



上海市长宁区建筑能效提升路径
Building Energy Efficiency Improvement Path
——Chiangning District, Shanghai

冒勤

上海市长宁区城市更新和低碳项目管理中心 2019年7月23日

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July 23rd, 2019

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1. 背景

1. Background



2 着力探索特大型城市老城区经济楼宇低碳改造的模式与路径。Focus on exploring economical low-carbon retrofit mode and path for buildings in the old urban areas of mega cities.



1 实现城市可持续发展。
To achieve sustainable urban development.



3 通过既有建筑低碳节能改造推动新理念、新技术、新能源应用，提升城市软实力。Promoting new concepts, new technologies, and new energy applications through low-carbon energy-efficiency retrofit of existing buildings to enhance the soft power of the city.

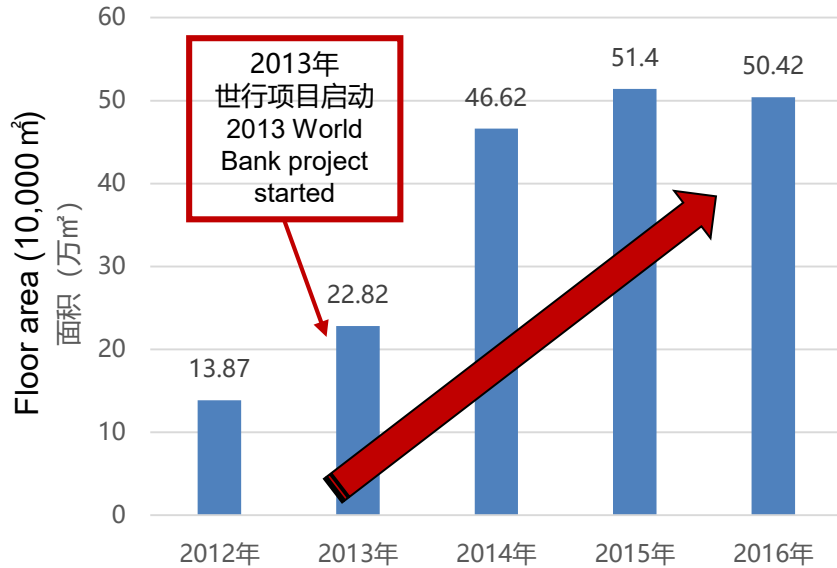
4 推动国际合作，借鉴和应用国内外先进理念、技术和机制，形成体制机制完善、政策体系完备、运作模式创新的可推广、可复制的经验与做法。Promoting international cooperation, drawing on and applying advanced concepts, technologies and mechanisms domestic and abroad, forming experience and practices that can be popularized and replicated with perfect system and mechanism, complete policy system and innovative operation mode.

2. 实践成果

2. Achievements

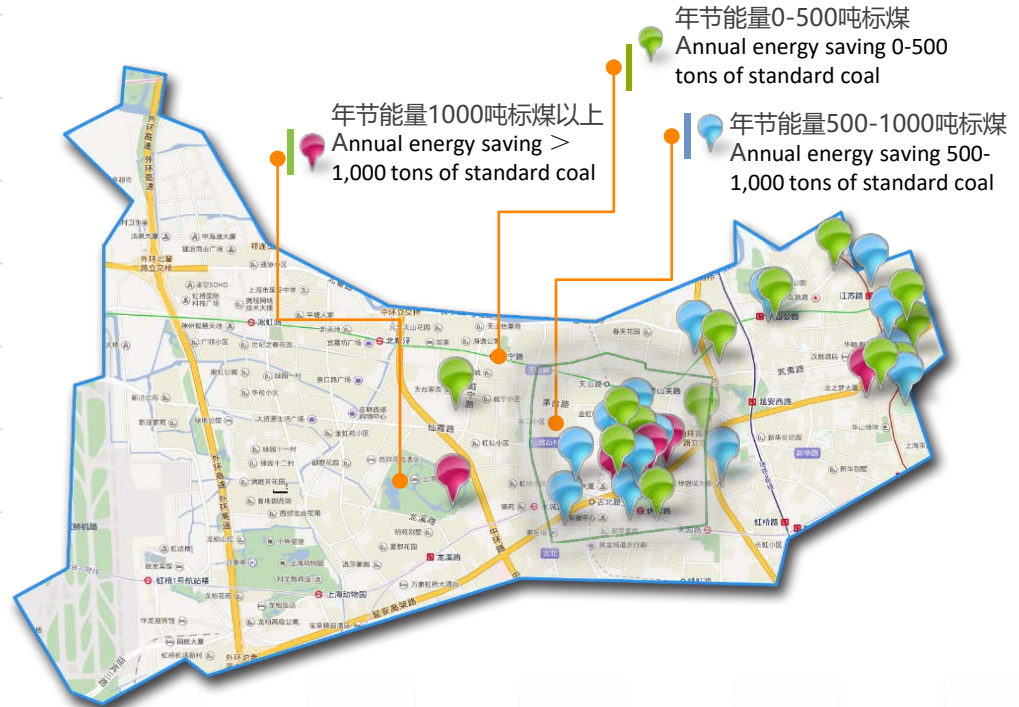
推动既有建筑节能改造

Promoting Existing Building Energy-efficiency Retrofit



逐年完成既有公建节能改造面积

Floor area completed energy-efficiency retrofit of existing commercial buildings, year by year



2012-2018年，累计完成既有建筑节能改造项目45个，建筑面积达240万平方米，年节能约3万吨标准煤/年。 From 2012 to 2018, 45 existing commercial building retrofit projects have been completed, with a floor area of 2.4 million square meters and an annual energy saving of about 30,000 tons of standard coal.

3. 路径——理念发展

3. Path —— Concept Development

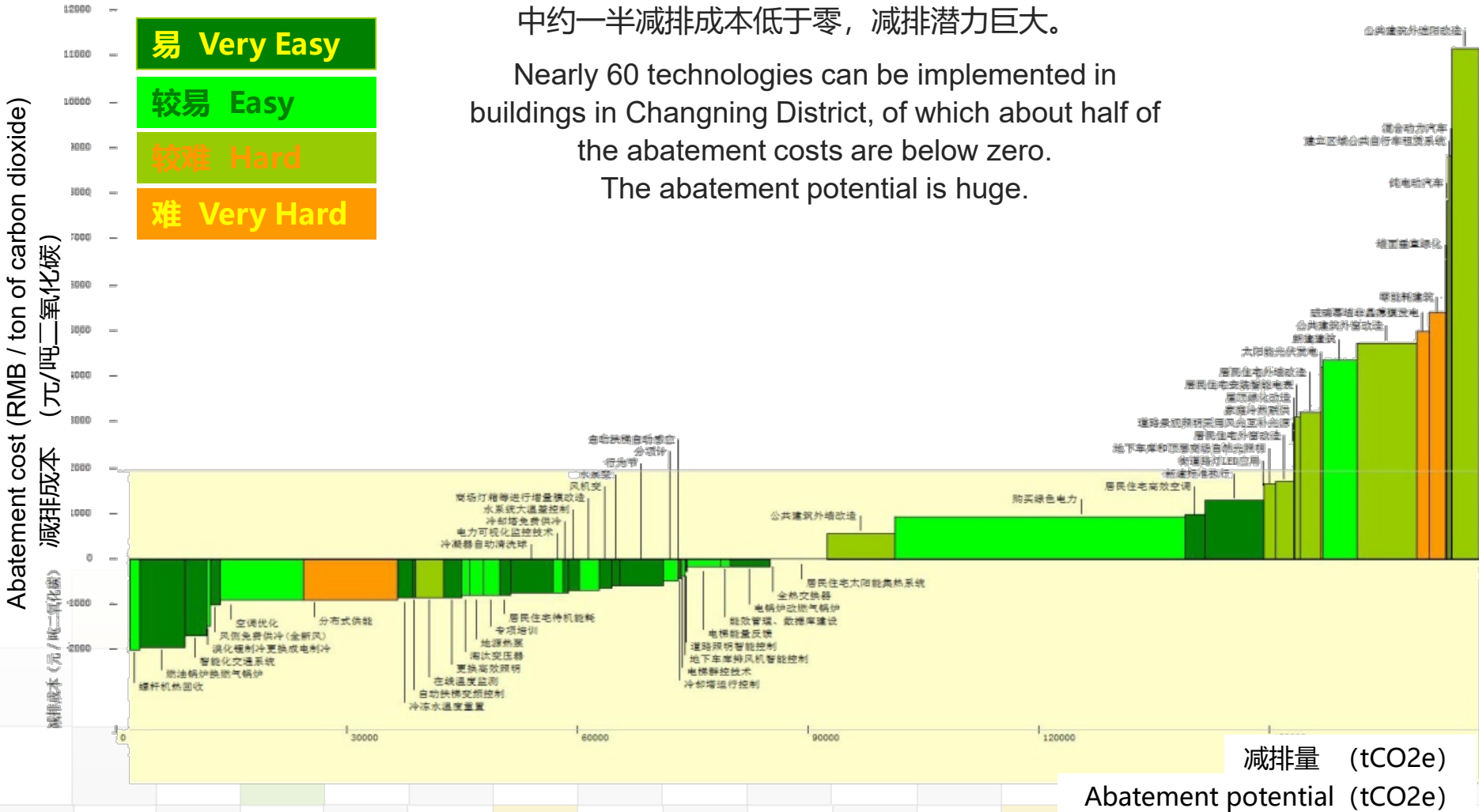


3. 路径——基础调研

3. Path —— Fundamental Investigate & Survey

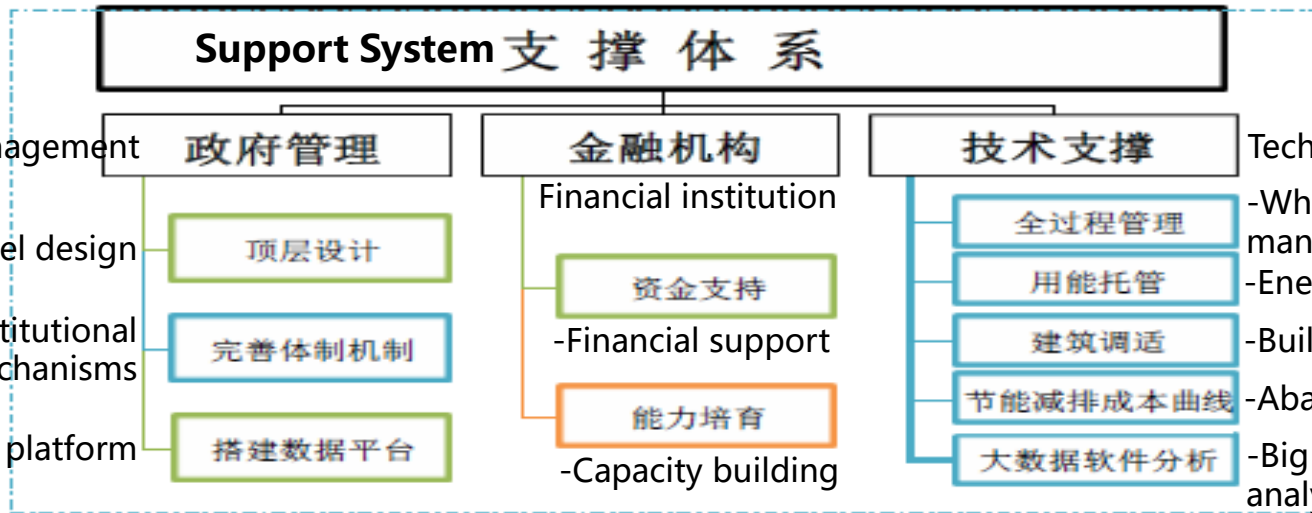
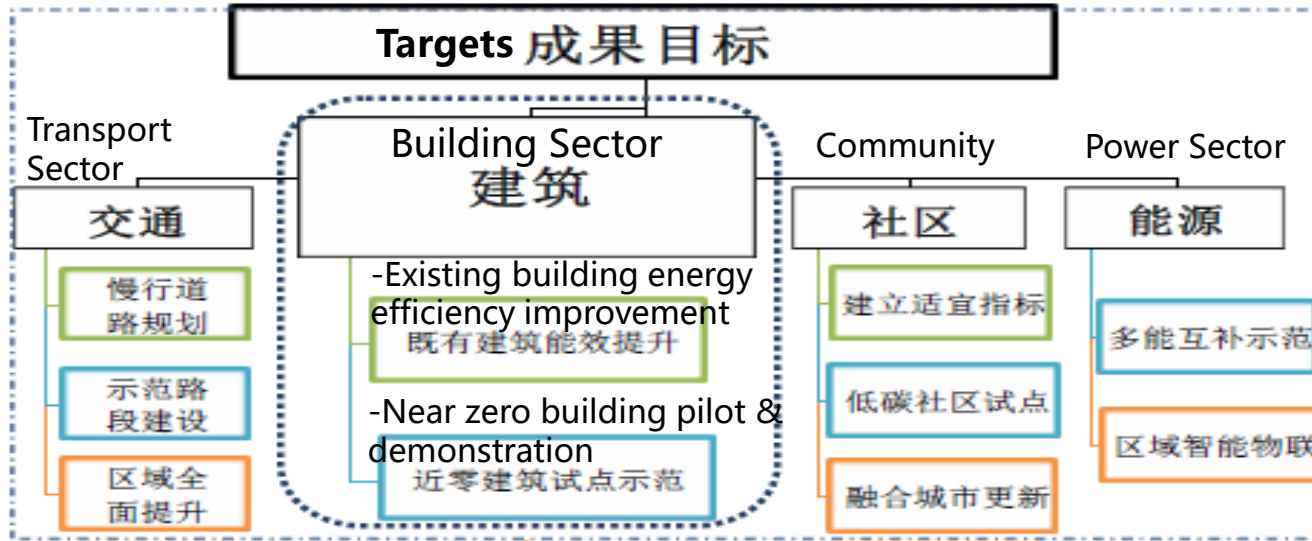
约有近60项技术可以在长宁区内建筑实施,其中约一半减排成本低于零, 减排潜力巨大。

Nearly 60 technologies can be implemented in buildings in Changning District, of which about half of the abatement costs are below zero. The abatement potential is huge.



3. 路径——顶层设计

3. Path —— Top-level Design



Excellent **优良** Pilot **示范** Explore **探索**

3. 路径——政策设计

3. Path —— Policy Design

建筑基本信息 Building basic information

详细地址	红宝石路 500 号
建筑面积 (m²)	87251.53
建筑年代	2008
建筑类型	<input checked="" type="checkbox"/> 办公建筑 <input type="checkbox"/> 商场建筑 <input type="checkbox"/> 宾馆饭店建筑 <input type="checkbox"/> 综合建筑 <input type="checkbox"/> 其他: _____

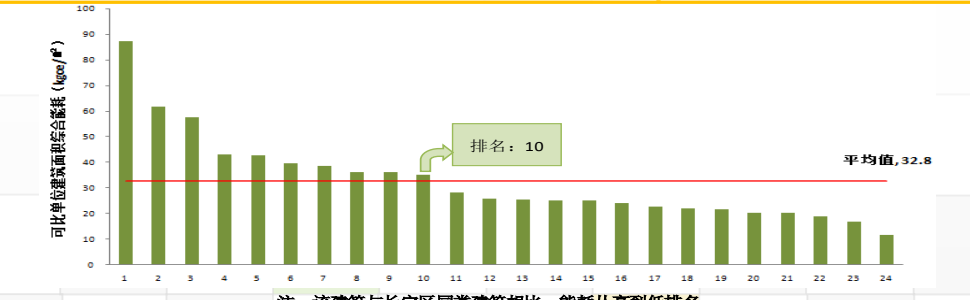


建筑能耗情况 Building energy consumption and energy efficiency status

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	<input type="checkbox"/> “先进”建筑 <input checked="" type="checkbox"/> “达标”建筑 <input type="checkbox"/> “未达标”建筑



距离合理值的提升空间	/
距离先进值的提升空间	6%



注: 该建筑与长宁区同类建筑相比, 能耗从高到低排名

附注:

配套措施
supporting
measures



专项补贴
Subsidy

2319 万元

23,19 million RMB

市场投入
Market Input

1.41 亿元

141,00 million RMB

1

:

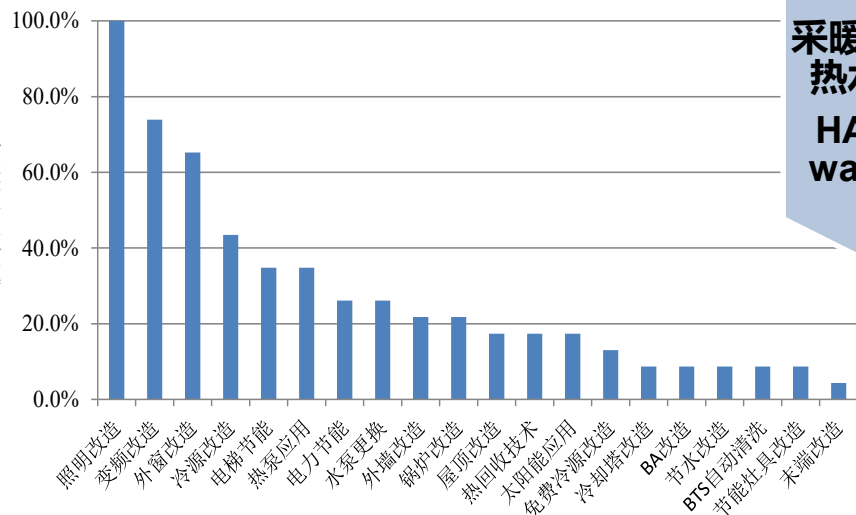
6.1

3. 路径——技术措施

3. Path —— Technical Measures

技术有效支撑

Effective technical support



长宁区既有建筑节能改造实施技术统计

- 照明节能技术应用率最高，达到100%
- 变频改造73.9%
- 外窗改造65.2%
- 冷源改造43.5%
- 电梯34.8%

Existing Building Energy-efficiency Retrofit Technical Implementation Statistics in Changning District:

- Lighting energy-saving technology has the highest application rate, up to 100%
- Frequency conversion retrofit 73.9%
- Exterior window retrofit 65.2%
- Cold source retrofit 43.5%
- Elevator 34.8%

采暖通风空调和热水供应系统 HAVC & Hot water supply system

- 空气源热泵
- 磁悬浮冷机
- 风机变频
- 水泵变频
- 全热交换器
- 冷却塔免费供冷
- 冷却塔清洗和改造
- 锅炉更换或改造
- 燃油锅炉换燃气锅炉
- 锅炉余热回收利用
- Air source heat pump
- Magnetic suspension cooler
- Fan frequency conversion
- Water pump frequency conversion
- Total heat exchanger
- Cooling tower free cooling
- Cooling tower cleaning and retrofit
- Boiler replacement or retrofit
- Oil boiler to gas boiler
- Boiler waste heat recovery

照明系统 Lighting System

- 更换高效照明
- 商场灯箱增亮膜改造
- Replace efficient lighting
- Mall light box brightness film modification

监测和控制系统 Monitoring & Control System

- BA系统优化
- 远程能源系统托管
- BA system optimization
- Remote energy system hosting

可再生能源利用 Renewable Energy

- 太阳能热水系统
- 太阳能光伏发电
- Solar water heating system
- Solar photovoltaic power generation

电梯系统 Elevator System

- 电梯能量反馈
- 自动扶梯变频控制
- 自动扶梯自动感应控制
- Elevator energy feedback
- Escalator frequency conversion control
- Escalator automatic induction control

3. 路径——调适应用

3. Path —— Building Commissioning

托管模式下的
常态化调适

Normalized building
commissioning
under energy
hosting model

- 采用EMC模式，由调适服务商提供调适服务并承担设备投资
- 节能效益按合同约定分成
- Using EMC model, the service provider (ESCO) provides the commissioning service and undertakes the equipment investment
- Energy saving benefit is divided according to the contract

EMC模式
EMC Model

独立的调适
咨询服务

Independent
building
commissioning
service

- 调适服务商通过调研、测试、诊断，为业主提供纯咨询方案，给出调适建议
- 纯咨询方案
- 咨询+调适服务
- Through investigation, testing and diagnosis, the service provider provides the building owner with pure consultation plan and gives commissioning suggestions
- Pure consulting program
- Consulting + commissioning service

既有公建用能系统
调适的应用模式
Existing Application
models of existing
commercial building
energy system
commissioning

改造的后续
优化服务

Follow-up
optimization
service of building
retrofit

- 独立于改造项目，在改造结束后，提供后续的优化调适服务
- 与节能改造项目相结合，通过调适保障节能改造效果
- Independent of the retrofit project, after the completion of the retrofit, to provide follow-up optimization commissioning services
- Combined with energy efficiency retrofit project, to guarantee the energy savings of the retrofit with commissioning

实际能效为目标的
设备安装后的
冷站调适

Cold station
commissioning after
equipment installation
aiming at actual energy
efficiency target

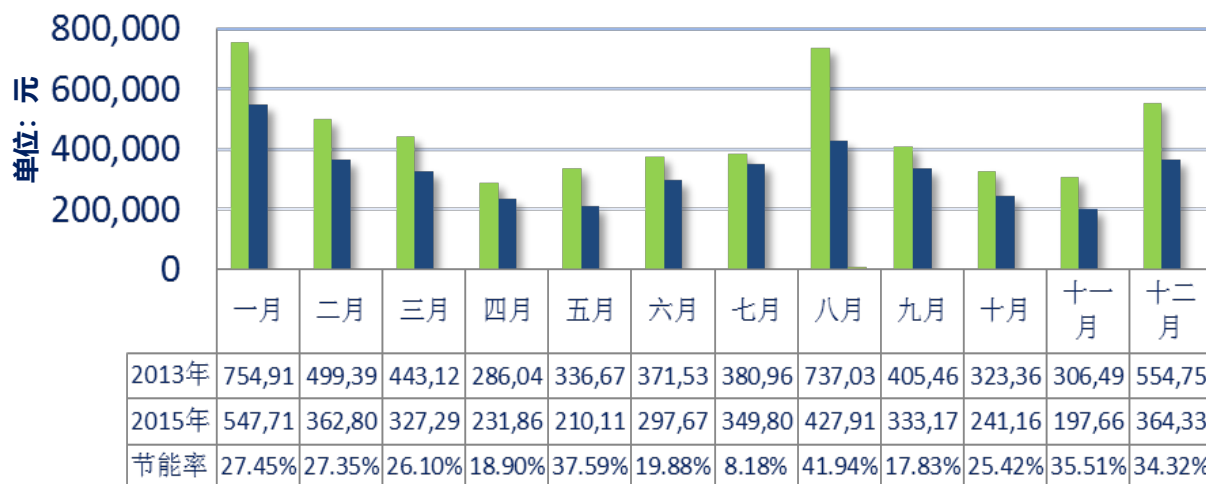
3. 路径——智能运维

3. Path —— Intelligent operation and maintenance

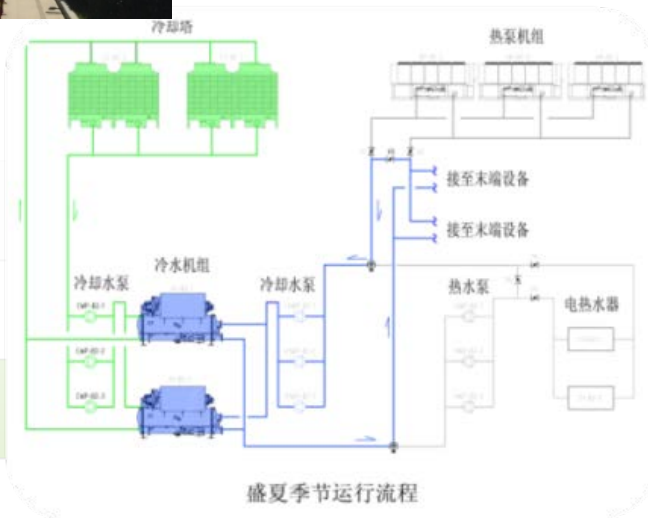


2017年节能量折合标煤412.89 tce，节能率23.85%

In 2017, the energy saving amount is equivalent to 412.89 tce of standard coal, and the energy saving rate is 23.85%.



面积: 42229m²
 业态: 5A办公
 Floor Area: 42229m²
 Type: 5A Office



4. 经验总结——动态成本曲线

4. Experience Summary —— Dynamic Cost Curve

□ 动态减排成本曲线特点

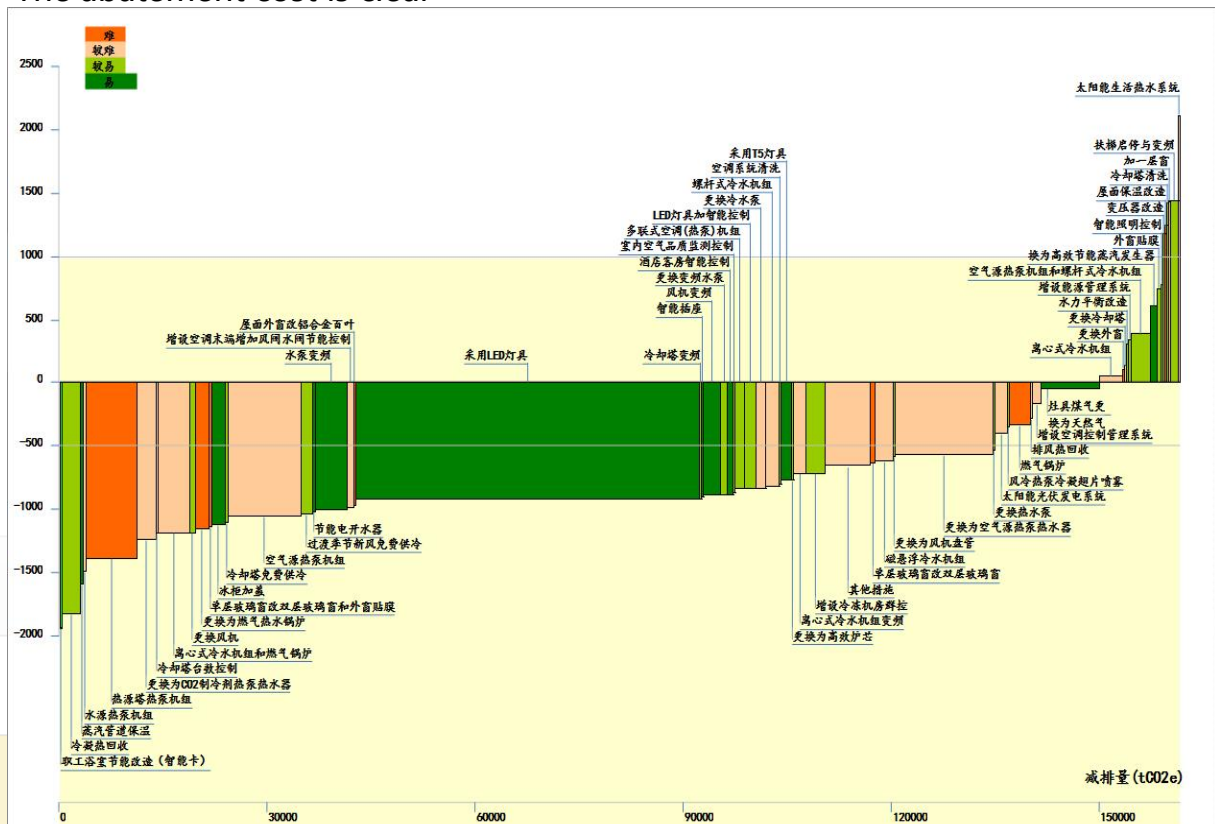
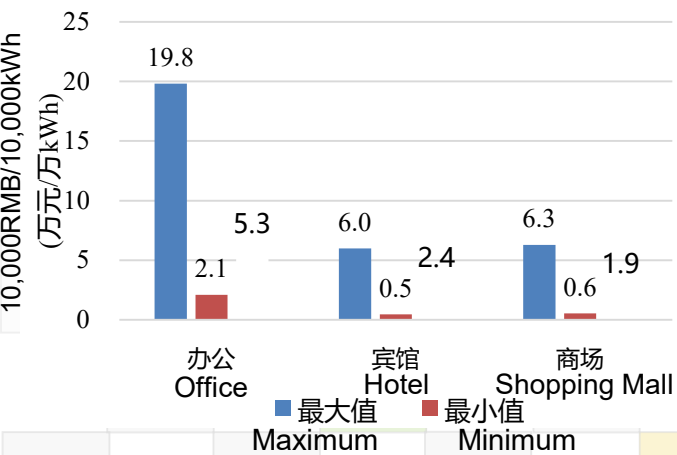
- 基于互联网，可以滚动更新
- 聚焦公共建筑节能改造领域，可以细分建筑类型
- 以实际用能案例数据为支撑：减排量不是该技术的减排潜力，而是实际形成的减排能力
- 成本清晰

□ Characteristics of dynamic abatement cost curve

- Internet-based, could be continuously rolling update
- Focusing on commercial building energy efficiency retrofit field, building types can be subdivided
- Supported by actual case data of energy use, emission reduction is not the emission reduction potential of this technology, but the emission reduction capacity actually formed
- The abatement cost is clear

Investment cost of 10,000 kWh energy savings of different commercial building types

不同建筑类型节能1万kWh的投资成本





谢谢聆听！
Thank you !

