

# How Mepsy Can Transform Your Energy Efficiency Policy Development

16 MARCH 2022



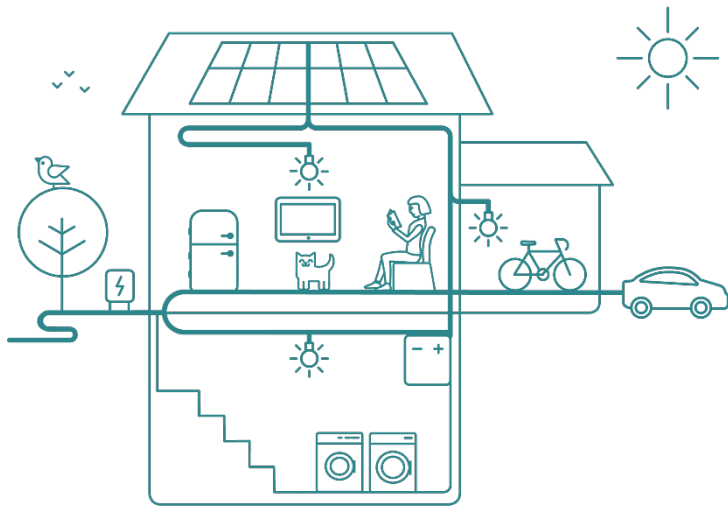
# CLASP's Mission



CLASP improves the energy and environmental performance of the appliances & equipment we use every day, accelerating our transition to a more sustainable world.

# Affordable, low-impact, high-quality appliances, lighting & equipment

## Climate



- Reduce carbon emissions
- Lower operating costs
- Decrease energy demand

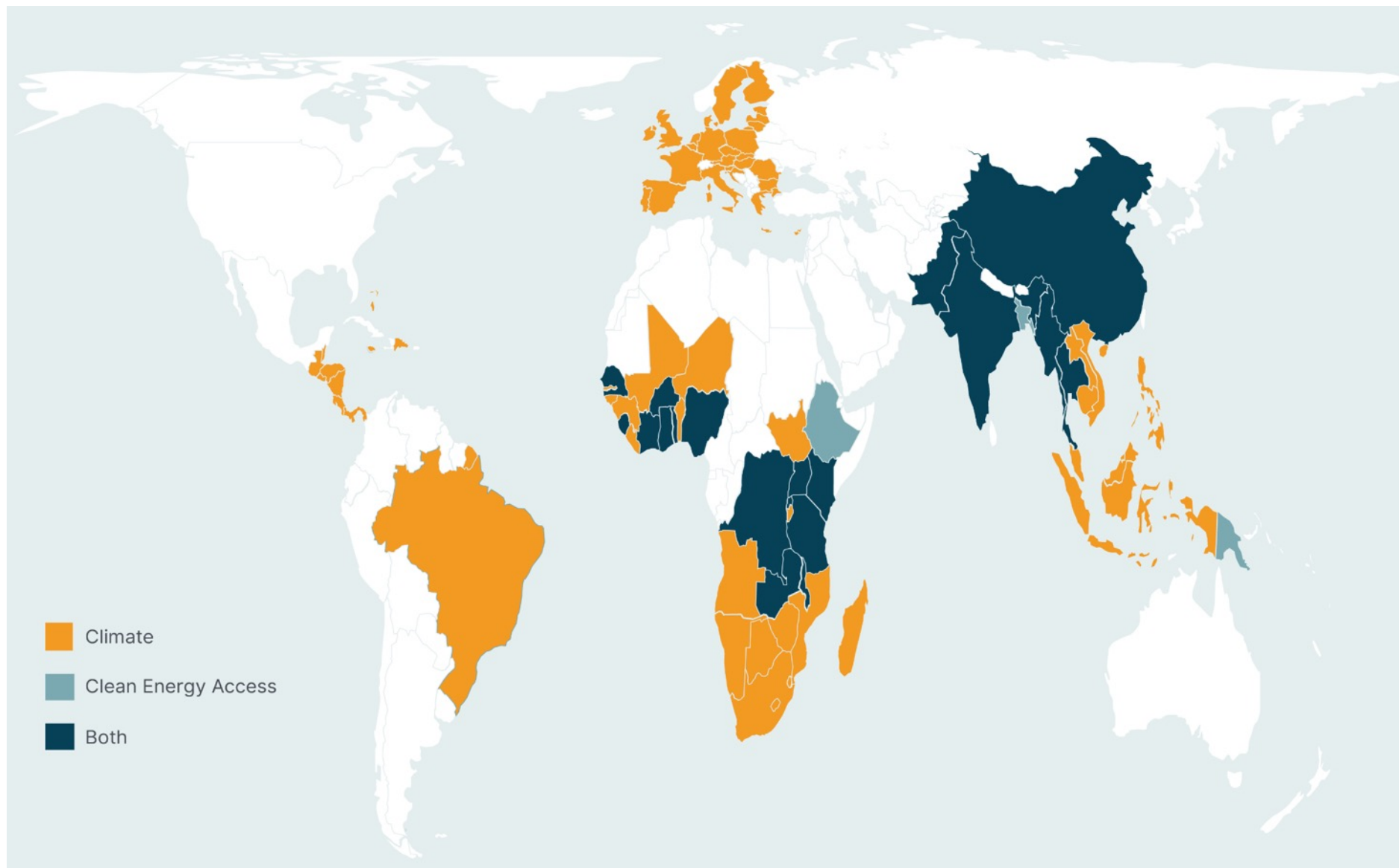
## Clean Energy Access



- Reduce energy supply cost
- Increase energy access
- Improve quality of life



# Where We Work



# What We Do



**Energy & Quality Standards** to keep inefficient, low-quality products off the market



**Policy Compliance, Testing & Quality Assurance** to ensure products perform & markets are fair to all



**Product Labeling & Consumer Education** to attract consumers to good products & inspire demand



**Awards & Product Recognition** to reward early-movers & accelerate markets



**Procurement, Incentives & Bulk Buys** to incentivize innovative manufacturers, reduce risks for all & saturate markets with efficient, high quality products



**Global Collaboration & Knowledge Sharing** to leverage cutting edge & collective knowledge and forge productive partnerships

- Mepsy Introduction and New Features
- Case Study: Refrigerators in Brazil
- Case Study: Analyzing Multiple Policy Tiers
- Q&A

## Speakers:



**Matt Malinowski**  
Director, CLASP



**Jiayi Zhang**  
Associate, CLASP



# Introduction to Mepsy

# What is Mepsy?

## Mepsy

The Appliance & Equipment Climate Impact Calculator Tool

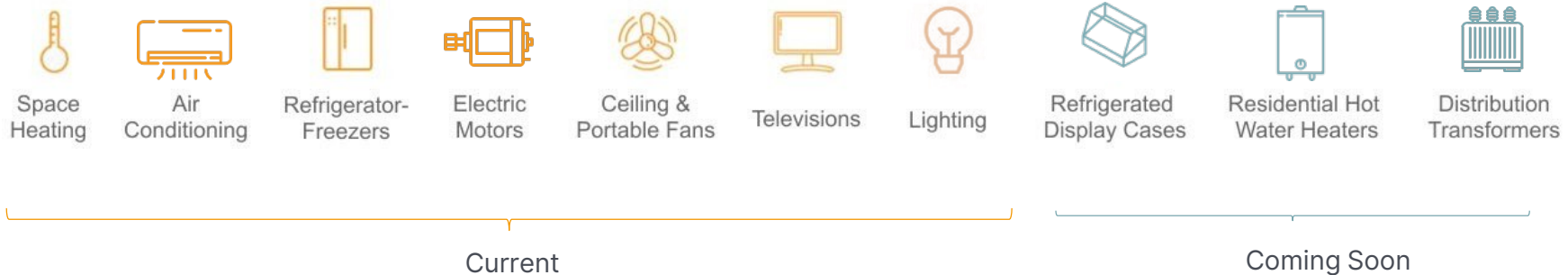
The ten appliances included in Mepsy encompass



of global residential and commercial energy use

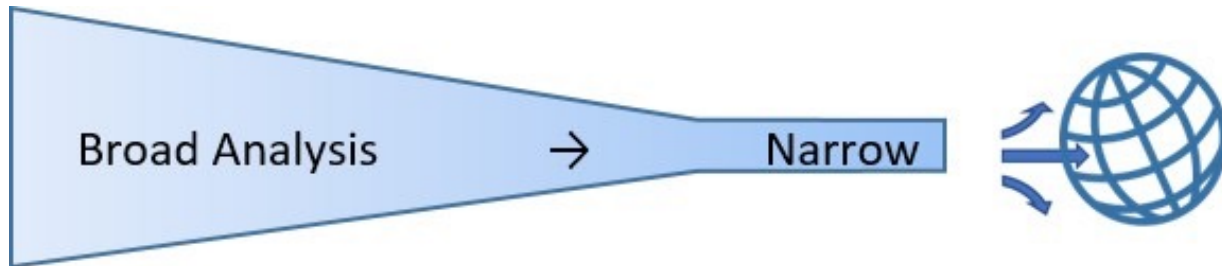


of global electricity use by industry





# Why do we need Mepsy?



Identifying opportunities across countries

- Multiple products
- Multiple countries

Prioritizing opportunities across products in one country

- Multiple products
- Single country

Analyzing cost-effective requirement levels

- Single product
- Single country

Documenting and communicating impacts and progress

- Addresses gap between broad and narrow analytical tools
- Provides:
  - Usability
  - Flexibility
  - Transparency
  - Integration
  - Authority
- Up-to-date, immediately usable to policymakers and analysts

- Bottom-up stock accounting model
  - Model accumulates sales over lifetime
  - Multiplies these appliances in use by unit energy consumption (UEC) under different scenarios
  - Factors in grid losses, power plant emissions, and electricity rates
  - Finally calculates cost and CO<sub>2</sub> impacts

# Data Sources

Data	Sources
Shipments and Stock	Market research company/ Data from key countries extrapolated to others
Unit Energy Consumption (UEC)	United for Efficiency (U4E) / national standards and databases / CLASP
Lifetime	US and national research
Consumer/National Interest rate (Deposit Interest rate)	World Bank
Transmission and Distribution Losses	World Bank / EIA
Grid Emission Factor	National Statistics/ International Financial Institutions (IFI)
Heat rate	ADB / World Bank / IEA
Electricity Cost	IEA
Macroeconomic (households/ population/GDP)	World Bank/ IMF/ UN / OECD ...

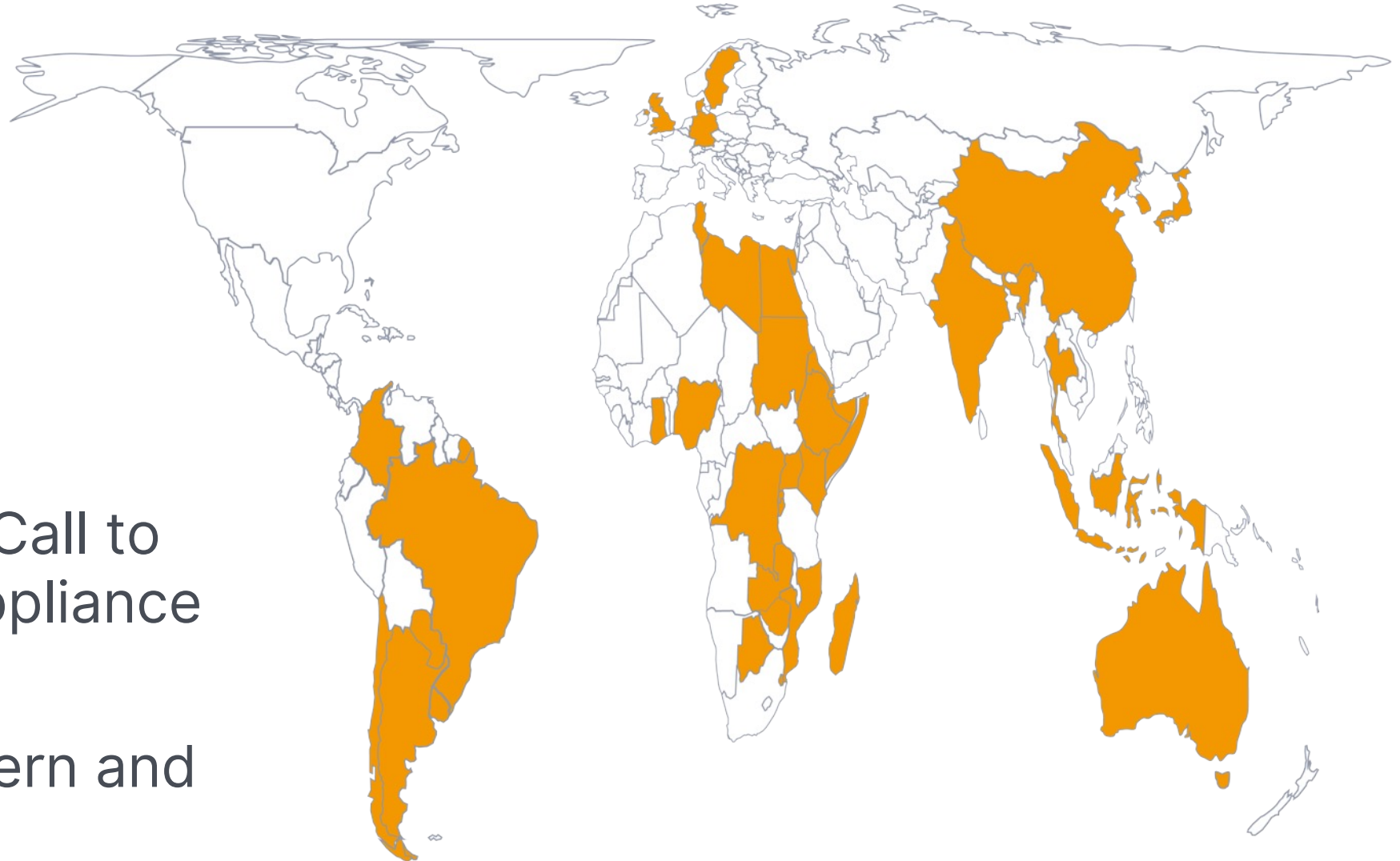


# Where is Mepsy Being Used

- Botswana
- China
- Brazil
- Thailand
- Ghana

+ 12 other COP26 Call to Action Doubling Appliance Efficiency

+ Trainings in Eastern and Southern Africa





# New Features: Lighting and Compliance



## LIGHTING

- Allows for modeling policy transition to LED
- Supports CLiC Minamata campaign
- Shipments/stocks cannot be modified in online version



## COMPLIANCE

- Shows impacts of compliance based on qualitative categories
- Low (50%) to Excellent (95%)





Mepsy: The Appliance & Equipment Climate Impact Calculator

Country:  

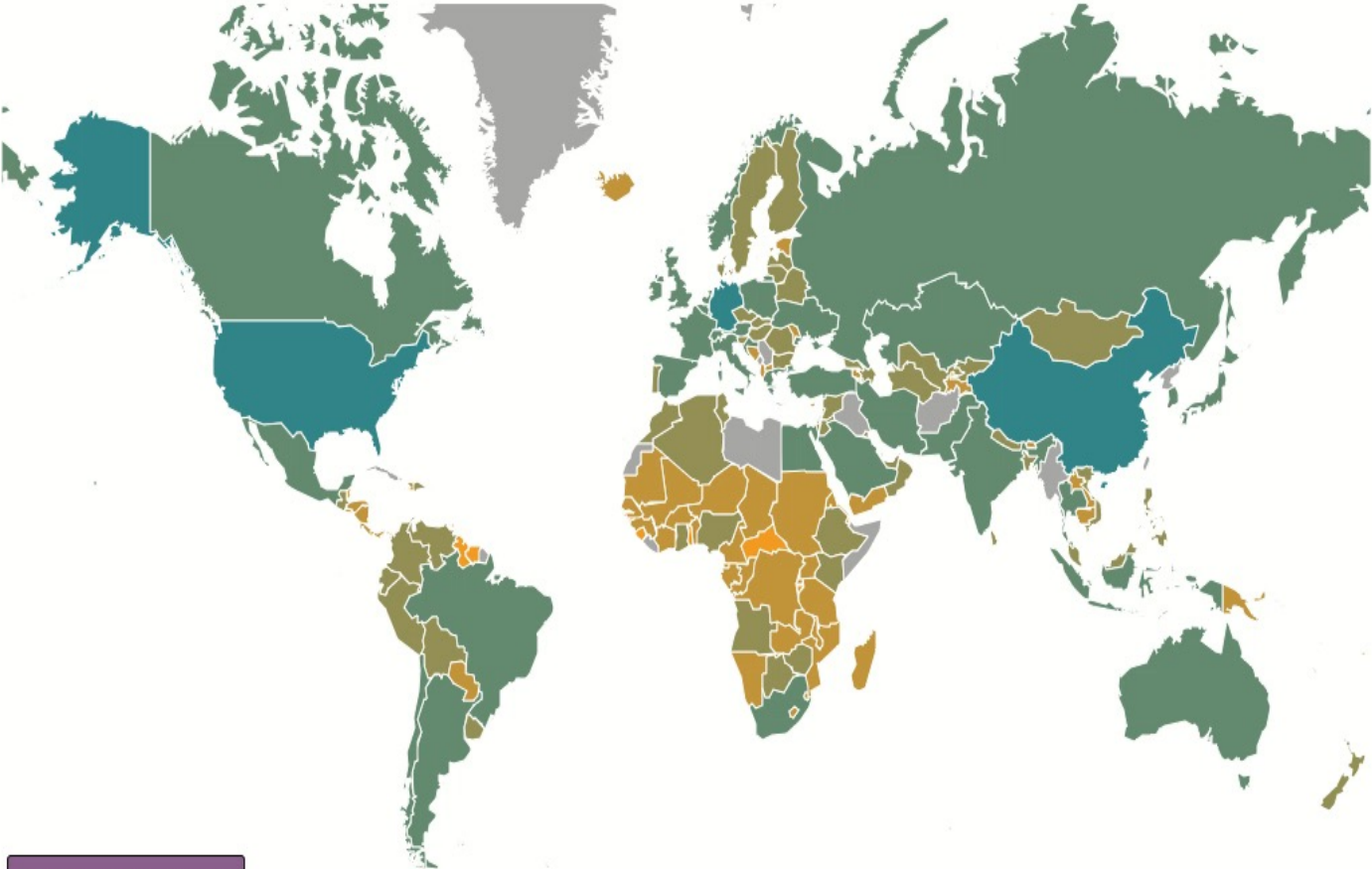
World

View Map By:  

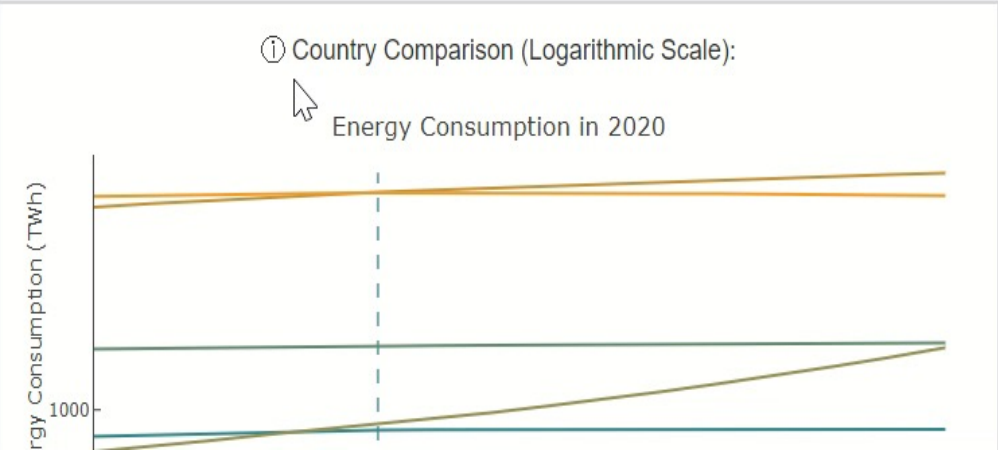
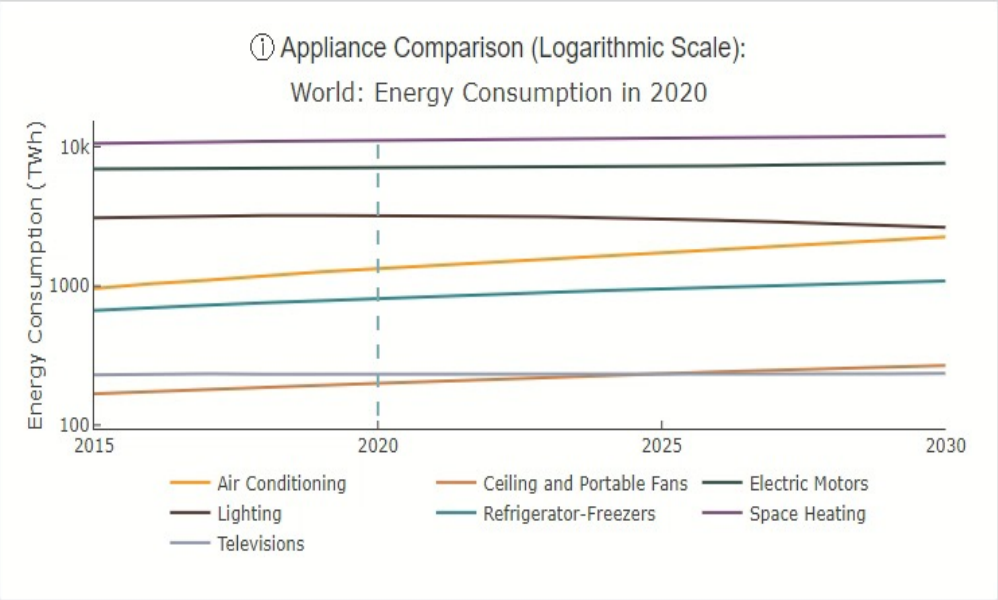
Energy Consumption in 2020

Filter By Appliance:  

All Appliances



Run Detailed Analysis >>




# 1. Getting started

1

**Scenario**

**Country:**

 Angola

**Appliance:**

Refrigerator-Freezers

Select **country of analysis** and **appliance type**

**Policy Dates**

**Policy Effective Year:** 2023

**Analysis Start Year:** 2005

**Analysis End Year:** 2030

Adjust **analysis period** and **policy effective year**

**Optional Parameters**

☐ Shipment Data

☐ Equipment Data

☐ Economic Data

☐ Used Appliance Market

☐ Energy Sector Data

☐ Compliance Data


Enable **optional parameters** for customized analysis

## 2. Knowing Your Market Size

2

### ① Scenario

**Country:**

 Angola ▼

**Appliance:**

Refrigerator-Freezers ▼

### ① Policy Dates

**Policy Effective Year:** 2023 ▼

**Analysis Start Year:** 2005 ▼

**Analysis End Year:** 2030 ▼

### ① Optional Parameters

<input type="checkbox"/> Shipment Data	<input type="checkbox"/> Used Appliance Market
<input type="checkbox"/> Equipment Data	<input type="checkbox"/> Energy Sector Data
<input type="checkbox"/> Economic Data	<input type="checkbox"/> Compliance Data

Customize **shipments** data  
(i.e. annual sales of products)

- Common sources for shipments data:
  - ❖ Customs data
  - ❖ Surveys or interviews with industry
  - ❖ Industry or market research reports



# 3. Defining Product Characteristics

3

① Scenario

Country:  
 Angola

Appliance:  
Refrigerator-Freezers

① Policy Dates

Policy Effective Year: 2023

Analysis Start Year: 2005

Analysis End Year: 2030

① Optional Parameters

☐ Shipment Data

☐ Equipment Data

☐ Economic Data

☐ Used Appliance Market

☐ Energy Sector Data

☐ Compliance Data

Calculate

Return to Global View

Adjust average **equipment lifetime**

- Sources include:
  - Detailed surveys and interviews with manufacturers and consumers
  - Academic and industry research

Modify **price** and **annual energy consumption** for each scenario

- Business As Usual** - Typical product on the market at present
- Efficiency Policy** – Typical product after introduction of new energy efficiency policy
- Best Available Technology** – Highest efficiency product on the market today

Change **currency** for inputs and outputs

## 4. Inputting Electricity Grid Factors

4

**Scenario**

Country:

 Angola

Appliance:

Refrigerator-Freezers

**Policy Dates**

Policy Effective Year: 2023

Analysis Start Year: 2005

Analysis End Year: 2030

**Optional Parameters**

☐ Shipment Data

☐ Equipment Data

☐ Economic Data

☐ Used Appliance Market

☐ Energy Sector Data

☐ Compliance Data

Change **energy sector data**

- Sources include:
  - ❖ Utilities
  - ❖ Energy ministries/departments
  - ❖ Annual reports from IEA and other energy agencies.

# 5. Identifying Economic and Compliance Data

5

Estimate **market compliance rate**  
to assess the  
true impact from  
scenario  
implementation

Adjust **consumer discount rate**  
for lifecycle cost analysis

## Scenario

Country:

 Angola ▼

Appliance:

Refrigerator-Freezers ▼

## Policy Dates

Policy Effective Year:

2023 ▼

Analysis Start Year:

2005 ▼

Analysis End Year:

2030 ▼

## Optional Parameters

- |   |  |
|---|--|
| <input type="checkbox"/> Shipment Data  | <input type="checkbox"/> Used Appliance Market |
| <input type="checkbox"/> Equipment Data | <input type="checkbox"/> Energy Sector Data    |
| <input type="checkbox"/> Economic Data  | <input type="checkbox"/> Compliance Data       |



# Lighting Is a Little Different

3

### Scenario

Country:

Angola

Appliance:

Lighting

Policy Scenario:

African Lighting Amendment (ALA)

### Policy Dates

Policy Effective Year: 2024

Analysis Start Year: 2005

Analysis End Year: 2030

### Optional Parameters

☐ Equipment Data

☐ Economic Data

☐ Energy Sector Data

☐ Compliance Data

Different lighting types eliminated from market in response to **policy scenario** and **effective year**

Enter **unit price** for life-cycle cost analysis

# Run Analysis and Download Results

## ① Scenario

Country:



Angola

Appliance:

Lighting

Policy Scenario:

CFL Phase Out

## ① Policy Dates

Policy Effective Year:

2023

Analysis Start Year:

2005

Analysis End Year:

2030

## ① Optional Parameters

☒ Equipment Data

☐ Economic Data

☐ Energy Sector Data

☐ Compliance Data

## ① Equipment Data

### Scenario Assumptions of Phase Out

	Domestic	Professional
Incandescent & Halogen		
Compact Fluorescent Lamps (CFL)	2023	2023
Linear Fluorescent Lamps (LFL)		
High Intensity Discharge Lamps (HID)		

### Unit Price

	Domestic	Professional
Incandescent & Halogen	2	3
Compact Fluorescent Lamps (CFL)	3	5
LED Omnidirectional	4	7
Linear Fluorescent Lamps (LFL)	6.5	8
LED Tube	8	10
High Intensity Discharge Lamps (HID)	80	100
LED Outdoor	120	140

# Download Your Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
		Business As Usual Final Energy Consump	Efficiency Policy Final Energy Consump	Best Available Technology Final Energy	Efficiency Policy Annual Final Energy	Best Available Technology Annual Final	Efficiency Policy Cumulativ e Final Energy	Best Available Technology Cumulativ	Business As Usual Primary Energy Consump	Efficiency Policy Primary Energy Consump	Best Available Technology Primary	Efficiency Policy Annual Primary Energy	Best Available Technology Annual Primary	Efficiency Policy Cumulativ e Primary Energy	Best Available Technology Cumulativ	Business As Usual CO2 Emissions (Mt)	Efficiency Policy CO2 Emissions (Mt)	Best Available Technology CO2 Emissions	Efficiency Policy Annual CO2 Reductio	Best Available Technology Annual CO2	Efficiency Policy Cumulativ e CO2 Reductio	Best Available Technology Cumulativ
1	Year																					
2	2005	1.002589	1.002589	1.002589	0	0	0	0	1.392902	1.392902	1.392902	0	0	0	0	0.481096	0.481096	0.481096	0	0	0	0
3	2006	1.039923	1.039923	1.039923	0	0	0	0	1.44477	1.44477	1.44477	0	0	0	0	0.499011	0.499011	0.499011	0	0	0	0
4	2007	1.078627	1.078627	1.078627	0	0	0	0	1.498541	1.498541	1.498541	0	0	0	0	0.517583	0.517583	0.517583	0	0	0	0
5	2008	1.118006	1.118006	1.118006	0	0	0	0	1.553251	1.553251	1.553251	0	0	0	0	0.536479	0.536479	0.536479	0	0	0	0
6	2009	1.158232	1.158232	1.158232	0	0	0	0	1.609137	1.609137	1.609137	0	0	0	0	0.555782	0.555782	0.555782	0	0	0	0
7	2010	1.2007	1.2007	1.2007	0	0	0	0	1.668138	1.668138	1.668138	0	0	0	0	0.57616	0.57616	0.57616	0	0	0	0
8	2011	1.247322	1.247322	1.247322	0	0	0	0	1.73291	1.73291	1.73291	0	0	0	0	0.598532	0.598532	0.598532	0	0	0	0
9	2012	1.298883	1.298883	1.298883	0	0	0	0	1.804545	1.804545	1.804545	0	0	0	0	0.623274	0.623274	0.623274	0	0	0	0
10	2013	1.353867	1.353867	1.353867	0	0	0	0	1.880933	1.880933	1.880933	0	0	0	0	0.649658	0.649658	0.649658	0	0	0	0
11	2014	1.408094	1.408094	1.408094	0	0	0	0	1.956271	1.956271	1.956271	0	0	0	0	0.675679	0.675679	0.675679	0	0	0	0
12	2015	1.457753	1.457753	1.457753	0	0	0	0	2.025263	2.025263	2.025263	0	0	0	0	0.699508	0.699508	0.699508	0	0	0	0
13	2016	1.501718	1.501718	1.501718	0	0	0	0	2.086344	2.086344	2.086344	0	0	0	0	0.720605	0.720605	0.720605	0	0	0	0
14	2017	1.538639	1.538639	1.538639	0	0	0	0	2.137638	2.137638	2.137638	0	0	0	0	0.738321	0.738321	0.738321	0	0	0	0
15	2018	1.567433	1.567433	1.567433	0	0	0	0	2.177642	2.177642	2.177642	0	0	0	0	0.752138	0.752138	0.752138	0	0	0	0
16	2019	1.58783	1.58783	1.58783	0	0	0	0	2.205979	2.205979	2.205979	0	0	0	0	0.761926	0.761926	0.761926	0	0	0	0
17	2020	1.599912	1.599912	1.599912	0	0	0	0	2.222764	2.222764	2.222764	0	0	0	0	0.767723	0.767723	0.767723	0	0	0	0
18	2021	1.607593	1.607593	1.607593	0	0	0	0	2.233437	2.233437	2.233437	0	0	0	0	0.771409	0.771409	0.771409	0	0	0	0
19	2022	1.607593	1.607593	1.607593	0	0	0	0	2.233437	2.233437	2.233437	0	0	0	0	0.771409	0.771409	0.771409	0	0	0	0
20	2023	1.599829	1.599829	1.599829	0	0	0	0	2.222649	2.222649	2.222649	0	0	0	0	0.767683	0.767683	0.767683	0	0	0	0
21	2024	1.583803	1.519117	1.367169	0.064686	0.216634	0.064686	0.216634	2.200385	2.110517	1.899414	0.089868	0.300971	0.089868	0.300971	0.759993	0.73749	0.684628	0.022504	0.075366	0.022504	0.075366
22	2025	1.561575	1.431917	1.257709	0.129657	0.303865	0.194343	0.5205	2.169503	1.989369	1.747341	0.180133	0.422161	0.270001	0.723132	0.749327	0.705775	0.647259	0.043551	0.102068	0.066055	0.177433
23	2026	1.532882	1.342204	1.157634	0.190678	0.375248	0.38502	0.895747	2.12964	1.864731	1.608306	0.264909	0.521334	0.534911	1.244466	0.735559	0.673798	0.614015	0.061761	0.121543	0.127816	0.298976
24	2027	1.498339	1.255658	1.070741	0.242681	0.427598	0.627701	1.323345	2.081649	1.744491	1.487585	0.337158	0.594063	0.872068	1.838529	0.718983	0.64329	0.585613	0.075693	0.13337	0.203509	0.432346
25	2028	1.461221	1.181575	1.004447	0.279647	0.456774	0.907348	1.780119	2.030081	1.641567	1.395483	0.388514	0.634598	1.260583	2.473127	0.701172	0.617304	0.564182	0.083868	0.13699	0.287378	0.569336
26	2029	1.423329	1.126739	0.963795	0.29659	0.459534	1.203938	2.239653	1.977437	1.565384	1.339004	0.412053	0.638433	1.672636	3.11156	0.682989	0.597598	0.550684	0.085392	0.132305	0.372769	0.701642
27	2030	1.386503	1.091194	0.946043	0.295309	0.440459	1.499247	2.680112	1.926275	1.516	1.314343	0.410275	0.611932	2.082911	3.723492	0.665318	0.583838	0.543789	0.08148	0.12153	0.45425	0.823172



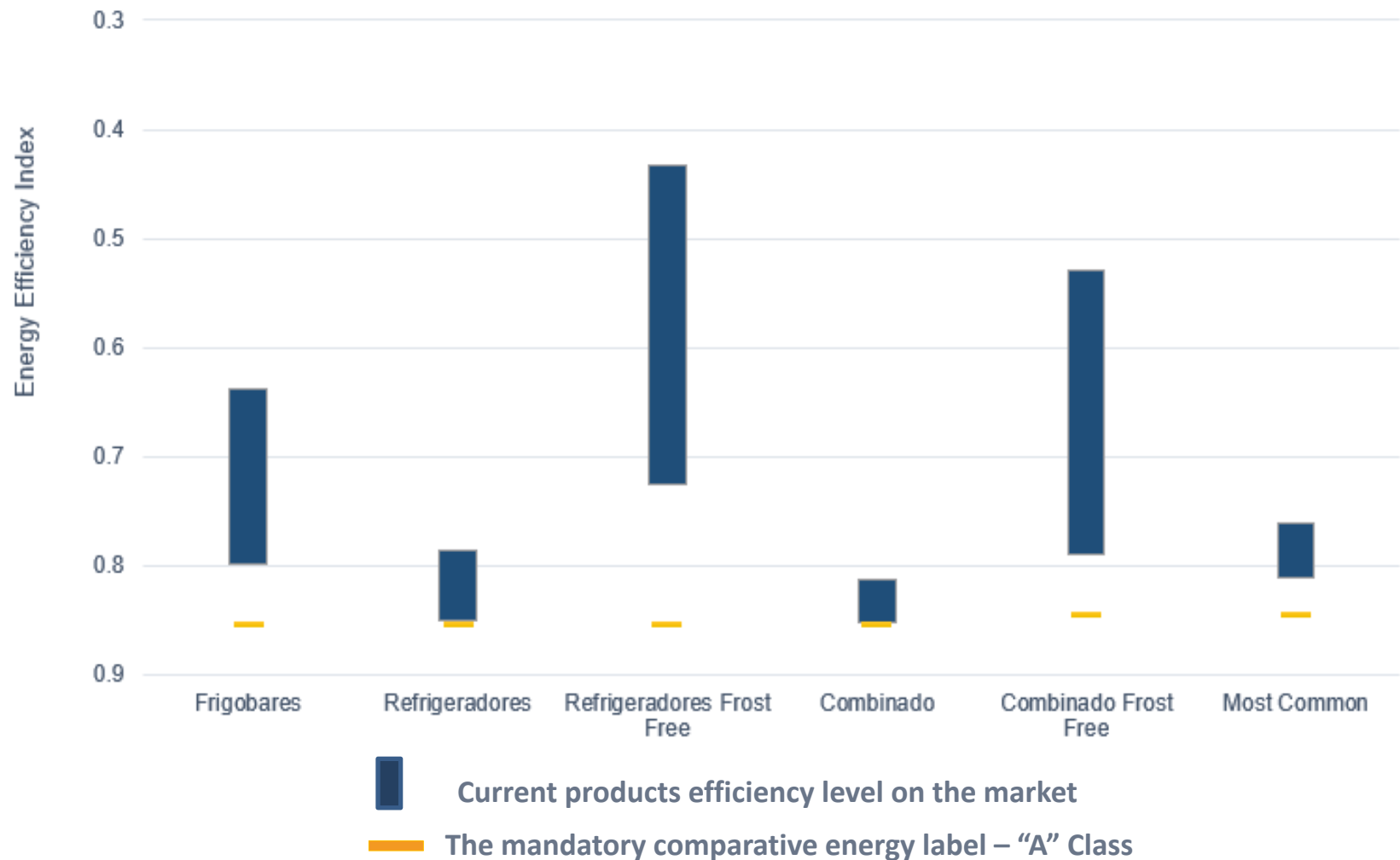
# Custom Analysis - Analyzing MEPS for Refrigerators in Brazil

# Background: Brazil Refrigerator Label is Outdated

More Efficient



Less Efficient





# Analyze MEPS Assumptions' Impact

- Starting from 2026, three MEPS are initiated to eliminate less efficiency classes refrigerators from the market
- Mepsy: Analysis scenarios' potential impact on nationwide energy consumption and consumers

Starting from 1/1/2026	
Class	Maximum Efficiency Index (For all categories)
A	0.67
B	0.83
C	1.00
D	1.16
E	1.32
F	>1.32

Scenario 2 : Eliminate part of C, and classes D E and F  
MEPS = 0.90

Scenario 3 : Eliminate classes C, D, E, F  
MEPS = 0.83

Scenario 1 : Eliminate D,E and F classes  
MEPS = 1.00

# Inputs for Custom Analysis

	Input Type	Custom Assumption		Resource
1 Policy Date	Policy Effective Year	2026		Standard Year
	Analysis Period	2026 – 2030		
2 Shipment Date	Shipments (2005-2030)			Euromonitor
3 Equipment Date	Average Equipment Lifetime	15 years		
	BAU Price and Energy Consumption	R\$ 2356	509 kWh/year	Market Research
	Scenario 1 Price and Energy Consumption	R\$ 2475	411 kWh/year	Market Research
	Scenario 2 Price and Energy Consumption	R\$ 2524	370 kWh/year	Market Research
	Scenario 3 Price and Energy Consumption	R\$ 2559	341 kWh/year	Market Research
4 Economic Date	Consumer Discount Rate	0.07		(PDE 2029, P.63)
5 Energy Sector Date	Electricity Price	0.78 BRL/kWh		(ANEEL, 2020)
	Heat Rate	0.4		
	T&D Loss Factor	0.18		(PDE 2029, P.220)
	Electricity CO2 emissions per kWh	0.42 kgCO2/kWh		<u>Ministério da Ciência, Tecnologia e Inovações.</u>

# Run Analysis in Mepsy



Mepsy: The Appliance & Equipment Climate Impact Calculator

1

## ① Scenario

Country:



Brazil

Appliance:

Refrigerator-Freezers

## ① Policy Dates

Policy Effective Year:

2026

Analysis Start Year:

2022

Analysis End Year:

2030

## ① Optional Parameters

- ☒ Shipment Data
- ☒ Used Appliance Market
- ☒ Equipment Data
- ☒ Energy Sector Data
- ☒ Economic Data
- ☒ Compliance Data

2

## ① Shipment Data

Insert Shipment Data Via:

- ☒ Copy-Paste Table
- ☐ CSV Attachment

	Sales (units)
2005	3027500
2006	3447900
2007	3983400
2008	4806700
2009	5477600
2010	6033000
2011	6264200
2012	6942400
2013	6558400
2014	6206000
2015	5209000
2016	4375400
2017	4998000
2018	5264900
2019	5493900

3

## ① Equipment Data

① Average Equipment Lifetime (years):

15

① COMING SOON - Business-as-Usual Efficiency Improvement Rate:

0

① COMING SOON - Business-as-Usual Price Decrease Rate:

0

① Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (BRL)	Unit Energy Consumption (kWh/yr)
Baseline	2356	509
Scenario 1	2475	411
Scenario 2	2524	370

① Currency Name/Code

BRL

4

## ① Economic Data

① Consumer Discount Rate:

0.07

## ① Used Appliance Market

COMING SOON - Proportion of appliances regulated

0

5

## ① Energy Sector Data

① Electricity Price (kWh)

0.78

① Heat Rate:

0.41

① T&D Loss Factor

0.158

① Electric CO2 emissions per kWh (kg)

0.42

① Heating Fuel Price (per kWh):

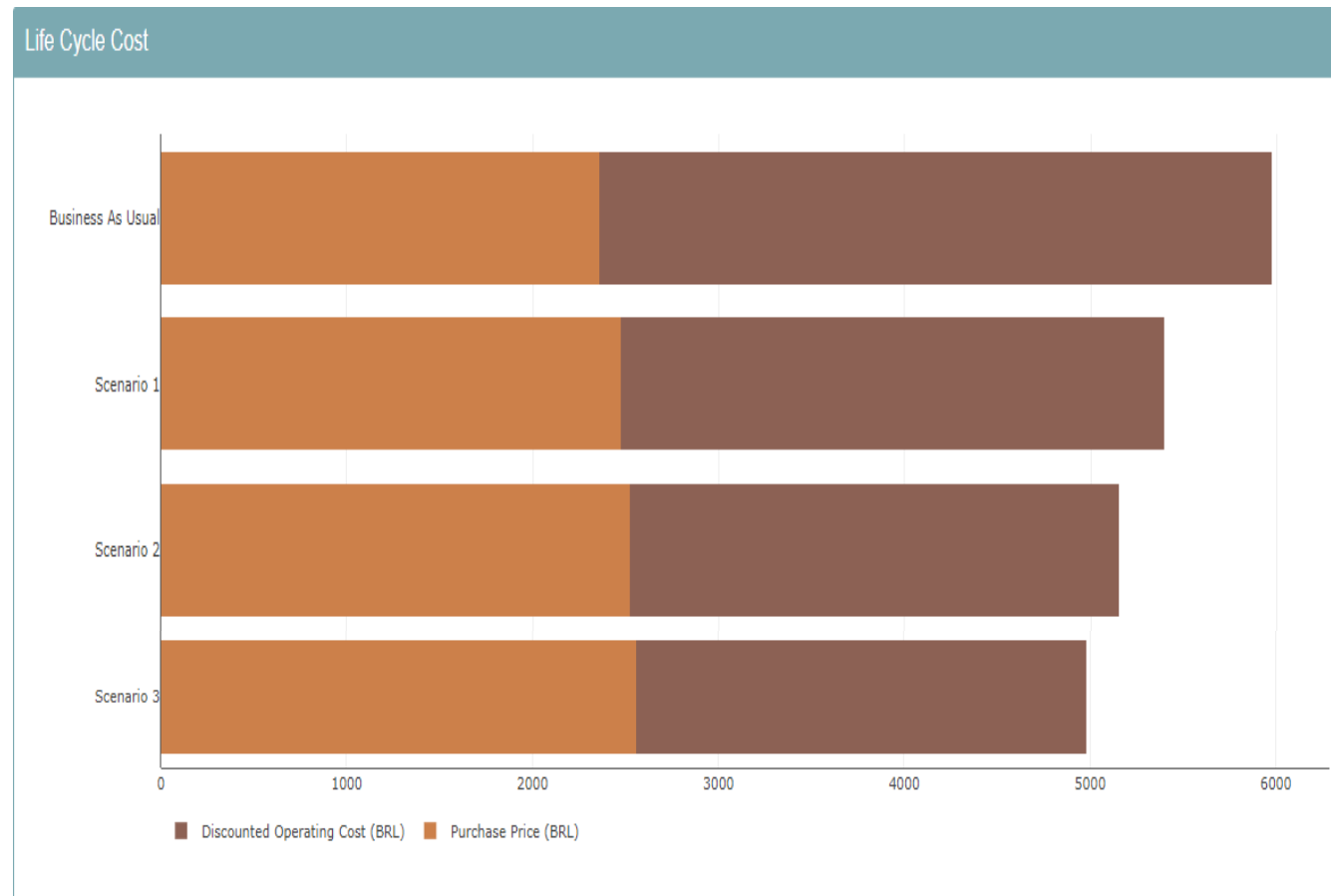
0

① Heating Fuel Emissions Factor (kg/kWh)

# Results: Assessing Impacts to Consumers

## Consumer impacts results for Brazil.

Customer Impact				
Customer Impact	Business As Usual	Scenario 1	Scenario 2	Scenario 3
Purchase Price (BRL)	2356	2475	2524	2559
Unit Energy Consumption (kWh/yr)	509	411	370	341
Energy Cost (BRL/yr)	397	321	289	266
Life Cycle Cost (BRL)	5972	5395	5153	4982
Life Cycle Cost Savings (BRL)	0	577	819	991
Payback Time (Year)	0	2	2	2



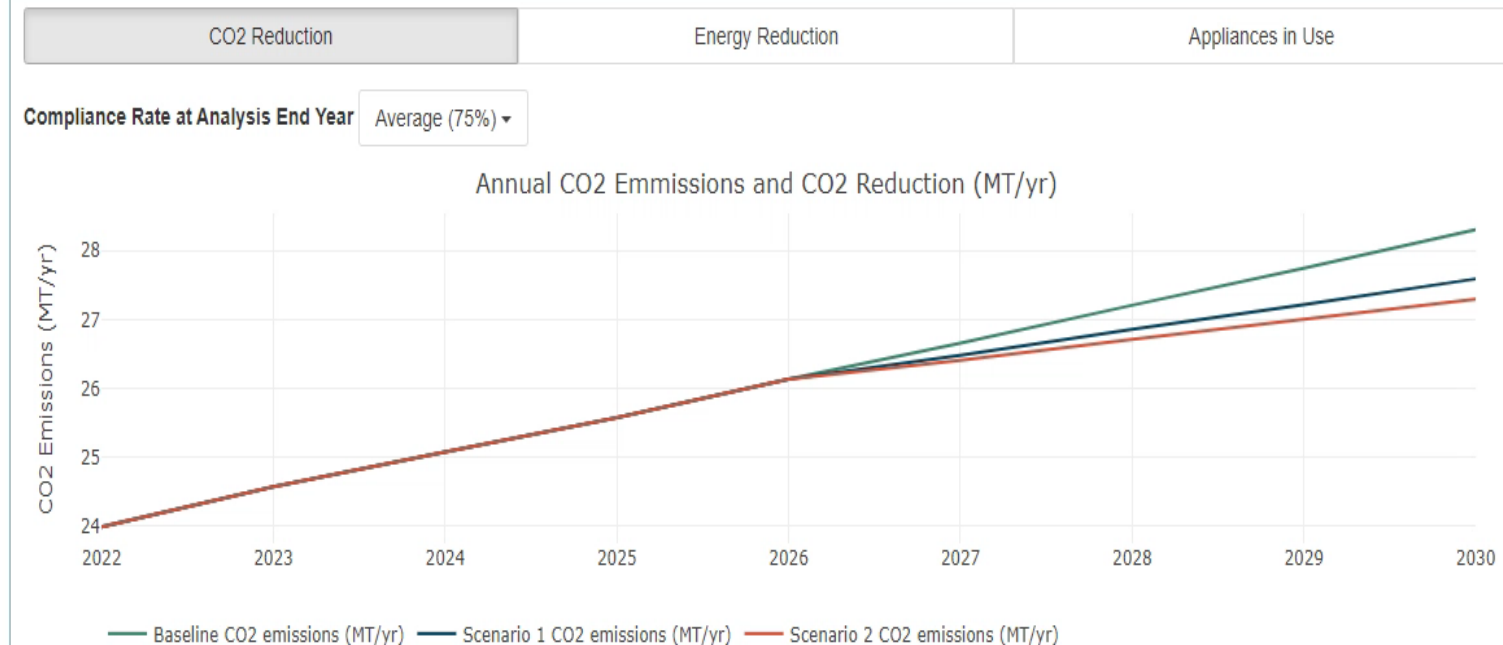
# Results: Estimating National Grid and Climate Impact



## National **energy and emissions impacts results** for Brazil.

National Impact				
National Impact	Business As Usual	Scenario 1	Scenario 2	Scenario 3
Annual Energy Reduction in 2030 (TWh/Year)	0	2.5	3.6	4.3
Cumulative Energy Reduction 2026 through 2030 (TWh)	0	6.3	8.9	11
Annual CO2 Reduction at 2030 (MT/Year)	0	1.3	1.8	2.2
Cumulative CO2 Reduction 2026 through 2030 (Mt)	0	3.2	4.6	5.5

### CO2 Reduction, Energy Reduction, and Products in Use



Download Model Results

Return to Inputs

Return to Global View



# Summary

Impact Analysis	Indicators	Scenario 1	Scenario 2	Scenario 3
/	Energy Efficiency Index	1.00	0.90	0.83
Customer Impacts	LLC Savings	R\$ 580	R\$ 822	R\$ 992
National Impacts	National Energy Savings through 2030	6.11 TWh	8.67 TWh	10.45 TWh
	National CO2 Emission Reduction through 2030	3.19 Mt	4.52 Mt	5.46 Mt

A graphic illustration of a winding road with white dashed lines, set against a dark blue background. Four location pins are placed along the road: a red pin at the top right, a gold pin below it, a green pin further down, and a large blue pin at the bottom. The text is overlaid on the left side of the image.

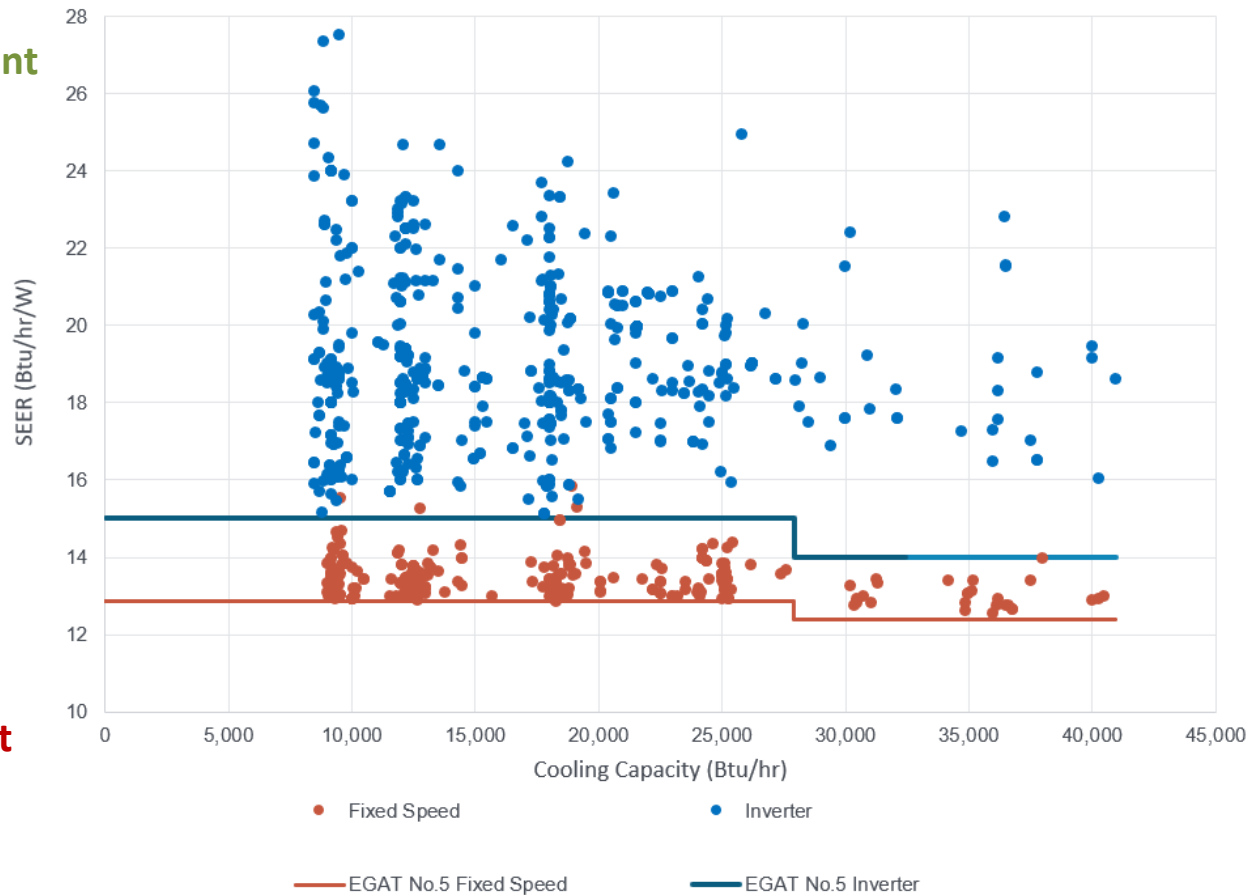
# Multiple Tiers Policy Impact Analysis – Label Revision Roadmap for AC in Thailand

# Introduction and Background

More Efficient



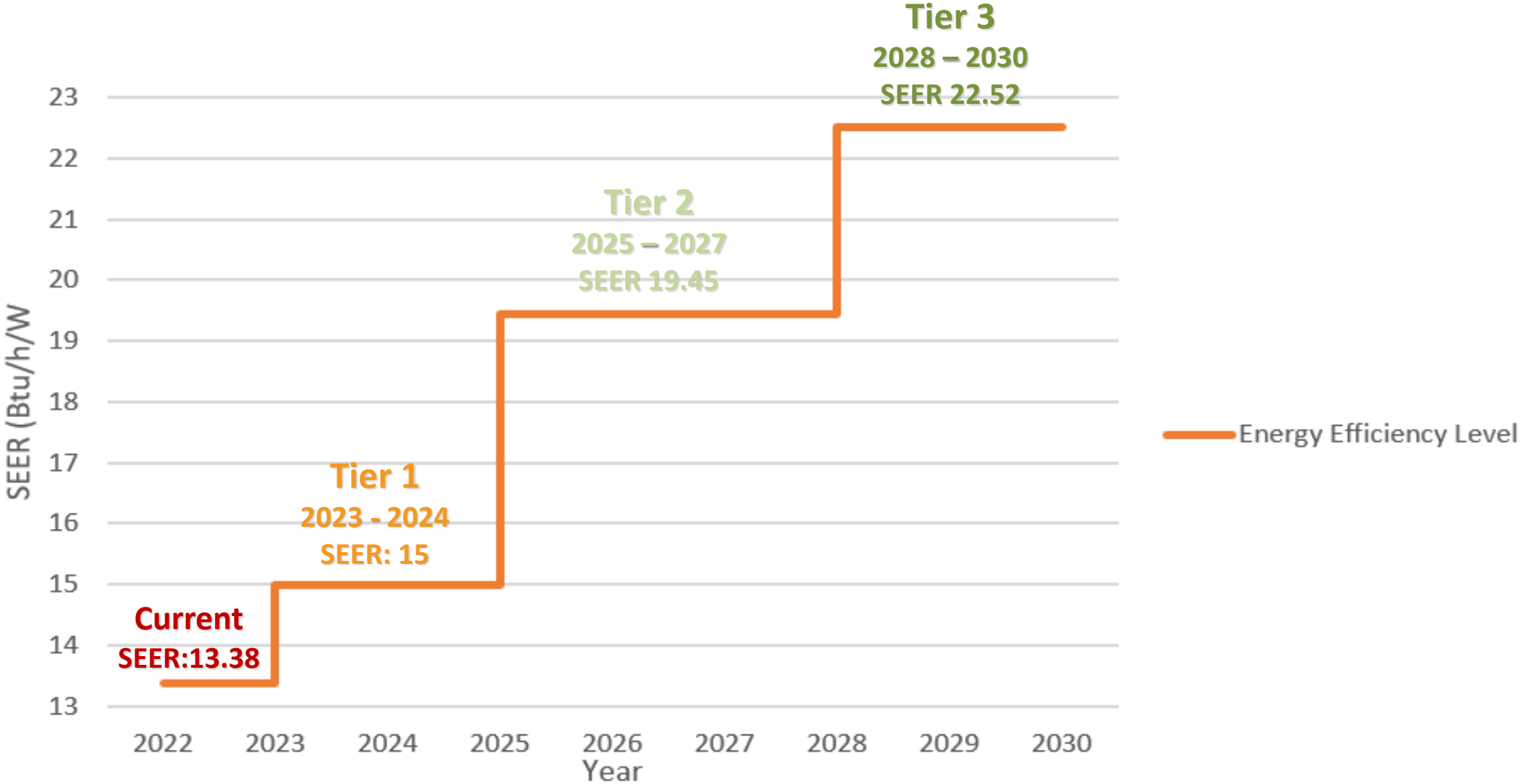
Less Efficient



The Electricity Generating Authority of Thailand (EGAT) :

Voluntary energy label -- **EGAT NO.5 Label**

# Proposed Steps and Goal



# Step 1: Build 3 Tiers' Models in Mepsy



Efficient Appliances for People & the Planet

## Mepsy: The Appliance & Equipment Climate Impact Calculator

### ① Scenario

Country:

Thailand

Appliance:

Air Conditioning

### ① Policy Dates

Policy Effective Year:

2023

Analysis Start Year:

2005

Analysis End Year:

2030

### ① Optional Parameters

☒ Shipment Data

☒ Equipment Data

☒ Economic Data

☒ Used Appliance Market

☒ Energy Sector Data

☒ Compliance Data

### ① Shipment Data

Insert Shipment Data Via:

☒ Copy-Paste Table

☐ CSV Attachment

	Sales (units)
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	
2013	
2014	
2015	
2016	
2017	
2018	

### ① Equipment Data

① Average Equipment Lifetime (years):

9.5

① COMING SOON - Business-as-Usual Efficiency Improvement Rate:

0

① COMING SOON - Business-as-Usual Price Decrease Rate:

0

① Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (THB)	Unit Energy Consumption (kWh/yr)
Business As Usual	0	3939
Efficiency Policy	0	2692
Best Available Technology	0	1661

① Currency Name/Code

THB

### ① Economic Data

① Consumer Discount Rate:

0.014

### ① Used Appliance Market

COMING SOON - Proportion of appliances regulated

0

### ① Energy Sector Data

① Electricity Price (kWh)

4.4217

① Heat Rate:

2.031396896

① T&D Loss Factor

0.06

① Electric CO2 emissions per kWh (kg)

0.432

① Heating Fuel Price (per kWh):

0



# Step 1: Build 3 Tiers' Models in Mepsy – Policy Dates

## Tier 1 2023 – 2024

① Policy Dates		
Policy Effective Year:	Analysis Start Year:	Analysis End Year:
2023 ▼	2005 ▼	2030 ▼

## Tier 2 2025 – 2027

① Policy Dates		
Policy Effective Year:	Analysis Start Year:	Analysis End Year:
2025 ▼	2005 ▼	2030 ▼

## Tier 3 2028 – 2030

① Policy Dates		
Policy Effective Year:	Analysis Start Year:	Analysis End Year:
2028 ▼	2005 ▼	2030 ▼

# Step 1: Build 3 Tiers' Models in Mepsy – Scenario Assumptions



## Tier 1 2023 – 2024

① Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (USD)	Unit Energy Consumption (kWh/yr)
BAU (Current Market)	10197	1964
Tier 1 Goal	12140	1752
/		/

Tier 1 Goal:

Fixed Speed AC Harmonized with Inverter AC Label Level

## Tier 2 2025 – 2027

① Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (USD)	Unit Energy Consumption (kWh/yr)
BAU (Market in 2025)	?	?
Tier 2 Goal	17475	1351
/		/

Tier 2 Goal:

U4E Low Efficiency Level

## Tier 3 2028 – 2030

① Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (THB)	Unit Energy Consumption (kWh/yr)
BAU (Market in 2028)	17475	1351
Tier 3 Goal	21157	1167
/		/

Tier 3 Goal:

U4E Intermediate Efficiency Level

# Step 1: Build 3 Tiers' Models in Mepsy – Inputs Highlights



## Tier 1 1/1/2023 – 12/31/2024

① Policy Dates

Policy Effective Year: 2023

Analysis Start Year: 2005

Analysis End Year: 2030

② Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (USD)	Unit Energy Consumption (kWh/yr)
BAU (Current Market)	10197	1964
Tier 1 Goal	12140	1752
/	/	/

## Tier 2 1/1/2025 – 12/31/2027

① Policy Dates

Policy Effective Year: 2025

Analysis Start Year: 2005

Analysis End Year: 2030

② Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (USD)	Unit Energy Consumption (kWh/yr)
BAU (Market in 2025)	12140	1752
Tier 2 Goal	17475	1351
/	/	/

## Tier 3 1/1/2028 – 12/31/2030

① Policy Dates

Policy Effective Year: 2028

Analysis Start Year: 2005

Analysis End Year: 2030

② Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (THB)	Unit Energy Consumption (kWh/yr)
BAU (Market in 2028)	17475	1351
Tier 3 Goal	21157	1167
/	/	/

- The BAU needs to reflect the CURRENT market situation
- Start the analysis in an earlier year
- Do not limit the end year

# Step 1: Build 3 Tiers' Models in Mepsy – Run Analysis



**① Scenario**  
**Country:**  

Thailand

  
**Appliance:**  

Air Conditioning

**① Policy Dates**  
**Policy Effective Year:** 2023  
**Analysis Start Year:** 2005  
**Analysis End Year:** 2030

**① Optional Parameters**  

☒ Shipment Data  
☒ Equipment Data  
☒ Economic Data

☒ Used Appliance Market  
☒ Energy Sector Data  
☒ Compliance Data

**① Shipment Data**  
**Insert Shipment Data Via:**  
☒ Copy-Paste Table ☐ CSV Attachment

	Sales (units)
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	
2013	
2014	
2015	
2016	
2017	
2018	
2019	
2020	

**① Equipment Data**  
**① Average Equipment Lifetime (years):**  
9.5  
**① COMING SOON - Business-as-Usual Efficiency Improvement Rate:**  
0  
**① COMING SOON - Business-as-Usual Price Decrease Rate:**  
0  
**① Scenario Assumptions (Click to Edit or Paste Table)**

Scenario	Price (THB)	Unit Energy Consumption (kWh/yr)
BAU	10197	1964
Tier 1 Goal	12140	1752
/	/	/


**① Currency Name/Code**  
THB

**① Economic Data**  
**① Consumer Discount Rate:**  
0.014

**① Used Appliance Market**  
**COMING SOON - Proportion of appliances regulated**  
0

**① Energy Sector Data**  
**① Electricity Price (kWh)**  
4.4217  
**① Heat Rate:**  
2.031396896  
**① T&D Loss Factor**  
0.06  
**① Electric CO2 emissions per kWh (kg)**  
0.432  
**① Heating Fuel Price (per kWh):**  
0  
**① Heating Fuel Emissions Factor (kg/kWh)**  
0

## Step 2: Download and Compile 3 Models' Results

 Download Model Results



3 times



Model Results THA-Air Conditioning 2022-03-14 Model Version 1.2 (2)

Tier 3 Model  
Results



Model Results THA-Air Conditioning 2022-03-14 Model Version 1.2 (1)

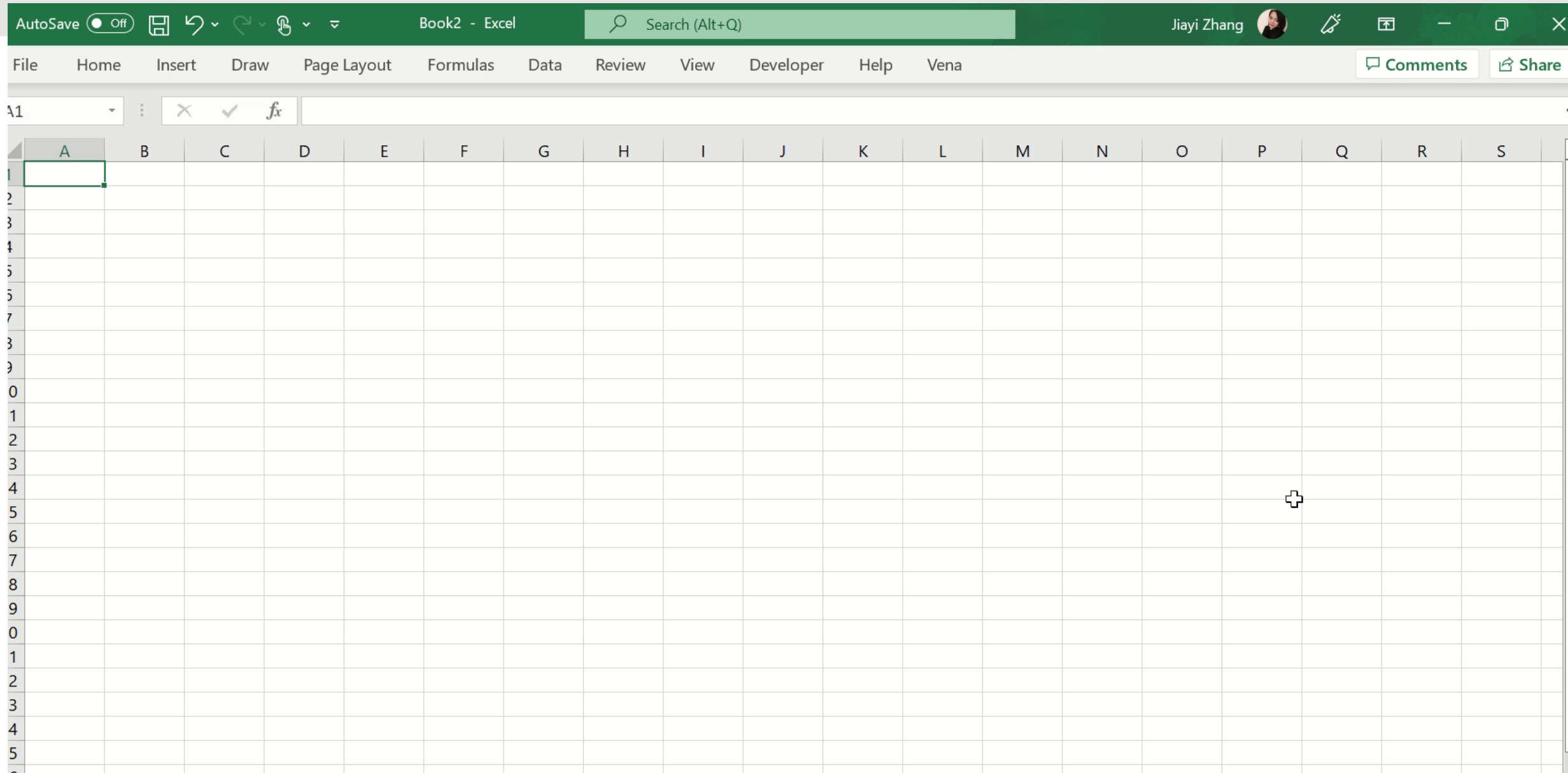
Tier 2 Model  
Results



Model Results THA-Air Conditioning 2022-03-14 Model Version 1.2

Tier 1 Model  
Results

# Step 2: Download and Compile 3 Models' Results





## Step 2: Download and Compile 3 Models' Results



### Tier 1 Model Results

### Tier 2 Model Results

### Tier 3 Model Results

Year	BAU	Tier 1 Goal	BAU (2025)	Tier 2 Goal	BAU (2028)	Tier 3 Goal
	Final Energy Consumption (TWh)	Final Energy Consumption (TWh)	Final Energy Consumption (TWh)	Final Energy Consumption (TWh)	Final Energy Consumption (TWh)	Final Energy Consumption (TWh)
2005	5.3	5.3	4.7	4.7	3.6	3.6
2006	5.9	5.9	5.3	5.3	4.1	4.1
2007	6.6	6.6	5.9	5.9	4.5	4.5
2008	7.4	7.4	6.6	6.6	5.1	5.1
2009	8.2	8.2	7.3	7.3	5.6	5.6
2010	9.0	9.0	8.0	8.0	6.2	6.2
2011	9.9	9.9	8.8	8.8	6.8	6.8
2012	10.7	10.7	9.6	9.6	7.4	7.4
2013	11.6	11.6	10.4	10.4	8.0	8.0
2014	12.7	12.7	11.3	11.3	8.7	8.7
2015	13.9	13.9	12.4	12.4	9.6	9.6
2016	15.2	15.2	13.5	13.5	10.4	10.4
2017	16.5	16.5	14.8	14.8	11.4	11.4
2018	17.6	17.6	15.7	15.7	12.1	12.1
2019	18.5	18.5	16.5	16.5	12.7	12.7
2020	19.3	19.3	17.2	17.2	13.2	13.2
2021	20.0	20.0	17.9	17.9	13.8	13.8
2022	20.7	20.7	18.5	18.5	14.3	14.3
2023	21.4	21.4	19.1	19.1	14.7	14.7
2024	22.1	21.8	19.7	19.7	15.2	15.2
2025	22.7	22.2	20.2	20.2	15.6	15.6
2026	23.3	22.5	20.8	20.3	16.0	16.0
2027	23.9	22.9	21.3	20.3	16.4	16.4
2028	24.5	23.3	21.9	20.4	16.9	16.9
2029	25.1	23.8	22.4	20.5	17.3	17.0
2030	25.8	24.2	23.0	20.6	17.7	17.2

# Why We Need the Tool?

## Tier 1 1/1/2023 – 12/31/2024

① Policy Dates

Policy Effective Year: 2023 Analysis Start Year: 2005 Analysis End Year: 2030

① Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (USD)	Unit Energy Consumption (kWh/yr)
BAU (Current Market)	10197	1964
Tier 1 Goal	12140	1752
/	/	/

## Tier 2 1/1/2025 – 12/31/2027

① Policy Dates

Policy Effective Year: 2025 Analysis Start Year: 2005 Analysis End Year: 2030

① Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (USD)	Unit Energy Consumption (kWh/yr)
BAU (Market in 2025)	12140	1752
Tier 2 Goal	17475	1351
/	/	/

## Tier 3 1/1/2028 – 12/31/2030

① Policy Dates

Policy Effective Year: 2028 Analysis Start Year: 2005 Analysis End Year: 2030

① Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (THB)	Unit Energy Consumption (kWh/yr)
BAU (Market in 2028)	17475	1351
Tier 3 Goal	21157	1167
/	/	/

Tier 1 Goal => Tier 2 BAU

# Why We Need the Tool?



## Tier 1 Model Results

## Tier 2 Model Results

## Tier 3 Model Results

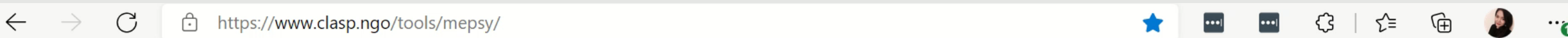
Year	BAU Final Energy Consumption (TWh)	Tier 1 Goal Final Energy Consumption (TWh)	BAU (2025) Final Energy Consumption (TWh)	Tier 2 Goal Final Energy Consumption (TWh)	BAU (2028) Final Energy Consumption (TWh)	Tier 3 Goal Final Energy Consumption (TWh)
2005	5.3	5.3	4.7	4.7	3.6	3.6
2006	5.9	5.9	5.3	5.3	4.1	4.1
2007	6.6	6.6	5.9	5.9	4.5	4.5
2008	7.4	7.4	6.6	6.6	5.1	5.1
2009	8.2	8.2	7.3	7.3	5.6	5.6
2010	9.0	9.0	8.0	8.0	6.2	6.2
2011	9.9	9.9	8.8	8.8	6.8	6.8
2012	10.7	10.7	9.6	9.6	7.4	7.4
2013	11.6	11.6	10.4	10.4	8.0	8.0
2014	12.7	12.7	11.3	11.3	8.7	8.7
2015	13.9	13.9	12.4	12.4	9.6	9.6
2016	15.2	15.2	13.5	13.5	10.4	10.4
2017	16.5	16.5	14.8	14.8	11.4	11.4
2018	17.6	17.6	15.7	15.7	12.1	12.1
2019	18.5	18.5	16.5	16.5	12.7	12.7
2020	19.3	19.3	17.2	17.2	13.2	13.2
2021	20.0	20.0	17.9	17.9	13.8	13.8
2022	20.7	20.7	18.5	18.5	14.3	14.3
2023	21.4	21.4	19.1	19.1	14.7	14.7
2024	22.1	21.8	19.7	19.7	15.2	15.2
2025	22.7	22.2	20.2	20.2	15.6	15.6
2026	23.3	22.5	20.8	20.3	16.0	16.0
2027	23.9	22.9	21.3	20.3	16.4	16.4
2028	24.5	23.3	21.9	20.4	16.9	16.9
2029	25.1	23.8	22.4	20.5	17.3	17.0
2030	25.8	24.2	23.0	20.6	17.7	17.2

# Why We Need the Tool?

## Three Tiers' Unit Energy Consumption (UEC) in Mepsy

		Policy Effective Year									
Tier 1	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	BAU	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964
	Tier 1 Goal	1964	1964	1752	1752	1752	1752	1752	1752	1752	1752
		Policy Effective Year									
Tier 2	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	BAU (2025)	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
	Tier 2 Goal	1752	1752	1752	1752	1351	1351	1351	1351	1351	1351
		Policy Effective Year									
Tier 3	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	BAU (2028)	1351	1351	1351	1351	1351	1351	1351	1351	1351	1351
	Tier 3 Goal	1351	1351	1351	1351	1351	1351	1351	1167	1167	1167

# Where to Find the Tool?



Efficient Appliances for People & the Planet

## Mepsy: The Appliance & Equipment Climate Impact Calculator

Mepsy is CLASP's digital tool to model the impacts of energy and carbon reduction policies. Pre-loaded with data from 162 countries, it supports analysis and prioritization for the most energy-intensive appliances and equipment.

[Launch Mepsy](#)

- **Analyze efficiency policy options for space heating equipment, ACs, refrigerators, motors, fans, and televisions**

# Using the Tool in the Thailand Case



ClipboardFontAlignmentNumberStyles												
P6	✕✔fx											
	A	B	C	D	E	F	G	H	I	J	K	
1									(*Fill in Mepsy energy consumption results for each tier			
2				Step 1	Input Mepsy Results of Energy Consumption - Prepare Dataset					Grey cells automatically calculated		
3					Tier 1			Tier 2				
4					(1/1/2023 – 12/31/2024)			Tier 2 (1/1/2025 -12/31/2026)			(1/1/	
					Business As Usual Final Energy Consumption (TWh)	Tier 1 Final Energy Consumption (TWh)	Tier 1 Annual Final Energy Reductions (calculated) (TWh)	Business As Usual Final Energy Consumption (TWh)	Tier 2 Final Energy Consumption (TWh)	Tier 2 Annual Final Energy Reductions (calculated) (TWh)	Business As Usual Final Energy Consumption (TWh)	Ti
5				Year								Er
6				Policy Analysis Start Year	2005		0.000			0.000		Co
7					2006		0.000			0.000		(T
8					2007		0.000			0.000		
9					2008		0.000			0.000		
10					2009		0.000			0.000		
11					2010		0.000			0.000		
12					2011		0.000			0.000		
13					2012		0.000			0.000		
14					2013		0.000			0.000		
15					2014		0.000			0.000		
16					2015		0.000			0.000		
17					2016		0.000			0.000		
18					2017		0.000			0.000		
19					2018		0.000			0.000		

	Tier 1 Goal Final Energy Consumption (TWh)	BAU (2025) Final Energy Consumption (TWh)	Tier 2 Goal Final Energy Consumption (TWh)	BAU (2028) Final Energy Consumption (TWh)	Tie Final Energy Co
1					
2	5.3	4.7	4.7	3.6	
3	5.9	5.3	5.3	4.1	
4	6.6	5.9	5.9	4.5	
5	7.4	6.6	6.6	5.1	
6	8.2	7.3	7.3	5.6	
7	9.0	8.0	8.0	6.2	
8	9.9	8.8	8.8	6.8	
9	10.7	9.6	9.6	7.4	
10	11.6	10.4	10.4	8.0	
11	12.7	11.3	11.3	8.7	
12	13.9	12.4	12.4	9.6	
13	15.2	13.5	13.5	10.4	
14	16.5	14.8	14.8	11.4	
15	17.6	15.7	15.7	12.1	
16	18.5	16.5	16.5	12.7	
17	19.3	17.2	17.2	13.2	
18	20.0	17.9	17.9	13.8	
19	20.7	18.5	18.5	14.3	
20	21.4	19.1	19.1	14.7	
21	21.8	19.7	19.7	15.2	
22	22.2	20.2	20.2	15.6	
23	22.5	20.8	20.3	16.0	
24	22.9	21.3	20.3	16.4	
25	23.3	21.9	20.4	16.9	
26	23.8	22.4	20.5	17.3	
27	24.2	23.0	20.6	17.7	
28					
29					
30					
31					
32					
33					
34					
35					
36					



# How Does the Tool Work?



Tier 1 Goal => Tier 2 BAU

Year	Tier 1			Tier 2			Tier 3		
	(1/1/2023 – 12/31/2024)			Tier 2 (1/1/2025 -12/31/2026)			(1/1/2028-12/31/2030)		
	Business As Usual Final Energy Consumption (TWh)	Tier 1 Final Energy Consumption (TWh)	Tier 1 Annual Final Energy Reductions (calculated) (TWh)	Business As Usual Final Energy Consumption (TWh)	Tier 2 Final Energy Consumption (TWh)	Tier 2 Annual Final Energy Reductions (calculated) (TWh)	Business As Usual Final Energy Consumption (TWh)	Tier 3 Final Energy Consumption (TWh)	Tier 3 Annual Final Energy Reductions (calculated) (TWh)
2005	5.256	5.256	0.000	4.689	4.689	0.000	3.616	3.616	0.000
2006 ~ 2020	:	:	:	:	:	:	:	:	:
2021	20.012	20.012	0.000	17.852	17.852	0.000	13.766	13.766	0.000
2022	20.730	20.730	0.000	18.492	18.492	0.000	14.260	14.260	0.000
2023	21.412	21.412	0.000	19.101	19.101	0.000	14.729	14.729	0.000
2024	22.061	21.810	0.251	19.680	19.680	0.000	15.175	15.175	0.000
2025	22.678	22.178	0.499	20.230	20.230	0.000	15.599	15.599	0.000
2026	23.287	22.546	0.741	20.773	20.276	0.498	16.019	16.019	0.000
2027	23.897	22.925	0.972	21.317	20.325	0.992	16.438	16.438	0.000
2028	24.513	23.324	1.189	21.867	20.393	1.474	16.862	16.862	0.000
2029	25.140	23.751	1.389	22.426	20.492	1.934	17.293	17.047	0.247
2030	25.782	24.210	1.573	22.999	20.633	2.366	17.735	17.243	0.492



# How Does the Tool Work?

Tier 1 Goal => Tier 2 BAU

2006 ~ 2020

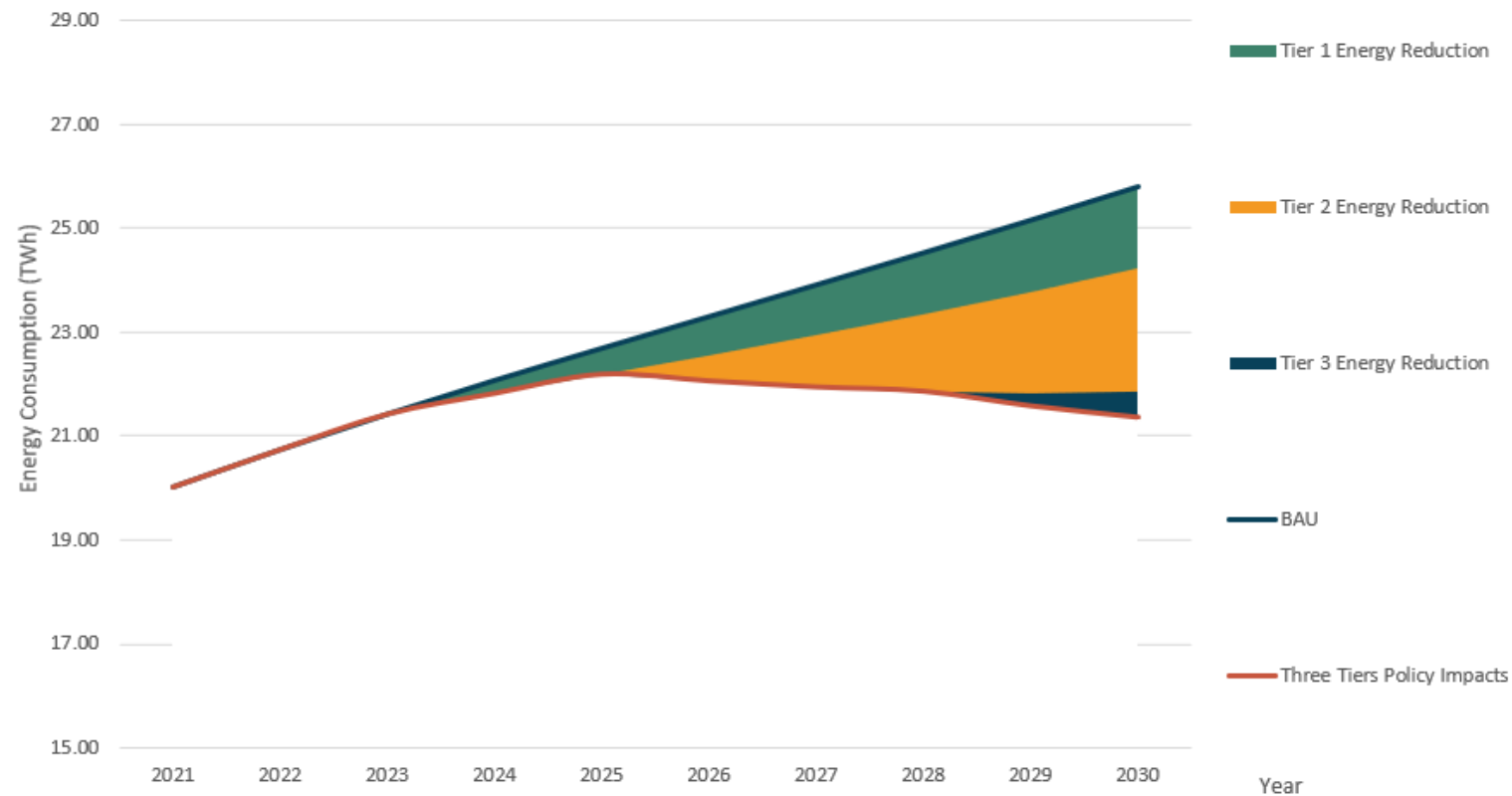
	Tier 1			Tier 2		
	(1/1/2023 – 12/31/2024)			Tier 2 (1/1/2025 -12/31/2026)		
Year	Business As Usual Final Energy Consumption (TWh)	Tier 1 Final Energy Consumption (TWh)	Tier 1 Annual Final Energy Reductions (calculated) (TWh)	Business As Usual Final Energy Consumption (TWh)	Tier 2 Final Energy Consumption (TWh)	Tier 2 Annual Final Energy Reductions (calculated) (TWh)
2005	5.256	5.256	0.000	4.689	5.256	0.000
⋮	⋮	⋮	⋮	⋮	⋮	⋮
2021	20.012	20.012	0.000	17.852	20.012	0.000
2022	20.730	20.730	0.000	18.492	20.730	0.000
2023	21.412	21.412	0.000	19.101	21.412	0.000
2024	22.061	21.810	0.251	19.680	21.810	0.000
2025	22.678	22.178	0.499	20.230	22.178	0.000
2026	23.287	22.546	0.741	20.773	22.048	0.498
2027	23.897	22.925	0.972	21.317	21.932	0.992
2028	24.513	23.324	1.189	21.867	21.850	1.474
2029	25.140	23.751	1.389	22.426	21.817	1.934
2030	25.782	24.210	1.573	22.999	21.843	2.366

$$22.546 - 0.498 = 20.048$$

# Results

	Tier 1			Tier 2			Tier 3		
	(1/1/2023 – 12/31/2024)			(1/1/2025 -12/31/2026)			(1/1/2028 -12/31/2030)		
Year	Business As Usual Final Energy Consumption (TWh)	Tier 1 Final Energy Consumption (TWh)	Tier 1 Annual Final Energy Reductions (same values as those in Step 1 table) (TWh)	Business As Usual Final Energy Consumption Taking Tier 1 Final Energy Consumption as BAU (TWh)	Tier 2 Final Energy Consumption (calculated) (TWh)	Tier 2 Annual Final Energy Reductions (same values as those in Step 1 table) (TWh)	Business As Usual Final Energy Consumption Taking Tier 2 Final Energy Consumption as BAU (TWh)	Tier 3 Final Energy Consumption (calculated) (TWh)	Tier 3 Annual Final Energy Reductions (same values as those in Step 1 table) (TWh)
2005	5.256	5.256	0.000	5.256	5.256	0.000	5.256	5.256	0.000
2006 ~ 2020	:	:	:	:	:	:	:	:	:
2021	20.012	20.012	0.000	20.012	20.012	0.000	20.012	20.012	0.000
2022	20.730	20.730	0.000	20.730	20.730	0.000	20.730	20.730	0.000
2023	21.412	21.412	0.000	21.412	21.412	0.000	21.412	21.412	0.000
2024	22.061	21.810	0.251	21.810	21.810	0.000	21.810	21.810	0.000
2025	22.678	22.178	0.499	22.178	22.178	0.000	22.178	22.178	0.000
2026	23.287	22.546	0.741	22.546	22.048	0.498	22.048	22.048	0.000
2027	23.897	22.925	0.972	22.925	21.932	0.992	21.932	21.932	0.000
2028	24.513	23.324	1.189	23.324	21.850	1.474	21.850	21.850	0.000
2029	25.140	23.751	1.389	23.751	21.817	1.934	21.817	21.570	0.247
2030	25.782	24.210	1.573	24.210	21.843	2.366	21.843	21.351	0.492
Cumulative Energy Savings			6.61			7.26			0.74
							Three Tier Total Energy Savings		14.62

Three Tiers Policy Impact on Energy Consumption



# Q&A



Efficient Appliances for People & the Planet

[clasp.ngo](http://clasp.ngo)

Access the tool through [clasp.ngo/tools/Mepsy](https://clasp.ngo/tools/Mepsy)

Website also has multiple resources for using the tool:

- Introduction to Mepsy
- Quick-Start Guide
- Methodology & Assumptions
- Multiple Tiers walkthrough
- FAQ

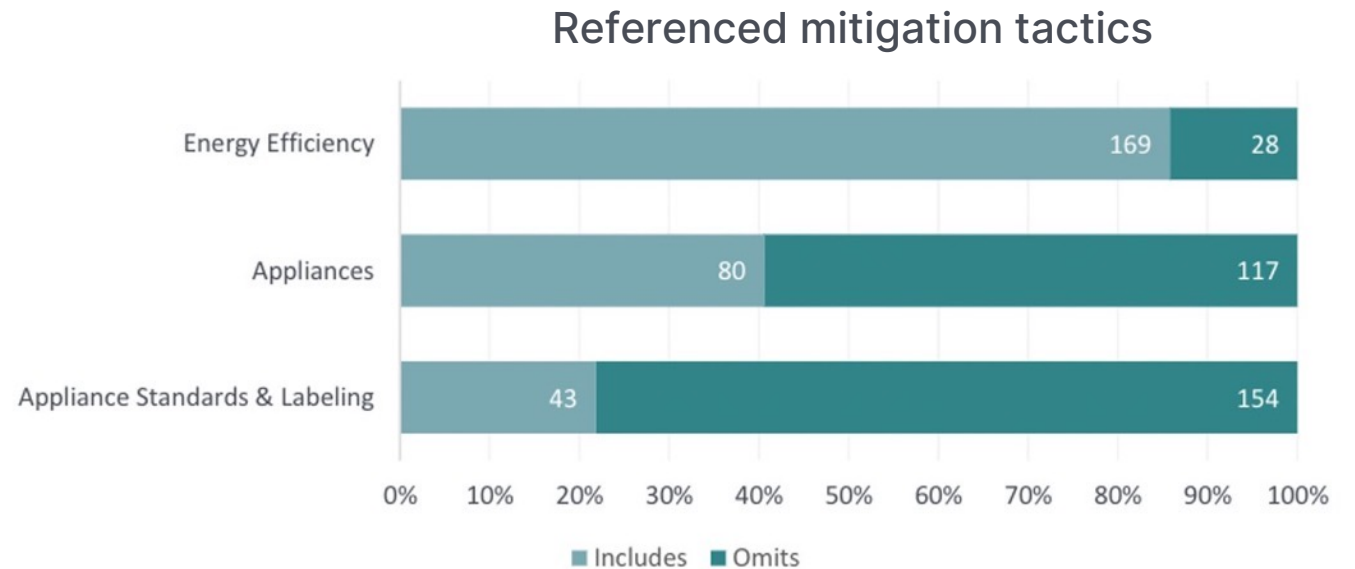
Please email [mepsy@clasp.ngo](mailto:mepsy@clasp.ngo) with any questions



# Integrating Appliance Efficiency in NDCs

- Analyzes inclusion of appliance efficiency in NDCs
- Provides recommendations for governments on how to further leverage appliance energy efficiency in updated NDCs

Launches March 23,  
webinar to follow



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