

# Report Annexes

## Pathways to Prevent the Environmental Dumping of Climate-Harming Room Air Conditioners in Latin America & the Caribbean

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# Annex 1: Detailed Methodology

## DATA AND SOURCES

To analyze the market of split room air conditioner (AC) units in eleven focus countries in the Latin America and the Caribbean (LAC), the authors used market data collected by the Building Services Research and Information Association (BSRIA) and trade data as reported by the United Nations International Statistics Database (UN Comtrade). To identify more detailed product-level information, the authors conducted primary research through direct, in-store data collection in collaboration with local consultants, and web scraping from popular e-retailers. Additional information on each source is provided below.

### Market characteristics

To assess market characteristics of room AC units in LAC, the authors used several data sources:

- **BSRIA market research on national room AC markets:** This data provided insights into the overall market size and distribution of single split room ACs in 2023 across eleven focus countries. BSRIA served as the primary source for room AC sales projections between 2022 and 2028, and provided data on key market trends such as growth rate, current and predicted inverter technology prevalence, capacity distribution, and brand dominance within each country's local market.
- **Information gathering from local experts:** The authors collaborated with local consultants to collect qualitative insights on the room AC market, verify modeling assumptions, and ensure that each dataset accurately reflected the market landscape. Where reliable data was not available, local consultants provided expert estimates grounded in their professional experience, available tariff data, and/or reliable sources online, e.g. government websites.

### Product Characteristics

- **Product-level data collected by on-the-ground local consultants:** Local experts were hired to gather detailed product-level data on room AC models using methodologies tailored to each country's specific context. The primary data collection methods included store visits, import data analysis, and direct stakeholder engagement, supplemented by online data collection, if necessary. This research gathered detailed information on available room AC models across ten focus countries<sup>i</sup>, detailing key attributes such as price, energy efficiency, refrigerant type, capacity, and other specifications. Data was collected in March through May 2025.
- **Web scraping:** In instances where product-level data was incomplete or poor-quality, web scraping was conducted to create a more comprehensive dataset. The site MercadoLibre was

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<sup>i</sup> In Brazil, the authors worked with CLASP's Brazil-based team to gather primary equipment data as well as analyze product registration data from Brazil's product registry.

selected for six countries, owing to its position as a popular e-retailer. In Brazil, Magazine Luisa was selected as more representative of the local market based on local expertise.

- **Product registries:** In countries which maintain product registries, these databases were used to validate primary research findings (e.g. Brazil). In cases where primary research was inconclusive or the datasets gathered were incomplete, data from product registries supplemented existing data, minimizing data gaps and resolving inconsistencies.

## Cooling Access

To estimate the access gap within the LAC region, several data sources were used:

- **BSRIA market research on room AC penetration rate:** This data provides insights into what percentage of households in select countries own at least one air conditioner. Data on household penetration rate was available in seven countries. This was compared and validated with other sources, where possible.
- **National surveys and statistics:** Where room AC penetration rate was unavailable, data from national statistics and surveys was used to determine household penetration rate for room ACs. Sources vary by country, but include departments of energy, households, and commerce.
- **Publicly available resources:** Regional penetration rate estimates published by the International Energy Agency (IEA) were assumed to be representative in countries where neither BSRIA nor national surveys and statistics provided the country's room AC penetration rate.<sup>ii</sup> Further, the methodology to estimate climate maximum saturation originated from a publicly-available publication by Andrijevic et al. and was calculated by the authors using population-weighted Cooling Degree Days (CDDs) as recorded in the CMCC-KAPSARC database. Additional information on this source and estimation framework is available in the Impact Evaluation section below.
- **On-the-ground local consultants:** In cases where room AC penetration rate was unavailable, local consultants provided country-specific estimates based on their expertise. Consultants also validated BSRIA and national survey data, and provided additional information on relevant factors, such as cultural context and income disparities, that may impact household penetration rate.

## Affordability

- **On-the-ground local consultants:** Local consultants obtained unit price information from visits to brick-and-mortar stores. Consultants also served as local experts for other relevant affordability variables, such as national electricity tariffs.
- **Web scraping:** In cases where local consultants were unable to collect pricing data directly from stores, online web scraping was employed to extract pricing information from popular e-

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<sup>ii</sup> This approach was only used for Barbados. For all other countries, room AC penetration rate data was available, either from BSRIA or national surveys and statistics.

retailers. As mentioned above, the e-retailers included in this process were MercadoLibre, which covered six countries, and Magazine Luisa in Brazil.

- **Publicly available resources:** Standardized demographic and socioeconomic indicators were sourced from the World Bank, including data Gross National Income (GNI) per capita, GINI index, population, deposit interest rate, and income distribution data.

## Modeling Assumptions

Many of the sources mentioned were integral in conducting direct and indirect emissions modeling for room ACs in the LAC region. In addition to those mentioned above, the following sources were leveraged:

- **Expertise of local consultants:** Consultants provided data that was integral to modeling, such as average unit lifetime and estimates of each room ACs operating hours.<sup>iii</sup> Additionally, local consultants were relied upon to provide estimates of refrigerant data including annual leakage rate, proportion of products leaking, proportion of products serviced, proportion of refrigerant vented at time-of-service, and the proportion of refrigerant vented at end-of-life. \
- **Publicly available resources:** These resources were used for several assumptions in the emissions modeling, including grid emission factor (International Financial Institutions Technical Working Group) and transmission and distribution loss factor (US Energy Information Administration). Additionally, resources such as National Cooling Action Plans and Kigali Implementation Plans were used to identify trends in refrigerant phase-outs.

Table 1 below identifies the primary and secondary source for each input utilized in this study.

TABLE 1: SOURCES OF DATA, BY DATAPOINT

Category	Datapoint	Primary Source	Supplementary Source(s)
Market characteristics	Market Growth Rate	BSRIA	Local Consultants
	Market Size	BSRIA	Local Consultants
	Inverter Penetration Rate	BSRIA	Local Consultants
	Refrigerant Market Distribution	BSRIA	Local Consultants
	Capacity Distribution	BSRIA	Local Consultants
	Brand Dominance	BSRIA	Local Consultants
	Imports	UN Comtrade	BSRIA
	Exports	UN Comtrade	BSRIA
Product characteristics	Efficiency	Local Consultants	Web Scraping
	Capacity	Local Consultants	Web Scraping

<sup>iii</sup> Rising global temperatures are expected to increase annual operating hours in the coming years, resulting in higher UECs than estimated in this modeling exercise. However, due to the unpredictability of global temperature trends and their uneven impact across different countries and regions, the impact of increasing room AC use was not quantified in this model. This omission does not affect the impact analysis – because the model calculates the difference in carbon reductions between BAU and policy scenarios and global temperature changes affects annual operating hours in both scenarios identically; thus, the overall impact of each policy change remains unchanged.

	Brand	Local Consultants	Web Scraping
	Refrigerant	Local Consultants	Web Scraping
	Refrigerant Charge	Local Consultants	Web Scraping
Access	Room AC Penetration Rate	BSRIA	National Surveys and Statistics, local consultants
	Population-Weighted Cooling Degree Days	CMCC-KAPSARC	-
Affordability	Price	Local Consultants	Web Scraping
	Electricity Tariff	Local Consultants	National Surveys and Statistics
	Gross National Income per capita	World Bank	-
	GINI Index	World Bank	-
	Population	World Bank	-
	Deposit interest rate	World Bank	-
	Income distribution	World Bank	-
Modeling Assumptions	Annual sales	Calculated using data from BSRIA	-
	Unit Energy Consumption	Calculated using data from local consultants	-
	Lifetime	Local Consultants	-
	Efficiency Improvement Rate	Local Consultants	-
	Grid Emission Factor	International Financial Institutions Technical Working Group (IFI TWG)	National Surveys and Statistics
	T&D Loss Factor	US Energy Information Administration	National Surveys and Statistics
	Annual Operating Hours	Local Consultants	-
	Refrigerant Global Warming Potential	Intergovernmental Panel on Climate Change (IPCC)	-
	Annual Leakage Rate	Local Consultants	-
	Proportion of Products Leaking	Local Consultants	-
	Proportion of Products Serviced	Local Consultants	-
	Proportion of Refrigerant Vented at Servicing	Local Consultants	-
	Proportion of Refrigerant Vented at End-of-Life	Local Consultants	-

	Refrigerant Transition	Calculated using data from National Cooling Action Plans	Calculated using data from Kigali Implementation Plans, HFC and HCFC inventories, United Nations Development Program, journal publications
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## LOW-EFFICIENCY ANALYSIS

The low-efficiency analysis was completed by simulating a market distribution of room AC sales across all eleven markets included in the study. Using market size and brand share data from BSRIA, the authors approximated total room AC sales by brand in each country. Total brand sales estimates were combined with in-store and online product-level data to estimate total sales for each model. In the absence of detailed product-level sales information, uniform distribution of product sales within a brand’s total room AC sales was assumed. This approach represents a brand- and model-weighted sales distribution applied to all room ACs captured in the dataset.<sup>iv</sup>

Using this simulated market distribution, the authors used the reported efficiency levels of these units, typically reported on the product’s label, to estimate the total amount of low-efficiency units in the LAC market. When combined with product-level information gathered by local consultants for each unit, including brand and country of origin, it was possible to identify instances of dumping. These included instances where low-efficiency units were imported from countries where they failed to meet local MEPS, or were manufactured locally by multinational companies who have the capability to manufacture higher-efficiency units in other markets.

## TRADE ANALYSIS

The authors analyzed import, export, reimport, and reexport data from the UN Comtrade Database for room AC units to determine regional trade flows and refrigerant trends. International trade for room ACs was analyzed using the following harmonized system (HS) code:

- **Room ACs (HS 841510):** Air conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity, including those machines in which the humidity cannot be regulated separately. Units designed to be fixed either to a window, wall, ceiling, or floor, and those that are either self-contained or “split-systems”, were analyzed.

## COST AND AFFORDABILITY ANALYSIS

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<sup>iv</sup> When on-the-ground research reported brands not included in BSRIA’s market-level dataset, these were categorized as “other.” To distinguish between lesser-known brands and unmeasured segments of the market, it was assumed that half of the market share categorized by BSRIA as “other” comprised the newly-identified models, while the remaining half represented models with no available data. This approach acknowledges that data collection was not exhaustive and serves as a practical approximation to ensure the representation of models not captured in the dataset, while incorporating all available information gathered through primary research.

For the price analysis, the authors estimated the normalized price for 3.52kW unit (the most common room AC size in the LAC region) based on the price data collected during in-store data collection and/or web scraping. Separate prices were calculated for cooling-only and cooling-heating units.<sup>v</sup>

The authors used the efficiency and size of each focus country's representative unit combined with each country's electricity tariff and annual operational hours to calculate average room AC operational costs in each country. For countries which lacked sufficient information to determine a representative unit (Barbados, Colombia, and Uruguay<sup>vi</sup>), it was assumed that the representative model was the same as another demographically similar country. Total lifetime ownership cost was compared to median income for each income quintile to examine the overall affordability of owning and operating a room AC in each country.

## IMPACT EVALUATION

The authors conducted an impact evaluation to quantify the environmental and financial impact of improving Minimum Energy Performance Standards (MEPS) for room ACs in all eleven focus countries.<sup>vii</sup> The impact evaluation focused on two areas:

- **Greenhouse gas emissions:** The authors modeled both direct emissions from refrigerant leakage, release, and disposal over equipment lifetime as well as indirect emissions from emissions resulting from the electricity generation to power room ACs.
- **Cost:** The authors assessed national energy savings from the implementation of MEPS as well as consumer lifecycle cost, taking into account both purchase price and lifetime operating costs.

The authors modeled greenhouse gas emissions under four policy scenarios designed to demonstrate the impact of eliminating environmental dumping of low-efficiency, high-GWP room ACs. The four scenarios are:

- **Business-as-usual (BAU):** This scenario assumes no policy intervention, with market growth continuing along current and historical trajectories and an ongoing transition to R-32. It anticipates gradual market transition to an ultralow-GWP refrigerant (R-290) beginning in 2035, reflecting alignment with the Montreal Protocol HFC phasedown schedule and current technological development trends.
- **Policy Scenario 1:** This scenario assumes the adoption of global benchmark MEPS for room ACs in 2027 (Cooling Seasonal Performance Factor (CSPF) 6.1 Wh/Wh) and an ongoing market-driven transition to R-32. It anticipates a gradual market transition to an ultralow-GWP refrigerant (R-290) beginning in 2035, reflecting alignment with the Montreal Protocol HFC phasedown schedule and current technological developments.

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<sup>v</sup> Cooling-only and cooling-heating units were disaggregated in the price analysis because of differences in pricing trends for the two technologies.

<sup>vi</sup> For Barbados, the representative unit from Jamaica was used as a proxy; for Colombia and Uruguay, the representative unit from Chile was used as a proxy.

<sup>vii</sup> The scope of this study only includes new room ACs, as only new room ACs are regulated in the focus countries. However, the impact analysis includes unit use throughout its entire lifetime, both by the first owner and subsequent owners.

- **Policy Scenario 2:** This scenario assumes the adoption of global benchmark MEPS for room ACs in 2027 (CSPF 6.1 Wh/Wh) and an accelerated market transition to an ultralow-GWP refrigerant (R-290) in 2029.
- **Policy Scenario 3:** This scenario assumes the adoption of global benchmark MEPS for room ACs in 2027 (CSPF 6.1 Wh/Wh), adoption of next generation MEPS for room ACs in 2029 (CSPF 7.59 Wh/Wh), and an ongoing market-driven transition to R-32. It anticipates a gradual market transition to an ultralow-GWP refrigerant (R-290) beginning in 2035, reflecting alignment with the Montreal Protocol HFC phasedown schedule and current technological developments.

To conduct the impact analysis, the authors identified two representative room AC units per country. One representative unit was selected to represent the lower-capacity market segment (less than or equal to 5 kW), while the other was selected to represent the higher-capacity market segment (greater than 5 kW). This approach was intended to ensure appropriate representation across multiple size categories within the impact analysis.

The representative units were selected from the dataset of 812 models across all eleven countries. In each country, the authors segmented the market into two size categories –  $\leq 5$  kW and  $> 5$  kW. For each size category, the authors calculated the median capacity and efficiency of each group. These calculations were assumed to define the ideal representative unit within each size category. The model which most closely aligned with the ideal representative unit characteristic was selected for each size category. Once representative units were identified, sales were allocated to each size category according to their market share within the country.<sup>viii</sup> For countries which lacked sufficient information to determine a representative unit (Barbados, Colombia, and Uruguay), it was assumed that the representative model was the same as another demographically similar country.<sup>ix</sup>

**TABLE 2:** REPRESENTATIVE UNITS USED FOR DIRECT AND INDIRECT EMISSIONS MODELING

Country	Group	Capacity (kW)	Efficiency (CSPF)	Brand	Refrigerant	Market Share
Argentina	$\leq 5$ kW	3.43	3.71	Surrey	R-410A	84%
	$> 5$ kW	5.3	4.94	Electra	R-410A	16%
Barbados	$\leq 5$ kW	3.52	5.13	Windy	R410A	65%
	$> 5$ kW	7.03	4.69	Windy	R410A	35%
Brazil	$\leq 5$ kW	3.5	6	Midea	R-32	75%
	$> 5$ kW	5.3	5.8	TCL	R-32	25%
Chile	$\leq 5$ kW	2.6	4.5	Midea	R410A	90%
	$> 5$ kW	5.28	5.9	Midea	R410A	10%
Colombia	$\leq 5$ kW	2.6	4.5	Midea	R410A	67%
	$> 5$ kW	5.28	5.9	Midea	R410A	33%

<sup>viii</sup> Sales were allocated to each category based on the sales-weighted market share of each size category according to BSRIA data. Sales were assumed to follow a linear growth trend until 2060 based on historical growth trends. Sales data for each country from 2005-2060 is available upon request.

<sup>ix</sup> For Barbados, the representative unit from Jamaica was used as a proxy; for Colombia and Uruguay, the representative unit from Chile was used as a proxy.

Dominican Republic	≤ 5 kW	3.52	5.28	Gree	R410A	69%
	> 5 kW	4.98	5.01	Whirlpool	R410A	31%
Grenada	≤ 5 kW	3.4	4.69	Carrier	R410A	72%
	> 5 kW	7.032	4.69	Carrier	R410A	28%
Jamaica	≤ 5 kW	3.52	5.13	Windy	R410A	61%
	> 5 kW	7.03	4.69	Windy	R410A	39%
Mexico	≤ 5 kW	3.516852	4.92	HISENSE	R410A	80%
	> 5 kW	6.84	4.69	York	R410A	20%
Panama	≤ 5 kW	3.52	5.05	RCA	R32	76%
	> 5 kW	6.78	5.03	Mabe	R410A	24%
Uruguay	≤ 5 kW	2.6	4.5	Midea	R410A	84%
	> 5 kW	5.28	5.9	Midea	R410A	16%

### Indirect emissions:

To quantify the impacts of MEPS implementation or improvement on indirect carbon emissions, CLASP used its free online tool Mepsy: The Appliance & Equipment Climate Impact Calculator.<sup>x</sup> Mepsy is a bottom-up stock-accounting model that accumulates sales and retirements to estimate the number of appliances in use in each country (stock), which is multiplied by average unit energy consumption to derive the national energy consumption of represented appliances. National energy consumption is multiplied by a grid emissions factor to estimate total carbon emissions and carbon savings under different policy scenarios.

The authors customized the tool with relevant data from each country, including market-level sales data from BSRIA market research and product-level efficiency information gathered by local consultants to evaluate national carbon reduction impacts under selected policy scenarios. Additional information on country-specific inputs for Mepsy are included in Table 3.

**TABLE 3: MODELING INPUTS USED FOR INDIRECT EMISSION MODELING**

Country	Lifetime (years) <sup>xi</sup>	Efficiency Improvement Rate	Grid Emission Factor, in kg CO <sub>2</sub> /kWh(2025-2050) <sup>xii</sup>	T&D Loss Factor	Annual Operating Hours
Argentina	15	2%	0.35-0.25	0.16	540
Barbados	10	2%	0.20-0.14	0.02	2,920
Brazil	10	2%	0.50-0.35	0.16	2,920
Chile	12	2%	0.34-0.24	0.05	750

<sup>x</sup> Mepsy is a publicly-available tool that can be accessed through the following link: <https://clasp.shinyapps.io/mepsy/>

<sup>xi</sup> Lifetime depends on factors such as compressor type, proper sizing and installation, maintenance frequency, local salinity and humidity conditions, and quality of brand/manufacture. For this modeling exercise, standard equipment lifetimes were assumed based on local consultant expertise.

<sup>xii</sup> Grid emission factors are assumed to decrease linearly between 2025 and 2050.

Colombia	10	2%	0.23-0.16	0.08	2,044
Dominican Republic	10	2%	0.46-0.32	0.14	3,650
Grenada	10	2%	0.52-0.37	0.07	3,000
Jamaica	11	2%	0.54-0.38	0.28	884
Mexico	10	2%	0.32-0.22	0.14	900
Panama	9	2%	0.36-0.25	0.14	3,650
Uruguay	8	2%	0.16-0.11	0.14	540

For modeling purposes, the UEC was calculated using the following equation using data gathered by local consultants and surveys of local stakeholders:

TABLE 4: UNIT ENERGY CONSUMPTION UNDER EACH SCENARIO

Country	Group	Capacity (kW)	Efficiency (CSPF Wh/Wh)	Brand	UEC BAU in kWh/year	UEC Scenario 1 (CSPF 6.1 Wh/Wh) in kWh/year	UEC Scenario 3 (CSPF 7.59 Wh/Wh) in kWh/year
Argentina	≤ 5 kW	3.43	3.71	Surrey	499	304	244
	> 5 kW	5.3	4.94	Electra	579	558	377
Barbados	≤ 5 kW	3.52	5.13	Windy	2,004	1,686	1,354
	> 5 kW	7.03	4.69	Windy	4,377	4,005	2,705
Brazil	≤ 5 kW	3.5	6	Midea	1,703	1,677	1,347
	> 5 kW	5.3	5.8	TCL	2,668	3,020	2,039
Chile	≤ 5 kW	2.6	4.5	Midea	433	320	257
	> 5 kW	5.28	5.9	Midea	671	776	522
Colombia	≤ 5 kW	2.6	4.5	Midea	1,181	872	700
	> 5 kW	5.28	5.9	Midea	1,829	2,106	1,422
Dominican Republic	≤ 5 kW	3.52	5.28	Gree	2,433	2,108	1,693
	> 5 kW	4.98	5.01	Whirlpool	3,628	3,547	2,395
Grenada	≤ 5 kW	3.4	4.69	Carrier	2,175	1,674	1,344
	> 5 kW	7.032	4.69	Carrier	4,498	4,116	2,779
Jamaica	≤ 5 kW	3.52	5.13	Windy	607	511	410
	> 5 kW	7.03	4.69	Windy	1,325	1,213	819
Mexico	≤ 5 kW	3.516852	4.92	Hisense	643	519	417
	> 5 kW	6.84	4.69	York	1,313	1,201	811
Panama	≤ 5 kW	3.52	5.05	RCA	2,544	2,108	1,693
	> 5 kW	6.78	5.03	Mabe	4,920	4,829	3,260
Uruguay	≤ 5 kW	2.6	4.5	Midea	312	230	185
	> 5 kW	5.28	5.9	Midea	483	556	376

$$UEC \left( \frac{kwh}{year} \right) = \frac{Cooling\ Capacity\ (kW)}{CSPF \left( \frac{W}{W} \right)} \times Annual\ Operating\ Hours$$

Calculated UEC for each model and policy scenario is listed in Table 4.

### Direct emissions:

To model direct emissions from room ACs, the authors used CLASP’s in-house direct emissions model to project greenhouse gas emissions from room AC-related refrigerant use and analyze the climate impact of low-GWP refrigerant requirements regionally. The model is a stock-accounting model that uses appliance sales data to calculate emissions from three sources of room AC direct emissions: annual leakage, venting at servicing, and end-of-life discharge.

All eleven markets were modeled with four refrigerants: R-22, R-410A, R-32, and R-290, which were assumed to demonstrate the AR-4 GWP listed in Table 5. Assumptions for refrigerant modeling are available in Table 6 and Table 7 below. Where refrigerant charge was not available for the representative unit, average refrigerant charge of a unit with the same capacity and refrigerant was used.

TABLE 5: GLOBAL WARMING POTENTIAL (GWP) ASSUMPTIONS FOR DIRECT EMISSION MODELING<sup>1</sup>

Refrigerant	Global Warming Potential (GWP)
R22	1,810
R410A	2,087.5
R32	675
R290	3.3

TABLE 6: REFRIGERANT CHARGE ASSUMPTIONS

kW	Argentina		Barbados		Brazil		Chile		Colombia		Dominican Republic		Grenada		Jamaica		Mexico		Panama		Uruguay	
	3.4	5.3	3.5	7	3.5	5.3	2.6	5.3	2.6	5.3	3.5	5	3.4	7	3.5	7	3.5	6.8	3.5	6.8	2.6	5.3
R-32	0.41	0.72	0.41	0.91	0.41	0.72	0.36	0.72	0.36	0.72	0.41	0.72	0.41	0.91	0.41	0.91	0.41	0.91	0.41	0.91	0.36	0.72
R-410A	0.63	1.11	0.63	1.40	0.63	1.11	0.55	1.11	0.55	1.11	0.63	1.11	0.63	1.40	0.63	1.40	0.63	1.40	0.63	1.40	0.55	1.11
R-22	1.13	1.75	1.16	2.32	1.16	1.75	0.86	1.74	0.86	1.74	1.16	1.64	1.12	2.32	1.16	2.32	1.16	2.26	1.16	2.24	0.86	1.74
R-290	0.32	0.56	0.32	0.70	0.32	0.56	0.27	0.56	0.27	0.56	0.32	0.56	0.32	0.70	0.32	0.70	0.32	0.70	0.32	0.70	0.27	0.56

TABLE 7: INPUTS USED FOR DIRECT EMISSIONS MODELING<sup>2</sup>

Country	Annual Leakage Rate	Proportion of Products Leaking	Proportion of Products Serviced	Proportion of Refrigerant Vented at Servicing	Proportion of Refrigerant Vented at End-of-Life
Argentina	5%	20%	100%	50%	85%
Barbados	5%	20%	90%	15%	85%
Brazil	5%	20%	90%	15%	85%
Chile	5%	20%	90%	10%	10%
Colombia	10%	30%	80%	10%	100%
Dominican Republic	5%	20%	90%	15%	85%
Grenada	5%	20%	90%	20%	85%
Jamaica	5%	10%	90%	20%	90%
Mexico	5%	20%	90%	15%	85%
Panama	5%	20%	90%	15%	85%
Uruguay	5%	20%	100%	100%	20%

Annual refrigerant market shares for each region were projected based on previously cited data sources and observed trends. Broadly speaking, the refrigerant transition across countries was projected to follow a progression from R-22 to R-410a – a transition which has already happened in all focus countries– and then to R-32, and ultimately to R-290, although the pace of change varies by country. Annual refrigerant transition data, available from 2005-2060 for all focus countries, is available upon request.

#### Consumer Impact:

National energy consumption projections from the Mepsy model were multiplied by countries' electricity tariffs to derive national electricity costs and savings. For the lifecycle cost analyses, the authors collected pricing data for the models in the dataset. For each country, the smaller ( $\leq 5$  kW) representative unit was chosen for the BAU scenario based on its regional dominance. The authors used a regression to estimate the price of the representative unit under the two scenarios – global benchmark and next-generation MEPS – as there was limited to no data on the higher efficiency models in many studied markets. For each unit, the authors multiplied annual UEC over the unit's lifetime by the country's electricity tariff and summed with the purchase price to derive the total lifecycle cost. Servicing costs were not included in this analysis, as limited information was available on average lifetime servicing costs and frequency of servicing in the focus countries.

#### Access and Affordability:

The cooling access gap was calculated by comparing a country’s ideal room AC penetration rate with the observed penetration rate to identify the gap between these two figures – in other words, the proportion of households who would need an air conditioner but currently do not.

To identify a country’s ideal room AC penetration rate, the authors used the climate maximum saturation framework proposed by Andrijevic et al. to estimate the ideal penetration rate of air conditioners in a given country – simply defined, the room AC penetration rate in a country if all households that need an air conditioner could afford one.<sup>xiii</sup> The equation to define climate maximum saturation assumes that air conditioner ownership is a function of Cooling Degree Days (CDDs)<sup>xiv</sup> The equation is listed below:

$$\text{Climate maximum saturation} = 1.00 - 0.949e^{-0.00187 * \text{CDD}}$$

To identify the actual room AC penetration rate, the authors relied on data reported by BSRIA, national surveys, or journalistic articles. Where insufficient information was available – particularly in the small Caribbean nations – regional room AC penetration rate data was used as a proxy for country-level data. In these cases, this assumption was validated with local consultants.

The difference between the observed penetration rate and climate maximum saturation was assumed to be the access gap. Both climate maximum saturation and the access gap estimates were validated through discussions with local consultants and other regional experts to ensure that it appropriately represented each focus country.

## LIMITATIONS

This study was limited by several factors.

First, market analyses in several countries were constrained by insufficient data. In some countries, many room AC units lacked detailed efficiency metrics, often due to limited labels available at the point of sale or the absence of mandatory room AC labeling requirements. Additionally, information on room AC servicing, leakage, and penetration rate of various refrigerants are generally unavailable in the LAC region. While local consultants and online research filled some of these gaps, it was ultimately not possible to collect data for all models, brands, or refrigerants in this analysis.

Second, the data for this study was collected in two different years: market-level data was collected in 2023, while product-level data was collected in 2025. Market data is retrospective, reflecting past trends, whereas product data is most accurately captured in real time. As a result, differences between market conditions in these two years may result in some inconsistencies. Though the authors have made every effort to mitigate these differences through consultations with local stakeholders and supplementary contextual analysis, some data may be incongruous.

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<sup>xiii</sup> This equation was generated by Andrijevic et al. by analyzing the relationships between the amount of Cooling Degree Days a household experiences and the likelihood that they own an air conditioner. Data for this analysis comes from the 40 largest cities in the United States, which were selected for their size, geographic variation, and similar socio-economic conditions, to the extent that all households who desired an air conditioner could afford to purchase and operate one. Based on these selection criteria, Andrijevic et al. assume that the more Cooling Degree Days that region experiences (i.e. the hotter the average temperature), the higher the “ideal penetration rate” of air conditioning.

<sup>xiv</sup> In some countries, households are concentrated in disproportionately hot cities (i.e. hotter than the geographical average of CDDs), while in others, households are concentrated in disproportionately cooler cities (i.e. cooler than the geographical average of CDDs for that country). To account for this difference, the authors used population-weighted CDDs to adjust for population concentration within a given country.

Third, some uncertainty existed regarding the classification of some imported units as environmental dumping. In this study, imported units that fell below the global benchmark level were considered environmental dumping. This definition serves as a practical proxy to measure environmental dumping, and was selected because most room air conditioners in the LAC region are imported from China or from companies headquartered there or in other countries with strong efficiency policies. Though there may be some variation in which units are classified as environmental dumping at the individual level, this classification provides a workable framework for most units analyzed. Given its applicability to most units examined, this classification was deemed appropriate for the study's objectives.

Lastly, the authors acknowledge that the secondhand room AC markets may exist in the focus countries, which have not been captured in this study. Due to limitations of data availability and regulatory reach, these units were intentionally excluded from the scope of this study.

# Annex 2: Trade Zones, Trade Agreements and Tariffs

Table 8, Table 9, Table 10 provide greater details on free trade zones (FTZs) in 11 focus countries, trade agreements and tariffs that countries impose on the imports.

**TABLE 8: FREE TRADE ZONES (FTZs) IN THE LAC REGION**

Country	FTZs	Additional Information
Panama	Colon Free Trade Zone	The largest FTZ in Latin America and second-largest worldwide, which sees up to 25% of room AC imported and re-exported to LAC countries. <sup>3</sup> Most imports come from China, with some units from Taiwan, and a smaller volume of specialized units from Japan and the U.S. <sup>4</sup>
Brazil	Manaus Free Trade Zone	The primary manufacturing hub for room ACs in the country due to incentives for completing specific product manufacturing stages in the zone. These incentives support local room AC production while taxes imposed on imported units disincentivize room AC imports. The Basic Productive Process (PBB) within the Zone's regulatory framework allows local companies to balance the internalization of specific product manufacturing stages with the import of some components or raw materials, pushing the market further toward domestic production.
Uruguay	Zonamerica	These FTZs have no import tariffs or value-added tax (VAT) as long as the goods are not introduced into national customs territory. Room AC suppliers in FTZs may store, assemble, or re-export room ACs tax-free which allows Uruguay to serve as a re-export hub for the Southern Cone.
	Free Zone Montevideo	
	Free Zone Florida	
Argentina	Tierra del Fuego Free Trad Zone	Suppliers operating in the Tierra del Fuego FTZ are exempt from tariffs when shipping to the Argentinian mainland, as long as local content requirements are met.
Colombia	La Cayena	Colombia's FTZs have no import tariffs or VAT as long as goods are not introduced in national customs territory. <sup>5</sup> Room AC suppliers in FTZs may store, process, and assemble room ACs without being subject to the usual customs procedures, until they are nationalized or re-exported. Goods that are introduced into national customs territory through the FTZs are subject to a preferential 20% income tax rate, lower than the general rate (35%).
	Zona Franca del Pacífico	
	Parque Central	
Chile	Zona Franca de Iquique	Chile's FTZs have no import tariffs or VAT as long as goods are not introduced into national customs territory. <sup>6</sup> Room AC suppliers in FTZs may

	Arica Free Trade Zone	store, process, and assemble room ACs without being subject to the usual customs procedures, until they are nationalized or re-exported. Goods that are introduced into national customs territory through the FTZs are subject to duties and VAT, with reduced or special rates for free trade extension zones (these are specific cities or regions bordering FTZs where goods can be sold or transferred, and keep some of their customs/tax exemptions).
	Punta Arenas Free Trade Zone	

TABLE 9: TRADE AGREEMENTS IN THE LAC REGION

Trade agreement	Members	Associate members	Description
<b>Mercosur (Southern Common Market)</b>	Argentina, Brazil, and Uruguay	Chile and Colombia	Intra-bloc trade is tariff-free, and for countries outside the bloc, a common external tariff (CET <sup>xv</sup> ) of 18%-20% is applied to room ACs <sup>7,xvi</sup>
<b>Andean Community (CAN) Trade Agreement</b>	Colombia	Argentina, Brazil, Paraguay, Uruguay, and Chile	Between full member countries of CAN, room AC imports are subject to a 0% tariff and associate members have preferential trade agreements. Outside countries (e.g., China) are subject to 15%-20% CET for room AC imports. <sup>8</sup>
<b>Caribbean Community and Common Market (CARICOM)</b>	Barbados, Jamaica, and Grenada		Intra-bloc room AC trade is tariff free while room AC imports outside CARICOM, except in cases where countries have superceding agreements in place, are subject to a 20% CET. <sup>9</sup>
<b>Latin American Integration Association (ALADI)</b>	Argentina, Brazil, Chile, Colombia, Mexico, Panama, and Uruguay		Facilitates intra-regional trade for room ACs and other products by helping to eliminate trade barriers including customs procedures and tariffs. <sup>10</sup>
<b>Pacific Alliance</b>	Chile, Colombia, and Mexico		Establishes tariff free trade between members, but does not impose tariffs outside of membership. Individual countries are responsible for trade agreements outside of the trade bloc. <sup>11</sup>

TABLE 10: LAC FOCUS COUNTRIES' TARIFFS ACCORDING TO TRADE AGREEMENTS

Country	Rates of Duty (%)				
	MERCOSUR (0% between members)	CARICOM (0% between members)	CAN (0% between members)	General Tariff	Other rates of duty

<sup>xv</sup> A common external tariff is a uniform tariff that all members of a customs union (e.g., Mercosur) apply to imports from countries outside the union. A CET simplifies customs rules by setting the same tariff on all non-members and protects internal markets with consistent duties on products.

<sup>xvi</sup> Argentina has a separate room AC tariff of 9.5% for imported systems.

Latin America region					
Argentina	9.5%		**		
Brazil	18%-20%		**		
Chile	*		**		
Colombia	*		20%		
Uruguay	18%-20%		**		
Central and North America region					
Mexico				0%	16%
Panama					10%
Caribbean region					
Barbados		20%			25%
Grenada		20%			
Jamaica		20%			
Dominican Republic		***			10%-20%

\*Associate member to MERCOSUR: separate trade agreements in some cases

\*\*Associate member to CAN: separate trade agreements may exist in some cases

\*\*\*Not a CARICOM member, but maintains separate free trade agreements with some CARICOM members including Jamaica and Barbados, under the CARICOM-Dominican Republic Free Trade Agreement.<sup>12</sup>

# Annex 3: Energy Efficiency Policy Overview

Table 11 provide additional information on the minimum energy performance standards and labeling regulations for split room ACs in 11 focus countries.

TABLE 11: MEPS AND LABELING POLICIES

Country	Room AC type	Scope (capacity)	EE Level	Metric	Referenced test standard
<b>SOUTH AMERICA</b>					
Argentina	<b>Label: Resolution 438/2024 RESOL-2024-438-APN-SIYC#MEC</b>				
	Split	Up to 10.5 kW	A: 8.5 < IEEEE B: 8.5 ≥ IEEEE > 5.6 C: 5.6 ≥ IEEEE > 3.6 D: 3.6 ≥ IEEEE > 3.39 E: 3.39 ≥ IEEEE > 3.18 F: 3.18 ≥ IEEEE > 2.97 G: 2.97 ≥ IEEEE	IEEEE (Wh/Wh)	ISO 5151
	<b>MEPS: Resolution No. 228/2014</b>				
	Split	Up to 10.5 kW	3.39	IEEEE (Wh/Wh)	ISO 5151
Brazil	<b>MEPS: MME Resolution No. 1 of 29 April 2022</b>				
	Split		Step 1: 3.14. Step 2: 4.5 (< 8.79 kW) Step 1: 3.14. Step 2: 3.9 (>=8.79kW)	IDRS (Wh/Wh)	ISO 16358-1 Inmetro Ordinance No. 269
	<b>Label: Inmetro Ordinance No. 234 of 29 June 2020<sup>xvii</sup></b>				
	Split		A: ≥ 7.0 B: 6.0 < IDRS < 7.0 C: 5.3 ≤ IDRS < 6.0 D: 4.6 ≤ IDRS < 5.3 E: 3.9 ≤ IDRS < 4.6 F: 3.5 ≤ IDRS < 3.9	IDRS (Wh/Wh)	ISO 5151 ISO 16358-1 Inmetro Ordinance No. 269
Chile	<b>MEPS: Resolution No. 4 (2018) - Minimum Efficiency Standard for Air Conditioners</b>				
	Split	Up to 12 kW	3.2	EEI (W/W)	ISO 5151
	<b>Label: PE No 1/26/2<sup>xviii</sup></b>				
	Split	up to 12 kW	A: EEI > 3.20 B: 3.00 < EEI ≤ 3.20 C: 2.80 < EEI ≤ 3.00 D: 2.60 < EEI ≤ 2.80 E: 2.40 < EEI ≤ 2.60 F: 2.20 < EEI ≤ 2.40 G: EEI ≤ 2.20	EEI (W/W)	ISO 5151

<sup>xvii</sup> Requirements applies for manufactured and imported room ACs through December 31, 2025

<sup>xviii</sup> Only A class room ACs are allowed for sale.

Colombia	<b>Label: RESOLUTION 4 1012 OF 2015</b> (lowest rating considered MEPS)				
	Split	Up to 10.5 kW	A: EER > 3.75 B: 3.5 < EER ≤ 3.75 C: 3.25 < EER ≤ 3.5 D: 3.0 < EER ≤ 3.25 E: 2.75 < EER ≤ 3.0	EER (Wt/We)	ISO 5151
Uruguay	<b>Label: UNIT 1170: 2009 Eficiencia Energética - Acondicionadores de aire y bombas de calor - Especificaciones y etiquetado</b> (new regulation based on seasonal performance metric and includes updated label rating and MEPS is currently under consideration)				
	Split	Up to 12 kW	A 3.2 < EER B 3.0 < EER ≤ 3.2 C 2.8 < EER ≤ 3.0 D 2.6 < EER ≤ 2.8 E 2.4 < EER ≤ 2.6 F 2.2 < EER ≤ 2.4 G 2.20 ≤ EER	EER (W/W)	ISO 5151
<b>CENTRAL AND NORTH AMERICA</b>					
Mexico	<b>MEPS and label: NOM-026-ENER-2015 Eficiencia energética en acondicionadores de aire tipo dividido (Inverter) con flujo de refrigerante variable, descarga libre y sin ductos de aire.</b>				
	Split (inverter)	Up to 19.05 kW	4.68 (below <5.9 kW) 4.39 (5.9kW < REEE ≤ 10.6kW) 4.1 (10.6kW < REEE ≤ 19.05kW)	REEE (Wt/We) (seasonal)	NMX-Z-013/1-1977 ANSI/ASHRAE 37-2005 AHRI 210/240-2008 ANSI/ASHRAE Standard 116-1995
SICA	<b>MEPS and label: NOM-023-ENER-2018 Split Systems</b>				
	Split (non-inverter)	Up to 19.05 kW	3.37 (below <5.9 kW) 3.31 (5.9kW < REEE ≤ 10.6kW) 3.28 (10.6kW < REEE ≤ 19.05kW)	REEE (Wt/We) (seasonal)	NMX-Z-013-SCFI-2015- ANSI/ASHRAE 37-2005 AHRI 210/240-2008 ANSI/ASHRAE Standard 116-2010
Panama	<b>MEPS: Central America Technical Regulation – RTCA 23.01.78:20 – Energy Efficiency Requirements for Split-Type (Inverter), Variable Coolant Flow, Free Discharge, and Ductless Air Conditioners</b>				
	Split (inverter)	Up to 19.05 kW	4.68 (below 4.68kW) 4.39 (5.859 kW < REEE ≤ 10.6kW) 4.1 (10.6kW < REEE ≤ 19.05kW)	REEE (Wt/We) (seasonal)	AHRI 210/240-2017. ANSI/ASHRAE 37-2009 ANSI/ASHRAE 116-2010 CSA C656-2014 NORMA Oficial Mexicana NOM 026 ENER 2015 ISO 16358-1:2013
Panama	<b>MEPS: Central America Technical Regulation – RTCA 23.01.80:21 Electrical Products. Split-Type Air Conditioners, free discharge. Energy Efficiency Specifications.</b>				
	Split (non-inverter)	Up to 19.05 kW	3.52	REEE (Wt/We) (seasonal)	ANSI/ASHRAE 37-2009 ARI 210/240-2017 NOM-023-ENER-2018
Panama	<b>MEPS: RTCA 23.01.78:20 – Energy Efficiency Requirements for Split-Type (Inverter), Variable Coolant Flow, Free Discharge, and Ductless Air Conditioners</b>				
	Split (inverter)	Up to 19.05 kW	4.68 (below 4.68kW) 4.39 (5.859 kW < REEE ≤ 10.6kW) 4.1 (10.6kW < REEE ≤ 19.05kW)	REEE (Wt/We) (seasonal)	AHRI 210/240-2017. ANSI/ASHRAE 37-2009 ANSI/ASHRAE 116-2010 CSA C656-2014 NORMA Oficial Mexicana NOM 026 ENER 2015 ISO 16358-1:2013
Panama	<b>MEPS: RTCA 23.01.80:21 Electrical Products. Split-Type Air Conditioners, free discharge. Energy Efficiency Specifications.</b>				
	Split (inverter)	Up to 19.05 kW	4.68 (below 4.68kW) 4.39 (5.859 kW < REEE ≤ 10.6kW) 4.1 (10.6kW < REEE ≤ 19.05kW)	REEE (Wt/We) (seasonal)	AHRI 210/240-2017. ANSI/ASHRAE 37-2009 ANSI/ASHRAE 116-2010 CSA C656-2014 NORMA Oficial Mexicana NOM 026 ENER 2015 ISO 16358-1:2013

	Split (non-inverter)	Up to 19.05 kW	3.52	REEE (Wt/We) (seasonal)	ANSI/ASHRAE 37-2009 ARI 210/240-2017 NOM-023-ENER-2018
<b>THE CARIBBEAN REGION</b>					
<b>Dominican Republic</b>	<b>Label: Clases de eficiencia energética para aires acondicionados en la etiqueta de la norma NORDOM 834</b>				
	Split	Up to 18kW	A: COPr > 4.10 B: 3.81 < COPr < 4.09 C: 3.51 < COPr < 3.8 D: 3.22 < COPr < 3.50 E: 3.21 < COPr < 2.93	COPr (Wt/We)	ISO 5151
<b>CARICOM</b>	<b>Label: CRS 59:2019 – Requirements for Energy Labelling – Air Conditioners (lowest rating considered MEPS)</b>				
	Split		A: 3.80 > EER B: 3.80 < EER ≤ 3.60 C: 3.60 < EER ≤ 3.40 D: 3.40 < EER ≤ 3.20 E: 3.20 < EER ≤ 3.00	EER (W/W)	ISO 5151
<b>Barbados</b>	<b>Label: BNS CRS 59:2019 – Requirements for Energy Labelling – Air Conditioners</b>				
	Split		Same as CARICOM	EER (W/W)	ISO 5151
<b>Grenada</b>	<b>Label: GDS 1: Part 11: 2022: Energy Labelling – Air Conditioners–Requirements (CRS 59: 2019, MOD) (lowest rating considered MEPS)</b>				
	Split		A++: 3.80 > EER A+: 3.60 < EER ≤ 3.80 A: 3.40 < EER ≤ 3.60 B: 3.40 < EER ≤ 3.20 C: 3.20 < EER ≤ 3.00	EER (W/W)	ISO 5151
<b>Jamaica</b>	<b>Label: JS CRS 59:2022 (CRS 59:2019)</b>				
	Split		Same as CARICOM	EER (W/W)	ISO 5151

# Annex 4: Country Commitments to Sustainable Cooling

Table 12 provide details on where countries are with their commitment to sustainable cooling including the development of National Cooling Action plans, including cooling in their Nationally Determined Contributions (NDCs), signing to the UN Cooling Pledge, and the development of other cooling related strategies and plans.

TABLE 12: COUNTRY COOLING POLICIES AND COMMITMENTS

Country	National Cooling Action Plan <sup>13, 14</sup>	Cooling in NDCs <sup>15</sup>	Signed UN Cooling Pledge <sup>cvi</sup>	Other Notable Cooling Documents
Argentina	In progress	No	No	
Barbados	Developed	No	No	National Cooling Strategy (2022) <sup>16</sup>
Brazil	In progress	No	Yes	
Chile	Developed	No	Yes	
Colombia	In progress	No	No	
Dominican Republic	In progress	Yes	Yes	Roadmap for Sustainable Cooling (2023), National Cooling Strategy <sup>17</sup>
Grenada	Developed	Yes	Yes	
Jamaica	Developed	No	No	
Mexico	Developed	No	No	National Climate Change Strategy <sup>18</sup>
Panama	Developed	No	Yes	Cooling Plan <sup>19</sup>
Uruguay	In Progress	Yes	Yes	

# Annex 5: Brand Climate Commitments

Table 13 summarizes the overall commitments by 8 most popular Chinese, Republic of Korea, Swedish, and the U.S. brands with target years and scope such as emissions reduction in only business operations or throughout the value chain.

TABLE 13: MULTINATIONAL BRANDS WITH LARGEST MARKET SHARES IN THE LAC REGION AND THEIR CLIMATE COMMITMENTS

Company	Latest Sustainability Report	Emissions Reduction Target	Product EE Included in Reduction Target?	Product EE Strategies/ Estimated Impact
Electrolux	<a href="#">Sustainability Statement 2024</a>	Net zero GHG in the value chain by 2050 42% reduction in absolute scope 3 emissions by 2030 (Lead in energy and resource-efficient solutions)	Yes	<ul style="list-style-type: none"> <li>• <b>Improving product efficiency.</b> Improving the efficiency of the products that the company sells.</li> <li>• <b>Improved product mix.</b> Offering more energy-efficient products to provide consumers additional options.</li> <li>• <b>HFC phase-out.</b> Transitioning away from HFCs and towards lower-GWP alternatives.</li> </ul>
LG	<a href="#">2023-2024 Sustainability Report</a>	Carbon neutrality* by 2030	Yes	<ul style="list-style-type: none"> <li>▪ <b>Improve products</b> to reduce emissions by 20% by 2030 during use of 7 major products including room ACs.</li> </ul>
Samsung	<a href="#">2024 Sustainability Report</a>	Net zero by 2050 in business activities	No	<ul style="list-style-type: none"> <li>▪ <b>Reduce product energy use.</b> Reduce power consumption by 30% on average of major models of 7 consumer products including room ACs by 2030.</li> </ul>
Carrier	<a href="#">2024 ESG Report</a>	Achieve net-zero across value chain by 2050 Reduce absolute Scope 3 GHG emissions by 25% by 2030 (reduce customer GHG emissions by 1 Gt)	Yes	<ul style="list-style-type: none"> <li>▪ <b>Improve product efficiency and HFC phase-out.</b> Reduce customers' emissions include leveraging energy-efficient products and use of lower-GWP refrigerants.</li> </ul>

Company	Latest Sustainability Report	Emissions Reduction Target	Product EE Included in Reduction Target?	Product EE Strategies/ Estimated Impact
		<a href="#">2030 ESG Goals</a>		
Gree	<a href="#">2023 ESG report</a>	None	No	N/A
Midea	<a href="#">2024 ESG Report</a>	Carbon neutrality by 2060 Green Strategy	Yes	<ul style="list-style-type: none"> <li>▪ <b>Improve product efficiency and HFC phase-out.</b> Make products more eco-friendly through increased efficiency and lower-GWP refrigerants.</li> </ul>
TCL	<a href="#">2024 ESG report</a>	None	No	<ul style="list-style-type: none"> <li>▪ <b>Improve product efficiency.</b> Improve the efficiency of room ACs to reduce user costs and environmental impact.</li> </ul>
Whirlpool	<a href="#">2024 Sustainability Report</a>	Achieve net zero in business operations by 2030 Reduce emissions from products in use by 20% by 2030	Yes	<ul style="list-style-type: none"> <li>▪ <b>Improving product efficiency.</b> Increasing product energy efficiency through design and engineering innovations.</li> </ul>

\*50% reduction in emissions in the production phase + 50% of external offset by 2030

# Annex 6: Brands Selling Units with R-32 Refrigerant

Table 14 lists the brands that were identified in this study that sell room ACs with R-32 refrigerant in at least one of the 11 studied LAC countries.

TABLE 14: BRANDS AND THEIR HEADQUARTER LOCATION AND SOURCE OF ROOM ACS WITH R-32 REFRIGERANT

BRAND	BRAND COUNTRY	PRODUCTION SOURCE
<b>LOCALLY MANUFACTURED</b>		
Agratto	Brazil	Brazil
Electrolux	Sweden	Brazil
Elgin	Brazil	Brazil
Fujitsu	Japan	Brazil
LG	South Korea	Brazil
Philco	Brazil	Brazil
TCL	China	Brazil
<b>IMPORTED</b>		
AIRMAX	Puerto Rico	Mexico, U.S.
ANWO	Chile	China
Carbone	Panama	China
Carrier	U.S.	China, U.S.
Cetrom	Dominican Republic	Japan
Clark	Chile	China
Frigidaire	Sweden	China
Godrej	India	India
Hisense	China	China
Hyundai	South Korea	China
Mabe	Mexico	China
Mirage	Mexico	China
MYSTIC	Panama	China
Nisato	Panama	China
Panasonic	Japan	China
Prime	Mexico	China
RCA	U.S.	China
Sankey	Panama	China
TGM	U.S.	China
York	U.S.	China
<b>BOTH</b>		
Gree	China	Brazil, China
Daikin	Japan	Brazil, China
Midea-Carrier & Midea	China/.U.S.	Brazil, Argentina, China
SAMSUNG	South Korea	Brazil, China, Thailand

# Annex 7: Multilateral Fund for the Implementation of the Montreal Protocol Dispersion

Table 15 provides information on Gross Domestic Product (GDP) and the Multilateral Fund for the Implementation of the Montreal Protocol (MLF) funding for HCFC Phase-out Management Plans (HPMPs) and Kigali Implementation Plans (KIPs) in 11 focus countries.

TABLE 15: COUNTRY GDP & MLF DISBURSED/APPROVED AS OF 2025 (USD) PER MLF AND UNEP

COUNTRY	Per Capita GDP USD (World Bank, 2023)	Total Funding Granted for HPMP to Date *	Current HPMP Phase	Total Funding Granted for KIP to Date**	Current KIP Phase
Argentina	\$14,187	\$ 10,977,438	HPMP Stage II	\$ 5,697,593	KIP Preparation
Barbados	\$23,804	\$ 619,228	HPMP Stage II	NA	KIP Preparation
Brazil	\$10,295	\$ 53,454,103	HPMP Stage III	NA	KIP Preparation
Chile	\$17,068	\$ 5,868,367	HPMP Stage III	\$ 876,507	KIP Stage I
Colombia	\$6,947	\$ 7,125,028	HPMP Stage III	\$ 2,813,811	KIP Stage I
Dominican Republic	\$10,718	\$ 4,570,123	HPMP Stage III	\$ 535,930	KIP Stage I
Grenada	\$11,246	\$ 522,399	HPMP Stage II	\$ 72,500	KIP Stage I
Jamaica	\$6,840	\$ 1,093,376	HPMP Stage II	NA	NA
Mexico	\$13,790	\$ 30,293,443	HPMP Stage III	\$ 6,746,923	KIP Stage I
Panama	\$18,686	\$ 1,715,240	HPMP Stage III	\$ 331,100	KIP Stage I
Uruguay	\$22,798	\$ 1,943,138	HPMP Stage III	\$ 176,787	KIP Stage I

\*Including all tranches approved so far from all stages.

\*\*Including the first tranche approved so far. In the case of Argentina it includes the conversion of the room AC sector, approved prior to the KIP.

# Endnotes

- <sup>1</sup> US EPA, ORD, “IPCC AR4, AR5, and AR6 20-, 100-, and 500-Year GWPs,” U.S. EPA Office of Research and Development (ORD), November 1, 2023, <https://catalog.data.gov/dataset/ipcc-ar4-ar5-and-ar6-20-100-and-500-year-gwps>.
- <sup>2</sup> “Consultant Interview,” May 2025.
- <sup>3</sup> BSRIA, “Latin America Split Systems Panama Report 6,” 2023, <https://clasp.ent.box.com/file/1824555434014>.
- <sup>4</sup> “Consultant Interview,” May 2025.
- <sup>5</sup> Zona Franca De Occidente, “Regulations: Everything You Need to Know about the Free Trade Zone Regime,” Zona Franca De Occidente, May 22, 2024, <https://zonafrancaoccidente.com/en/zona-franca/regimen-de-zonas-francas/>.
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- <sup>7</sup> MERCOSUR, “MERCOSUR in Brief - MERCOSUR,” accessed June 30, 2025, <https://www.mercosur.int/en/about-mercosur/mercosur-in-brief/>.
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- <sup>9</sup> Clara Camarasa et al., “Setting the Standard: How Central America Is Harmonising Energy Efficiency for Appliances,” IEA, November 21, 2023, <https://www.iea.org/commentaries/setting-the-standard-how-central-america-is-harmonising-energy-efficiency-for-appliances>; CROSQ, “The CARICOM Regional Energy Efficiency Labelling Scheme,” CROSQ Energy, December 14, 2020, <https://energy.crosq.org/the-caricom-energy-efficiency-labelling-scheme-what-you-need-to-know/>.
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