

Developing GHG inventory management system for Korean energy sector

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Outline of Presentation

1. Energy Data

- How to collect and compile them?
- Limitations and difficulties?

2. Energy Sector GHG Emissions Data

- Overview of energy sector GHG emissions in Korea
- Necessity of management system
- Optimal way of data organization
- Improvements

※ Focus on Very Practical Issues



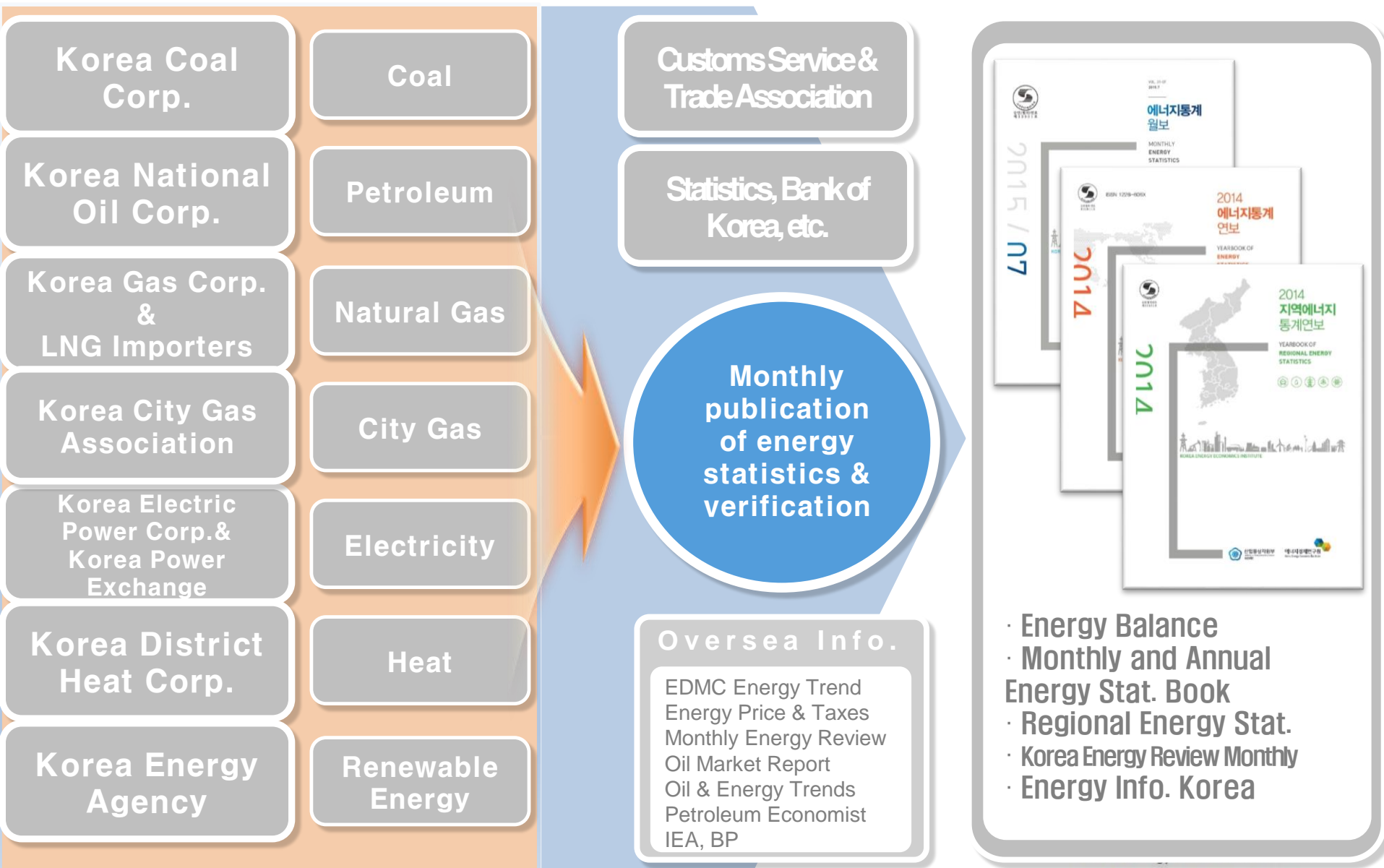
1. Energy Data



Energy Data Collection

- Energy importers and producers regularly report raw energy data to KEEI
 - Some of them provide data by law, and rest of them voluntarily
 - There is no serious punishment for no reporting
- KEEI collects energy and other social data from various sources for triangulation
 - For example, KEEI collects energy import data from importers and customs service as well.
- KEEI publishes monthly energy statistics as it is and annual energy statistics after verification
 - Annual energy statistics are official and used for GHG inventory.

Energy Statistics Compiling Process





Limitations and Difficulties

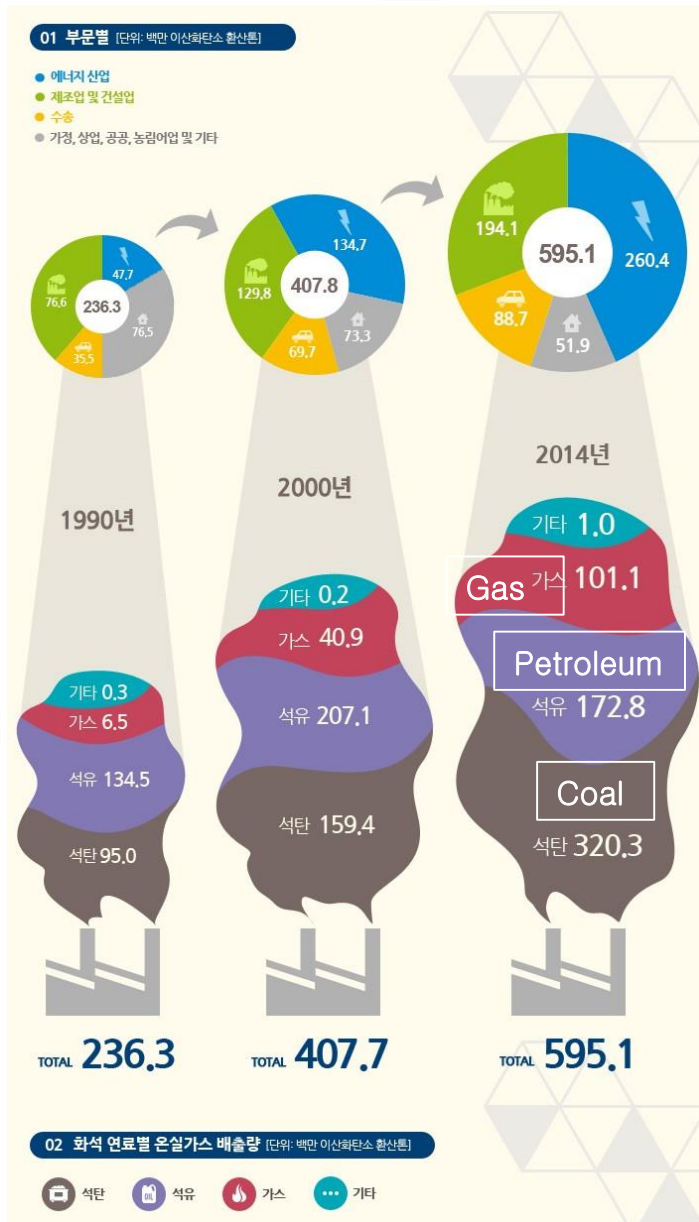
- Depending on voluntary cooperation of reporters
 - KEEI cannot control raw data collection process
- Different criteria on energy type and sector categories by reporters
 - Each reporters have their own criteria
 - Depth of sector category varies by reporters
- Various data collecting period
 - Each reporters have their own collecting and reporting schedule
- Possibilities of human and systematic error
 - Raw data collecting stage
 - Integrating and converting data from different reporters



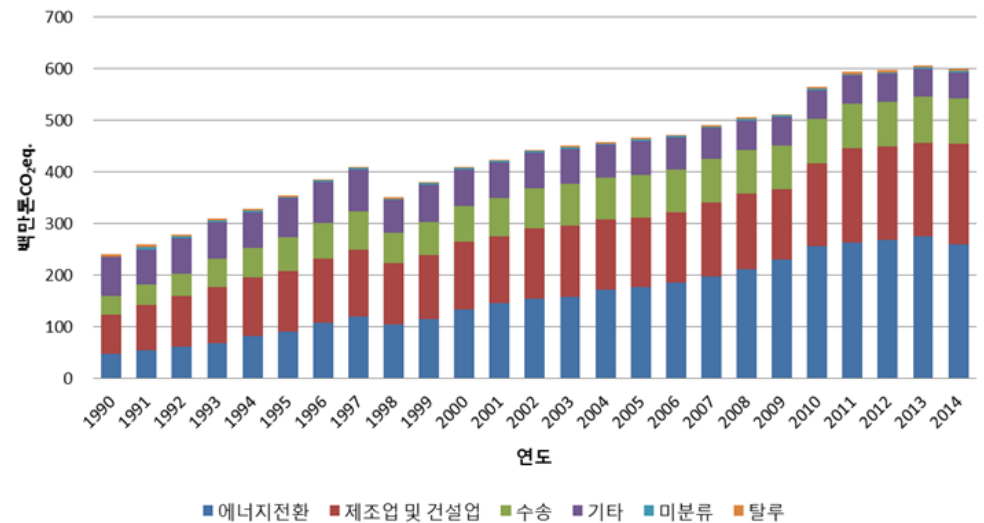
2. GHG Emissions Data



Energy Sector GHG Emissions



- Korean energy sector emitted about 600 MtCO₂e in 2014,
 - Total national emissions was about 690 MtCO₂e
 - Energy sector's portion in world GHG emissions was about 1% in 2014(IEA, 2017)



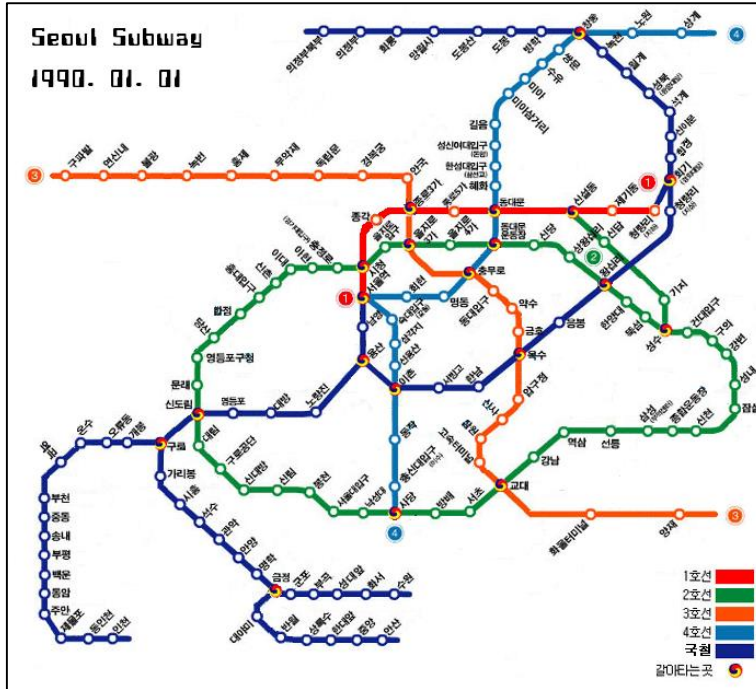


Energy Sector GHG Emissions

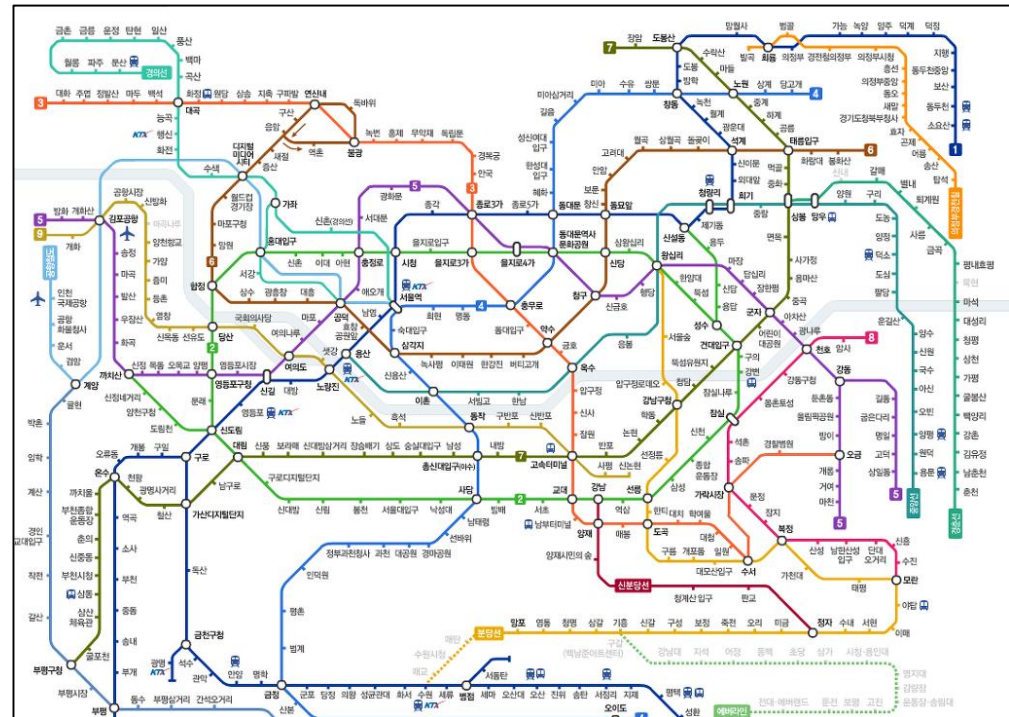
- Activity data, emission coefficients, method
 - Major activity data: annual energy balance
 - Emission coefficients: country specific coefficients and IPCC 1996 and 2006 guideline default coefficients
 - Method: IPCC 1996 guideline(transition to 2006)
 - Adjusting activity data and emissions coefficients with other available data(survey data, raw energy data, etc.)
- Source categories and GHG
 - Source categories: 1A1~5(Except 4), 1B
 - GHG: CO₂, CH₄, N₂O (CH₄ only from 1B)
- Major challenge in GHG inventory work
 - Improve transparency and accuracy: data organization
 - Make inventory work sustainable



Necessity of Management System



- Complexity of input data!
 - High risk of error
 - Hard to verify
 - Low work efficiency
- Need to improve accuracy and transparency, also ensure sustainable work

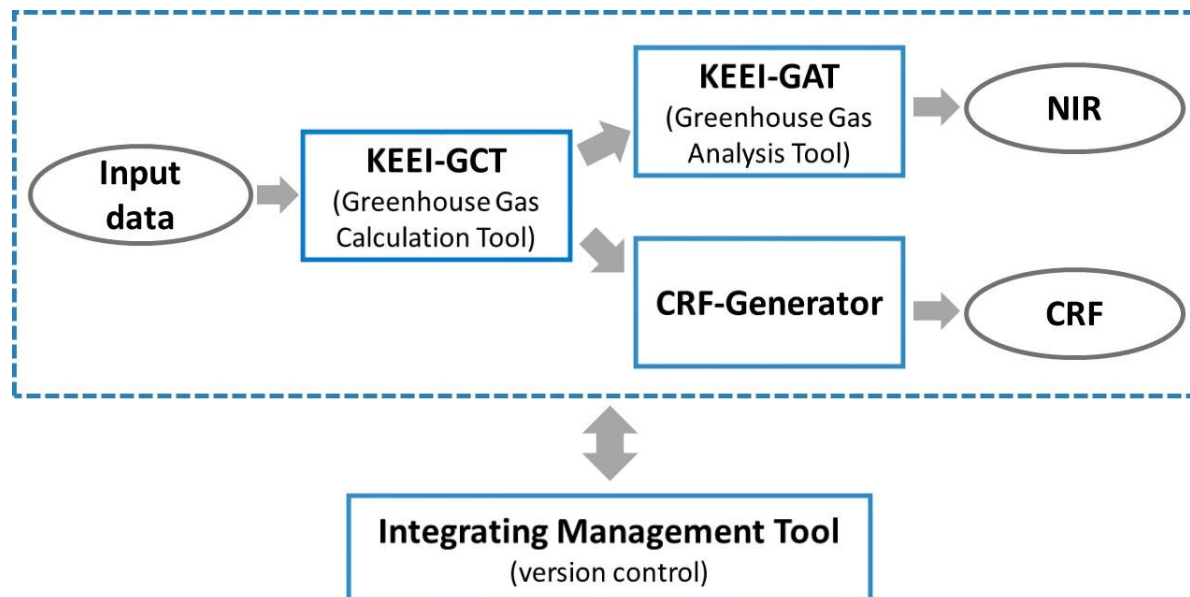


KEEI-GHG Inventory Management System(GIMS) Project since 2011



Required Functions for GIMS

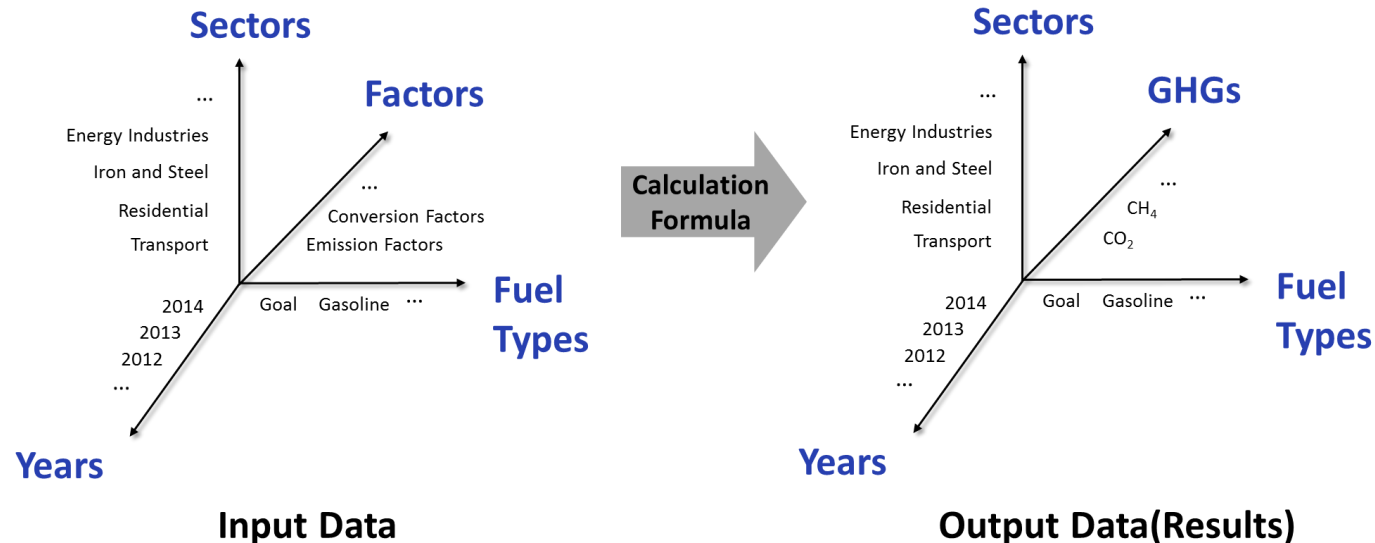
- Automatic calculation and easy verification
 - Linking input data automatically
 - Review whole calculation process
 - Change calculation method and update coefficients
- Producing tables and graphs for National Inventory Report(NIR)
 - Pivot input and output data set
- Generating Common Reporting Format(CRF) files
- Record keeping
 - Track revision and version history





Inventory Data Characteristics

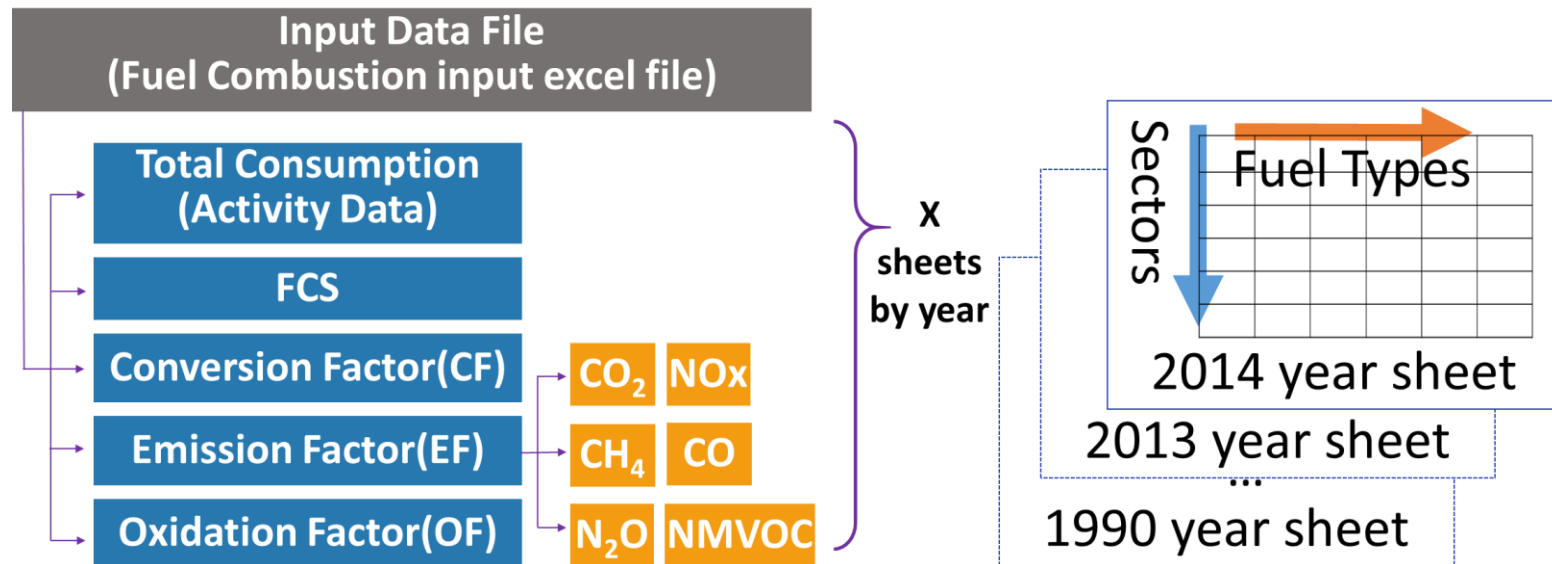
- Inventory input data have multiple dimensions
 - Each activity datum has multi-dimensional information including fuel type,
 - sector, year, emission factors, unit conversion factors, heat values and so on
- Frequent recalculation of inventory data is necessary
 - Update of activity data, and revision of methods, emission factors, conversion factors, etc.





Input Data Management

- Optimal way to organize input data using MS Excel files
 - Tab by year, row by fuel type, column by sector(just like energy balance). Annual tabs all in the same format
 - Time consuming to build but helpful in QA/QC



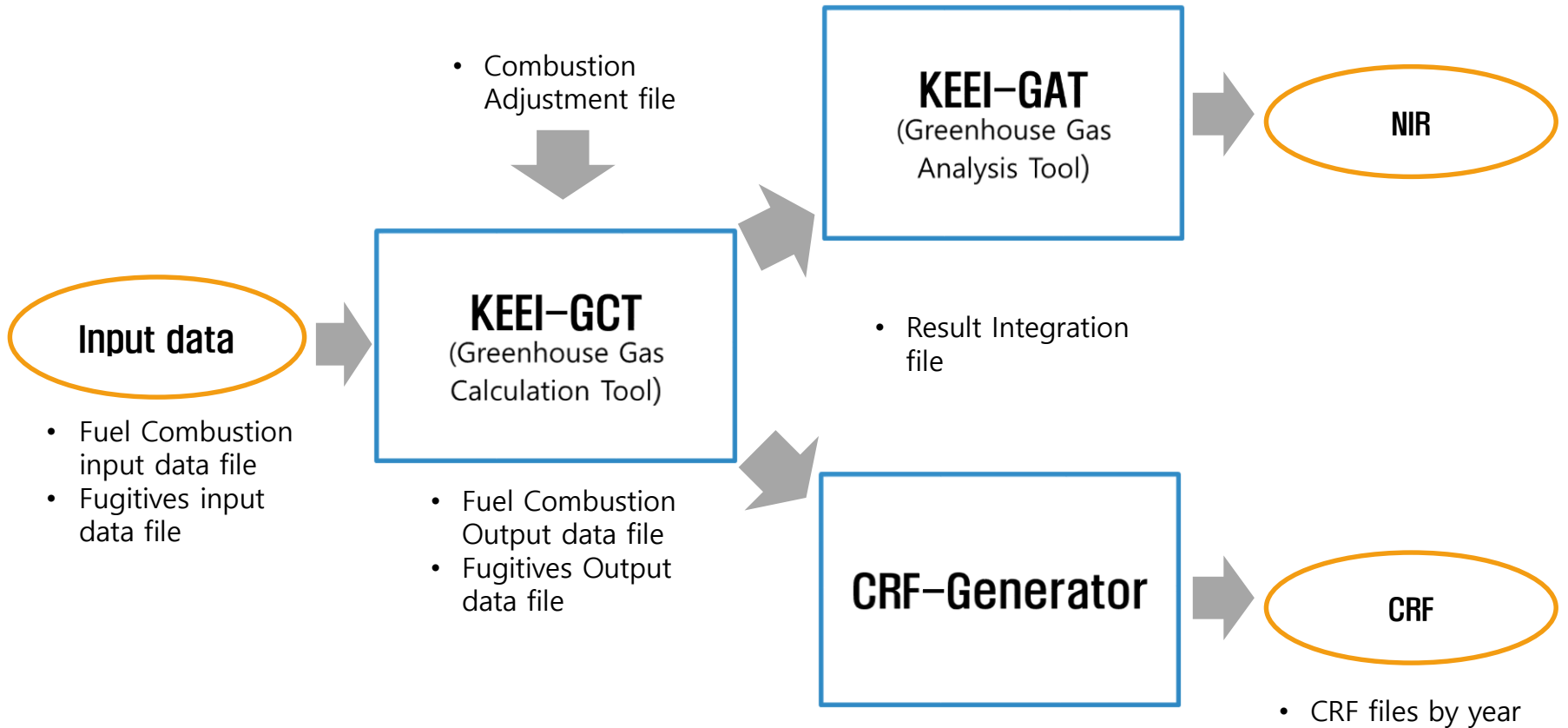


Other Improvements

- Total number of files: Six(used to be total 16 files)
 - Input: combustion(1), fugitives(1)
 - Adjustment: combustion(1, utilizing detailed data)
 - Output: combustion(1), fugitives(1)
 - Integration of results(1)
- Standardization
 - Variable name: ex) TA.2017 for 2017 activity data, EF.CO2.2016
 - Fixed cell location for specific data: ex) Food producer-gasoline -> Q37 at all tabs
 - Color coding: ex) red for 1996 emission factors
- Use of network drive
 - Everyone shares the same file
- Automatic record keeping of all activities(Using Github)
 - Record all revision and update activities by cell



File Processing Flow





Final Thoughts and Suggestions

- Staying simple is the key
 - Limit the total number of files
 - Organize your data by your team's own rule, which outside reviewers can easily understand
- Consider to use Excel binary file
 - File size will get bigger
- Work closely with energy statistics compilers
 - Improvement or change of energy data quality should be reflected on the GHG inventory immediately
- Cross-checking with team members is must
 - Team leader has to monitor members' work
- Record keeping is important
 - Have to report recalculation at NIR
 - Need to track down "who and why" of errors in order to prevent the same error
 - It saves time at the end
- Utilize NIR for information sharing of your team
 - Try to record every information
 - NIR is an official document but also your team's history book

Thank You!

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