Release Note

GCAM-EML ver 1.0.15.630

This Program is developed by the collaborative work of Energy Modeling Laboratory at Ajou University and Joint Global Change Research Institute (JGCRI) / Pacific Northwest National Laboratory (PNNL).

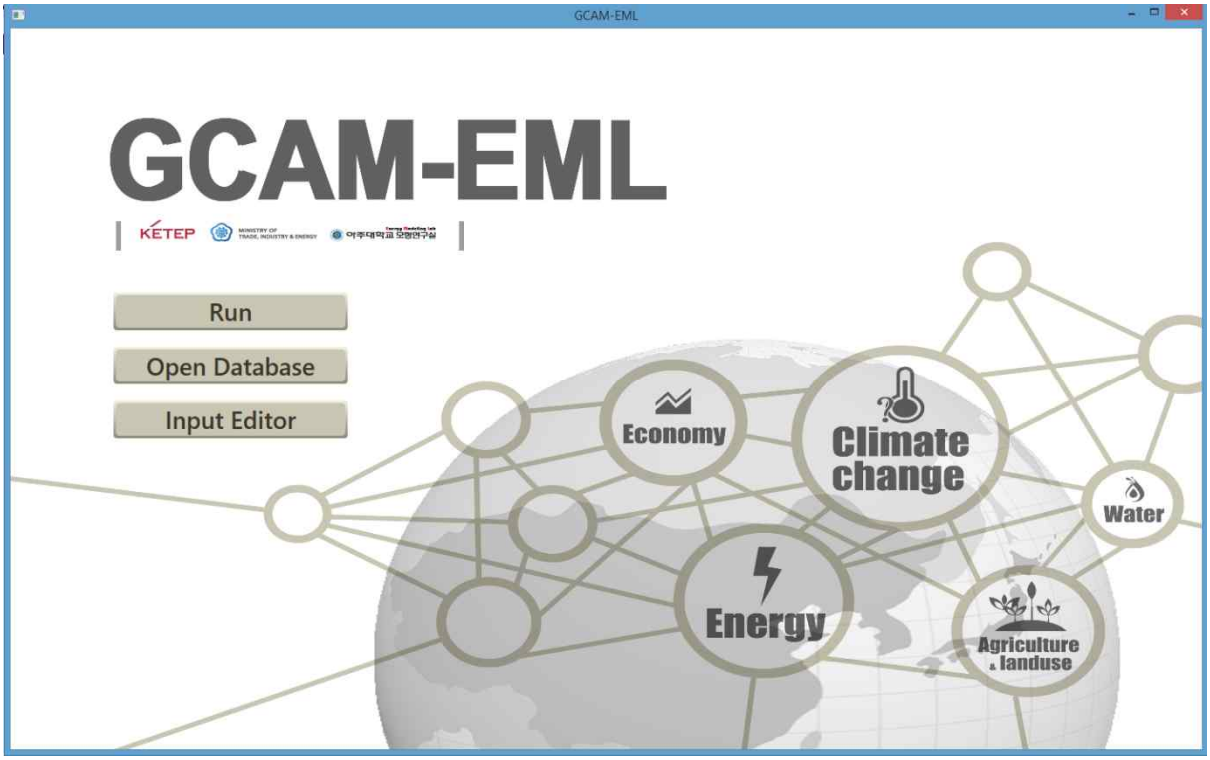
This work was supported by the International Cooperation Research Program (No. 20128510010060) of the Korea Institute of Energy Technology Evaluation and Planning (KETEP) grant funded by the Korea government Ministry of Trade, Industry and Energy.

July 1st, 2015

Energy Modeling Lab
Department of Energy Systems Research
Ajou University
www.eml.ajou.ac.kr

How to Use

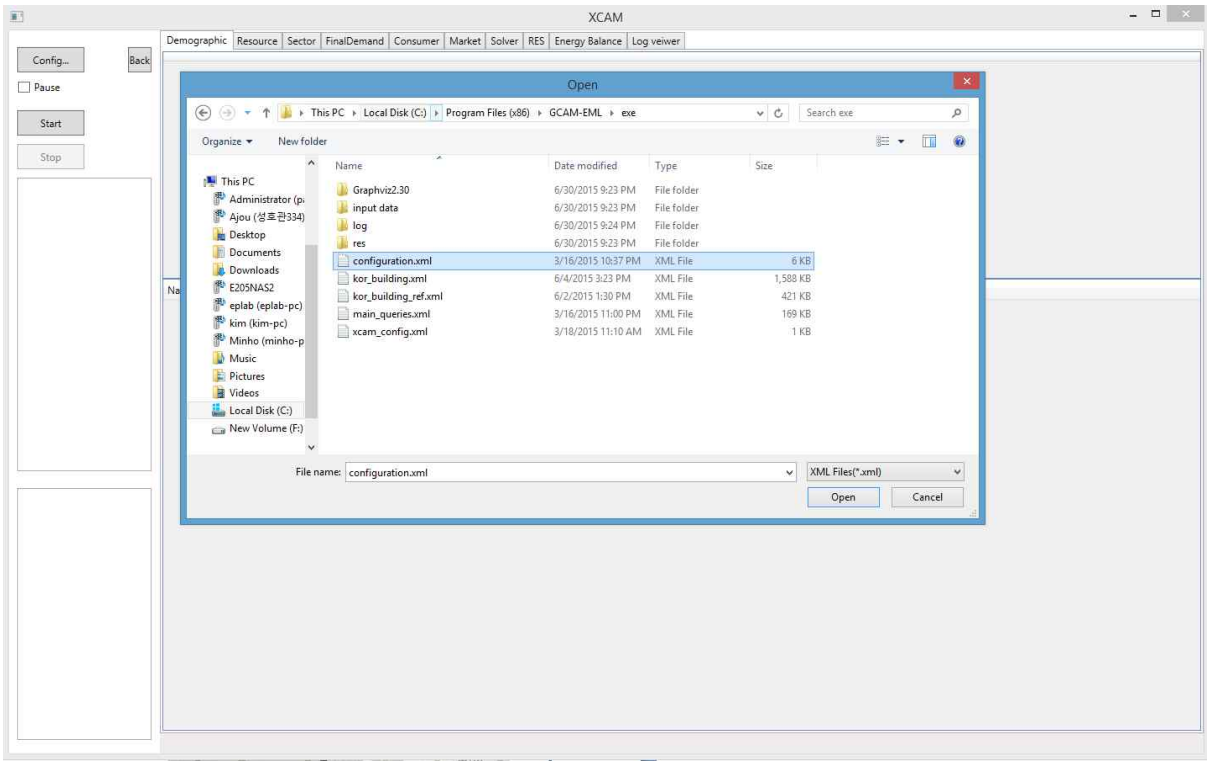
Install the program simply by double clicking the *setup.exe* downloaded from the EML website. After finishing the installation process, the main execution file of GCAM-EML can be checked in (usually) C:₩Program Files (x86)₩GCAM-EML₩exe folder. There, double click *Xcam.exe* to start the program. Or you can simply find the shortcut of the *GCAM-EML.exe* in the desktop or start menu. The front-screen of the GCAM-EML would look like the figure below.



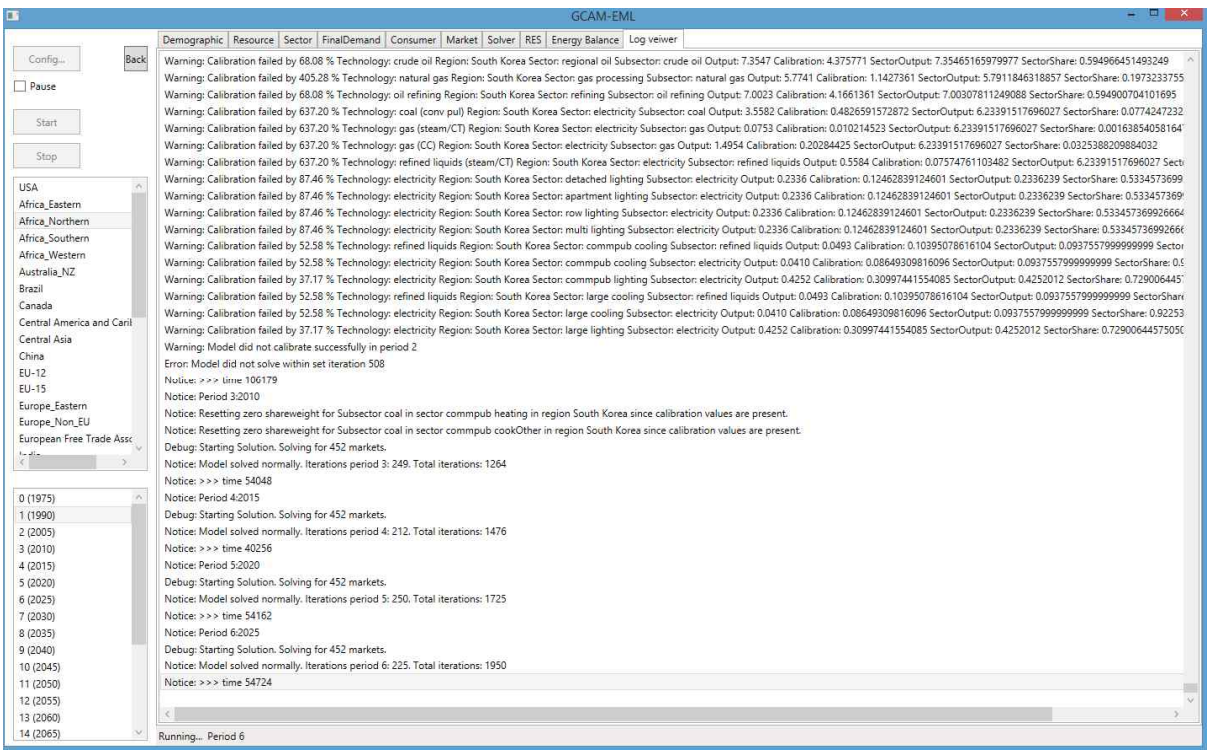
As seen in the figure above, there are three options in the program:

1. **Run**

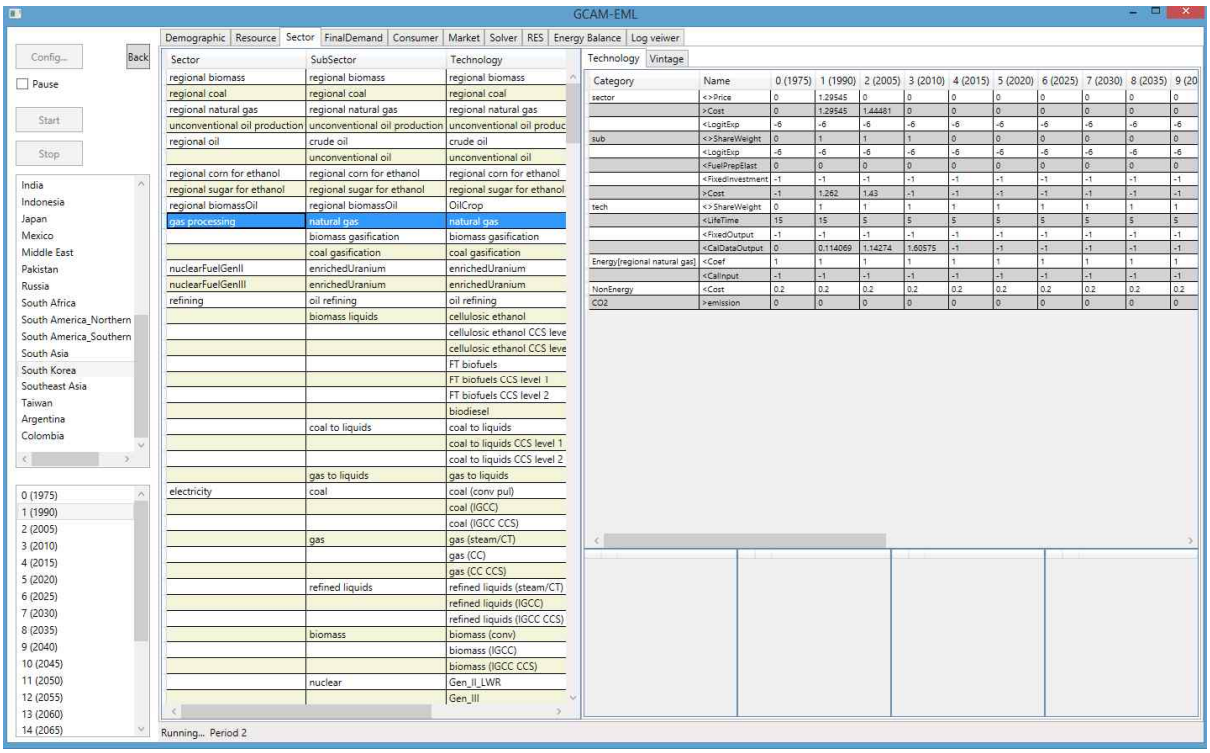
The first function in the GCAM-EML is *Run*, which is the more advanced and user friendly version of the original GCAM run. To utilize this function, press the *Config...* button to open up the configuration file, which, among others, list up the input xml files that compose the GCAM structure itself. The default file that can be chosen is the configuration.xml as shown in the figure below. After that, press *Start*.



At this point, the model will run as can be seen in the bottom part of the GCAM-EML screen. There, the user can determine at which point (period) the program is currently running. The improved GCAM-EML's GUI also provides several tabs to assist the user understand the progress and the process inside the GCAM running. The *Log Viewer*, for instance, lets the user to see the log, similar to what is shown when running the vanilla GCAM. Figure below shows the example of *Log Viewer* which shows the parsing process of the input files.



The other tabs provides the user with the many data and information that are being processed by the program. Some of them (*Demographic, Resource, Sector, Final Demand, Consumer*) represent the many class of parameters in GCAM, which interact between each other. The *Demographic* tab is a specific class for population and GDP related parameters, such as labor productivity and productivity growth. The *Resource* tab shows the data related with resource in GCAM (coal, crude oil, natural gas, uranium, etc.), such as the grade-wise available resource and its extraction cost. The *Sector* tab deals with the many sectors in GCAM which build the energy and Agricultural and Land Use (AgLU) system. The sectors are the connectors between resources and final demands, including the transformation system and end use services. Information such as efficiency, non-fuel input cost, and base year calibrated-value can be observed in this tab. The *Final Demand* consists of information related with transportation and industry sectors, while the *Consumer* currently holds the information about building sector (residential and commercial). In these tabs, the user can check the parameters that control the demand calculation, such as base-service, income-elasticity and price-elasticity. At figure below, an example of checking the parameters in gas processing sector is shown.



Since GCAM is a partial equilibrium, market mechanism is used to find the solution of the model. The tabs *Market* and *Solver* are important to check this process. The *RES* tab stands for the Reference Energy System. This feature is developed to untangle the complexity of energy system in GCAM. Here, the user can choose a specific sector and see its relationships with other sectors within GCAM. Las, the *Energy Balance* tab shows the calibrated-value that is used to calibrate GCAM parameters in the base year. Please also note that the user should choose the specific

region and period before selecting the tabs to check the information there.

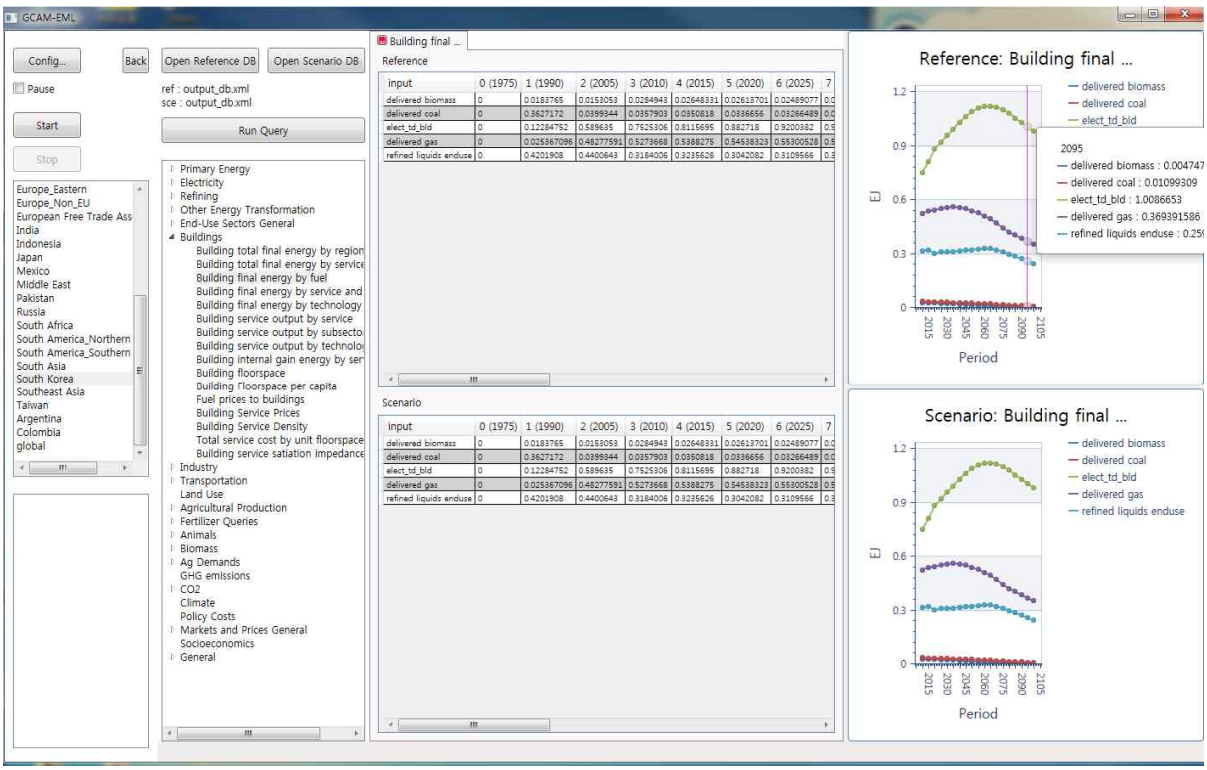
Another feature is to *Pause* momentarily the running of GCAM-EML at the current period. Please note that the model will halt after the whole process within a period is done. Then, the user may continue the run by pressing the *Start* again.

The end of the running process would produce an output xml file (*output_db.xml*) in ₩GCAM-EML₩exe₩log folder.

2. Open Database

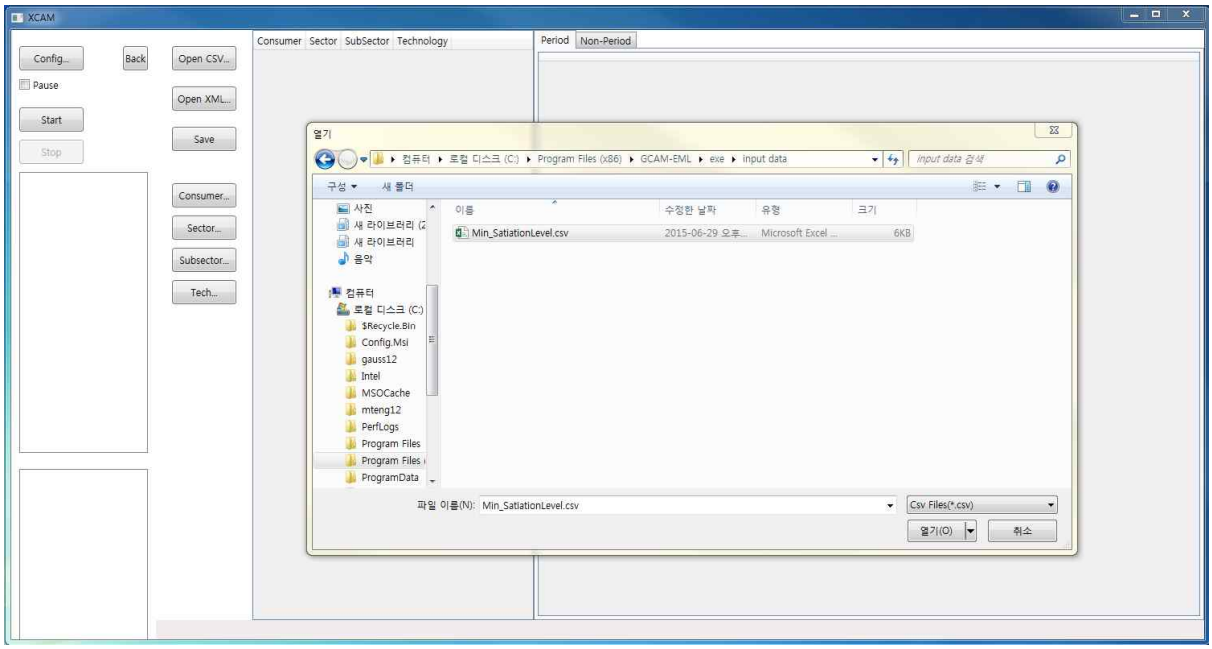
This option enables the user to easily check the output file of GCAM which is in xml form. This feature upgrades the Model Interface of GCAM. To open the target output db file, please click the *Open Reference DB* button. Then, the user can select the target xml file, for example (output_db.xml). GCAM-EML GUI also gives ability to the user to compare two scenarios at the same time. This feature can be used by selecting the second db file through clicking *Open Scenario DB* and choosing another DB file.

Then, the user can choose one of the many queries available in the UI. The queries are classified into several categories, such as electricity, buildings, industry, and transportation. For example, the user can choose query *Buildings final energy by fuel* and then click *Run Query*. Then, the GCAM-EML UI would produce the information as requested by the user in form of table and graphics. The user can easily compare the results between the two scenario using this feature. Figure below show the example, although in this case the scenarios compared are the same one.

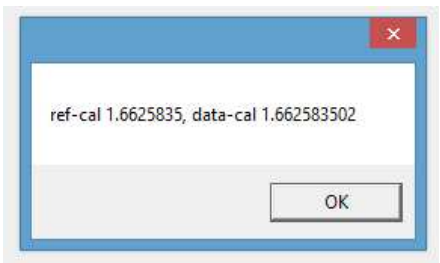


3. Input Editor

The Input Editor simplifies the reading and redefinition of model structure in GCAM. Currently the feature is tailored specifically for the building sector, which is the main object of the project for which GCAM-EML is built. A csv file is used as input file, which sets the structure of building sector such as Building type and the energy services that are demanded by the building. This is done by redefining the consumer, sector, and technologies in the original GCAM structure. The base-year energy consumption (which is used for calibration) is read from the csv input file. Other parameter like the satiation level and base building size are also read in by the program from the same csv file. To read in the csv file, the user can simply click the *Open CSV...* button and choose the target csv as shown in figure below. The example csv file is provided in ₩GCAM-EML₩exe₩input data folder.

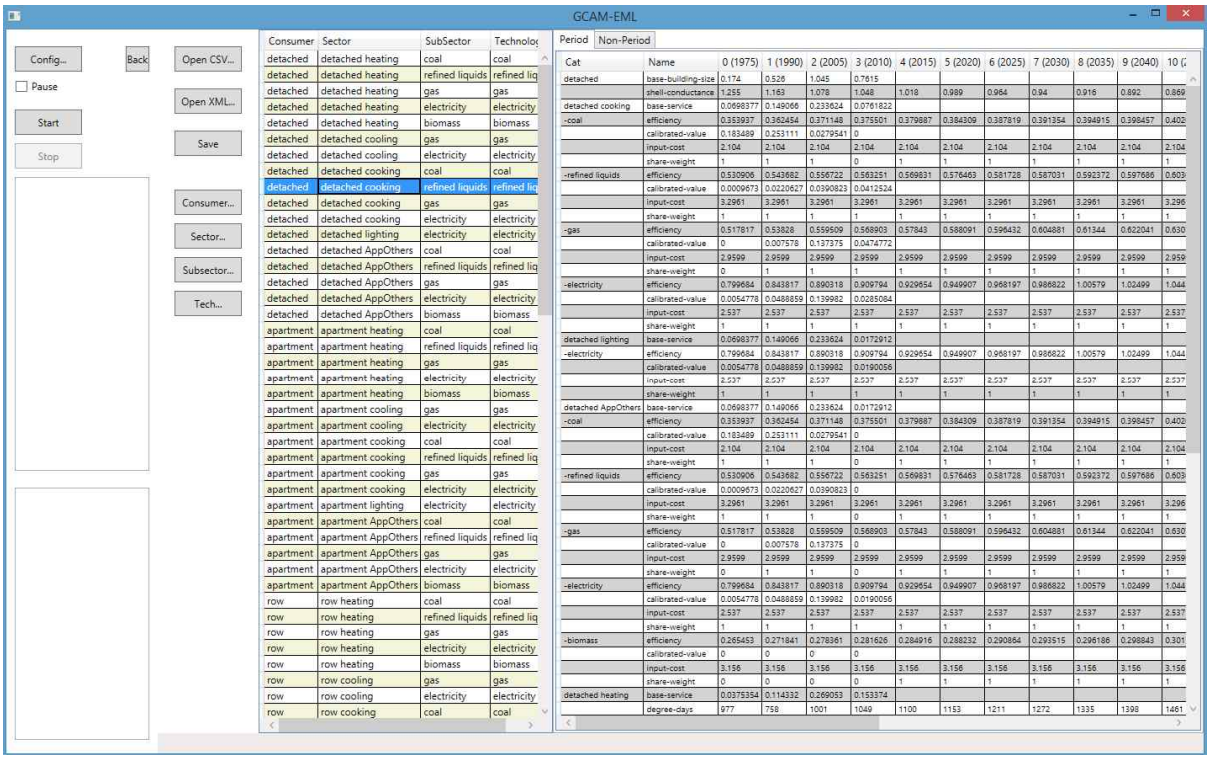


After selecting the appropriate csv file, the program would read in the data and translate it into the xml file for building sector. But before that, the program compares the total size of calibrated values between the new definition/structure and the original (reference). If the value is close enough, as shown in the figure below, then we can simply proceed to the next step. This checking process is important to make sure that there is no error in the model.



After clicking *OK*, the user can see the inputted data in the GCAM-EML UI as shown in the figure

below. Here, the user can choose to see the data within a consumer/sector/subsector/technology. The user then can check if the input data for the building sector is correct or appropriately set or not. The user also able to change the data right on the UI, simply by clicking and inputting the desired value. Afterwards, the user can click *Save* button to save the resulting file into the xml file. The resulting file would saved as kor_building.xml, which is saved in ₩GCAM-EML₩exe folder. Please note at this point, the same pop up as the one above would show up again to re-check the calibrated-value total.



At this point, the user can directly try to run the model with the new input file (kor_building.xml) by clicking the *Config* button, then selecting the *configuration - kor building.xml* (This configuration file has been modified to include the kor_building.xml instead of the original building xml file. After clicking the *Start* button, the model would run properly. As pointed earlier the user can click *Back* and go to *Run* option to be able to check the progress of the model run. The *Log Viewer* tab as well as other informative tabs in this feature are available at the user's dispense.