

ver. 1.0.0

GCAM-EML User Guide

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Installing GCAM-EML

GCAM-EML only runs on windows.

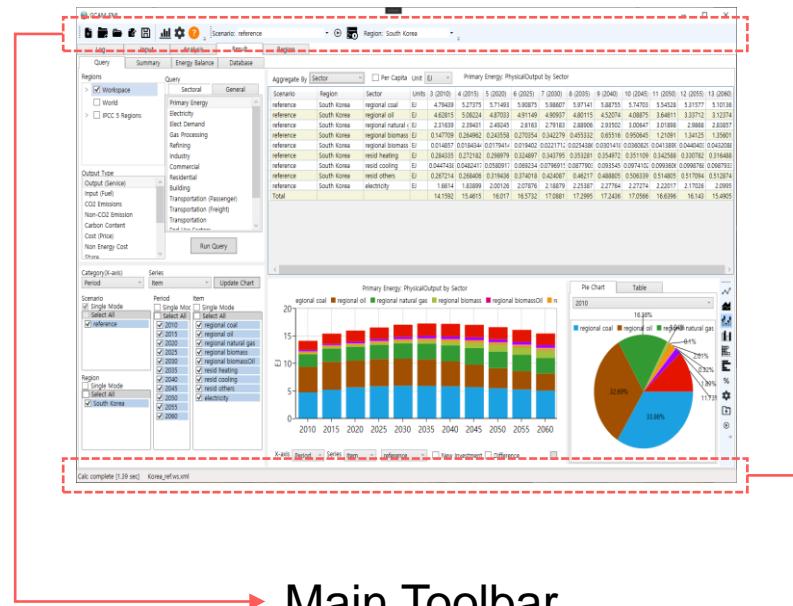
- ① Download xcam.zip from EML site
- ② Unzip zip file and then open the root “xcam” folder
- ③ Run XcamApp.exe
- ④ If you are asked to install .Net Core 3.1,
go to the below link and install **.NET Core Desktop Runtime 3.1.8 x64**
✓ <https://dotnet.microsoft.com/download/dotnet-core/3.1>

.NET Core Desktop Runtime 3.1.8

The .NET Core Desktop Runtime enables you to run existing Windows desktop applications. **This release includes the .NET Core Runtime, you do not need to install it separately.**

OS	Installers	Binaries
Windows	x64 x86	

Main Toolbar & Status bar



Status bar

Ready

Initial state

Workspace loaded Korea_ref.ws.xml

Workspace loaded

Running Korea_test.ws.xml

Running scenario

Calc complete [1803 ms] Korea_ref.ws.xml

Run complete

Main Toolbar



1 2 3 4 5 6 7 8

9

10 11

12

13

1. New workspace
2. Open workspace
3. Open file
4. New workspace
5. Save workspace
6. View chart
7. Open option dialog
8. Open help file
9. Current scenario
10. Run the current scenario
11. Run all scenarios
12. Current region
13. Change unit

Concept of Workspace and Scenario

```
<workspace name="test ws">
  <scenarios>
    <scenario name="reference">
      <file>primary/input_South_Korea_53.xml</file>
      <file>secondary/abc.xml</file>
    </scenario>
    <scenario name="sce1" based-on="reference">
      <file>secondary/sce1.xml</file>
    </scenario>
    <scenario name="sce2" based-on="sce1">
      <file>secondary/sce2.xml</file>
    </scenario>
  </scenarios>
  <chart-list />
</workspace>
```

Workspace contains all the information to run multiple scenarios.

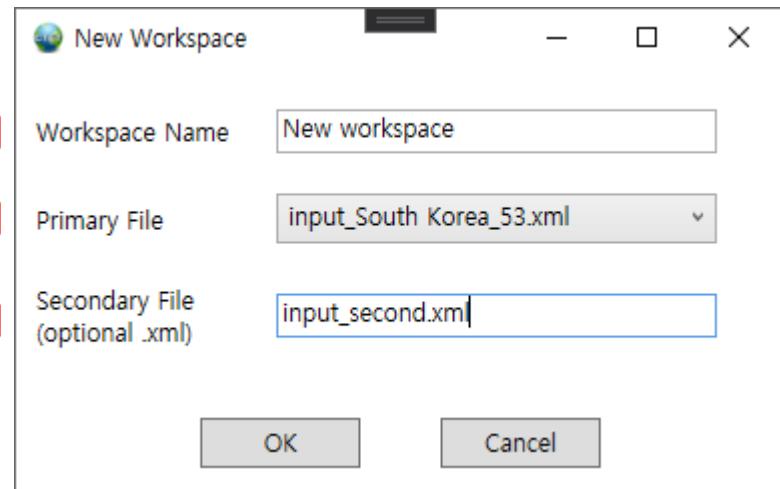
This workspace contains 3 scenarios

1. reference
2. sce1 based on reference
3. sce2 based on sce1

- Primary file is a main input file exported from GCAM input xml.
- Primary file remains intact.
- Secondary file contains data to update primary file.
- Scenario relationship is hierarchical. If scenario2 is based on scenario1, scenario2 includes all the changes in scenario1 plus changes in scenario2.



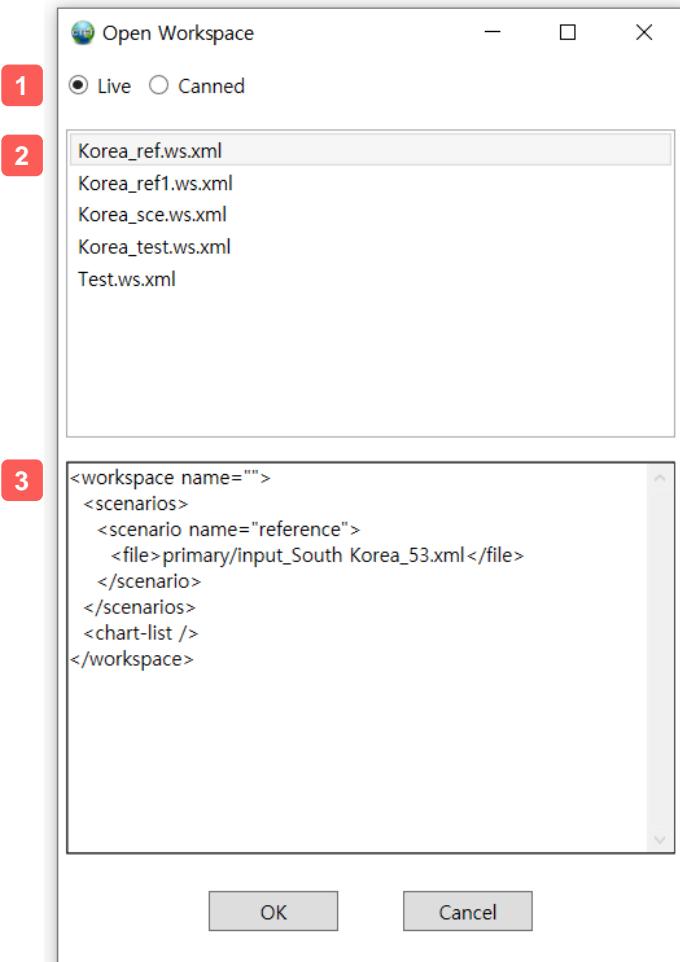
New Workspace



1. Workspace name
2. Main input file for the reference scenario
3. Optional secondary xml used to modify reference scenario



Open Workspace



1. Select live or canned

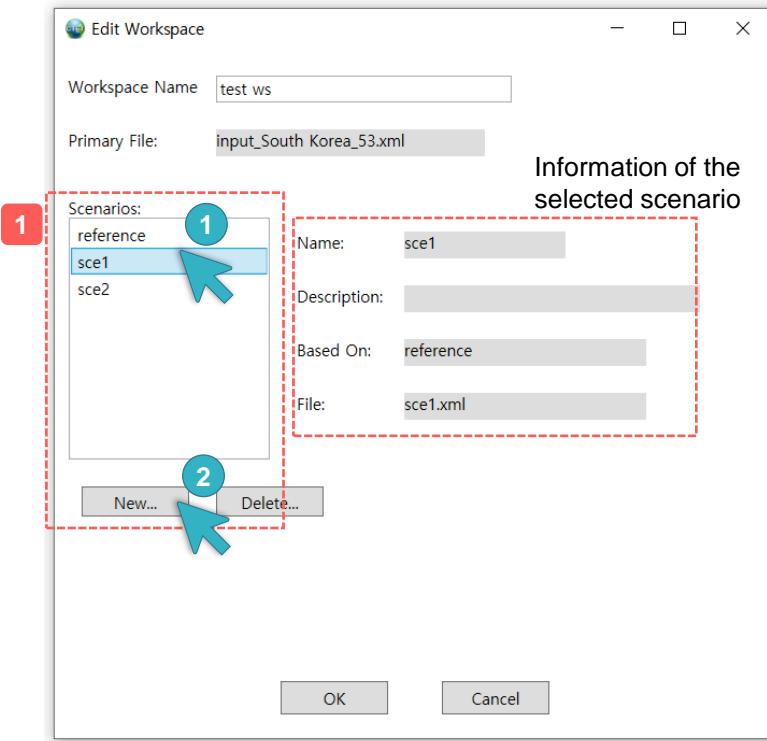
- Live: load input data and run, allows to update input data and scenarios.
- Canned: load output data and view

2. Workspace files in the folder

3. Display content of selected workspace

Edit Workspace

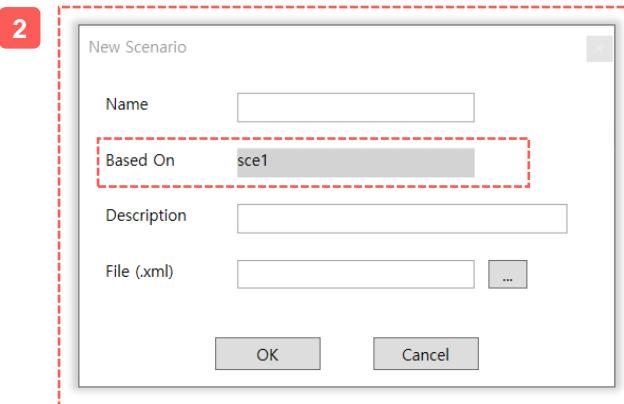
Create or delete scenario



1. Select a scenario and click New.

2. New Scenario dialog opens.

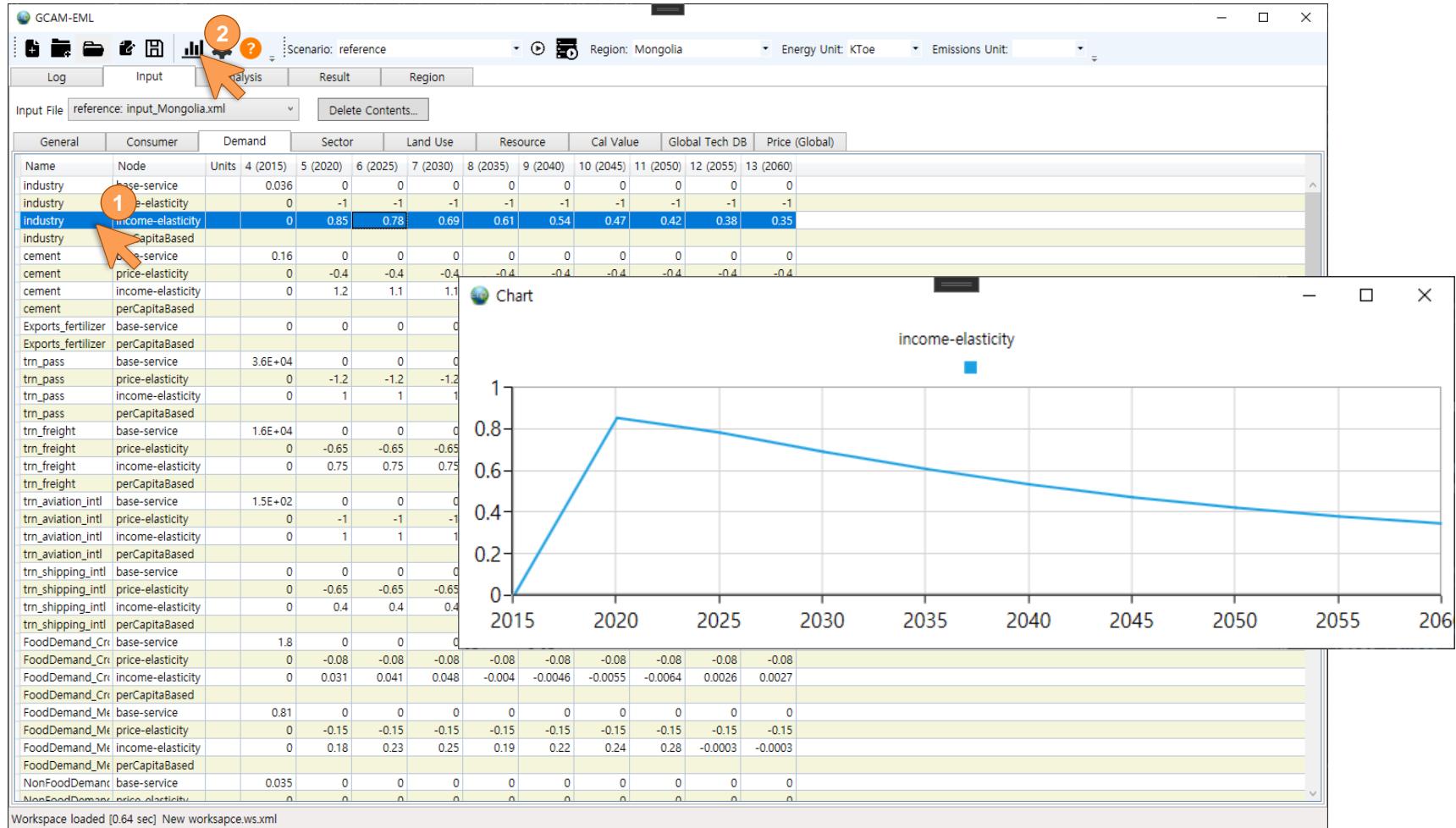
- New scenario is based on the selected scenario





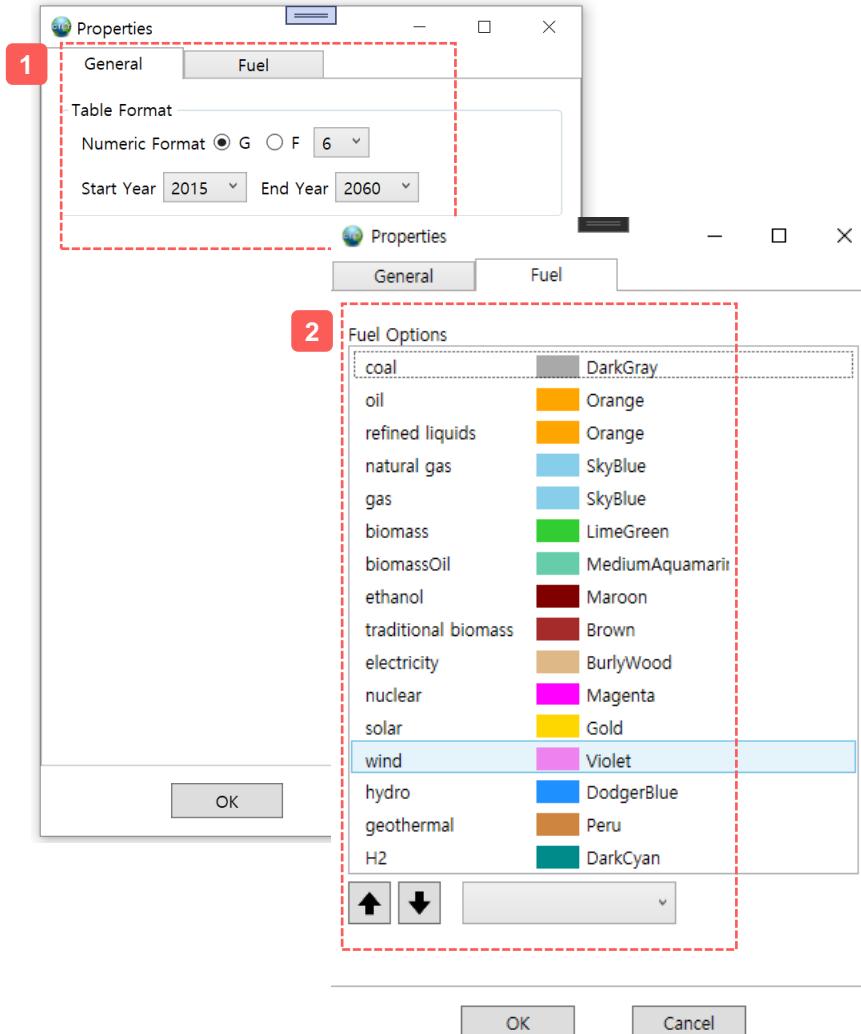
View Chart

Allows to view any tabular period data in a chart.





Option Dialog



1. Set table format and unit

- Numeric format
 - G: General
 - F: Fixed-point

2. Set fuel colors and display order on the chart





Help

Display this document

ver. 1.0.0

GCAM-EML User Guide

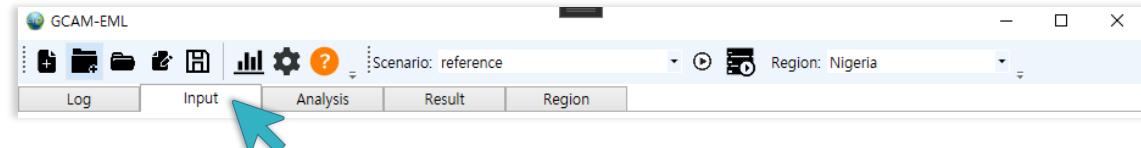
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Eunju Min
Muntae Kim

Energy Modeling Lab., Ajou University

The diagram features a central white outline of the Earth. Surrounding the Earth are several white circles, each containing a different icon. These icons include a solar panel, a leaf, a lightning bolt, a hydrogen molecule (H_2), an oxygen molecule (O_2), and a power transmission tower. Lines connect these surrounding circles to the central Earth icon, suggesting a global network or interconnectedness of these elements.

Input tab



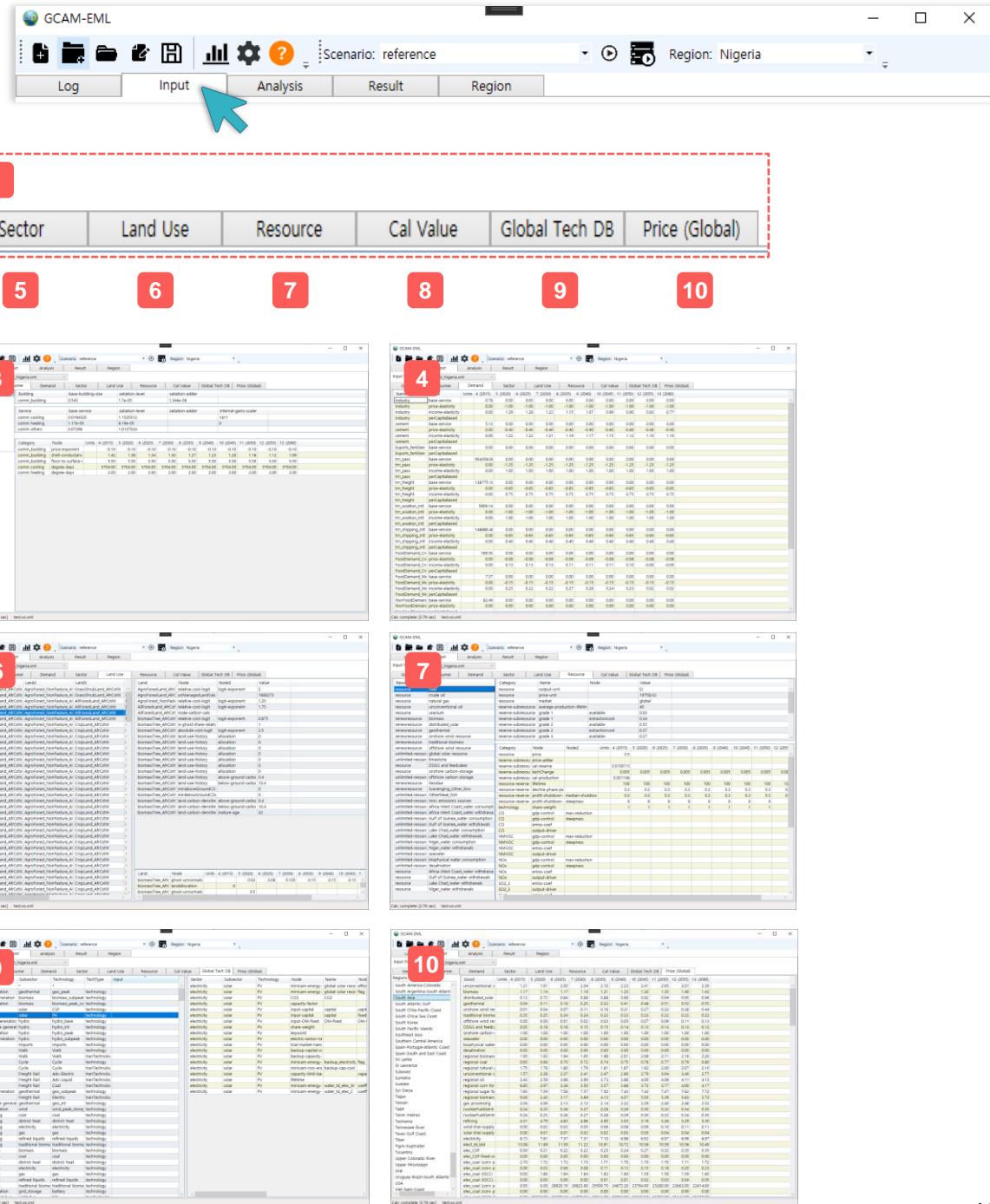
View and analyze input data

A screenshot of the GCAM-EML software interface. On the left, there's a detailed view of an input XML file for Nigeria. On the right, the main workspace shows the 'Input' tab with several numbered callouts pointing to specific sections:

- 1. Input File: reference: input_Nigeria.xml
- 2. General
- 3. Consumer
- 4. Demand
- 5. Sector
- 6. Land Use
- 7. Resource
- 8. Cal Value
- 9. Global Tech DB
- 10. Price (Global)

1. Select input xml file
2. Socioeconomic parameters & CO2 coefficient
3. Building consumer
4. View base service, income & price elasticities, per capita based
5. View parameters for sector (share weight, interpolation rule, logit exponent....)
6. View parameters for land use (allocation, land carbon density, logit exponent)
7. View parameters for resource (resource curves, gdp or mac control....)
8. View all the calibrated values in the input data
9. Global technology database
10. Global price of good

Input tab



Input tab: Cal Value

GCAM-EML

Scenario: reference Region: Nigeria

Log Input Analysis Result Region

Input File reference: input_Nigeria.xml

General Consumer Demand Sector Land Use Resource Cal Value Global Tech DB Price (Global)

1 2

Readin value

1

Sector	SubSector	Technology	Fuel	Efficiency	Coefficient	Readin Input	Readin Outp	Input	Output
regional oil	crude oil	crude oil	crude oil	1		0.8264838	0.8264838	0.8264838	0.8264838
regional oil	unconventional oil	unconventional oil	traded unconventional	1		0	0	0	0
regional biomassOil	regional biomassOil	OilCrop	regional oilcrop	84	0	0	0	0	0
gas processing	natural gas	natural gas	regional natural gas	1		0.5750811	0.5750811	0.5750811	0.5750811
gas processing	biomass gasification	biomass gasification	regional biomass	1.343		0	0	0	0
gas processing	coal gasification	coal gasification	regional coal	1.326		0	0	0	0
refining	oil refining	oil refining	regional oil	1.0252895		0.806098	0.82648382	0.806098	0.806098
refining	biomass liquids	corn ethanol	elect_td_ind	0.026		0	0	0	0
refining	biomass liquids	biodiesel	regional biomassOil	1.0309		0	0	0	0
refining	coal to liquids	coal to liquids	regional coal	2.112		0	0	0	0
refining	gas to liquids	gas to liquids	regional natural gas	1.654		0.008372	0.013847288	0.008372	0.008372
electricity	coal	coal (conv pul)	regional coal	0.397		0	0	0	0
electricity	gas	gas (steam/CT)	wholesale gas	0.377		0.0794573925	0.21076231	0.0794573925	0.21076231
electricity	gas	gas (CC)	wholesale gas	0.565		0.0166518074	0.029472226	0.0166518074	0.029472226

2

Sector	Cal	Cal Output	Base Service(Rea
regional oil	0.826484	0.826484	
regional biomassOil	0	0	
gas processing	0.575081	0.575081	
refining	0.840331	0.814447	
electricity	0.240321	0.0961956	
elec_CSP	0	0	
elec_coal (conv pul)	0	0	
elec_gas (steam/CT)	0.210762	0.0794574	
elec_gas (CC)	0.0294724	0.0166519	
elec_refined liquids (steam	0	0	
elec_biomass (conv)	0	0	
elec_Gen_II_LWR	0	0	
elec_geothermal	0	0	

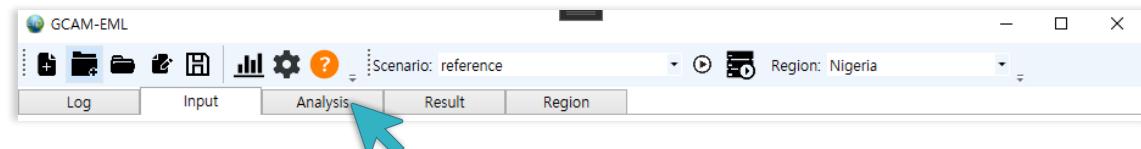
Calculated value

3

Flow / Product	coal	oil	natural gas	biomass	traditional bi	biomassOil	H2	ethanol	nuclear	wind	solar	hydro	geothermal	elec
Total Primary Supply	3.41071	4.97301	1.66364	0.230208		0.0180382		1.78121	0.0048312	0.01431		0		
gas processing	0		-1.66364	-0.0104003										
refining	0	-4.97301	0		-0.0180382									
electricity	-2.0686		-0.0230648		-0.0230648		-0.0230648	-1.78121	-0.0048312	-0.01431		0		
CHP														
trans & distr														-0
Total Transformation	-2.0686	-4.97301	-1.66364	-0.0334651	-0.0180382		-0.0230648	-1.78121	-0.0048312	-0.01431		0		
comm	0		0.0589617											
resid	0.0274183		0.0112579											
industry	1.3147		0.126523											
transportation	0													0
Total Demand	1.34212		0.196742											
TPS + Transform - Demand	0	0	0	0	0	0	0	0	0	0	0	0	0	0

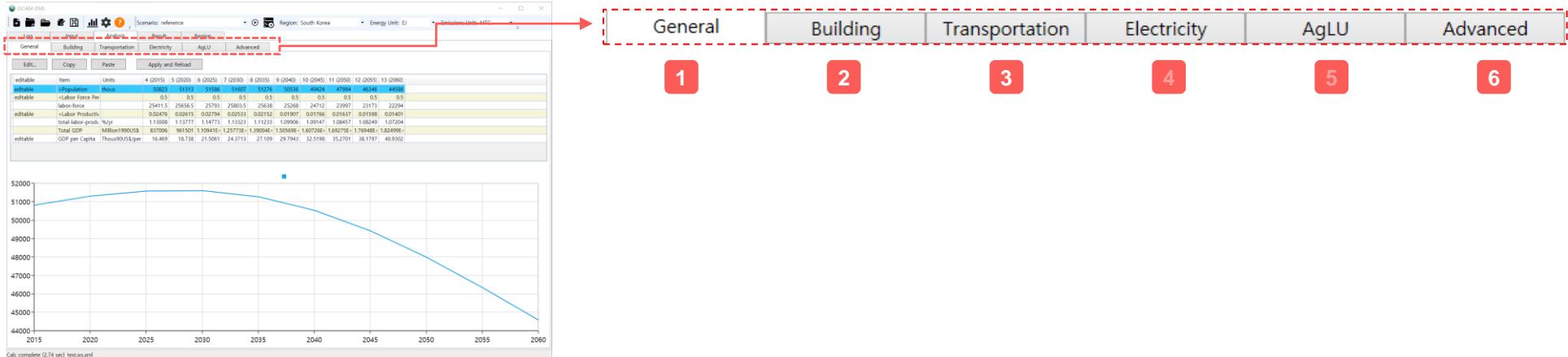
Needs validation

Analysis tab



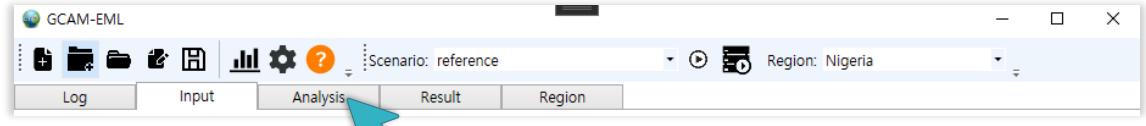
Analyze scenario runtime data

Provides tools to develop and analyze scenarios

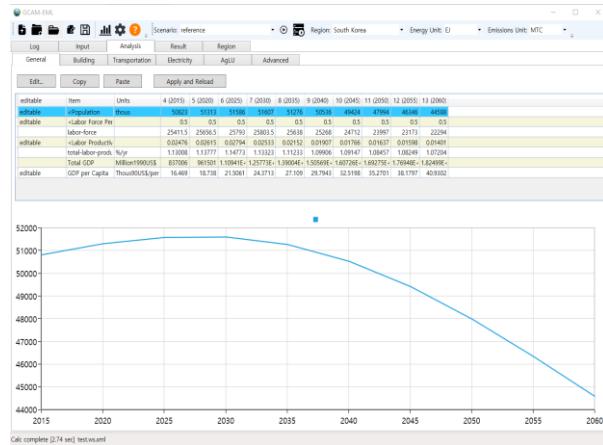


1. Allows to visualize and modify all the relevant data regarding socioeconomics
2. Allows to visualize and modify all the relevant data regarding building sector
3. Enables to easily visualize all the relevant data regarding transportation sector
4. Under construction
5. Under construction
6. Shows all the runtime values while running scenarios and provides useful data to develop and debug model and scenario.

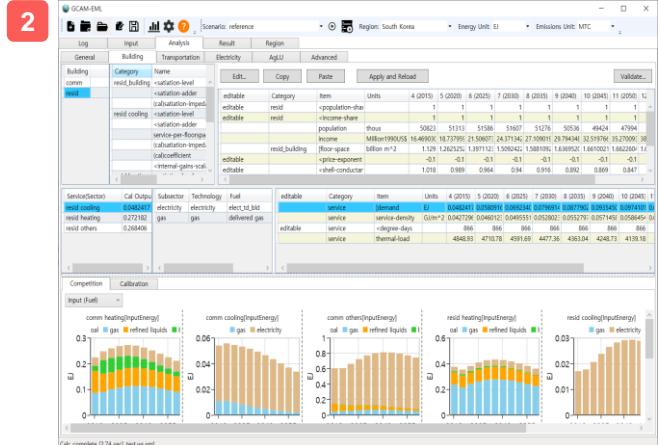
Analysis tab



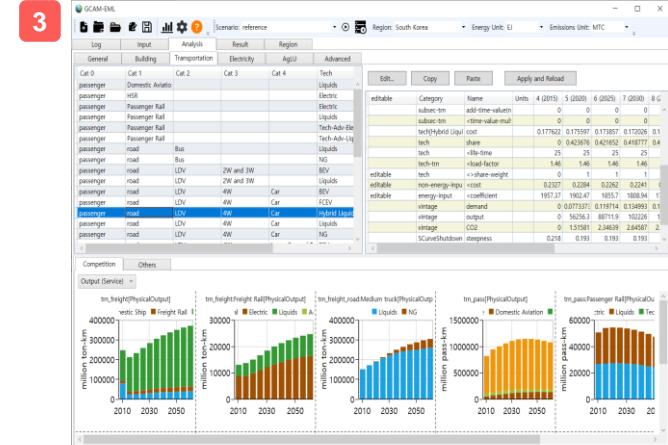
1



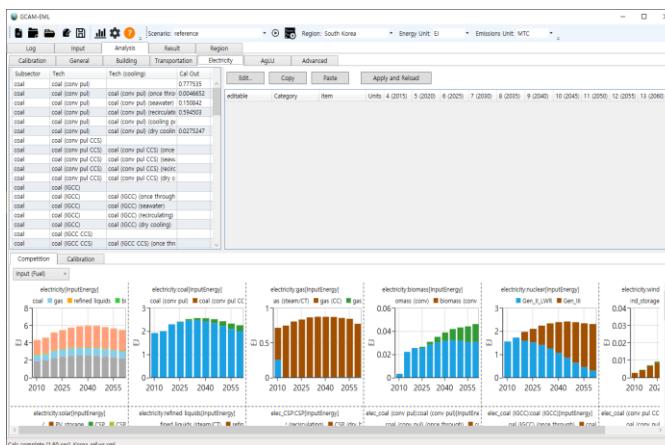
2



3



4



5

AglU tab screenshot showing a large table of agricultural and land use data (e.g., Irrit. oil, Irrit. water, Irrit. land, Irrit. crop, Irrit. pasture, Irrit. forest, Irrit. wetland, Irrit. soil, Irrit. water, Irrit. land, Irrit. crop, Irrit. pasture, Irrit. forest, Irrit. wetland, Irrit. soil) for different regions and markets.

Analysis tab: Edit scenario input data



2

General

Building

Transportation

Electricity

AgLU

Advanced

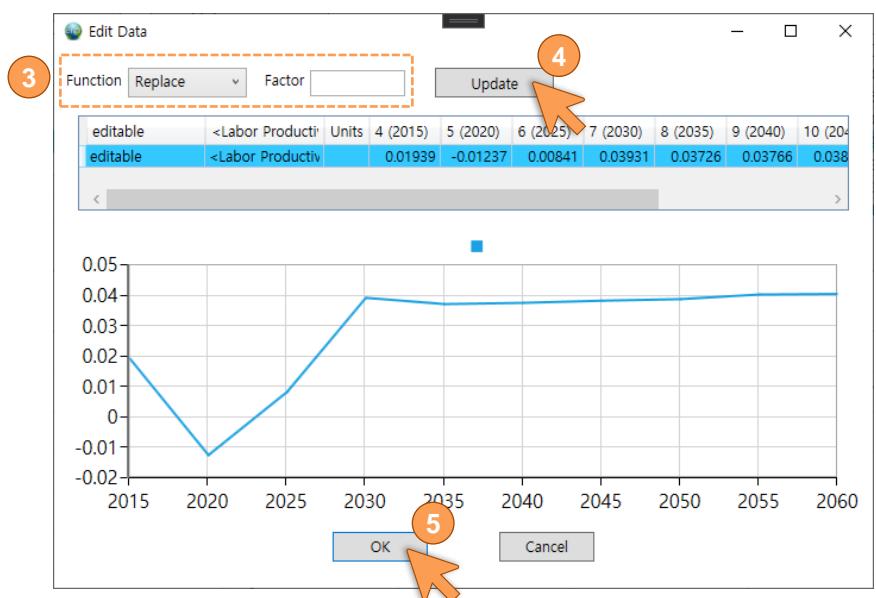
The screenshot shows the 'Building' tab of the software. At the top, there are buttons for 'Edit...', 'Copy' (which is highlighted with an orange circle and arrow), 'Paste', and 'Apply and Reload'. Below these buttons is a table with rows labeled 'editable'. One row is highlighted in yellow and circled with an orange circle containing the number 1. This row contains the text '<Population' and 'labor-force'. The table has columns for 'Item', 'Units', and years from 2015 to 2050.

editable	Item	Units	4 (2015)	5 (2020)	6 (2025)	7 (2030)	8 (2035)	9 (2040)	10 (2045)	11 (2050)
editable	<Population	ous	181137.00	204121.00	229063.00	255975.00	284632.00	314617.00	345333.00	376476.00
editable	<Labor Force P		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	labor-force		90568.50	102060.50	114531.50	127987.50	142316.00	157308.50	172666.50	188238.00
editable	<Labor Productiv		0.01939	-0.01237	0.00841	0.03931	0.03726	0.03766	0.03838	0.0389
	total-labor-prod	%/yr	1.10	0.94	1.04	1.21	1.20	1.20	1.21	1.21
	Total GDP	Million1990US\$	306264.45	324301.14	379490.97	514244.42	686584.37	912993.64	1209776.7	1596148.0
editable	GDP per Capita	Thous90US\$/per	1.69	1.59	1.66	2.01	2.41	2.90	3.50	4.24

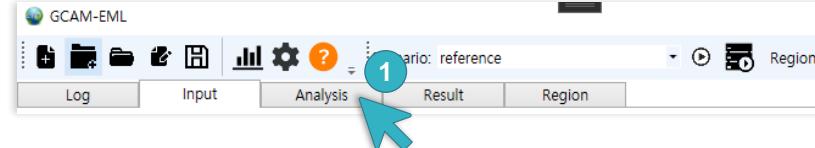
You can modify the row of which the first column is marked with editable as shown below.

1. Select an editable row you want to edit
2. Click Edit button opens Edit Data dialog
3. Type value into Factor text box and select function
4. Click Update, then modified values are represented in table and chart
5. Click OK button
6. After finishing editing, click Apply and Reload, which updates input xml file and reloads workspace.

You need to run the scenario again.



Analysis tab: Edit scenario input data in collaboration with Excel



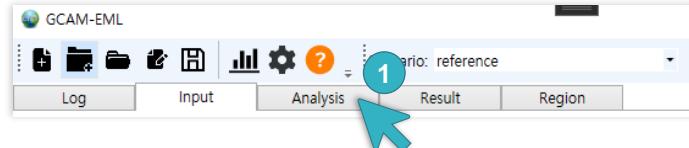
The screenshot shows the 'Building' tab selected in the navigation bar. Below the tab, there is a toolbar with buttons: Edit..., Copy (circled in orange with number 2), Paste (circled in orange with number 3), and Apply and Reload (circled in orange with number 4). The main area is a data grid with rows of scenario data. Row 1 (highlighted in yellow) contains the columns: Item, Units, and values for years 2015 through 2050. Row 2 contains the item <Population thou, value 181137.00, and years 2020 through 2050. Row 3 contains the item <Labor Force Per Capita, value 0.5, and years 2025 through 2050. Row 4 contains the item labor-force, value 90568.50, and years 2020 through 2050. Row 5 contains the item <Labor Productivity, value 0.01939, and years 2025 through 2050. Row 6 contains the item total-labor-productivity, value 1.10, and years 2025 through 2050. Row 7 contains the item Total GDP, value 306264.45, and years 2020 through 2050. Row 8 contains the item GDP per Capita, value 1.69, and years 2025 through 2050.

editable	Item	Units	4 (2015)	5 (2020)	6 (2025)	7 (2030)	8 (2035)	9 (2040)	10 (2045)	11 (2050)
editable	<Population	thous	181137.00	204121.00	229063.00	255975.00	284632.00	314617.00	345333.00	376476.00
editable	<Labor Force Per Capita			0.5	0.5	0.5	0.5	0.5	0.5	0.5
	labor-force		90568.50	102060.50	114531.50	127987.50	142316.00	157308.50	172666.50	188238.00
editable	<Labor Productivity		0.01939	-0.01237	0.00841	0.03931	0.03726	0.03766	0.03838	0.0389
	total-labor-productivity	/yr		1.10	0.94	1.04	1.21	1.20	1.20	1.21
	Total GDP	Million1990US\$	306264.45	324301.14	379490.97	514244.42	686584.37	912993.64	1209776.7	1596148.0
editable	GDP per Capita	Thous90US\$/per	1.69	1.59	1.66	2.01	2.41	2.90	3.50	4.24

1. Click on a row you want to edit
2. Click Copy button
 - Paste to Excel (or your favorite editor) and edit data as desired.
 - Copy modified data from Excel.
3. Click Paste button.
4. After finishing editing, click Apply and Reload, which updates input xml file and reloads workspace.

You need to run the scenario again.

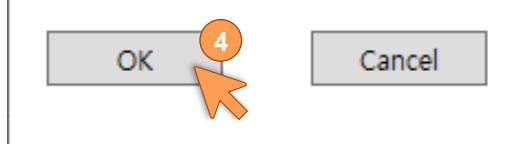
Analysis tab: Segregate resid into 'resid_rural' and 'resid_urban'



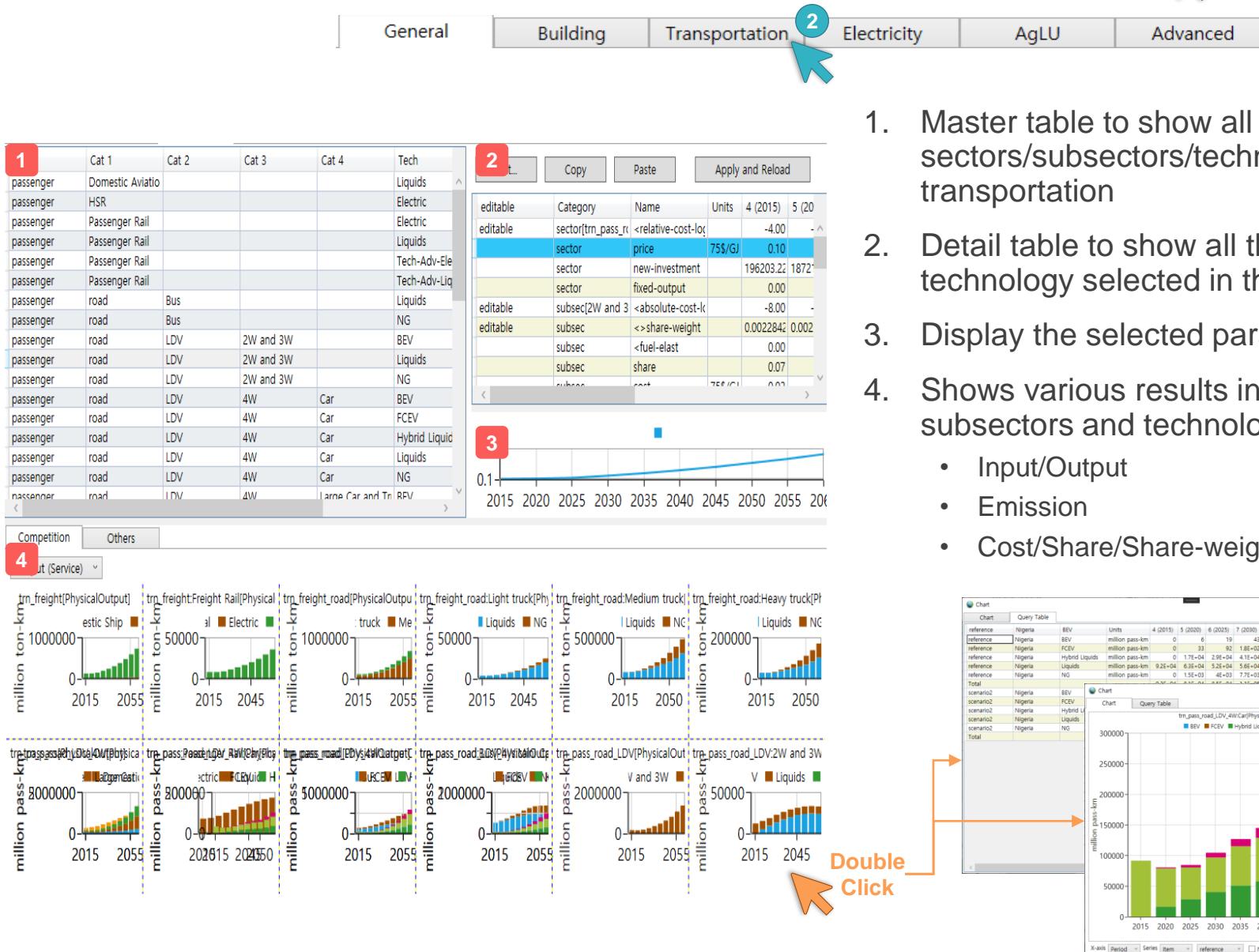
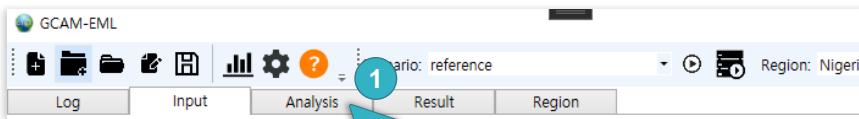
This screenshot shows the 'Segregate ...' dialog box open. It has several tabs at the top: Edit..., Copy, Paste, and Apply and Reload. The 'Apply and Reload' tab is highlighted with an orange arrow and the number 5. The dialog box contains four sections: Population, Income, Floor space, and Service, each with a text input field. The 'Population' section is highlighted with an orange dashed box and the number 3. An orange arrow points to the 'Population' section. Another orange arrow points to the 'Service' section. The main grid in the background shows rows for 'resid_building' and 'resid'.

1. Right click on the Building grid.
2. Click Rural & Urban context menu, then segregate dialog pops up.
3. Enter desired urban shares.
4. Click OK.
5. Click Apply and Reload.

This operation can be only applied to the reference scenario.



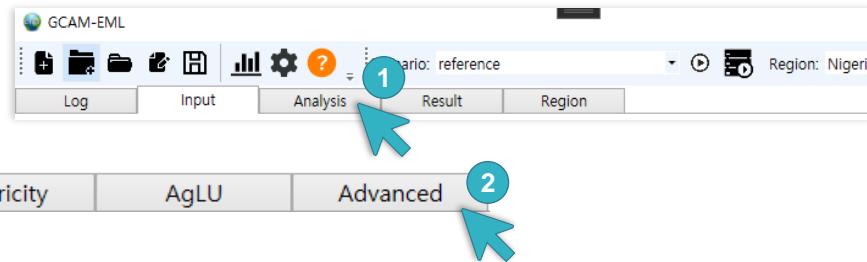
Analysis tab: Transportation



1. Master table to show all the sectors/subsectors/technologies in transportation
 2. Detail table to show all the parameters in the technology selected in the master table
 3. Display the selected parameter in the chart
 4. Shows various results in all the competing subsectors and technologies
 - Input/Output
 - Emission
 - Cost/Share/Share-weight



Analysis tab: Advanced



Shows all the runtime values while running scenarios.

Provides useful data to develop and debug model and scenario.

1. Shows all the values related to the calibration process including share weight

2. Shows all parameters related to socioeconomic

3. Shows all parameters related to resource

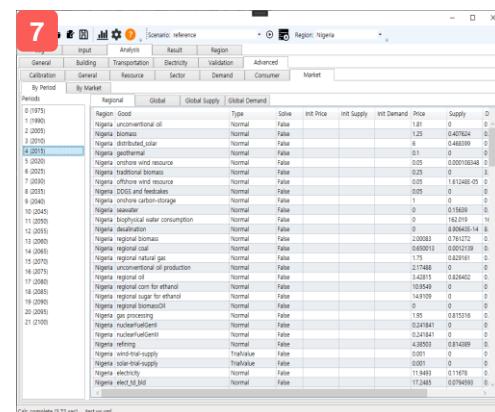
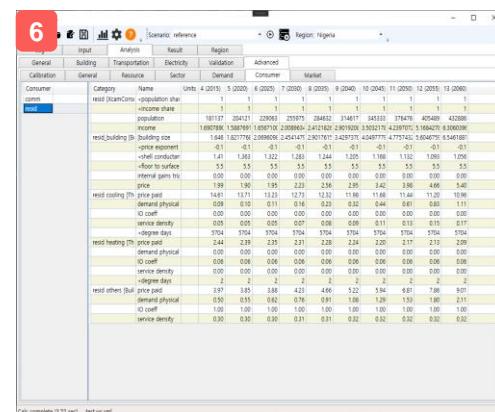
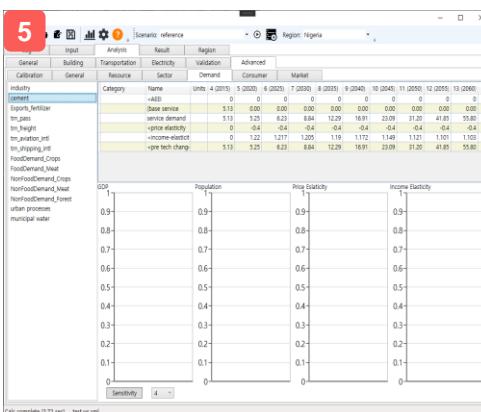
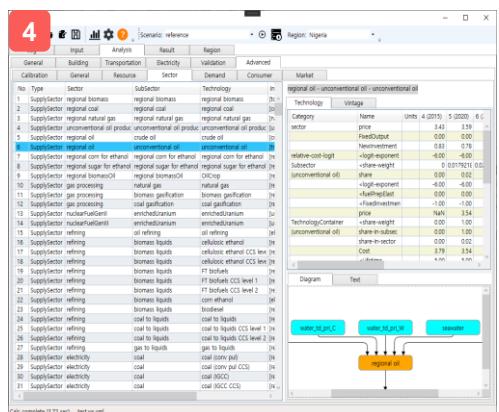
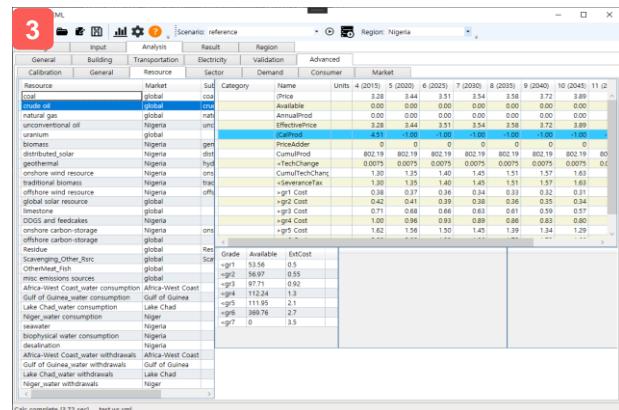
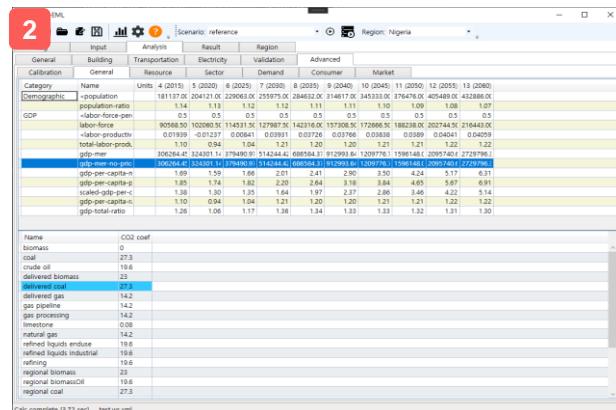
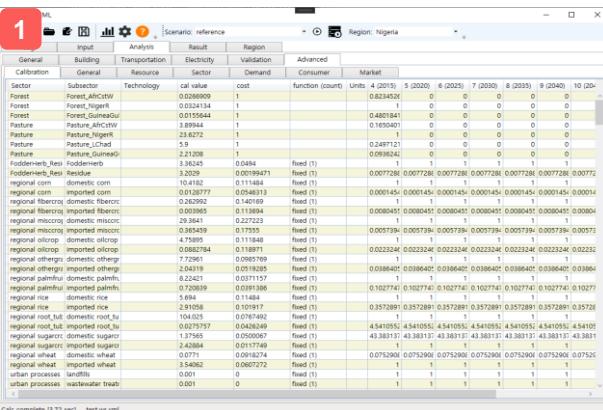
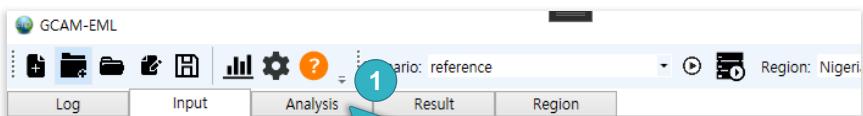
4. Shows all parameters related to sector with a link diagram

5. Shows all parameters related to base service

6. Shows all parameters related to GCAM consumer

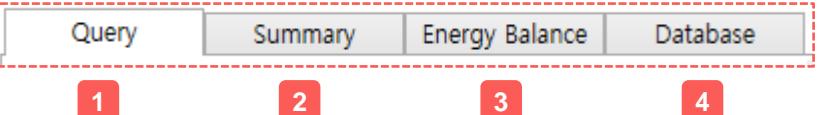
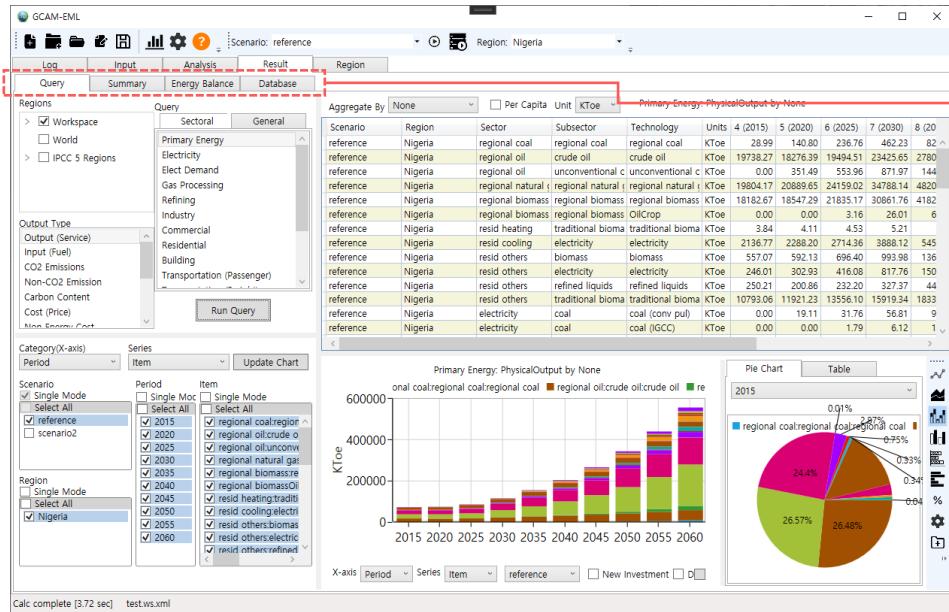
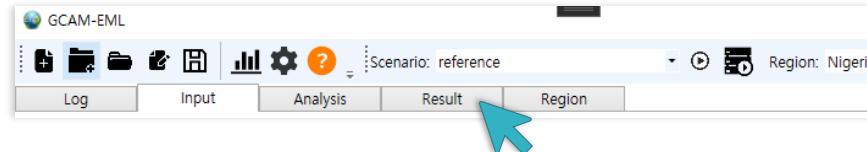
7. Shows all parameters of all market

Analysis tab: Advanced



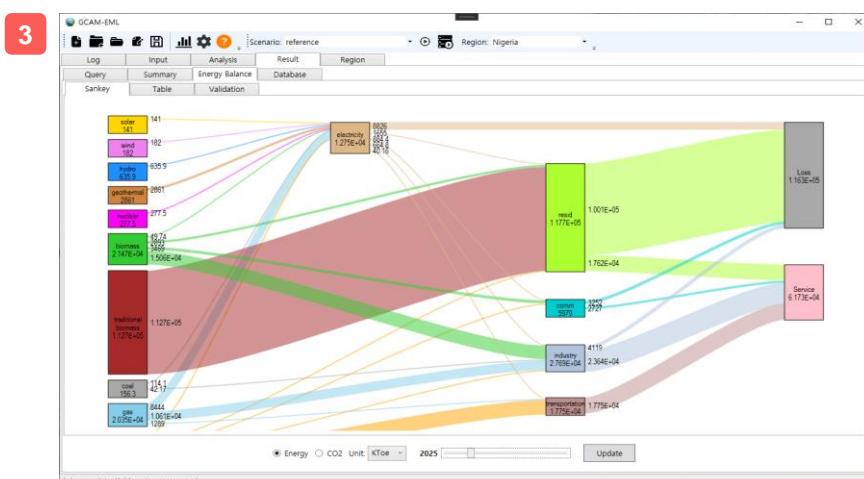
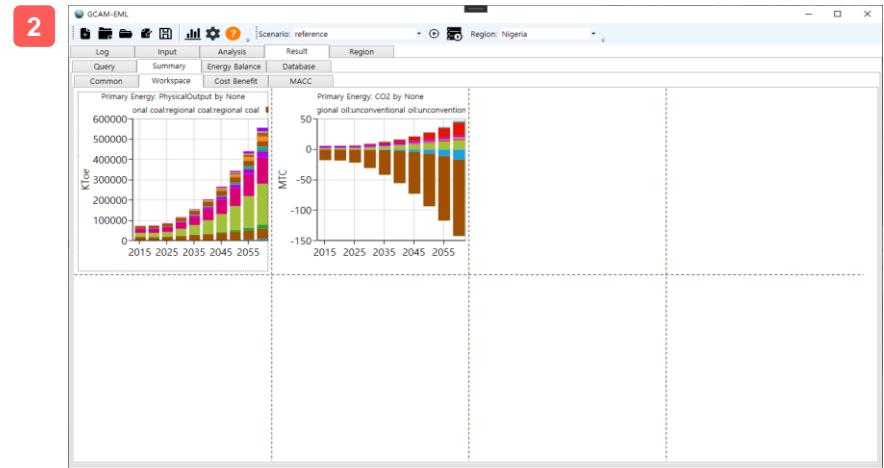
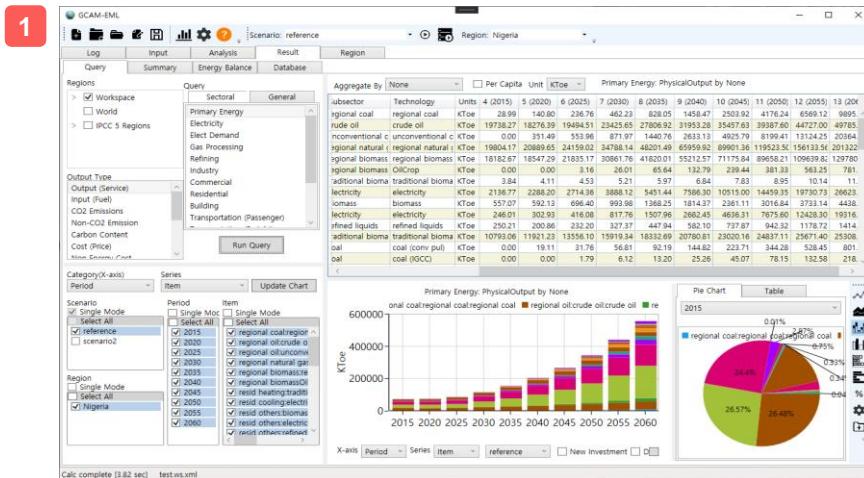
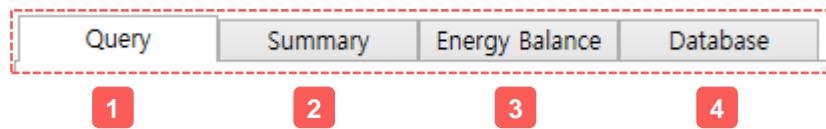
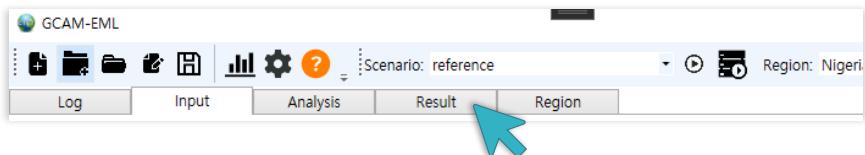
Calc complete [3.72 sec] test.ws.xml

Result tab



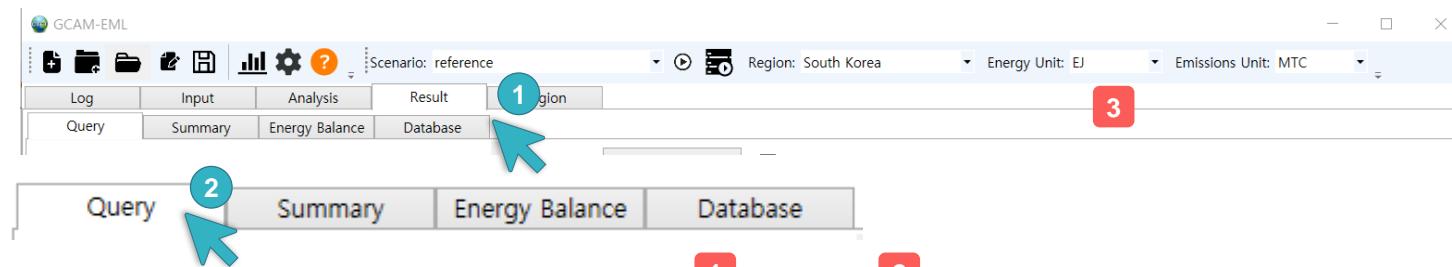
1. Query output data and display the result in the table and chart
2. Display charts as thumbnail grid which has been saved in the Query tab
3. Display energy/emission flow and energy balance table in IEA standard format
4. Display output database in master/detail table, allows to easily visualize massive xml data

Result tab



Scenario: reference							
	Log	Input	Analysis	Result	Region		
Period	Market	General	Resource	Sector	Land	Demand	Consumer
By Period	By Market						
1975	Region	Good		Price	Supply	Demand	Diff Price
1990	Nigeria	unconventional oil	1.81	0	0	0	0
2005	Nigeria	biomass	1.25	0.749818	0.377987	0	0
2010	Nigeria	distributed_solar	6	0.709932	0.00012694	0	0
2015	Nigeria	geothermal	0.1	0	0.0889115	0	0
2020	Nigeria	onshore wind resource	0.05	0.000119751	0.00324507	0	0
2025	Nigeria	traditional biomass	0.25	0	4.22709	0	0
2030	Nigeria	other wind resource	0.05	1.73601E-05	5.32E-06	0	0
2034	Nigeria	DDGS and feedstuffs	0.05	0	4.71379	0	0
2035	Nigeria	onshore carbon-storage	1	0	7.39993E-37	0	0
2040	Nigeria	leisurewater	0	0.146902	0.146902	0	0
2045	Nigeria	biophysical water consumption	0	170.02	170.02	0	0
2050	Nigeria	depreciation	0	9.8517E-14	9.8517E-14	0	0
2055	Nigeria	regional biomass	1.97577	0.776338	0.776338	0	0
2060	Nigeria	regional coal	0.679857	0.00594945	0.00594945	0	0
2065	Nigeria	regional natural gas	1.75508	0.874608	0.874608	0	0
2070	Nigeria	unintended oil production	2.1039	0	0	0	0
2075	Nigeria	regional oil	1.58541	0.779912	0.779912	0	0
2080	Nigeria	regional corn for ethanol	11.3496	0	0	0	0
2085	Nigeria	regional sugar for ethanol	14.4611	0	0	0	0
2090	Nigeria	regional palmOilSS	7.19867	0	0	0	0
2095	Nigeria	gas flaring	1.0460	0.861104	0.861104	0	0
2100	Nigeria	nuclearFuelGen1	0.249662	0	0	0	0
	Nigeria	nuclearFuelGen11	0.249662	0.00300365	0.00300365	0	0
	Nigeria	refining	5.01696	0.768597	0.768597	0	0
	Nigeria	wind-trial-supply	0.001	0	0	0	0
	Nigeria	solar-trial-supply	0.001	0	0	0	0
	Nigeria	electricity	10.983	0.133653	0.133653	0	0
	Nigeria	elect_lt_bld	16.0153	0.0873277	0.0873277	0	0
	Nigeria	elec_CSP	0.191131	1.41672E-07	1.41672E-07	0	0
	Nigeria	elec_CSP-fixed-output	0	0	0	0	0
	Nigeria	other_and_meth	1.72303	0.000100472	0.000100472	0	0

Result tab: Query



Regions

- Workspace
- World
- IPCC 5 Regions

Output Type

- Primary Energy
- Electricity
- Elect Demand
- Gas Processing
- Refining
- Industry
- Commercial
- Residential
- Building
- Transportation (Passenger)

CO2 Emissions

- Non-CO2 Emission
- Carbon Content
- Cost (Price)
- Non-Energy Cost

Query

- Sectoral
- General

1

2

3

4

Run Query

- Procedure to query
1. Select Region(s)
 2. Select Output Type
 3. Select Query
 4. Click Run button

1

2

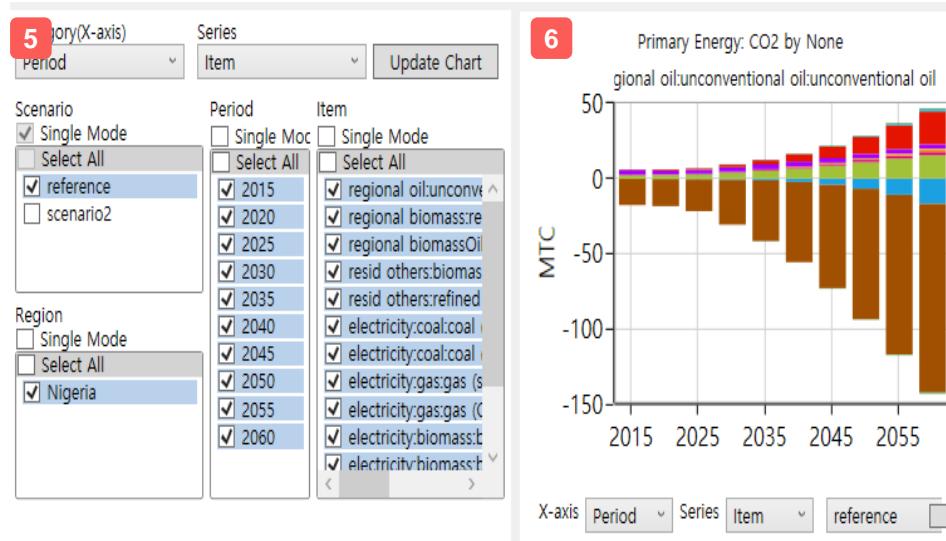
3

4

Aggregate By: None

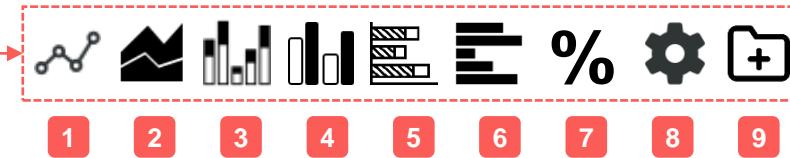
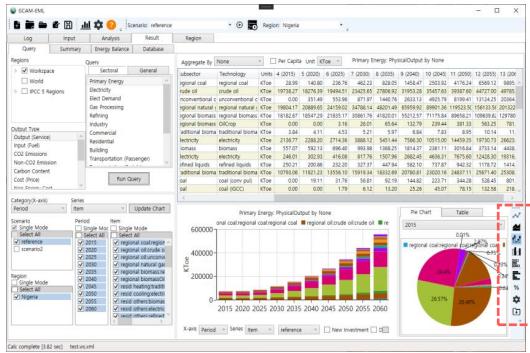
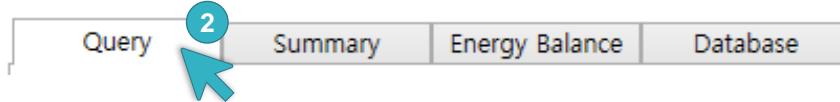
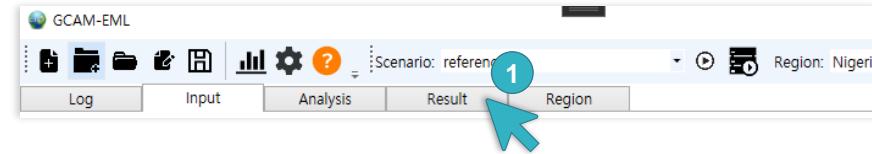
Primary Energy: InputEnergy by None

Scenario	Region	Sector	Subsector	Technology	Fuel	Units	4 (2015)	5 (2020)	6 (2025)
reference	South Korea	regional coal	regional coal	regional coal	coal	EJ	5.27375	5.71491	5.9086
reference	South Korea	regional coal	regional coal	regional coal	_water_td_pri_C	km^3	0.020226	0.0219181	0.02266
reference	South Korea	regional coal	regional coal	regional coal	_water_td_pri_W	km^3	0.066315	0.0718627	0.07429
reference	South Korea	regional coal	regional coal	regional coal	_seawater	km^3	0.0149498	0.0162003	0.01674
reference	South Korea	regional oil	crude oil	crude oil	oil	EJ	5.08224	4.77832	4.7756
reference	South Korea	regional oil	crude oil	crude oil	_water_td_pri_C	km^3	0.225221	0.211752	0.21163
reference	South Korea	regional oil	crude oil	crude oil	_water_td_pri_W	km^3	0.738429	0.69427	0.69388
reference	South Korea	regional oil	crude oil	crude oil	_seawater	km^3	0.166468	0.156513	0.15642
reference	South Korea	regional oil	unconventional oil	unconventional oil	oil	EJ	0	0.0918951	0.13570
reference	South Korea	regional natural gas	regional natural gas	regional natural gas	natural gas	EJ	2.39431	2.49225	2.6159
reference	South Korea	regional natural gas	regional natural gas	regional natural gas	_water_td_pri_C	km^3	2.06509E-2	2.14957E-2	2.25628E-2
reference	South Korea	regional natural gas	regional natural gas	regional natural gas	_water_td_pri_W	km^3	6.7708E-0	7.04776E-0	7.39763E-0
reference	South Korea	regional natural gas	regional natural gas	regional natural gas	_seawater	km^3	1.52637E-1	1.58881E-1	1.66768E-1
reference	South Korea	regional biomass	regional biomass	regional biomass	biomass	EJ	0.264962	0.243565	0.27030



1. Select Aggregate Type
2. Check Per Capita for per capita result
3. Select a desired unit
4. Query result table
5. Filter data for drawing chart
6. Display chart
7. Change chart type and chart property

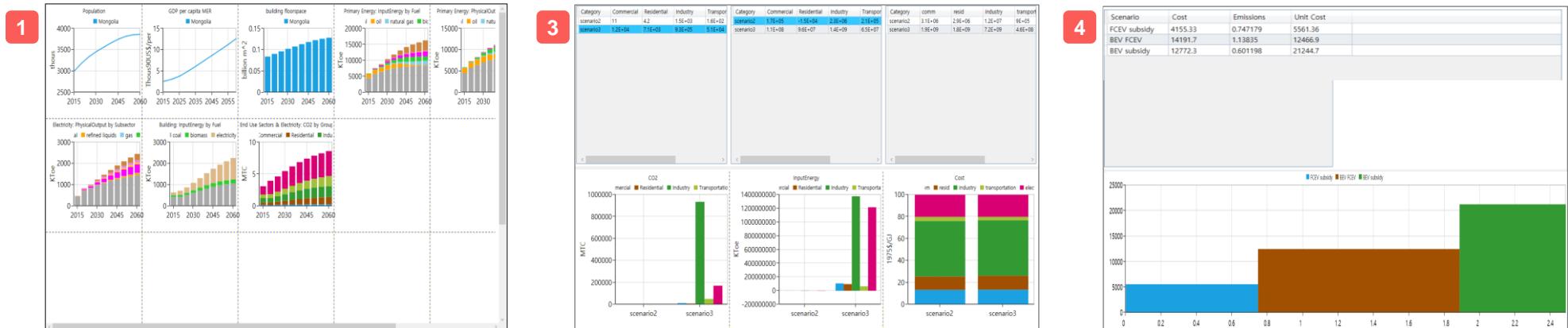
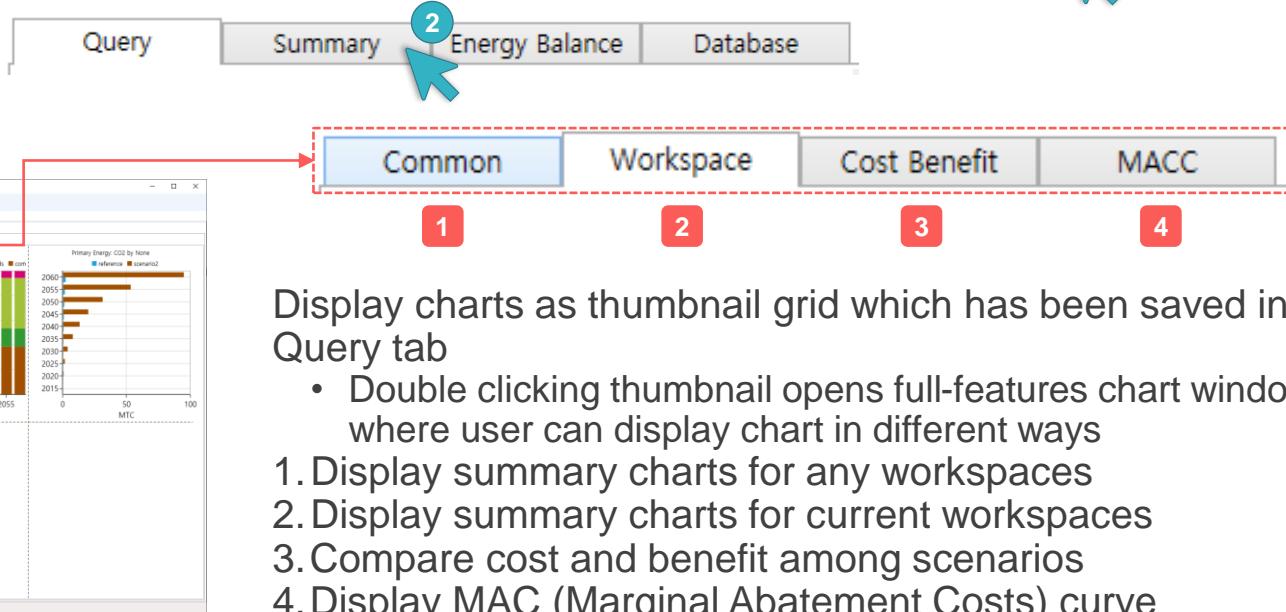
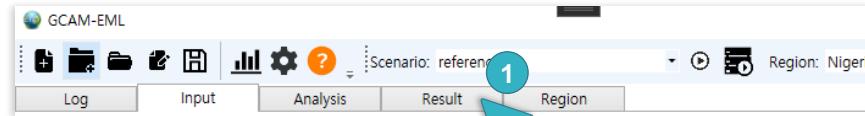
Result tab: Query



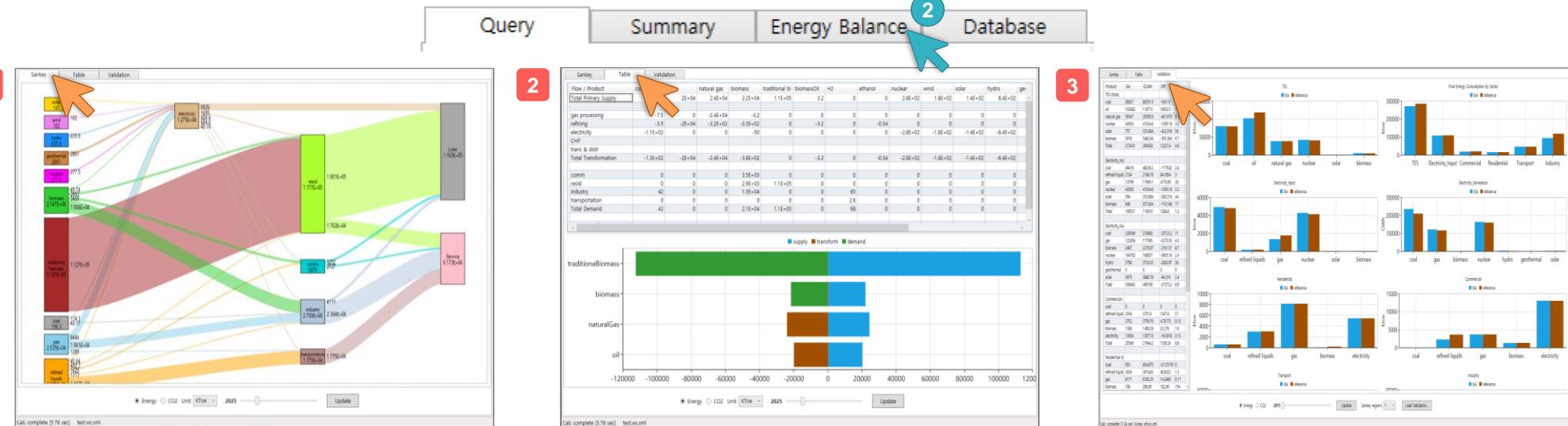
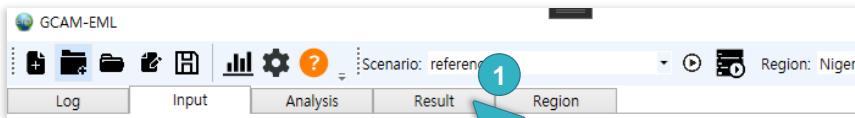
1. Line chart
2. Area cart
3. Stacked column bar chart
4. Side by side bar chart
5. Stacked bar chart

6. Horizontal side by side bar chart
7. 100% toggle button
 - On: 100% chart such as a 100% stacked bar or area chart
8. Chart option
9. Save chart as thumbnail which is displayed in Summary

Result tab: Summary



Result tab: Energy Balance



1. Display energy/emission flow in the Sankey chart
2. Display energy balance table in IEA standard format

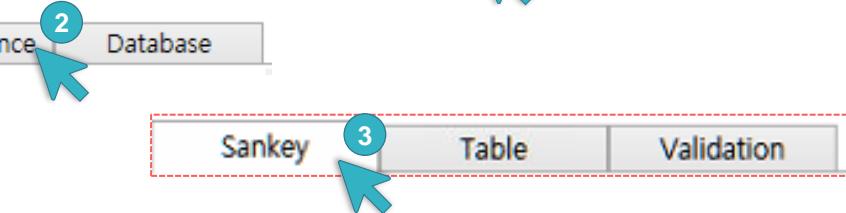
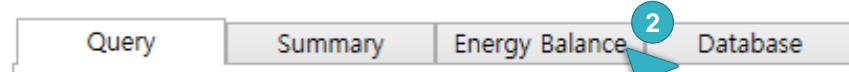
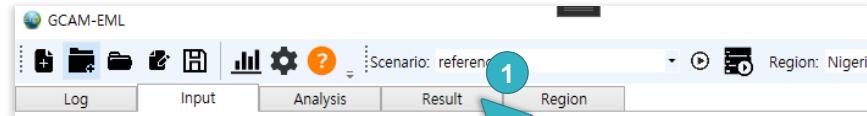
Flow

Flow / Product	coal	oil	natural gas	biomass	traditio	biomassOil	H2	ethanol	nuclear	wind	solar	hydro	geother	electricity	refined liquic	gas	Total
Total Primary Supply	3.36166	4.97034	1.64545	0.229547	0	0.0180285	0	0	1.73898	0.00471666	0.0139707	0.0134388	0				1.6566
gas processing	0	0	-1.64545	-0.0102866	0	0	0	0	0	0	0	0	0	0	0	0	-0.15092
refining	0	-4.97034	0	0	0	-0.0180285	0	0	0	0	0	0	0	-0.0407914	4.55184	-0.001008	-2.8185
electricity	-2.01955	0	0	-0.022518	0	0	0	0	-1.73898	-0.00471666	-0.0139707	-0.0134388	0	1.83899	-0.0920336	-0.7521	-0.2859
CHP																	0.0928584
trans & distr																	-0.15092
Total Transformation	-2.01955	-4.97034	-1.64545	-0.0328046	0	-0.0180285	0	0	-1.73898	-0.00471666	-0.0139707	-0.0134388	0	1.74014	4.4598	0.899762	-3.35758
comm	0	0	0	0.0589617	0	0	0	0	0	0	0	0	0	0.547533	0.154978	0.157288	0.918762
resid	0.0274183	0	0	0.0112579	0	0	0	0	0	0	0	0	0	0.2294	0.128729	0.3427	0.739055
Industry	1.3147	0	0	0.126523	0	0	0	0	0	0	0	0	0	0.996005	2.2366	0.351056	5.02488
transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00798658	1.93949	0.0487216	1.9962
Total Demand	1.34211	0	0	0.196742	0	0	0	0	0	0	0	0	0	1.78093	4.4598	0.899766	8.67935
TPS + Transform - Demand	-6.3E-06	0	0	-8.5E-08	0	0	0	0	0	0	0	0	0	-0.0407904	6.545E-06	-4.469E-06	-0.0407947

3. Display sector value difference between IEA energy balance and GCAM-EML data

This row should be 0

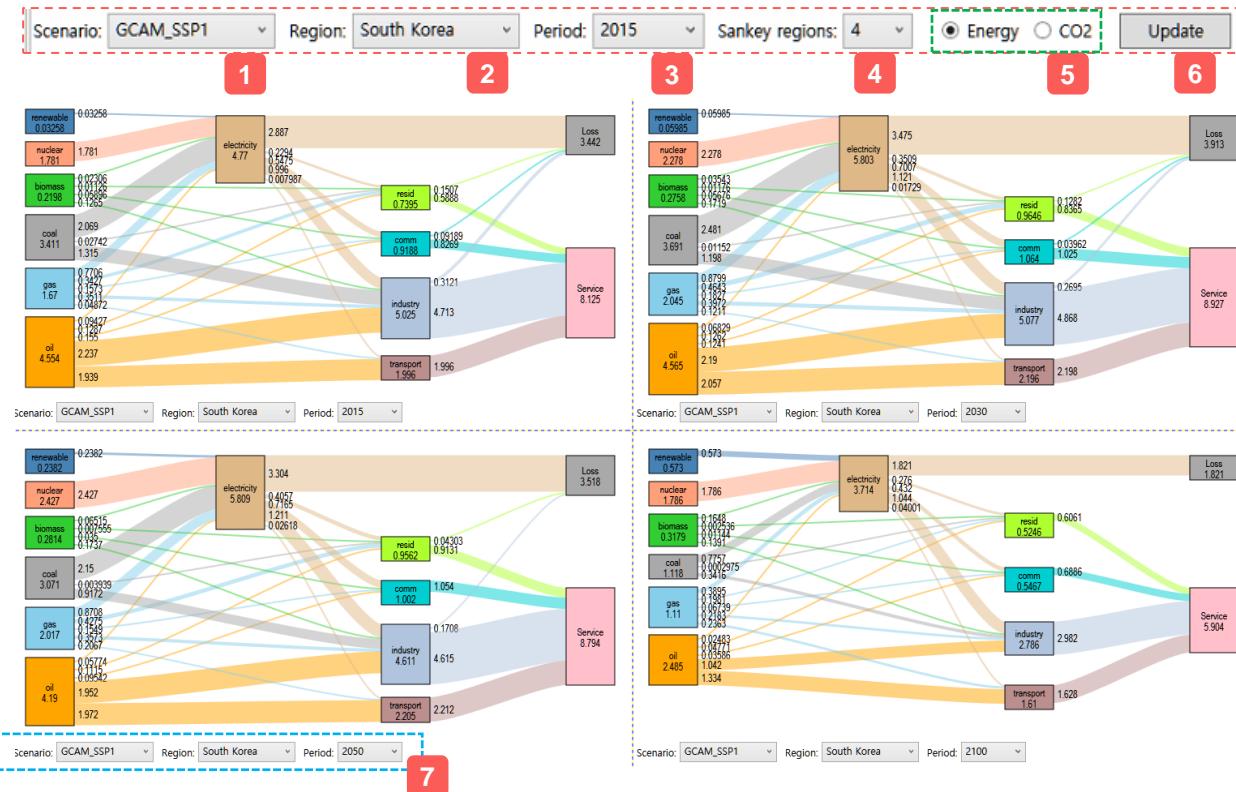
Result tab: Energy Balance



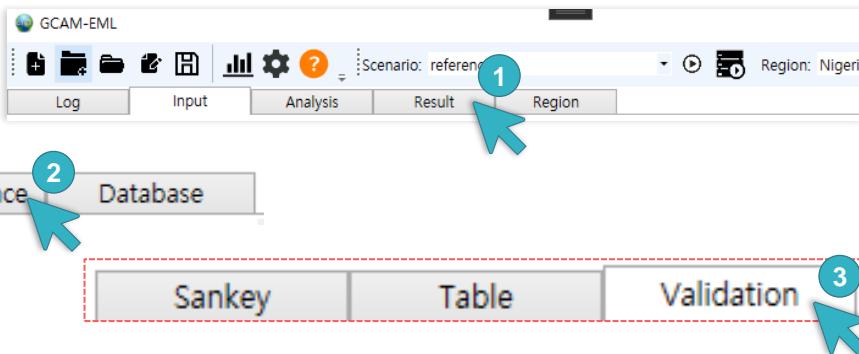
Compare simple energy & CO₂ emission flow using SANKEY diagram

- Based on 2015 IEA energy balance data

1. Set scenario
2. Set region for all SANKEY diagram
3. Set period for all SANKEY diagram
4. Set number of SANKEY diagram (1~4)
5. Choose diagram topic
6. Click the button to change the diagram
7. Change parameter in one diagram



Result tab: Energy Balance



3

Click

Compare IEA energy balance data and GCAM-EML data

- Based on 2015 IEA energy balance data

1. Compare

IEA & GCAM data's value, % diff.

2. Compare IEA, GCAM using chart

3. Load IEA energy balance csv file

* IEA energy balance data Link:

<https://www.iea.org/data-and-statistics/data-tables?country=WORLD&energy=Balances&year=2015>

* IEA electricity generation data Link:

<https://www.iea.org/data-and-statistics/data-tables?country=WORLD&energy=Electricity&year=2015>

Find country's energy balance table and make csv file as the sample form in /xcam_data/IEA_EB.

Result tab: Energy Balance

Way to make IEA energy balance table.csv

* IEA energy balance data Link:

<https://www.iea.org/data-and-statistics/data-tables?country=WORLD&energy=Balances&year=2015>

* IEA electricity generation data Link:

<https://www.iea.org/data-and-statistics/data-tables?country=WORLD&energy=Electricity&year=2015>

Explore energy data by category, indicator, country or region													
Energy Category	Country or region	Year											
Balances	World	2015	Coal	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Wind, solar, etc.	Biofuels and waste	Electricity	Heat	Total
Production	3 877 572	4 419 467		2 966 252	6 701 72	334 851	203 821	1 265 443		1 867	13 739 445		
Imports	7 651 86	2 312 966	1 276 375	878 814					23 451	64 620	6	5 321 418	
Exports	-7 95 086	-2 264 148	-1 380 269	-910 334					18 044	-63 001	-5	5 420 889	
International marine bunkers													
International aviation bunkers													
Stock changes	-4 929	-18 429	-17 727	-15 937				385			56 637		
TES	3 842 742	4 449 855	-12 162 2	2 928 795	6 701 72	334 851	203 821	1 271 235	1 619	1 868	13 583 338		
Transfers	-971	216 085	24 146					-27			24 334		
Statistical differences	-19 322	4 961	37 804	15 714				24	-2 245	-6 508	407	20 867	
Electricity plants	1 686 083	46 486	188 553	-818 301	-662 093	-334 851	-158 438	-96 750	1 759 146	-873	2 233 784		
CHP plants	-618 700	-7	18 488	-321 488	-7579		-2729	-59 613	328 588	228 299	4 71 718		
Heat plants	23 963	654	-11541	62 264			-1203	-1156	373	98 066	13 491		
Gas works	-8 451	-3	-2482	4 592				-220			-6 565		
Oil refineries	-4 208 441	4127460									80 981		
Coal transformation	282 304	-2 531	-64					-166			285 085		
Liquefaction plants	-10 105	14 376	17 894								-13 623		
Other transformation	-368	46 461	-35 562	-12 974				-77405		-569	80 417		
Energy industry own use	92 711	-12 077	213 705	-273 590				14 408	-176 684	-36 950	820 124		
Losses	-2 503	8 478	-391	19 864			-11	-189	-165 064	18 265	-214 765		
Total final consumption	109 261	13 500	3 811 786	1422 661			41 414	1 008 654	1 740 726	2 71984	9 407 986		
Industry	888 001	3 556	292 606	541 402			850	199 657	733 588	124 658	2 784 319		
Transport	56	15	2 486 875	97 764				78 151	28 795		2 691 655		
Residential	74 956		204 943	423 166			29 973	688 011	472 082	102 624	1 995 755		
Commercial and public services	34 778		82 279	185 474			7 680	29 396	387 199	34 421	761 226		
Agriculture / forestry	15 327	10	106 938	9 229			1 878	11 187	49 932	3 074	19 7573		
Fishing	1		6 363	97			43	22	616	31	7173		
Non-specified	29 839	58	23 450	3 520			990	2 230	68 914	7176	135 777		
Non-energy use	54 305	9 861	608 332	162 009			834 508						

1. Copy to excel

2. Copy a value which has a space in middle of value (something like 81 129)

3. Select all the IEA value and Ctrl + h
(find and replace)

4. Paste the value and remain only space in 'Find what' and 'Replace with' nothing.

5. Make same form as the sample form.

* IEA energy balance data Link:

<https://www.iea.org/data-and-statistics/data-tables?country=WORLD&energy=Balances&year=2015>

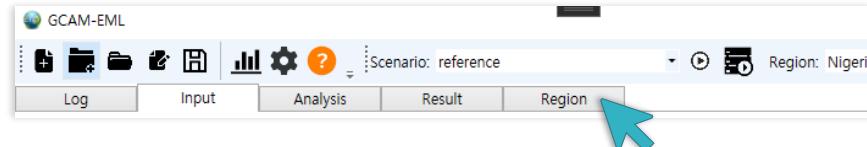
* IEA electricity generation data Link:

<https://www.iea.org/data-and-statistics/data-tables?country=WORLD&energy=Electricity&year=2015>

Find country's energy balance table and make csv file as the sample form in /xcam_data/IEA_EB

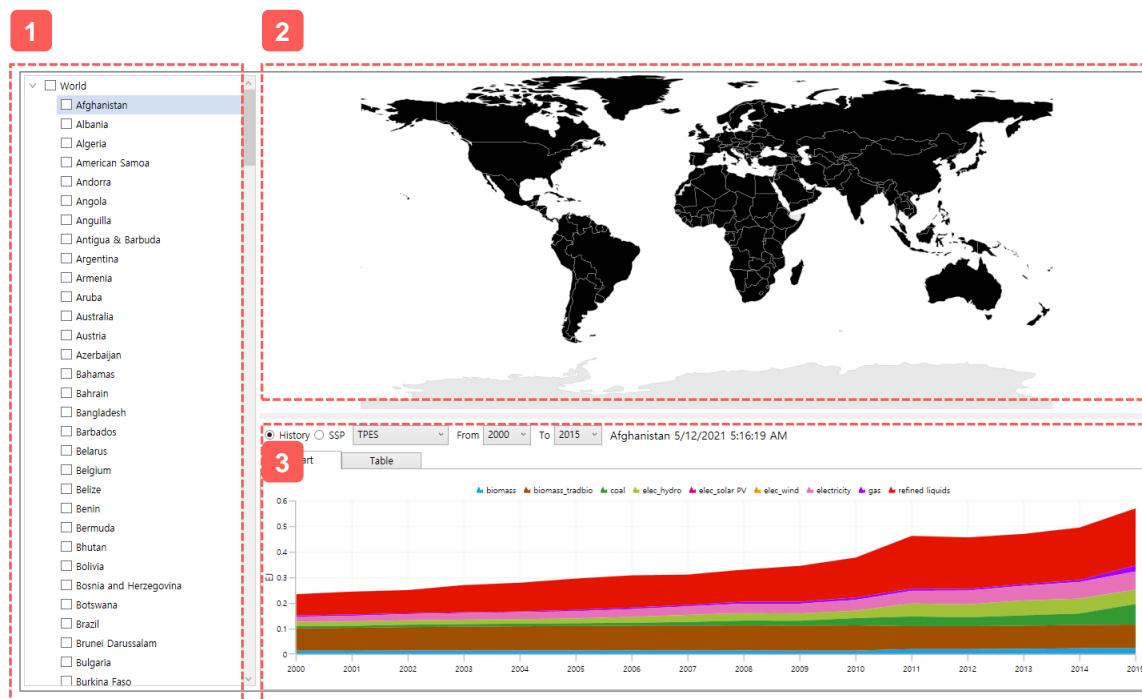
Drag end here(out of line)

Region tab



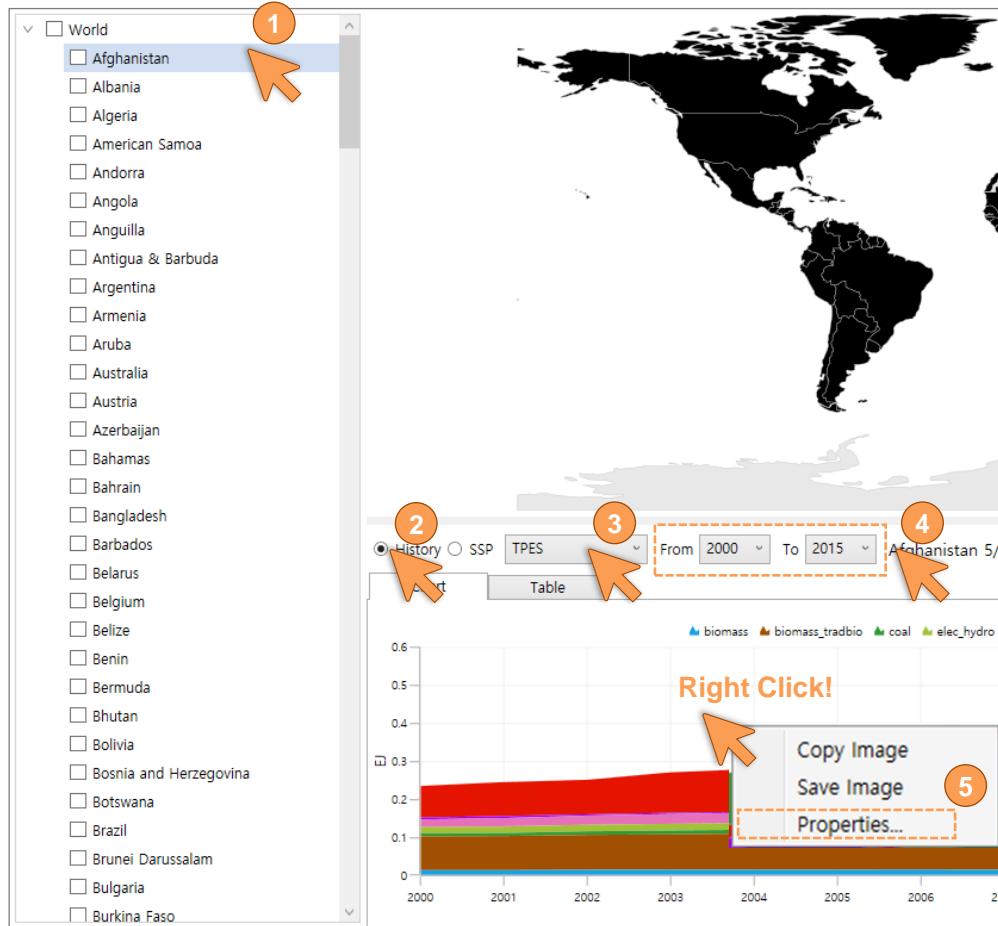
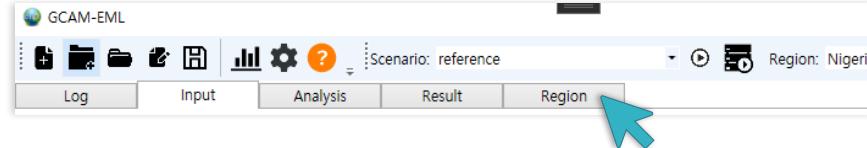
Provide historical data for each individual country

- Population and GDP
 - The socioeconomic data comes from IMF and UN.
- Energy input or output of each sector (TPES ~ heat)
 - The energy data comes from IEA's energy balance.



1. Country list.
2. Highlight a selected country
3. Historical data graph

Region tab



1. Select a country
2. Check 'History' radio button
3. Select socioeconomic variable or energy sector
4. Select period

Change graph type

5. Go to 'Properties...' in the context menu, then 'Chart Properties' dialog will pop up
6. Select chart type in the combo box and click 'Apply' button. And then, re-select socioeconomic variable or energy sector again.

