



世行上海低碳城市项目实施情况汇报

Report on the Implementation of the World Bank's Low Carbon City Project in Shanghai

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Shanghai Changning District Urban Renewal and Low Carbon
Project Management Center

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目录 Contents

一、项目背景 Background

二、发展目标 Goal

三、项目成果 Outcomes

四、体制机制 Institution and Mechanism

五、技术模式 Technical Pattern

六、创新探索 Innovation and Exploration

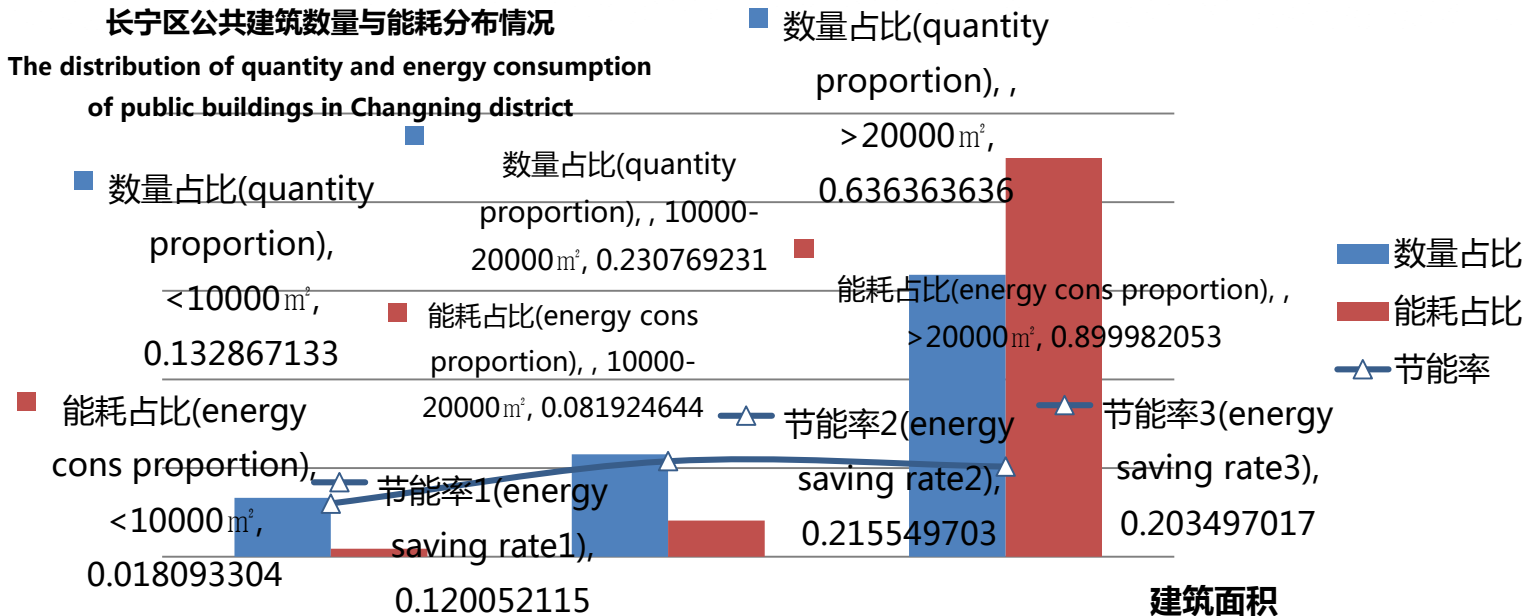
一、项目背景 Background

大型公建是区域能耗重要载体

Large public construction is an important consumer of regional energy

长宁区公共建筑数量与能耗分布情况

The distribution of quantity and energy consumption of public buildings in Changning district



长宁区大型公共建筑约占64%，而建筑能耗占比约为90%

Large public buildings in Changning district account for about 64%, while building energy consumption accounts for about 90%

二、发展目标 Goal

总体目标 General Goal

建成具有示范意义的，建筑能效较高、能源结构优化、绿色交通顺畅、体制机制和政策体系较完善、运作模式创新的低碳发展实践区。

A low-carbon development zone with demonstrative significance, high energy-efficient buildings, optimized energy structure, smooth green transportation, sound institution and mechanism and innovative operation mode will be built



节能76000 吨标煤，减排165000 吨CO₂
Saving 76,000 tons of standard coal,
Reducing 165,000 tons of CO₂ emission

具体指标 Indicators



2015 年的碳排放强度比2010 年下降17% 左右，2018 年下降23%
Carbon intensity in 2015 was about 17% lower than in 2010,
and 23% lower in 2018

三、项目成果—既有公共建筑改造

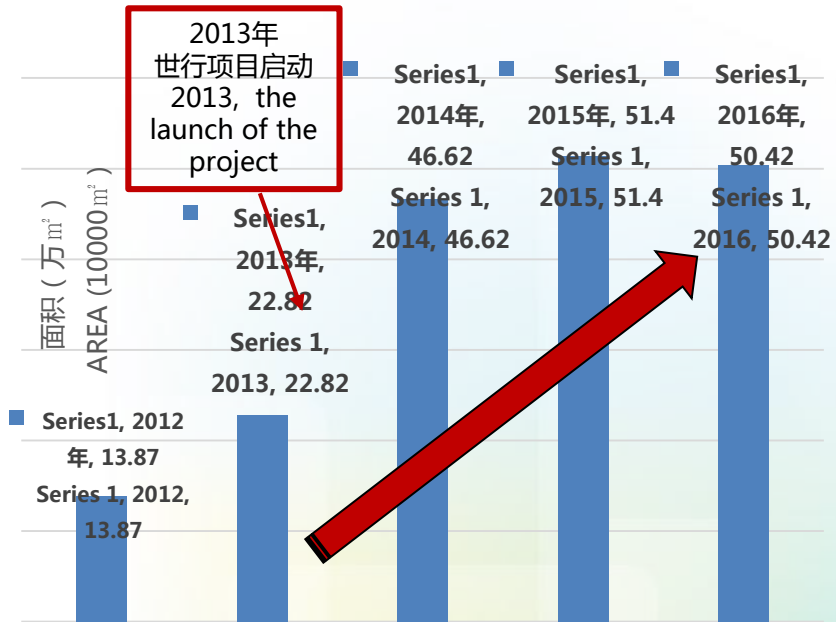
Outcomes: Renovation of Existing Public Buildings

PDO层面成果指标 Outcomes Index at PDO level	衡量单位 Unit of Measurement	累计目标值和实际完成情况 Cumulative target value and actual completion	说明 Notes
		FY2013-2018	
1.长宁区单位GDP累计碳强度 Cumulative carbon intensity per unit GDP of Changning district	%	项目结束时实现碳排放强度较2010年下降31% By the end of the project, carbon intensity was 31% lower than in 2010	根据当前上海用能结构按加权排放因子2.166吨二氧化碳/吨标煤换算用能强度目标。A1框是关于换算方式的说明。 According to the current energy structure of Shanghai, the goal of energy consuming intensity is converted according to the weighted emission factor, 2.166 tons of carbon dioxide/ton coal . Box A1 is a description of the conversion method.
2. 项目投资产生的节能量 Energy savings from project investment	吨标煤 Tons of standard coal	76000/84000	假设建筑子项目平均投资成本为20000元/吨标煤或3175美元/吨标煤 Assume that the average investment cost of construction sub-projects is 20,000 yuan per ton of standard coal or 3,175 dollars per ton of standard coal
3.项目投资产生的二氧化碳减排量 CO2 emission reduction from project investment	吨二氧化碳 Tons of carbon dioxide	176000/202949	按照目前上海能源结构假设为2.166吨二氧化碳/吨标煤。该假设没有将未来排放因子的预期变化考虑进去。According to the current energy structure in Shanghai, it is assumed that the conversion index is 2.166 tons of carbon dioxide per ton of standard coal. This assumption does not take into account the expected changes in future emission factors.
4.项目总投资 Total project investment	万美元 10 thousand dollars	25600/29850	—

GEF成果指标 GEF outcomes index	衡量单位 Unit of Measurement	目标值 和实际完成情况 Target value and actual completion	说明 Notes
		FY2013-2018	
项目支持的低碳投资额 Low Carbon Investment Supported by Projects	万美元 Ten thousand dollars	435.5	—
试点的创新改造政策 Innovation and Reform Policy of Pilot Project	—	出台能效对标制度和创新的约束政策 Publishing Energy Efficiency Comparison System and Innovation Restriction Policy	—
在长宁区建设160栋建筑的在线能源监控平台 On-line Energy Monitoring Platform for 160 Buildings in Changning District	—	完成187幢公共建筑在线能源监测平台 On-line energy monitoring platforms for 187 public buildings	—
试点一座近零排放建筑 A Near Zero Emission Building	—	完成虹桥迎宾馆9号楼和内江路191号两幢近零项目 Complete two near-zero projects: No.9 Building of Hong Qiao State Guest Hotel and No.191 Neijiang Road	—
建设至少一座分布式供能中心 Building at least one distributed energy supply center	—	贷款支持了三个分布式供能中心，完成同仁医院智慧能源系统建设，启动了临空能源互联网建设 The loan supports three distributed energy supply centers, completes the construction of intelligent energy system in Tongren Hospital, and initiates the construction of air-related energy internet	—
在长宁试点非机动车系统 Non-motor Vehicle System in Changning	—	完成虹桥慢行道路系统和长宁慢行道路系统的规划建设 Complete the planning and construction of Hongqiao non-motor Road System and Changning non-motor Road System	—

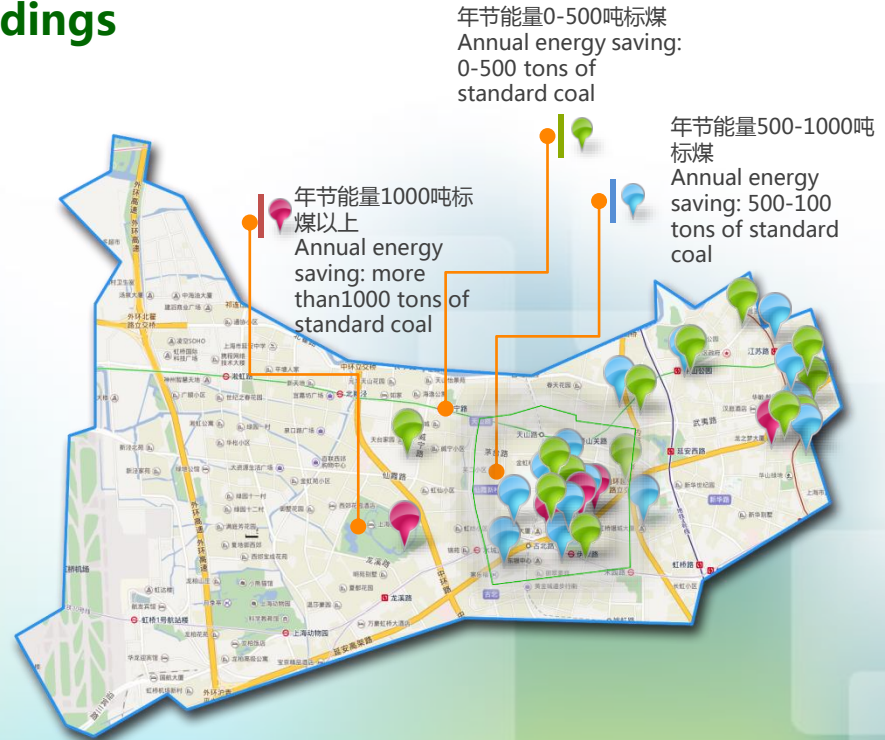
三、项目成果—既有公共建筑改造

Outcomes: Renovation of Existing Public Buildings



逐年完成既有公建节能改造面积

the energy-saving transformation area of existing public buildings year by year



三、项目成果—既有公共建筑改造

Outcomes: Renovation of Existing Public Buildings

世行项目启动后，长宁区既有公建节能改造速度加快。累计完成既有建筑节能改造项目37个，建筑面积达240万平方米，年节能2.1万吨标准煤/年，平均节能率达到18%。

Since the launch of the World Bank project, the speed of energy-saving renovation of existing public buildings in Changning District has been accelerated. 37 energy-saving renovation projects for existing buildings have been completed, with an area of 2.4 million square meters and an annual energy-saving rate of 21,000 tons of standard coal per year; average energy-saving rate is 18%.

三、项目成果—既有公共建筑改造案例

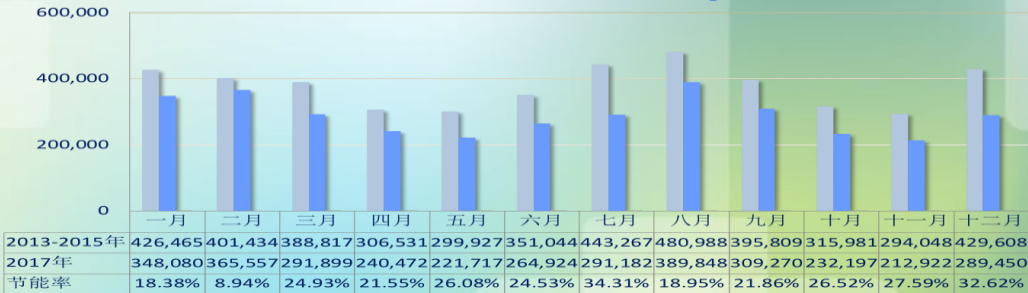
Outcomes: Case of Renovation of Existing Public Buildings



中央空调能耗偏高 High energy consumption of central air conditioning
——过渡季节、特殊时段大马拉小车 Waste in transitional season and special period

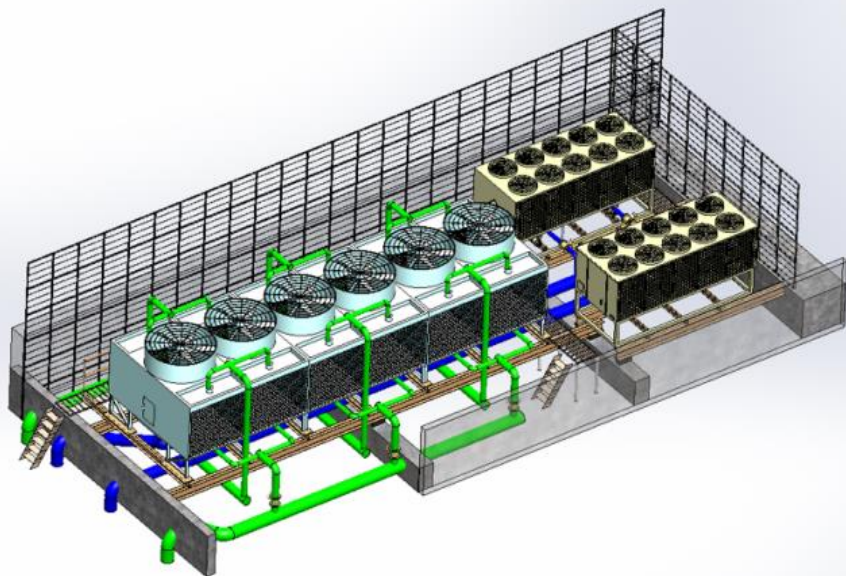
缺少安全运行保障 Lack of Safe Operation Guarantee
——空调冷热源、水泵无备用设备 No backup for cold and heat sources of air conditioning and water pumps

节能光源使用率低 Low utilization rate of energy-saving light source
——LED光源使用率 <3% The utilization rate of LED light is less than 3%



三、项目成果—既有公共建筑改造案例

Outcomes: Case of Renovation of Existing Public Buildings



预装式系统设计

Preassembled system design

BIM技术应用

BIM Technology

集约化、精细化管理

More centralized and accurate
management

四、体制机制—机制+资金+政策 Institution and Mechanism: Mechanism+Finance+Policy

① 一个机构 One department



两个融合：

1. 政府内部横向融合；
2. 注重市场方式融合。

Integration:

1. Horizontal integration within the government;
2. Focus on market integration

② 一个专项资金 A special fund



专项资金
Special fund

2319万元
23.19 million Yuan



市场投入
Market input

1.41亿元
141 million Yuan

1 : 6.1

③ 一套政策 A set of policies

上海市长宁区人民政府文件

长府〔2013〕3号

上海市长宁区人民政府关于批转区发展改革委
制订的《长宁区低碳发展专项资金管理办法》的通知

区政府各委、办、局，各街道办事处，街道办事处：为
促进我区低碳发展，根据《长宁区低碳发展专项资金管理办法》
已经2012年12月31日区政府第38次常务会议讨论通过，现予
发布执行，请认真贯彻执行。



三个转变：

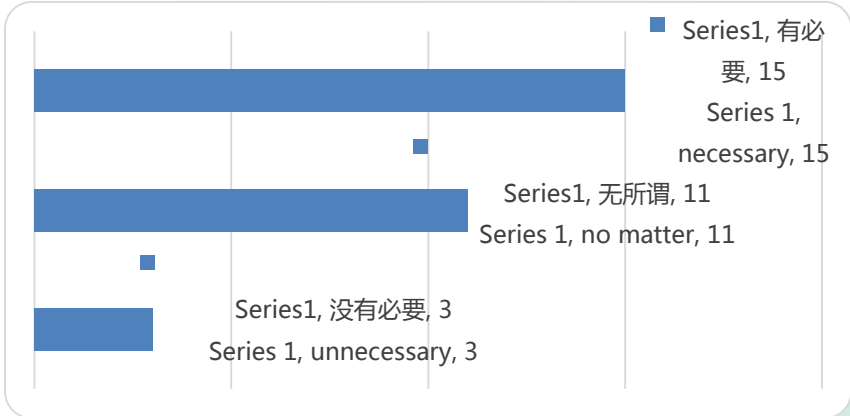
1. 补贴方向转变；
2. 补贴力度降低；
3. 补贴针对性强。

Three changes:

1. The direction of subsidies changed.
2. Decrease in subsidies;
3. Subsidies are highly targeted

四、体制机制—能效对标

Institution and Mechanism: Comparison of Energy Efficiency



有无必要公示自己楼宇的能耗和能效
信息反馈统计

建筑基本信息

详细地址	红宝石路 500 号
建筑面积 (㎡)	87251.53
建筑年代	2008
建筑类型	☒ 办公建筑 ☐ 商场建筑 ☐ 宾馆饭店建筑 ☐ 综合建筑 ☐ 其他: _____

建筑能耗情况

统计年份	2017	总能耗 (tce)	3058.0
可比单位面积综合能耗 (kgce/m²·a)	35.0	能效水平评价	☐ “先进”建筑 ☒ “达标”建筑 ☐ “未达标”建筑

可比单位面积综合能耗

单位: kgce/m²·a

距离合理值的提升空间

/

距离先进值的提升空间

6%

排名: 10
平均值: 32.8

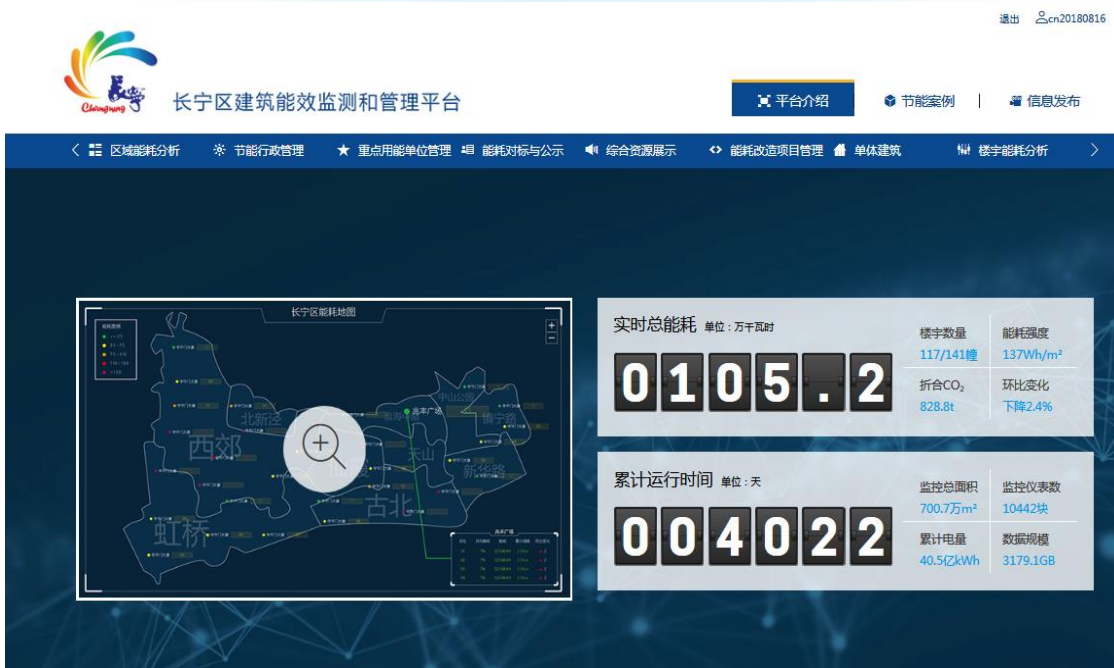
附注: 该建筑与长宁区同类建筑相比, 能耗从高到低排名

四、体制机制—在线监测平台

Institution and Mechanism: Online Monitoring Platform

累计接入**187幢**公共建筑，参与**6.1亿度**电能管理，长宁区既有公建覆盖率**99%以上**

Connect **187** public buildings and participate in **610 million kw·h** power management;
more than **99%** coverage rate of existing public buildings in Changning District.



功能拓展：

- 1、注重政府管理功能；
- 2、市场化功能的服务；

Functional expansion:

1. Focus on the function of government management;
2. Services of marketization function

五、技术模式—用能托管

Technical Pattern: Energy Entrustment



第三方能源托管系统产生的背景 The Background of the Third Party Energy Entrustment System

1、物业节能管理的需求；2、NB-IOT等新技术的出现。

1. Requirements for energy-saving; 2. The emergence of new technologies such as NB-IOT

五、技术模式—用能托管

Technical Pattern: Energy Entrustment

优势

- 1、现场操作人员减少；
- 2、系统运行更稳定、更节能；
- 3、设备使用寿命更长。

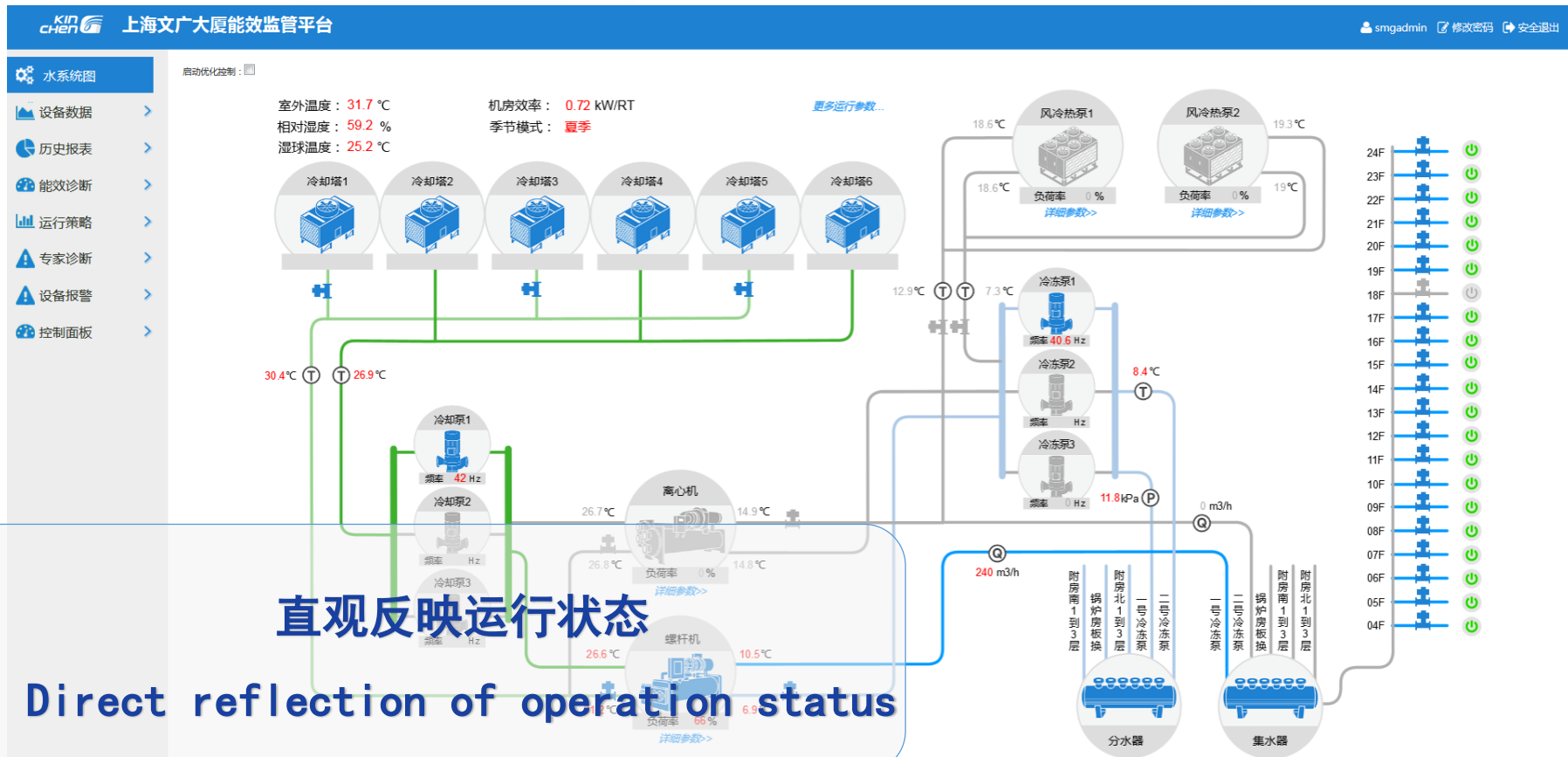
Advantage

1. Reduction of field operators;
2. The system is more stable and energy-saving.
3. Long service life of equipment



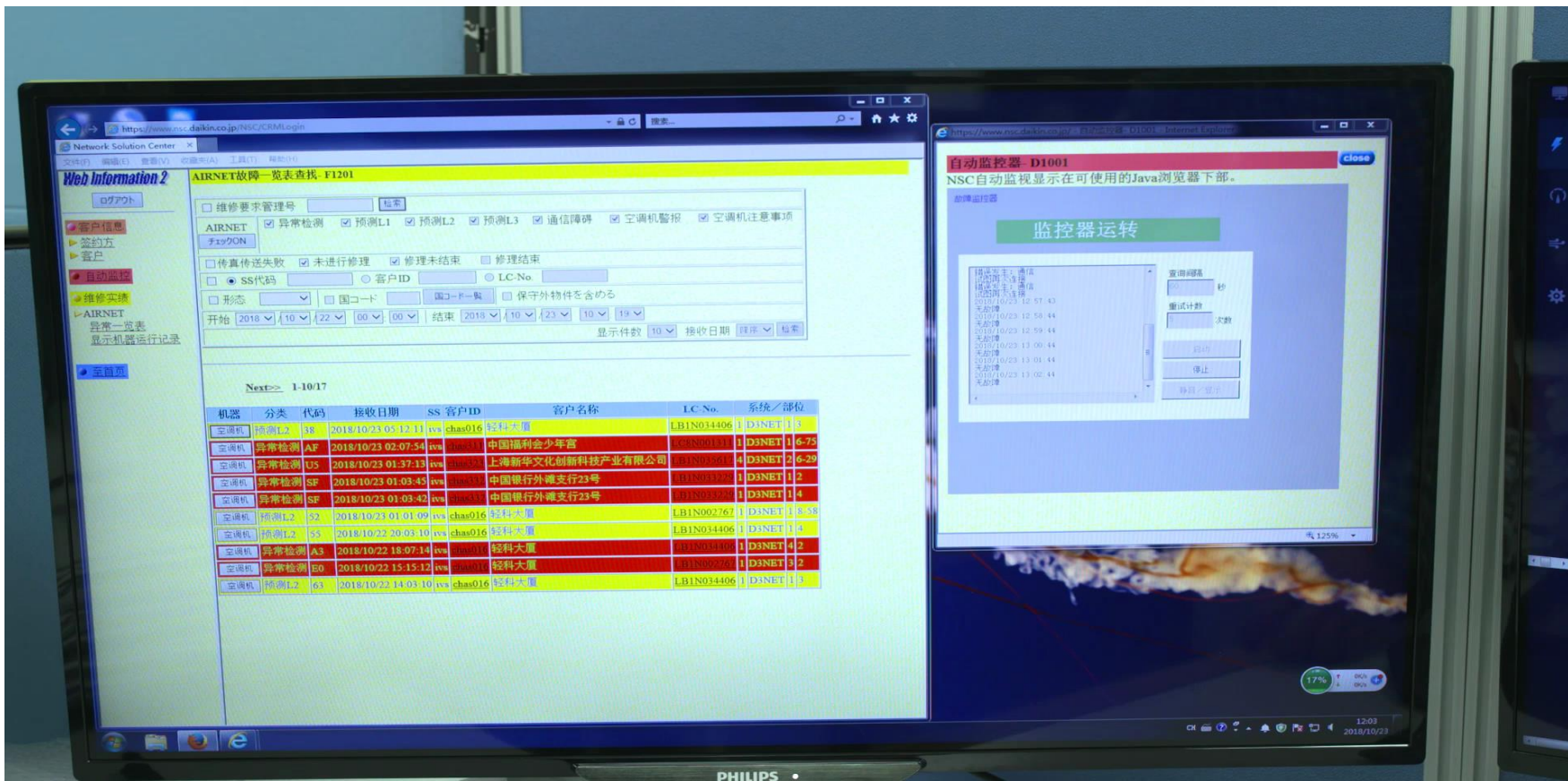
五、技术模式—用能托管

Technical Pattern: Energy Entrustment



Technical Pattern: Energy Entrustment

Technical Pattern: Energy Entrustment



五、技术模式—全过程管理模式

Technical Pattern: Whole Process Management Mode

全过程节能管理模式保障绿色建筑技术实施效果

The whole process energy-saving management mode ensures the implementation of green building technology

示范案例：上海虹桥迎宾馆某办公楼

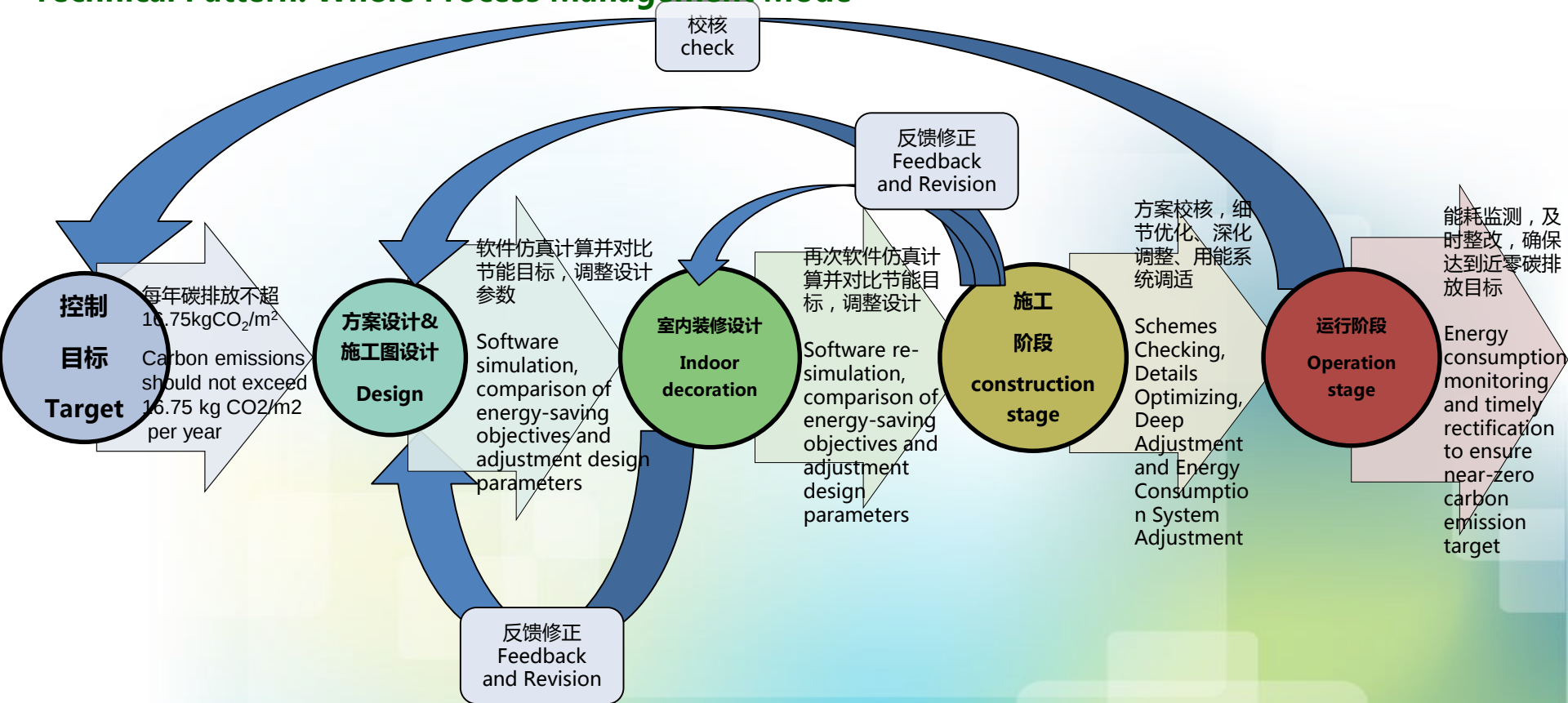
Case: an office building of Hong Qiao State Guest Hotel , Shanghai

- ❑ 全生命周期指标控制 Life Cycle Index Control
- ❑ 各阶段内容反馈修正 Feedback and Revision in Each Stage



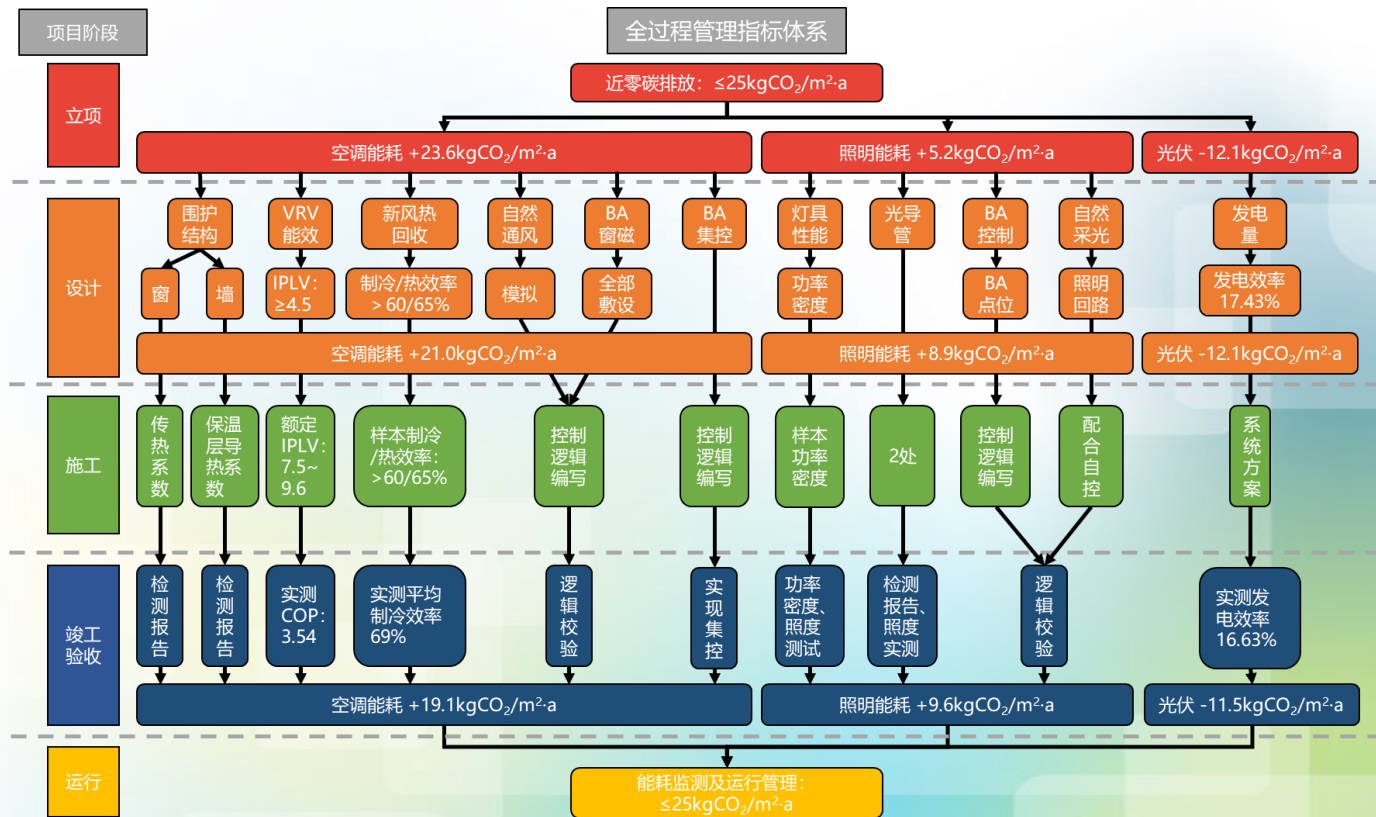
五、技术模式—全过程管理模式

Technical Pattern: Whole Process Management Mode



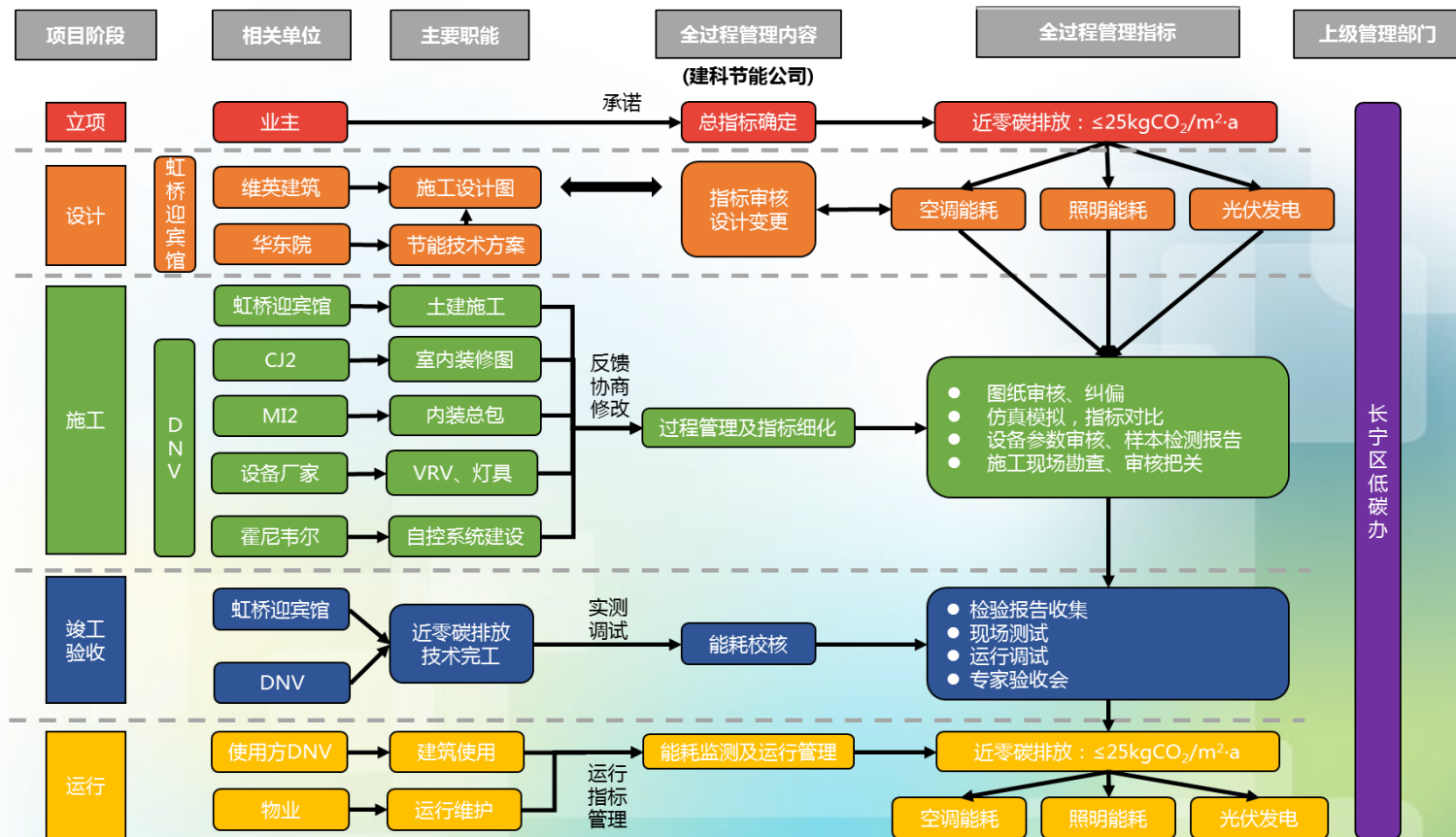
五、技术模式—全过程管理模式

Technical Pattern: Whole Process Management Mode



五、技术模式—全过程管理模式

Technical Pattern: Whole Process Management Mode



五、技术模式—近零超低能耗建筑建设案例

Technical Pattern: Case of Construction of Near-zero Ultra-low-energy Buildings

虹桥迎宾馆9号楼

No.9 Building of Hong Qiao
State Guest Hotel



建筑全年能耗 Annual energy consumption	单位建筑面积CO2排放CO2 emission per unit building area (kgCO ₂ /m ² .a)
实测排放值 Measured emission	24.39

内江路191号近零改建项目

No.191 Neijiang Road Near-zero
Project



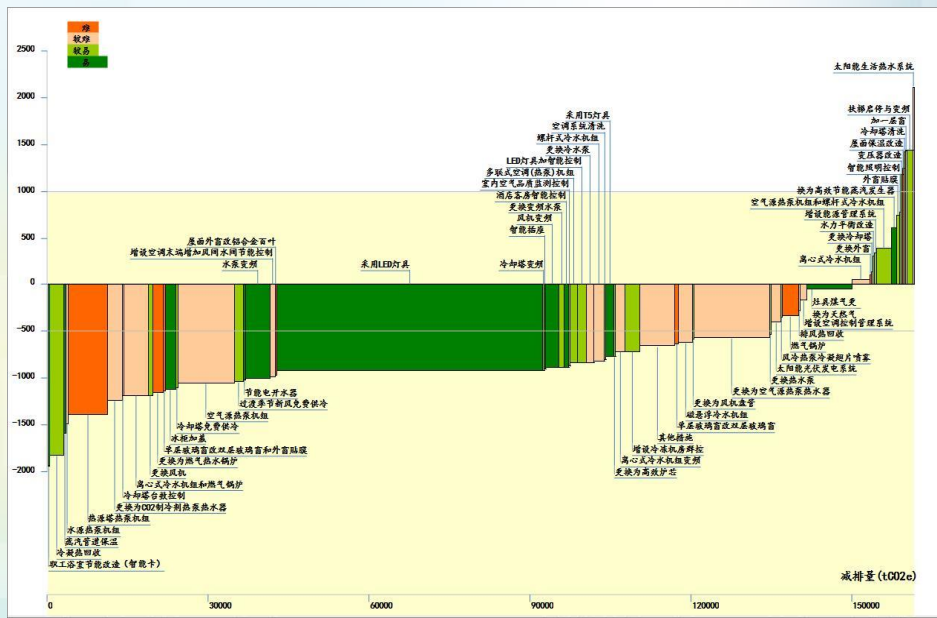
建筑全年能耗 Annual energy consumption	单位建筑面积CO2排放 emission per unit building area (kgCO ₂ /m ² .a)
设计排放值 Designed emission	6.96

五、技术模式—节能减排成本曲线

Technical Pattern: Cost Curve of Energy Saving and Emission Reduction

动态节能减排成本曲线：支撑三维信息（横坐标减排量、纵坐标CO₂减排成本、实施难易度）、还可提供四维及以上的信息，绘制区域减排成本曲线

Dynamic energy saving and emission reduction cost curve: support three-dimensional information (abscissa emission reduction; vertical coordinate CO₂ emission reduction cost and implementation difficulty), provide four-dimensional information or more, and draw regional emission reduction cost curve



五、技术模式—节能减排成本曲线

Technical Pattern: Cost Curve of Energy Saving and Emission Reduction

▣ 减排成本曲线开发步骤(Development steps of emission reduction cost curve)

- 对长宁虹桥地区进行一次**自下而上**的全面调查，分析诊断目前的用能模式，确定用能措施（85幢楼、57种技术）

A **bottom-up** survey was conducted in Hongqiao area of Changning to analyze the current energy using patterns and determine energy using measures (85 buildings, 57 technologies).

- 在调查所得数据的基础上，绘制CO2减排曲线，确定各项减排措施的减排潜力和成本

Based on the data obtained from the survey, draw the CO2 emission reduction curve and determine the potential and cost of various emission reduction measures.

- 根据减排潜力、成本和实施的难易程度给各项减排措施排序

Rank the emission reduction measures according to their potential, cost and difficulty of implementation

- 设置可选用的减排情景，设定一个低碳目标

Set an optional emission reduction scenario and a low-carbon target

五、技术模式—节能减排成本曲线

Technical Pattern: Cost Curve of Energy Saving and Emission Reduction

□ 减排成本曲线开发步骤(Development steps of emission reduction cost curve)

- 收集建筑节能改造项目资料，通过整理、提取，对节能减排技术进行全面分析

Collect the data of building energy-saving renovation project, and make a comprehensive analysis of energy-saving and emission reduction technology.

- 在所得数据的基础上，建立数据库，绘制二氧化碳减排曲线，确定各项减排措施的减排量和成本

Based on the data obtained, establish a database, draw a carbon dioxide emission reduction curve, and determine the amount and cost of various emission reduction measures.

- 根据减排量、成本和实施的难易程度给各项减排措施排序

Rank the emission reduction measures according to their amount, cost and difficulty of implementation

- 计算示范项目**实际节能量**

Calculating the **actual energy saving** of demonstration projects

六、创新探索—区域能源互联网

Innovation and Exploration: Regional energy Internet

临空能源互联网 air-related energy internet

电力公司侧

用户侧

