



Cooling the World Sustainably

Evaluating the Impact of Energy-Efficiency Labeling Policies on
Room Air Conditioning Efficiency in China and Brazil

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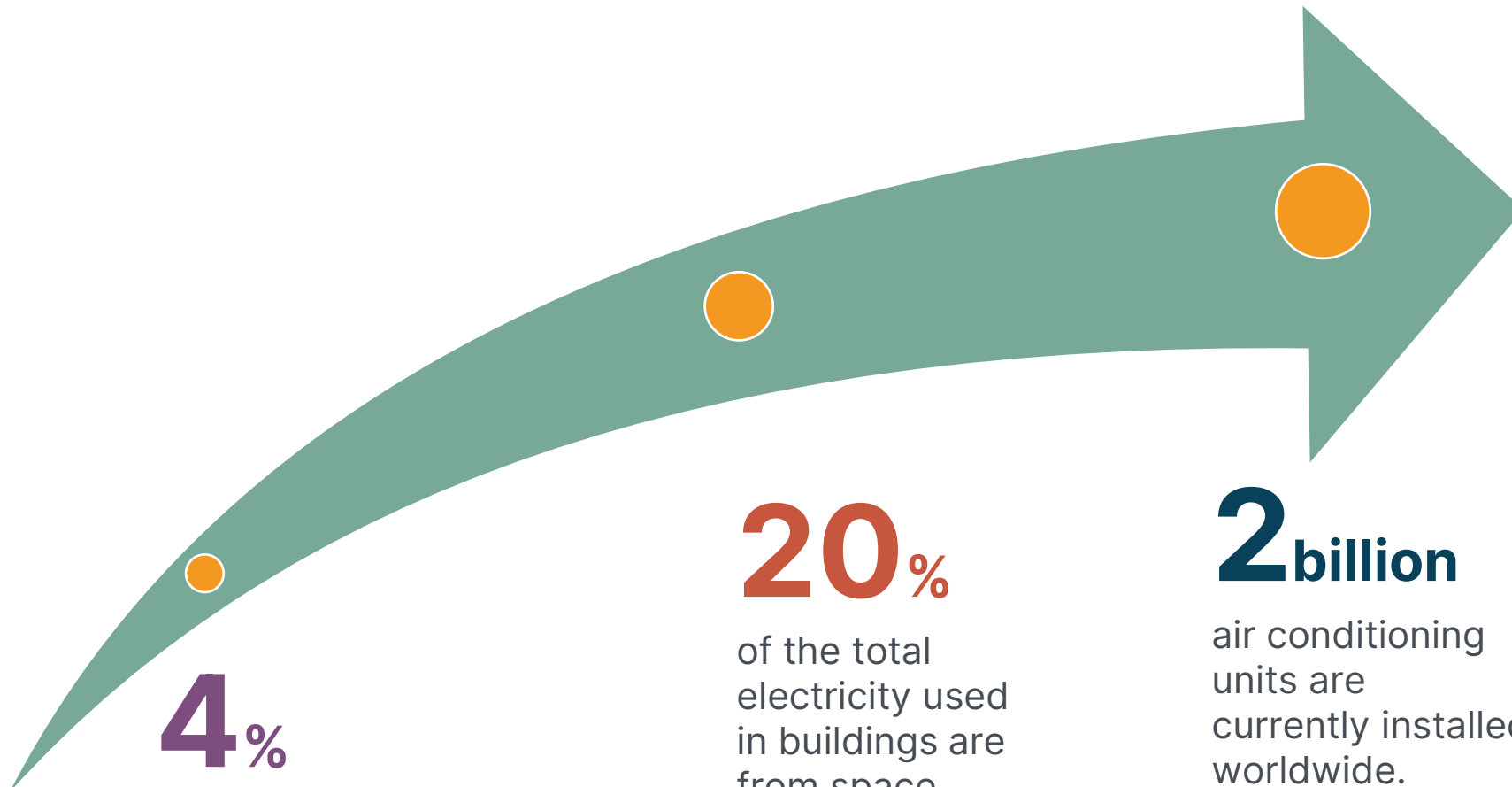


Efficient Appliances for People & the Planet



-  **Background**
-  **Methodology**
-  **Findings in China**
-  **Findings in Brazil**
-  **Conclusion**

Increasing demand for cooling



4%

average annual increase in energy demand for space cooling since 2000.

20%

of the total electricity used in buildings are from space cooling.

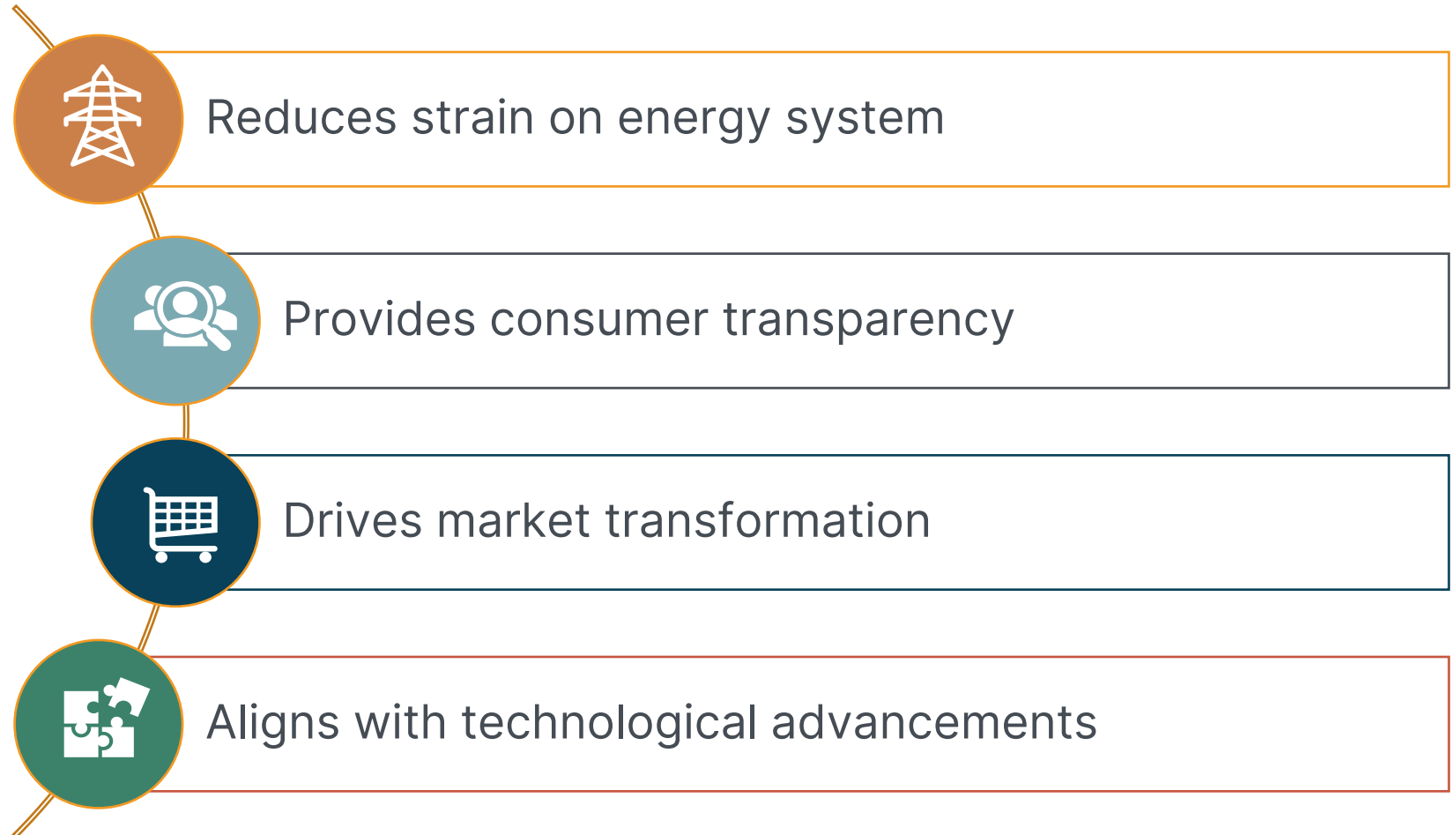
2 billion

air conditioning units are currently installed worldwide.

5.6 billion

air conditioning stock is projected to triple by 2050.

Energy efficiency labeling: the key to unlocking sustainability



Understanding the effects of RAC energy labeling: insights from China and Brazil



RAC market

- RAC Ownership: 1.3 units per household
- Leading the world in both production and demand

RAC labeling:

- The new labeling was updated in **2019**, aiming to accelerate the transition to variable-speed AC units with unified, strict standards.



RAC market

- The 5th largest air-condition market
- Population growth and extreme heat waves will drive a continued surge in AC adoption.

RAC labeling:

- New labeling policy was published in **2020**, targets a doubling of energy labeling stringency over five years.

Understanding the effects of RAC energy labeling: insights from China and Brazil



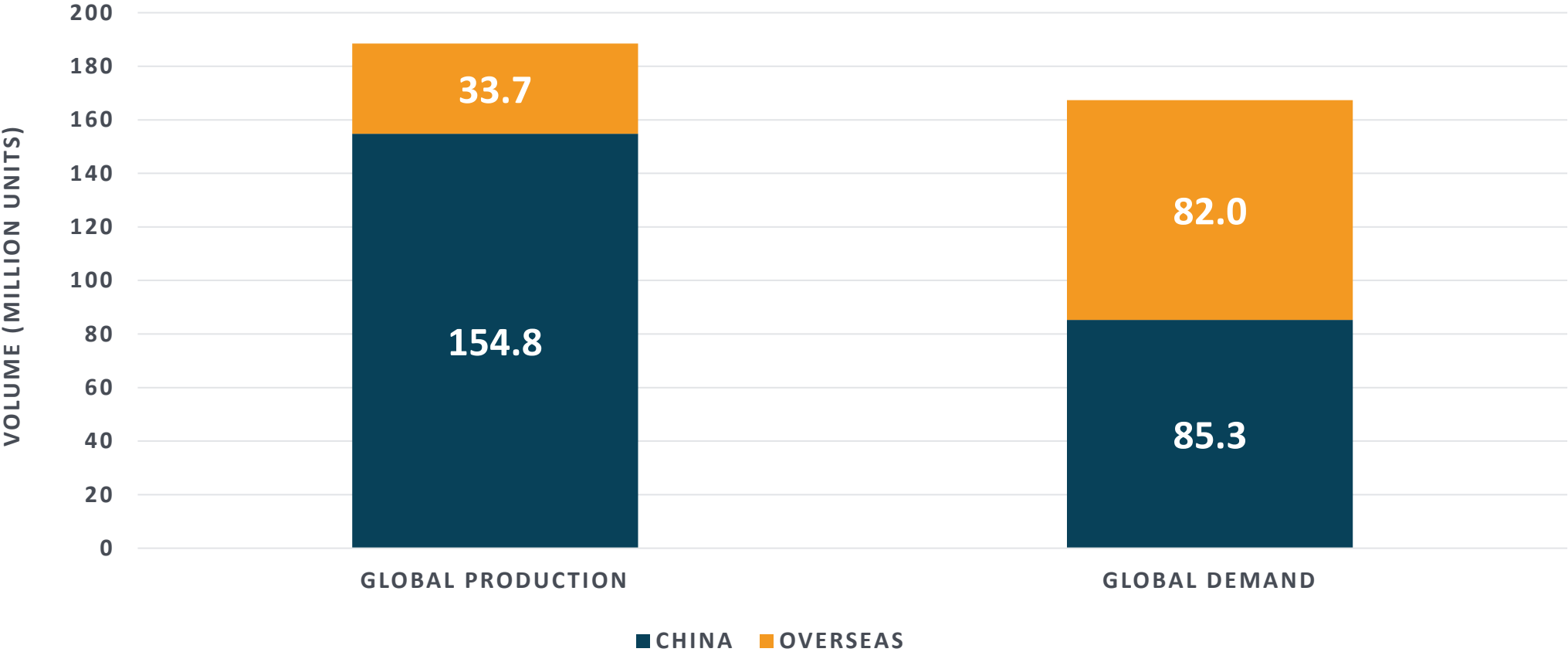
- **Objective:**
 - Assess the impact of labeling policies on energy efficiency within the RACs market (2018–2022)
- **Data source:**
 - China Industry Online
 - Brazil Labeling Program Service Portal
- **Findings:** Provides insights into energy efficiency trends following policy implementation in both markets.
- **Outcomes:**
 - Identifies opportunities for policy improvement in both countries.
 - Sharing experiences with other countries in the development of RAC labeling.

Impact of RAC labeling on Energy Efficiency in the Chinese Market

China leads the world in both production and demand of room AC.



CHINA'S AC MARKET: PRODUCTION & DEMAND IN 2021

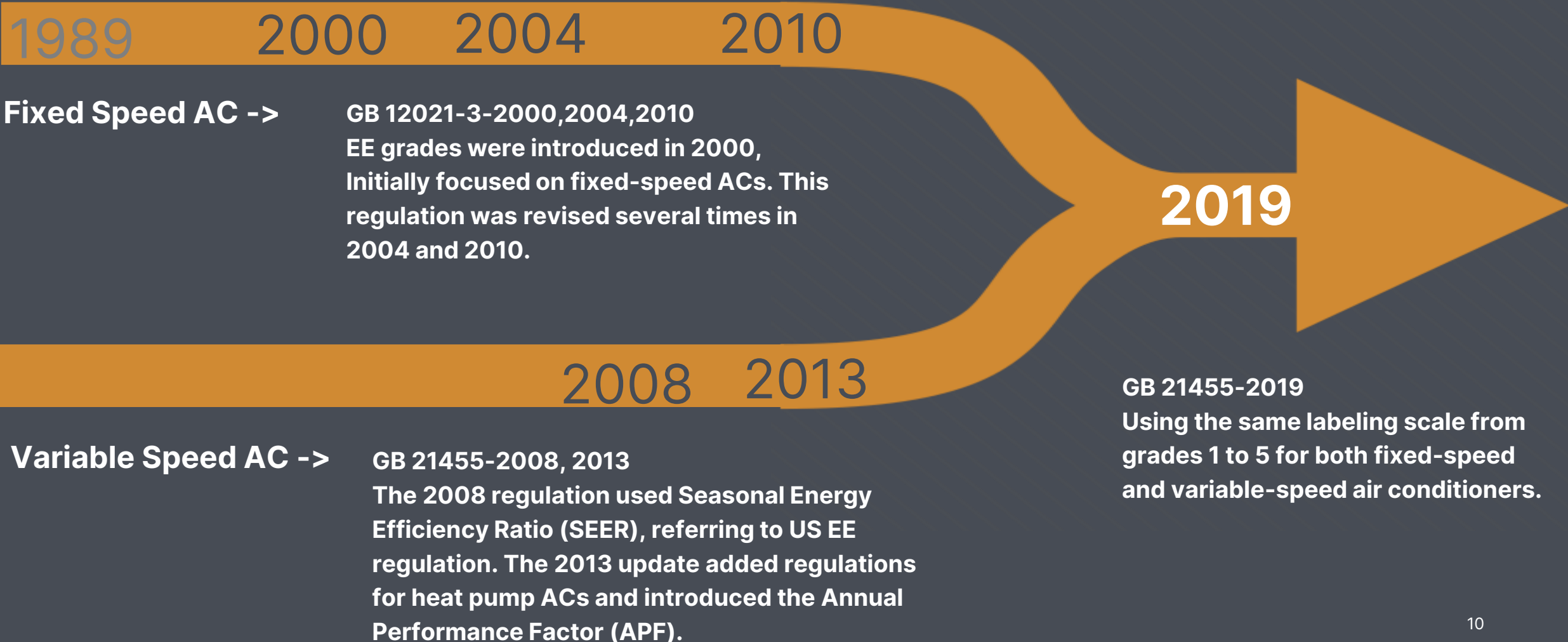




• China Energy Label

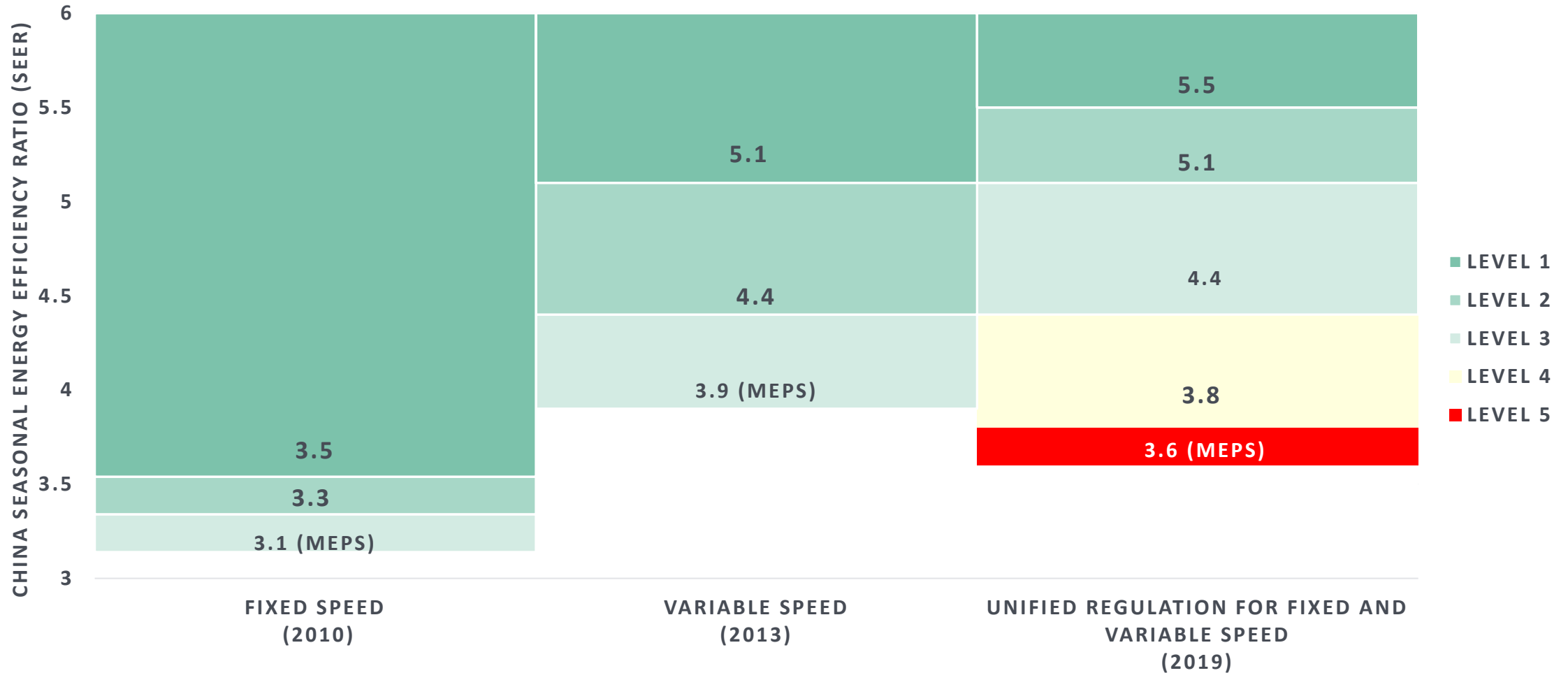
- The mandatory energy labeling program, managed by China National Institute of Standardization (CNIS), includes either three or five energy efficiency levels.
- Level 1 requiring the most efficient level
- level 3 (or level 5) representing the MEPS
- The first RAC labeling was introduced in the early 2000s.

30 Years of energy efficiency regulation development for RAC in China



The new labeling policy facilitated the phase-out of most fixed-speed room ACs.

COMPARISON OF EE LEVELS IN LABELING VERSIONS: GB 12021.3-2010, GB 21455-2013 AND GB21455-2019

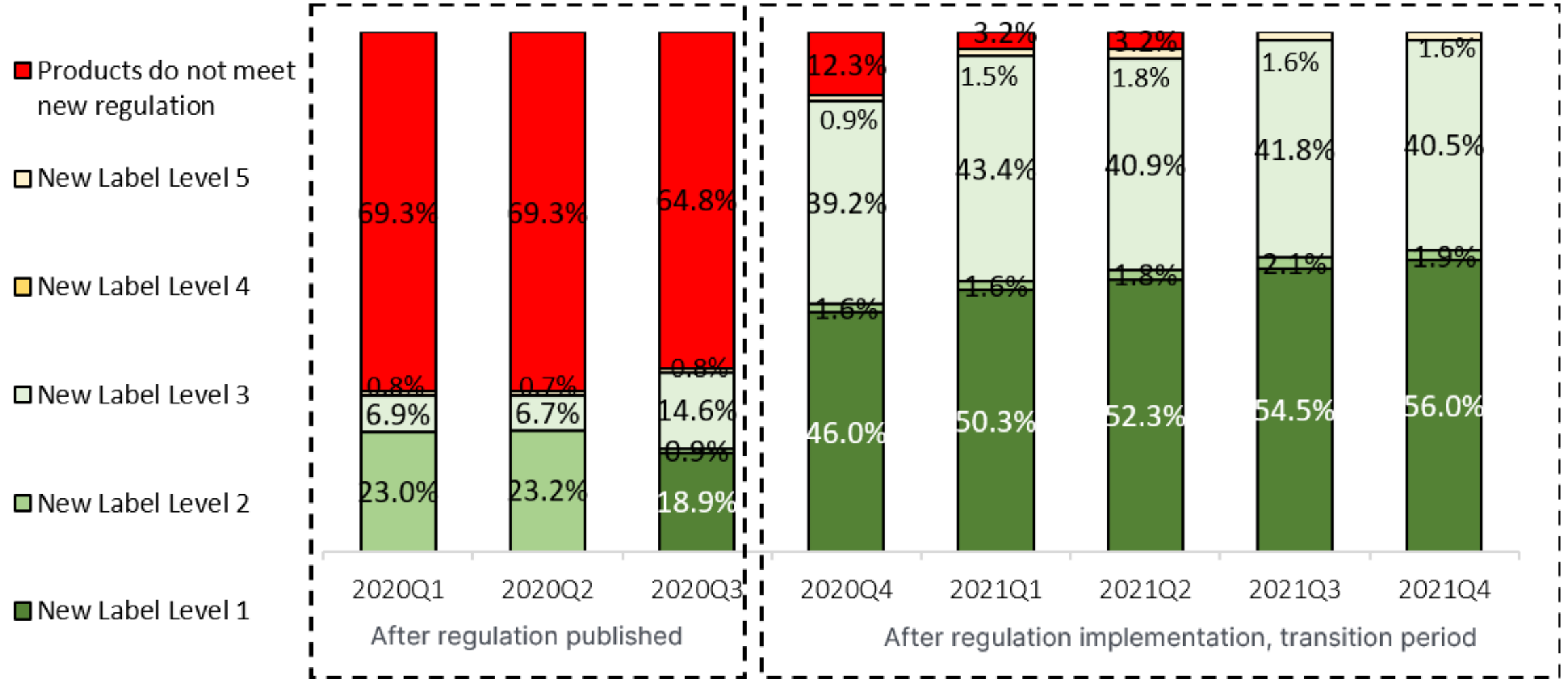


THE ENERGY EFFICIENCY LEVEL COMPARISON IN THIS TABLE PERTAINS TO COOLING-ONLY PRODUCTS WITH A COOLING CAPACITY RANGING FROM 4500 TO 7100 W. GB 12021.3-2010 USES EER AS THE METRICS, CLASP DEVELOPED A SIMPLE EMPIRICAL FORMULA TO CONVERT VALUES BETWEEN SEER TO EER, WHICH SEER= EER+0.04

Significant shift in market distribution towards higher efficiency products following policy implementation.

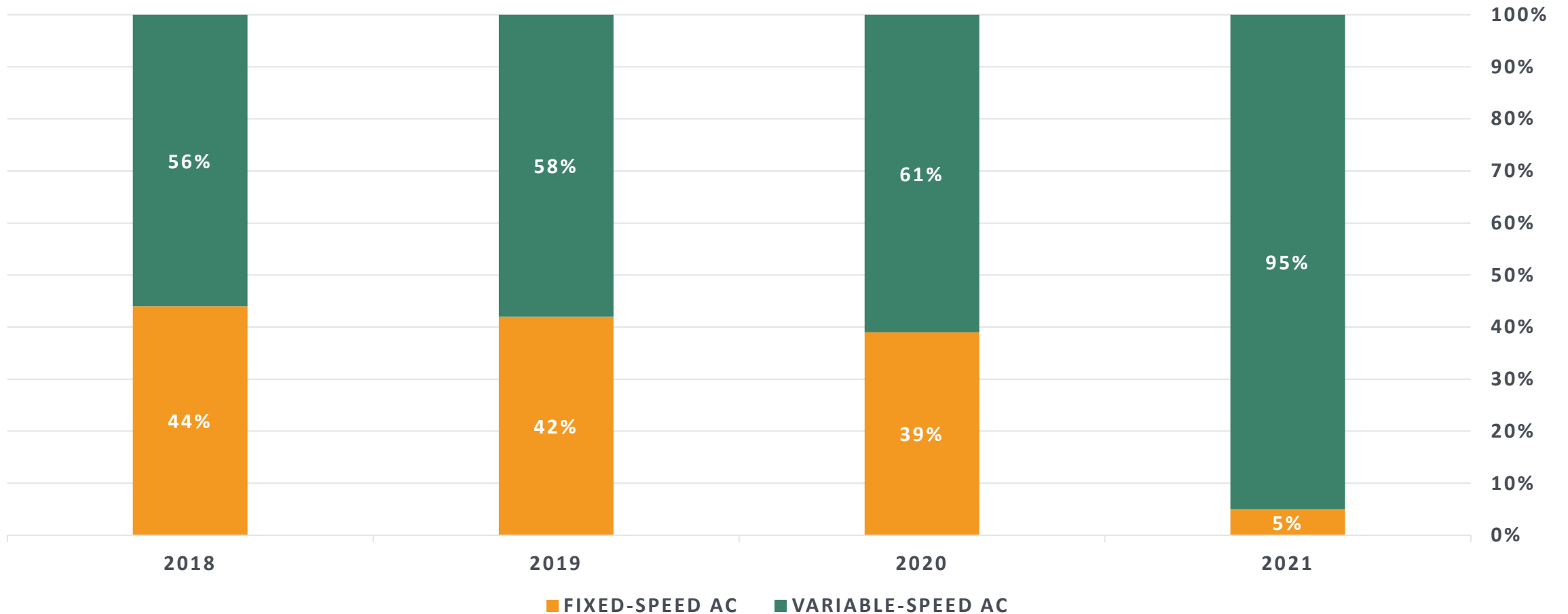


EFFICIENCY IMPROVEMENTS IN CHINA'S RAC MARKET FOLLOWING LABELING IMPLEMENTATION



China's RAC market undergoes major technological transformation following labeling implementation.

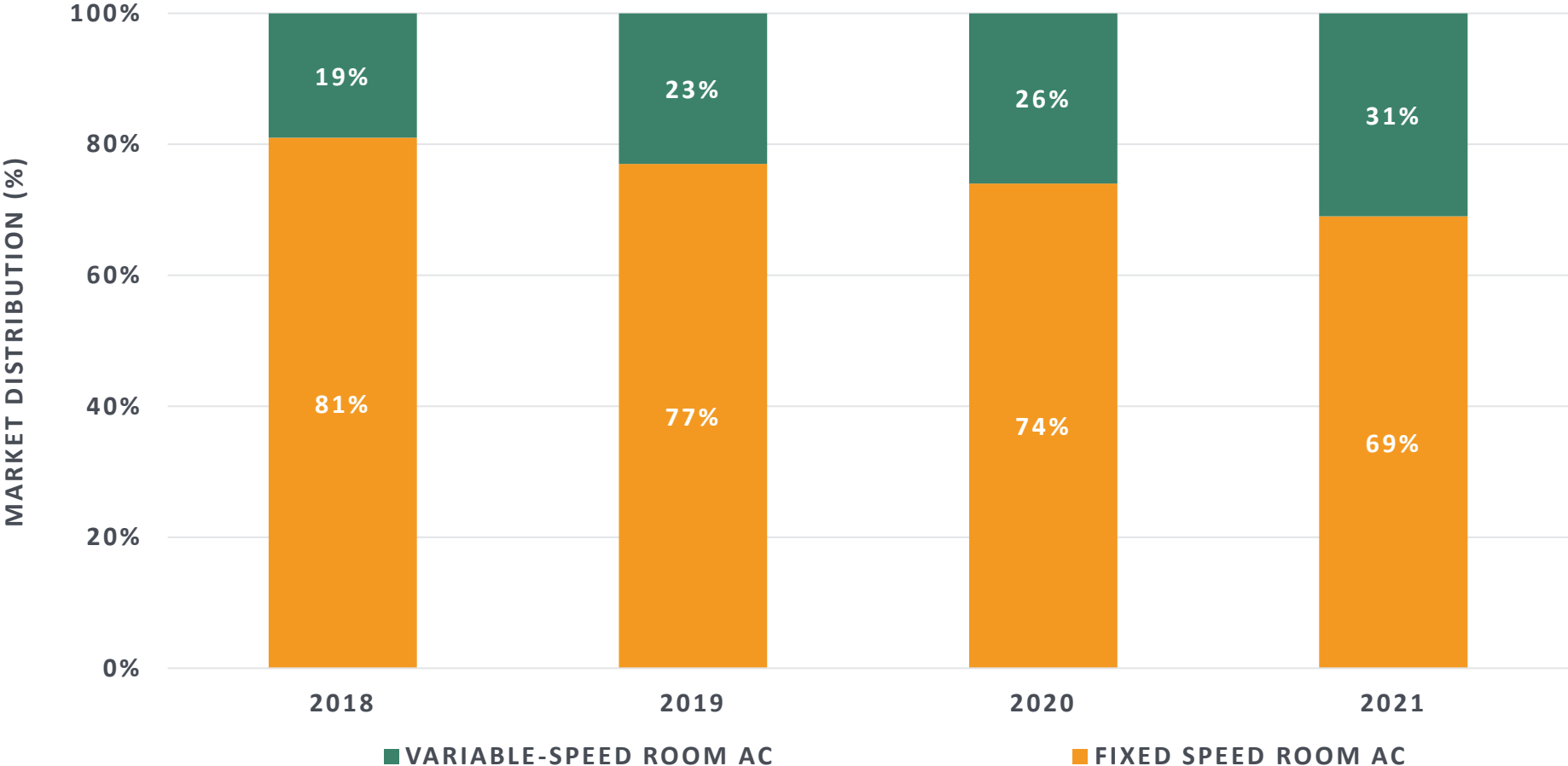
SALES PROPORTIONS OF VS ROOM ACS VS. FS ROOM ACS IN CHINA (2018–2021)



New labeling policy has some impact on RAC export market.

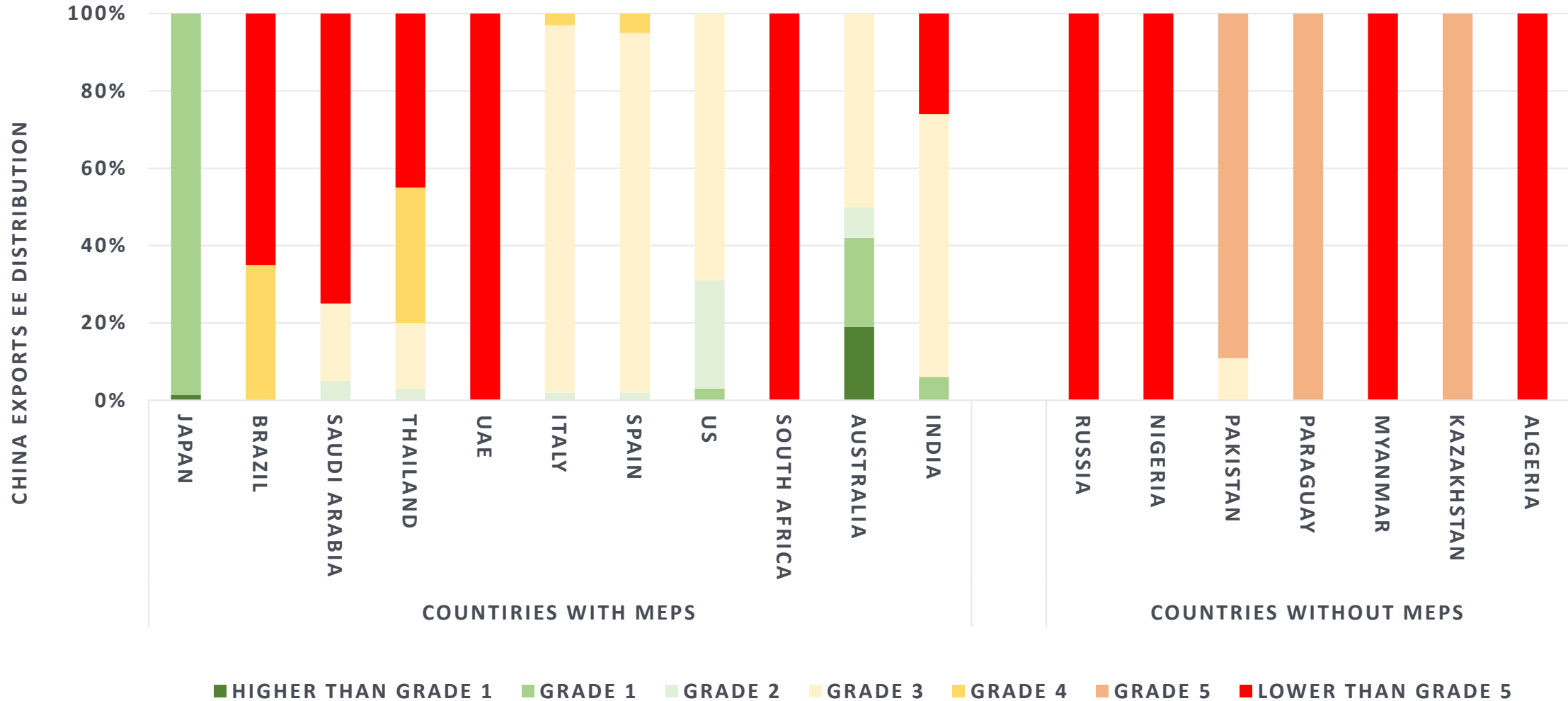


EXPORT SALES PROPORTIONS OF ROOM ACS IN CHINA (2018-2021)



Exported Split AC Energy Efficiency Distribution from China to Other Countries

See the figure below.



Impact of RAC labeling on Energy Efficiency in the Brazilian Market

Surge in cooling demand driven by growing population, rising temperatures, and economic recovery.



18%

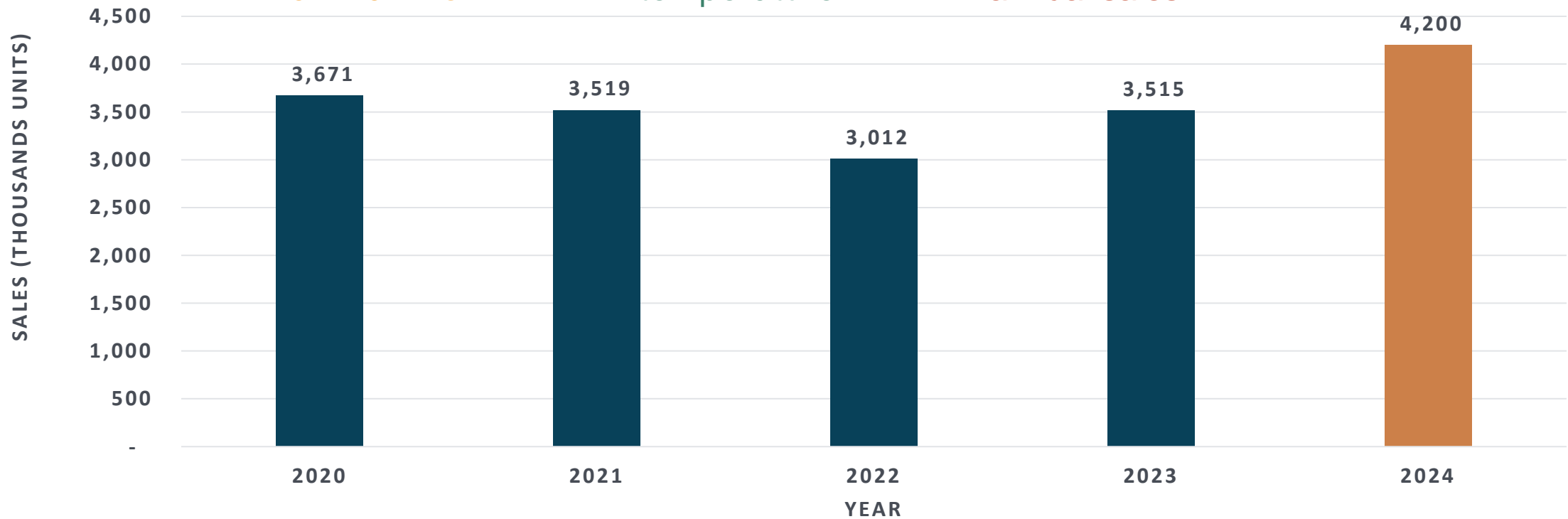
of the households own an AC

28°C

yearly average temperature

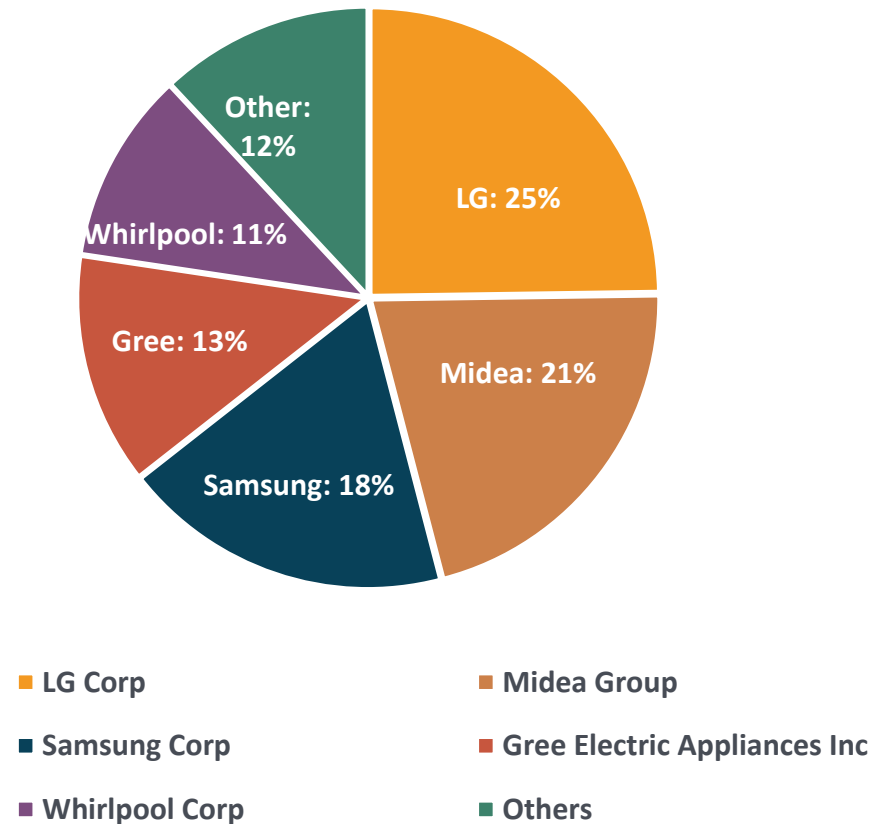
20%

Increase in annual sales

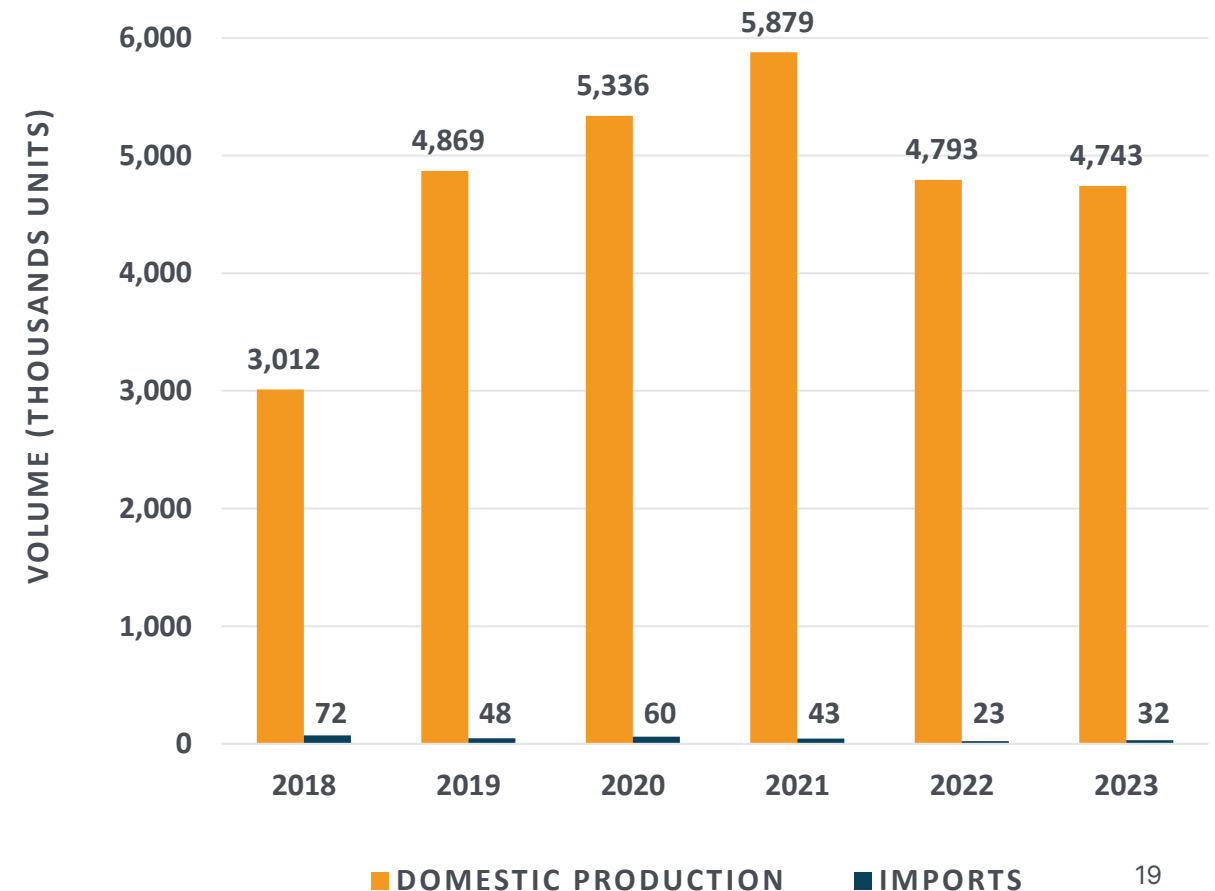


Brazil's split RAC market growth in the 2000s was mainly driven by domestic production.

KEY PLAYERS IN AC MARKET IN BRAZIL (2023)



ROOM AC PRODUCTION IN BRAZIL (2018–2023)



Manufacturing regulations fueling growth in Brazil's split AC market.

- **Tax benefits + local content requirements**

Manaus Free Trade Zone (ZFM)

Basic Production Process (PPB)

- **Attracted foreign manufacturers**

Since the 1990s, multinationals acquired local AC manufacturers, dominating the market.

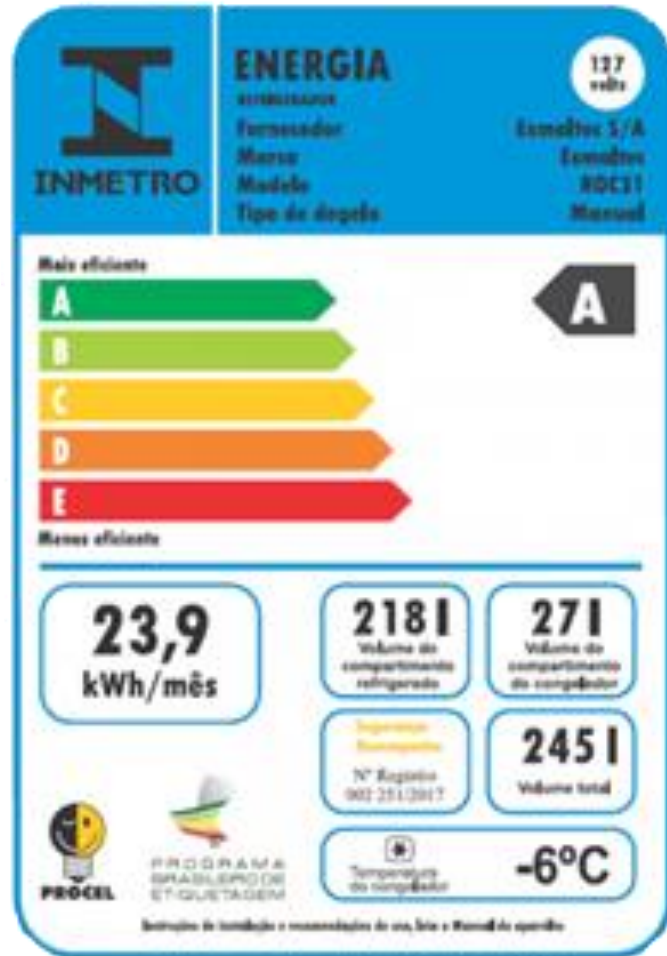
- **Local components make up 50% of unit value**

Multinationals have set up factories in Manaus to qualify for tax benefits by manufacturing components and assembling them with imported compressors.

- **Logistic costs hinder AC exports**

Factories located in the heart of the Amazon rainforests lead to higher export cost.





- **The Brazilian Labeling Program (PBE)**

- A mandatory comparative label program
- Managed by the Brazilian National Metrology, Quality, and Technology Institute (INMETRO)
- Categories from 'A' to 'C' or 'G'
- AC labeling was first introduced in 2006

20 years of policy development

Energy Efficiency Law

2001

2006

2009

2011

2013

First enforced labeling

A		CEE >	3,20
B	2,76	<CEE ≤	3,20
C	2,58	<CEE ≤	2,80
D	2,39	<CEE ≤	2,60
E		CEE ≤	2,40

Label revision
A class not revised

A		CEE >	3,20
B	2,80	<CEE ≤	3,20
C	2,60	<CEE ≤	2,80
D	2,40	<CEE ≤	2,60
E		CEE ≤	2,40

Label revision
A class not revised

A	3,20	CEE >	
B	3,00	<CEE ≤	3,20
C	2,80	<CEE ≤	3,00
D	2,60	<CEE ≤	2,80
E	2,39	≤CEE ≤	2,60

Label revision
+1% A class

A	3,23	<CEE	
B	3,02	<CEE ≤	3,23
C	2,81	<CEE ≤	3,02
D	2,60	<CEE ≤	2,81

According to CLASP's market assessment in 2020:

77%

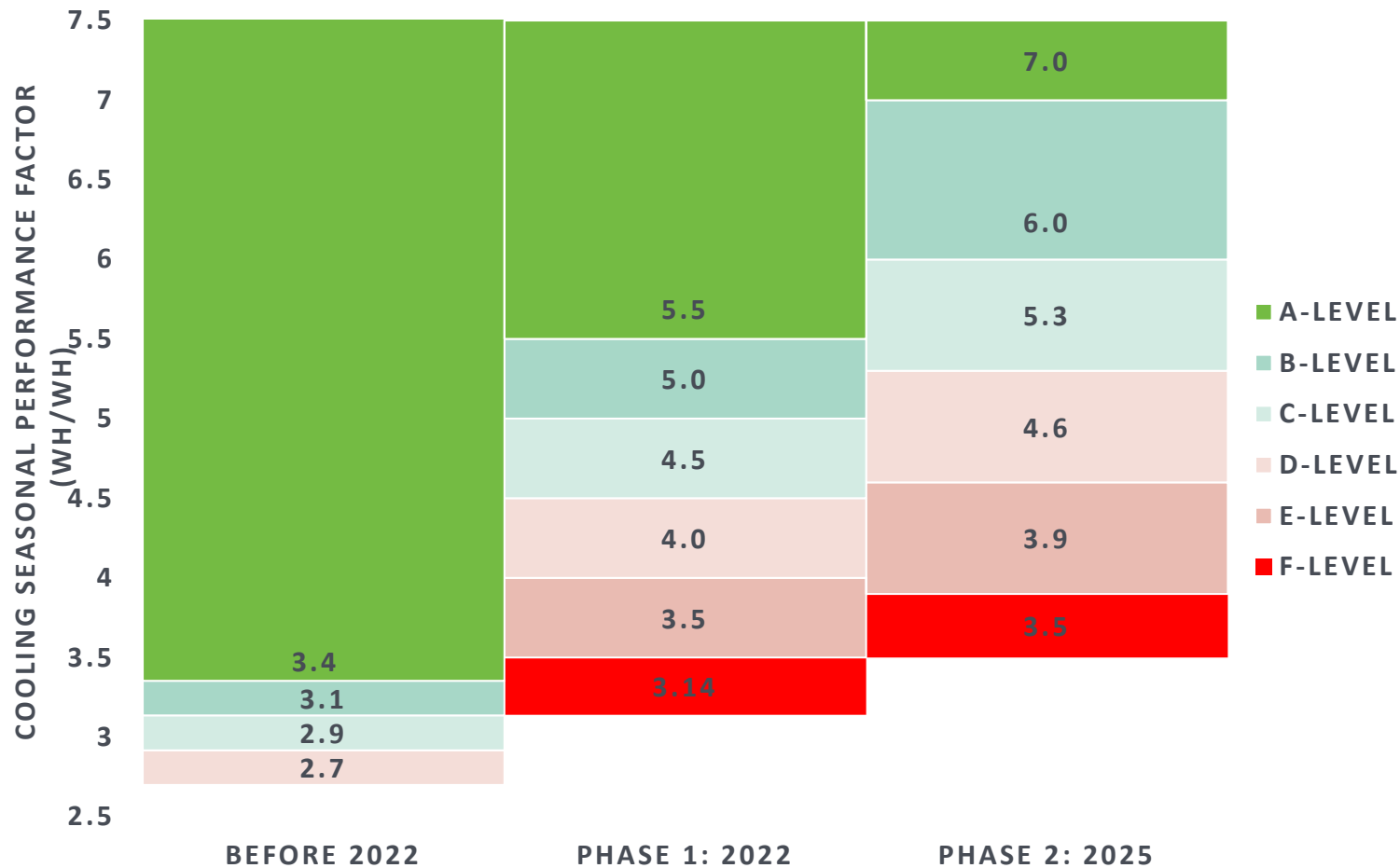
of split ACs sold in Brazil were classified as 'A' class

10.2%

Increase in the median energy efficiency level of ACs from 2010 to 2018

Brazil introduced two-phase labeling with significant improvements to efficiency requirements

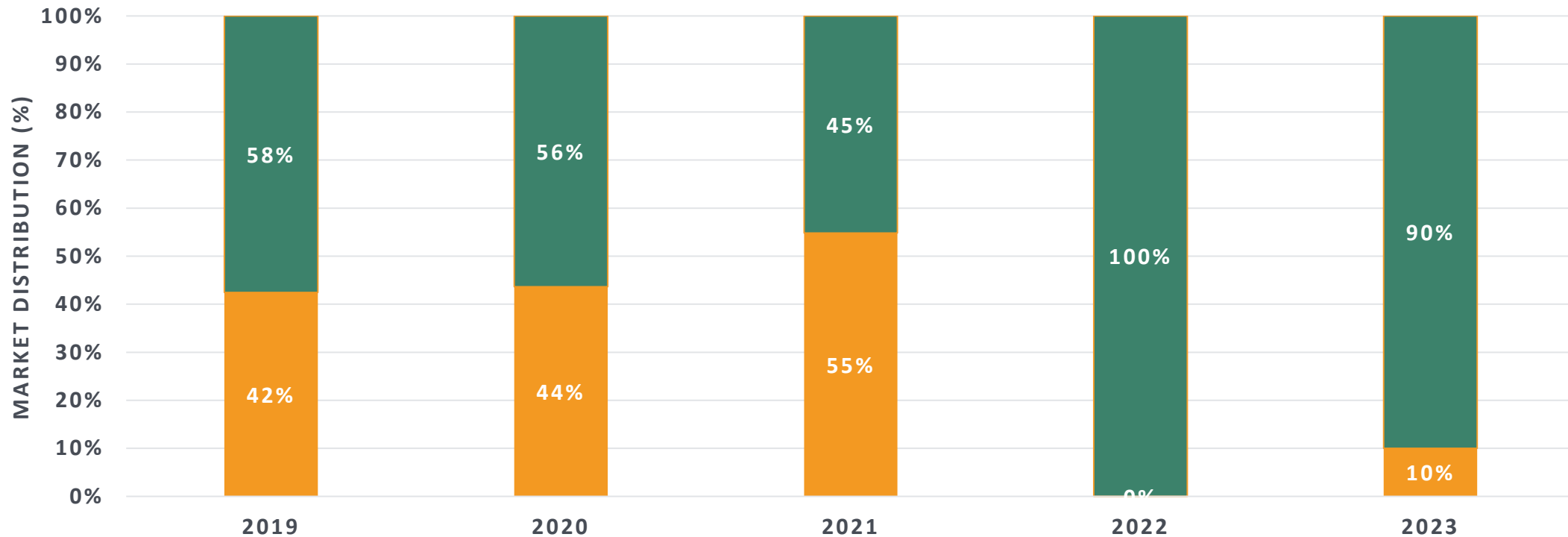
BRAZIL ROOM AC LABELING ROADMAP FROM 2013 TO 2025 – SPLIT SYSTEM
UP TO 60,000 BTU/H



In 2020, with support from CLASP, Instituto Clima e Sociedades' (iCS) and Kigali Network, Brazil implemented its first meaningful AC label revision in a decade – avoiding 34.5 Mt CO₂ emissions cumulatively through 2030.

Rapid growth of variable-speed ACs: from 45% market share in 2021 to 100% in 2022

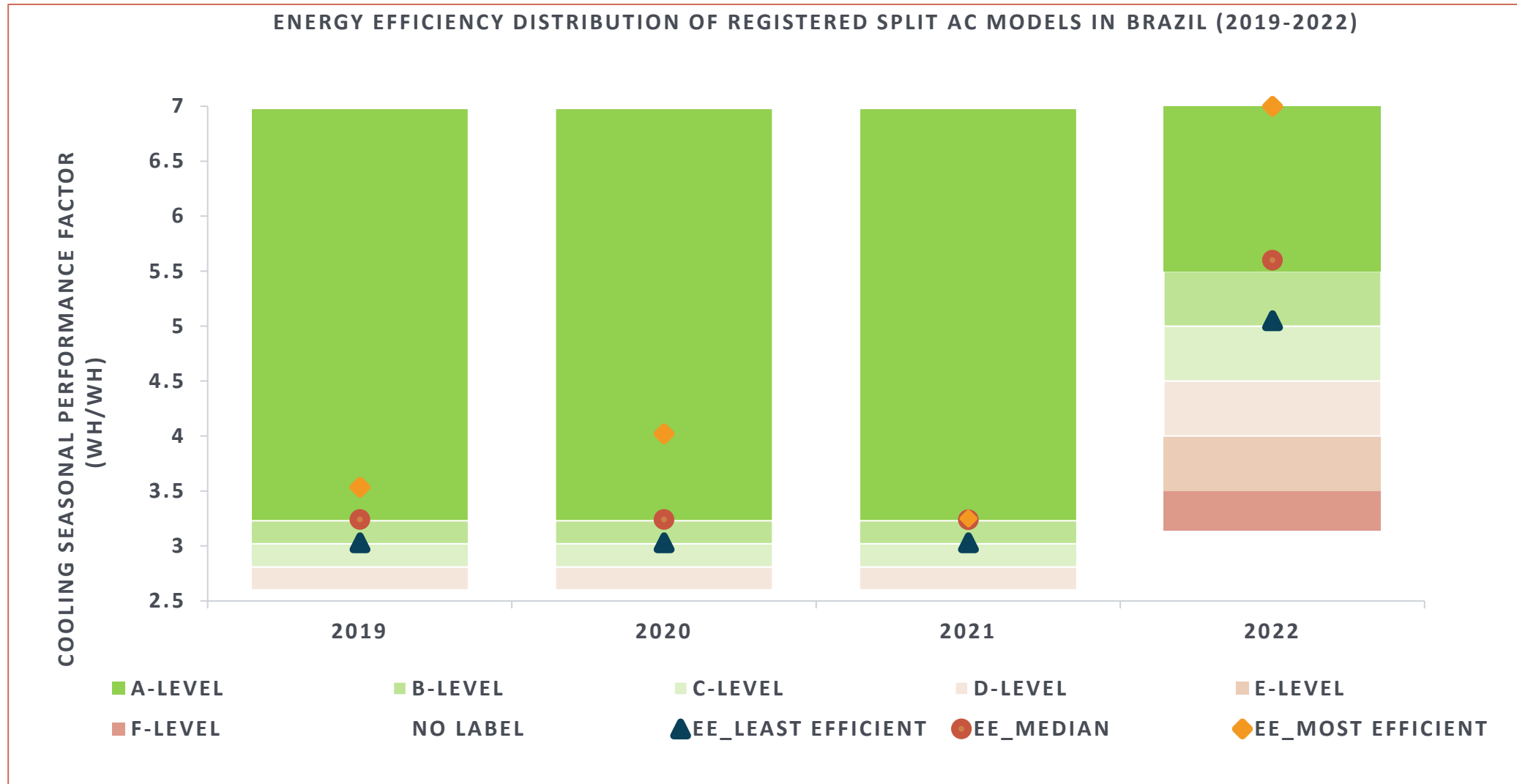
PRODUCT EFFICIENCY LABELING LEVEL DISTRIBUTION IN BRAZIL FROM 2019 TO 2023



REGISTERED MODEL NUMBER	2019	2020	2021	2022	2023
	73	142	31	96	31

■ FIXED-SPEED ■ VARIABLE-SPEED

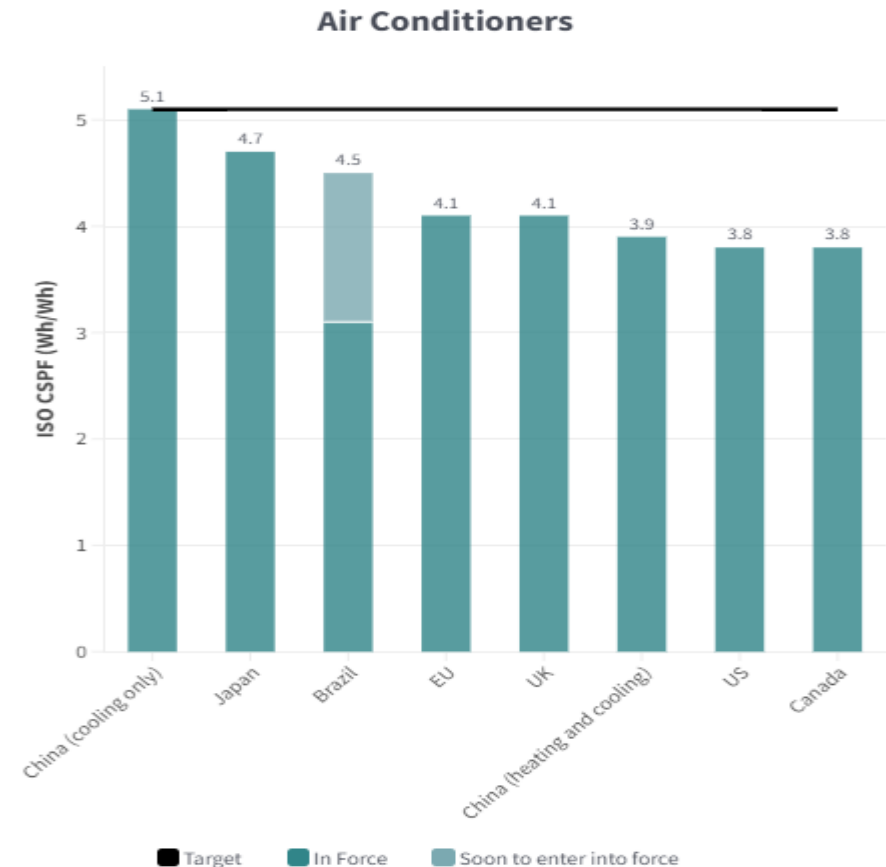
The median RAC efficiency has nearly doubled following the adoption of the new labeling



Conclusion

- **Energy Efficiency Regulation are essential:** both import and export countries should prioritize the energy efficiency regulations for RAC to support the market transition and achieve energy savings.
- **International Benchmarks:** international benchmarks can assist policymakers in developing more inclusive labeling program.
- **Ensure Timely Revisions:** Some countries have established overarching labeling framework regulations that mandate periodic review of standards and labeling.

INTERNATIONAL BENCHMARK TOOL: WORLD BEST MEPS (SPLIT AC WITH 7 KW COOLING CAPACITY)



- While the database used in this study provides critical evidence for analysis over specific years, there is limited public data tracking product efficiency in the market over longer periods for both countries.
- Some other product features were not tracked in the study, including refrigerants and pricing. The results can also provide valuable guidance for policymakers in regulatory revisions..
- **Recommendations:** Regular market assessments needed to track the effectiveness of energy efficiency labeling policies and inform future revisions.

Thank you!
Any questions?



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