipment, and allows for better planning of maintenance schedules and budgets.

3. Predictive Maintenance and Energy Consumption Anomaly Detection

3.2 Energy Consumption Anomaly Detection:

INPUT:

Energy consumption patterns

Carnot AI

The system learns the typical energy consumption patterns of a building and flags significant deviations in real-time, which could indicate equipment malfunction or energy wastage.

OUTPUT:

Identifies opportunities for energy savings, leading to direct cost reductions in utility bills for government-managed properties.

Methodology of AI Optimization

Data Analysis + Machine Learning + Energy Forecast + Optimization Algorithm = **AI Optimization**

Optimization Model :

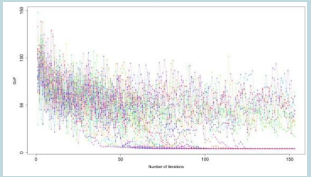
Consider
- Demand
- System Design Constraints

Controls
- Equipment On/Off
- Speed
- Setpoints

Predictive Model :

Predictive Models
- Future Demand
- Energy Consumption

We use Optimization Algorithm to find the optimal parameters:



Automatically check all possible combinations of equipment and parameters. Then the best energy efficiency setting is return from the algorithm

Join us to make this world GREENER

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