How to Evaluate and Prioritize Efficiency Policies with Mepsy

April 27, 2020

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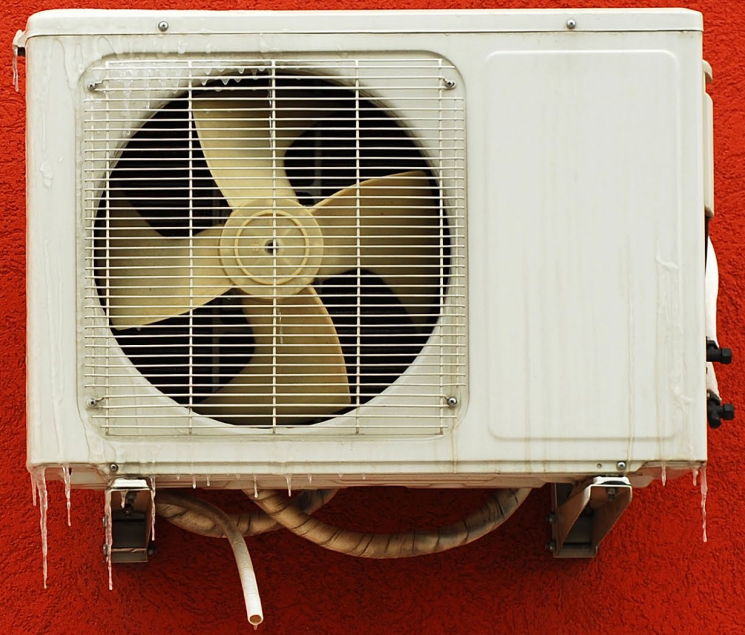
Efficient Appliances for People & the Planet



Mitigating Climate Change Through Efficient Appliances

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Energy-efficient appliances are one of the most cost-effective methods for mitigating climate change.

Transitioning to energy efficient appliances and equipment on a global scale would reduce electricity use by 1,500 TWh cumulatively by 2030.

CLASP's role

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

Where We Work

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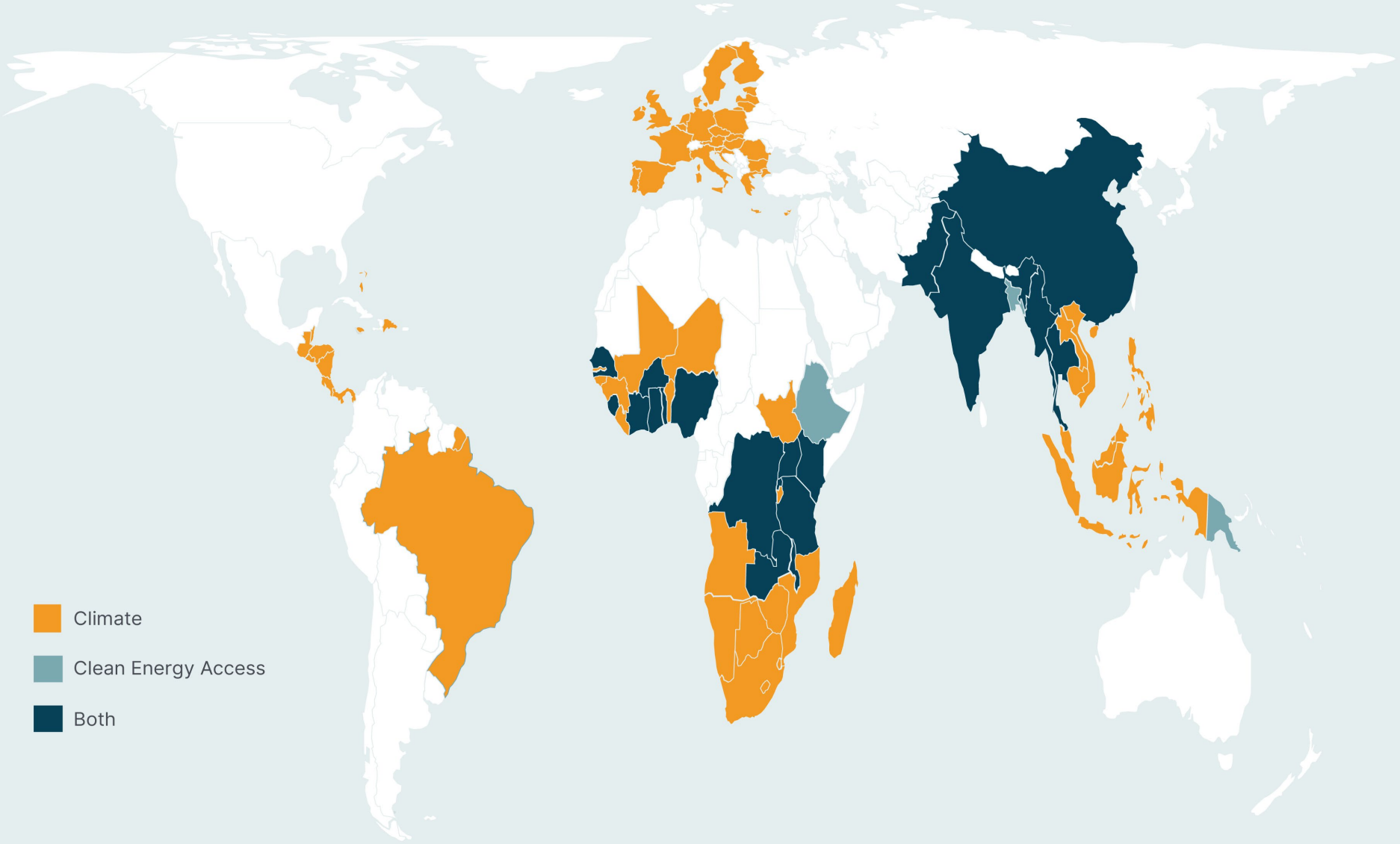


What We Do

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

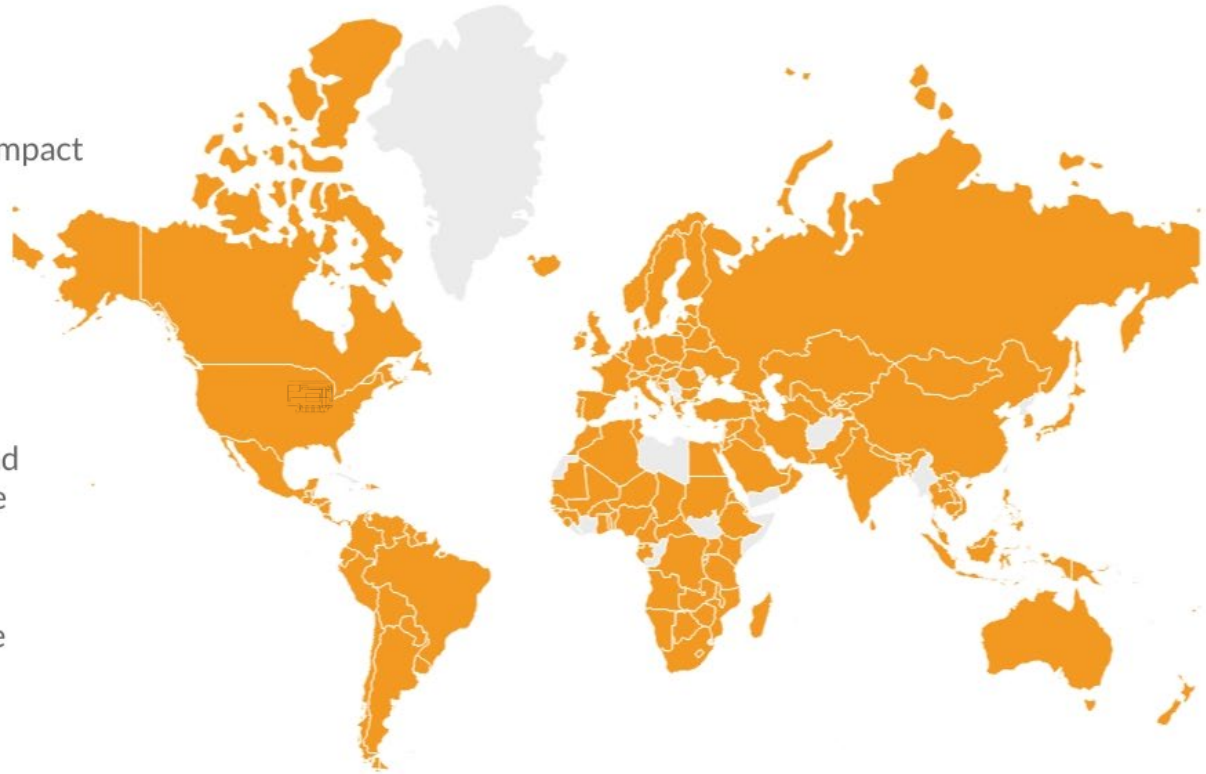
Procurement, Incentives & Bulk Buys to incentivize innovative manufacturers, reduce risks for all & saturate markets with efficient, high quality products

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

Intro to 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

Agenda and Speakers

- Introduction to Mepsy
- Live demonstration of Mepsy's custom features
- Audience Q&A

Speakers

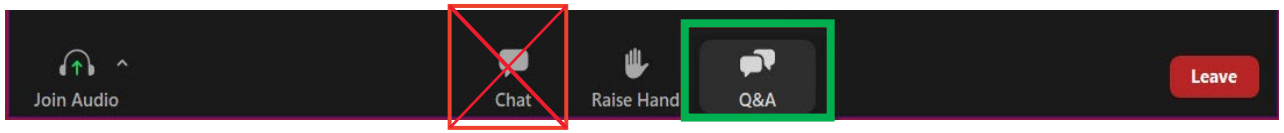
Stephen Pantano
Chief Research Officer

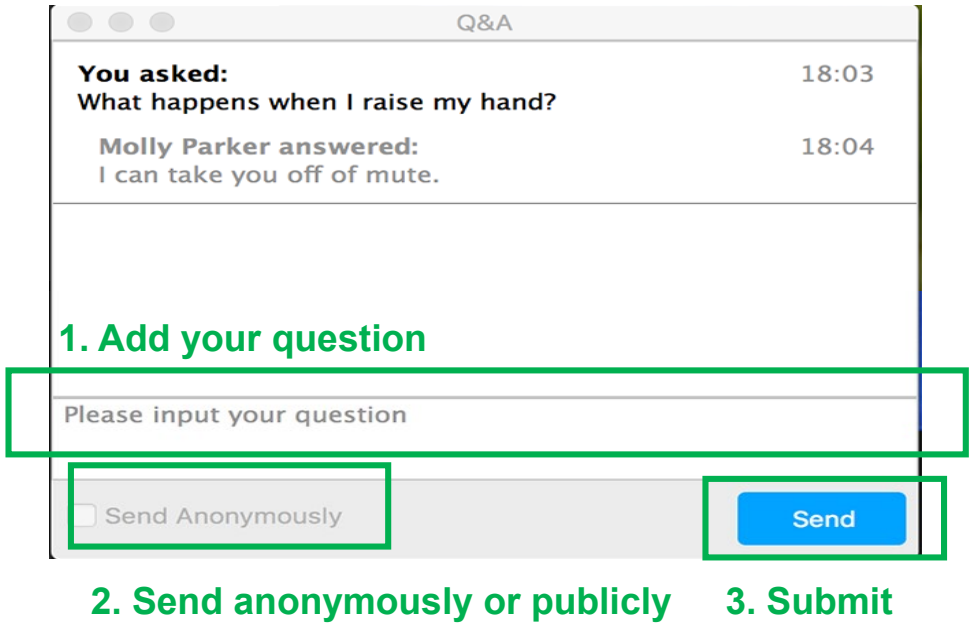
Matt Malinowski
Senior Manager

Rebecca Schloemann
Senior Associate

Asking Questions

- You may submit a question at any point during the webinar using the Q&A feature, rather than the chat feature.
- To submit a question, select the Q&A button located on the task bar.
- You will then be prompted to submit your question publicly or anonymously.
- Attendees may “like” and comment on all questions.

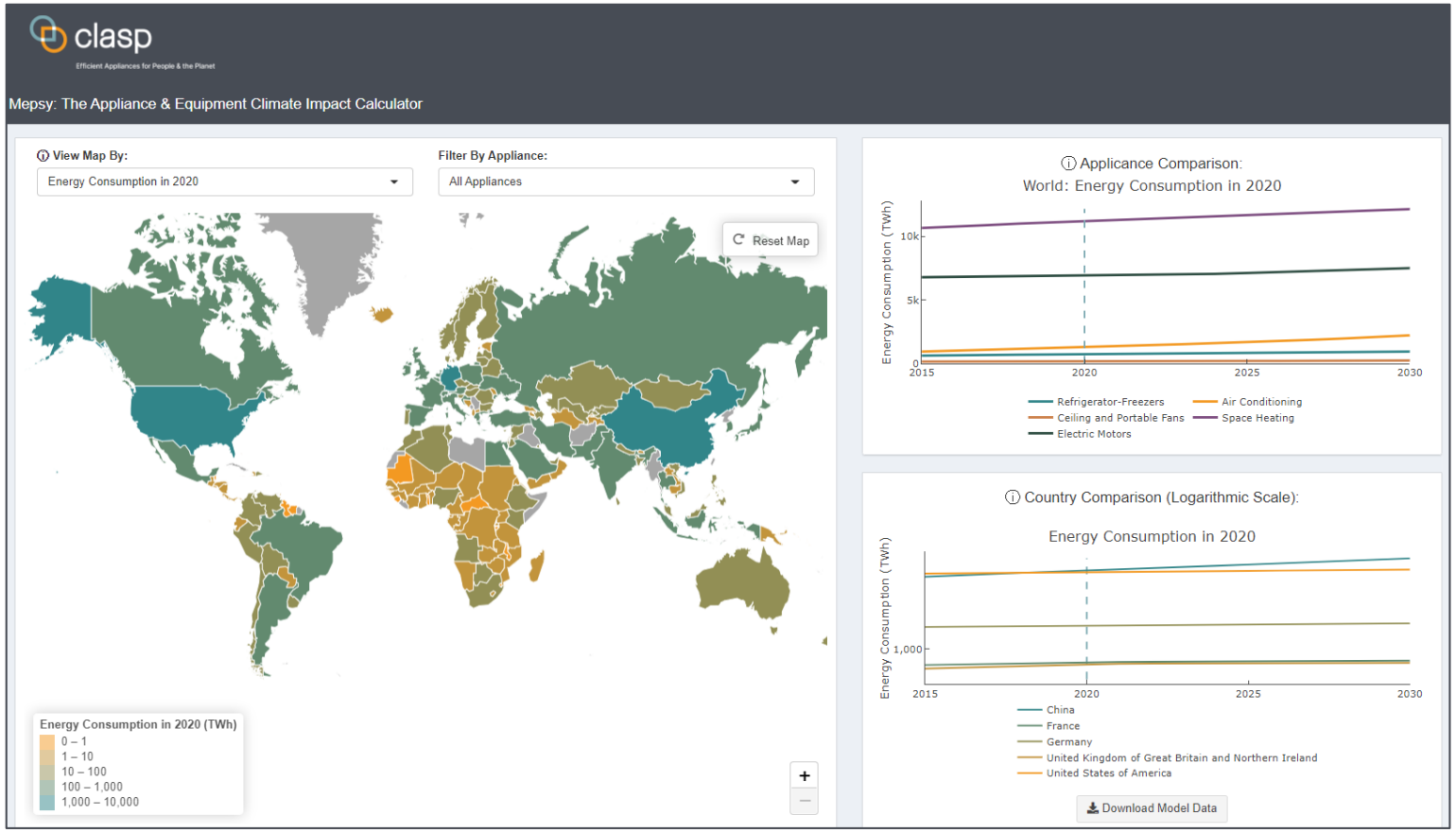




Mepsy Methodology and Key Features

Overview

- Why another model?
- Who should use Mepsy and for what purpose?
- Underlying methodology and data
- Key features



Poll #1

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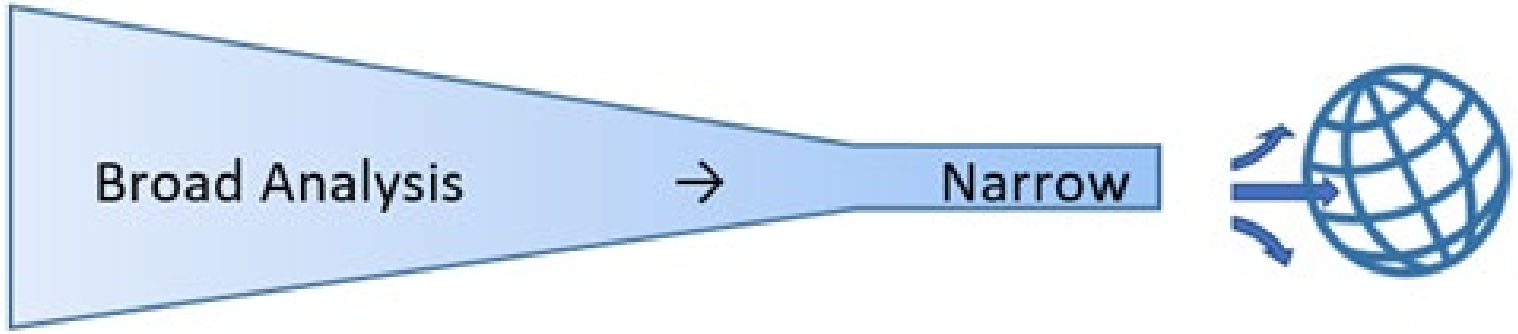
Why are you interested in appliance efficiency policy modeling?



Identifying opportunities across countries

- Multiple products
- Multiple countries

Prioritizing opportunities across products in one country

- Multiple products
- Single country

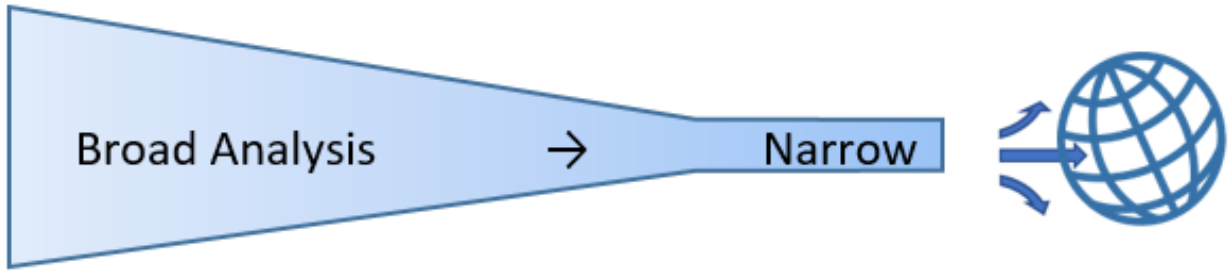
Analyzing cost-effective requirement levels

- Single product
- Single country

Documenting and communicating impacts and progress

Why do we need another tool/model?

- Gap between detailed national tools and larger global models
- Mepsy is a tool that provides:
  - Usability
  - Flexibility
  - Transparency
  - Integration
  - Authority
- Up-to-date, immediately usable to policymakers and analysts



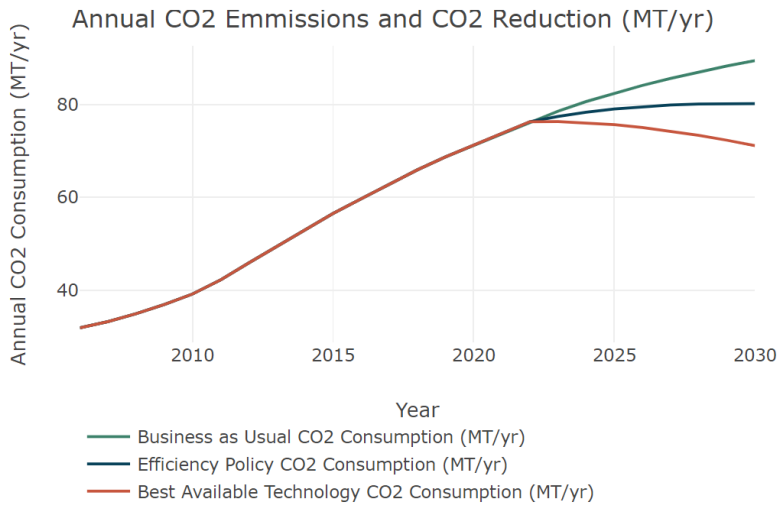
Identifying opportunities across countries	Prioritizing opportunities across products in one country	Analyzing cost-effective requirement levels	Documenting and communicating impacts and progress
• Multiple products • Multiple countries	• Multiple products • Single country	• Single product • Single country	

Quick, Visual Interface

- Visuals intended to support policymaking
- Reproduce some of the most common graphics/outputs used by Climate team
- Ability to create custom outputs by downloading data:

Download Model Results

- Prioritization of countries and appliances
- Analysis of different policy scenarios
- Presentation of cost-benefits, paybacks, and tons



How Can Mepsy Help?

NATIONAL POLICYMAKERS	▪ Review and prioritize efficiency opportunities in your country ▪ Experiment with different efficiency levels and see impacts ▪ Leverage publicly-available data or input own data ▪ Download your results to use in supporting analysis and share with stakeholders
RESEARCHERS AND ANALYSTS	▪ Compare the benefits of policies for different products ▪ Conduct detailed analyses using custom shipments data and assumptions for unit energy consumption, lifetimes, grid emission factors and discount rates
DONORS	▪ Assess the potential of investing in different countries ▪ Visualize how appliance use varies by country, and the associated energy and climate impacts ▪ Ensure that policy programs address the most energy- and carbon-intensive appliances

Methodology & Data

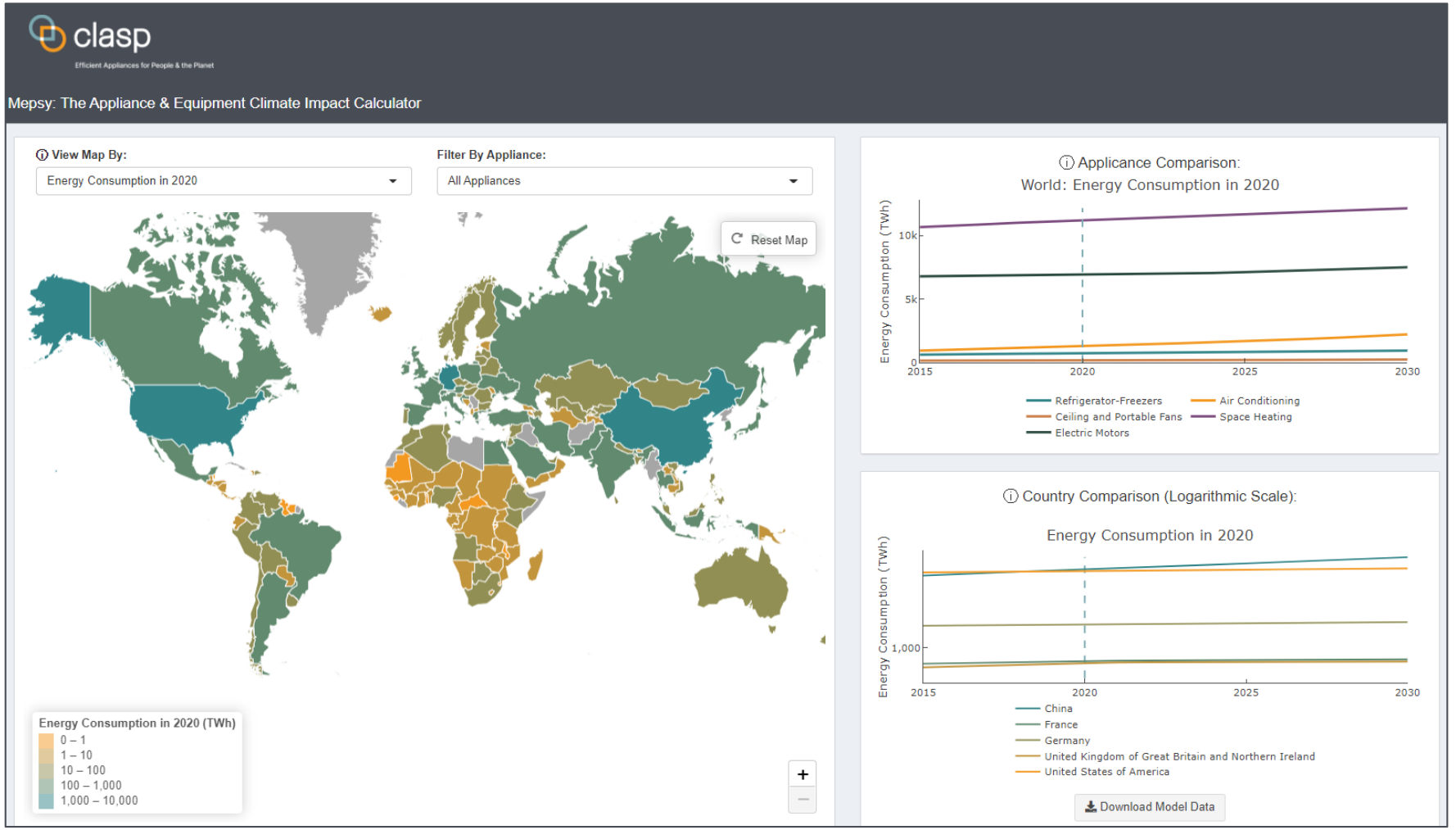
Time-tested calculation:

- Model accumulates sales over lifetime
- Multiplies these appliances in use by unit energy consumption
- Finally calculates cost and CO_2 impacts

Up-to-date data:

- Sales data from market research firms
- Recently updated grid emission and other global data
- Data from key countries extrapolated to others using households/population/GDP while accounting for climate
- Supplemented with CLASP primary research in some countries

Key Features



Poll #2

- Which country should we look at?

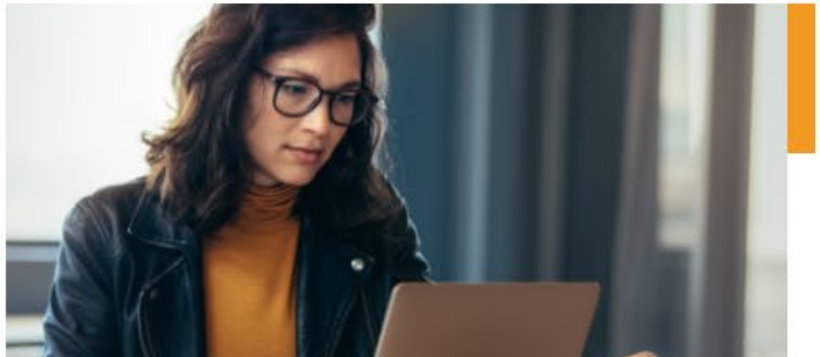
1. South Africa
2. Egypt
3. China
4. India
5. Peru
6. Argentina
7. United States
8. France

Mepsy: The Appliance & Equipment Climate Impact Calculator

Launch Mepsy

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

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.



For efficiency policy practitioners, accurate data and predictive models provide insight into how policy decisions translate to real-

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Efficient Appliances for People & the Planet

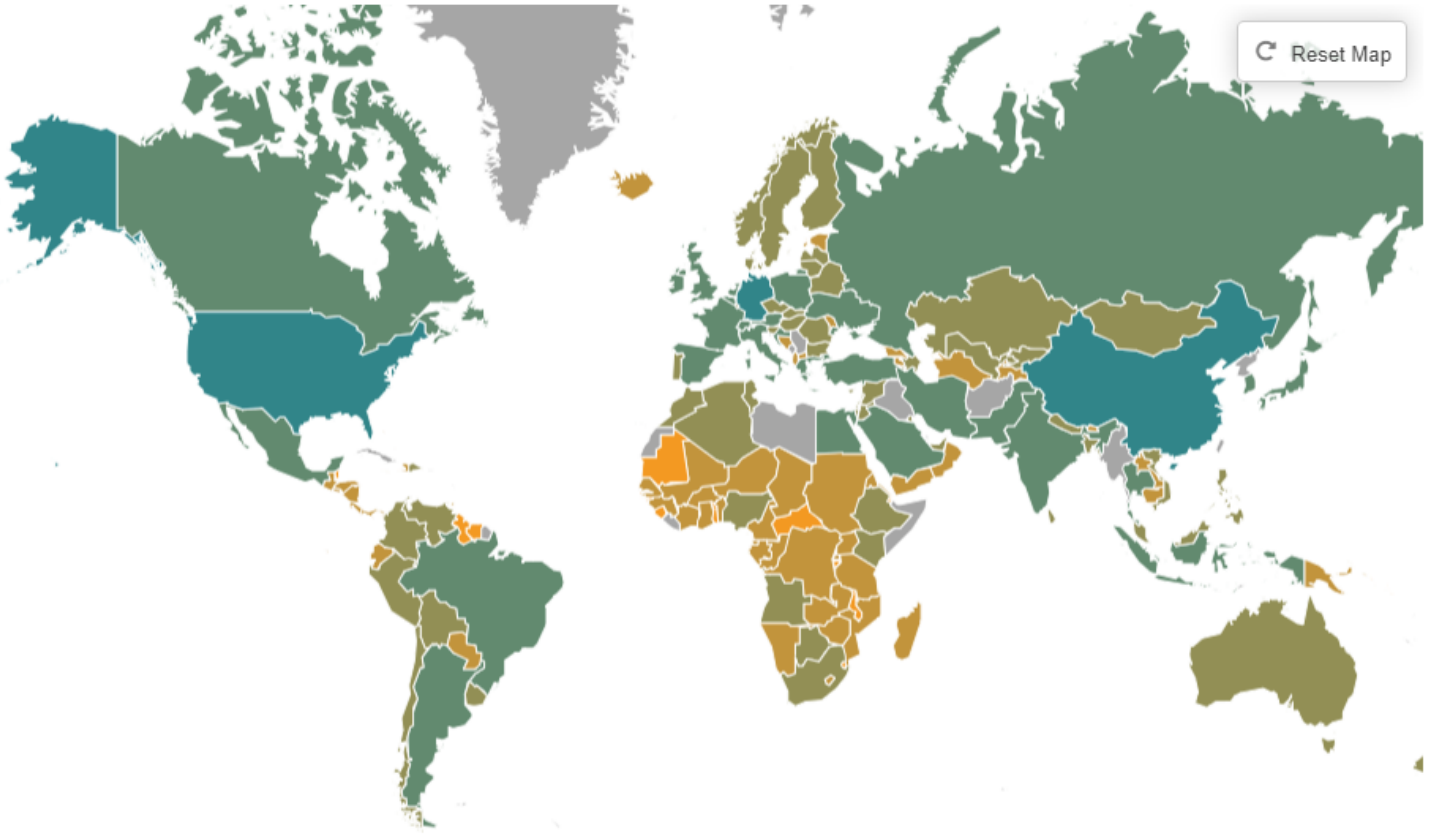
Mepsy: The Appliance & Equipment Climate Impact Calculator

ⓘ View Map By:

Energy Consumption in 2020

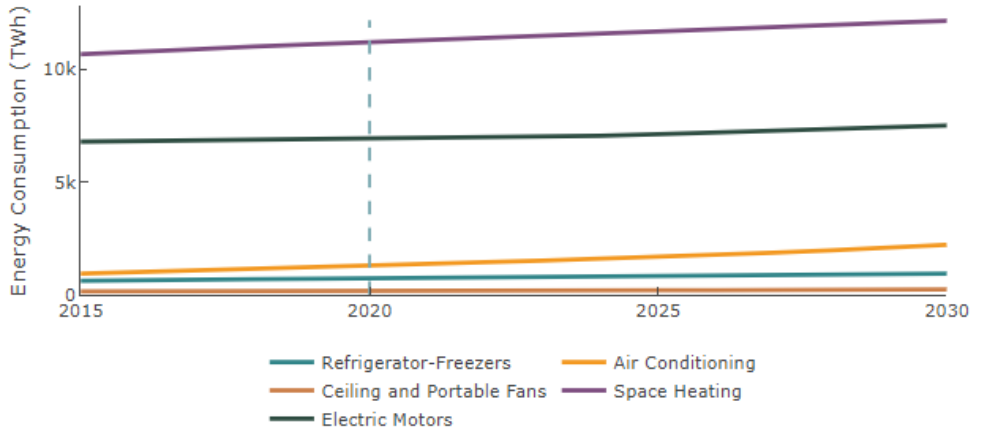
Filter By Appliance:

All Appliances



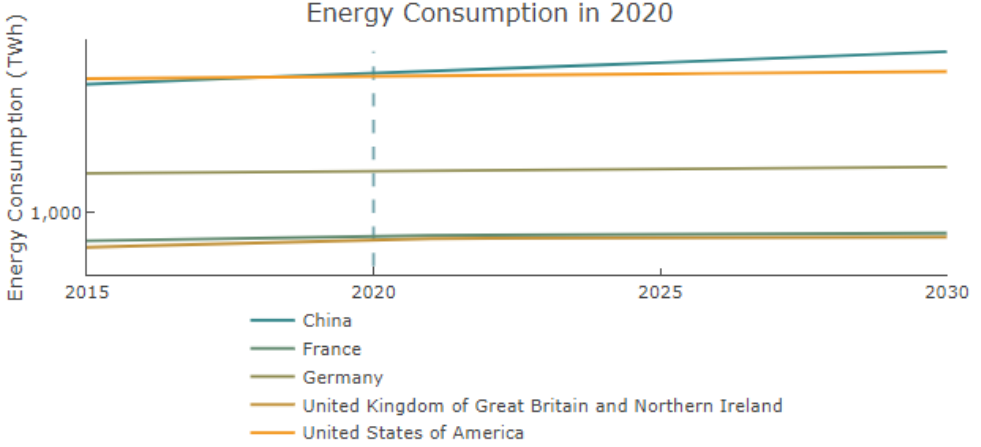
ⓘ Applicance Comparison:

World: Energy Consumption in 2020



ⓘ Country Comparison (Logarithmic Scale):

Energy Consumption in 2020

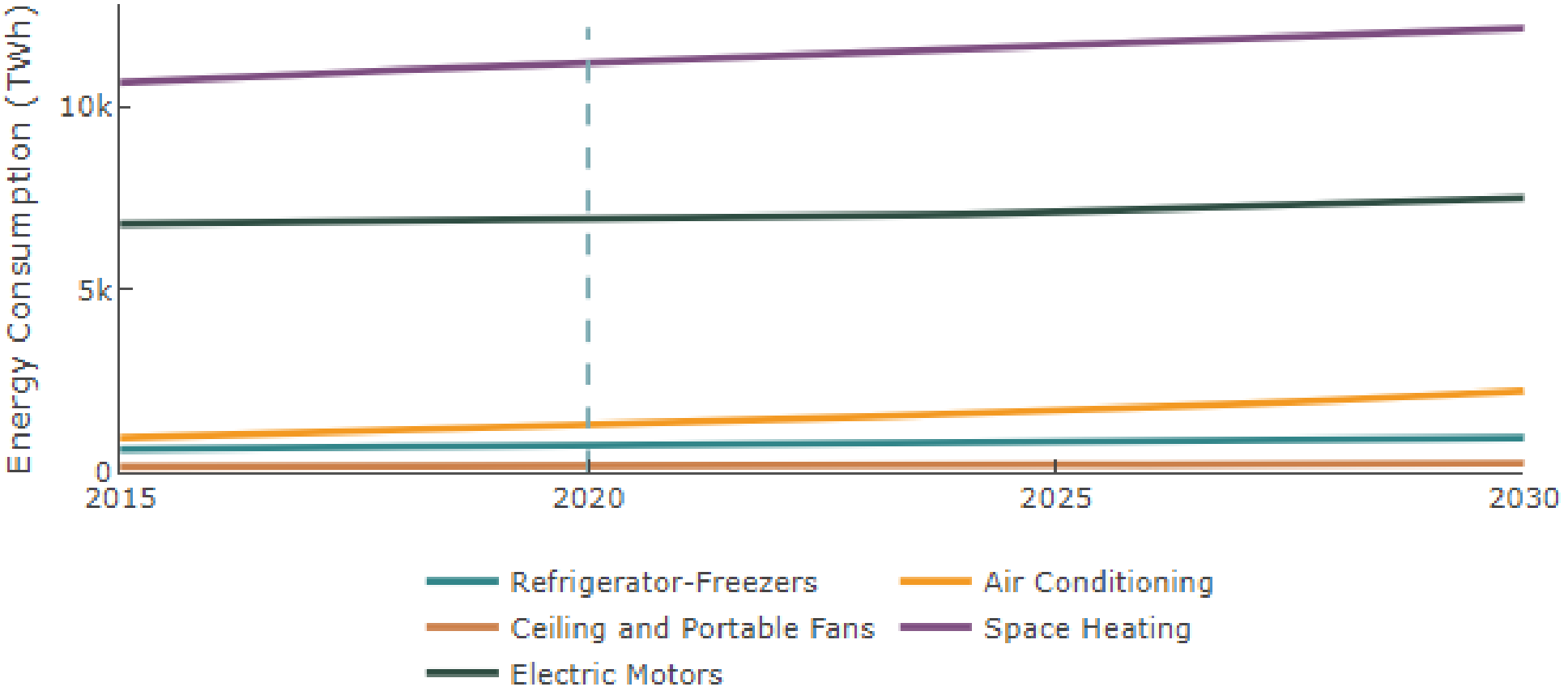


Download Model Data

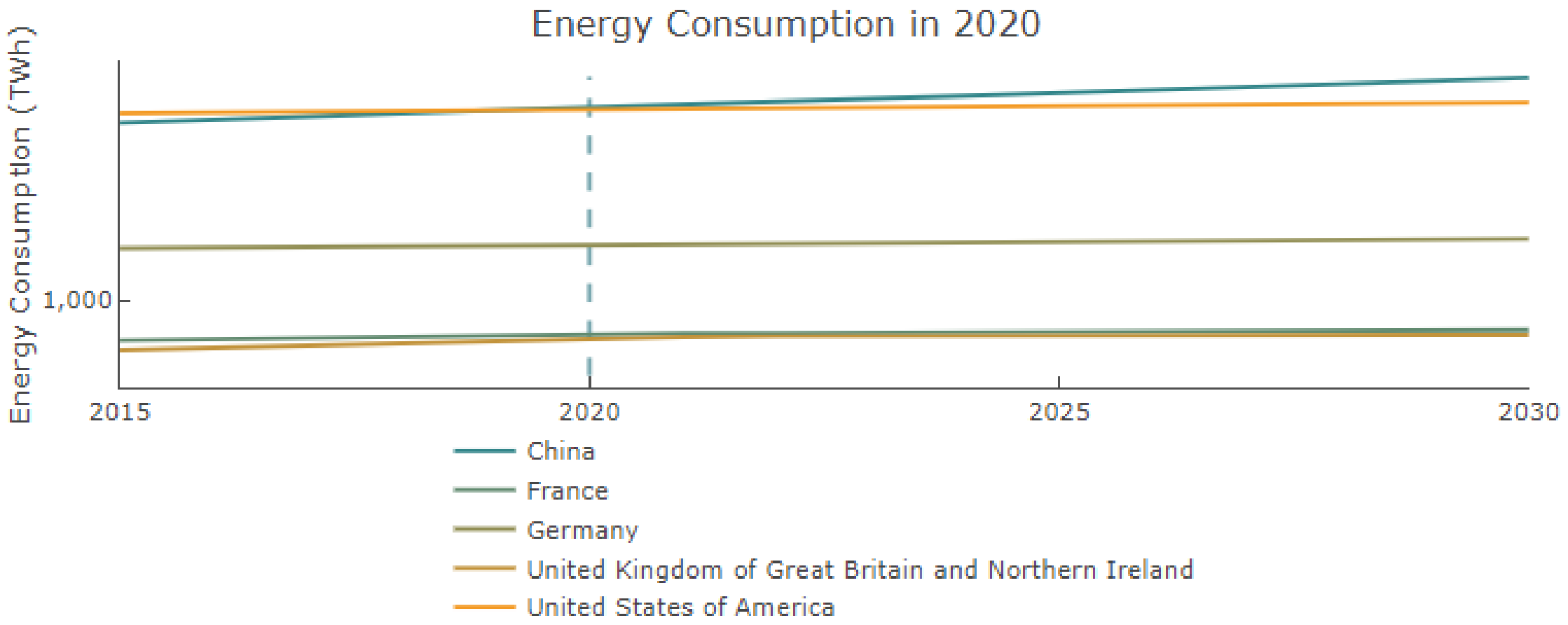
Reset Map

ⓘ Applicance Comparison:

World: Energy Consumption in 2020



ⓘ Country Comparison (Logarithmic Scale):



Download Model Data

Mepsy: The Appliance & Equipment Climate Impact Calculator

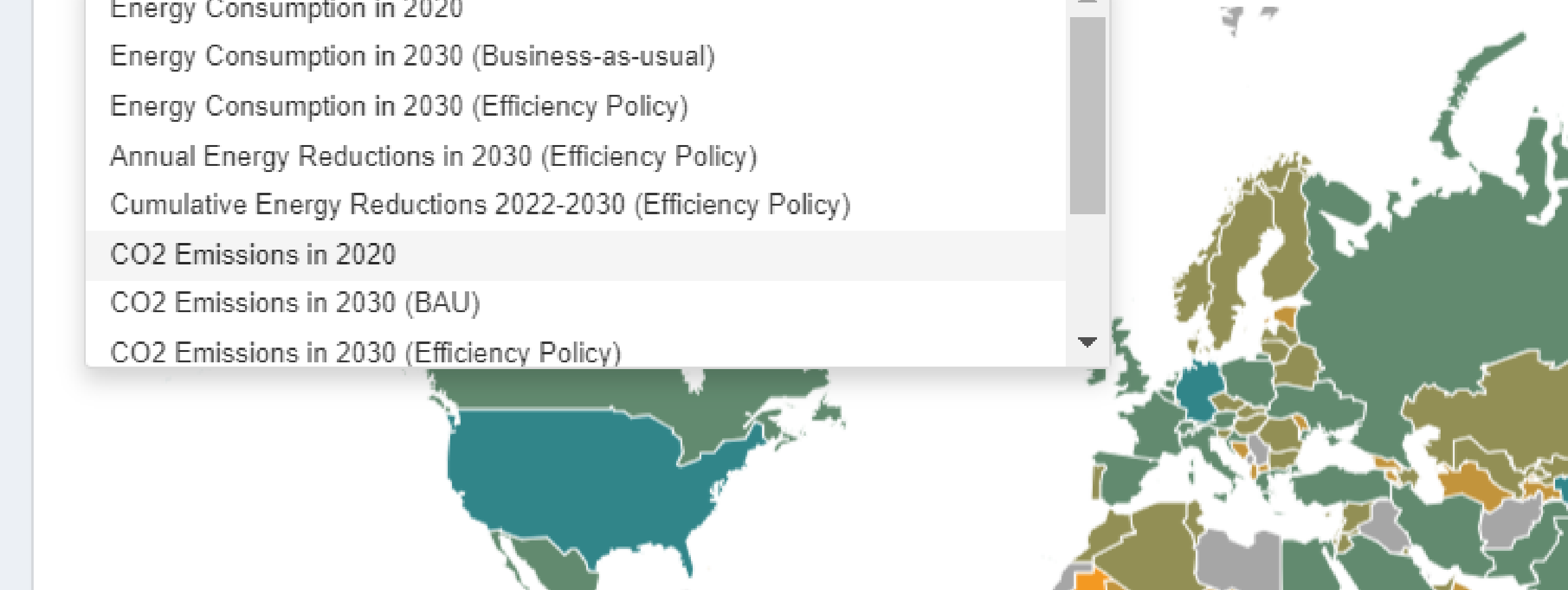
View Map By:

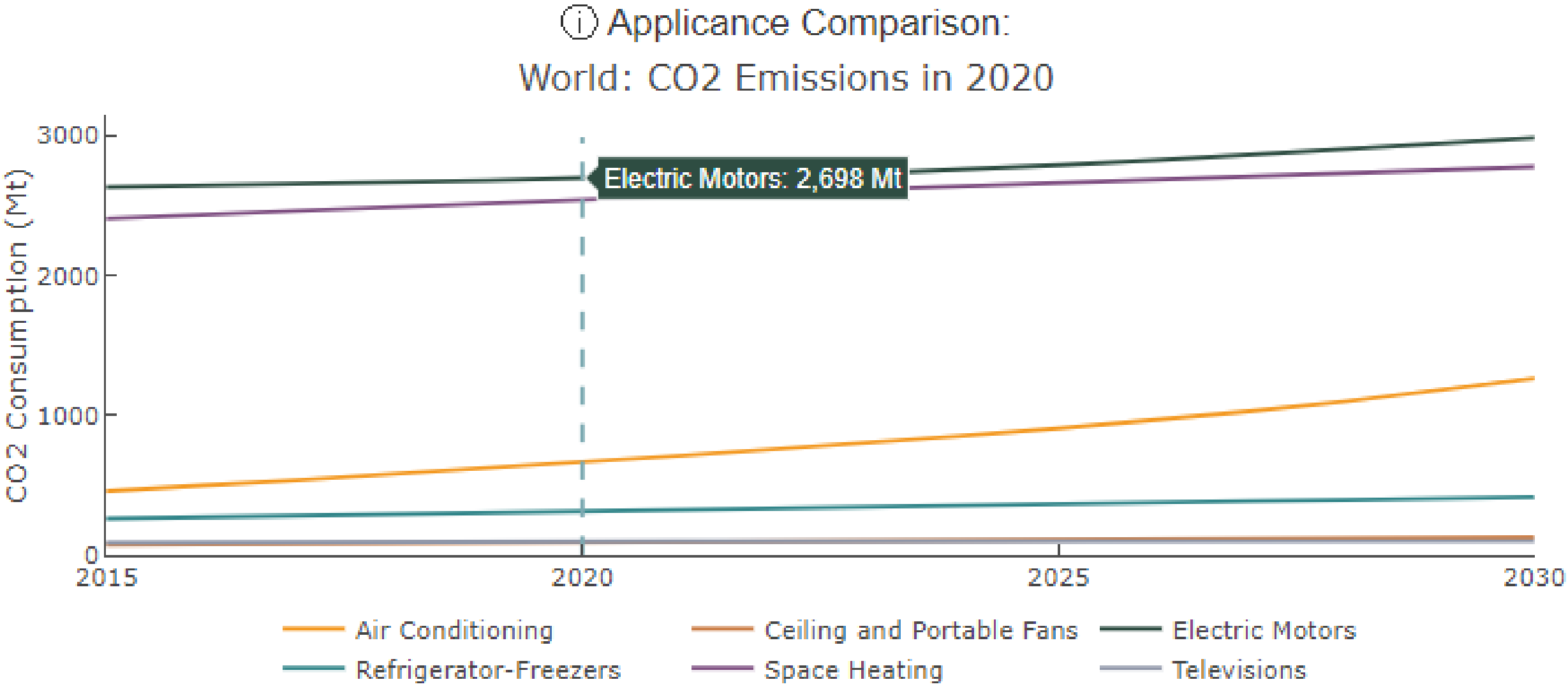
Energy Consumption in 2020

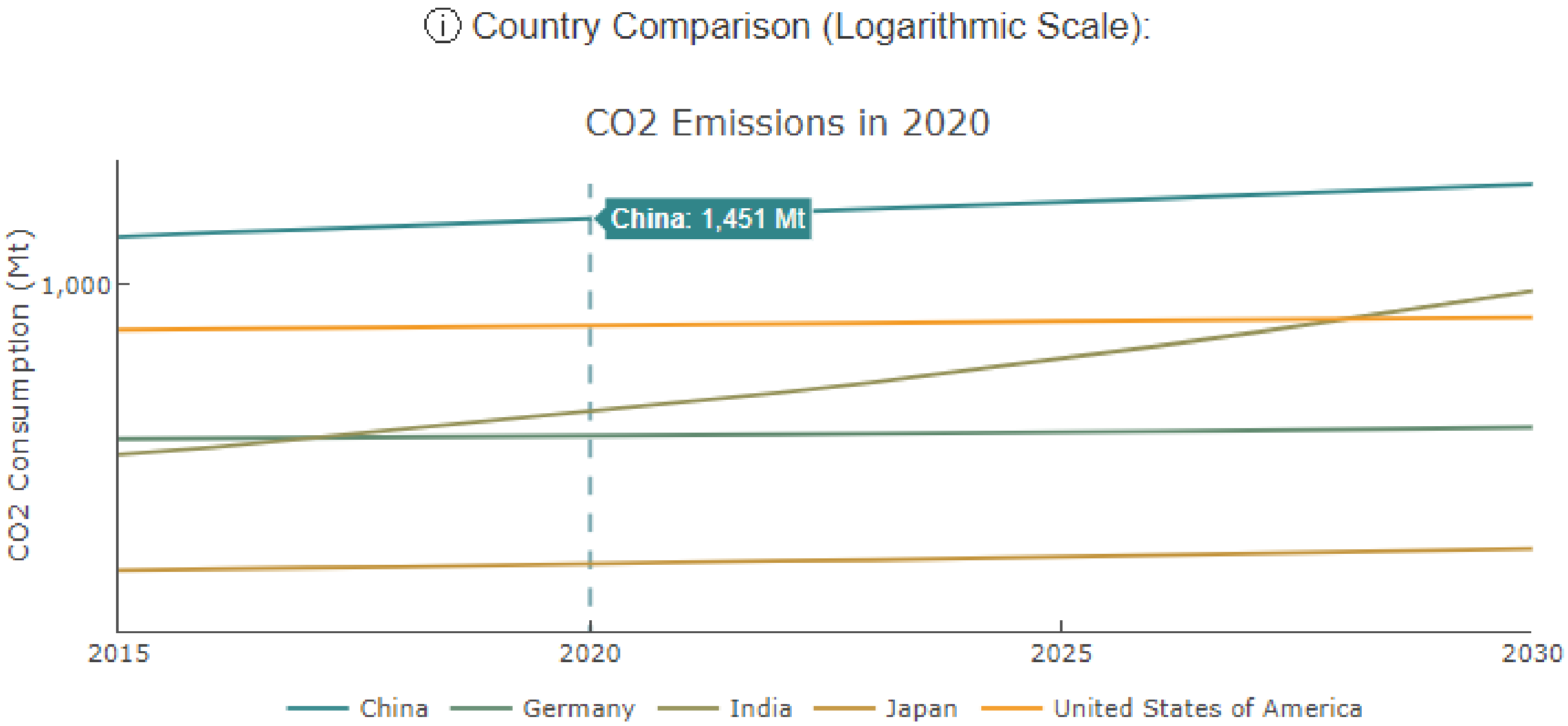
- Energy Consumption in 2020
- Energy Consumption in 2030 (Business-as-usual)
- Energy Consumption in 2030 (Efficiency Policy)
- Annual Energy Reductions in 2030 (Efficiency Policy)
- Cumulative Energy Reductions 2022-2030 (Efficiency Policy)
- CO2 Emissions in 2020
- CO2 Emissions in 2030 (BAU)
- CO2 Emissions in 2030 (Efficiency Policy)

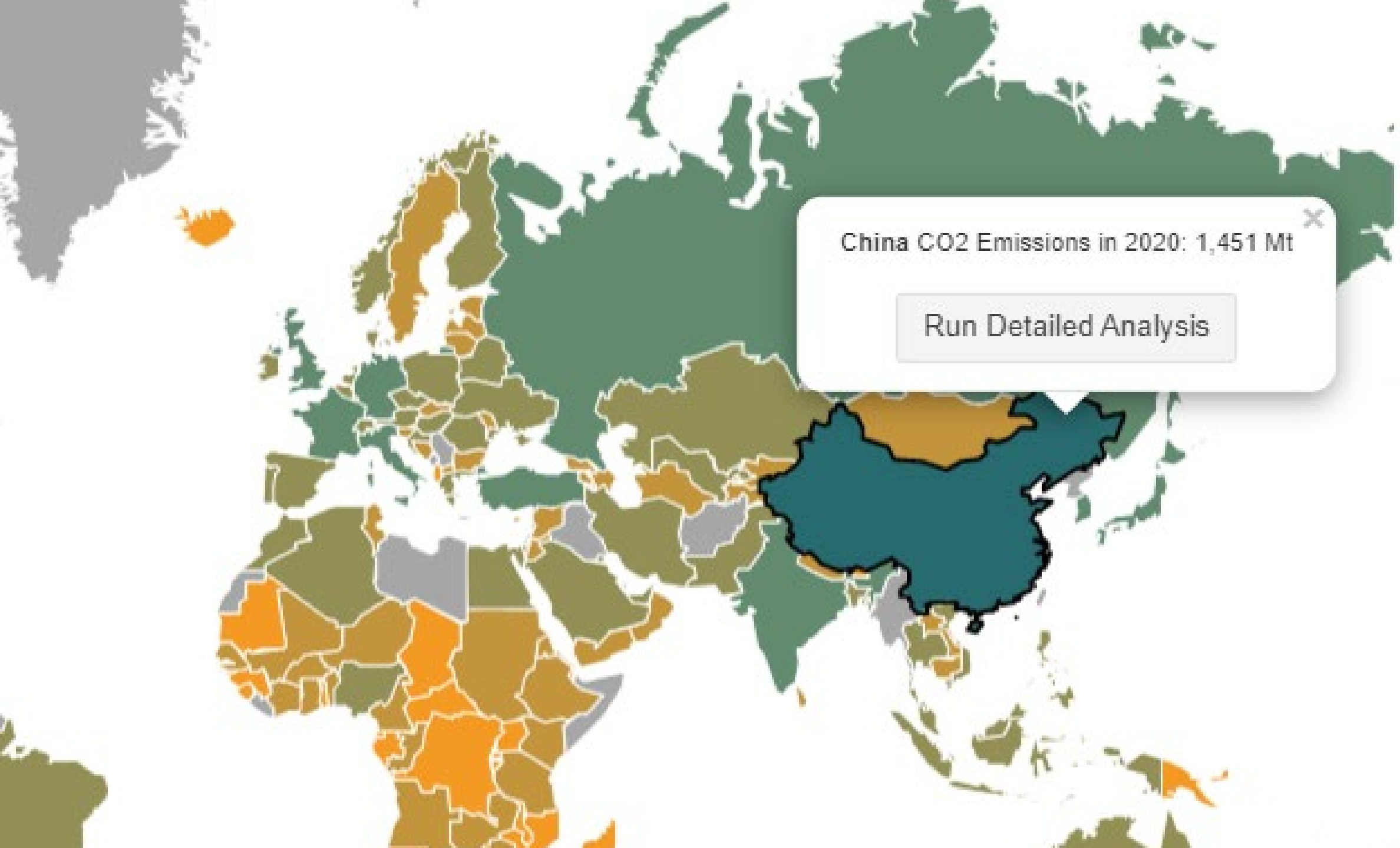
Filter By Appliance:

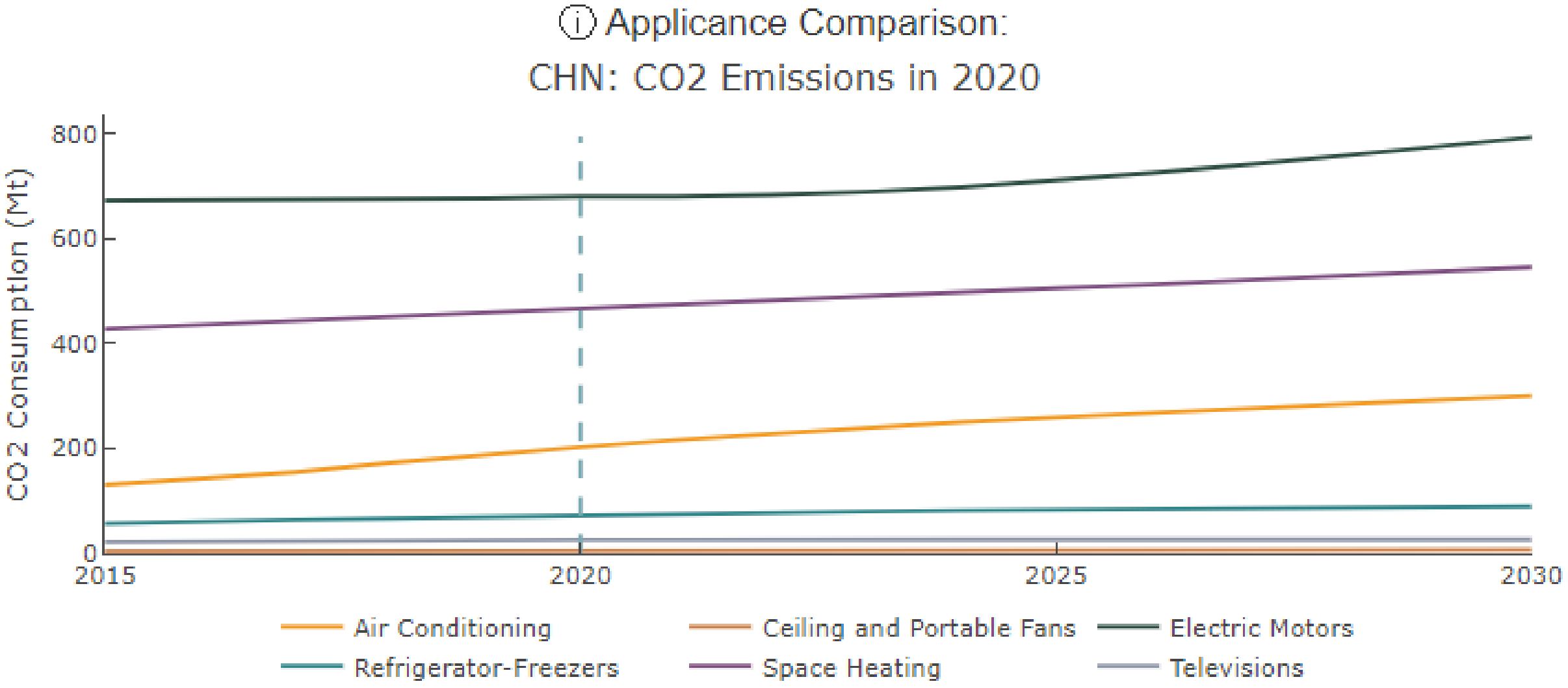
All Appliances

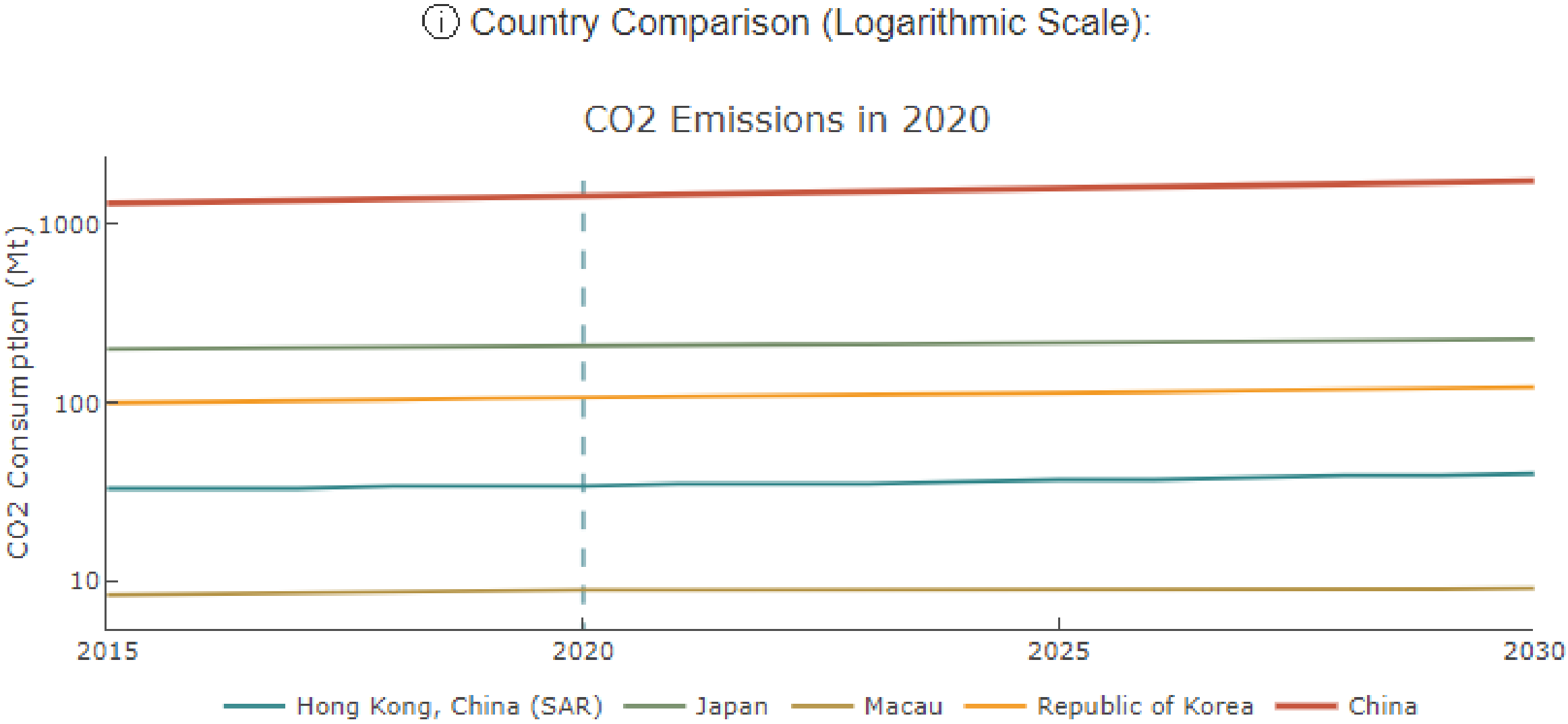


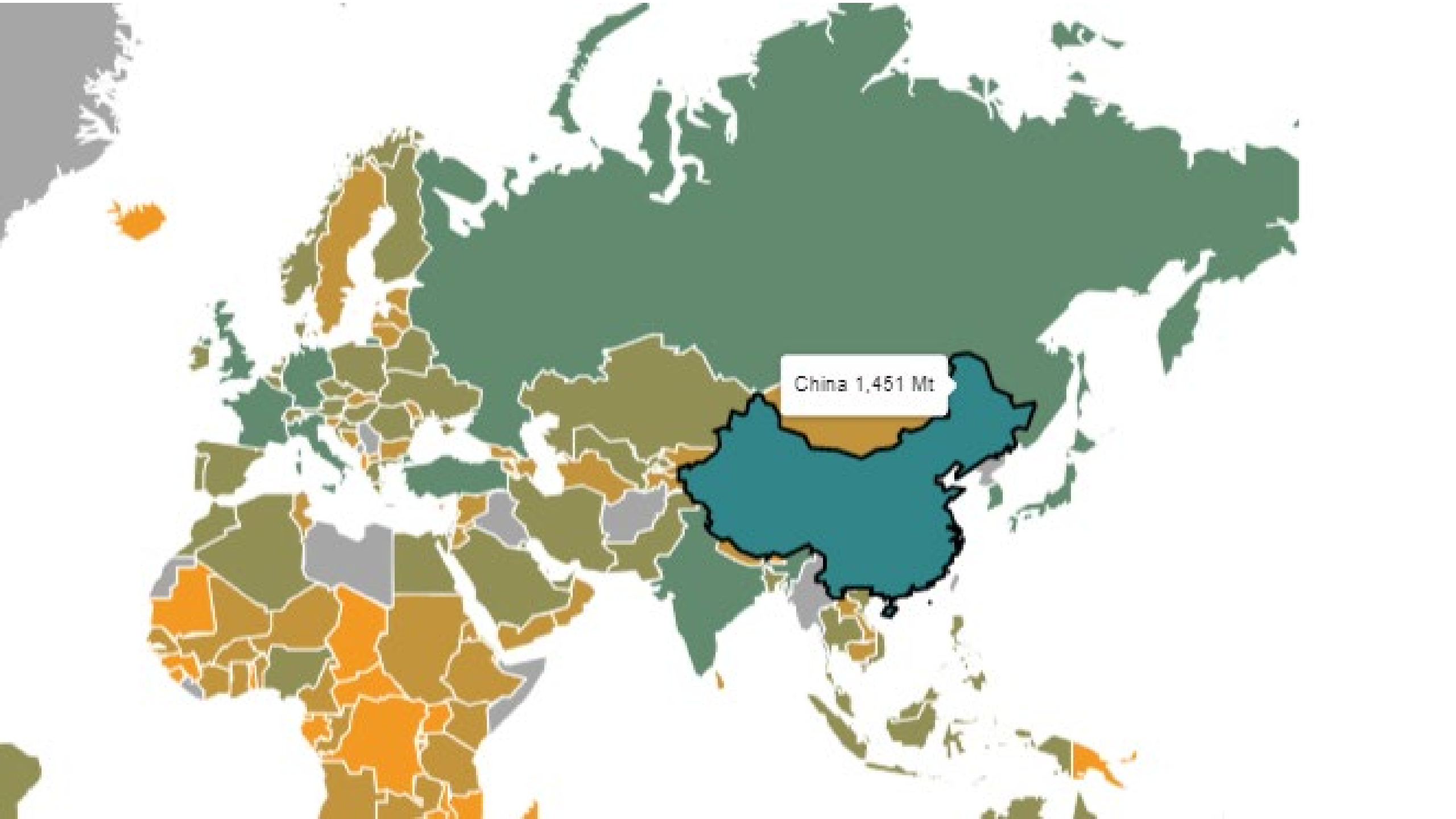

ⓘ Applicance Comparison:
World: CO2 Emissions in 2020
CO2 Consumption (Mt)
3000
2000
1000
0
2015
2020
2025
2030
Electric Motors: 2,698 Mt
Air Conditioning
Ceiling and Portable Fans
Electric Motors
Refrigerator-Freezers
Space Heating
Televisions


ⓘ Country Comparison (Logarithmic Scale):
CO2 Emissions in 2020
CO2 Consumption (Mt)
1,000
China: 1,451 Mt
2015
2020
2025
2030
China
Germany
India
Japan
United States of America


China CO2 Emissions in 2020: 1,451 Mt
Run Detailed Analysis


Applicance Comparison:
CHN: CO2 Emissions in 2020
CO2 Consumption (Mt)
800
600
400
200
0
2015
2020
2025
2030
Air Conditioning
Ceiling and Portable Fans
Electric Motors
Refrigerator-Freezers
Space Heating
Televisions

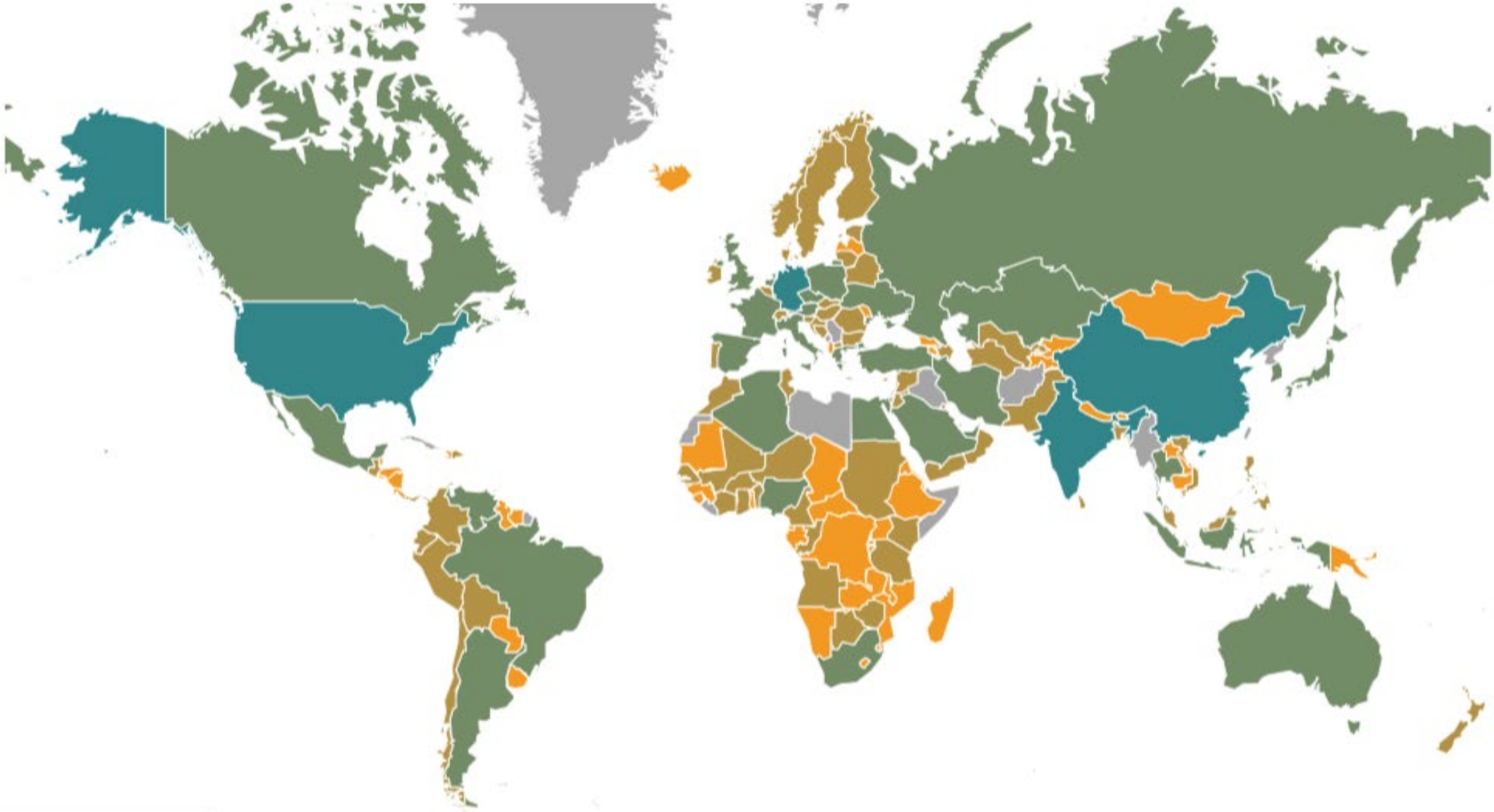

ⓘ Country Comparison (Logarithmic Scale):
CO2 Emissions in 2020
CO2 Consumption (Mt)
1000
100
10
2015
2020
2025
2030
Hong Kong, China (SAR)
Japan
Macau
Republic of Korea
China


China 1,451 Mt

Filter By Appliance:

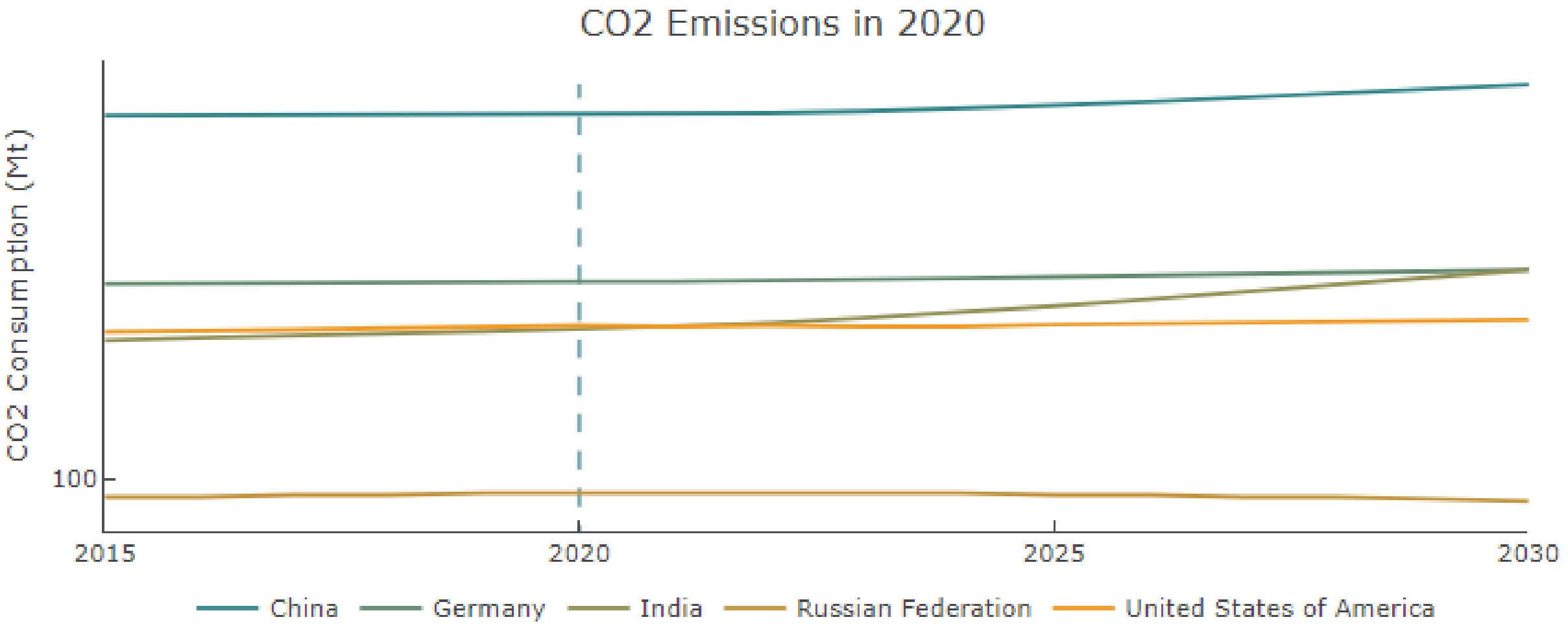
All Appliances

- All Appliances
- Air Conditioning
- Ceiling and Portable Fans
- Electric Motors
- Refrigerator-Freezers
- Space Heating
- Televisions



Run Detailed Analysis »

ⓘ Country Comparison (Logarithmic Scale):




China CO2 Emissions in 2020: 681 Mt
Run Detailed Analysis

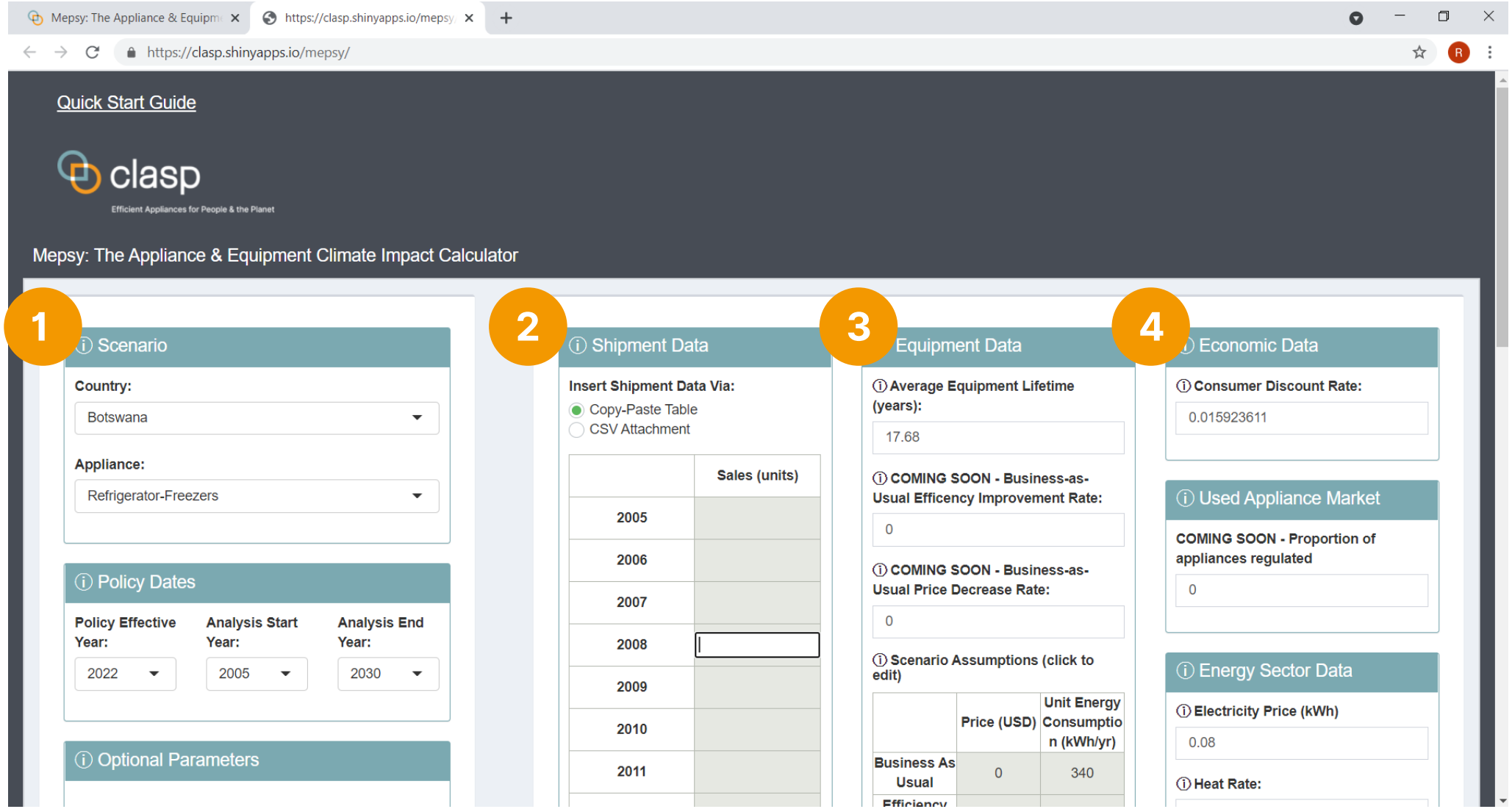
Conclusion

- Mepsy is a new global model of appliance energy and climate impacts
- Based on time-tested methodologies and supplied with market data by CLASP and market research organizations
- Helpful across all analyses in support of product efficiency policies

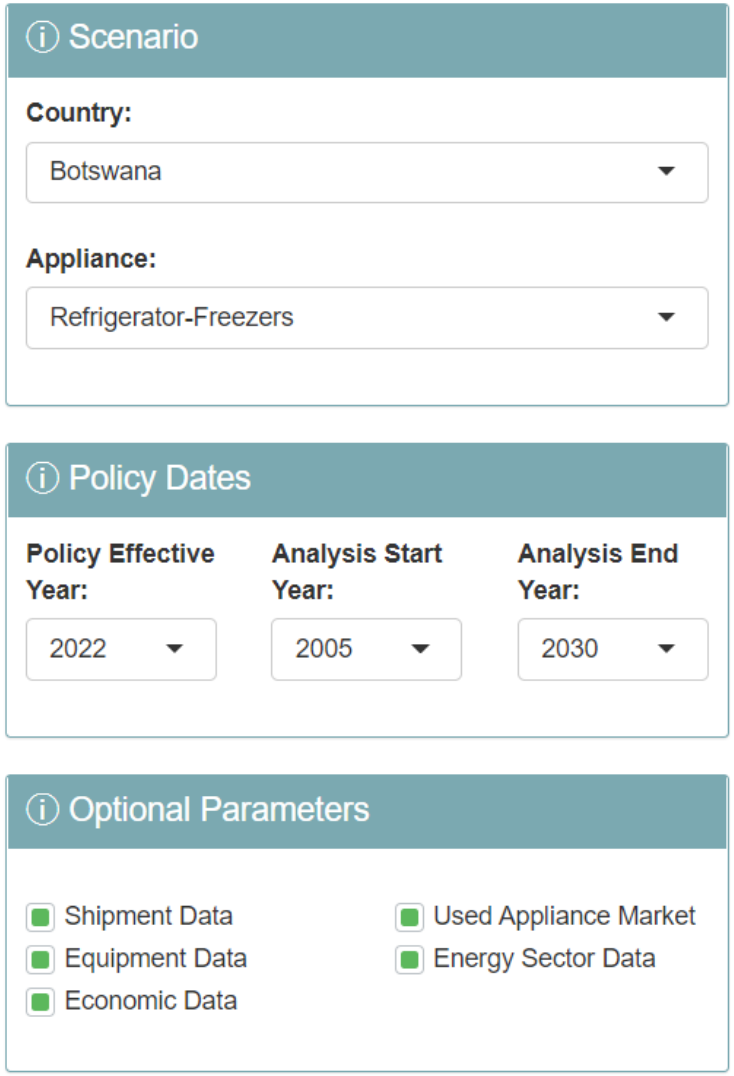
How to Conduct Custom Analysis in Mepsy

Rebecca Schloemann

Option to Run Detailed Analysis



1. Getting started



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

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

Enable **optional parameters** for customized analysis

2. Knowing your market size

ⓘ Shipment Data

Insert Shipment Data Via:

- (●) Copy-Paste Table
- ( ) CSV Attachment

	Sales (units)
2005	
2006	
2007	
⋮	⋮
2027	
2028	
2029	
2030	

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

- Common sources for shipments data include:
  - Customs data (*appropriate for countries that primarily import the analyzed product)
  - Surveys or interviews with industry regarding sales volume
  - Industry or market research reports

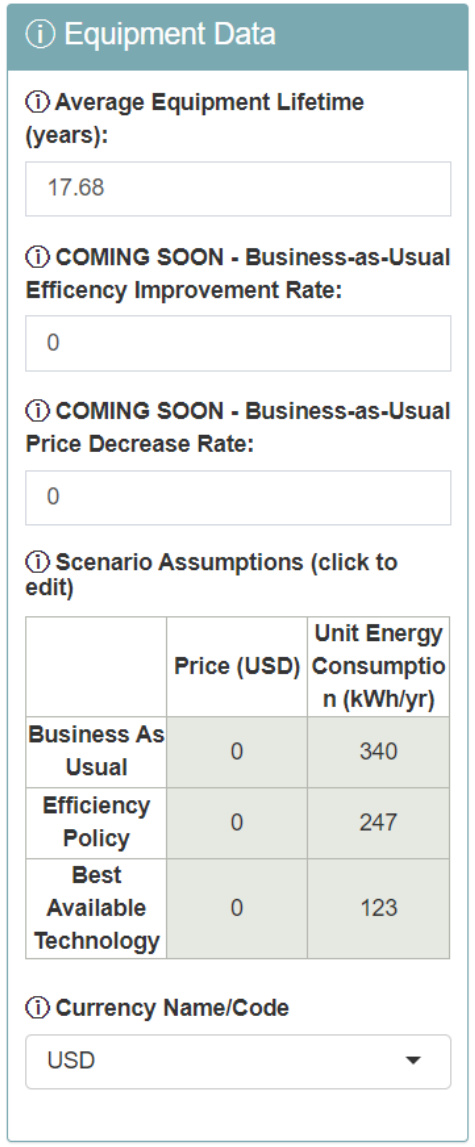
Most energy efficiency policies (e.g. MEPS) only regulate new equipment.

ⓘ Used Appliance Market

COMING SOON - Proportion of appliances regulated

0

3. Defining Product Characteristics



Adjust average **equipment lifetime** if needed

- Some possible sources include:
  - Detailed surveys and interviews with manufacturers and consumers
  - Academic and industry research

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

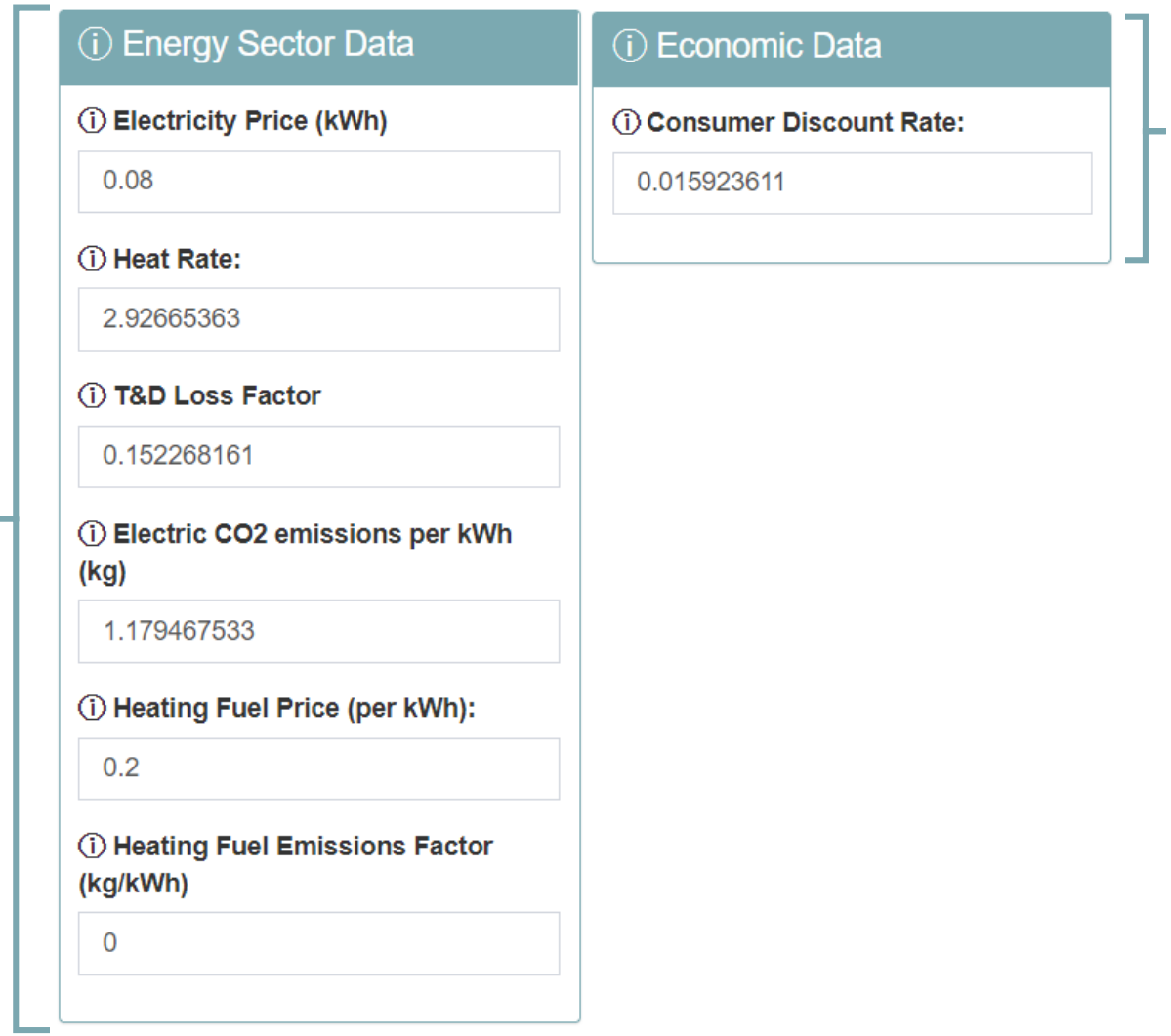
- **Business As Usual** - Typical product on the market at present
- **Efficiency Policy** – Typical product after introduction of new energy efficiency policy.
- **Best Available Technology** – Highest efficiency product on the market today.

Change **default currency** for inputs and outputs

4. Identifying key grid and economic assumptions

Change **energy sector data**

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



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

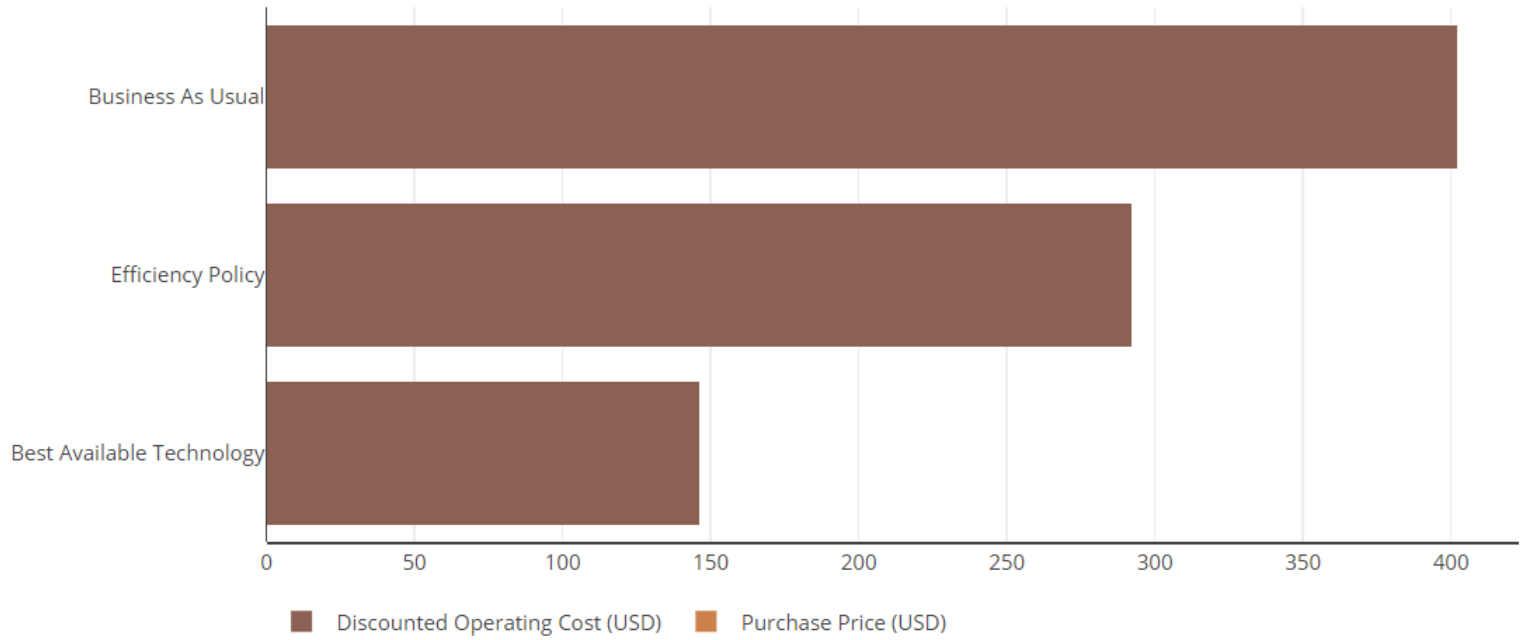
Assessing impacts to consumers

Default **consumer impacts** results for Botswana.

Customer Impact

Customer Impact	Business As Usual	Efficiency Policy	Best Available Technology
Purchase Price (USD)	0	0	0
Unit Energy Consumption (kWh/yr)	340	247	123
Energy Cost (USD)	27	20	10
Life Cycle Cost (USD)	402	292	146
Life Cycle Cost Savings (USD)	0	110	257
Payback Time (Year)	0	0	0

Life Cycle Cost



Because product prices are highly variable, Mepsy does not include default prices.

Estimating national grid and climate impact

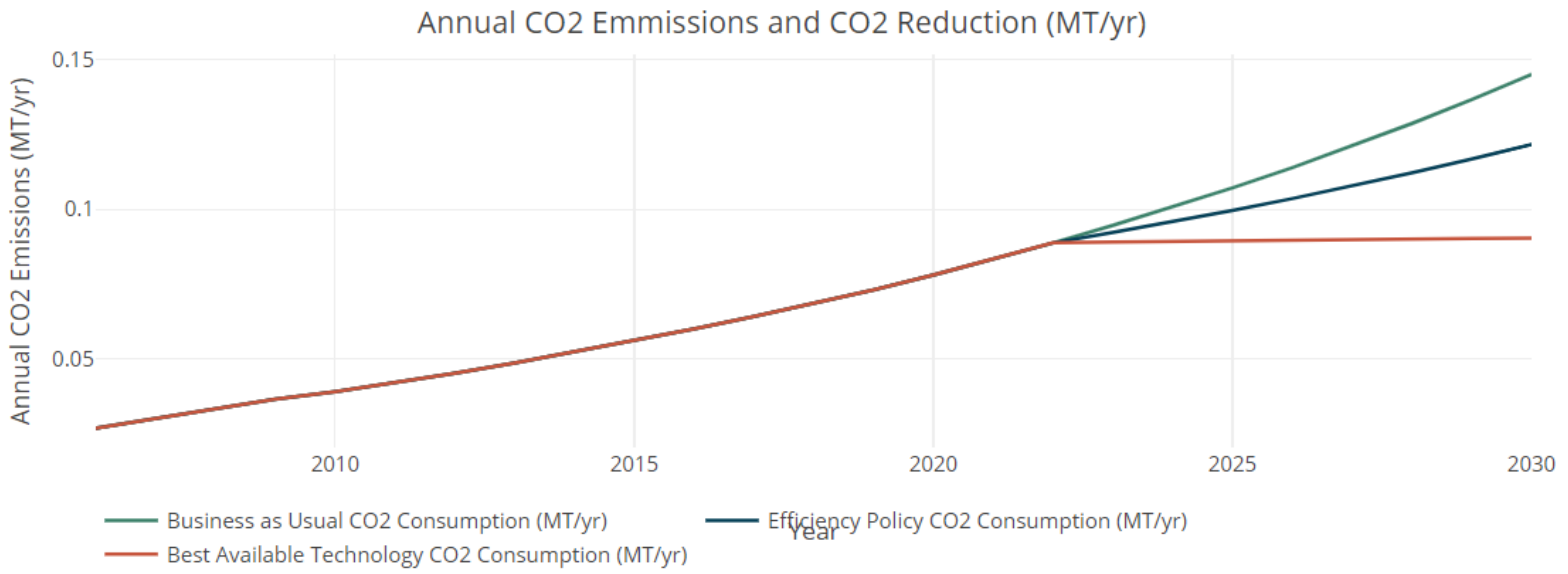
Default national **energy and emissions impacts results** for Botswana.

National Impact

National Impact	Business as Usual	Efficiency Policy	Best Available Technology
Annual Energy Reduction in 2030 (TWh/Year)	0	0.02	0.04
Cumulative Energy Reduction 2022 through 2030 (TWh)	0	0.07	0.2
Annual CO2 Reduction at 2030 (MT/Year)	0	0.02	0.05
Cumulative CO2 Reduction 2022 through 2030 (Mt)	0	0.10	0.2

CO2 Reduction, Energy Reduction, and Products in Use

CO2 Reduction | Energy Reduction | Appliances in Use



Saving your results or revising your analysis

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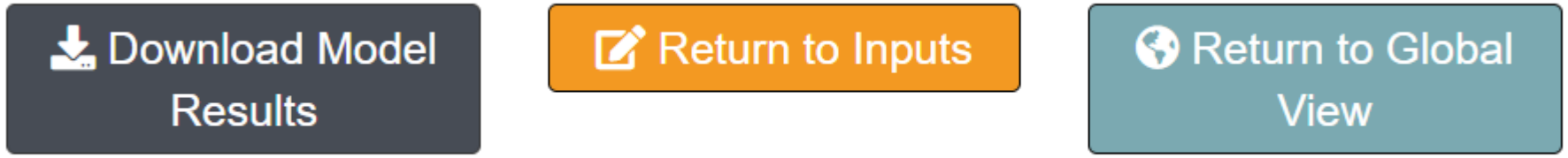


Report Model Inputs – Summary of all inputs used in the analysis

Report Results – A CSV of the results

Putting Custom Analysis to Use - Refrigerating Appliances in Botswana

Botswana Use Case: Collecting Data

This demonstration relies on data collected for Botswana via:

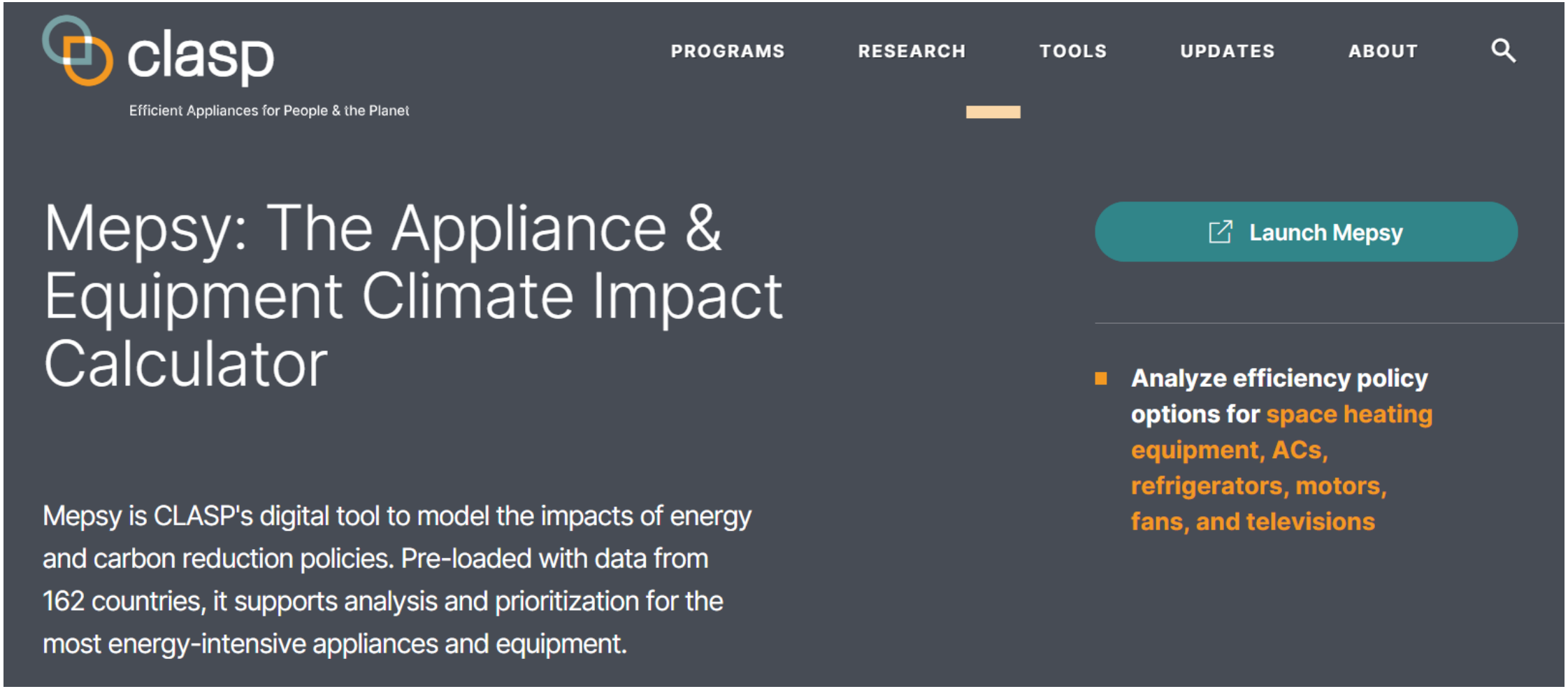
- Retailer surveys provide product data necessary for establishing a custom Business As Usual scenario:
  - Type, storage volume, defrosting technology, annual energy consumption, price
- UN Comtrade trade statistics
  - Net import volume (Imports – Exports) used as proxy for sales data to estimate annual shipments
- Stakeholder interviews with government and major importers provide
  - Corroboration of national statistics
  - Appropriate electricity tariffs for impacts analysis

Botswana Use Case: Customizing Key Assumptions

Input Type	Custom Assumption		Default Assumption	
Policy Effective Year	2023		2022	
Analysis Period	2005 – 2030		2005 - 2030	
Shipments (2005-2030)	Comtrade (Imports – Exports)		Default (Projection from region)	
Average Equipment Lifetime	17.68 years		17.68 years	
Electricity Price	0.12 USD/kWh		USD 0.08/kWh	
Heat Rate	2.93		2.93	
T&D Loss Factor	0.152		0.152	
Electricity CO2 emissions per kWH	1.18 kgCO2/kWh		1.18 kgCO2/kWh	
Heating Fuel Price	USD 0.20/kWh		USD 0.20/kWh	
Heating Fuel Emissions Factor	0 kg/kWh		0 kg/kWh	
Consumer Discount Rate	0.0159		0.0159	
BAU Price and Energy Consumption	USD 473	332 kWh/year	USD 0	340 kWh/year
Efficiency Policy Price and Energy Consumption	USD 550	260 kWh/year	USD 0	247 kWh/year
BAT Price and Energy Consumption	USD 768	123 kWh/year	USD 0	123 kWh/year

Demonstration

Web Address: https://www.clasp.ngo/tools/mepsy/



Results Comparison – Consumer Impact

Default

Customer Impact

Customer Impact	Business As Usual	Efficiency Policy	Best Available Technology
Purchase Price (USD)	0	0	0
Unit Energy Consumption (kWh/yr)	340	247	123
Energy Cost (USD)	27	20	10
Life Cycle Cost (USD)	402	292	146
Life Cycle Cost Savings (USD)	0	110	257
Payback Time (Year)	0	0	0

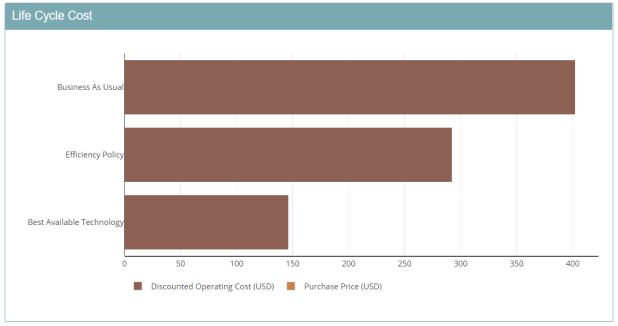
Custom

Customer Impact

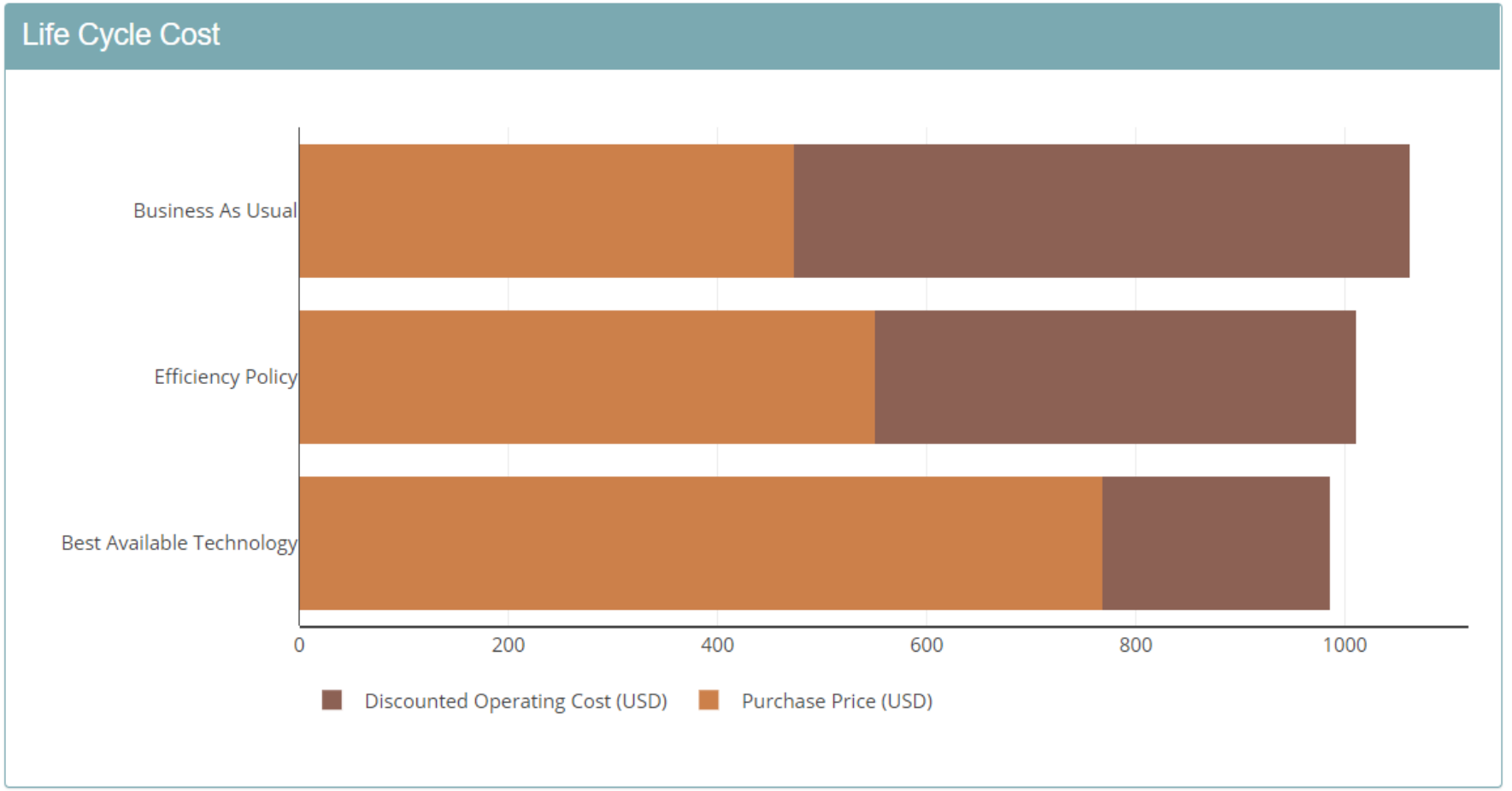
Customer Impact	Business As Usual	Efficiency Policy	Best Available Technology
Purchase Price (USD)	473	550	768
Unit Energy Consumption (kWh/yr)	332	260	123
Energy Cost (USD)	40	31	15
Life Cycle Cost (USD)	1062	1011	986
Life Cycle Cost Savings (USD)	0	51	76
Payback Time (Year)	0	9	12

Results Comparison – Consumer Impact

Default



Custom



Results Comparison – National Impact

Default

National Impact

National Impact	Business as Usual	Efficiency Policy	Best Available Technology
Annual Energy Reduction in 2030 (TWh/Year)	0	0.02	0.04
Cumulative Energy Reduction 2022 through 2030 (TWh)	0	0.07	0.2
Annual CO2 Reduction at 2030 (MT/Year)	0	0.02	0.05
Cumulative CO2 Reduction 2022 through 2030 (Mt)	0	0.10	0.2

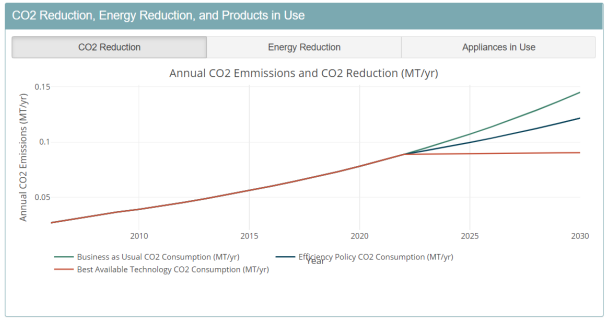
Custom

National Impact

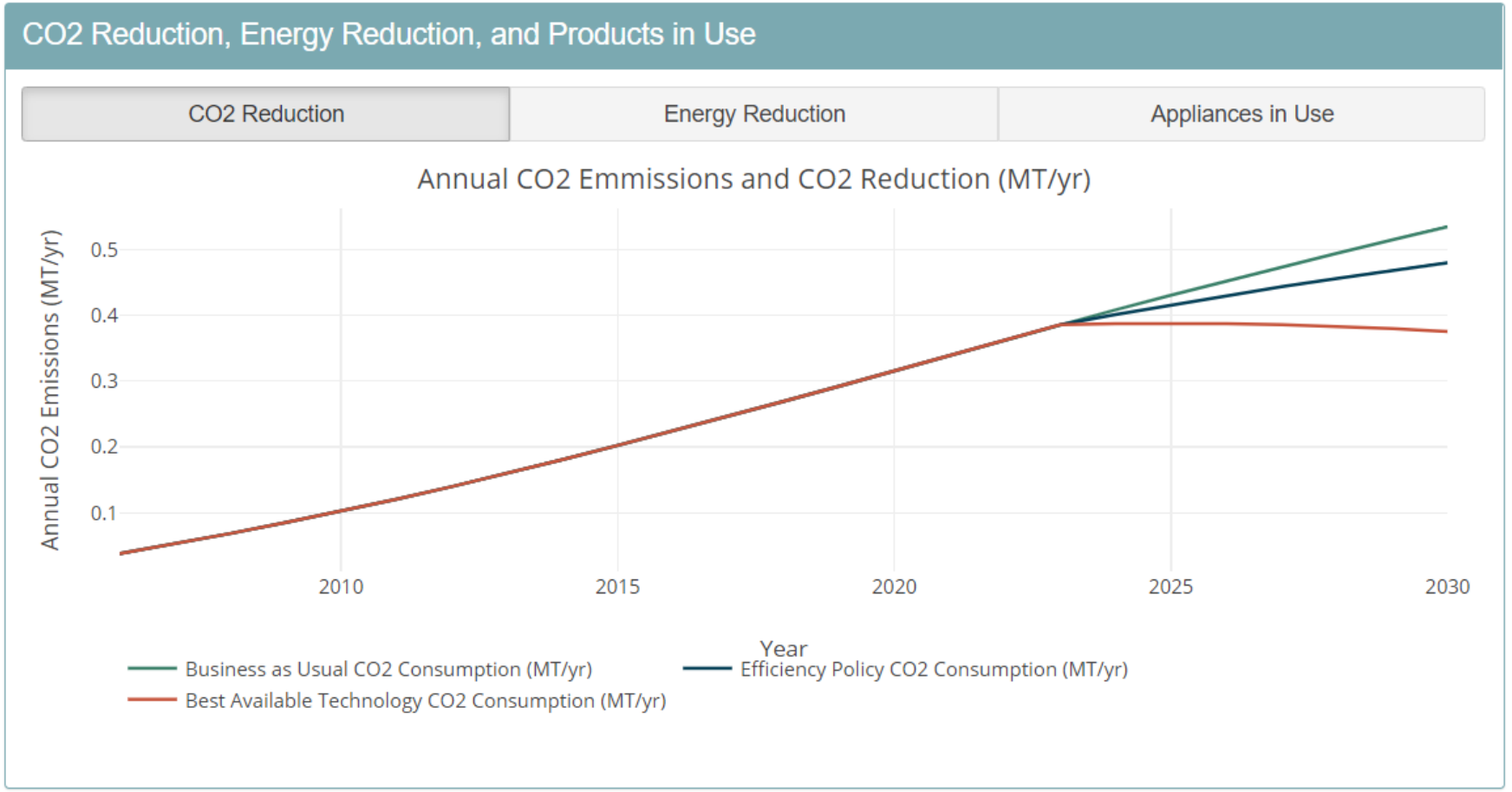
National Impact	Business as Usual	Efficiency Policy	Best Available Technology
Annual Energy Reduction in 2030 (TWh/Year)	0	0.04	0.1
Cumulative Energy Reduction 2023 through 2030 (TWh)	0	0.2	0.4
Annual CO2 Reduction at 2030 (MT/Year)	0	0.05	0.2
Cumulative CO2 Reduction 2023 through 2030 (Mt)	0	0.2	0.6

Results Comparison – National Impacts

Default



Custom



Audience Q&A

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Efficient Appliances for People & the Planet

Resources

- Access the tool through clasp.ngo/tools/Mepsy
- Website also has multiple resources for using the tool:
  - Introduction to Mepsy
  - Quick-Start Guide
  - Methodology & Assumptions
- Please email mepsy@clasp.ngo with any questions

Thank you

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