US Environmental Protection Agency's ENERGY STAR Building Rating Program and US-China Collaboration on Benchmarking
美国能源环保署能源之星建筑能效评级项目及中美能效评测比对的合作

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The Equation
等式

BUILDINGS建筑 =

ENERGY CONSUMPTION能源消耗 =

BURNING FOSSIL FUEL燃烧化石燃料 =

CO_2 EMISSIONS CO_2 排放

Technology ≠ Performance
技术≠ 高效

- 60% fan systems oversized by 60%.
  60% 的风机系统设计能力超出实际需求60%
- Chillers oversized 50% to 200%.
  冷机设计能力超过实际需求的50%-200%
- Improper installation and poor maintenance.
  安装不当、维护不到位
- Buildings can exceed code, but not perform as intended.
  建筑物虽达标，但没有达到预期效果。
- "Class of 1999, 2000, and 2001" research found technology is not driving great performance.
  研究表明，技术并不是提高能源利用效率的主要因素。

Source: EPA Fan Study & Chillers - Lawrence Berkeley National Laboratory
资料来源： EPA 风机系统和冷机研究 — LBNL

How Do We Certify?
我们如何认证

- Develop a metric for comparing energy performance.
  开发能够进行能效比较的衡量标准
- Enable large numbers of buildings to easily apply the metric.
  让大量建筑能够容易方便地使用这一衡量标准.
- Certify buildings above a set performance threshold or buildings that measurably improve performance。
  对高于能效标准或显著提高能效的建筑给予认证。

“Benchmark 评测”

- Relative ranking based on energy performance.
  依据能效的高低进行相对排名。
- Based on a large data set for homogeneous buildings (same space type, different settings).
  以采集到的大量同类建筑（相同建筑类型、不同位置）的数据为基础。
- Used to determine what is certifiable.
  作为是否给予认证的依据。

Is Your Building Performing Well?
您的建筑是否高能效运行？

Fuel Efficiency
燃料效率

MPG 耗油量

Is 250 kWh/SM/YR high or low for a building?
250 kWh/平方米/年对建筑来说是高还是低?

How Portfolio Manager Works to Improve Energy Performance
如何利用建筑群管理者工具提高能效

- Shifts focus to controllable aspects of building performance (e.g., energy use, water use). 将重点转向可控的建筑能效影响因素（如：能耗、水耗）
- Allows a property manager to establish a baseline, set targets, and measure savings.能够帮助物业管理人员建立能效基准、设定节能目标、并测量计算节能成果。
- Identify performance problems early so that they can be resolved before wasting money or causing tenant discomfort. 尽早发现影响能效的问题，以便及时解决、避免浪费资金或影响舒适度。

How Portfolio Manager Works to Improve Energy Performance
如何利用建筑群管理者工具提高能效

- Provides opportunities for recognition (e.g. ENERGY STAR Label, Leaders, Partner of the Year Award). 提供认可机会（如：能源之星标志、能源之星先锋、能源之星年度最佳合作伙伴）
- Calculates success metrics to communicate to building owners, tenants, potential new tenants, and other important audiences. 计算节能成果、向建筑业主、承租人、潜在租户及其他重要的相关方进行宣传。

ENERGY STAR
能源之星

- ENERGY STAR is a government backed symbol providing valuable, unbiased information – source of authority. 〃能源之星〃是具有政府公信力的标识项目，公正且具权威性
- Recognized by 75% of Americans. 得到75%的美国人认可
- Protects the environment through superior energy efficiency. 通过促进高能效来保护环境
- No tradeoffs in performance or quality. 在能效和品质上严格要求
- Cost effective.经济效益显著

ENERGY STAR Savings
能源之星取得的节约成果

- Through 2011, nearly 16,500 ENERGY STAR Certified buildings. 至2011年，近1.65万栋建筑获得“能源之星”标识
- Saved nearly $2.3 billion in energy costs annually.每年节约 23亿美元的能源费用
- Reduced the equivalent of 12 Million Metric Tons of CO2 a year. 每年减少CO2 排放达1200万吨
- ENERGY STAR buildings show an average of 7% energy savings and 6% GHG emissions reductions over three years. “能源之星”标识的建筑在三年中实现平均节能7%，减少温室气体排放6%。

Portfolio Manager Benchmarking Tool
建筑群管理者评测工具

- Management Tool – Helps business and organizations by offering a platform to: **管理工具-提供平台帮助商业机构：**
  - Assess whole building energy and water consumption 评估建筑整体能耗和水耗
  - Track changes in energy, water, greenhouse gas emissions, and cost over time 跟踪能耗、水耗、温室气体排放及费用随时间的变化
  - Track green power purchase 跟踪绿色电力采购
  - Share/report data with others 分享并报告数据
  - Create custom reports 生成专门的报告

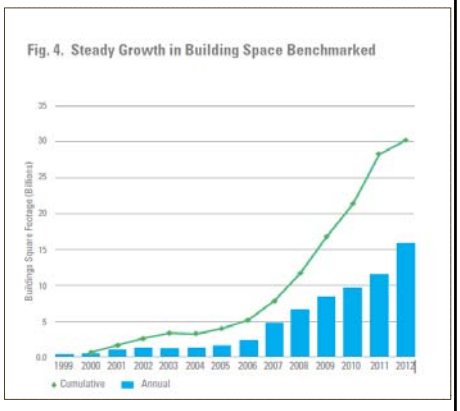
- Metrics Calculator – Provides key performance metrics to integrate into a strategic management plan 衡量标准计算器—提供可整合到企业战略管理计划中的重点能效衡量标准。
  - Energy Consumption (source, site, weather normalized) 能耗（能源种类、位置和天气标准化）
  - Water Consumption (indoor, outdoor) 水耗（室内、室外）
  - Greenhouse Gas Emissions (indirect, direct, total, avoided) 温室气体排放（间接、直接、总量及可避免的）

Benchmarking in Portfolio Manager Continues to Increase
建筑群管理者的能效评测持续增加

- Tens of thousands of active accounts.
  数以万计的活跃账户。

- Used by more than 260,000 buildings, representing nearly 30 billion square feet of commercial and institutional building space in the U.S. 美国超过26万栋建筑、近300亿平方公尺（30亿平方米）的商业和政府建筑在使用.

- Nearly 40% of the commercial building market。近40%的商业建筑



- Selected by the Canadian Government as the platform for their national energy management program for existing commercial and institutional buildings. 加拿大政府在国家能源管理项目的既有商业和政府建筑部分使用

US Eligible Space Types
美国适用的建筑类型

Hospitals 医院

Retail 零售商店

Office Buildings办公建筑

Hotels 宾馆

Houses of Worship
会议厅

Medical Office Buildings
医院办公楼

Waste Water
Treatment Plants
污水处理厂

Courthouses
法院

Financial Centers
金融中心

Senior Living Facilities
高级居住区

Warehouses仓库

Dormitories 宿舍

Supermarkets 超市

Schools 学校

Data Centers
数据中心

EPA Performance Rating System: Basic Methodology
EPA 能效评价系统：基本方法

- Normalizes building energy consumption for important performance factors: 对影响建筑能效的主要因素进行标准化:
  - Based on national building survey data 基于全国建筑调查数据
  - Weather, hours, occupant density, plug load
    天气、运行时长、租住率、插座负载
  - Whole building “mpg” rating (kbtu/sf/yr) 整体建筑的 “mpg” 得分
  - Rating based on *source* energy 基于一次能源打分
- Benchmarks for comparison 对比评测
  - Similar buildings in national stock 全国同类建筑
  - 1-100 rating scale, 50 = average 1-100 的分数范围，50 为平均值
  - 75 = performance better than 75% of the market
    75分表示建筑能效高于市场上75%的建筑

Building Rating – Technical Foundation 建筑能效评价-技术基础

- Normalize for Operating Characteristics
  运行特征标准化
  - To be fair, must adjust for characteristics that cannot be controlled by the owner
    为公平比较，需对业主无法控制的特性进行调整
    - Operating hours, occupant density, weather
      运行时间、租住密度、天气因素
  - To be fair, *do not* adjust for characteristics that can be controlled by the owner
    为公平比较，不对建筑业主能够控制的特性进行调整
    - Type of lighting technology used 使用的照明技术
    - Efficiency of HVAC system 暖通空调系统的效率

Building Rating – Technical Foundation 建筑能效评价-技术基础

- Normalization Methods标准化方法
  - Ordinary least square regression 一般最小二乘法
  - We have examined other techniques (data envelopment analysis, stochastic frontier regression)我们也对其他分析方法进行了研究（数据包络分析、随机前沿回归）
  - Ordinary least square is simple, effective, reliable, and transparent
    一般最小二乘法简单、有效、可靠和显著

Energy Efficiency = Smart Business
提高能效=智慧的企业

ENERGY STAR qualified offices demonstrate
获得能源之星标识的办公楼展示了:

- 35% less energy use 节约35%的能耗
- $0.50 per square foot less to operate 每平方英尺运行费用减少$0.5
- Energy performance persists over multiple years. 节能成效持续多年

Other benefits/trends: 其他的益处及趋势：

- Higher occupancy 租住率提高
- Increased asset value 资产价值增加
- Lower carbon emissions 碳排放减少
- Savings in operations/maintenance 运行维护费用节省

Marriott US Case Studies 美国案例

- *Awarded Sustained Excellence Award by U.S. EPA 3 years in a row.* 连续三年获得美国环保署“可持续杰出奖”
- *Long-term goal of benchmarking all US properties.* 测评所有在美物业的长期目标
- *Through partnering with ENERGY STAR:* 通过与“能源之星”的合作：
  - *Avoided **$1.3 million (8.8 million RMB)** in costs.* *节约了**880万人民币**的费用。*
  - *Decreased GHG emissions by **3% per available room.** 每间客房减少温室气体排放**3%**。*

Courtyard by Marriott, ES certified 2009

TownePlace Suites by Marriott BWI, ES certified 2009

US Case Studies 美国案例

- *ENERGY STAR Partner of the Year 2002 and 2003.*
  2002, 2003 年“能源之星”合作伙伴
- *Supported development of the US national energy performance rating system 支持美国国家能效评价系统的开发*
- *Use US EPA Benchmarking Tool to assist with hotel purchasing decisions. 使用测评工具协助采购*
- *Utilize ENERGY STAR products when possible.*
  - *2001: **$3.5 million (23.7 million RMB)** in energy cost savings*
    *2001 年：节约能源开支 **350 万美元（2370 万人民币）***
  - *2002: **$1.3 million (8.8 million RMB)** in energy cost savings*
    *2002 年：节约能源开支 **130 万美元（880 万***

- *“…Realized it was more beneficial to Starwood to invest in energy efficiency than marketing due to a higher return on investment.” “…我们看到，因为有更高的投资回报，喜达屋投资于节能的收益比投资市场推广的收益还要高。”*
- – John Lembo, Starwood Energy Manager in 2002 and 2003
  喜达屋2002-2003年能源经理 John Lembo

ENERGY STAR and LEED™
能源之星与LEED™

- LEED for Existing Building Operation & Maintenance (EBOM) LEED (既有建筑运行和维护）
  - Energy & Atmosphere prerequisite: Minimum Energy Efficiency Performance能源和环境条件：最低能效
    - Buildings eligible for an EPA energy performance rating must achieve a rating of at least 69. 适用EPA能效评价的建筑，其得分不得低于69分
    - Buildings not addressed by EPA rating must demonstrate energy efficiency at least 19% better than the national average source energy data provided in Portfolio Manager
      不能用EPA能效评价打分的建筑，其能效必须比Portfolio Manager中全国建筑平均水平高至少19%
  - Additional Energy & Atmosphere points are earned through higher EPA ratings or reduced source energy intensity.
    如果得到更好的EPA评分或能耗强度降低，可获得额外的能源和环境项加分。

LEED EBOM Energy Points
LEED EBOM 能源分数

EPA ENERGY STAR Rating	LEED for Existing Buildings: O&M points	Percentage better than national average (for buildings not eligible for an EPA rating)*	LEED for Existing Buildings: O&M points
65	NA	15%	NA
67	1	17%	1
69	2	19%	2
71	3	21%	3
73	4	23%	4
75	5	25%	5
77	6	27%	6
79	7	29%	7
81	8	31%	8
83	9	33%	9
85	10	35%	10
87	11	37%	11
89	12	39%	12
91	13	41%	13
93	14	43%	14
95+	15	45%	15

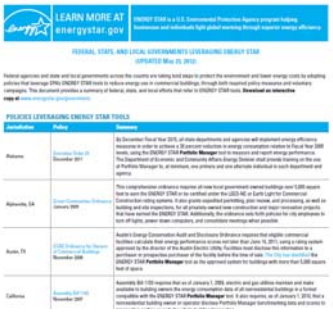
* projects should use the Portfolio Manager tool available on the ENERGY STAR web site to benchmark their building even when it is not eligible for an EPA rating: http://www.energystar.gov/benchmark

US Federal Policies
美国联邦政府政策

- According to Section 435 of EISA 2007, federal agencies are required to lease space in buildings that have earned the **ENERGY STAR**.
  EISA2007 435节 规定联邦政府机构需租用获得"能源之星"的建筑
- EISA 2007 Section 432 required the U.S. Department of Energy (DOE) to select a building energy use benchmarking system, such as the ENERGY STAR **Portfolio Manager** tool, and issue guidance for use of the system.
  EISA 2007 432节 要求美国能源部确定一个建筑能效评测系统，如"能源之星"的 **建筑群管理者**工具，并发布工具体系使用指南。
- E.O. 13514 requires at least 15% of each agency's facilities and building leases to meet the Federal Guiding Principles for High Performance and Sustainable Buildings by 2015. E.O. 13514 要求到2015年各政府机构至少15%的建筑符合**高能效可持续建筑的联邦指导原则。**
- The EISA 2007 Section 432 Benchmarking Guidance issued in April 2010 requires that the ENERGY· STAR Portfolio Manager tool be used to benchmark metered buildings that are owned or leased by federal agencies
  EISA 2007 432节 能效评测指南于2010年4月发布，要求联邦机构所拥有或租用的建筑必须使用"能源之星"建筑管理者工具进行评测。

US State and Local Policies
美国州政府和地方政策

- More than 40 US jurisdictions have policies and incentives for using the ENERGY STAR Portfolio Manager Tool. www.energystar.gov/government.
  - For example, Buildings in New York City required to track energy use using the US Benchmarking Tool. Performance metrics are published on a publicly available online database.
    如纽约市要求建筑使用美国能效评测比对工具跟踪其建筑能耗。建筑的能效水平在公共的在线数据库中发布。
- 超过40个美国地方辖区出台了使用“能源之星”建筑群管理者工具的政策和激励方. www.energystar.gov/government.

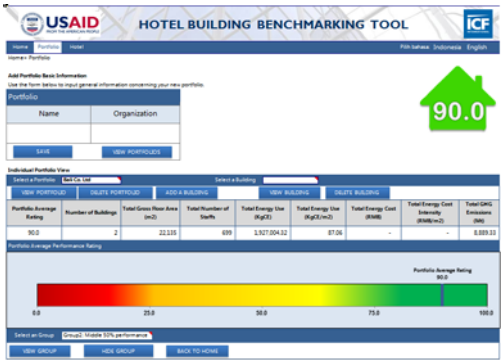


China Hotel Benchmarking Tool Available On-line 中国酒店能效评测比对工具-可在线使用

http://www.cabr-cecc.com/

Time Period 时间	Total Floor Area Benchmarked (Sq M) 参与能效评测总面积 （平方米）	GHG Emission Reduction (MtCO2e) 温室气体减排量（吨 CO_{2e}）	Equivalent Trees Planted 相当于植树（棵）
Short-term短期: 2015-2017	58,800,000	1,899,595	48,707,564
Med-term中期: 2015-2025	342,000,000	38,642,440	990,831,795
Long-term长期: 2015-2035	804,000,000	165,759,153	4,250,234,692

Indonesia Prototype Hotel Benchmarking Tool
印尼酒店能效评测比对原型工具



Total Annual Energy Savings **每年总节能量**	533,166,666 kilowatt hours (kWh) 533,166,666 度
Total Annual Energy Cost Savings **每年节约能源费用**	US$ 38,867,850 238,091,000 RMB
Total Annual GHG Emissions Reductions **每年减少温室气体排放**	381,214 $MtCO_2e$ 381,214 吨CO_2e
Estimated Annual New Trees Planted **相当于每年种植树木（棵）**	9.7 million 970万

Thank You! 谢谢!

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