推广节能及气候友好型空调

Leapfrogging to Energy-Efficient and Climate Friendly Air Conditioners

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15 April 2020

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INTRODUCTION OF U4E 简介

能效设备联盟（U4E）是一项全球计划，旨在支持各国向节能照明，电器和设备过渡。 U4E由环境署牵头，民间社会，企业，区域和国际组织以及金融机构等一系列合作伙伴参与，共同致力于提高效率。

United for Efficiency (U4E) is a global initiative led to supports countries in transitioning to energy-efficient lighting, appliances and equipment. U4E is led by UNEP and involves a range of partners from civil society, the private sector, regional and international organisations and financial institutions that together aim to improve efficiency.

INTRODUCTION: Global strategy 国际战略

At Global level
国际层面

- 对每个发展中和新兴经济体的能源，排放和成本节省进行评估 Assessments of energy, missions and cost savings for every developing and emerging economy
- 涵盖的每种产品的能源效率政策指南 Guides on Energy Efficiency policies for each product covered by U4E
- 能力建设及沟通推广 Capacity building & Communications and outreach

At Regional Level
区域层面

- 区域市场评估 Regional Market Assessment
- 区域政策蓝图 Regional Policy Roadmap
- 区域政策协调Regional Harmonization
- 区域能力建设 Regional Training for Policymakers; Practitioners

At National Level
国家层面

- 国家节能产品战略 National Energy-Efficient Product Strategy
- 技术支持和能力建设 Implementation through technical assistance and capacity building
- 宣传成功市场转型案例 Promote success stories

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U4E APPROACH FOR MARKET TRANSITION

帮助国家推动产品能效提升和市场转型的渠道

帮助国家了解市场，抓住机遇，明确优先事项
Understand the market, the opportunities, benefits and priorities

提高意识和能力建设
Raise awareness and capacity

设定测试范围和测试方法
Set scope & definitions, exemptions, test methods

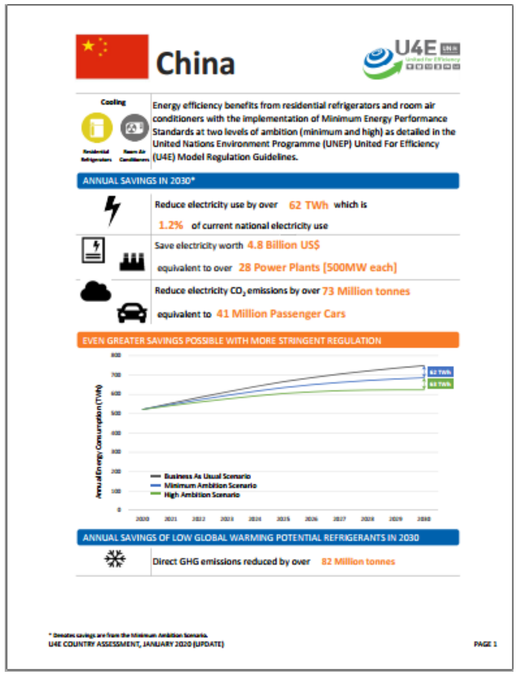
建立能效标准限值淘汰低能效的产品
Establish MEPS to ban the worst products

启用能效标识以帮助购买者了解产品能效优势
Deploy Labels to help buyers understand energy efficiency benefits

加强市场准入监管，并测试产品以确保合规
Monitor what enters the market and test to Verify compliance and enforcement of rules

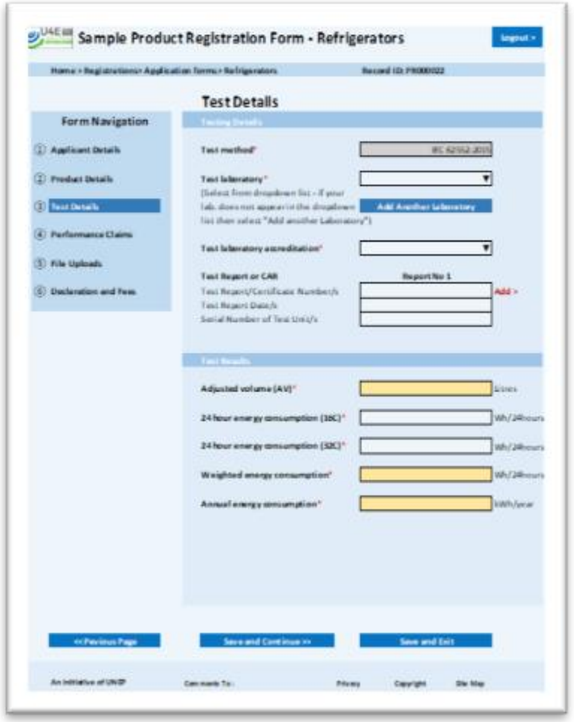
制定财政激励措施，支持高能效产品的购买
Create financial incentives support adoption of the best products

156份国家评估
country assessments

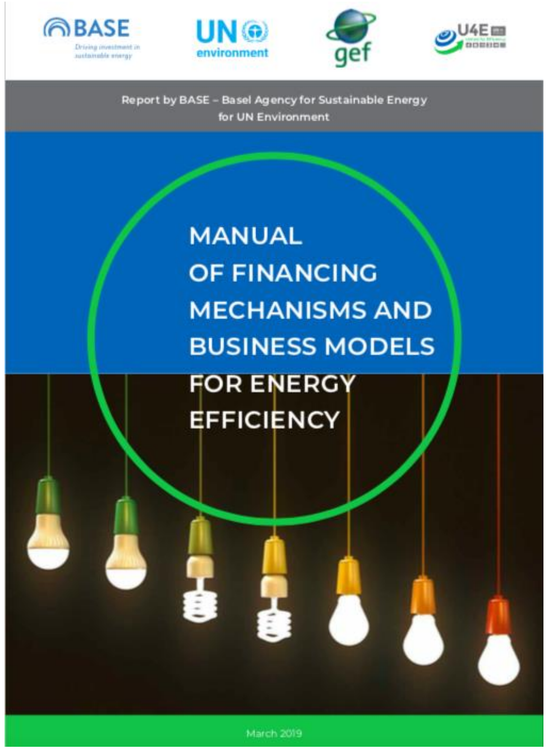


能效标准指南
Model Regulation Guidelines

产品注册系统和软件开发规范
Prototype product Registration System and specifications for software development



财政激励机制
Financial Mechanism



RESOURCES READY
协助市场转型的可用资源

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Regional projects 区域项目

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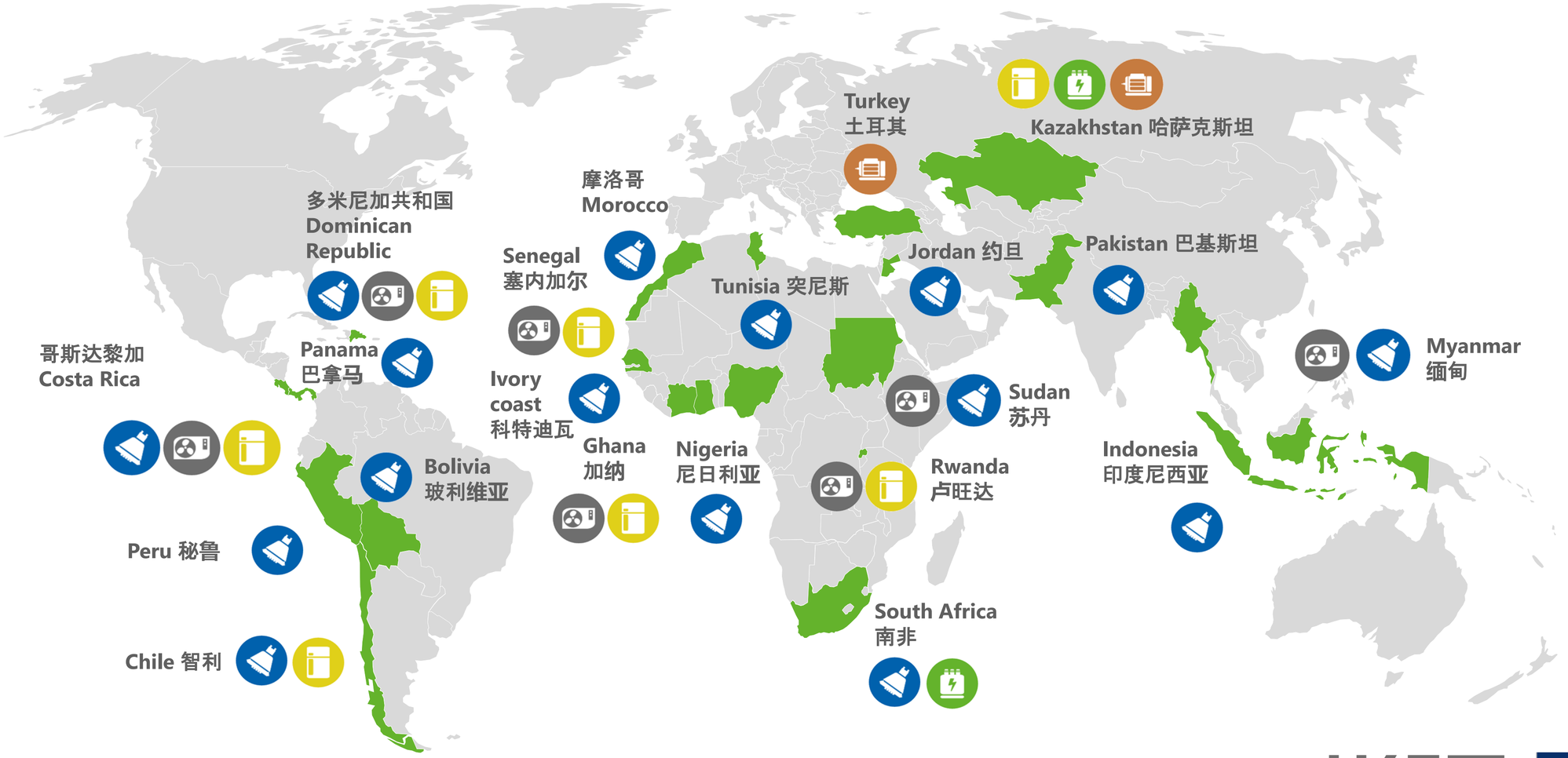
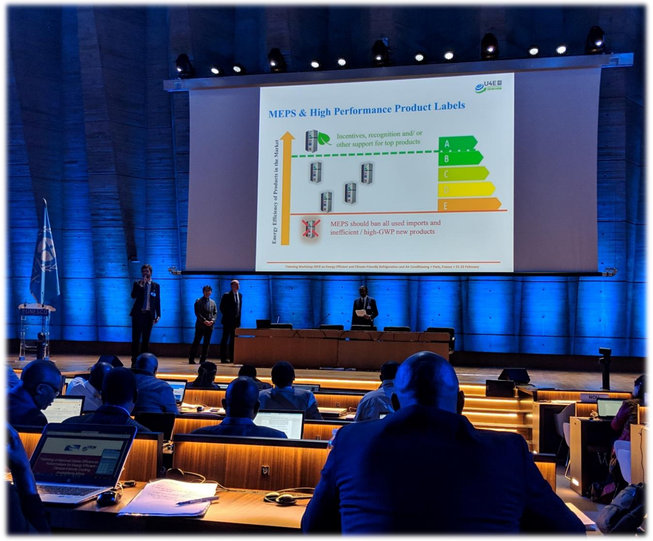
National projects 国家项目



Global activities – Training 国际范围培训活动



来自**120多个**国家的环境和能源官员参与了2018年和2019年会议，共同商讨如何对提升能源效率和优化制冷剂采取行动。许多国家/地区希望采取更多行动来应对数据挑战，使用最低能效标准和标识以及跨部委和国界开展工作

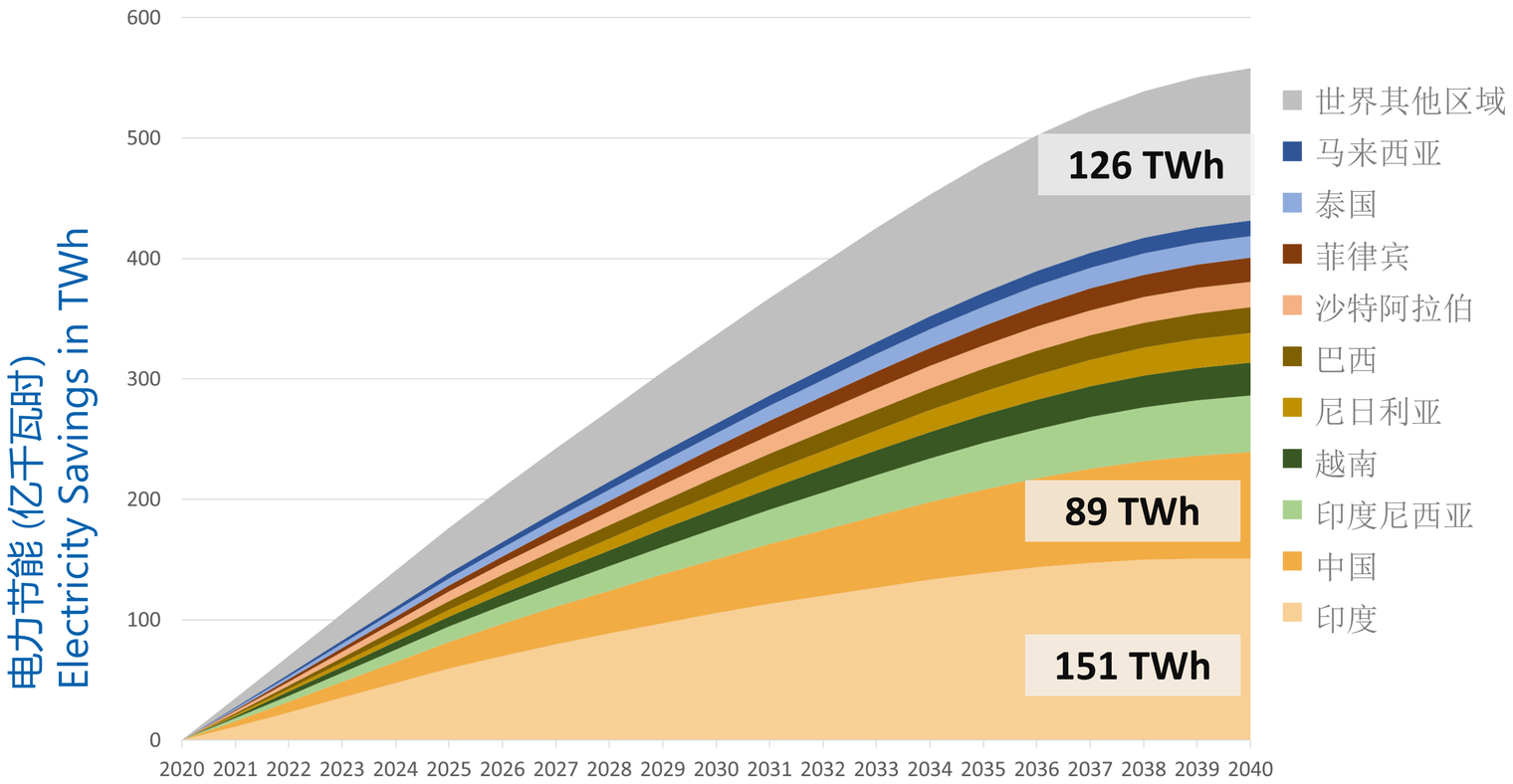
Environment and energy officials from **120+ countries** convened in 2018 and in 2019

Addressed why and how to take action on energy efficiency and refrigerants

Many countries want to take additional action to address data challenges, use MEPS and labelling, and to work across ministries and borders

BACKGROUND: OPPORTUNITIES AND CHALLENGES

机遇与挑战并存 —— 2040年房间空调器的节能潜力



到2040年，年节能潜力
Annual Savings in 2040*:

558 亿千瓦时(TWh)电力节省,相当于
electricity consumption, equivalent to:

255 座年发电量为500兆瓦(MW)的发电站
power stations

5.16 亿吨二氧化碳减排
516 Million tonnes of **CO2**

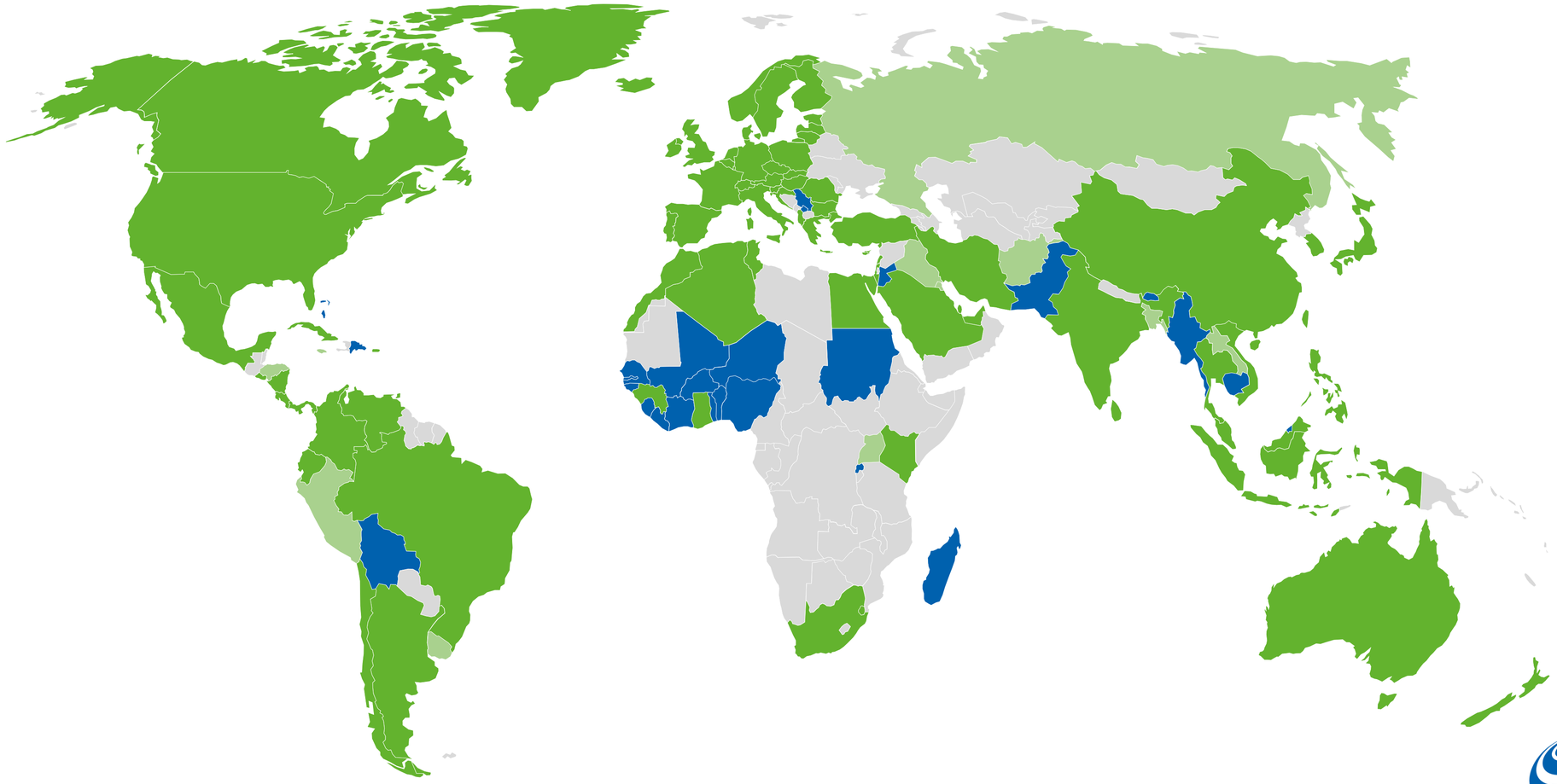
510 亿美元电费节省
51 Billion USD on electricity bills

* 基于最低能效限值的情景模拟With Minimum Ambition Scenario

该图涵盖已接受U4E国家评估的156个发展中国家和新兴经济体。Graph refers to the 156 developing countries and emerging economies that had been assessed for the U4E Country Saving Assessments.

BACKGROUND: OPPORTUNITIES AND CHALLENGES

机遇与挑战并存 —— 世界范围内最低能效标准和能效标识的采用水平不一



即使有强制性标准，很多
Yet many are:

- 已经过时 Out of date,
- 没有有效地执行 unenforced
- 作弊现象仍存在circumvented,
- 严格程度不同 Varying in stringency

强制性Mandatory

自愿Voluntary

正在更新
New Development

暂无数据 No Data Found

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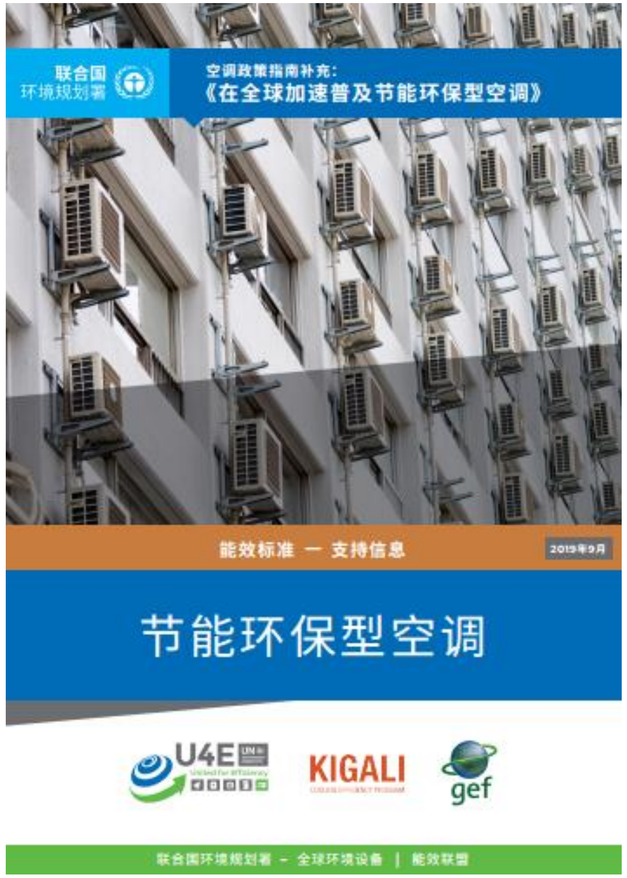

空调能效标准指南和支持信息
MODEL REGULATION GUIDELINES & SUPPORTING DOCUMENT FOR ACs

→ 作为指导方针来帮助发展中国家和新兴经济体的监管机构和决策者。 Intended as a guideline to help **inform regulatory authorities and policy makers** in developing and emerging economies.

→ 设置最低能效限值，以淘汰将来从市场上销售低效产品。 Sets a **minimum efficiency floor** to prohibit future sales of inefficient products from the market.

提供英语、西班牙语、中文版本，法语和阿拉伯语版本即将上线
Available in English Spanish, and Chinese. French and Arabic versions are coming soon.

链接: https://united4efficiency.org/resources/model-regulation-guidelines-for-energy-efficient-and-climate-friendly-air-conditioners/

能效标准指南
MODEL REGULATION GUIDELINES*

产品范围和类别
Model Regulation Guideline Scope and Product Categories**

最低能效标准和产品标识
MEPS & Performance labelling

测试方法
Test method

制冷剂和泡沫发泡剂规定
Refrigerant and foam blowing agent regulations

支持信息文件中的补充内容
ADDITIONAL INFORMATION IN THE SUPPORTING DOCUMENTS

标准指南对标
Benchmarking the Model Regulation Guidelines

能效性能要求示例
Example of Energy-Efficiency Performance Requirements

节能空调市场供应状况与认可度
Market Availability and Recognition of Energy Efficient AC Systems

产品可用性和成本考量
Considerations of Product Availability and Cost

* 示范标准指南不包括产品注册、试验室认证程序；监督、验证和执行程序 Model Regs does not include product registry, lab certification procedures; Monitoring, verification & enforcement procedures
** 无风管分体式、独立式、便携式和可逆式热泵 non-ducted single split, self-contained, portable and reversible heat pumps

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STAKEHOLDERS ENGAGED 参与方

60+ Expert Reviewers! 60余位专家参与审阅

资助机构 FUNDERS

全球制造商和行业协会
GLOBAL MANUFACTURERS & INDUSTRY ASSOCIATIONS

技术组织
TECHNICAL ORGANISATIONS

区域政府间组织
REGIONAL INTERGOVERNMENTAL ORGANISATIONS

gef KIGALI COOLING EFFICIENCY PROGRAM

Electrolux B/S/H/ Whirlpool CORPORATION arçelik Cu International Copper Association Copper Alliance SAMSUNG ELECTRONICS

GREE 格力 三花控股集团 SANHUA HOLDING GROUP ENERGY FOUNDATION 能源基金会 DAIKIN mabe

BERKELEY LAB NRDC BASE CARBON TRUST ONIS clasp giz UNDP

iea EESL WORLD BANK GROUP Global Alliance for Buildings and Construction IIEC International Institute for Energy Conservation

SACREEE SADC CENTRE FOR RENEWABLE ENERGY & ENERGY EFFICIENCY CEREEC ECREEE olade ORGANIZACIÓN LATINOAMERICANA DE ENERGÍA EACREEE EAST AFRICAN CENTRE FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY

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MODEL REGULATION GUIDELINES CONTENT AND RATIONALE

Facilitate national adoption and harmonization across countries
促进不同国家间的标准采用和统一

主要包括以下部分 Includes many key elements :

- 范围和定义、豁免 Scope & definitions, exemptions
- 测试方法 Test methods
- 最低能效标准 Energy efficiency regulations (MEPS)
- 能效标识 Performance Labelling
- 制冷剂和泡沫发泡剂规定 Refrigerant and foam blowing agent regulations

不包括 Does not include:

- 产品注册、试验室认证程序 Product registry, lab certification procedures
- 监督、验证和执行程序 Monitoring, verification, & enforcement procedures

Scope 产品范围

无风管分体式，独立式、移动式空调和热泵
Non-ducted single split, self-contained, portable and reversible heat pumps

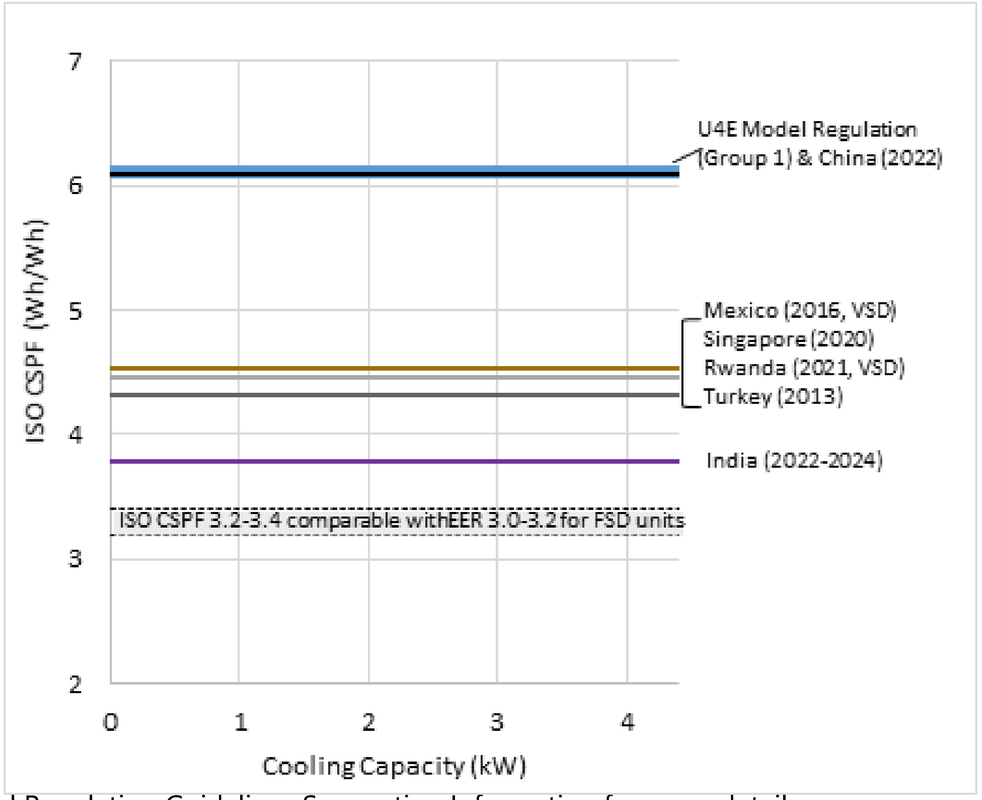
Energy Performance Evaluation Methods 能耗评价方法

	空调 Air Conditioners
产品类型 Category	• 空调、热泵Air conditioners, Heat pumps (reversible) • 定频、变频Fixed-speed, variable-speed
参考标准 Reference Standards	• ISO 5151:2017 • ISO 16358-1, -2, -3: 2013 • ISO 16358-1: 2013/Amd 1: 2019
关键参数 Key parameters	• 35℃时性能测试数据(对于极端干热地区为46℃)Performance measured at 35℃(and 46℃for extremely hot-dry regions) • ISO16358室外温度小时数分布和气候分区(依据ASHRAE定义) Outdoor temperature bin hours by ISO 16358 and climate regions (per ASHRAE definitions)
能效指标 Efficiency metric	• 单冷机组采用制冷季节能耗效率 Cooling Seasonal Performance Factor (CSPF, Wh/Wh) for cooling-only units • 热泵机组采用全年能耗效率 Annual Performance Factor (APF, Wh/Wh) for reversible heat pumps

Minimum Energy Performance Requirements 最低能效要求

- 《能效标准指南》建议，能效要求与主要经济体和新兴经济体的技术和政策改进所带来的市场转型一致。
  The Model Regulation Guidelines suggest requirements to be consistent with the market transition expected from technology and policy improvements in major and emerging economies.

小冷量产品(≤4.5 kW) Small capacity products



详见《能效标准指南支持信息》文件 See the Model Regulation Guidelines Supporting Information for more details.

针对能效标识、激励政策和采购项目设有高中低不同等级要求。
There are stretch tiers for labels, incentive and procurement programs.

Energy Performance Grade Requirements 能效等级要求

Table 13: Labeling Requirements for Air Conditioners in Group 1 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 4.5 kW	4.5 kW < Rated Cooling Capacity ≤ 9.5 kW	9.5 kW < Rated Cooling Capacity ≤ 16.0 kW
Group 1 (ISO 16358-1: 2013)	High Efficiency	8.00 ≤ CSPF	7.60 ≤ CSPF	7.10 ≤ CSPF
	Intermediate	7.10 ≤ CSPF < 8.00	6.40 ≤ CSPF < 7.60	5.80 ≤ CSPF < 7.10
	Low Efficiency	6.10 ≤ CSPF < 7.10	5.10 ≤ CSPF < 6.40	4.50 ≤ CSPF < 5.80
0A (Model Regulation)	High Efficiency	7.40 ≤ CSPF	7.00 ≤ CSPF	6.60 ≤ CSPF
	Intermediate	6.60 ≤ CSPF < 7.40	6.00 ≤ CSPF < 7.00	5.50 ≤ CSPF < 6.60
	Low Efficiency	5.70 ≤ CSPF < 6.60	4.90 ≤ CSPF < 6.00	4.30 ≤ CSPF < 5.50
1A (Model Regulation)	High Efficiency	7.00 ≤ CSPF	6.60 ≤ CSPF	6.20 ≤ CSPF
	Intermediate	6.20 ≤ CSPF < 7.00	5.70 ≤ CSPF < 6.60	5.20 ≤ CSPF < 6.20
	Low Efficiency	5.40 ≤ CSPF < 6.20	4.70 ≤ CSPF < 5.70	4.20 ≤ CSPF < 5.20
2A (Model Regulation)	High Efficiency	7.30 ≤ CSPF	6.90 ≤ CSPF	6.50 ≤ CSPF
	Intermediate	6.50 ≤ CSPF < 7.30	5.90 ≤ CSPF < 6.90	5.40 ≤ CSPF < 6.50
	Low Efficiency	5.60 ≤ CSPF < 6.50	4.80 ≤ CSPF < 5.90	4.30 ≤ CSPF < 5.40
3A (Model Regulation)	High Efficiency	7.00 ≤ CSPF	6.60 ≤ CSPF	6.20 ≤ CSPF
	Intermediate	6.20 ≤ CSPF < 7.00	5.70 ≤ CSPF < 6.60	5.20 ≤ CSPF < 6.20
	Low Efficiency	5.40 ≤ CSPF < 6.20	4.70 ≤ CSPF < 4.70	4.20 ≤ CSPF < 5.20

- 高能效等级比目前可实现的全球普遍节能技术水平高约30%–60%，但其低于或等于现有最高能效技术水平。The high-efficiency levels represent approximately 30-60 percent of the efficiency improvement that is possible in energy-efficient technologies globally, but similar to or less than the efficiency levels of best available technologies.

Refrigerant & Foam Blowing Agent Requirements
制冷剂和泡沫发泡剂要求

- 臭氧破坏潜值(ODP)和基于100年时间跨度的全球变暖潜值(GWP)的要求 Requirements for ozone depletion potential (ODP) and global warming potential (GWP) over a 100-year time horizon.
- 制冷剂名称(ISO 817)和安全性要求(ISO 5149 or IEC 60335-2-40, IEC 60335-2-24) Refrigerant designation (ISO 817), Safety requirements (ISO 5149 or IEC 60335-2-40, IEC 60335-2-24).

	GWP	ODP
独立式空调	150	0
无风管分体式空调	750	0

Product Information 产品信息

能效性能标识是基于[测试标准名称]的测量值，该值仅为指示性数值，并不代表在所有工况下的实际全年能耗量。All representations of energy performance shall indicate that the performance rating is based on the measurement according to [test standard name], an indicative value, and not representative of actual annual energy consumption in all situations.

1)产品名称/序列号 Model name/serial number

2)产品类型[无风管分体, 独立式, 移动式] Type of unit[ductless split,self-contained,or portable]

3)产品生产国家 Country where the product was manufactured

4)额定制冷量(制热量，如有),单位kW Rated cooling (and heating,if applicable) capacity in kW

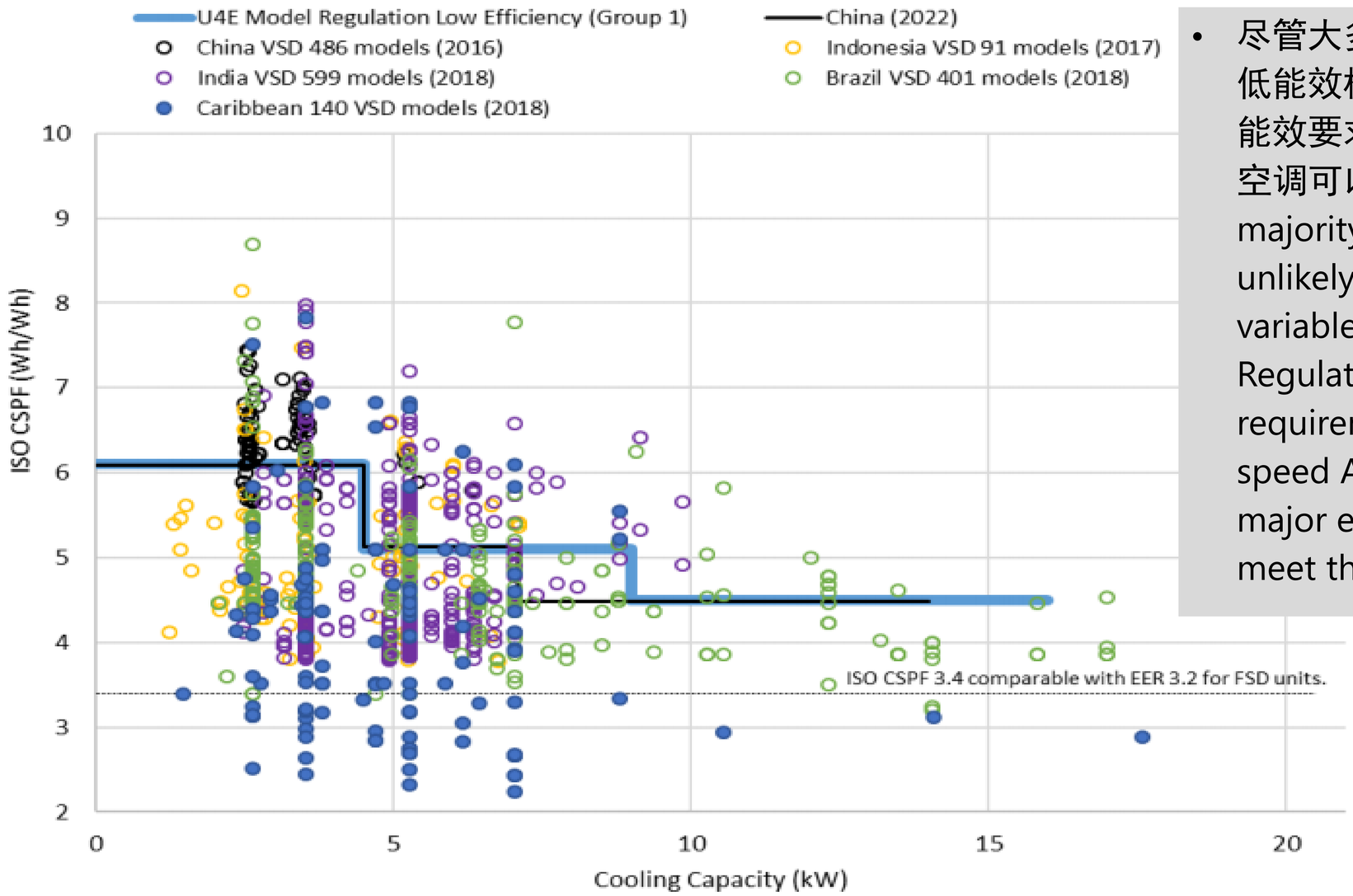
5)额定最大功率，单位kW Rated maximum power consumption in kW

6)额定产品能效等级 Rated performance grade

7)额定能效[CSPF,APF,EER或COP]和年耗电量，单位kWh Rated energy efficiency in [CSPF,APF,EER,or COP],and yearly electricity consumption in kWh

8)制冷剂名称与[ISO 817或ASHRAE 34]保持一致,包含ODP和GWP Refrigerant designation in accordance with [ISO 817 or ASHRAE 34],including ODP and GWP.

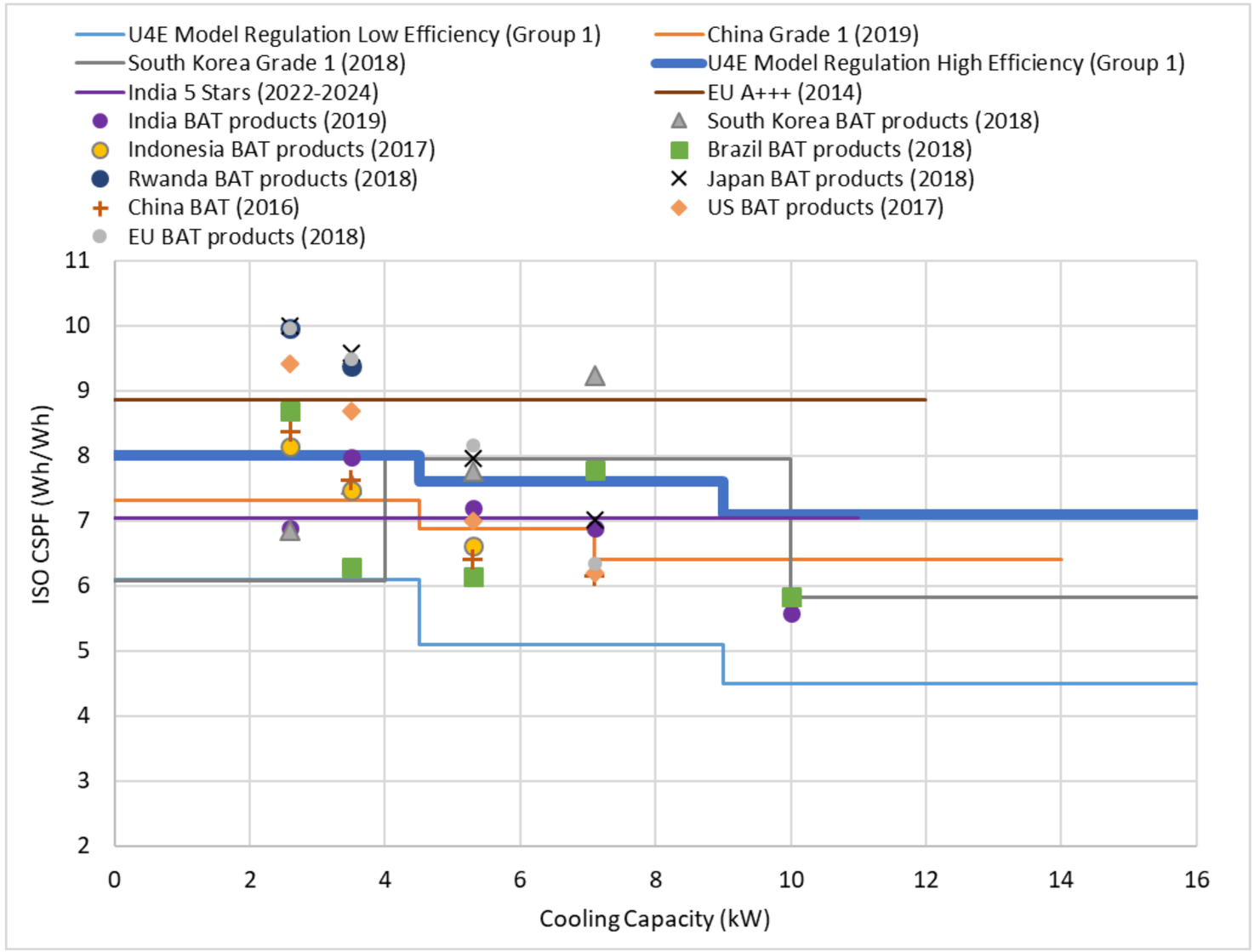
Availability of Compliant Air Conditioners 现有的合规空调



- 尽管大多数定频空调可能达不到中国2020最低能效标准(变频机)和《能效标准指南》的能效要求，但现有市场依旧有12–26%的变频空调可以达到上述能效水平。Although the majority of fixed-speed AC models are unlikely to meet the China 2020 MEPS (for variable-speed units) and the Model Regulation Guidelines efficiency requirements, 12–26 percent of variable-speed AC models currently available in major emerging economies are estimated to meet the levels.

数据来源：《空调能效标准支持信息》 Source: AC Model Regulation Guidelines Supporting Information
基于某些经济体中现有变频空调估算的ISO CSPF能效水平 Efficiency in ISO CSPF estimated for variable-speed ACs available in selected economies

Availability of Compliant Air Conditioners 现有的合规空调



《能效标准指南》中不同气候区的高能效水平大概比低能效水平高约30%–60%，此高能效水平相当于区域标准的高能效或最佳可行技术(BAT)的能效水平。 The high efficiency levels in the Model Regulation Guidelines are ~30–60%, by climate region, more efficient than the low efficiency levels, and they are comparable with high efficiency levels in regional standards or the efficiency of best available technologies (BAT).

数据来源：《空调能效标准支持信息》 Source: AC Model Regulation Guidelines Supporting Information

《能效标准指南》、区域标准和最佳可行技术(BAT)能效水平之间的高能效和低能效等级比较 Comparison of high and low efficiency grades of the Model Regulation, regional standards, and BAT

Lower-GWP refrigerants are available, too
较低GWP的制冷剂也普遍存在

截至2019年6月，已有约8400万台空调采用R32(GWP 677)*。

~84 million units use R-32 (GWP 677) as of June 2019

截至2018年9月，Godrej已经在印度和东南亚销售了60万台R-290 (GWP 3)空调 ** 。

Godrej has sold 600,000 with R-290 (GWP 3) in India & SE Asia as of Sept 2018

限制新产品中制冷剂GWP值，可确保市场向更好的制冷剂替代品过渡过程中更加顺畅。

Regulations limiting refrigerant GWP in new products ensure the market transitions to better alternatives without unnecessary delay

* https://www.daikin.com/csr/information/influence/hfc32.html

** http://hydrocarbons21.com/articles/8543/sales_of_r290_rac_units_hits_600_000_says_godrej

Conclusions 结论

- 最低能效标准和标识应尽可能的减少新生产的空调所造成的能源浪费和污染 MEPs and labels needed to minimize growth in energy use and pollution caused by new A/Cs
- 兼顾制冷剂和能效要求 Address the refrigerant and efficiency simultaneously
- 不同国家间能效标准的统一有利于消费者、制造商和政府的利益 Harmonizing across countries benefits consumers, manufacturers, and governments
- 市场上已存在符合标准要求的产品 Compliant products are already on the market
- 更高效的产品对消费者更具成本效益(节省的电费远超过增加的成本) More efficient models are cost-effective for consumers (utility bill savings can far exceed incremental cost)

U4E Model Regulations Make it Easy!

U4E能效标准提供了简单有效的解决方式！

BENEFITS FOR SUPPORTING THE ADOPTION OF GUIDELINES

支持U4E能效标准指南为决策者带来的效益

简化标准的采用和实施流程
Simplify **adoption and implementation of a robust regulation**

- 提升能效的同时降低GWP制冷剂的使用 Target energy-efficiency + lower-GWP refrigerants simultaneously
- 通过能效标识鼓励性能更高的产品 Encourage higher performing products through labelling
- 能根据气候差异设计不同产品要求 Vary requirements to capture climatic differences
- 采用最佳实践并紧跟全球政策和技术趋势
  Use proven best practices and tap into global policy and technology trends

促进产品创新，为消费者提供更多选择
Catalyze **product innovation**, giving consumers more choice

促进区域标准协调以减少贸易壁垒，实现规模经济并使产品更实惠
Easier to harmonize requirements to **reduce trade barriers and unlock economies of scale** to make products more affordable

使用经过验证的测试程序，更轻松地交换合规性信息，从而提高市场执法效率
Enable more **effective market enforcement** using proven test procedures and an easier exchange of compliance info

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BENEFITS FOR SUPPORTING THE ADOPTION OF GUIDELINES

支持U4E能效标准指南为制造商带来的效益

拓展新市场 Expand to New Markets

帮助建立新市场，扩展现有市场并增强节能产品和服务的能见度和竞争力 Help establish new markets, expand existing markets and enhance the competitiveness of energy efficient products

获取深入的市场信息 Acquire In-depth Market Information

新兴市场通常缺乏可靠的数据，通过U4E的市场转型项目获得深入了解市场机会。Gain in-depth insights into the needs and market opportunities in emerging and developing countries where robust data is often scarce

拓展交际网络 Effective Network

定期与有影响力的决策者，高层企业主管和主要的民间社会代表进行联系 Regularly network with influential policymakers, top business executives and leading civil society representatives

树立良好的企业形象 Prominent International Image

担任重要的公共角色，帮助加速在世界范围内采用高效制冷产品。 Serve in a prominent public role helping to accelerate adoption of efficient cooling products around the world

U4E United for Efficiency

UN environment programme

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FUTURE ACTIONS 活动展望

扩大能效标准指南在国际范围的采用

实施已有并开展新的区域和国家项目
Implement regional and country projects

- 根据能效标准指南为国家量身定做其标准，在给定本地市场条件的情况下进行影响力分析Tailoring the model regulations for use in a given country / region (how to conduct impact analyses given local market conditions)
- 设计能效标识以及执行协议 Design specification and placement requirements as well as compliance and enforcement protocols for energy labels
- 管理最低能效标准和标识的实施 Administering and complying with MEPS and labels

国际范围活动
Global activities

- 与合作伙伴一起组织示范标准网络研讨会、举办行业研讨会以及关于制冷活动 Organise webinars in different languages on Model Regulations, host industry seminars as well as cooling events together with partners

建立可持续制冷产品数据库
Build Sustainable Cooling Products Database

- 收集不同国家现有高能效产品的数据，以帮助考虑或计划采用示范条例标准的政府了解市场高能效产品供应状况并提升高能效产品的能见度 Collect data on the available compliant products in targeting regions and countries to help governments that consider or plan adopting the model regulations to understand the market

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HOW INDUSTRY COULD SUPPORT 企业支持方式

参与推广与意识提升 Awareness raising

- 参加U4E组织的交流活动，行业研讨会，网络研讨会和其他相关的全球活动 Participate in communication campaigns, industry seminars, webinars, and other relevant global events
- 协助制定针对决策者，全球供应商，消费者的能力建设素材 Contribute to the development of training package for policy makers, global suppliers, consumers

提升制冷产品能效 Improve EE of cooling products

- 提高国内和出口产品的能效水平，为全球市场转型做准备Improve the EE level of domestic and export products to be prepared for the global market transformation
- 分享产品监管，检测的经验Share the experience of product monitor, verification and enforcement

数据收集 Data collection

- 促进高效制冷产品数据库的开发，支持政府了解市场上可用的高能效产品 Contribute to the development of Cool Product Database, supporting governments to understand the available compliant products in the market

We look forward to working with you

期待您的支持

Let’s help the world meet tomorrow’s energy needs by leapfrogging to Efficient Cooling **today**

让我们用**今日**的高效制冷帮助世界满足**明日**的能源需求

TRANSFORMING MARKETS TO ENERGY-EFFICIENT PRODUCTS

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