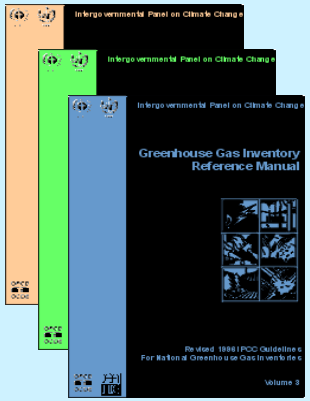
Japan's Experience in Compiling and Reporting the National GHG Inventory

Naofumi Kosaka
Greenhouse Gas Inventory Office of Japan

18th Workshop on Greenhouse Gas Inventories in Asia
July 2021

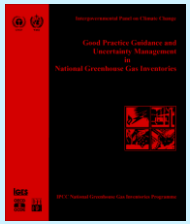
Revision of the IPCC Guidelines

Revised 1996 IPCC Guidelines



Annex I Parties must use until 2014 submission

Currently, Non-Annex I Parties use these under the UNFCCC.



GPG2000
(non-LULUCF)

GPG2003
(LULUCF)

2006 IPCC Guidelines

Annex I Parties must use from 2015 submission

All Parties to the Paris Agreement must use from 2024 submission

New Supplementary Guidance in 2013 (encourage to use)

JAPAN'S EXPERIENCE ON TRANSITIONING TO THE REVISED GUIDELINES

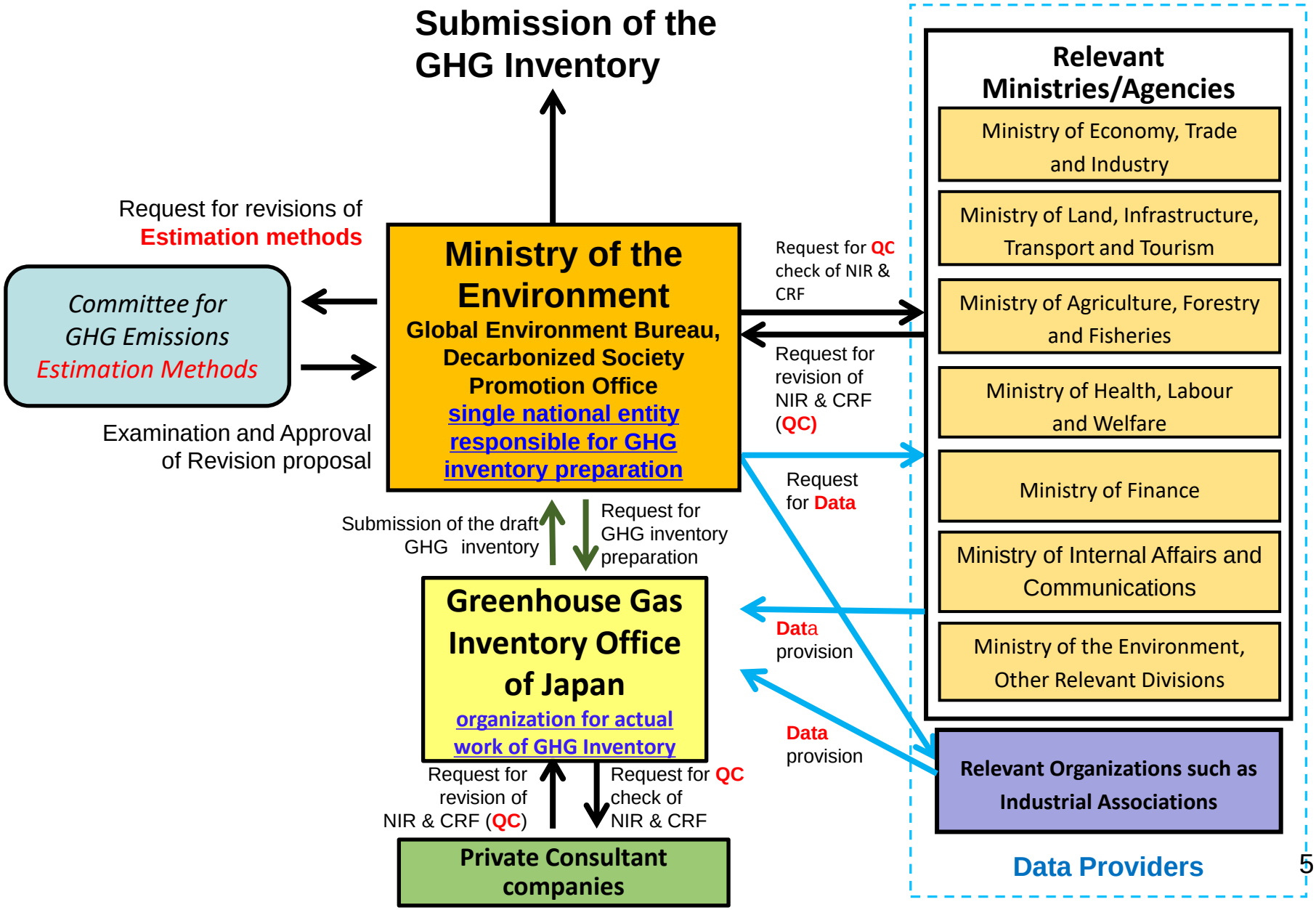
Revision of UNFCCC Reporting Guidelines

- COP19 adopted the revision of the UNFCCC inventory reporting guidelines for Annex I Parties to incorporate the 2006 IPCC Guidelines. (Decision 24/CP.19)

Timeline

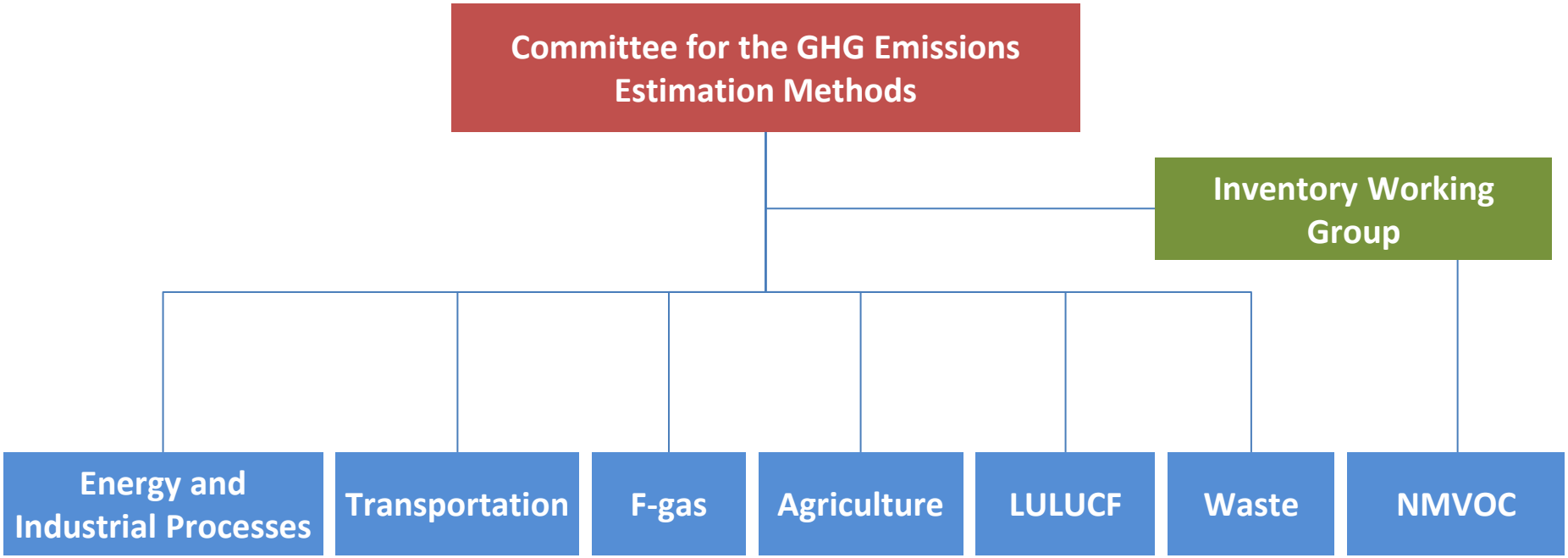
Date	International	Domestic
Jun. 2009	SBSTA made the Work Plan for 2015 submissions applying 2006GLs	
Dec. 2011	COP17 decided Reporting Guidelines (in. CRF), tentatively.	
2012	(Each party started to trial)	Initiated consideration of applying 2006GLs in the method committee
Nov. 2013	COP19 decided Reporting Guidelines (in. CRF), officially.	
Dec. 2014		Released preliminary 2013 inventory applying 2006GLs
Apr. 2015 Dec.		NIR2013 submission applying 2006GLs CRF2013 Submission

Institutional Arrangements



Committee for GHG Emissions Estimation Methods in 2015

- ✓ The Committee for the GHG Emissions Estimation Methods consists an inventory working group (WG) that examines cross-cutting issues, 6 breakout groups that consider sector-specific issues and the NMVOC taskforce under the Inventory WG that examines methodologies of NMVOC emission estimation.
- ✓ Improvement suggestions by each WG, breakout group and taskforce are considered once more by the Committee for the GHG Estimation Methods before approval.
- ✓ Over 60 experts from universities, industrial organizations, and relevant research institutes
- ✓ 19 meetings were held in FY2014. (Almost double than usual)



Updating Estimation Methodology for 2015 Submission

- 2006 IPCC GLs
  - Re-allocate sectors and categories (e.g., “Industrial Processes” and “Solvent and Other Product Use” are merged into “Industrial Processes and Product Use”)
  - Estimate emissions/sinks from sources/sinks where methodologies are newly provided (e.g., harvested wood products)
  - Update the methodologies and emission factors
- Revised UNFCCC reporting guidelines
  - New gases (NF_3, HFC-245fa, etc.)
  - Change of Global Warming Potentials (SAR to AR4)
  - Indirect CO_2 and N_2O (See paragraph 29)
  - NE (considered insignificant) (See paragraph 37(b))
- Major update of country-specific methodologies
  - Update carbon emission factors on Fuel Combustion
  - Revise Energy Balance Tables (General Energy Statistics)
  - Apply model, Tier 3 (DNDC-Rice model, Roth C model for cropland)
- Address the annual Review under UNFCCC

General Consideration for New Methodologies

- New emission source or removal sink
  - Is the source/sink present or absent?
  - With the methodology we want to use, how will the CRF look like? How will it be filled out?
  - Do we have the necessary AD, emissions, and other information for the whole time-series? (Statistics, Company data [Confidential or not])
  - Can it be reported year after year?
- New emission factor (EF)
  - Is the default value in 2006 IPCC GLs updated or unchanged from Revised 1996 IPCC and GPG2000?
  - Is new country-specific EF better, comparing with previous one?

General Consideration for New Methodologies

- Disaggregated emission factor
  - Example: Methane conversion factors of manure management are disaggregated by temperature
  - Check national circumstances
  - Collect activity data
- Major update of country-specific methodology
  - Quality Assurance
  - Verify with lower Tier Method

RECALCULATION BETWEEN 2014 AND 2015 SUBMISSIONS

Main New Emission Sources and Removal Sinks

SOURCE and SINK (CRF number)	Emissions in FY2012 (Submitted in 2015) [kt CO_2 eq.]
Abandoned Underground Mines (1.B.1)	466
Fugitive Emissions Associated with the Geothermal Power Generation (1.B.2)	266
CO_2 Transport and Storage (1.C)	NO
Caprolactam, Glyoxal and Glyoxylic Acid Production (2.B.4)	822 (incl. confidential data)
Titanium Dioxide Production (2.B.6)	51
Ethylene Oxide Production (2.B.8)	C
Carbon Black Production (2.B.8)	C
TFT Flat Panel Display (2.E.2)	263
Photovoltaics (2.E.3)	IE
Urea Application (3.H)	162
Indirect N_2O emissions (3.B.5.) from Manure Management	1180
Harvested Wood Products (HWP) (4.G)	308
Biological Treatment of Solid Waste (5.B.)	259
Open Burning of Waste (5.C.2.)	NO

Estimates between SAR and AR4

GAS	GWP		Submitted in 2014	Estimate	Difference
	SAR	AR4	FY2012(SAR)	FY2012(AR4)	
Carbon dioxide	1	1	1275.61	1275.61	0.00
Methane	21	25	20.01	23.82	3.81
Nitrous oxide	310	298	20.23	19.45	-0.78
Hydrofluorocarbons (HFCs)					
HFC-23	11,700	14,800	0.10	0.12	0.03
HFC-32	650	675	0.78	0.81	0.03
HFC-125	2,800	3,500	3.36	4.20	0.84
HFC-134a	1,300	1,430	3.38	3.71	0.34
HFC-152a	140	124	0.14	0.12	-0.02
HFC-227ea	2,900	3,220	0.09	0.10	0.01
Mix			15.08	18.10*	3.02
Perfluorocarbons (PFCs)					
Perfluoromethane – PFC-14	6,500	7,390	0.01	0.01	0.00
Perfluoroethane – PFC-116	9,200	12,200	0.00	0.00	0.00
Perfluorocyclobutane – PFC-318	8,700	10,300	0.00	0.00	0.00
Mix			2.75	3.41**	0.66
Sulphur hexafluoride (SF_6)	23,900	22,800	1.59	1.51	-0.07
Total			**1343.11**	**1350.97**	**7.86**

(Million tonnes CO_2 eq)

* Implied GWP of Commercial Refrigeration

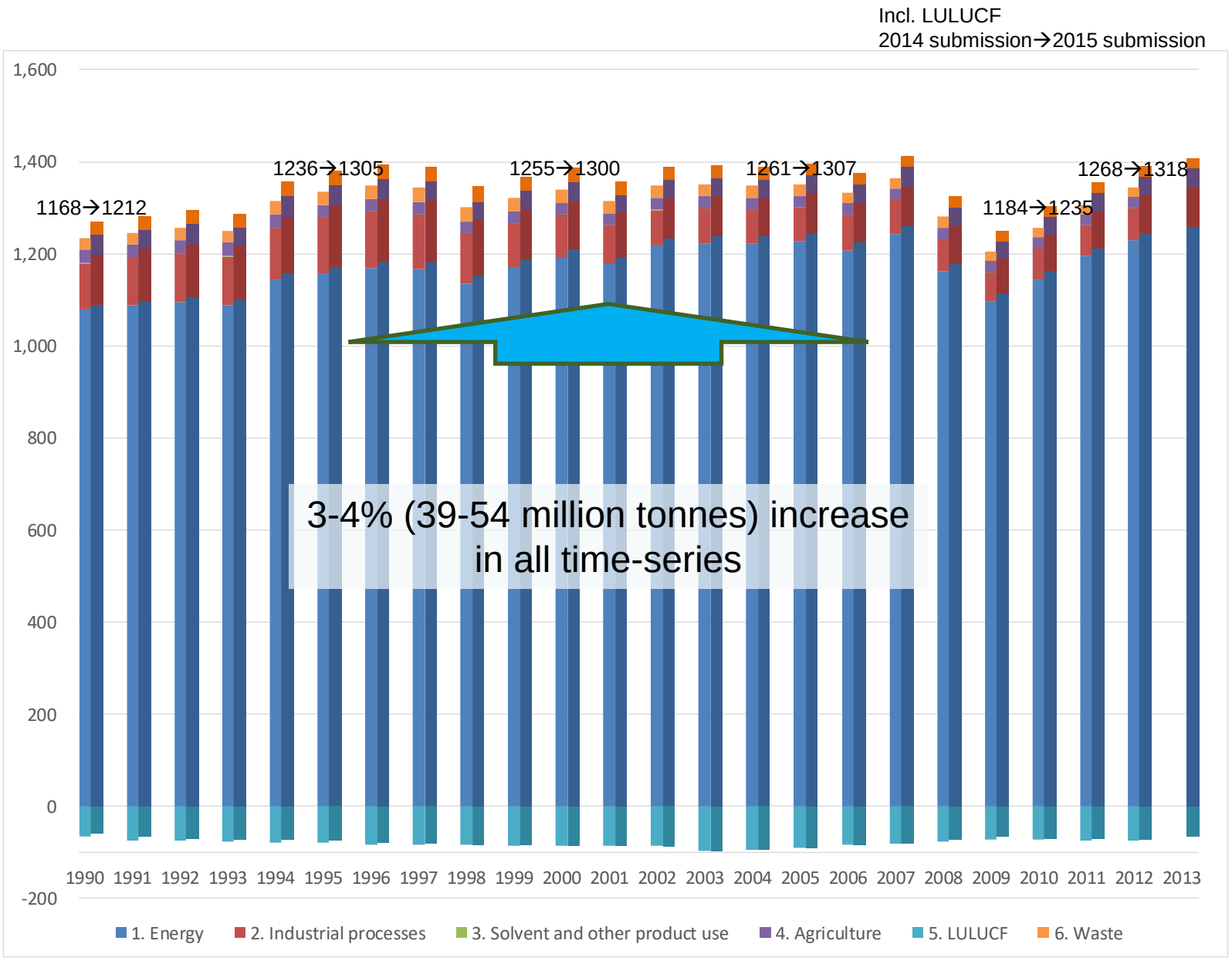
** Average of PFCs

Trial Estimation, Amount of Change due to Update

SOURCE	FY1990	FY2005	FY2012
1. Energy	+11.16	+10.99	+11.51
New Sources*	+9.75	+10.34	+10.80
Revised Methodology*	+1.25	+0.48	+0.52
Revised GWP	+0.15	+0.18	+0.19
2. IPPU	+5.50	+11.10	+14.50
New Sources*	+4.22	+6.26	+6.99
Revised Methodology*	+1.65	+1.66	+1.25
Revised GWP	-0.37	+3.18	+6.26
3. Agriculture	+4.46	+4.03	+4.02
New Sources*	+2.71	+2.28	+2.28
Revised Methodology*	+0.48	+0.57	+0.72
Revised GWP	+1.27	+1.17	+1.02
5. Waste	+2.36	+1.88	+1.54
New Sources*	-	-	-
Revised Methodology*	+0.50	+0.73	+0.75
Revised GWP	+1.86	+1.14	+0.79
Total excl. LULUCF	+23.48	+27.99	+31.57

* Including GWP revision (Source: Committee for the GHG Emissions Estimation Methods) (Million tonnes CO_2 eq)

Recalculation between 2014 and 2015 submission



(Million tonnes CO_2 eq)

LINKAGE BETWEEN CALCULATION SYSTEM AND CRF

Calculation files: Japan's case (1)

- **Microsoft Excel is used (offline)**
- **Each calculation file is named by sector/category and level of work it contains**
  - Level 1: Files for data input
  - Level 2: Files for calculation of emission factors and activity data
  - Level 3: Files for calculation of emissions
  - Level 4: Files for summary of emissions/QC check, and transferring data to the CRF Reporter
  - Level 5: Files for output to NIR tables and graphs

For example: The file with the title of "**1B-L3-2020**" is the calculation file of the emissions from the 1B category (fugitive emissions from fuels) prepared for the 2020 submission

Calculation files: Japan's case (2)

Each calculation file covers the whole time-series, enabling the compiler to see the trend, and also align data with the CRF entry format

Sample of Level 3 file

	Unit	1990	1991	…	References
Activity data of source i					Statistics of …
Emission factor of source i					Default
Emissions of source i					EF*AD

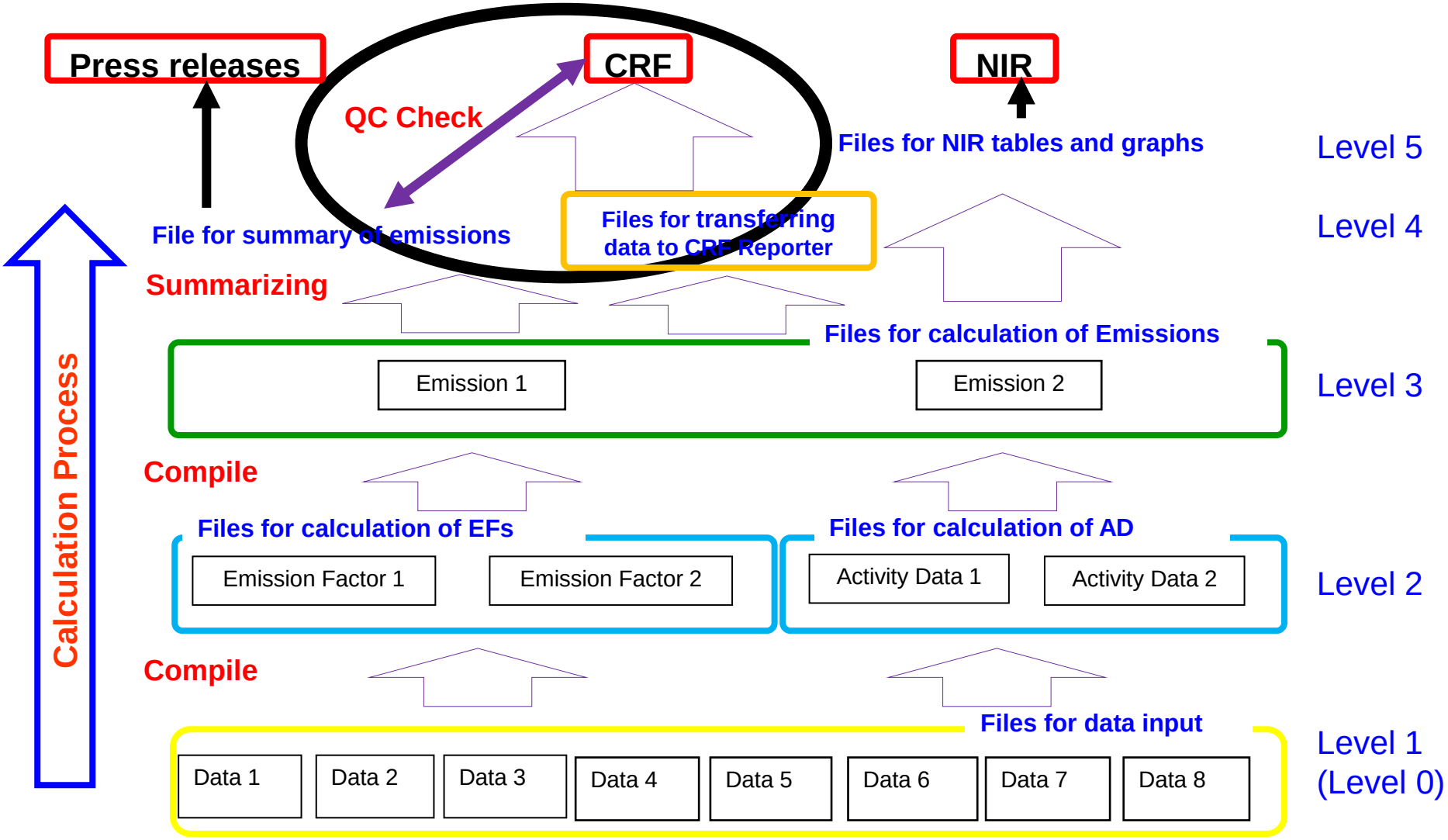
Calculation files: Japan's case (3)

- **Calculation is automatically carried through from Level 1 to Level 5, by links**
  - emissions are calculated in the L3 files, and then summarized in the L4 file and utilized in the L5 files
- **Each year, the calculation files are updated to reflect:**
  - a new inventory year and any change in methodology (by changing e.g. links, calculation formula)
  - most recent year data are added, and older data are modified (if needed)
- **The calculation files generally look similar across all sectors with:**
  - the whole time-series displayed in a similar manner
  - cells shaded in a similar manner
  - font colored in a similar manner

Helps to intuitively avoid mistakes

Structure of the Excel File System

For details, please see NIR Annex 6



Common Reporting Format (CRF)

- The CRF tables are designed to ensure that Annex I Parties report quantitative data in a standardized format and to facilitate comparison of inventory data and trends.

Sample of CRF

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	1055484.64	28485.41	19988.39	49715.18	3422.60	2001.35	NO,NA	261.47	1159359.04
1. Energy	1048150.30	1954.63	5799.00						1055903.93
A. Fuel combustion (sectoral approach)	1047757.06	1235.48	5798.41						1054790.95
1. Energy industries	447922.13	356.76	1879.50						450158.39
2. Manufacturing industries and construction	260341.45	558.81	1607.25						262507.51
3. Transport	198811.01	119.70	1635.21						200565.93
4. Other sectors	140682.47	200.20	676.45						141559.12
5. Other	NO	NO	NO						NO
B. Fugitive emissions from fuels	393.24	719.16	0.59						1112.98
1. Solid fuels	0.42	467.89	0.51						468.82
2. Oil and natural gas	392.81	251.27	0.08						644.17
C. CO_2 transport and storage	NO,NE,NA								NO,NE,NA
2. Industrial processes and product use	45173.64	41.12	924.57	49715.18	3422.60	2001.35	NO,NA	261.47	101539.93
A. Mineral industry	32606.28								32606.28
B. Chemical industry	4347.79	24.89	550.68	132.41	64.13	40.15	NA	19.26	5179.32

Transferring data to the CRF Reporter

Until 2014 submission

File for Summary of Emissions (Level 4)

6. QC Check by National Inventory Compiler and sectoral experts

CRF Tables

Emission calculation files (Level 3)

5. Generate CRF tables

3. Copy and paste data in each row manually

CRF Reporter (offline) (Sectoral experts)

2. Share master database file

CRF Reporter (offline) (National inventory compiler)

4. Share database file

1. Install (or update) software for each PC

1. Install (or update) software

Transferring data to the CRF Reporter

For 2015 submission

Emissions didn't match several months due to bug of CRF Reporter.

File for Summary of Emissions (Level 4)

5. QC Check by National Inventory Compiler and sectoral experts

CRF Tables

4. Generate CRF tables

Emission calculation files (Level 3)

Data transfer files ('empty')

1. Export Excel files

CRF Reporter (online)

2. Establish the links (offline)

a lot of work initially

Data transfer files (filled)

3. Import

Renewal (web browser-based software)

Transferring data to the CRF Reporter

Since 2016 submission

File for Summary of Emissions (Level 4)

6. QC Check by National Inventory Compiler and sectoral experts

CRF Tables

5. Generate CRF tables

Previous Data transfer files (linked to calculation files)

Data transfer files ('empty')

1. Export Excel files

CRF Reporter (online)

2. Copy the links (offline)

Less work than initially

3. Paste + modify links (offline)

Data transfer files (filled)

4. Import

For the use of the CRFs and Reporter…

- **It is important to establish an inventory calculation system that is easy to use for newcomers, clear, and therefore stable**
- **A good calculation system is adaptable to 1) country-specific methodology modification, 2) changes in reporting formats/software in the future**

>>> Although setting up the system and changing it in the future will require a lot of work, <u>IT ISN'T DIFFICULT</u>

Summary of presentation

- **Adapting to new GLs leads to a huge change for inventories.**
- **Adapting to new GLs may trigger improvement of methodologies (higher Tiers, Models).**
- **It's important to allocate enough time for discussion of methodologies.**
- **It's essential to allocate enough time to QC.**
  - **QC is more difficult than usual: various changes may happen for one source (e.g., not only change of EF but also GWP), posing complications for checking the reasons for recalculation.**
- **The impact of recalculation is not small.**
- **The recalculation occurs not only for the most recent year but also for previous years.**
- **There may be implications for the base year for emission reduction target.**
- **Although setting up the calculation system and changing it in the future will require a lot of work, it isn't difficult.**

Thank you for your attention

https://www.nies.go.jp/gio/en/index.html

www-gio@nies.go.jp