

Mepsy: The Appliance & Equipment Climate Impact Calculator

,December 8, 2021



Efficient Appliances for People & the Planet



Introduction to Mepsy

What is Mepsy

Mepsy

The Appliance & Equipment Climate Impact Calculator Tool

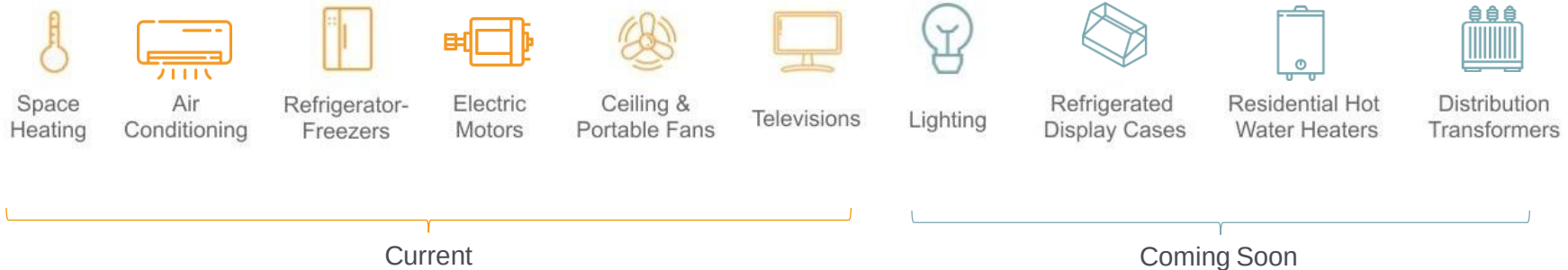
The ten appliances included in Mepsy encompass



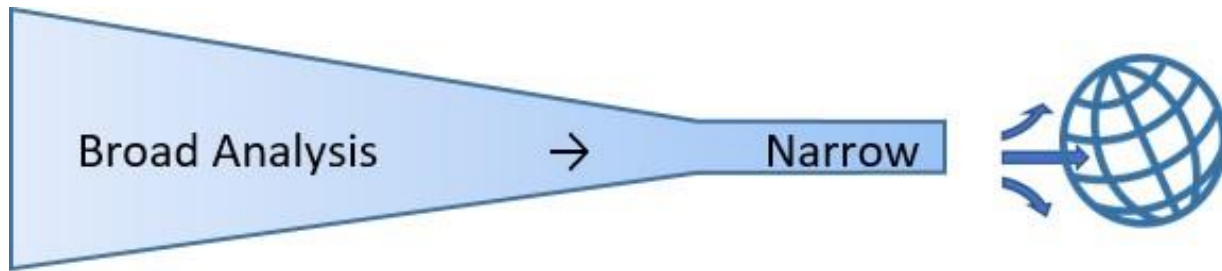
of global residential and commercial energy use



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

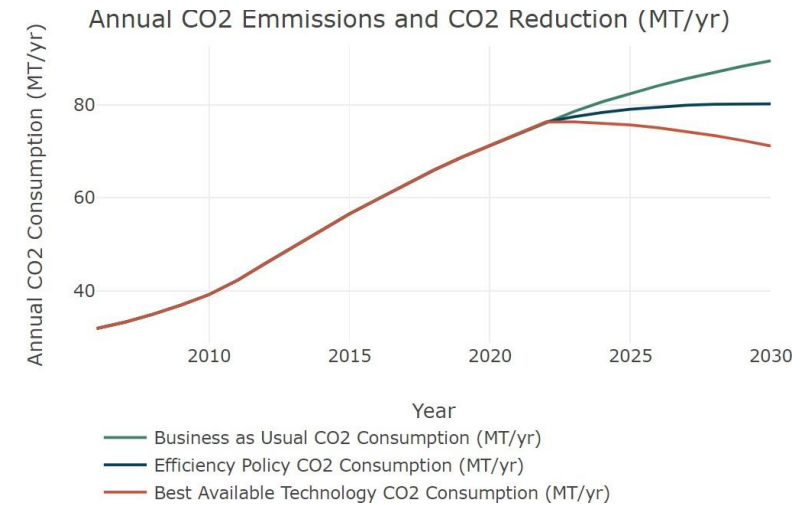
Documenting and communicating impacts and progress

- 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

Why does Mepsy have these elements and not others?

- 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

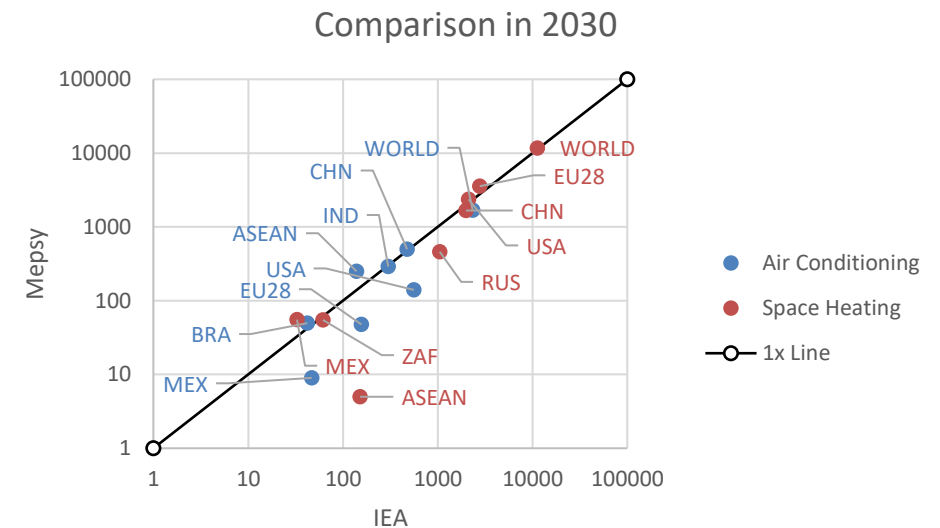
DONORS

- 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

- 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 CO₂ impacts
- Validate results with others

Lifetime Function:

- Lighting: S-shape Survival Function
- Other 6 appliances: Weibull Distribution



Data	Resources
Shipments and Stock	Market research company Data from key countries extrapolated to others
Consumer/National Interest rate (Deposit Interest rate)	World Bank
Transmission and Distribution Losses	World Bank/IEA
Carbon Emission Factor	IEA
Heat rate	IEA
Electricity Cost	IEA
Lifetime	Market Assessment/Manufacturer
Macroeconomic (households, population/GDP)	World Bank/ IMF/ UN / OECD ...

Data:

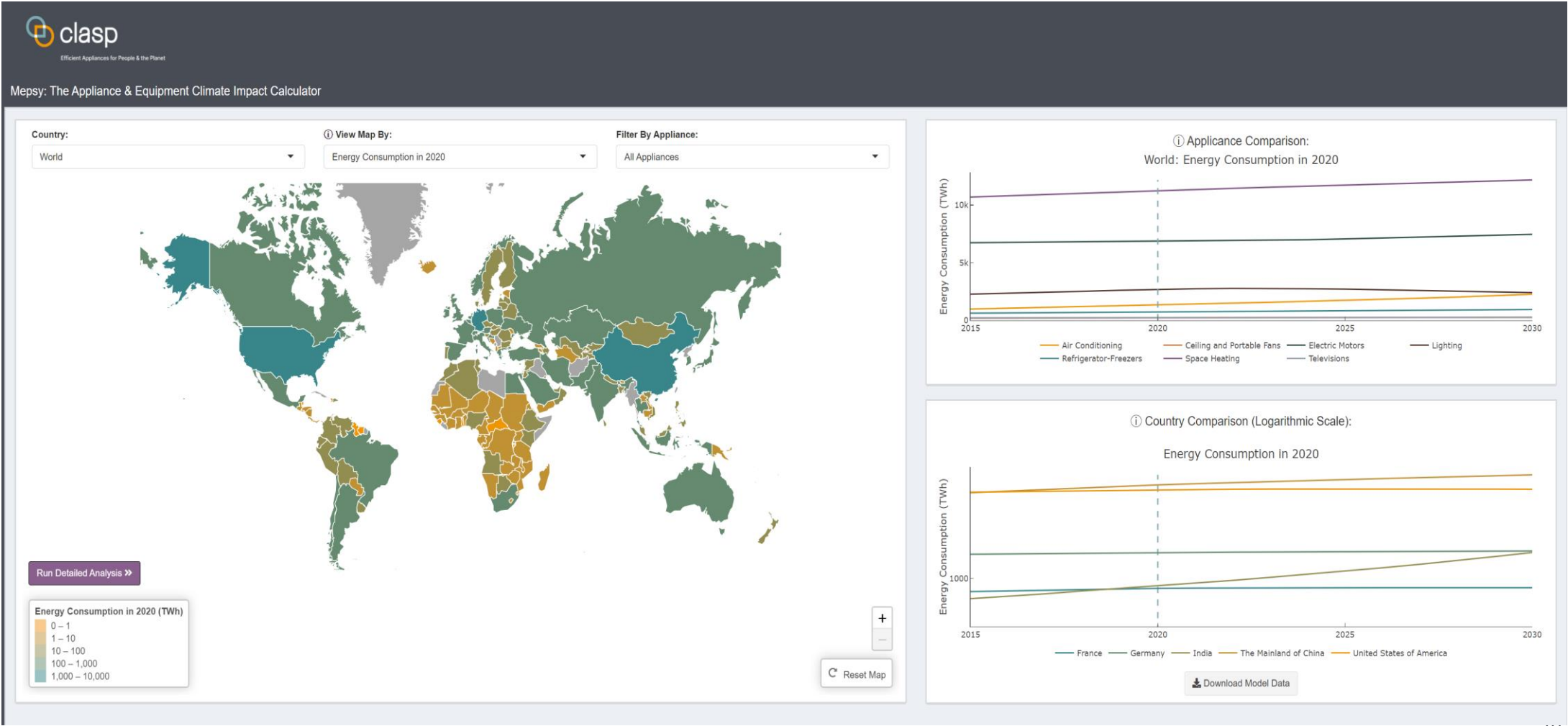
- Up-to-date
- Transparent
- Authority

Data Resources:

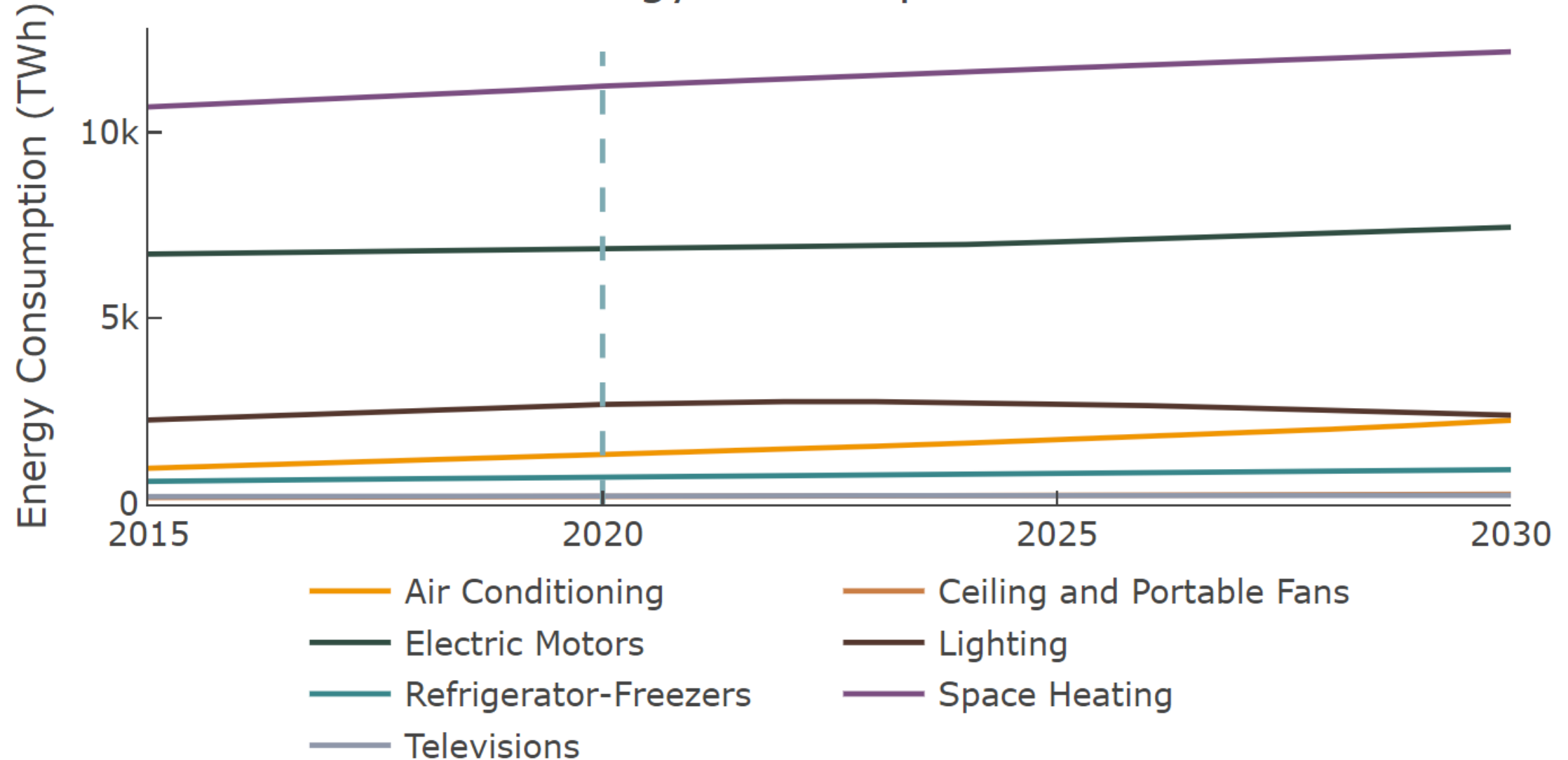
- Market research firms
- International organizations
- CLASP primary research in some
- Data from key countries extrapolated to others

- **Representative unit:** 11.4 kW avg. 8-pole motor for centrifugal pumps and compressors based on stock-weighted worldwide average of medium (0.75-375 kW) and large (>375 kW) motors
- **Shipments:** Omdia shipments for centrifugal pumps, compressors, and industrial fans, 2020; data for 2018–2023.
- **Efficiency:** baseline is meeting the MEPS requirements; in countries with no standards, 1 percentage point below IE1. MEPS at IE3 (for countries already meeting IE3, MEPS is half-way between IE3 and IE4); BAT at IE4.
- **Usage:** Running at 62% average capacity for 3280 hours annually
- **Average Lifetime:** 7.7 years

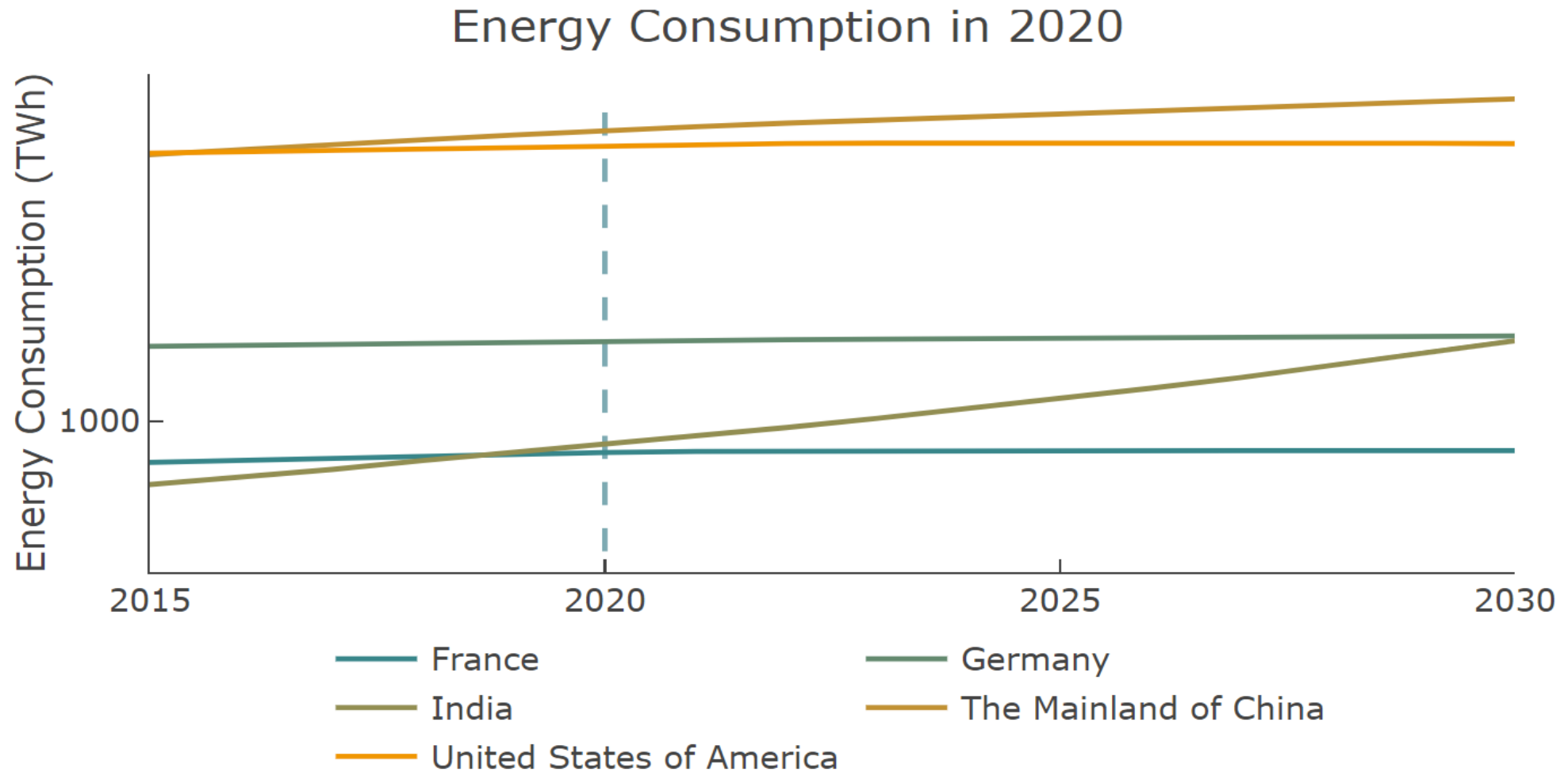
Key Features



① Appliance Comparison:
World: Energy Consumption in 2020



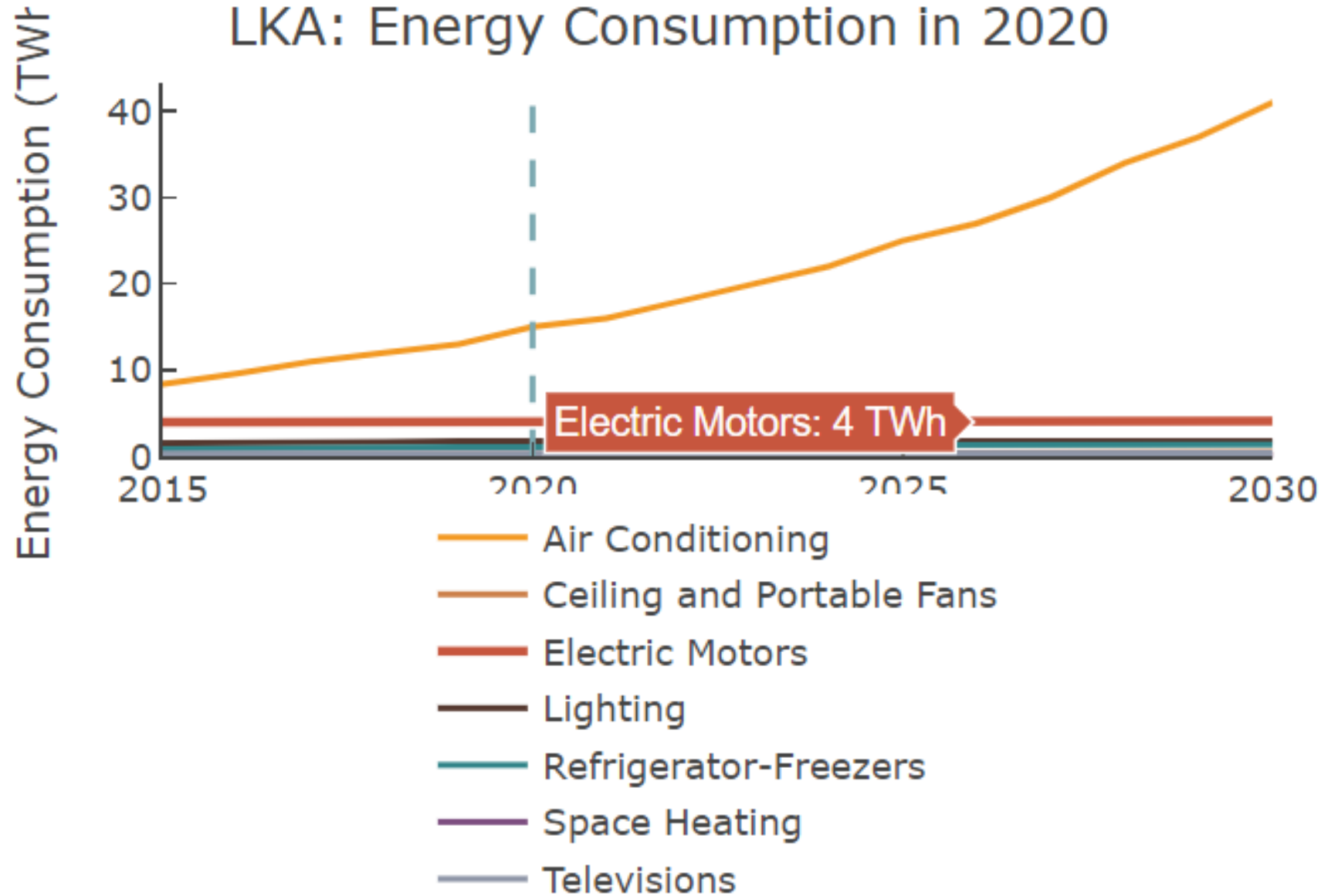
① Country Comparison (Logarithmic Scale):



Download Model Data

① Appliance Comparison:

LKA: Energy Consumption in 2020



Country:

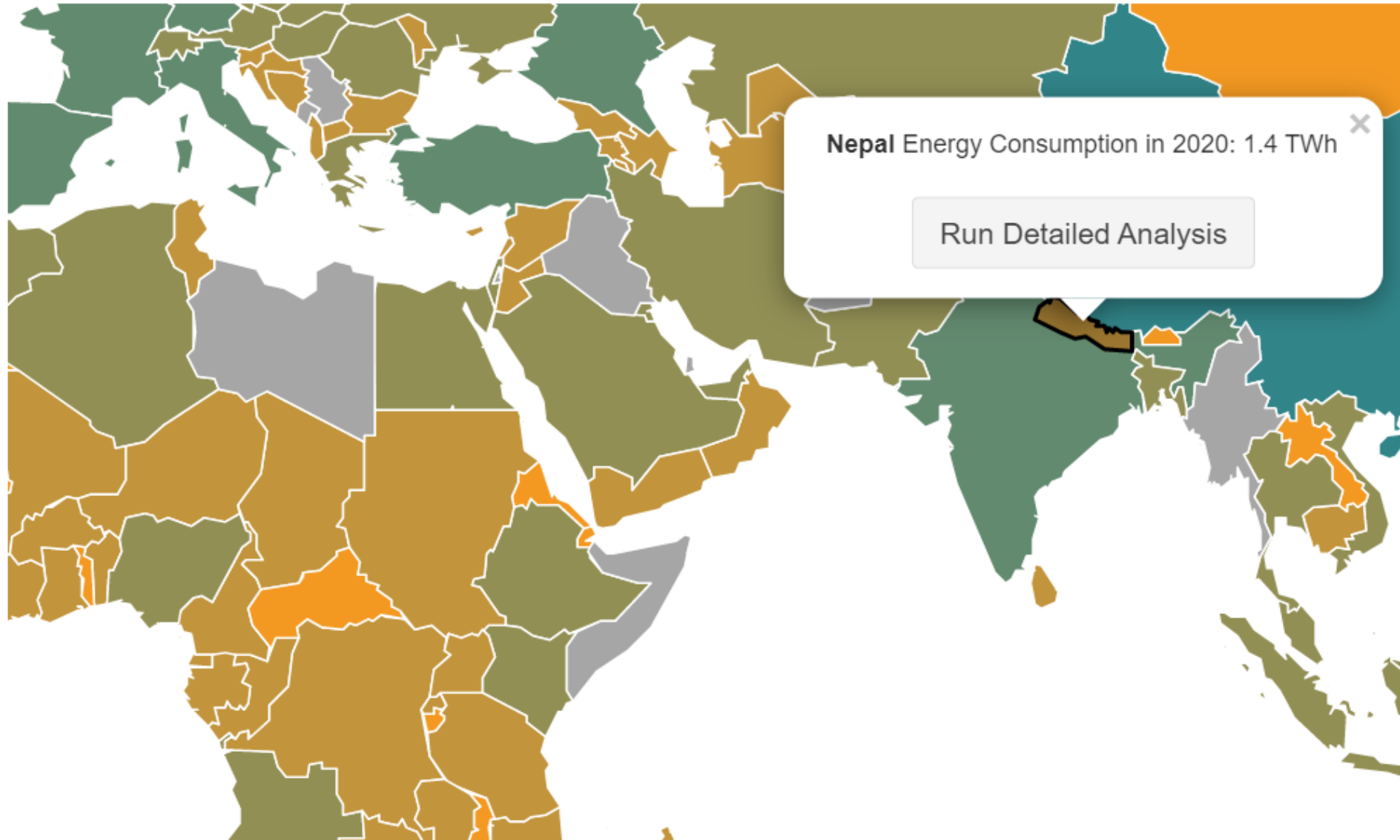
Nepal

 View Map By:

Energy Consumption in
2020

Filter By Appliance:

Electric Motors





How to Conduct Custom Analysis in Mepsy

Detailed Analysis

Scenario

Country:

India

Appliance:

Electric Motors

1

Policy Dates

Policy Effective Year:

2022

Analysis Start Year:

2005

Analysis End Year:

2030

Optional Parameters

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

Shipment Data

Insert Shipment Data Via:

- ☒ Copy-Paste Table
- ☐ CSV Attachment

2

Year	Units (units)
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	
2013	

Equipment Data

Average Equipment Lifetime (years):

7.72

3

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

0

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

0

Scenario Assumptions (Click to Edit or Paste Table)

Scenario	Price (USD)	Unit Energy Consumption (kWh/yr)
Business As Usual	0	27466
Best	0	26700

Economic Data

Consumer Discount Rate:

0.0945

4

Used Appliance Market

COMING SOON - Proportion of appliances regulated

0

Energy Sector Data

Electricity Price (kWh)

0.1

Heat Rate:

2.908465592

T&D Loss Factor

0.180865527

Calculate

Return to Global View

1. Getting started

1

Scenario

Country:
India

Appliance:
Electric Motors

Policy Dates

Policy Effective Year:
2022

Analysis Start Year:
2005

Analysis End Year:
2030

Optional Parameters

☒ Shipment Data

☒ Used Appliance Marke

☒ Equipment Data

☒ Energy Sector Data

☒ Economic Data

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

2

i 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 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

3. Defining product characteristics

3

① Equipment Data

① Average Equipment Lifetime (years):

7.72

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 (INR)	Unit Energy Consumption (kWh/yr)
Business As Usual	0	27466
Efficiency Policy	0	26700
Best Available Technology	0	26064

① Currency Name/Code

INR

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 **currency** for inputs and outputs

4. Identifying key grid and economic assumptions

4

Change **energy sector data**

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

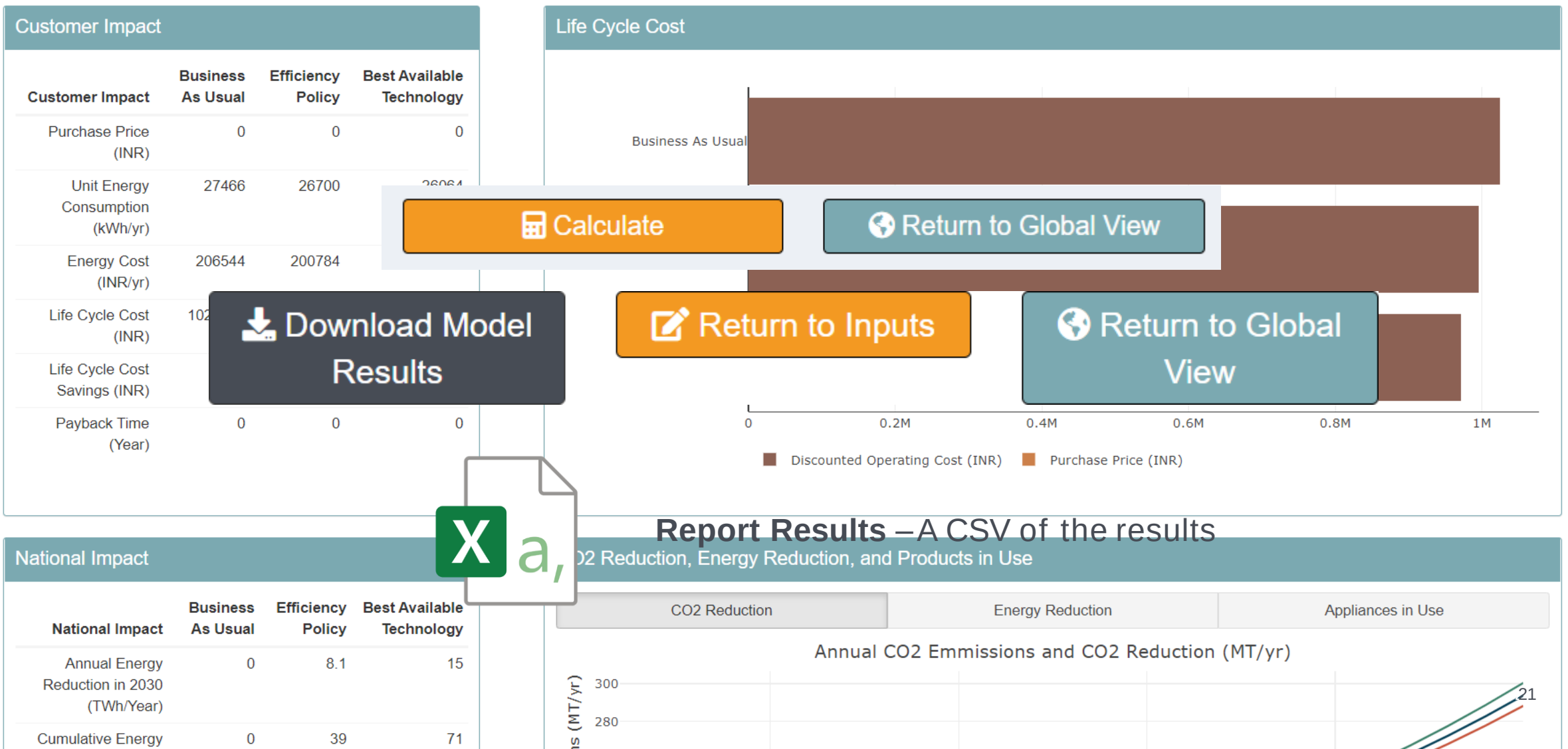
① Energy Sector Data
① Electricity Price (kWh)
7.52
① Heat Rate:
2.908465592
① T&D Loss Factor
0.180865527
① Electric CO2 emissions per kWh (kg)
0.67268182
① Heating Fuel Price (per kWh):
0.28
① Heating Fuel Emissions Factor (kg/kWh)
0

① Economic Data
① Consumer Discount Rate:
0.0945

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

Saving your results or revising your analysis

India - Electric Motors



Audience Q&A



Efficient Appliances for People & the Planet

clasp.ngo