

A Theater of Art and Life

#SmartEnergyEfficiency

#AudienceComfort

#SustainableArchitecture

The National Taichung Theater (NTT), designed by Pritzker Prize-winning architect Toyo Ito, officially opened in 2016. Acclaimed by international media, the NTT is a green building infused with sunlight, air, and water. In recent years, responding to the global call for sustainability, the NTT has actively enhanced its energy-saving systems, moving steadily toward becoming a smart and eco-friendly 'Green Theater'.



National Taichung Theater



Radiant Floor Cooling System

The NTT's main floor features a radiant floor cooling system, with chilled water pipes installed beneath the ground. Unlike conventional air-conditioning that blows cold air from above, this design allows for even temperature distribution, maintaining a thermally comfortable environment for all visitors.

Floor Vent Design

Cool air is delivered through floor vents and maintained at a height of about two meters — approximately the average height of an adult. This design not only ensures a stable and comfortable indoor temperature, but also enhances energy efficiency.

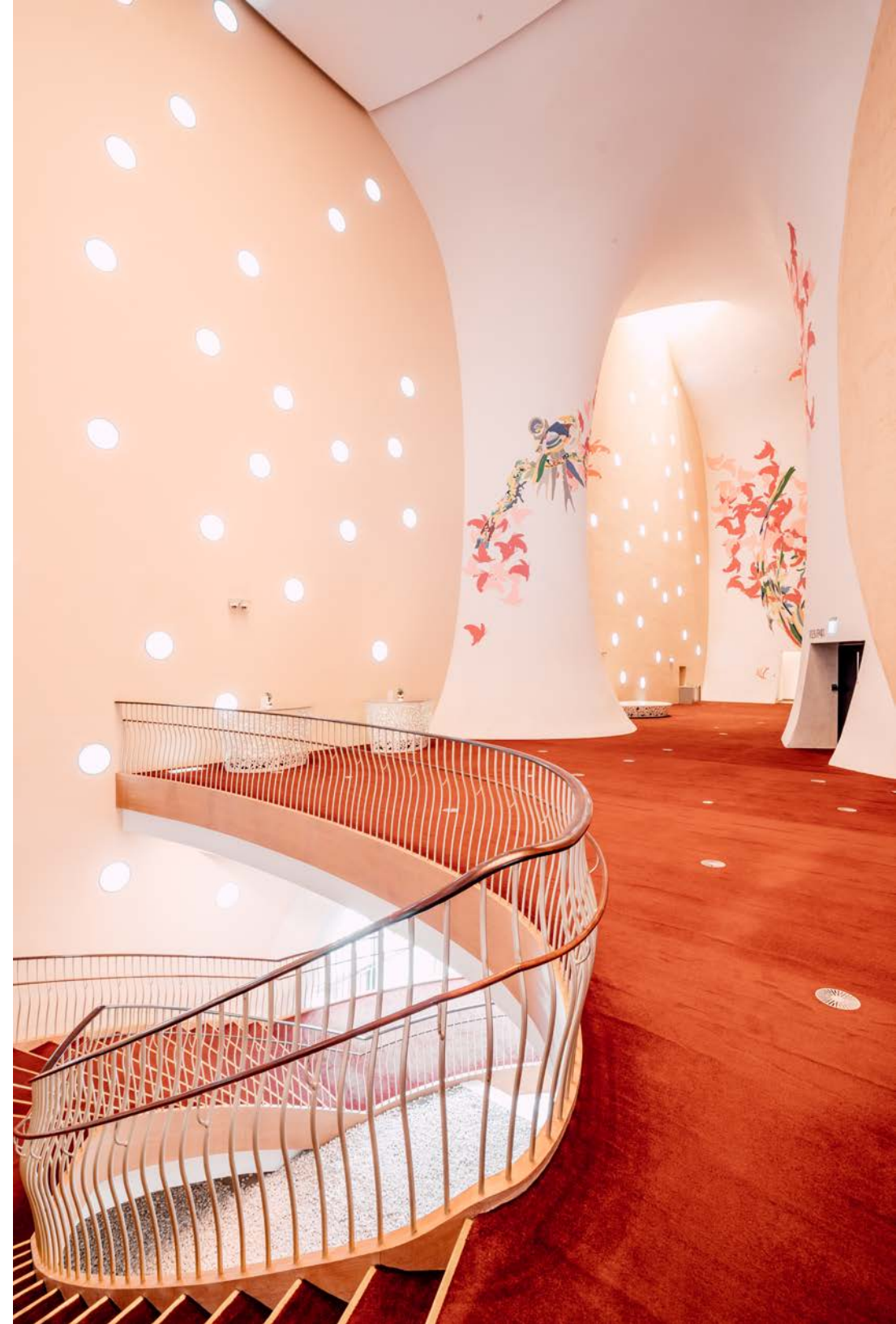
Concealed DC Fans

In the high-traffic foyer of the theater, low-noise DC fans are discreetly installed beneath public seating and tables. These fans intelligently adjust their airflow based on ambient temperature and crowd density, providing a comfortable environment for theatergoers without lowering the central air-conditioning temperature.



High-Efficiency, Low-Noise Active Magnetic Bearing Compressor / Chiller

To replace the original high-energy-consuming equipments, the NTT has installed an Active Magnetic Bearing Compressor / Chiller. Working in conjunction with variable-frequency drives (VFDs) on the cooling tower fan motors and the chilled and cooling water pumps, and monitored through an integrated building automation system, this upgrade has effectively reduced energy consumption by 36%. As a result, it achieves an annual carbon emissions reduction of 360 tCO₂e.



Upgraded Theater Air Conditioning: Enhanced Audience Comfort

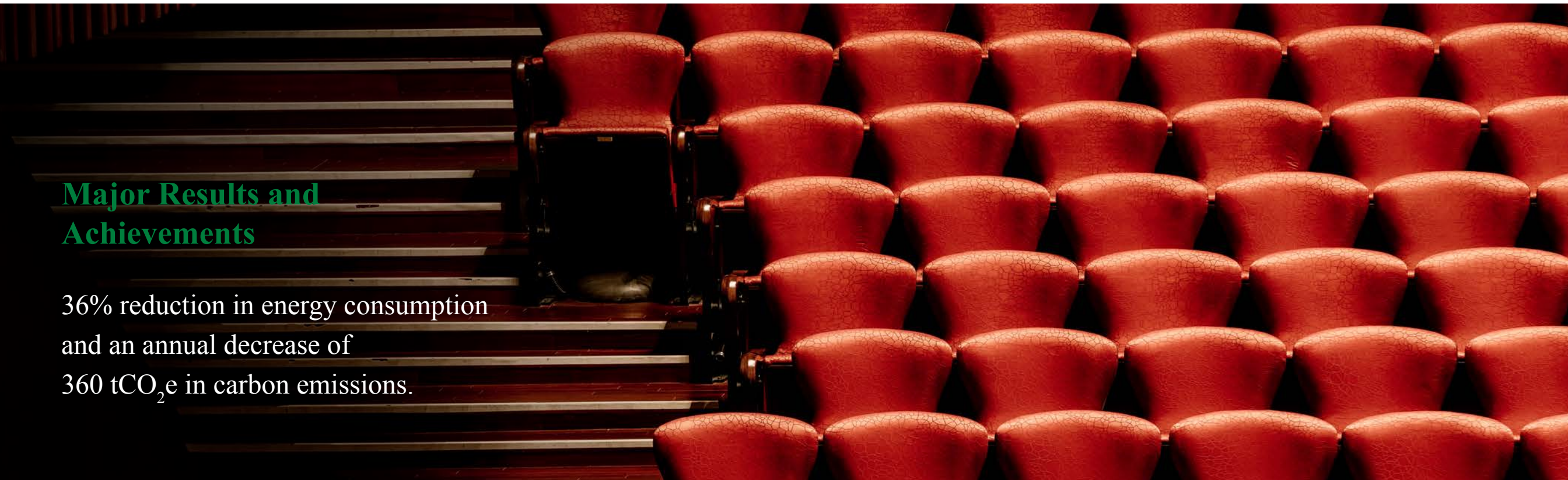
The air-conditioning systems in the Grand Theater (2,007 seats) and the Playhouse (794 seats) have been upgraded with the addition of a Variable Air Volume (VAV) system and multiple air distribution boxes. For every 10 to 20 seats, an individual air damper has been installed. These dampers are centrally controlled to automatically regulate temperature, airflow, airspeed, and air quality based on audience occupancy and seating zones.

Smart Air-Conditioning: A Perfect Balance of Comfort and Energy Efficiency

Construction of the NTT began in 2009. However, the original design can no longer meet today's operational needs. In response to global environmental challenges and government energy-saving policies, the NTT's air-conditioning optimization project not only enhances theater comfort, but also demonstrates the NTT's commitment to efficient energy management and long-term sustainable operations.

Major Results and Achievements

36% reduction in energy consumption
and an annual decrease of
360 tCO₂e in carbon emissions.





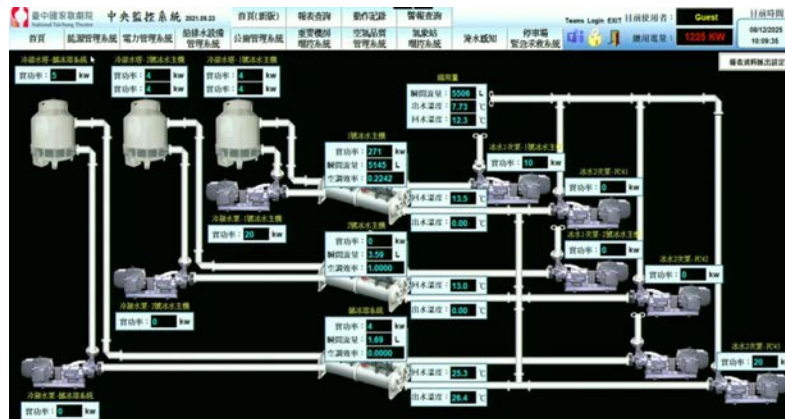
Advancing Toward a Smart Venue

#IntegratedMonitoring
#FourSystemsIntegration
#VisualInterface
#ConnectedPlatforms

The National Taichung Theater (NTT), which officially opened in 2016, is an international landmark that integrates architectural aesthetics with intelligent technology. To enhance operational efficiency, safety, and sustainability, the theater has implemented an energy management system operated through a central monitoring system. This system collects operational data and enables intelligent regulation of energy use, further advancing the venue's energy performance.

National Taichung Theater

The Smart Venue's Four Major Systems



1. Environmental Control and Monitoring

The central monitoring system oversees key information such as security monitoring, environmental sensing, equipment status, and crowd movement. Management personnel can monitor the real-time operation of critical facilities—including air conditioning, lighting, water and electricity systems, elevators, and fire safety equipment. Based on collected data and actual needs, the team can adjust energy usage accordingly, ensuring precise and efficient energy management throughout the venue.

2. Access Control

Access control systems have been implemented in critical areas such as backstage, administrative offices, and equipment rooms. In addition, electronic surveillance cameras with motion detection capabilities have been installed to further enhance the venue's security infrastructure.

3. Alarm Systems and Emergency Procedures

Fire alarms, emergency call buttons, and abnormal condition alerts are integrated into a centralized platform with established Standard Operating Procedures (SOPs), enabling immediate activation of emergency response protocols.

4. CCTV System

A comprehensive network of high-resolution IP cameras provides round-the-clock, venue-wide surveillance. With enhanced image clarity and expanded storage capacity, the system significantly strengthens the venue's overall security.

Visualized Interface for Enhanced Emergency Responsiveness

The central control room features a large video wall and a graphic-based user interface that visualizes real-time operational status and usage data across the venue. This setup enables staff to swiftly initiate corresponding emergency protocols, ensuring more precise, secure, and efficient venue operations.

A Sustainable and Smart Blueprint for the Future

The NTT central monitoring system regularly analyzes energy data to identify and eliminate potential waste, ensuring optimal performance of the venue's facilities. Efforts are also underway to enhance applications of artificial intelligence and big data analytics, such as automatic detection of abnormal behavior, predictive energy usage, smart patrols, and optimized security routes. Looking ahead, the theater aims to integrate ticketing, guided tours, and audience interaction into a unified smart platform—creating a more connected, user-friendly, and mutually beneficial venue experience.

