Technical Appendix

Air Conditioners

1. Introduction

This appendix offers a detailed explanation of the specific assumptions used in the air conditioners module of Mepsy. For information on outputs and data sources for the parameters, please refer to the comprehensive Mepsy Methodology document.

Mepsy's air conditioners (ACs) module encompasses all types of residential use electric ACs. These include portable, window and split-system ACs, commonly classified under Harmonized Commodity Description and Coding System, (referred to as Harmonized System or HS) with code 841510. This code comprises ACs with a self-contained unit with a cooling capacity not exceeding 50kW. Ducted central ACs, commercial ACs, or industrial cooling units are not included.

There are three main categories of room ACs:

- **Portable ACs**: These offer quick and convenient cooling, are portable, and can be positioned wherever cooling is needed. They require only an open window or access to an exhaust vent to expel warm air, making them easy to set up and use.
- **Split ACs**: These include both mini-split and multi-split ACs, which feature separate evaporator and condenser units. Split systems are more powerful than portable units, with the main cooling unit positioned inside the room and the condenser placed outside. The two components are connected via a flexible refrigerant pipe. These units are commonly used in regions with hotter climates and to cool larger spaces.
- **Window ACs**: Also known as through-the-wall or through-the-window air conditioners, these units are designed to regulate temperature and humidity in a room. The window AC is a self-contained, boxed unit that does not require separate internal and external components, making installation simpler and the appliance more compact.

Mepsy does not include newer, less common ACs models, such as multi-zone systems or ductless systems. These designs have smaller market shares and lower impact on overall stock.

2. Shipments and Stock

Euromonitor publishes data on air conditioner (including portable AC, window AC, and split AC) shipments in 210 countries from 2005 to 2024. For 46 countries, the data are based on market research (e.g., reviews of official statistics, secondary reports, interviews with manufacturers and associations) while 164 are modeled or extrapolated based on the findings in a comparable country.[1] We selected and used data from Euromonitor for 162 countries in Mepsy. Sales forecasts between 2024 and 2030 are based on the compound annual growth rate (CAGR) for 2019-2024.

We estimated the stock or number of AC in use in each country by accumulating shipments since 2005. Once they are shipped, ACs enter service and remain in service until they fail beyond repair or are otherwise replaced. We used the Weibull Distribution function to model survival probabilities $P\,(x)$ of appliances and calculate the surviving stock of a certain year (y), based on the cumulative survival appliances from the previous year $(Stock(y-1))$.[2]

$$P\,(x) = \; e^{-\left(\frac{x-\theta}{\alpha}\right)^{\beta}}$$

Where:

$P\,(x)$ is the probability that the appliance is still in use at a certain age (x);

x is the appliance age;

α is the scale parameter, which corresponds to the decay length in an exponential distribution, also known as lifetime. In Mepsy, we set the lifetime of AC units with a cooling capacity of 3.5 kW to 8 years, and the lifetime of AC units with a cooling capacity of 7 kW to 18 years.[2] The average lifetime of ACs for a specific country is then calculated based on the market share ratio of these two types of AC units, using data provided by United 4 Efficiency (U4E).[3]

β is the shape parameter, which determines how the failure rate changes over time;

θ is the delay parameter, which introduces a delay before any failures occur.

---

[1] "Our Methodologies," Euromonitor, accessed January 9, 2025, https://www.euromonitor.com/our-methodologies.

[2] LBNL. Lutz et al. 2011. Using National Survey Data to Estimate Lifetimes of Residential Appliances. https://www.osti.gov/biblio/1182737

[3] "U4E_AC_Model-Regulation_EN_2021-11-08.Pdf," accessed January 14, 2025, https://united4efficiency.org/wp-content/uploads/2021/11/U4E_AC_Model-Regulation_EN_2021-11-08.pdf.

Based on the Lawrence Berkeley National Laboratory (LBNL) study, Mepsy determines a shape parameter (β) of 2 and a delay parameter (θ) of 0.[2]

Stock forecast beyond 2030: Since residential appliances are typically shared within a household, we calculate the future number of appliances in use through the equation below:[4]

$$Number\ of\ appliances\ in\ use = Household\ Ownership\ Rate\ \times Total\ Households$$

CLASP used a two-step methodology to project ownership. We first collected the latest available ownership data from national survey and market research firms where available. If data were incomplete, we supplemented it through regression analysis.

Regression analysis is a statistical technique used to understand how changes in one or more independent variables are associated with changes in the dependent variable. Prior research found that the ownership of most household appliances is driven by macroeconomic factors including household income, urbanization, and electrification.[5] Therefore, CLASP utilizes beta regression analysis, which is well-suited for modeling continuous dependent variables constrained between 0 and 1.[6] The analysis correlates scaled appliance ownership (dependent variable) with the above socio-economic factors (independent/driver variables) for the same countries and for the latest year available.[7] We then used the results to close data gaps and project the ownership till 2050. The formula is given by:

$$logit\left(\frac{\mu_c}{\alpha}\right) = \beta_0 + \beta_1 \times I_c + \beta_2 \times E_c + \beta_3 \times U_c$$

Where:

μ_c is the household ownership rate of a country (c) for a specific appliance;

α is the maximum observed ownership rate across all available data;

β_0 is the intercept term;

[4] "Household Size and Composition | Population Division," accessed April 10, 2023, https://www.un.org/development/desa/pd/data/household-size-and-composition; "World Population Prospects - Population Division - United Nations," accessed April 10, 2023, https://population.un.org/wpp/.

[5] Michael A. McNeil and Virginie E. Letschert, "Modeling Diffusion of Electrical Appliances in the Residential Sector," Energy and Buildings 42, no. 6 (June 1, 2010): 783–90, https://doi.org/10.1016/j.enbuild.2009.11.015.

[6] Achim Zeileis et al., "Betareg: Beta Regression," September 12, 2024, https://cran.r-project.org/web/packages/betareg/.

[7] Ownership was scaled by the maximum ownership rate, selected from the available 2019 data across all countries, to ensure the dependent variable value fall within the 0 to 1 range, enabling the use of beta regression analysis.

$\beta_1, \beta_{2,}\beta_3$ are the coefficients for the respective independent variables;

I_c is the household income given by GDP divided by the number of households in the country;

U_c is the urbanization rate;

E_c is the electrification rate.

In previous research, it was found that cooling demand (measured by cooling degree days, or CDD) and household income are the main drivers of AC ownership.[8] However, the correlation between these two variables can complicate regression analysis.[4] Therefore, instead of directly using CDD as an independent variable, our research suggests using CDD to scale AC ownership, which helps improve the reliability of the regression results. The Scaled AC ownership is calculated using the following equation:

$$Scaled\ AC\ Ownership = \frac{AC\ Ownership}{Climate\ Maximum\ (CDD_{Max})}$$

$Climate\ Maximum\ (CDD_{Max})$ is calculated by the equation[4] below:

$$Climate\ Maximum\ (CDD_{Max}) = 0.994 - 1.17\ \times \exp(-0.00298\ \times CDD)$$

To calculate the Climate Maximum (CDD_{Max}), CLASP collected cooling degree day data for each country.[6] Because the CDD data collected were based on 24 hours values, CLASP extracted and added up yearly CDD values (CDD_{YEAR}) for the latest five-year period from 2009 to 2013, then divided by 4 to turn the daily (24 hours) data into (6hour) daily basis, and finally divided by 5 to calculate the average 5-year CDD parameter from 2009 to 2013 for each country. The calculation is given by:

$$CDD = \frac{\sum CDD_{YEAR} \div 4}{5}$$

Where:

CDD_{YEAR} is the annual number of coolness dates based on daily data.

The relationship between AC ownership and household income is represented by the following formula:

$$AC\ Ownership = (-2.14 + 1.5\ \times 10^{-4} \times I_c) \times Climate\ Maximum\ (CDD_{Max})$$

[8] "A Global Degree Days Database for Energy-Related Applications," accessed January 13, 2025, https://kapsarc.opendatasoft.com/explore/dataset/a-global-degree-days-database-for-energy-related-applications/information/.

Based on the correlation, Mepsy fills data gaps for some countries. We then used this relationship to extrapolate ownership through 2050, incorporating projected driven variables.[9] The household ownership rate is multiplied by the future number of households, estimated by the United Nations, to calculate the total stock. Additional details of this approach are provided in the 'Extending-Mepsy to 2050' annex.[10] For the period from 2050 to 2060, Mepsy extrapolates appliance sales based on the Compound Annual Growth Rate (CAGR) calculated from the data between 2045 and 2050.

3. Unit Energy Consumption, Usage, and Standards Scenarios

The unit energy consumption (UEC) in the **Business-as-usual (BAU) and Global Benchmark (GB) scenarios** are aligned with the estimates from United for Efficiency (U4E), where available.[11] U4E's Methodology and Assumptions document provides a list of UECs in three scenarios for 17 different climate zones (Table 1), capacities (3.5 kW and 7 kW), and appliance types (fixed-speed versus variable-speed).[12] A full country list is provided in Table 3, including the climate zone and information about the ACs' capacity distribution on the market to develop the UECs for each country. As an example, China's UEC assumptions are listed in Table 2.

CLASP estimates the UEC values for EU countries by using a regression model that analyzes the correlation between Operating Days, Cooling Degree Days (CDD), and UEC across non-EU countries. Based on this relationship, we calculated the UEC values for EU countries.

TABLE 1. U4E ASSUMPTIONS FOR TYPICAL ROOM AC CHARACTERISTICS IN 2019

	BAU UEC (KWH/Y)				MINIMUM AMBITION UEC (KWH/Y)		HIGH AMBITION UEC (KWH/Y)	
CLIMATE CLASS	3.5 KW FIXED-SPEED	3.5 KW VARIABLE-SPEED	7 KW FIXED-SPEED	7 KW VARIABLE-SPEED	3.5 KW	7 KW	3.5 KW	7 KW
0A	3028	2234	6546	4831	1774	4128	1367	2890
1A	2158	1619	4671	3502	11315	101	1014	2151

[9] In the model, we use linear interpolation to ensure data availability for the intervening years.

[10] "Mepsy Insights: 2050 Extension Model for Longer Forecasting," Zoho Campaigns, accessed January 10, 2025, https://zc.vg.

[11] "CSA_Methodology_September2022.Pdf," accessed December 10, 2024, https://united4efficiency.org/wp-content/uploads/2022/07/CSA_Methodology_September2022.pdf.

[12] The Global Benchmark UECs in Mepsy refer to the values listed under Minimum Ambition UEC in the U4E table.

2A	1027	760	2220	1644	613	1429	470	994
3A	549	415	1187	897	338	775	260	552
0B	2517	1769	5439	33825	1543	3549	1203	2535
1B	1996	1391	4317	3004	1185	2717	928	1954
2B	1802	1417	3895	3068	1180	2690	933	1961
3B	654	498	1415	1078	400	918	313	664
3C	222	160	481	346	126	297	96	202
4A	633	486	1370	1050	394	908	307	653
5A	417	312	901	674	2249	580	193	409
6A	102	74	220	160	58	136	44	94
4B	933	731	2015	1580	605	1374	472	991
5B	688	548	1488	1185	465	1042	365	767
6B	329	239	711	517	188	444	188	444
7	176	129	380	279	102	237	102	237
8	131	97	283	219	77	180	77	180

TABLE 2. CHINA'S AC ENERGY EFFICIENCY INDEX IN THREE SCENARIOS

UNIT ENERGY CONSUMPTION (UEC, KWH/YEAR) OR EFFICIENCY LEVEL FOR ROOM AIR CONDITIONING		
Business as Usual (BAU)	Global Benchmark Scenario	Type of Product
703	615	A mix of 3.5 kW and 7 kW split units with a weighted average cooling capacity of 3.9 kW

TABLE 3. CLIMATE GROUP, COOLING CAPACITY, AND UEC FOR 162 COUNTRIES UNDER BAU AND GB SCENARIO

COUNTRY	ISOA3	COOLING OPERATING DAYS	U4E CLIMATE CLASS	TYPICAL COOLING CAPACITY BASED ON MARKET RATIO IN 2019 (KW)	3.5 KW AC MARKET RATIO IN 2019	7 KW AC MARKET RATIO IN 2019	BAU UEC (KWH/Y)	GB UEC (KWH/Y)
Albania	ALB	0.5	3A	5.2	51%	49%	810	549
Algeria	DZA	0.5	3A	5	57%	43%	813	526
Angola	AGO	0.93	1A	5	57%	43%	3198	2049
Argentina	ARG	0.88	3A	4.5	71%	29%	679	464
Armenia	ARM	0.33	4A	6.4	17%	83%	1232	818
Australia	AUS	0.54					1247	1060
Austria	AUT	0.3					484	411
Azerbaijan	AZE	0.33	4B	6.4	17%	83%	1814	1239
Bahamas	BHS	0.88	1A	4.6	69%	31%	2717	1844
Bahrain	BHR	0.65	0B	6.4	17%	83%	4884	3198
Bangladesh	BGD	0.97	0A	5	57%	43%	4124	2786
Barbados	BRB	0.88	0A	4.6	69%	31%	3795	2504
Belarus	BLR	0.33	6A	5.2	51%	49%	149	96
Belgium	BEL	0.17					287	244
Belize	BLZ	0.88	0A	4.6	69%	31%	3795	2504
Benin	BEN	0.93	0A	5	57%	43%	4481	2786
Bhutan	BTN	0.97	3A	4.7	66%	34%	753	526
Bolivia (Plurinational State of)	BOL	0.88	1A	4.5	71%	29%	2644	1805
Bosnia and Herzegovina	BIH	0.5	4A	5.2	51%	49%	937	642
Botswana	BWA	0.93	2B	5	57%	43%	2637	1829
Brazil	BRA	1	2A	5.2	51%	49%	1486	1013
Brunei Darussalam	BRN	0.97	0A	4.2	80%	20%	3417	2229
Bulgaria	BGR	0.5					1057	898

Burkina Faso	BFA	0.93	0B	5	57%	43%	3717	2406
Burundi	BDI	0.93	1A	5	57%	43%	3198	2049
Cambodia	KHM	1	0A	5	80%	20%	2949	1844
Cameroon	CMR	0.93	0A	4.2	57%	43%	3417	2229
Canada	CAN	0.25					4481	2786
Cabo Verde	CPV	0.93	1B	5	57%	43%	435	370
Central African Republic	CAF	0.93	0A	5	57%	43%	4481	2786
Chad	TCD	0.93	0B	5	57%	43%	3717	2406
Chile	CHL	0.88	3C	4.2	80%	20%	243	175
China	CHN	0.48	2A	3.9	89%	11%	703	615
Colombia	COL	0.88	3A	4.4	74%	26%	679	464
Comoros	COM	0.93	0A	5	57%	43%	4481	2786
Congo	COG	0.93		5	57%	43%	3198	2049
Democratic Republic of the Congo	COD	0.93	1A	4.6	57%	43%	1288	866
Costa Rica	CRI	0.88	2A	5	69%	31%	4481	2786
Côte D'Ivoire	CIV	1	0A	5	57%	43%	1012	860
Croatia	HRV	0.5					802	682
Cyprus	CYP	0.3					890	757
Czech Republic	CZE	0.5					3198	2049
Denmark	DNK	0.17					224	191
Djibouti	DJI	0.93	0B	5	57%	43%	3717	2406
Dominican Republic	DOM	0.88	0A	4.6	69%	31%	3795	2504
Ecuador	ECU	0.88	3A	4.5	71%	29%	679	464
Egypt	EGY	0.75	2B	5	57%	43%	2673	1829
El Salvador	SLV	0.88	0A	4.6	69%	31%	3795	2504
Equatorial Guinea	GNQ	0.93	0A	5	57%	43%	4481	2786
Eritrea	ERI	0.93	0B	5	57%	43%	3717	2406
Estonia	EST	0.33					556	473

Ethiopia	ETH	0.93	2A	5	57%	43%	813	526
Fiji	FJI	0.97	1A	5	80%	20%	1520	964
Finland	FIN	0.08					2446	1645
France	FRA	0.37					121	103
French Polynesia	PYF	0.97					685	582
Gabon	GAB	0.93	0A	4.2	57%	43%	4040	3434
Gambia (Republic of The)	GMB	0.93	0A	5	57%	43%	4481	2786
Georgia	GEO	0.33	4A				4481	2786
Germany	DEU	0.17					547	465
Ghana	GHA	0.93	0A	5	57%	43%	256	218
Greece	GRC	0.5					3717	2406
Guatemala	GTM	0.88	2A	5	69%	31%	1236	1081
Guinea	GIN	0.93	0A	4.6	57%	43%	1288	866
Guinea Bissau	GNB	0.93	1A	5	57%	43%	4481	2786
Guyana	GUY	0.88	0A	5	66%	34%	3198	2049
Haiti	HTI	0.88	0A	4.7	69%	31%	2076	1878
Honduras	HND	1	2A	4.6	69%	31%	3795	2504
Hong Kong, China (SAR)	HKG	0.5					1288	866
Hungary	HUN	0.5					1212	1030
Iceland	ISL	0.08					953	810
India	IND	0.92	0A	5	57%	43%	121	103
Indonesia	IDN	1	0A	5	94%	6%	3761	2786
Iran (Islamic Republic of)	IRN	0.65	3B	3.7	57%	43%	3188	1939
Ireland	IRL	0.3					899	623
Israel	ISR	0.65	2A	5	17%	83%	449	382
Italy	ITA	0.5					1996	1286
Jamaica	JAM	0.88	0A	5	69%	31%	989	841
Japan	JPN	0.5					3795	2504
Jordan	JOR	0.65	3B	3.9	17%	83%	1080	918

Kazakhstan	KAZ	0.33	5A	6.4	51%	49%	1273	827
Kenya	KEN	0.93	2A	5.2	57%	43%	614	409
Republic of Korea	KOR	0.42		5	89%	11%	1520	964
Kuwait	KWT	0.65	0B	6.4	17%	83%	4884	3198
Kyrgyzstan	KGZ	0.33	4A	5.2	51%	49%	614	409
Lao People's Democratic Republic	LAO	0.5	0A	4.2	80%	20%	3417	2229
Latvia	LVA	0.33					556	473
Lebanon	LBN	0.67	2A	6.4	17%	83%	1996	1286
Lesotho	LSO	0.93	3B	5	57%	43%	970	623
Lithuania	LTU	0.33					559	475
Luxembourg	LUX	0.17					224	191
Macau	MAC	0.5					1212	1030
The former Yugoslav Republic of Macedonia	MKD	0.5	4A	5	51%	49%	813	526
Madagascar	MDG	0.93	3A	5	57%	43%	813	526
Malawi	MWI	0.93	3A	4.2	57%	43%	3417	2229
Malaysia	MYS	0.97	0A	5	80%	20%	4124	2786
Maldives	MDV	0.97	0A	5	57%	43%	4481	2786
Mali	MLI	0.93	0A	5	57%	43%	1367	1162
Malta	MLT	0.3					3717	2406
Mauritania	MRT	0.93	0B	5	57%	43%	3198	2049
Mauritius	MUS	0.93	1A	4.6	57%	43%	601	473
Mexico	MEX	0.86	3A	3.9	69%	31%	121	88
Republic of Moldova	MDA	0.33	5A	5	51%	49%	813	526
Mongolia	MNG	0.5	8	5	89%	11%	3198	2049
Morocco	MAR	0.65	3A	5	57%	43%	2673	1829
Mozambique	MOZ	1	1A	5	57%	43%	1400	964
Namibia	NAM	0.93	2B	5	57%	43%	471	400

Nepal	NPL	0.97	2A	5	57%	43%	699	594
Netherlands	NLD	0.3					3795	2504
New Zealand	NZL	0.42					3717	2406
Nicaragua	NIC	1	0A	5	69%	31%	4481	2786
Niger	NER	1	0A	5	57%	43%	121	103
Nigeria	NGA	0.93	0A	6.4	57%	43%	4884	3198
Norway	NOR	0.08		5	200%	-100%	2630	1844
Oman	OMN	0.65	0B	4.6	17%	83%	3795	2504
Pakistan	PAK	0.97	1B	4.2	57%	43%	3417	2229
Panama	PAN	1	0A	4.5	69%	31%	1263	848
Papua New Guinea	PNG	0.97	0A	4.5	80%	20%	2250	1614
Paraguay	PRY	0.88	2A	4.2	71%	29%	3417	2229
Peru	PER	0.88	2B	5	71%	29%	917	780
Philippines	PHL	1	0A	5	80%	20%	935	795
Poland	POL	0.5					598	451
Portugal	PRT	0.5					614	409
Romania	ROM	0.5					936	796
Russian Federation	RUS	0.08	6A	5.2	51%	49%	149	96
Rwanda	RWA	0.93	2A	5	57%	43%	1520	964
Saudi Arabia	SAU	0.65	0B	5.8	34%	66%	4408	2887
Senegal	SEN	0.93	1B	5	57%	43%	2949	1844
Sierra Leone	SLE	0.93	1A	5	57%	43%	3198	2049
Singapore	SGP	0.97	0A	4.2	80%	20%	2682	2229
Slovakia	SVK	0.5					922	784
Slovenia	SVN	0.5					881	749
Solomon Islands	SLB	0.97	0A	4.2	80%	20%	3417	2229
South Africa	ZAF	0.62	3C	5	57%	43%	329	200
Spain	ESP	0.46					1096	932
Sri Lanka	LKA	0.97	0A	5	57%	43%	4124	2786
Sudan	SDN	0.65	0A	5	57%	43%	3717	2406
Suriname	SUR	0.88	0A	4.5	71%	29%	3722	2451

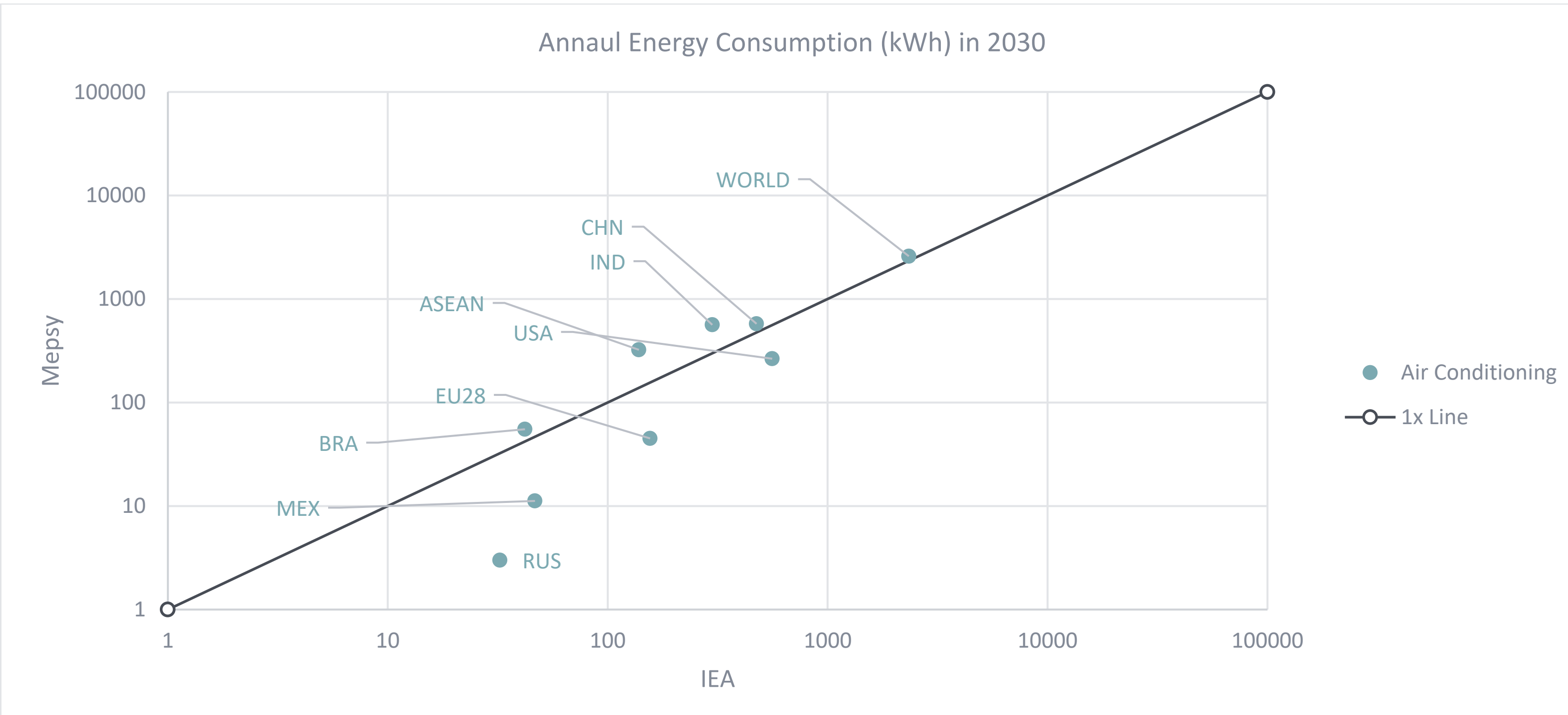
Eswatini	SWZ	0.93	3A	5	57%	43%	121	103
Sweden	SWE	0.08					467	397
Switzerland	CHE	0.3					1273	827
Syrian Arab Republic	SYR	0.5	3B	5.2	17%	83%	810	549
Tajikistan	TJK	0.42	3A	4.9	51%	49%	3939	2692
United Republic of Tanzania	TZA	0.93	1A	5.2	57%	43%	937	642
Thailand	THA	1	0A	5	60%	40%	4481	2786
Togo	TGO	0.93	0A	4.6	57%	43%	3795	2504
Trinidad and Tobago	TTO	0.88	0A	5	69%	31%	1520	964
Tunisia	TUN	0.65	2A	6.4	57%	43%	961	818
Türkiye	TUR	0.5	4A	5.2	17%	83%	966	650
Turkmenistan	TKM	0.33	3B	5	51%	49%	1520	964
Uganda	UGA	0.93	2A	5.2	57%	43%	614	409
Ukraine	UKR	0.33	5A	6.9	51%	49%	5365	3509
United Arab Emirates	ARE	0.65	0B	5	3%	97%	212	180
United Kingdom of Great Britain and Northern Ireland	GBR	0.17					3198	2049
United States of America	USA	0.71					1672	1405
Uruguay	URY	0.88	3A	4.5	71%	29%	679	464
Uzbekistan	UZB	0.5	4B	5.2	51%	49%	1384	976
Venezuela, Bolivarian Republic of	VEN	0.88	3B	4.5	71%	29%	3058	2120
Viet Nam	VNM	1	0A	3.9	89%	11%	3088	2056
Yemen	YEM	1	3B	6.4	17%	83%	1273	827
Zambia	ZMB	1	3A	5	57%	43%	813	526

Zimbabwe	ZWE	0.93	3A	5	57%	43%	813	526

For countries not analyzed by U4E (a subset of OECD countries), CLASP calculates the UEC for a specific country based on its climate zone and domestic product mix, using the U4E assumptions. **Net Zero Hero (NZH) UECs** are set at 50% of the BAU levels to align with the ambitious targets outlined in the Net Zero Heroes report.

4. Model Outputs and Validation

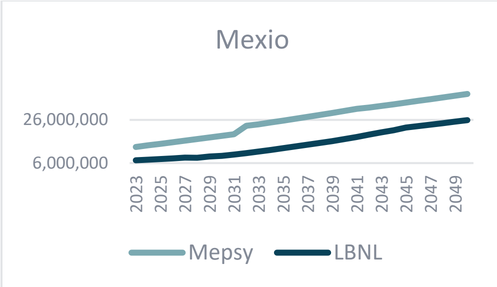
FIGURE 1. COMPARISON OF 2030 ENERGY CONSUMPTION (KWH) BETWEEN MEPSY AND IEA[13]

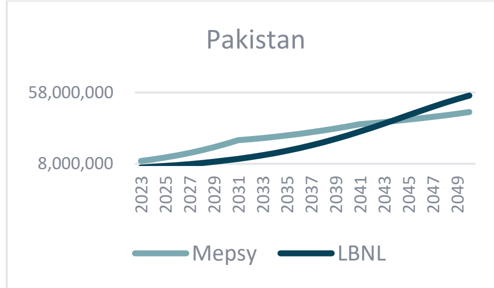


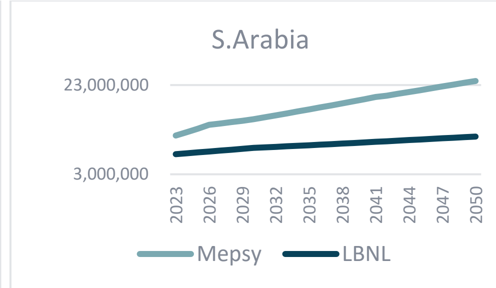
[13] "Energy Technology Perspectives 2017," n.d.

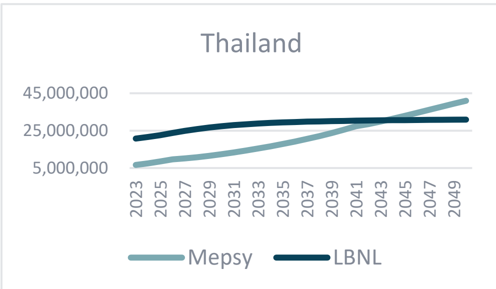
FIGURE 2. AC STOCK COMPARISON BETWEEN MEPSY AND LAWRENCE BERKELEY NATIONAL LABORATORY (LBNL)[14]

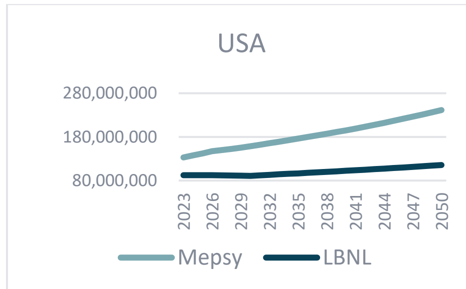
[14] The data used in this analysis was provided by LBNL (Lawrence Berkeley National Laboratory, unpublished data, 2022).


Mexio
26,000,000
6,000,000
2023 2025 2027 2029 2031 2033 2035 2037 2039 2041 2043 2045 2047 2049
Mepsy
LBNL


Pakistan
58,000,000
8,000,000
2023 2025 2027 2029 2031 2033 2035 2037 2039 2041 2043 2045 2047 2049
Mepsy
LBNL


S.Arabia
23,000,000
3,000,000
2023 2026 2029 2032 2035 2038 2041 2044 2047 2050
Mepsy
LBNL


Thailand
45,000,000
25,000,000
5,000,000
2023 2025 2027 2029 2031 2033 2035 2037 2039 2041 2043 2045 2047 2049
Mepsy
LBNL


USA
280,000,000
180,000,000
80,000,000
2023 2026 2029 2032 2035 2038 2041 2044 2047 2050
Mepsy
LBNL

Glossary

Air Conditioning Market Ratio: The proportion of different types or capacities of air conditioners in the market (e.g., 3.5 kW vs. 7 kW units).

AC Ownership: The proportion of households in a country that own an air conditioner. The ownership could exceed 100%.

BAU (Business-as-usual) Scenario: A scenario that assumes no changes in lighting or appliance policies between 2020 and 2030, reflecting current trends without additional interventions.

CAGR (Compound Annual Growth Rate): A measure of the mean annual growth rate of an investment or metric over a specified period of time longer than one year.

CDD (Cooling Degree Days): A measure of how much (in degrees) and for how long (in days) the outside temperature was above a certain threshold, often used to estimate energy needs for cooling.

Cooling Operating Days: The number of days a particular appliance is actively used for cooling or is expected to be used in a given period.

Electrification: The process of providing electrical power to a region or industry that previously did not have access to it.

Energy Efficiency Index: A metric used to assess how efficient a device is at converting energy into useful work.

Fixed-speed versus Variable-speed: Refers to the type of motor in air conditioners, where fixed-speed runs at one speed, while variable-speed adjusts according to demand.

GB (Global Benchmark) Scenario: The global benchmarks are those efficiency levels recommended by CLASP and others such as United for Efficiency. These levels are generally considered to be quite ambitious.

Harmonized Commodity Description and Coding System (HS code): A standardized system for classifying traded products, used globally.

Market Share: The portion of total sales in a market captured by a particular company or product.

Portable ACs: Air conditioning units that offer quick and convenient cooling, easy to move, and require only an open window or access to an exhaust vent to expel warm air.

Regression Analysis: A statistical method used to understand the relationship between variables.

Socio-economic Factors: Aspects of society and economy that influence behavior and decisions, like income, education, or urbanization.

U4E (United for Efficiency): A global initiative aimed at improving the energy efficiency of appliances and systems.

Weibull Retirement Function: A statistical function used to model the lifetime of products and their failure rate over time.

CONTACT

CLASP
info@clasp.ngo
clasp.ngo