



智慧建筑一站式节能解决方案 Integrated Energy Solution for Smart Building

马端宁

集团总部大楼 - 节能环保技术和系统的 动态 展厅

SH HQ Building - A Live Demo of Integrated Energy Solution



IFC-World Bank Group's
EDGE (Excellence in
Design for Greater
Efficiencies) Certification



LEED (Leadership in
Energy and
Environmental
Design) Platinum
Certification



China Green Building
Design Label Three
Star Certification



45.47%
Energy Savings



42.27%
Water savings



20.82%
Less Embodied
Energy in materials



楼宇自控系统 Building Automation System

项目BAS监控设施 Johnson controls APAC HQ BAS facility

包括冷/热源系统、空调系统、环境监测、水系统等超过2500个智能控制点

Included cooling and heating source, HVAC system, environmental monitoring, water system etc. over 2500 digital points

冷/热源系统：冷水机组、热泵机组、冷却塔、锅炉、蓄能设备、水泵、水阀、水系统工况等

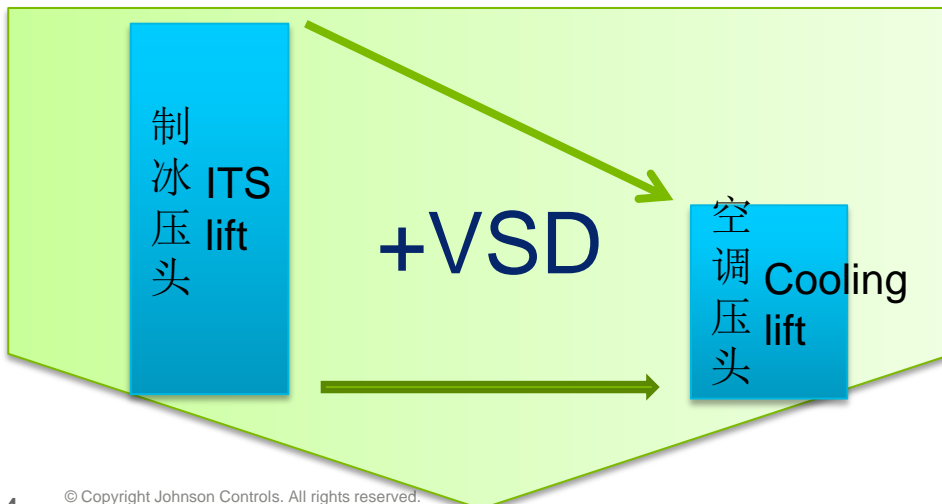
Cooling/Heating Source: chiller, heat pump, cooling tower, boiler, energy storage pump, water-loop pump, water valve, water condition.

名称Name	变频双工况离心式冷水机组 VSD Dual duty centrifugal chiller	变频磁悬浮离心式冷水机组 VSD magnetic bearing centrifugal chiller	变频螺杆式热泵机组 VSD water source screw heat pump
Qty.	2	1	1
Capacity	AC-580USRD/ITS-428USRD	550USRD	180USRD
			
功能对象 Object	冰蓄冷 / 新风机组5台 ITS/Priliminary air handling unit 5 models	空气处理机12台 AHU 12 models	IT机房 / 冷库 IT-Room/ refrigerator

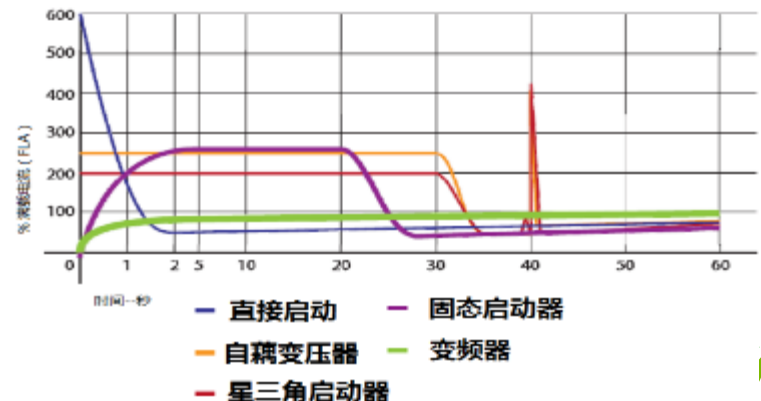
变频双工况离心式冷水机 VSD Dual Duty Centrifugal Chiller

变频驱动离心式双工况主机VSD Dual duty centrifugal chiller

- 通过改变转速，提高空调工况时的运行效率，同时提高机组运行的稳定性和安全性，空调工况年节能超过30%
- Improved the chiller operating efficiency by changing the speed, more than 30% annual energy saving.
- 夜间制冰工况，也可充分利用低温冷却水进行节能，年节能超过5%
- ITS operating at night, more than 5% annual energy saving.
- VSD 双工况主机，使得冰蓄冷系统”既省钱又节能”
- VSD dual duty chiller, save investment and save energy



低启动冲击电流--变频启动<100% FLA

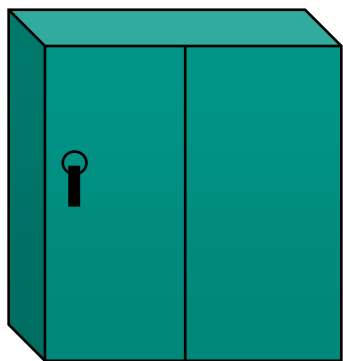


变频双工况离心式冷水机组 - 节能性

VSD dual duty centrifugal chiller - Energy Saving

冷冻水温度 Chilled water temp
温度设定值 set point
蒸发/冷凝压力
Evaporative/Condensation pressure
PRV 位置 PRV position
实际电机转速
Actual motor speed

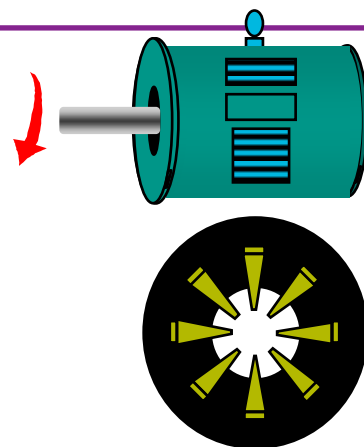
- ▶ 年节能达15-30%。 The annual energy saving is 15-30%.
- ▶ 能准确预测离心机的喘振点，允许机组在喘振点附近工作正常，防止机组在低负荷时发生喘振。 It can accurately predict the surge point of the centrifuge, allow the unit to work normally near the surge point, and prevent the unit from surging at mini load.
- ▶ 降低机组噪声，使机组运行更宁静， Reduce the noise of the unit, more quiet operation.
- ▶ 功率因素为 0.95或以上 The power factor is 0.95 or above.



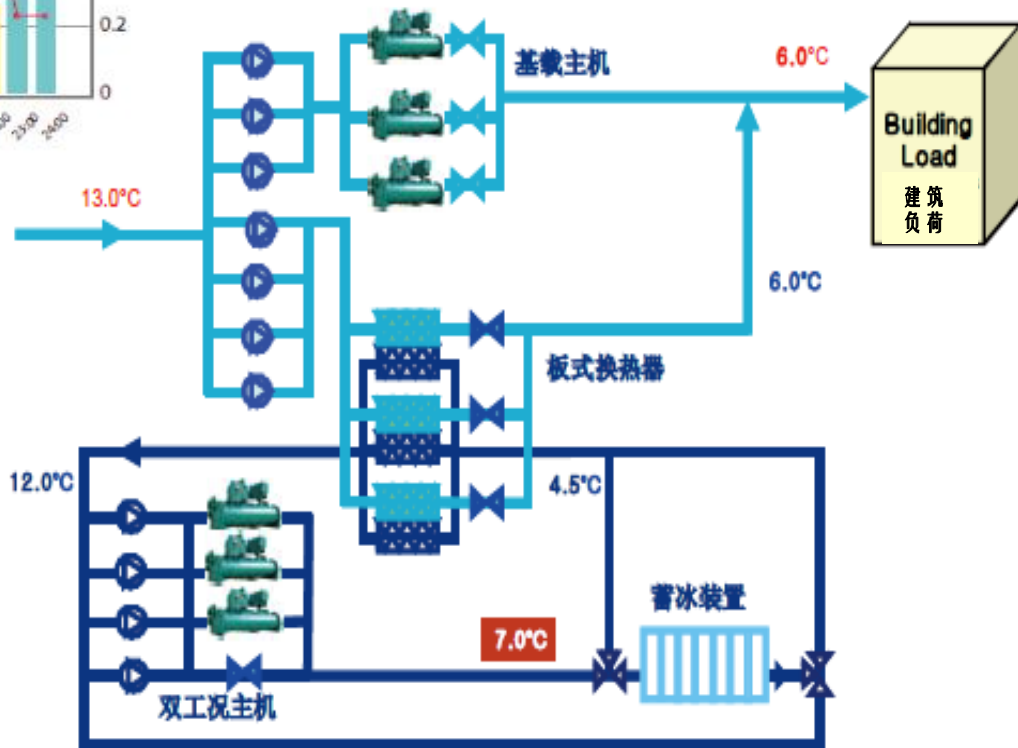
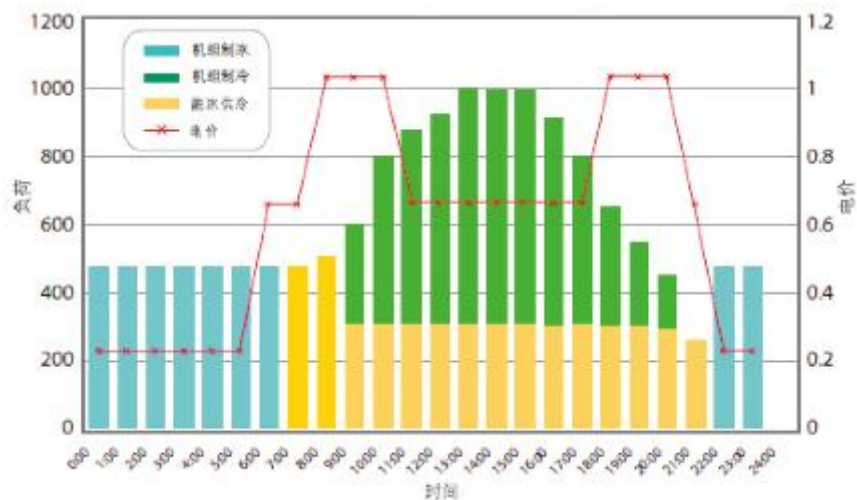
VSD

优化电机转速
Optimize motor speed

优化PRV导叶开度
Optimize PRV guide vane opening



冰蓄冷系统 ITS System



高效策略 Efficient Strategy

— 冷机系统 Chiller System

高效机房 Efficient Chiller

Plant

■ 高效变频冷水机组 High efficiency VSD

	ASHRAE Baseline Chiller AHRI ASHRAE AHRI工况下的基 准值	Magnetic chiller (Chilled Water Temp:13℃~16℃) 磁悬浮冷水机组
COP	6.1	7.78
IPLV	6.4	17.58



- 水源热泵机组 water-loop heat pump
 - ✓ 冷水机组用于空间制冷，其排热用于生活热水 chilled water for cooling, condensation for living hot water
- 冰蓄冷系统 Ice-storage system
 - ✓ 50%的储存能力 50% storage capacity



磁悬浮离心机组 Magnetic Bearing Chiller

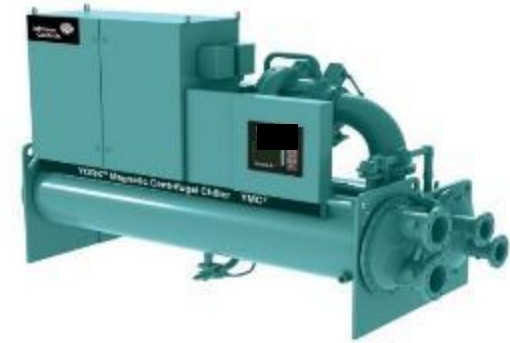
- 制冷剂Refrigerant: R134a
- 制冷量Cooling capacity: 250~1000TR
- 配置Configuration

永磁电机和磁悬浮轴承

PM motor and automatic magnetic suspension bearing

新一代变频驱动柜及控制系统New generation VSD and control system

高效混合降膜式蒸发器Hybrid falling film evaporator

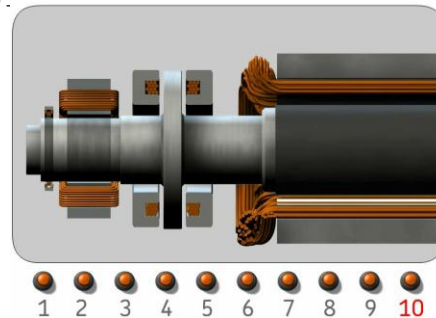
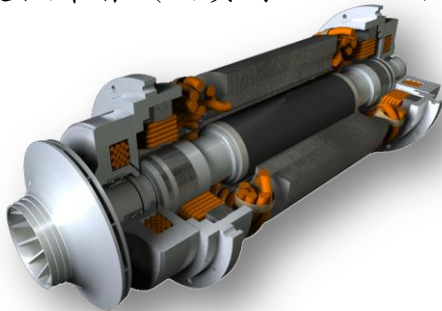


■ 特点Feature

COP: 5.5 - 6.5, NPLV: 9 - 11;

无油润滑; 高密封性设计; 迅速重启; 自由冷却功能 Oil free; high sealing; quick start; free cooling

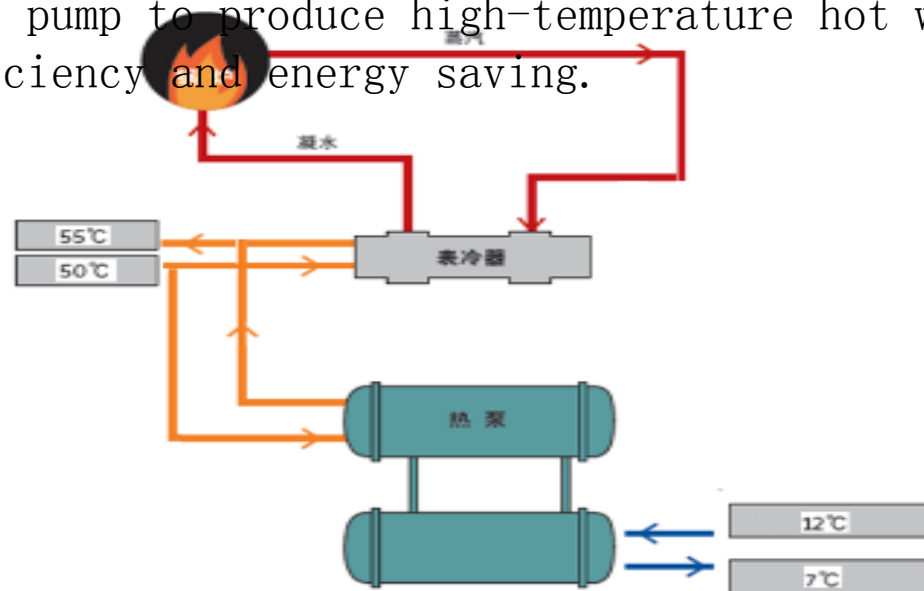
超低噪音 (满负荷73dBA左右); U₁ (3dBA at full load)



热泵热回收 Heat Pump Heat Recovery

热泵机组是通过制冷工质在蒸发器中的蒸发过程从余热资源中吸取热量，并通过在冷凝器中的冷凝过程将热量释放到用户侧，实现同时高效提供冷水和高温热水的目的。而且，热泵机组也可以利用低品位的“废”热水作为热泵热源水，生产高温热水，实现高效节能。

The heat pump unit absorbs heat from the waste heat resource through the evaporation process of refrigerating working medium in the evaporator, and discharge the heat to the user side through the condensation process in the condenser, realizing the purpose of providing both cold water and hot water efficiently. Moreover, the heat pump unit can also use low-grade "waste" hot water as heat source water to produce high-temperature hot water and achieve high efficiency and energy saving.



自动在线清洗系统 Automatic Online Cleaning System

新机器

New machine



使用一段时间

After a period of



换热管内壁结垢
Scaling on heat exchange tube



换热器传热性能变差
Poor heat transfer performance



冷凝温度升高，小温差增大
High condensation temp, large delta T



机组性能下降
Poor chiller performance



运行费用更高
Higher operating costs

Strategy

— 空气系统 Airside

空气处理和分布系统

Air Handling & Distribution

System

□ 地板送风系统

- ✓ 减少冷负荷
- ✓ 减少风机能耗

□ UFAD System

- ✓ Reduce cooling load
- ✓ Reduce fan energy consumption

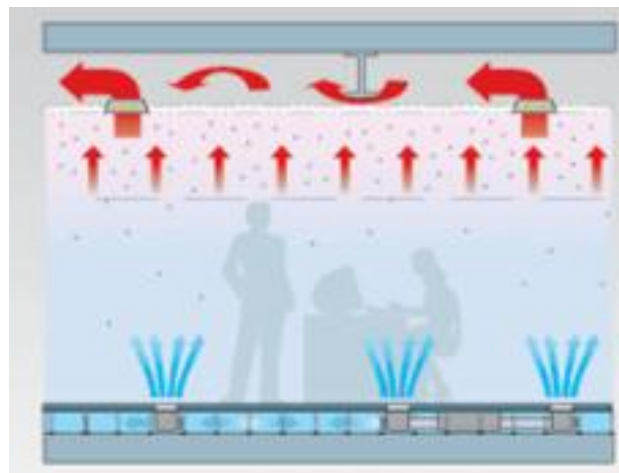
□ 热回收AHU机组

- ✓ HVAC 热负荷减低模块 (HLR)
- ✓ 转轮热回收系统
- ✓ 静电除尘模块

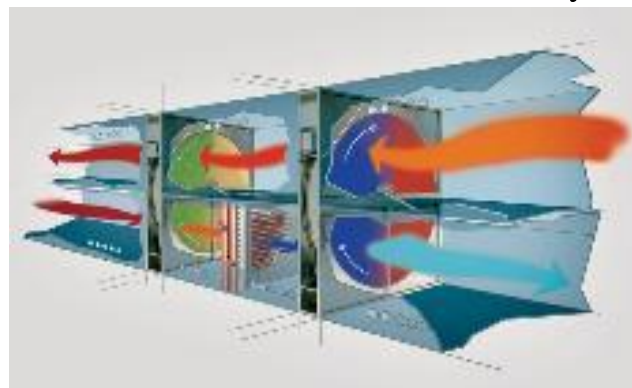
□ Heat Recovery AHU

- ✓ HVAC heat load reduction (HLR)
- ✓ Rotor heat recovery system
- ✓ Electrostatic precipitators (ESP) module

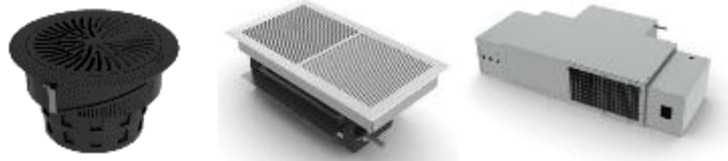
地板送风系统 UFAD System



热回收AHU机组 Heat recovery AHU



地板送风系统 UFAD System



➤ 高空气品质和环境舒适度

区域温度可单独控制

新风自下而上，首先经过人体呼吸

上升气流有效除污染，LBNL* 研究表明除CO2效率高于预期值13%

➤ 初投资低

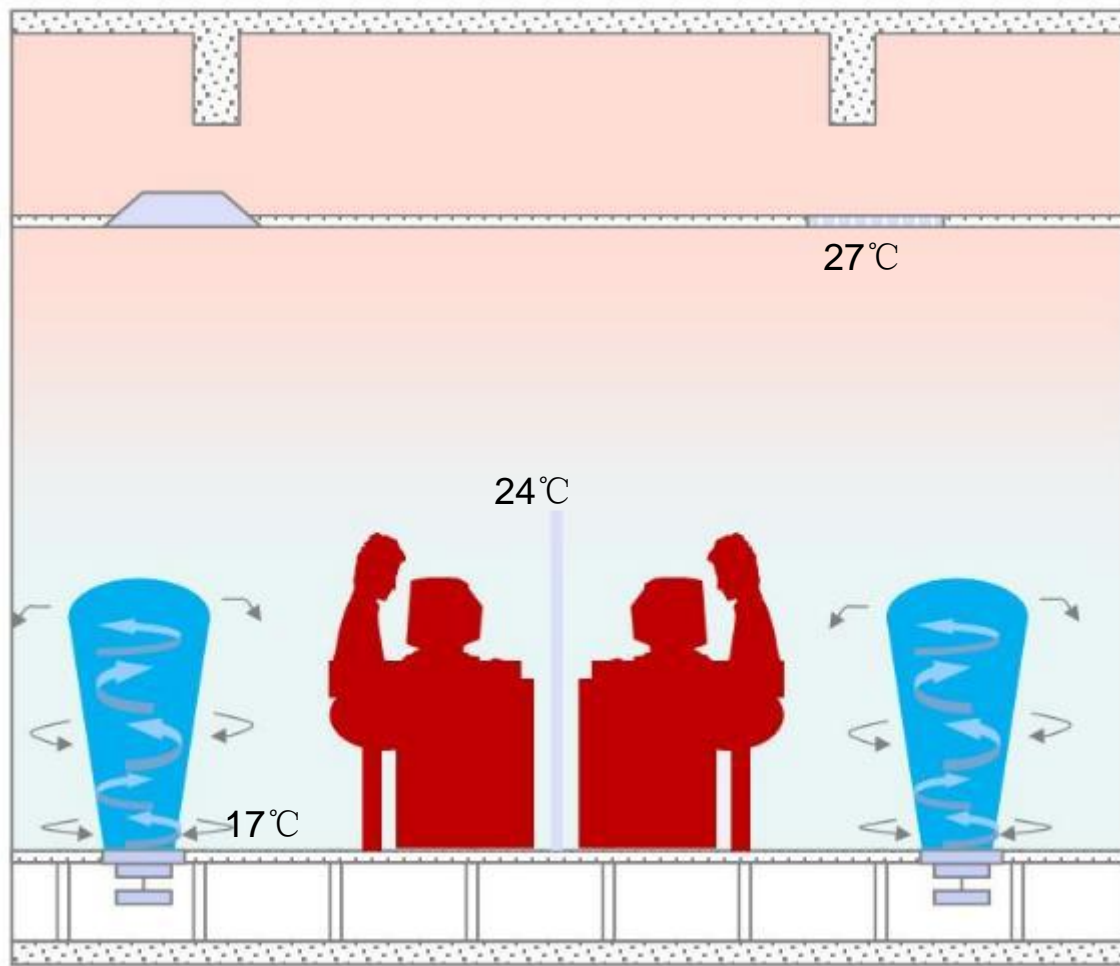
- 无复杂风道设计，制作、安装费用低于吊顶式VAV系统
- 顶层空间不计入总负荷，减少制冷量
- 高送风温度，低压头，AHU投资减少
- 控制系统简化
- 网络、电源管路地面安装，安装成本低

➤ 低生命周期成本

- 系统送风温度高，有效降低能耗
- 送风口可灵活移动，减少后期改造成本
- 大量内区采用地板送风口，低维护成本
- 夜间蓄冷模式，长期运行能耗低
- 有利于节能认证申请

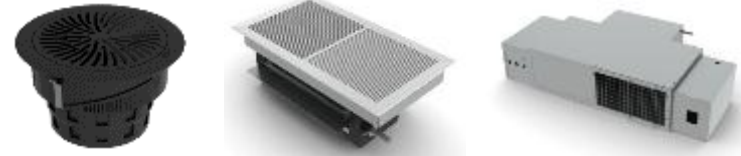
LEED加分项：

- i. 优化能源效率
- ii. 热舒适度
- iii. 系统可控性
- iv. 改善通风有效性

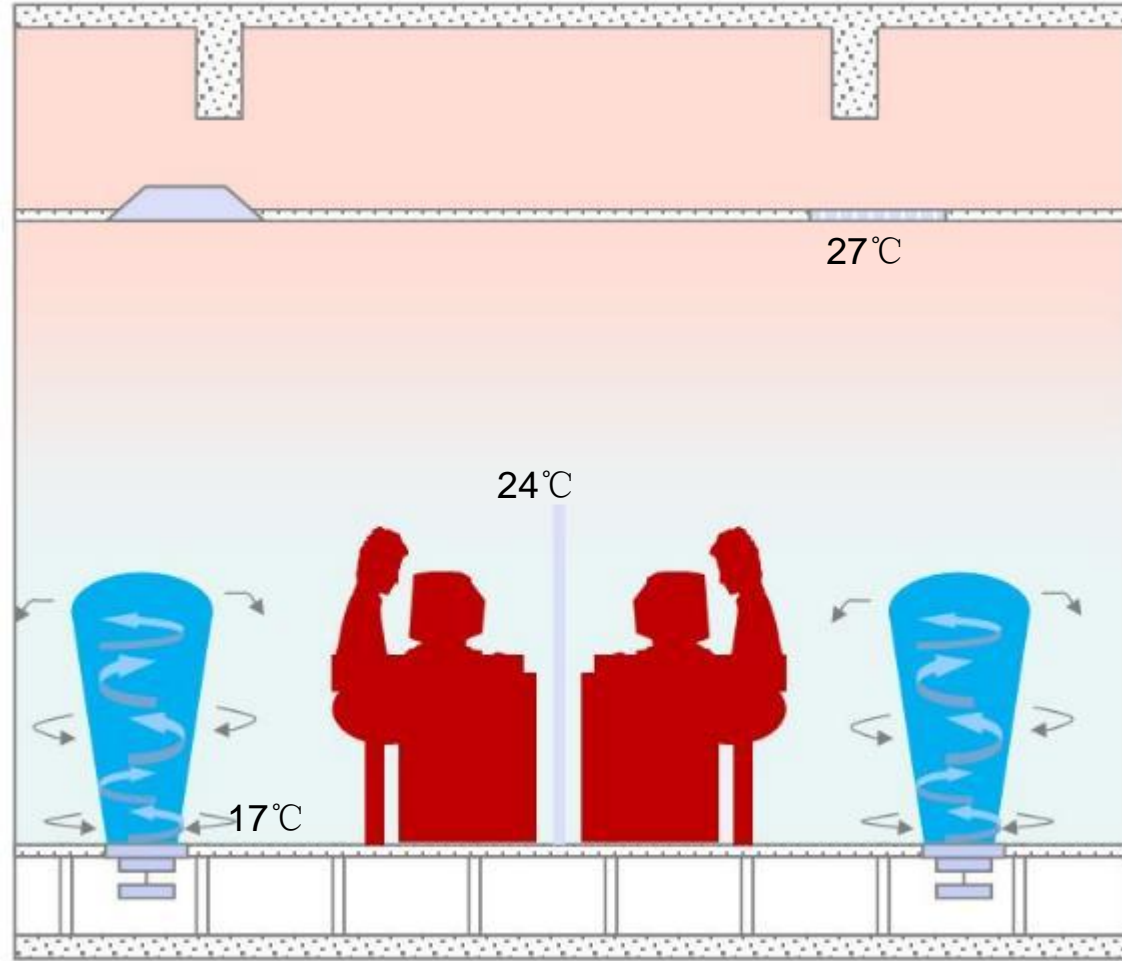


Under Floor Air

Distribution

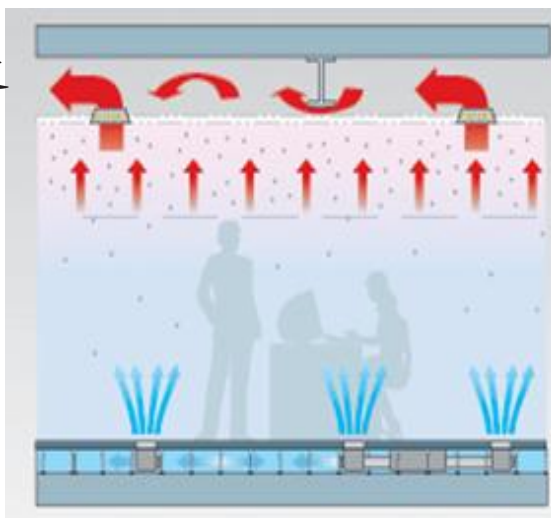


- High air quality and environmental comfort
 - Region temp can be controlled separately
 - Fresh air comes from the bottom up and passes through the human body first
 - Updraft removes pollution
- Lower first cost and installation cost than ceiling VAV effectively
 - a LBNL* Research shows that the efficiency of CO₂ removal is 13% higher than expected.
 - The top floor space is not counted in the total load, reducing the cooling capacity
 - High supply air temperature, low static pressure, AHU investment reduced
 - Simplified Control system
- Lower life cycle cost
 - Ground wiring work, reduce installation cost
 - High air supply temperature of the system can effectively reduce energy consumption
 - The air diffuser can be moved flexibly to reduce the cost of later transformation
 - Interior areas are equipped with floor air outlets with low maintenance costs
 - Cold storage mode at night, low energy consumption for long-term operation



地板送风系统 UFAD System

以1.8米高的呼吸区域为舒适度关注重点，地板送风系统自下而上供送调节空气，这与其他任何空气调节方式相比，均具有更高的能效性。当从地板往上送风时，仅需对一部分办公空间制冷或制热，这样有效节省了风量和能源。此外，地板送风系统还直接向使用者呼吸区供送清洁的调节空气，可减少空气中的微粒物质。



Air Side System 空气系统

- 地板送风系统
 - ✓ 减少冷负荷
 - ✓ 减少风机能耗

FlexSys™ 地板 送风系统



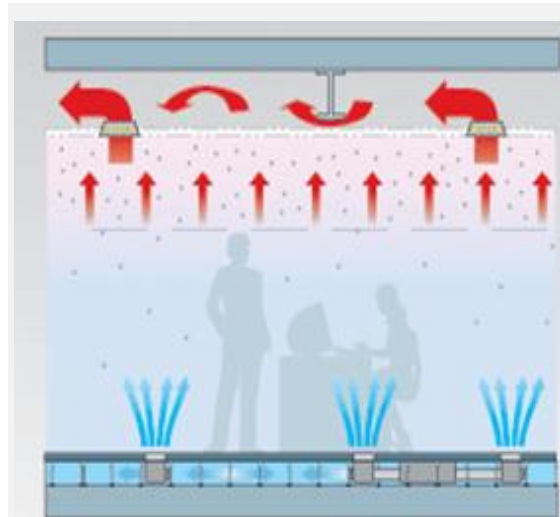
地板送风系统利用经空气处理机组调节的空气，以及大楼内部设备的冷却水/热水，用来保持室内温度。

空气从地板处送入，从天花板处送出，不仅提升了大楼内部的换气效率，同时还减少了所需的室外空气量以及因加热、冷却及送风而消耗的能源。

借助地板送风系统，能源节约量超出基准线要求9%。

Under Floor Air Distribution

UFAD focus on a comfortable zone with a 1.8-meter-high breathing space, the floor air supply system delivers conditioned air from the bottom up, which is more energy efficient than any other air conditioning method. When the wind is blown up from the floor, only a part of the office space needs to be cooled or heated, which effectively saves air volume and energy. In addition, the floor air supply system also supplies clean conditioned air directly to the user's breathing zone, which reduces particulate matter in the



Air Side System

□ UFAD System

- ✓ Reduce cooling load
- ✓ Reduce fan energy consumption

FlexSys™ UFAD System



The UFAD system uses the conditioned air from AHU and the cooling water/hot water of the building's internal equipment to maintain the indoor temperature.

The air is supplied from the floor and discharged from the ceiling, which not only improves the ventilation efficiency inside the building, but also reduces the amount of outdoor air required and the energy consumed by heating, cooling and air supply.

With the UFAD system, the energy saving exceeds the baseline requirement by

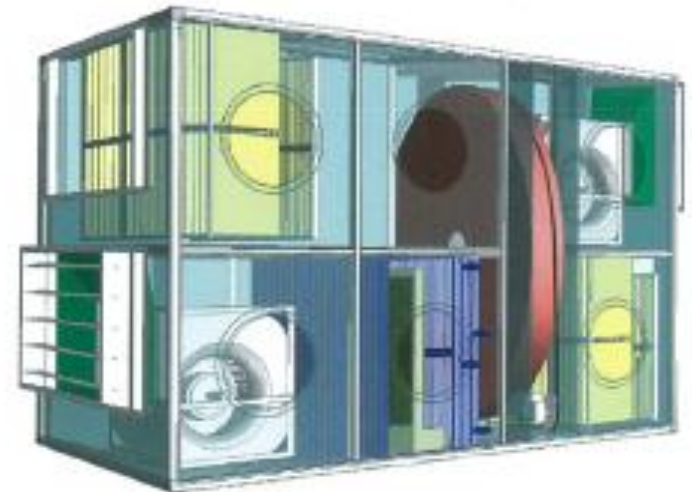
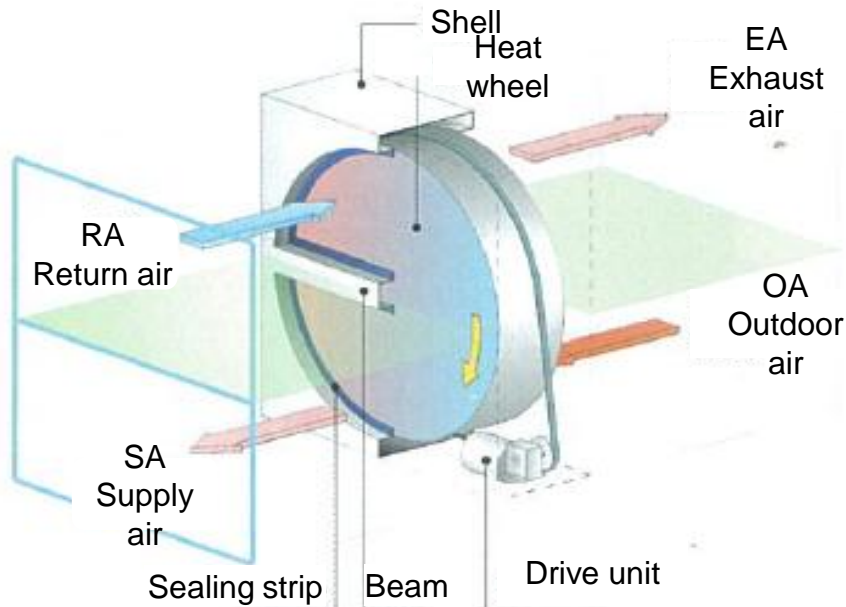


转轮热回收系统

Heat Wheel Energy Recovery System

工作原理：转轮式热交换由蜂窝状蓄热轮，壳体，动力驱动机构，密封件等组成。热排风和冷新风分别通过蓄热轮的半圆，轮体同时不断旋转，将排风中的热量和水分不断传递给新风。

Heat Exchanger Principles: The rotating heat exchanger consist of a rotating wheel, casing and drive unit. As the wheel rotates slowly, the heat from the exhaust air is picked up by the aluminum in the matrix and transferred to the cool supply air. The possibility of adding coating to the wheel, which allows moisture (latent) transfer, is another factor favoring these products.



EcoAdvance™ 技术 空气处理机组回风处理技术

EcoAdvance™ Technology AHU Return Air Treatment

它是什么?

- 自再生的HVAC负荷减低模块 Self-regenerating HLR(HVAC Load Reduction) module
- ✓ 处理室内空气 Treat the indoor air
- ✓ 新风量管理 Manage the outside air
- ✓ 自动再生 Automatic self-cleaning("regeneration")
- ✓ 监测和报告 Monitor, report and validate



它是如何工作的? How does it work?

- 专利技术捕捉分子污染物并安全清除, 如CO2、VOCs、甲醛HCHO, 并调节空气质量 Proprietary technology captures molecular contaminants such as CO2, VOCs and HCHO etc., and conditions the air
- 通过感应建筑物内非高峰时期使用率, 排出污染物 Intelligent, self-cleaning unit purges contaminants out of the building via exhaust by sensing non-peak occupancy within a building
- 智能传感器持续监测系统性能和室内空气质量 Smart Sensors continuously monitor system performance and air quality inside the building.



它带来了什么?

- 减少HVAC设备尺寸
- 100%符合ASHRAE 62.1-2013要求
- 具备实时监控功能
- LEED认证加分项
- 显著降低HVAC负荷: 约50%, 年度节能20%-30%

What does it bring to us?

- Reduce size of your HVAC equipment
- 100% comply for the requirements of ASHRAE 62.1-2013
- Real-time monitoring capable
- Qualifies for U.S Green Building Council LEED points
- Significant HVAC load reduction : about 50%, annual energy saving 20%-30%



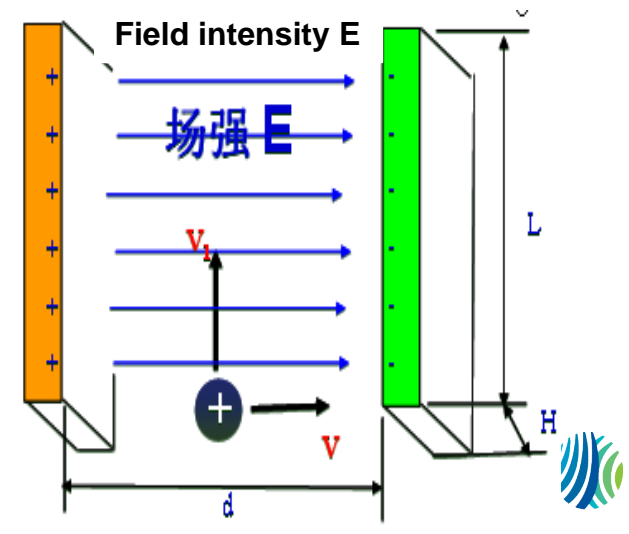
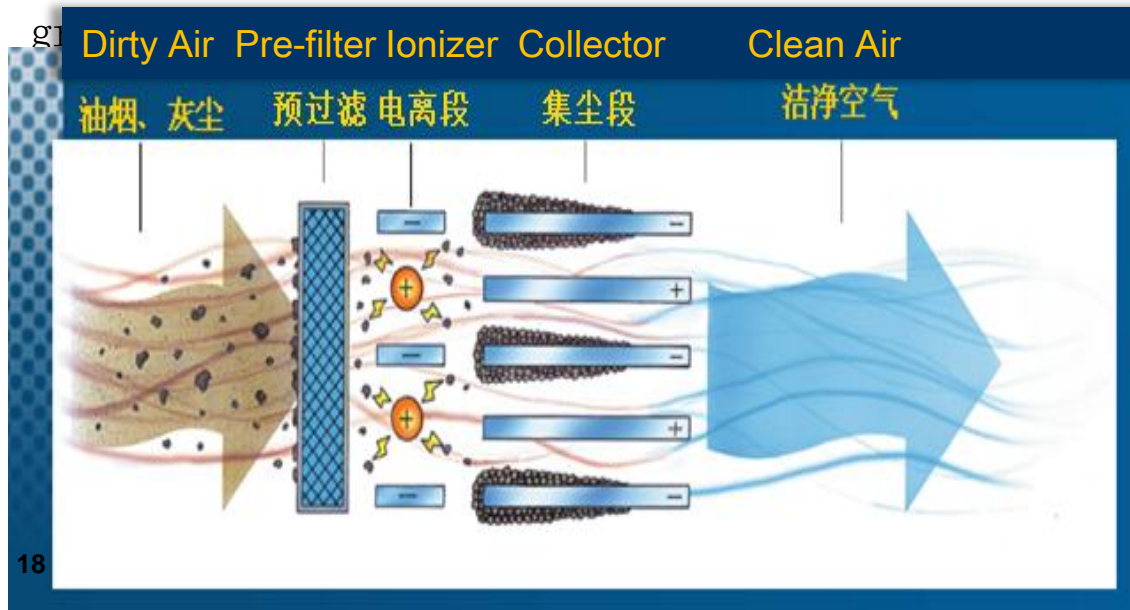
Controls

静电除尘系统PM2.5过滤系统

Electrostatic Precipitation System for PM2.5 Filtration

采用静电集尘原理，空气先通过前置金属过滤网，过滤大尺寸的微粒，剩下的较小的微粒甚至小到0.01微米的微粒，继续通过超强高压电场（电离区）并带电，带电微粒通过电场集尘段，被反向电极捕捉收集。

Air is drawn by the motor/blower through a washable metal mesh pre-filter which traps large dust particles. The remaining particles, some as small as 0.01 microns, pass into a strong electrical field (ionizing section) where the particulate receives an electrical charge. The charged particles then pass into a collector plate section made up of a series of equally spaced parallel plates. Each alternate plate is charged with the same polarity as the particles, which repel, while the interleaving plates are



高效策略 Efficient Strategy

— 楼宇控制系统 Building Automation System

- ❑ 物理空间属性 Physical Location
以物理空间为基础分布管理各被控设备
报警设置更为便捷
- ❑ 设备关联定义 Equipment Mapping
被控设备之间的相互关系
- ❑ 友好的界面显示 New User Interface
更全面的浏览器支持
更容易的掌握
更为智能的多窗口显示
- ❑ 便捷的报表存储 Easy Data Export
PDF格式直接下载存储，操作更为简便



楼宇自控系统 Building Automation System

包括冷、热源系统、空调系统、水系统等系统的智能控制。总点数约为2500点。

Plant room, airside and piping system controlled with 2500dp

整栋大楼的办公区采用地送风形式。送风分内外区，内区为带风阀的送风口，外区为带盘管冷梁。通过BA系统控制末端控制器，调节风阀及水阀。

Served by UAFD in office, damper outlet in inner zone, chilled beam in window side, all damper and water valve controlled by field controller.

水源热泵为双工况机组，机组为IT机房及厨房供冷。可选择热回收或冷却塔冷却冷却水。热回收的冷源通过储热罐用做生活热水。

大楼冷源低温冷水为冰蓄冷系统，利用白天和夜间电价差，夜晚蓄冰，白天融冰。Heat pump as dual duty chiller for IT room & kitchen, ITS

produces ice at night for cooling next day under peak-valley price

为满足LEED要求，在每个会议室安装了CO2传感器，每个楼层及室外安装了PM2.5传感器及气象站传感器。CO2 & PM2.5 sensors installed in meeting room & indoor/outdoor for air quality in LEED

大楼还做了很多集成接口有：高低压配电、太阳能、水电表、能量表、中雨水、锅炉、智能照明等系统。Integration to power distribution, solar, meters, energy meter, rain water, boiler and lighting system

楼宇自控系统 Building Automation

环境监测： 每个会议室CO2浓度 (LEED认证要求) CO2 sensor in meeting room

Environment: 每个楼层公共区域PM2.5浓度、环境湿度PM2.5, RH in each floor

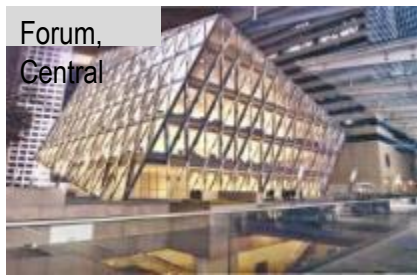


调光控制及窗帘控制系统 Lighting Integrated with Shade Control

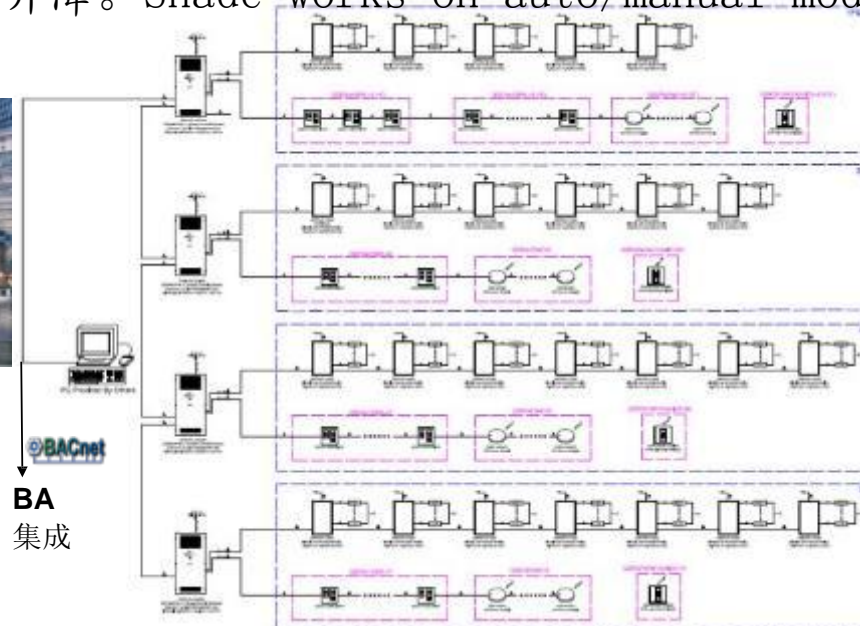
楼内所有的照明灯具和窗帘均会采用智能控制系统，窗帘数量约为1000副，灯具数量约为7000盏，900个传感器（人员占空传感器、日光探测传感器），采用多种场景模式控制。在该系统下，大楼照明能源消耗能达到最节能的状态。All lamp controlled by occupancy sensor and integrated with shade via daylight sensor for energy saving.

在同一场景可实现开关控制、预设场景控制、感应控制、日光控制等控制模式。感应控制是指在区域内感应到无人动作15分钟后，自动关闭相应灯光。SP=15Min

窗帘控制指区域内电动窗帘会根据系统内默认的遮阳功能自动升降，有些区域还可以通过本地的控制面板控制升降。Shade works on auto/manual mode



Forum, Central



高效策略 Efficient Strategy

照明灯具 Lamp

照明功率密度 Power Density In
Lighting

区域 Zone	ASHRAE基准Baseline	大楼设计
办公区 Office	12 W/m ²	5.4 W/m ²
会议室 Meeting	14W/m ²	8 W/m ²
大堂 Lobby	14W/m ²	5.5 W/m ²
餐厅 Canteen	15 W/m ²	5 W/m ²
展示厅Demo Room	11 W/m ²	4 W/m ²
楼梯间Staircase	6.5 W/m ²	3.5 W/m ²
设备机房Plant	16.1 W/m ²	3.5 W/m ²

高效策略 Efficient Strategy

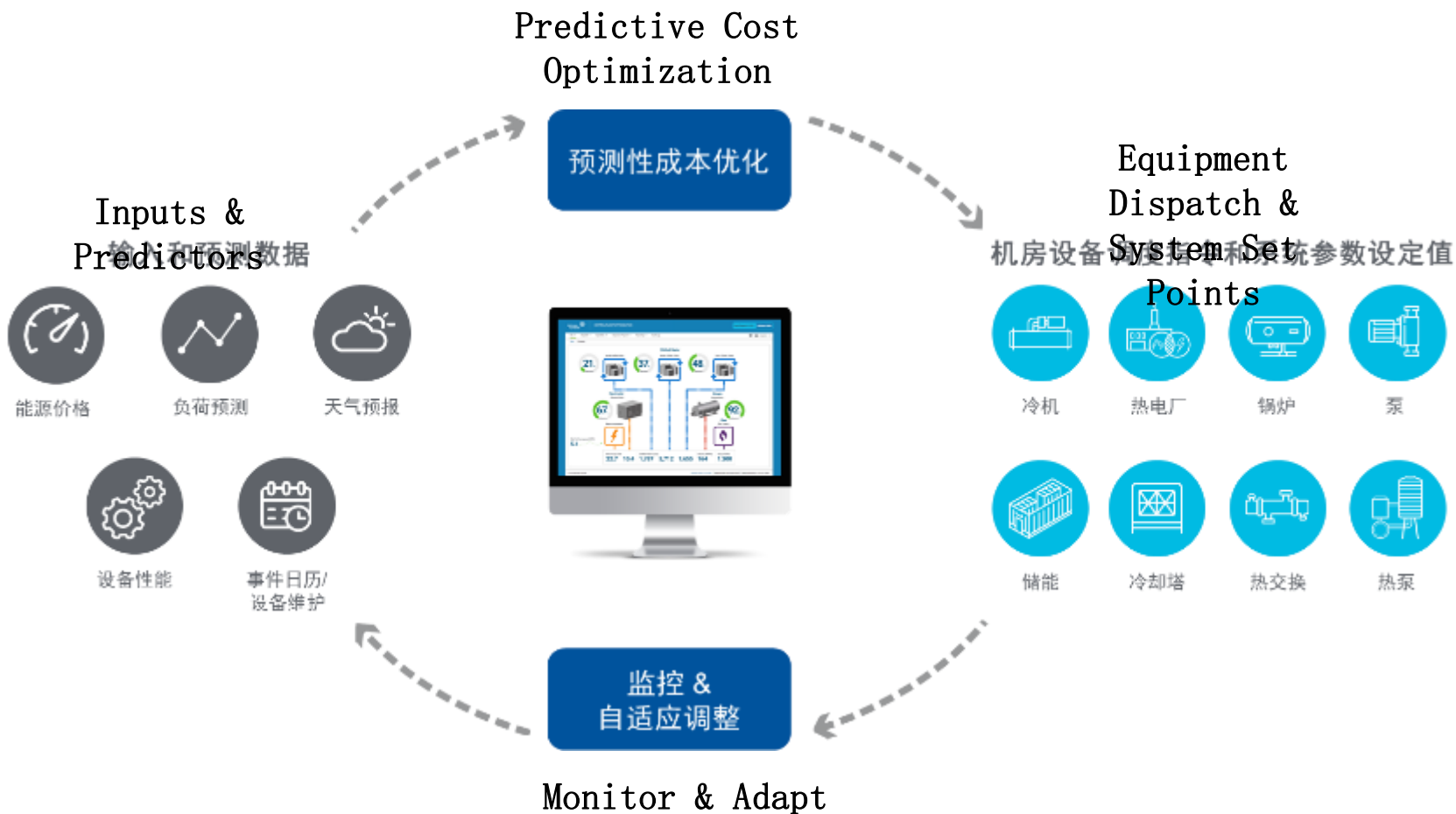
其他策略 Others

- ❑ 能源之星产品 (Energy Star) Product
 - ✓ 降低35%设备负荷 35% load drop
- ❑ 太阳能热水系统 Solar Domestic Hot Water
 - ✓ 与热泵机组一起提供生活热水 Work with Heat Pump for Domestic hot water
- ❑ 太阳能光伏系统 (PV system)
 - ✓ 补偿3%的年建筑能耗 Supply 3% of annual electricity
- ❑ 日光和人员感应系统 Daylight & Occupancy
 - ✓ 减少10%的照明用电 Save 10% of electricity in lighting



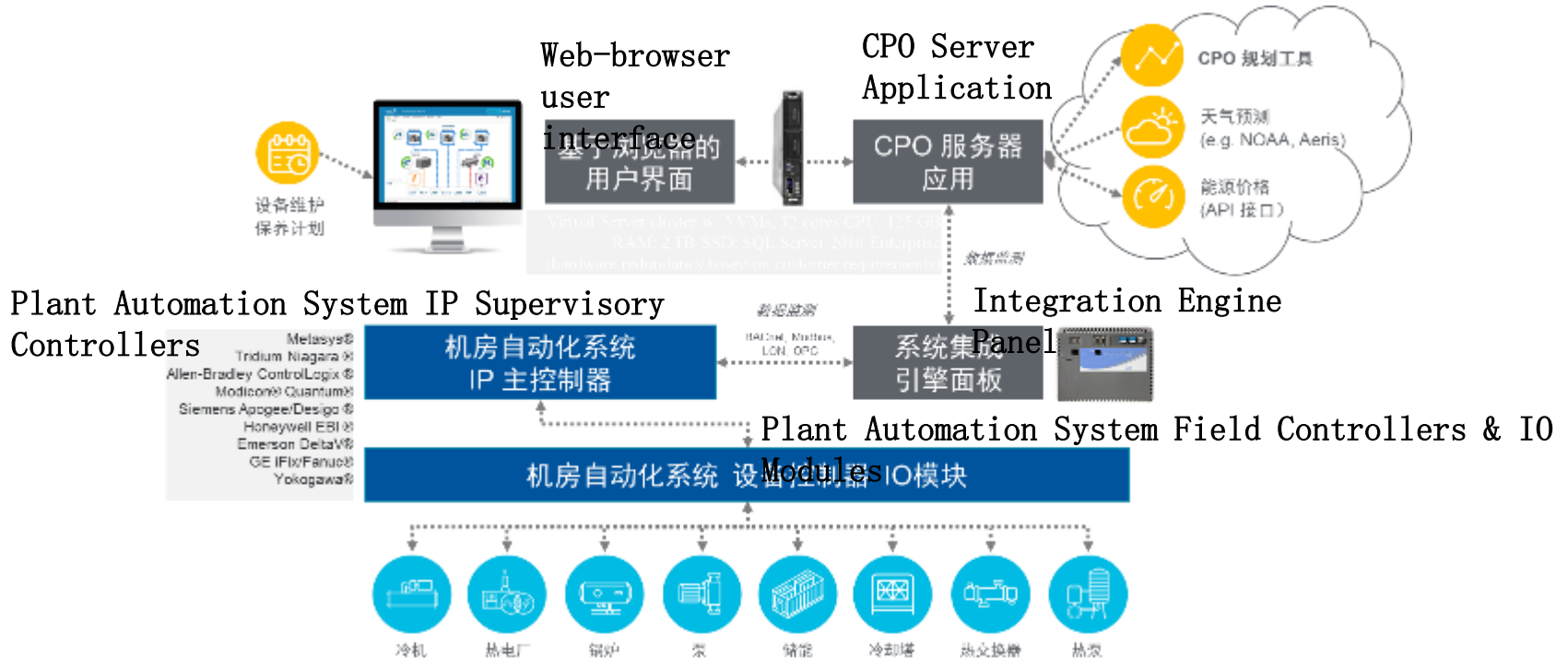
下一代高效机房优化解决方案如何工作？

New CPO (Chiller Plant Optimization)



New CPO运行工具系统架构

CPO Operational Tool System Architecture



New CPO将运行在BA和制冷系统之上，实现机房运行的全局优化

New CPO running on top of BAS and Chiller for a system optimization

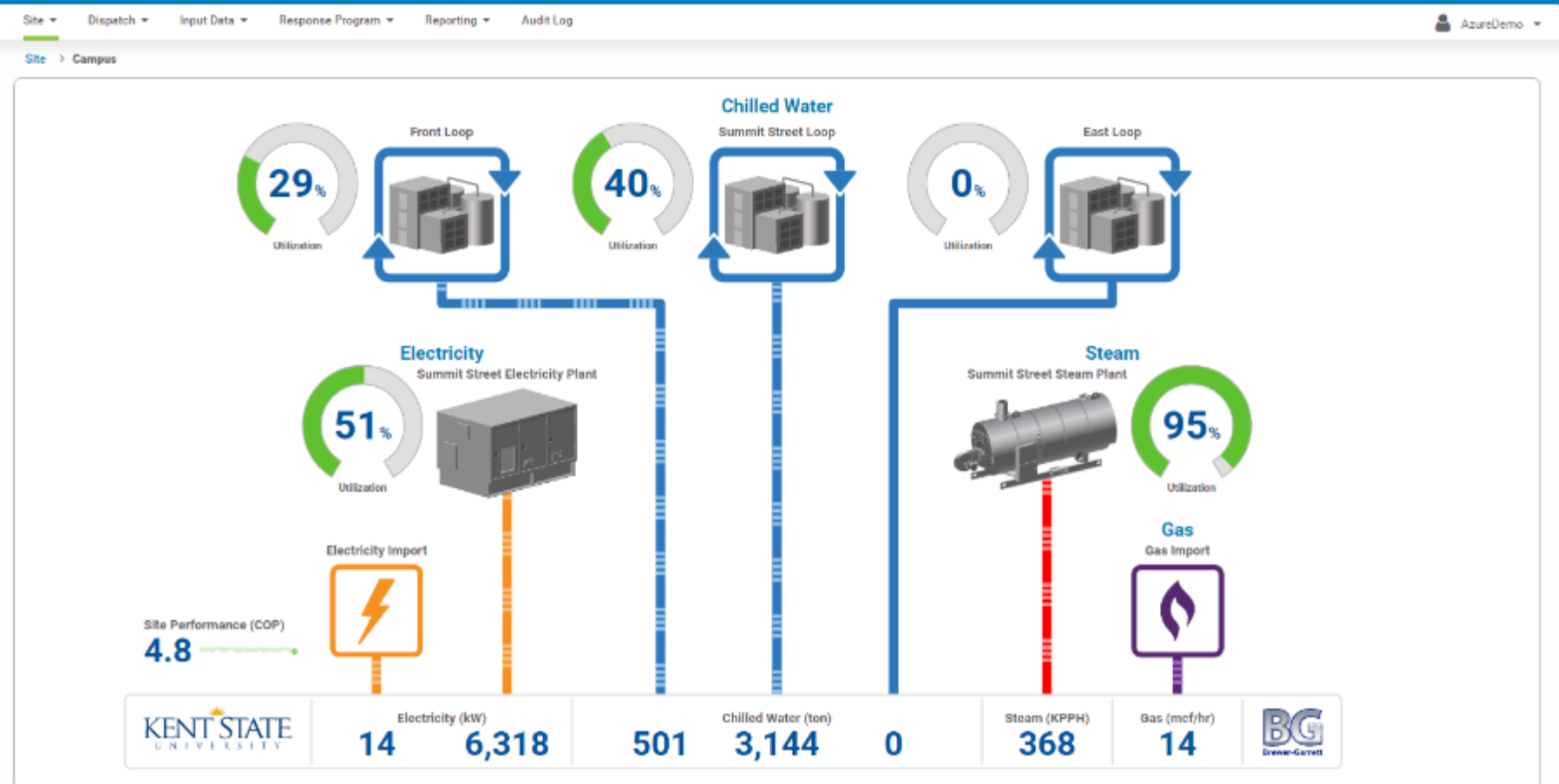
肯特大学案例中，多种冷热源运行实况及综合COP值

JC Chiller Plant Optimization in Kent State University



ENTERPRISE OPTIMIZATION SOLUTION

Next Dispatch: 03:50 Advisory Mode



© 2018 Johnson Controls

Software Version: 2.0.0.1588

根据未来7天每小时的天气预测数据

Load Prediction Based on Weather, Historical Data & Big Event



CENTRAL PLANT OPTIMIZATION

Next Dispatch: 10:48 Auto Mode

Site Dispatch Input Data Response Program Reporting Audit Log

Azuredemo

Kent State Dry Bulb Temperature (°F)

Override



00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00

3/20/2019	31.82	31.39	31.24	31.19	31.13	30.82	30.80	30.19	29.07	28.76	29.17	30.25	31.48	33.38	35.21	35.33	⋮
3/21/2019	31.63	30.88	29.78	28.51	27.84	27.20	27.64	27.70	27.80	28.70	31.79	34.57	37.02	36.70	36.96	37.42	⋮
3/22/2019	32.74	33.23	32.63	32.03	33.03	33.72	33.56	34.05	34.73	36.81	39.48	44.64	49.54	53.08	55.18	57.52	⋮
3/23/2019	56.34	56.97	58.18	57.54	57.11	56.59	55.78	55.28	54.79	55.10	56.53	58.29	60.14	61.31	62.61	62.82	⋮
3/24/2019	58.27	58.24	57.76	57.09	58.02	58.87	59.74	59.57	59.14	59.23	60.50	62.75	65.40	67.50	68.93	70.61	⋮



预测未来7天内每小时的用电负荷，并每15分钟下发近150个命令，使实时负荷贴近预测负荷

Predictive Algorithms Respond to Myriad Inputs Every 15 Min



CENTRAL PLANT OPTIMIZATION

Next Dispatch: 11:44

Auto Mode

Site ▾ Dispatch ▾ Input Data ▾ Response Program ▾ Reporting ▾ Audit Log

? 👤 Azuredemo ▾

Electricity Load (kW) ▾

Override



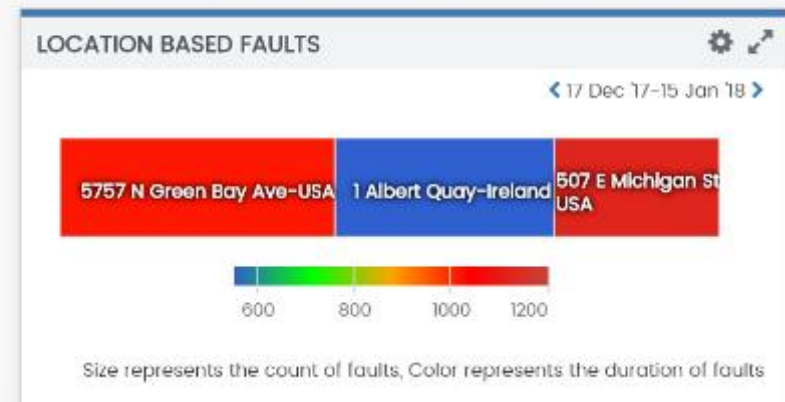
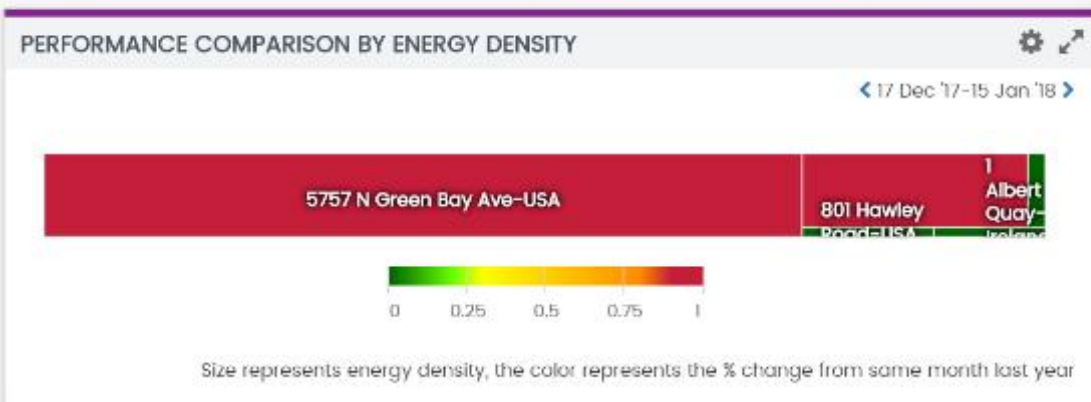
00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00

	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00
3/20/2019	6,963.03	6,674.52	6,531.67	6,568.61	6,514.04	6,910.06	7,606.15	8,013.34	8,986.23	9,189.93	9,343.13	9,308.68	9,275.23	9,261.43	9,429.43	9,811.94	9,429.43
3/21/2019	6,501.04	6,430.79	6,268.86	6,114.44	6,070.81	6,182.27	6,551.91	6,986.80	7,978.23	8,272.94	8,516.78	8,566.74	8,624.17	8,715.35	8,928.42	9,360.42	9,429.43
3/22/2019	6,421.36	6,340.89	6,202.42	6,076.99	6,042.22	6,172.54	6,504.44	6,948.18	7,921.92	8,232.11	8,464.26	8,557.60	8,631.05	8,740.77	8,976.39	9,411.86	9,429.43
3/23/2019	5,740.57	5,801.86	5,694.85	5,481.04	5,422.35	5,514.83	5,688.82	5,817.43	6,082.48	6,363.30	6,664.54	6,922.94	7,067.73	6,993.70	6,944.75	6,993.75	6,993.75



节能诊断云平台JEM

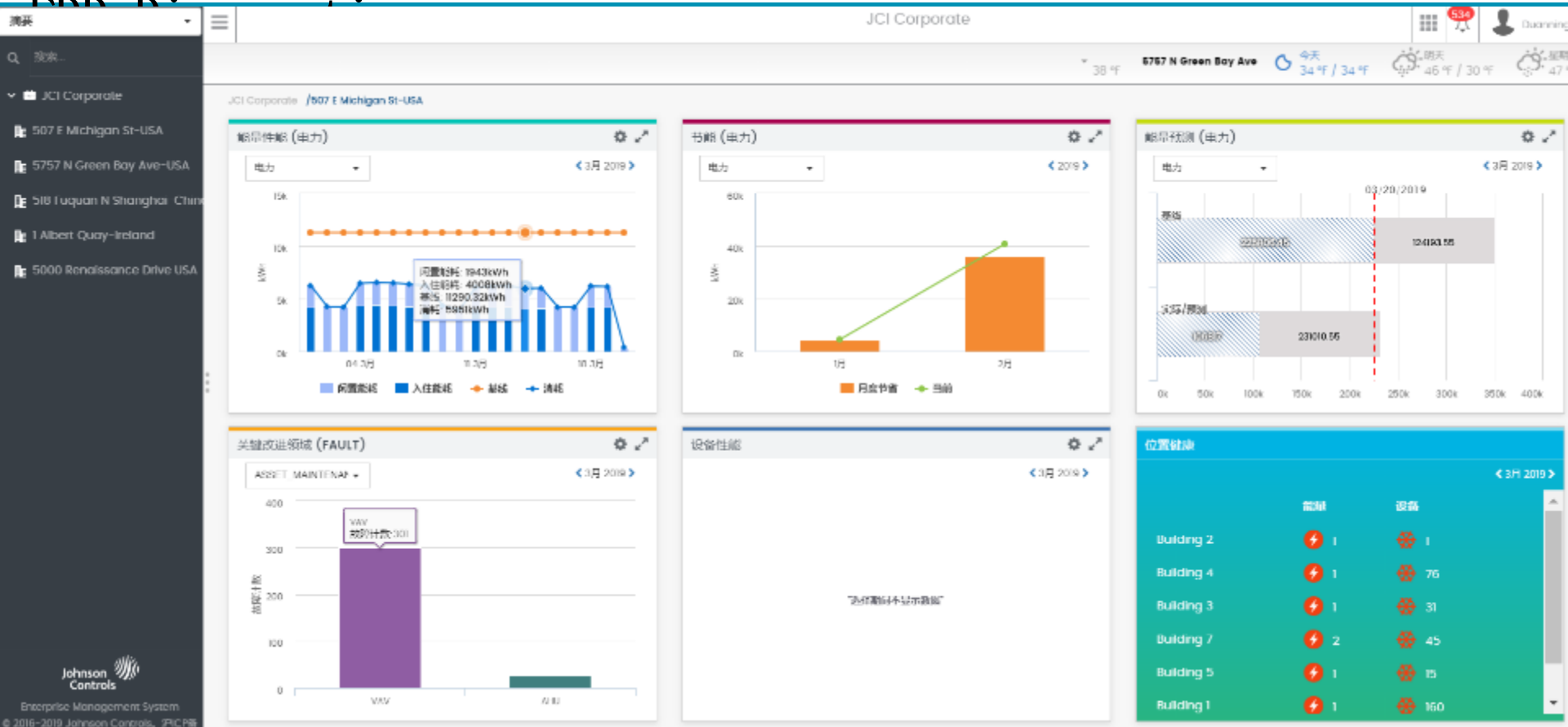
Energy Management Platform



能效呈现与耗能设备运行“故障”匹配关联

Energy Consumption Mapping to Equipment's "Fault" by

EBB Diagnostics



内嵌节能诊断专家库机器诊断发现耗能 “故障” 设备位置、原因、持续时间 Built-in FDD Rule Library Detects “Fault” at Equipment Location, Cause & Duration

概览 自定义 FDD

- 5000 Renaissance Dri 今天 28 年 / 28 年 明天 52 年 / 28 年 后天 50 年 / 38 年

JCI Corporate > 507 E Michigan St-USA > Building 1

Q 搜索

设备	故障名称	时长
507-BIF6-AHU-IR1	AHU-FD-016 CO2 sensor faulty	448.58 Hr
507-BIF5-ZNI4	Abnormal zone temperature setpoint	240 Hr
	VAV-FD-007 High Zone Temperature - Reheat	21.5 Hr
	VAV-FD-004 VAV Low Supply Air Flow - Reheat	21 Hr
507-BIF2-VMA-1B	VAV-FD-019 VAV Zone Temperature higher than effective cooling set point - RH	240 Hr
	VAV-FD-007 High Zone Temperature - Reheat	192.01 Hr
	VAV-FD-004 VAV Low Supply Air Flow - Reheat	150.51 Hr
	VAV-FD-016 Unit is not running - RH	139.01 Hr
UII4 VMA 105	VAV-FD-008 Low Zone Temperature - Reheat	240 Hr
	VAV-FD-020 VAV Zone temperature lower than effective heating set point - RH	240 Hr
	Abnormal zone temperature setpoint	240 Hr
507 UII2 VMA 1B	VAV-FD-019 VAV Zone Temperature higher than effective cooling set point - RH	240 Hr
	VAV-FD-016 Unit is not running - RH	121.01 Hr
	VAV-FD-007 High Zone Temperature - Reheat	89.75 Hr
	VAV-FD-004 VAV Low Supply Air Flow - Reheat	71.5 Hr
	VAV-FD-008 Low Zone Temperature - Reheat	5.75 Hr
507-BIF7-VMA-57	VAV-FD-019 VAV Zone Temperature higher than effective cooling set point - RH	240 Hr
	Unexpected value : Zone temperature sensor	240 Hr

故障

AHU-D-037 CO2 Sensor Faulty (448.58 Hr)

关系

设备由以下提供服务

无可使用设备

设备已获得服务

507-BIF8-VMA-1B, 507-BIF8-VMA-3B, 507-BIF8-VMA-1B, 507-BIF6-VMA-6, 507-BIF6-VMA-7, 507-BIF6-VMA-4, 507-BIF6-VMA-1B, 507-BIF6-VMA-3, 507-BIF6-VMA-1B, 507-BIF6-VMA-2, 507-BIF6-VMA-1B, 507-BIF6-VMA-9, 507-BIF6-VMA-8, 507-BIF6-VMA-1, 507-BIF6-VMA-5, 507-BIF6-VMA-10

楼层/设备位置

Building 1 > Floor 5

工作通知单

创建工作通知单

分析诊断后的措施 - 派工处理故障
 Place work order after “Fault” confirmed



节能诊断专家库包括通用规则和客户定制规则库

FDD Rule Library Covers General Rule & Customer Rule

设置 - 全局规则

空间 仪表配置 设备配置 会员规则 自定义规则 用户 计划 会员市 基础 自动配置 工作通知单 已核封单 历史数据 价格表

设备故障规则 报警 能源故障规则

故障列表 设备类型 选择设备类型 设备类型 选择设备类型 标签 选择全部 搜索故障

故障名称	故障描述	故障优先级	标签	删除设备	故障严重程度映射
AHU-FD-007 Supply Air Flow Less Than Set Value	Supply air flow less than 40% of its set point value	Medium	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-008 Determine if Supply Air Humidity sensor is Faulty	Determine if Supply Air Humidity sensor is Faulty	High	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-008 Determine if Supply Air Temperature sensor is Faulty	Determine if Supply Air Temperature sensor is Faulty	Low	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-010 After Hour Operation	Detect AHU After Hour Operation	Low	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-012 AHU Status and Command Mismatch	Detect if AHU Status and Command is Not Match	Low	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-013 Supply Air Flow Reading During Unit Off	Detect Supply Air Flow Sensor Calibration Issue / Fault	Low	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-014 CHW/HHW valve open while fan inactive	AHU in cooling or heating mode while the supply fan is not running	Low	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-015 CO2 rises during Economy Cycle	In economy cycle CO2 is above set limit	Low	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-016 CO2 sensor faulty	Detect faulty RA CO2 sensor if it shows below 300 ppm	Critical	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AHU-FD-017 Economy damper enabled while fan is off	Detect if economy cycle damper is open while fan is not running	Low	Global	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

每页显示数: 10 / 22 条 共 217 条

故障资产映射

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Johnson Controls

认可 Recognition

该大楼汇集了各种节能产品和解决方案，体现了可持续发展先进技术。Integrated Efficient Product & System in the building which demos the Leading Concept in Sustainability.

该大楼获得LEED铂金级，中国绿色建筑三星认证和世界银行组织EDGE的三重认证。Awarded LEED Platinum, China Green Building 3 Star and World Bank Edge Certificate.

