

Implementation of SEEA in Japan: First experiences

March 28, 2022

(April 4, 2023 revision)

Economic and Social Research Institute, Cabinet Office

Recent policies related to SEEA in Japan

- Master Plan Concerning the Development of Official Statistics(March,2018)
 - 2 Development of statistics that accurately grasp changes in social and economic situations
 - (5) ... “Further, responses to international initiatives SEEA and SDGs have become important.”
- Follow-up on the Growth Strategy(July,2021) and Green Growth Strategy Through Achieving Carbon Neutrality in 2050(June,2021)
 - “ In addition, in order to achieve Carbon Neutrality, related ministries and agencies will collaborate in research and development of statistics(such as Green GDP(tentative name))and indicators that take environmental factors into account, in line with the System of Environmental and Economic Accounts(SEEA), an international standard set by the United Nations, and research by international organizations.

Recent policies related to SEEA in Japan

- Basic Policy on Economic and Fiscal Management and Reform2021(June,2021)
“In addition, research and development of Green GDP(tentative name)will be prompt.”
- Basic Policy on Economic and Fiscal Management and Reform2022(June,2022)
“We will pursue research and development of Green GDP(tentative name).”
⇒ The Growth Strategy clearly states that research will be conducted in line with SEEA.
- As a first step, Air Emission Accounts is estimated to understand the relationship between GDP and GHG emissions by industry as part of our 2021 research.
- The figures in this presentation are based on results of the 2021 research.

Data Material and Compiled Format

1. Industries and households

Main data①: National Greenhouse Gas Inventory Report of JAPAN(2021)

Main data②: General Energy Statistics

⇒ Commercial Industry(incl,Electricity) and Transportation is divided by energy consumption.

In term of other sectors, reclassification from CRF to JSIC

2. Bridging Item

Main data①: Entrance of Vessels by Nationality

Main data②: Arrival of Aircraft by Nationality

Main data③: Air Transport CO2 Emissions(OECDstat)

3. Compiled format

① **32industries based on JSIC, 3 Household items and 5Bridging Items**
(7industries and 1Household item in Air Emission Accounts –OECD Estimates)

② **FY1990-FY2019**

③ Only CO2, CH4, N2O is compiled

Industrial Classification(Based JSIC)

A-B: AGRICULTURE AND FORESTRY and FISHERIES	
C: MINING AND QUARRYING OF STONE	
D: CONSTRUCTION	
E: MANUFACTURING	
E: MANUFACTURING	E09: MANUFACTURE OF FOOD
	E11: MANUFACTURE OF TEXTILE PRODUCTS
	E14: MANUFACTURE OF PULP, PAPER AND PAPER PRODUCTS
	E16, E17: MANUFACTURE OF CHEMICAL AND ALLIED PRODUCT, and MANUFACTURE OF PETROLEUM AND COAL PRODUCTS
	E21: MANUFACTURE OF CERAMIC, STONE AND CLAY PRODUCTS
	E22: MANUFACTURE OF IRON AND STEEL
	E23: MANUFACTURE OF NON-FERROUS METALS AND PRODUCTS
	E24-E27: MANUFACTURE OF FABRICATED METAL PRODUCTS , GENERAL-PURPOSE MACHINERY, PRODUCTION MACHINERY and BUSINESS ORIENTED MACHINERY
Miscellaneous Manufacturing Industry (other than the above)	
F: ELECTRICITY, GAS, HEAT SUPPLY AND WATER	
F: ELECTRICITY, GAS, HEAT SUPPLY AND WATER	F33: PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRICITY
	F34-F36: PRODUCTION AND DISTRIBUTION OF GAS, HEAT SUPPLY and COLLECTION, PURIFICATION AND DISTRIBUTION OF WATER, AND SEWAGE COLLECTION, PROCESSING AND DISPOSAL
G: INFORMATION AND COMMUNICATIONS	
H: TRANSPORT AND POSTAL SERVICES	
H: TRANSPORT AND POSTAL SERVICES	H42-H44 and H47-H49: RAILWAY TRANSPORT, ROAD PASSENGER TRANSPORT, ROAD FREIGHT TRANSPORT, WAREHOUSING, SERVICES INCIDENTAL TO TRANSPORT, POSTAL SERVICES, INCLUDING MAIL DELIVERY
	H45: WATER TRANSPORT
	H46: AIR TRANSPORT
I: WHOLESALE AND RETAIL TRADE	
J: FINANCE AND INSURANCE	
K: REAL ESTATE AND GOODS RENTAL AND LEASING	
L-N: SCIENTIFIC RESEARCH, PROFESSIONAL AND TECHNICAL SERVICES and LIVING-RELATED AND PERSONAL SERVICES AND AMUSEMENT SERVICES	
M: ACCOMMODATIONS, EATING AND DRINKING SERVICES	
O: EDUCATION, LEARNING SUPPORT	
P: MEDICAL, HEALTH CARE AND WELFARE	
Q-R: COMPOUND SERVICES and SERVICES, N. E. C.	
Q-R: COMPOUND SERVICES and SERVICES, N. E. C.	R88: WASTE DISPOSAL BUSINESS
	Q and R89-R96: Miscellaneous Services
S-T: GOVERNMENT, EXCEPT ELSEWHERE CLASSIFIED and INDUSTRIES UNABLE TO CLASSIFY	

Household and Bridging items

HH:Households		
	HH: Transport	
HH:Households	HH: Housing, water, electricity, gas and other fuels	
	HH: HH - Other	
BI:Bridging items		
	less National residents abroad	
	less National residents abroad	NRA-WATER: Water transport
		NRA-AIR: Air transport
	plus Non-residents on the territory	
	plus Non-residents on the territory	NRT-WATER: water transport
		NRT-AIR: Air transport
	OTHER: Other adjustments and statistical discrepancy	
	INV-TOTAL: Total emissions as reported to international conventions (UNFCCC)	

Unit: mt

Air Emission Accounts in Japan (CO₂, FY1990–FY2006)Tentative estimation
Presentation only

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A, B	21	22	22	21	20	20	20	20	20	20	20	21	20	20	20	20	18
C	3	3	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1
D	5	5	5	5	6	6	5	5	5	5	4	4	4	4	4	3	3
E	470	467	459	461	468	476	481	477	444	452	464	455	458	457	459	455	453
E09	7	8	8	9	9	10	10	10	11	11	11	12	12	12	12	12	12
E11	15	15	15	14	14	14	14	14	14	13	12	12	12	12	11	9	8
E14	26	26	26	27	28	30	30	30	29	30	30	30	30	29	30	28	27
E16, E17	131	131	129	131	131	133	137	138	124	128	132	128	127	127	130	133	132
E21	92	94	95	95	97	97	97	94	84	83	84	81	79	78	76	76	76
E22	157	153	146	145	148	149	152	154	146	150	158	156	161	163	164	160	162
E23	8	8	8	7	7	7	6	6	6	6	6	6	6	6	6	5	5
E24–E27	20	20	20	20	21	22	22	18	16	16	16	16	17	16	16	16	16
others	8	8	9	8	9	9	9	9	10	9	10	10	10	11	11	11	10
F	311	313	320	301	338	326	328	322	313	333	341	334	362	379	374	389	378
F33	309	311	318	298	336	324	326	320	311	331	339	332	360	377	372	386	376
F34–F36	2	2	2	2	2	2	1	2	2	2	2	2	2	1	2	2	2
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	170	182	181	181	184	193	194	203	197	197	194	198	195	189	184	181	179
I	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	5
J	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1
L–N	6	6	7	7	7	8	8	9	10	10	11	11	12	12	12	12	12
M	7	7	8	9	8	10	10	10	11	11	11	12	12	11	11	10	11
O	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4
P	5	5	6	6	6	7	7	8	9	10	10	10	10	10	10	9	9
Q, R	17	17	18	18	21	21	22	23	23	24	24	23	22	22	21	20	19
R88	15	15	17	16	19	20	20	21	21	21	22	20	20	20	19	18	17
Q, R89–R96	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	1
S, T	37	35	33	34	36	36	31	33	34	36	36	35	35	36	41	44	42
HH	107	108	119	126	131	135	143	133	138	144	149	145	149	147	146	146	140
Total Industries +Total Households	1173	1185	1195	1187	1242	1255	1267	1261	1222	1258	1281	1265	1296	1304	1299	1307	1283
BI																	
less NRA	15	15	15	15	15	16	15	16	17	17	16	15	17	16	17	17	15
plus NRT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
OTHER	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
INV–TOTAL	1158	1169	1179	1172	1227	1239	1251	1244	1204	1241	1264	1249	1279	1287	1282	1290	1267

Breakdown total and the actual total do not match due to rounding

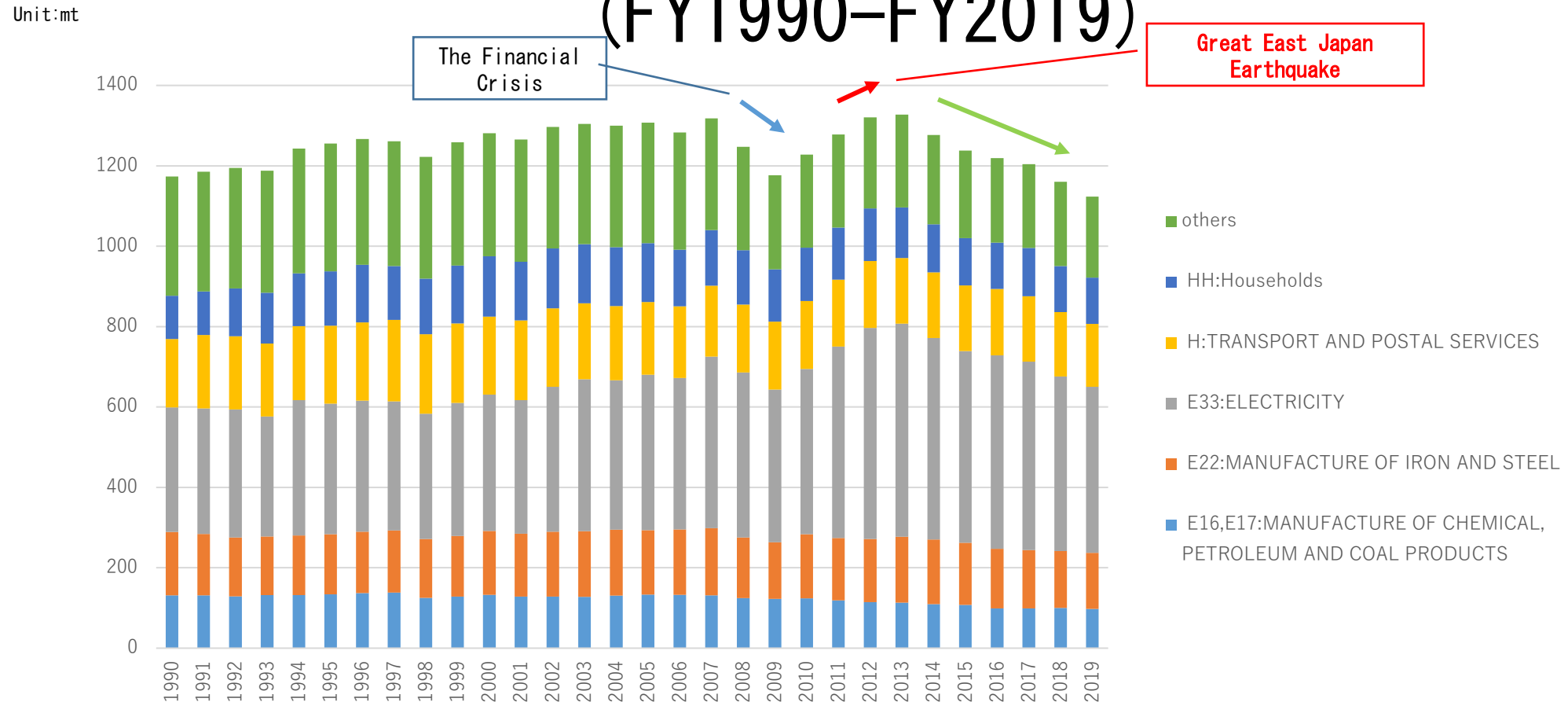
Air Emission Accounts in Japan (CO₂, FY2007–FY2019)

Unit:mt

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A, B	19	16	19	18	16	16	15	15	16	17	17	14	14
C	1	1	1	1	1	1	1	1	1	1	1	1	1
D	3	2	3	3	4	4	4	3	4	4	4	4	4
E	449	415	391	409	403	401	406	396	385	365	360	359	350
E09	10	10	9	10	10	10	9	9	8	8	8	9	8
E11	7	6	6	7	6	5	6	6	6	6	5	5	5
E14	26	24	22	22	22	23	23	22	22	20	20	19	18
E16, E17	131	124	122	124	119	114	113	109	107	98	98	99	97
E21	74	70	62	61	61	62	64	63	61	60	60	60	58
E22	167	150	141	159	154	157	163	161	154	148	145	141	139
E23	5	4	4	4	3	4	3	3	3	3	3	3	2
E24–E27	15	13	13	12	13	13	11	10	9	9	9	10	9
others	10	9	9	9	9	9	9	9	9	8	8	9	9
F	430	414	383	415	481	530	534	505	480	486	472	438	416
F33	426	410	379	411	476	524	530	501	476	481	468	434	413
F34–F36	3	4	4	4	4	5	4	4	4	4	3	3	3
G	0	0	0	0	0	0	0	0	0	0	0	0	0
H	176	169	168	168	166	166	163	163	163	165	162	160	156
I	4	4	4	5	4	4	4	4	3	3	3	4	3
J	0	0	0	0	0	0	0	0	0	0	0	0	0
K	1	1	1	1	1	1	1	1	1	1	1	1	1
L–N	11	11	9	9	8	8	7	7	7	6	6	7	6
M	9	9	9	8	10	10	9	9	9	8	7	9	7
O	4	3	3	3	3	3	5	4	4	4	4	4	4
P	7	7	7	6	7	7	8	7	9	9	7	7	7
Q, R	20	19	17	17	17	17	17	16	16	16	15	16	16
R88	18	18	15	16	15	15	15	15	15	14	14	15	15
Q, R89–R96	1	1	1	1	2	1	1	1	1	1	1	1	1
S, T	38	34	25	24	19	13	21	17	15	12	16	15	16
HH	138	135	130	133	129	131	126	119	117	115	119	114	115
Total Industries +Total Households	1318	1247	1176	1228	1278	1320	1327	1276	1238	1219	1204	1160	1123
BI													
less NRA	15	15	13	13	13	14	11	12	14	15	16	17	17
plus NRT	–	–	–	–	–	–	–	–	–	–	–	–	–
OTHER	–	–	–	–	–	–	–	–	–	–	–	–	–
INV-TOTAL	1303	1232	1163	1214	1264	1306	1315	1263	1223	1203	1188	1143	1105

Tentative estimation
Presentation only

CO2 trends in main 5 sectors (FY1990–FY2019)



Because of Great East Japan Earthquake in 2011, CO2 emissions have been increased by about 3.8% from FY2011 to FY2013.

Since 2014, CO2 emissions is steadily decreasing due to renewable energy and energy conservation.

Air Emission Accounts in Japan (CH₄, FY1990–FY2006)

Tentative estimation
Presentation only

Unit: mt-CO₂e

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A, B	24	24	25	25	26	25	24	25	24	24	24	23	23	23	23	23	23
C	4	4	4	3	2	2	2	2	2	1	1	1	1	1	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
F33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F34–F36	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L–N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q, R	9	9	9	9	9	9	8	8	8	7	7	7	7	6	6	6	5
R88	9	9	9	9	9	9	8	8	8	7	7	7	7	6	6	6	5
Q, R89– R96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S, T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Industries +Total Households	43	43	43	42	42	41	40	39	38	38	37	36	35	34	34	34	34
BI																	
less NRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
plus NRT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
OTHER	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
INV–TOTAL	43	43	43	42	42	41	40	39	38	37	37	36	35	34	34	34	34

Air Emission Accounts in Japan (CH₄, FY2007–FY2019)

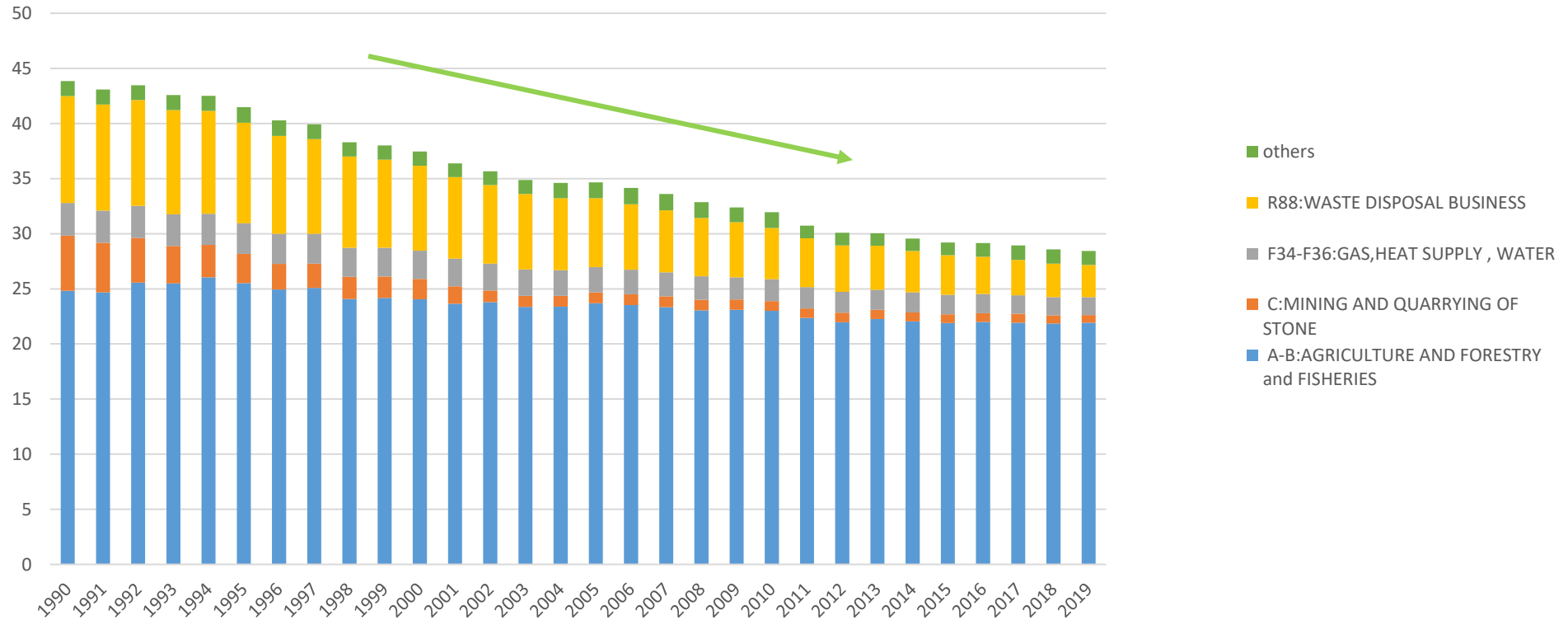
Tentative estimation
Presentation only

Unit:mt-CO₂e

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A, B	23	23	23	23	22	21	22	22	21	21	21	21	21
C	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
F	2	2	2	2	2	2	1	1	1	1	1	1	1
F33	0	0	0	0	0	0	0	0	0	0	0	0	0
F34-F36	2	2	2	1	1	1	1	1	1	1	1	1	1
G	0	0	0	0	0	0	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0	0	0	0	0	0	0
I	0	0	0	0	0	0	0	0	0	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0
L-N	0	0	0	0	0	0	0	0	0	0	0	0	0
M	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0
Q, R	5	5	4	4	4	4	3	3	3	3	3	3	2
R88	5	5	4	4	4	4	3	3	3	3	3	3	2
Q, R89-R96	0	0	0	0	0	0	0	0	0	0	0	0	0
S, T	0	0	0	0	0	0	0	0	0	0	0	0	0
HH	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Industries +Total Households	33	32	32	31	30	30	30	29	29	29	28	28	28
BI													
less NRA	0	0	0	0	0	0	0	0	0	0	0	0	0
plus NRT	-	-	-	-	-	-	-	-	-	-	-	-	-
OTHER	-	-	-	-	-	-	-	-	-	-	-	-	-
INV-TOTAL	33	32	32	31	30	30	30	29	29	29	28	28	28

CH4 trends in main 4 sectors (FY1990–FY2019)

Unit:mt-CO2e



The decrease since FY1990 is mainly result of a decrease in emission from the waste sector .

Air Emission Accounts in Japan (N2O, FY1990–FY2006)

Unit: mt-CO₂e

Tentative estimation
Presentation only

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A, B	11	11	11	11	11	10	10	10	10	10	10	10	10	10	9	10	10
C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	11	11	11	10	12	12	13	14	12	6	9	5	5	5	5	5	5
E09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E16, E17	10	10	10	9	10	10	11	12	11	5	7	4	4	4	4	3	3
E21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E24–E27 other than above	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
F33	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
F34–F36	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	2	3	3	2	2	3	3	3	3	2	2	2	2	2	2	2	1
I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L–N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q, R	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
R88	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Q, R89–R96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S, T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Total Industries +Total Households	31	31	31	31	32	33	34	35	33	27	30	26	25	25	25	25	24
BI																	
less NRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
plus NRT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
OTHER	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
INV–TOTAL	31	31	31	31	32	33	34	35	33	27	29	26	25	25	25	24	24

Air Emission Accounts in Japan (N2O, FY2007–FY2019)

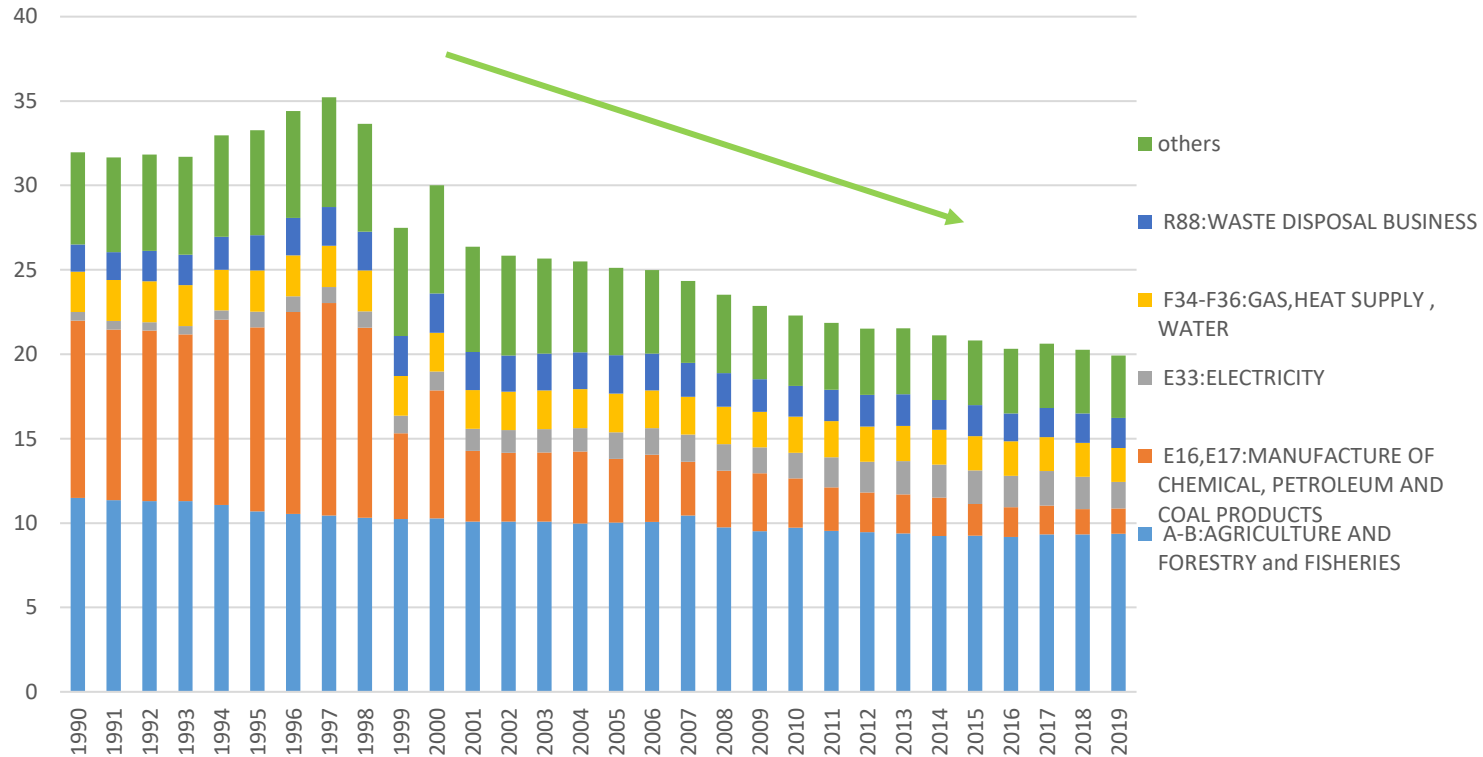
Unit: mt-CO₂e

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A, B	10	9	9	9	9	9	9	9	9	9	9	9	9
C	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0	0	0
E	4	4	4	4	3	3	3	3	3	3	3	2	2
E09	0	0	0	0	0	0	0	0	0	0	0	0	0
E11	0	0	0	0	0	0	0	0	0	0	0	0	0
E14	0	0	0	0	0	0	0	0	0	0	0	0	0
E16, E17	3	3	3	2	2	2	2	2	1	1	1	1	1
E21	0	0	0	0	0	0	0	0	0	0	0	0	0
E22	0	0	0	0	0	0	0	0	0	0	0	0	0
E23	0	0	0	0	0	0	0	0	0	0	0	0	0
E24–E27	0	0	0	0	0	0	0	0	0	0	0	0	0
other than above	0	0	0	0	0	0	0	0	0	0	0	0	0
F	3	3	3	3	3	3	4	4	4	3	4	3	3
F33	1	1	1	1	1	1	1	1	1	1	2	1	1
F34–F36	2	2	2	2	2	2	2	2	2	2	2	2	2
G	0	0	0	0	0	0	0	0	0	0	0	0	0
H	1	1	1	1	1	1	1	1	1	1	1	1	1
I	0	0	0	0	0	0	0	0	0	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0
L–N	0	0	0	0	0	0	0	0	0	0	0	0	0
M	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0
Q, R	2	1	1	1	1	1	1	1	1	1	1	1	1
R88	2	1	1	1	1	1	1	1	1	1	1	1	1
Q, R89–R96	0	0	0	0	0	0	0	0	0	0	0	0	0
S, T	0	0	0	0	0	0	0	0	0	0	0	0	0
HH	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Industries +Total Households	24	23	22	22	21	21	21	21	20	20	20	20	19
BI													
less NRA	0	0	0	0	0	0	0	0	0	0	0	0	0
plus NRT	–	–	–	–	–	–	–	–	–	–	–	–	–
OTHER	–	–	–	–	–	–	–	–	–	–	–	–	–
INV-TOTAL	24	23	22	22	21	21	21	20	20	20	20	20	19

Tentative estimation
Presentation only

N2O trend in main 5 sectors (FY1990–FY2019)

Unit: mt-CO2e



N2O emissions are mainly dependent on the operation of adipic acid production plant.

N2O is decreasing due to N2O abatement equipment from FY1998.

(From FY1999 to FY2000, N2O abatement equipment's operation rate decreased due to machine failure.)

Application and Extension

- We use AEAs to estimate Environmental Adjusted Multi-Factor Productivity(EAMFP) by industry

We published the SEEA and EAMFP in August 2022 as "On Economic Statistics and Indicators Considering Environmental Factors".

(<https://www.esri.cao.go.jp/jp/esri/prj/hou/hou087/hou087.html> (Japanese only))

As for the published materials, EAMFP is based on the parameters estimated by the OECD, and AEA is based on the JSNA industrial classification

- Developments after our 2021 research
 1. Review of the industrial classification for easier international comparison
 2. Compilation of other GHG data

Currently we are estimating the AEAs according to the GHG inventory (CO₂,CH₄,N₂O,HFCs,PFCs,SF₆,NF₃,No_x,CO,NMVOC,SO₂)