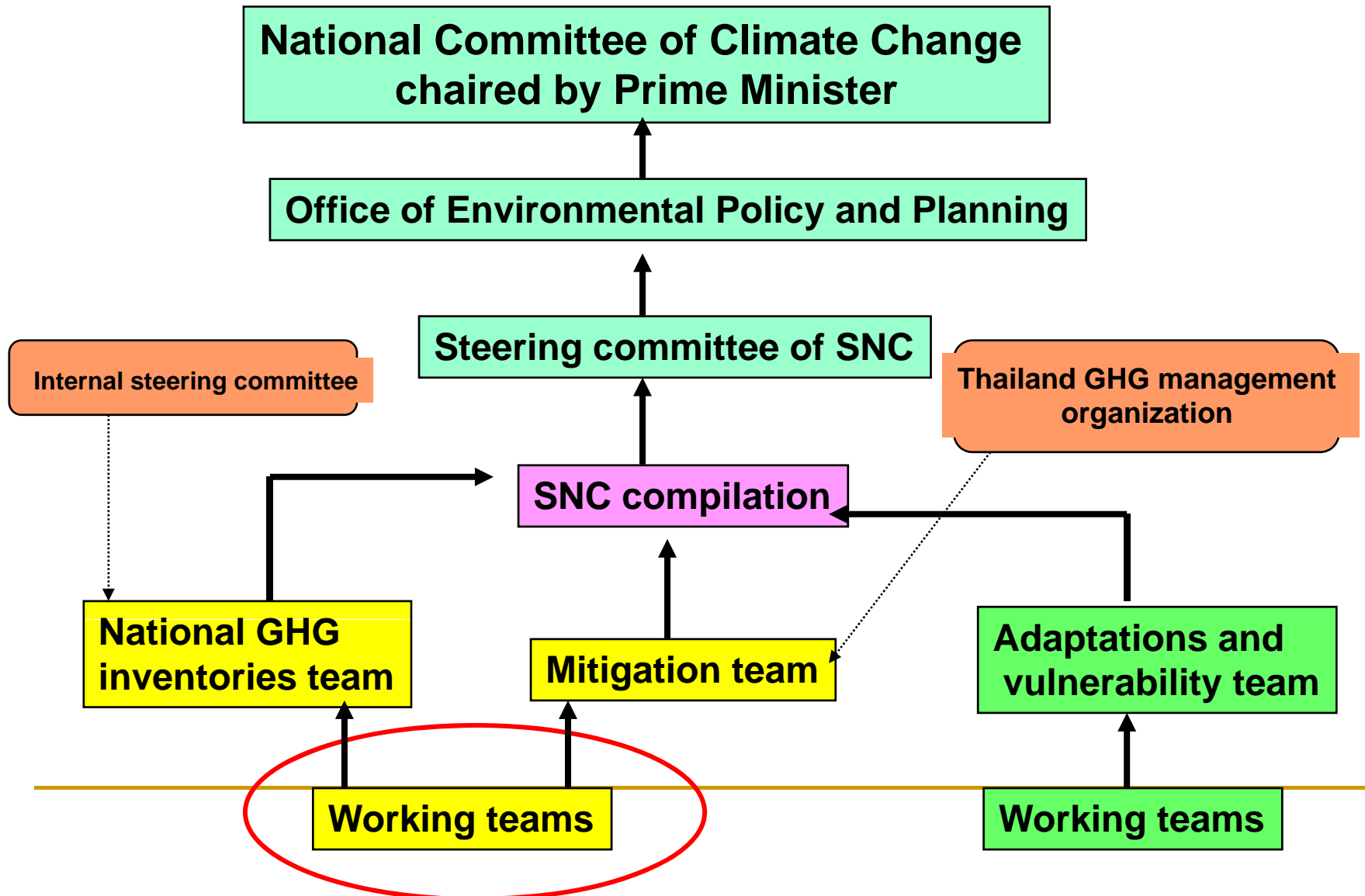# Time series estimates made for Thailand's GHG inventory included in the SNC

S. Towprayoon, A. Chidthaisong, S. Garivait, S. Pathumsawas, C Sorapipat, S. Jiarakorn, A. Nopparat, C Chiemchaisri, and A. Phongphiphat
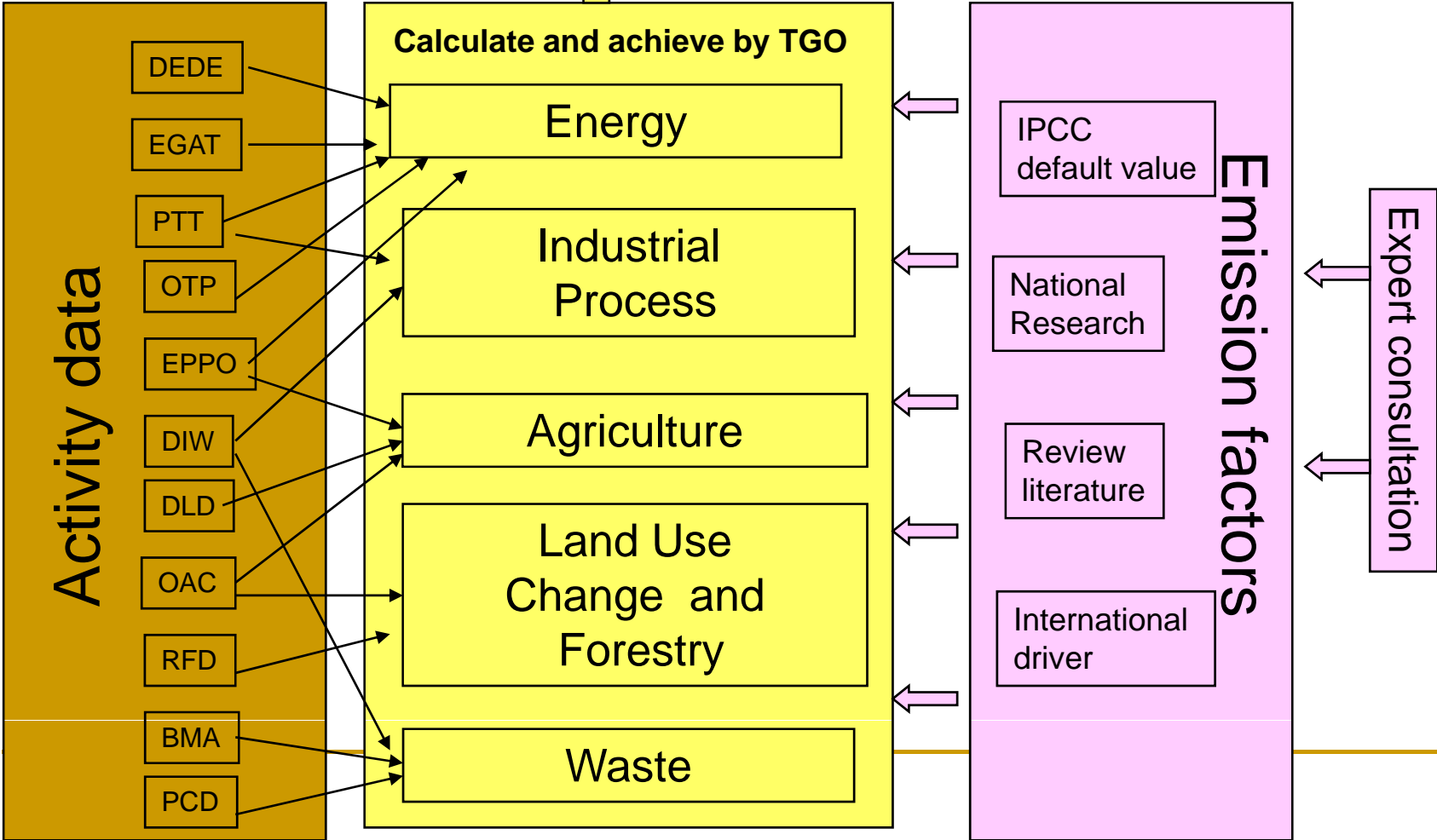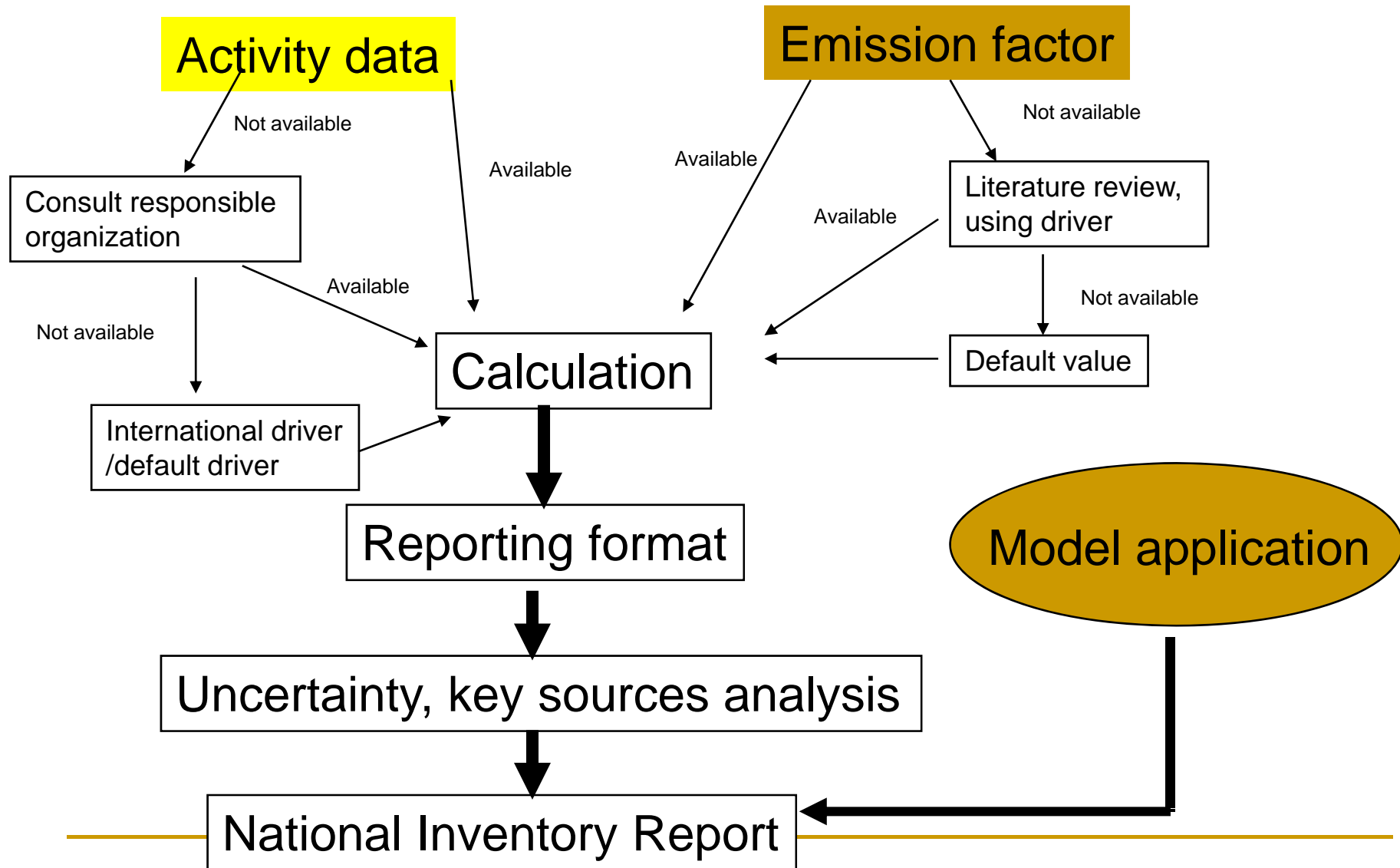
Structure of SNC in Thailand

National Committee of Climate Change chaired by Prime Minister

Office of Environmental Policy and Planning

Steering committee of SNC

Internal steering committee

Thailand GHG management organization

SNC compilation

National GHG inventories team

Mitigation team

Adaptations and vulnerability team

Working teams

Working teams

Approved by national committee

External expert review

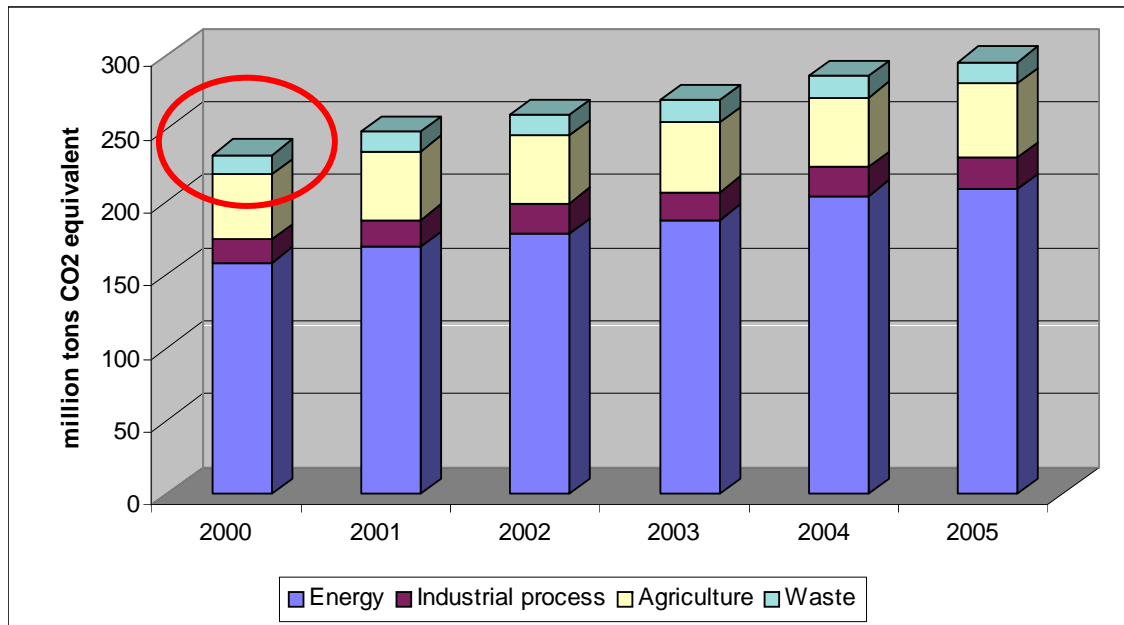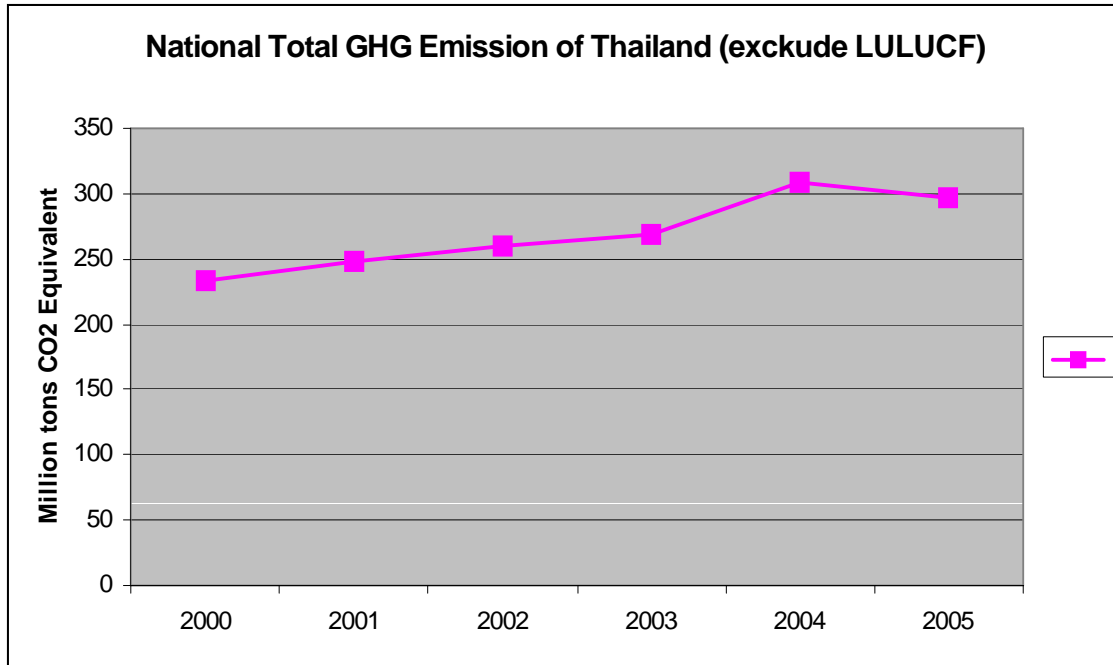recalculation, time series, uncertainty, QAQC, key sources analysis

Calculate and achieve by TGO

Activity data

- DEDE
- EGAT
- PTT
- OTP
- EPPO
- DIW
- DLD
- OAC
- RFD
- BMA
- PCD

Energy

Industrial Process

Agriculture

Land Use Change and Forestry

Waste

Emission factors

- IPCC default value
- National Research
- Review literature
- International driver

Expert consultation

Conceptual framework of Thai GHG estimation

Activity data

Emission factor

Not available

Available

Available

Not available

Consult responsible organization

Available

Literature review, using driver

Available

Not available

Not available

Available

Calculation

Default value

International driver /default driver

Reporting format

Model application

Uncertainty, key sources analysis

National Inventory Report

Previous Inventories and Initial National Communication
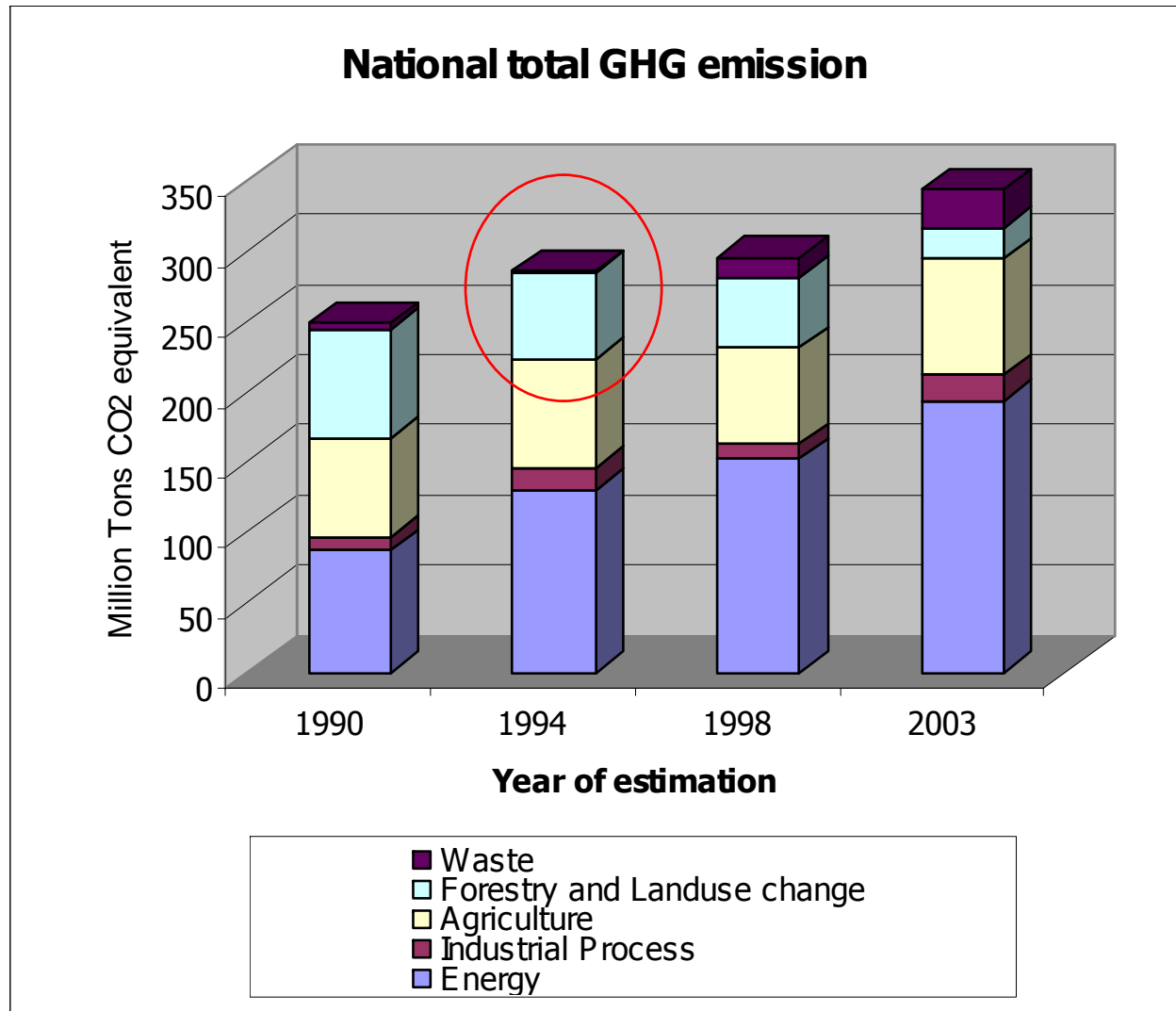
National total GHG emission

Y-axis: Million Tons CO2 equivalent (0, 50, 100, 150, 200, 250, 300, 350)

X-axis: Year of estimation (1990, 1994, 1998, 2003)

Legend:
- Waste
- Forestry and Landuse change
- Agriculture
- Industrial Process
- Energy

1990 : Report from TEI   1994 : Initial national communication
1998 : National Strategic Studies   2003 : ERM report

National Total GHG Emission of Thailand (exckude LULUCF)

Emission form
2000-2005

Emission by sector
(exclude LULUCF)

Share of GHG by type

	2000	2001	2002	2003	2004	2005
N2O	4.8	4.7	4.5	4.7	3.9	4.3
CH4	24.4	23.3	22.3	22.4	20.5	21.7
CO2	70.8	72.0	73.1	73.0	75.7	73.9
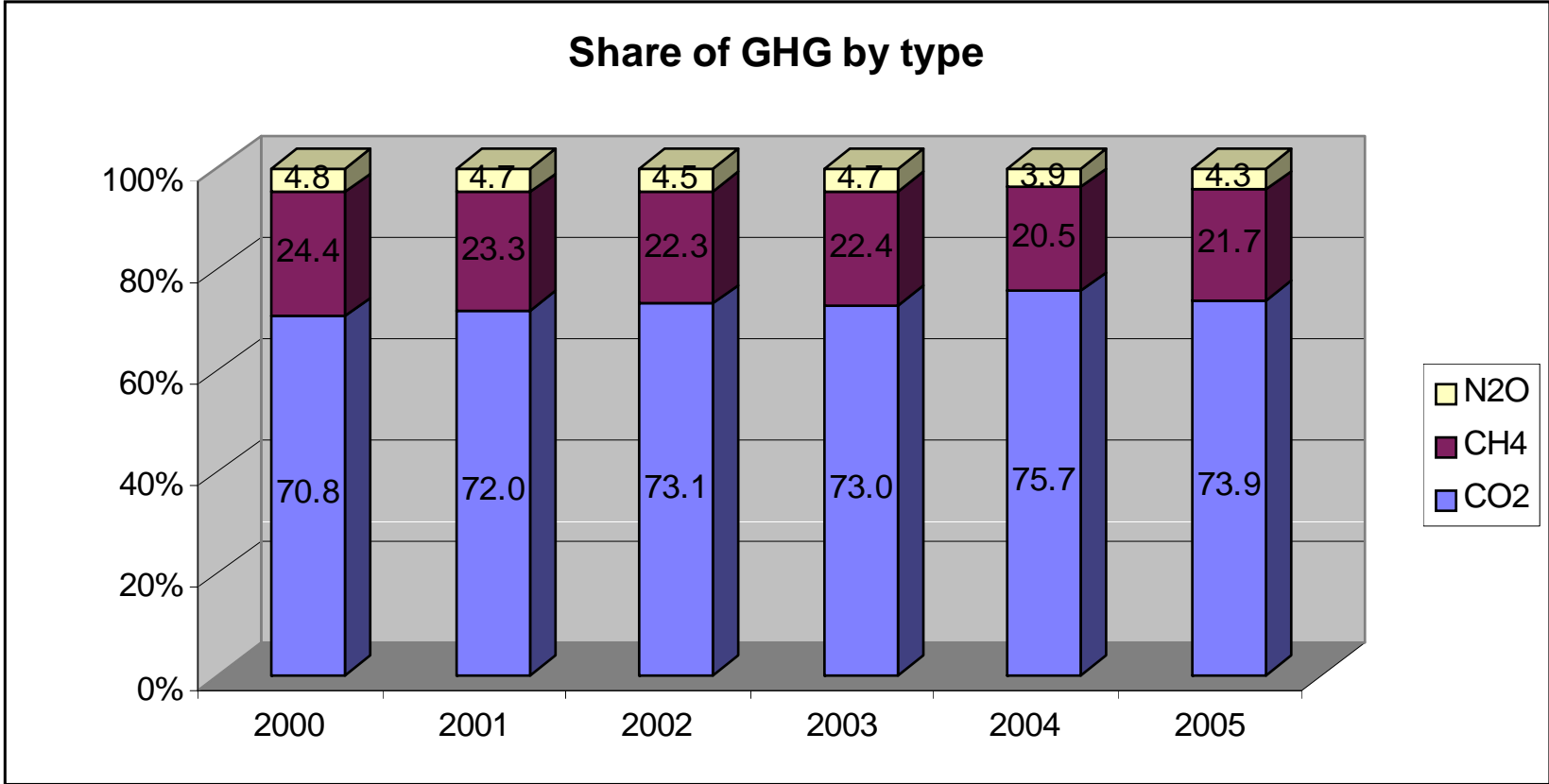
Comparison of 1994 and 2000

Emission form 1990-2005

Combination of two data sets of nation GHG inventory excluded LULUCF

Y-axis: Million tons CO2 equivalent (0, 50, 100, 150, 200, 250, 300)

X-axis: 1990, 1994, 1998, 2000, 2001, 2002, 2003, 2004, 2005

Legend: ☐ Energy ☐ Industrial process ☐ Agriculture ☐ Waste
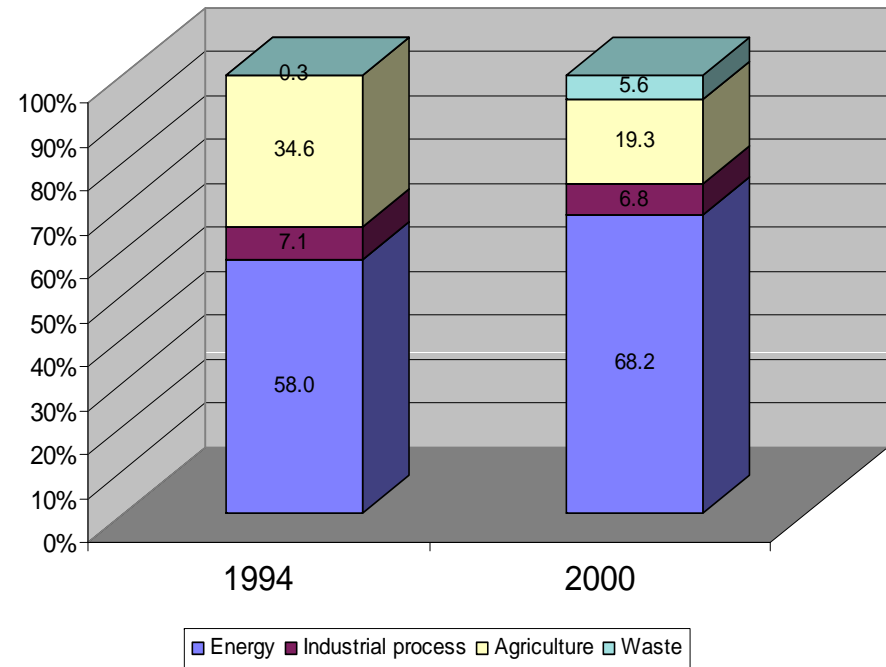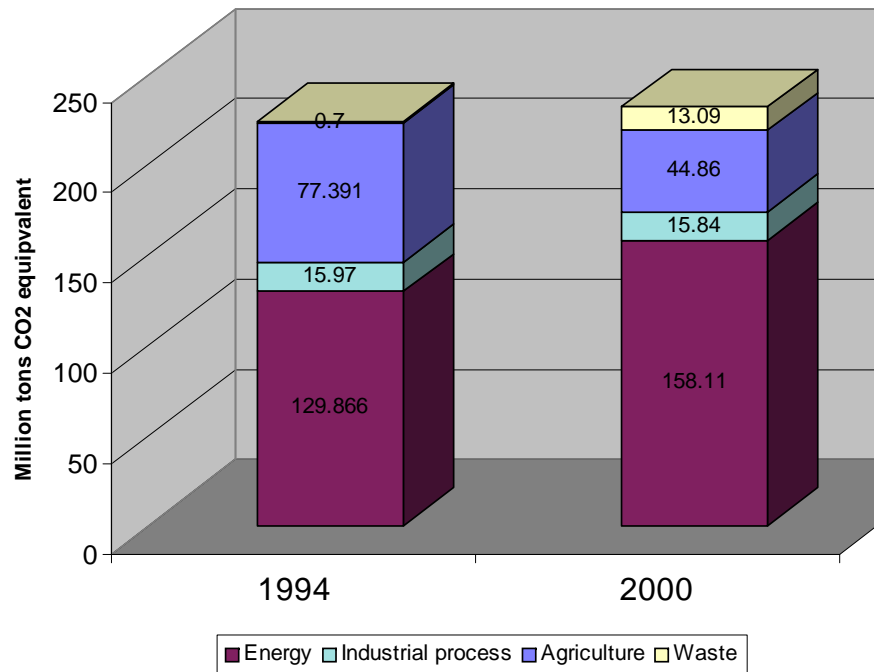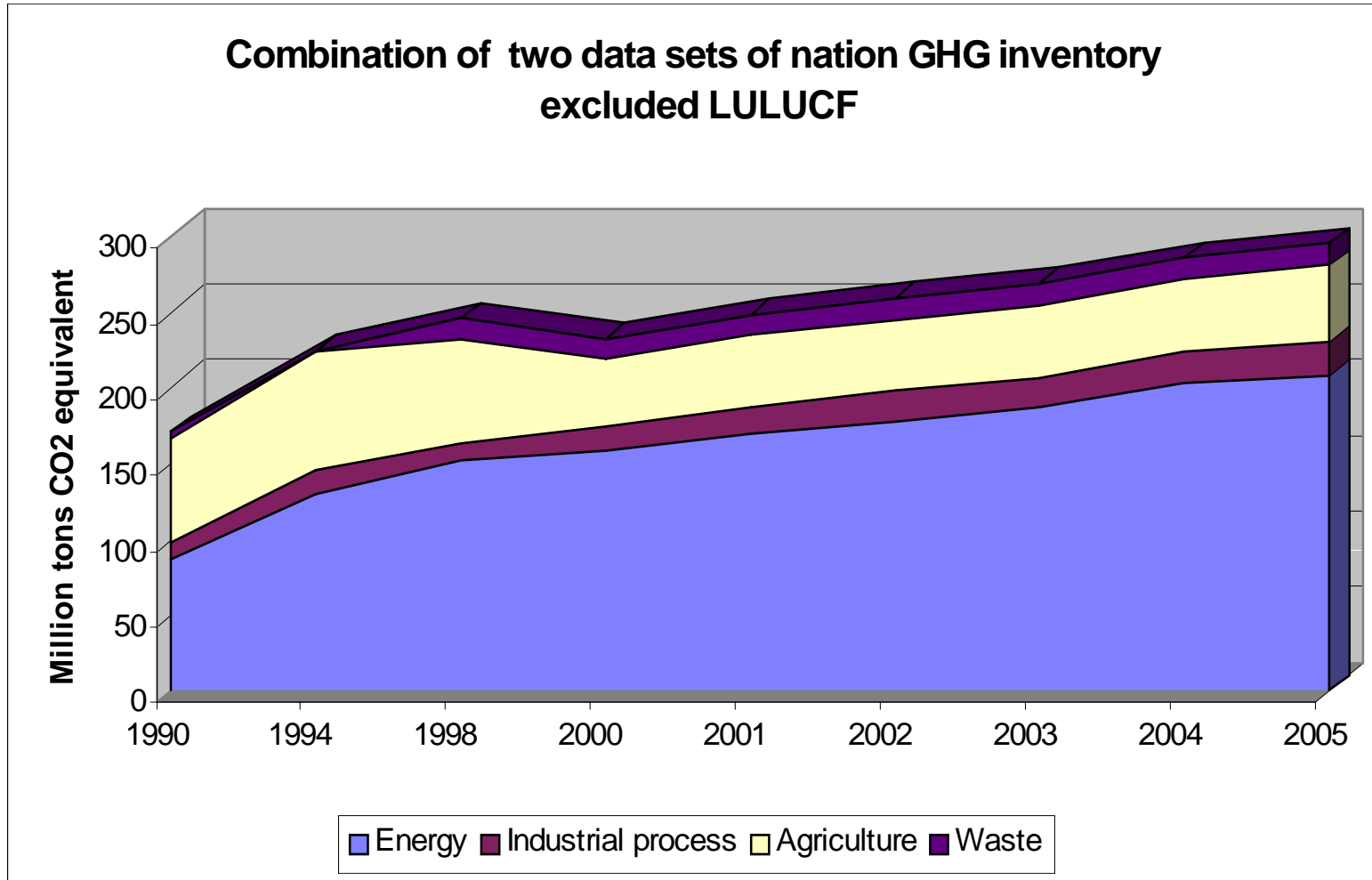
Problems in estimation: activity data

- Agriculture sector : rice field
- Agricultural sector : livestock – change in dataset
- Waste sector : domestic wastewater-population
- Waste sector : Industrial wastewater- detail of amount of effluent
- LULUCF : information of forest area

Subsector with good reliable data

- Energy sector : energy industry, energy manufacturing and transportation
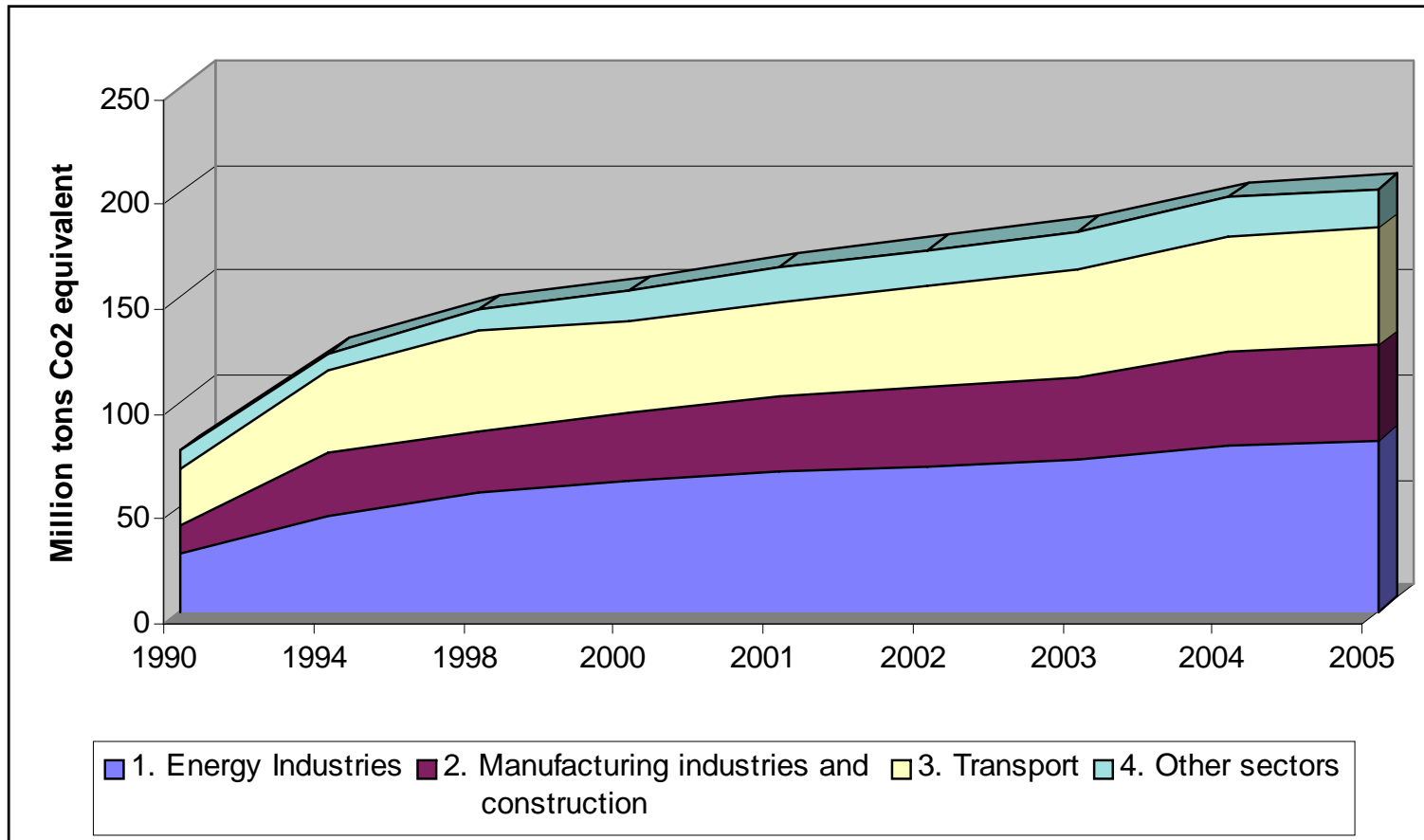- Agricultural sector : rice field

Emission from energy categories
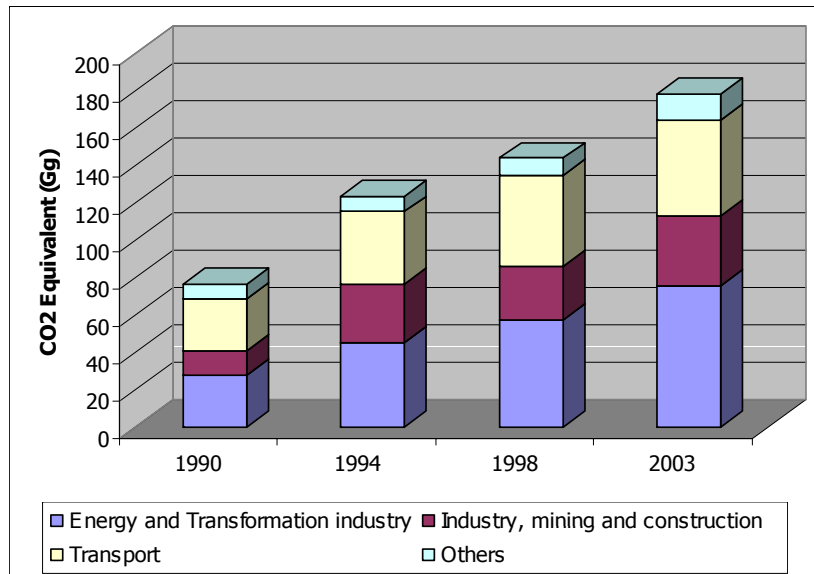
1990 : Report from TEI
1994 : Initial national communication
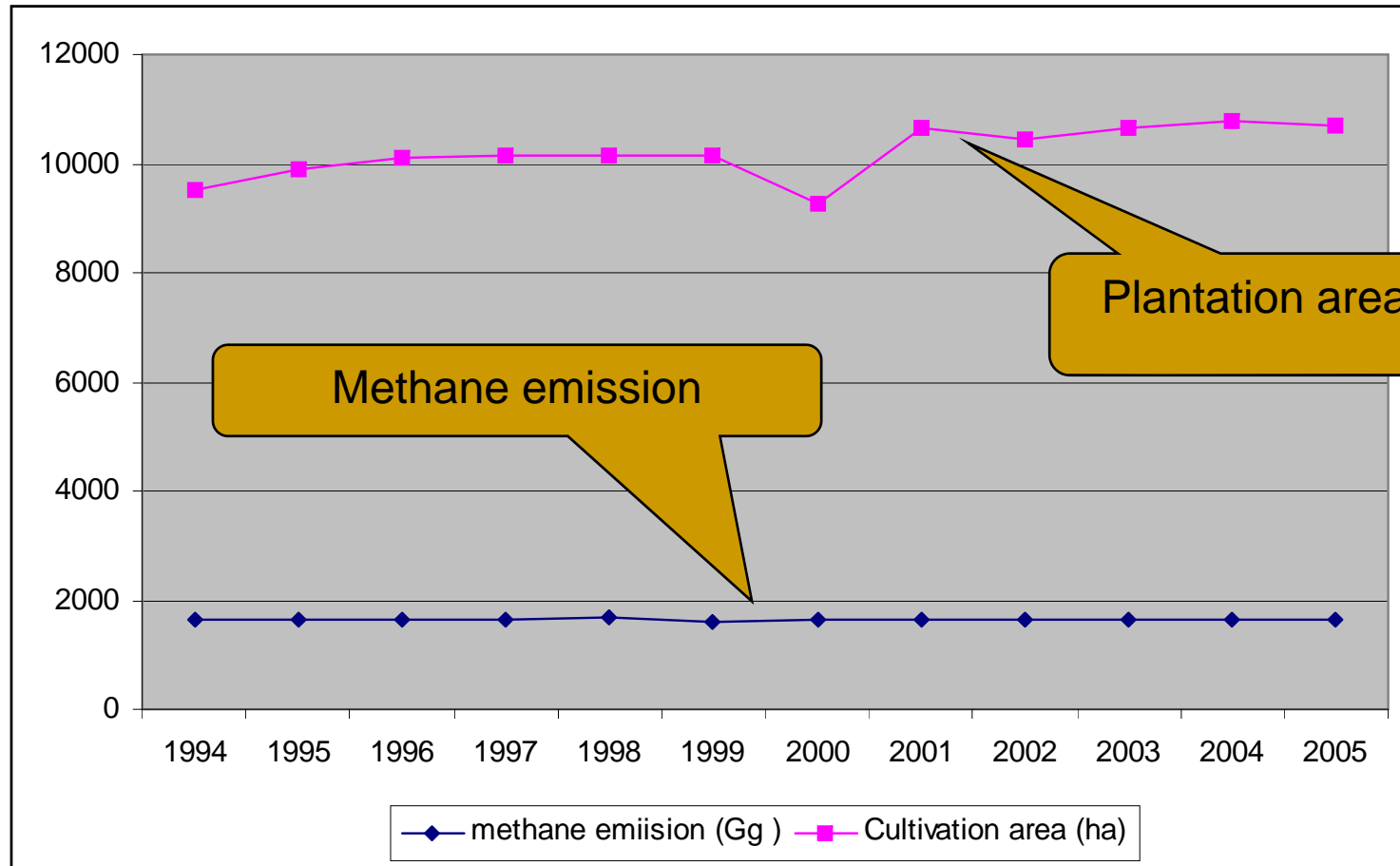1998 : National Strategic Studies
2003 : ERM report
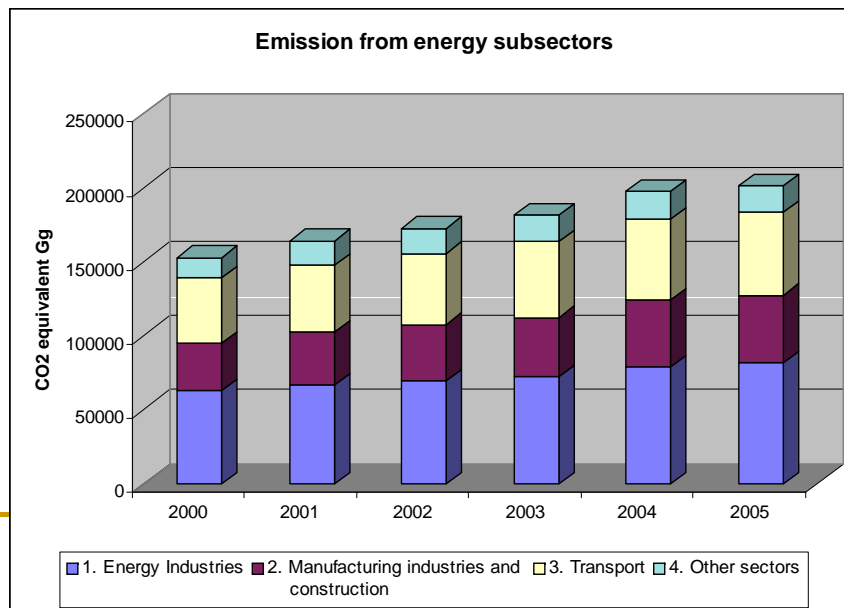
SNC estimation

Combination of the two data sets of inventory (1990,1994,1998 and 2000-2005)

Emission from rice field and plantation area

Subsector encounter inconsistency of data collection

- Waste Sector: Industrial waste water
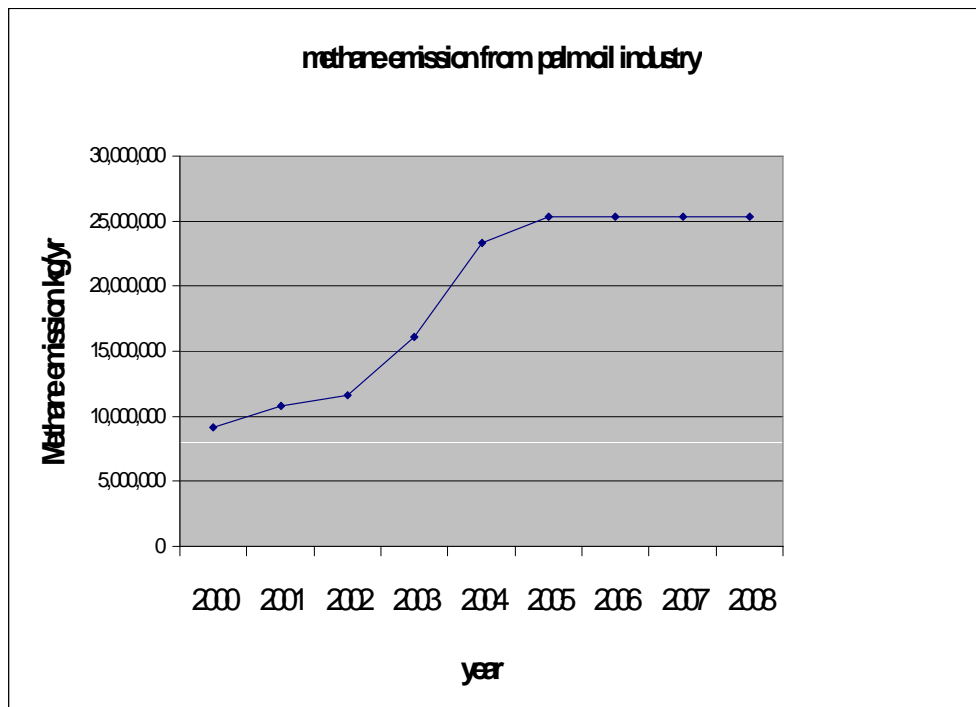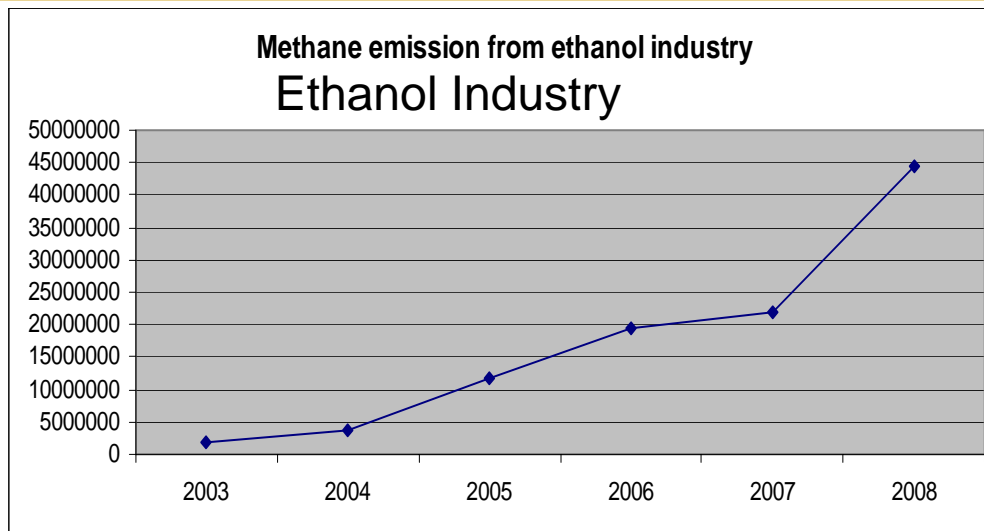- Waste Sector : Domestic wastewater
- LULUCF

Example from industrial wastewater

Literature data

In country expert judgment

Number	Year	Name of factory	Treatment	FLOW(m3/day)	COD(mg/l)	TOW(kgCOD/yr)	B0(kgCH4/kg)	MCF	EF(kg CH4/kgCOD)	CH4 emission(kg/yr)
1	2003	บริษัท ไทยอะโกร เ	An.Digester+AL	1200	90000	39420000	0.25	0.8	0.2	7884000
2	2003	บริษัท เริ่มอุดม เอ	Anae F & Sta P	2800	85000	86870000	0.25	0.9	0.225	19545750
3	2004	บริษัท ไทยง้วน เอ	Anae	1200	85000	37230000	0.25	0.9	0.225	8376750
4	2005	บริษัท พรวิไล อิน	Sta Pond	1200	85000	37230000	0.25	0.2	0.05	1861500
5	2005	บริษัท เพโทกรีน	Sta Pond	1200	80000	35040000	0.25	0.2	0.05	1752000
6	2006	ขอนแก่นเอทานอล	Sta Pond	300	85000	9307500	0.25	0.2	0.05	465375
7	2007	บริษัท ที พี เค เอท	Sta Pond	1200	85000	37230000	0.25	0.2	0.05	1861500
8	2007	บริษัท เค ไอ เอทาน	Sta Pond	500	85000	15512500	0.25	0.2	0.05	775625
9	2008	บริษัท ไทยแอลกอฮ	Sta Pond	1200	85000	37230000	0.25	0.2	0.05	1861500

Complete literature data of ethanol factory with AD was in 2008
9 factories were account for emission in 2008

Methane emission from ethanol industry
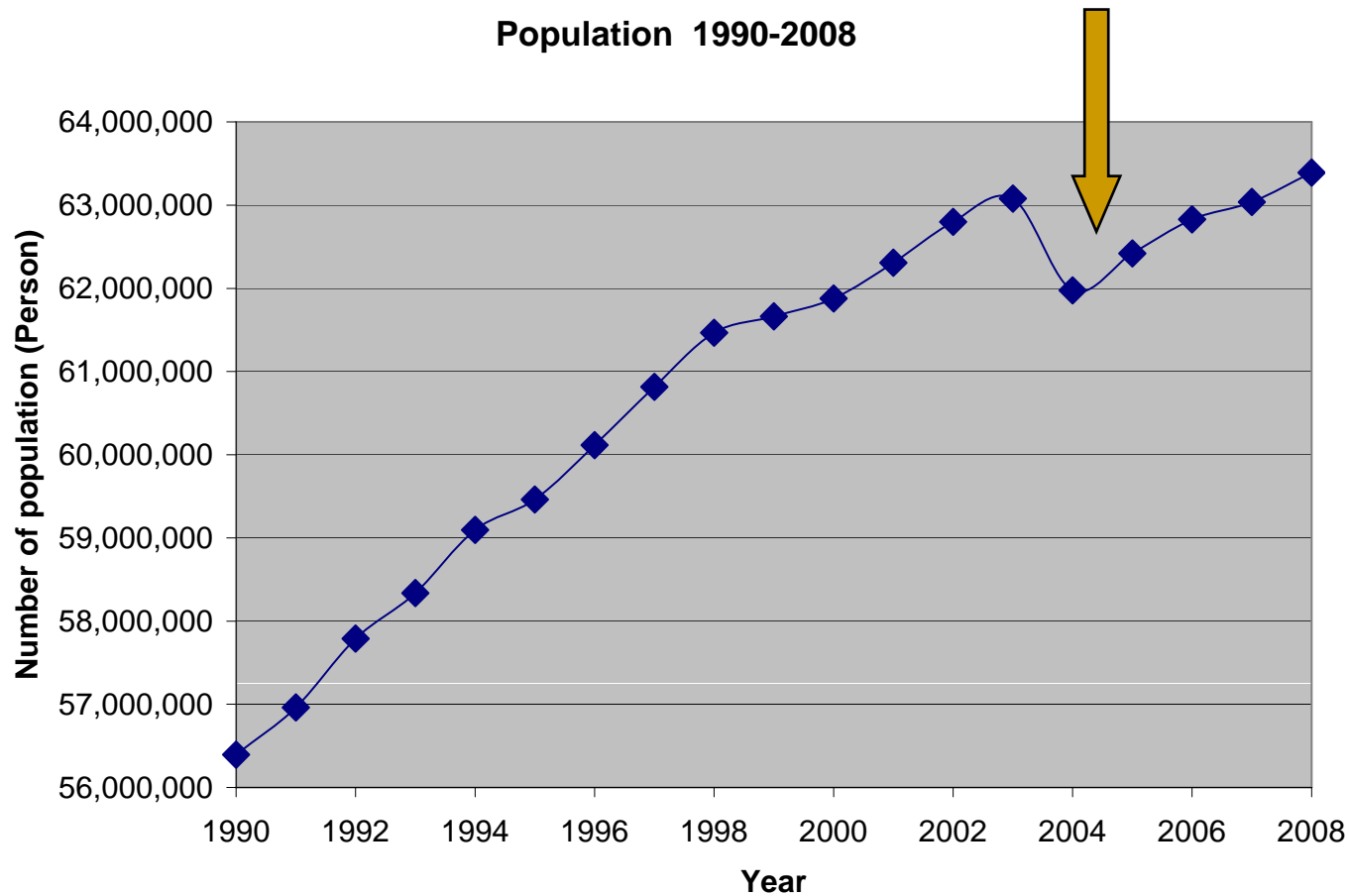Ethanol Industry

methane emission from palm oil industry
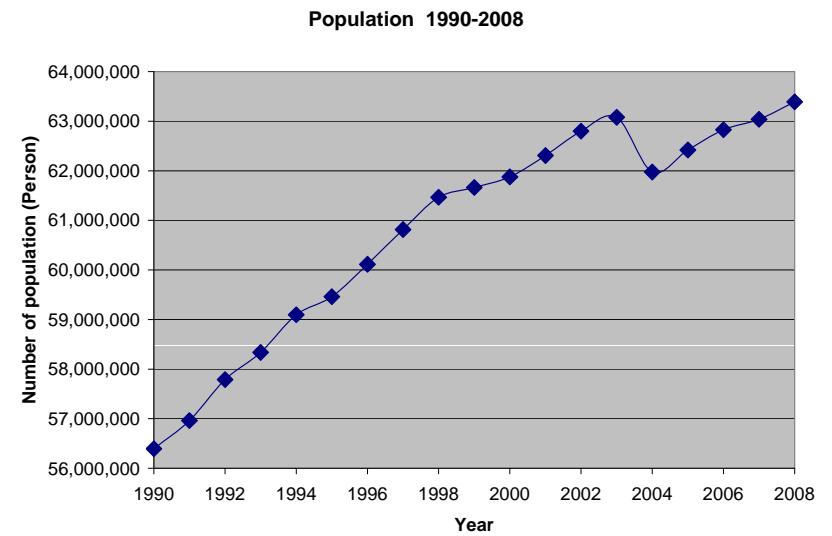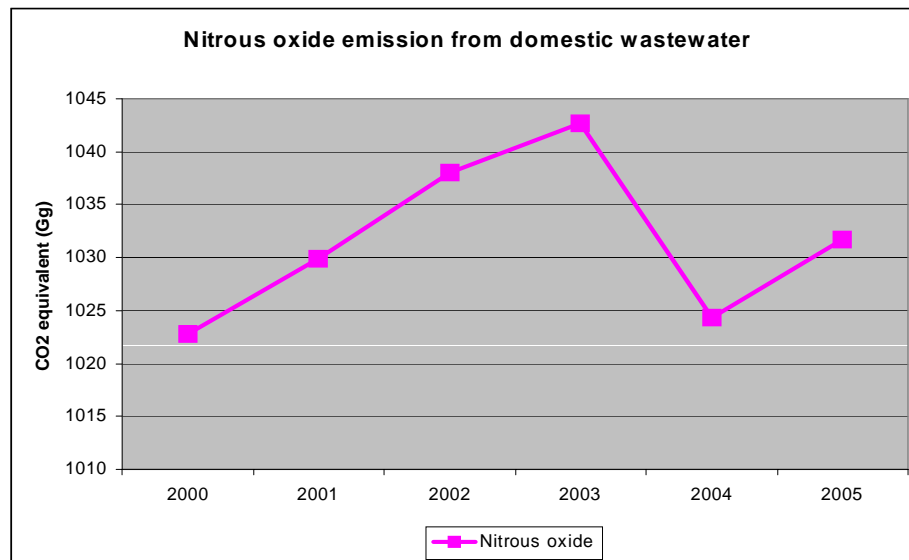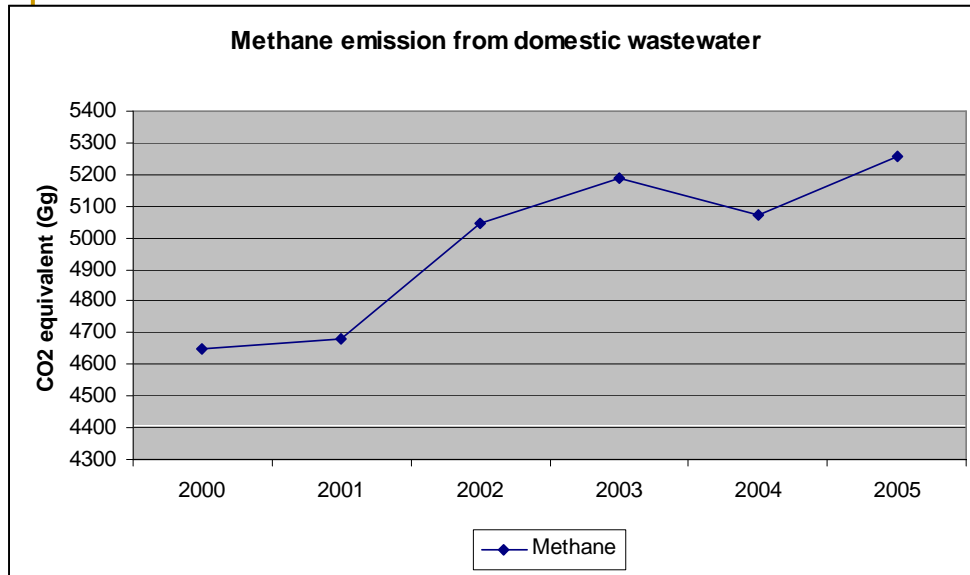
Palm Oil Industry
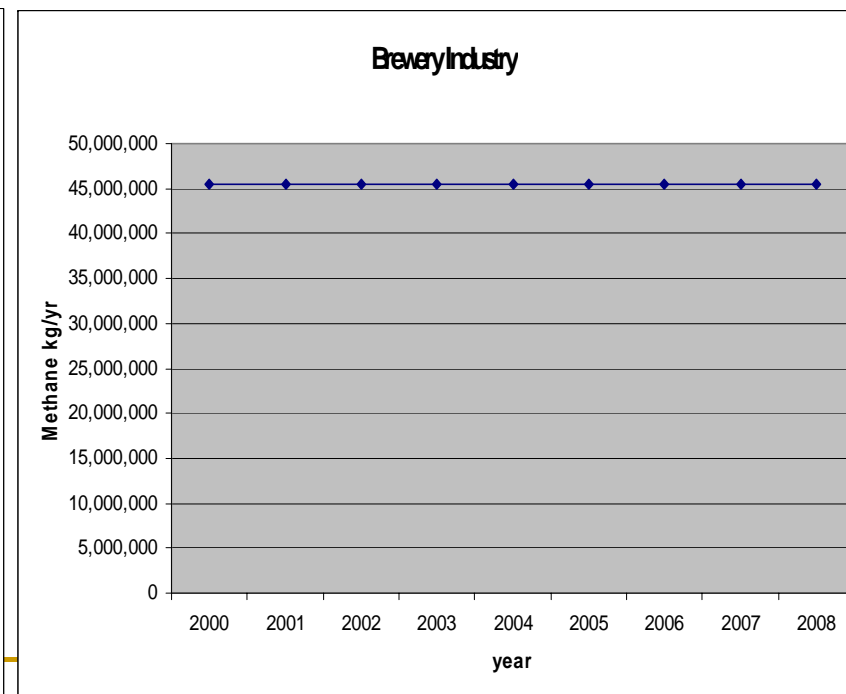
Brewery Industry

Brewery Industry

Domestic wastewater : data collection system change
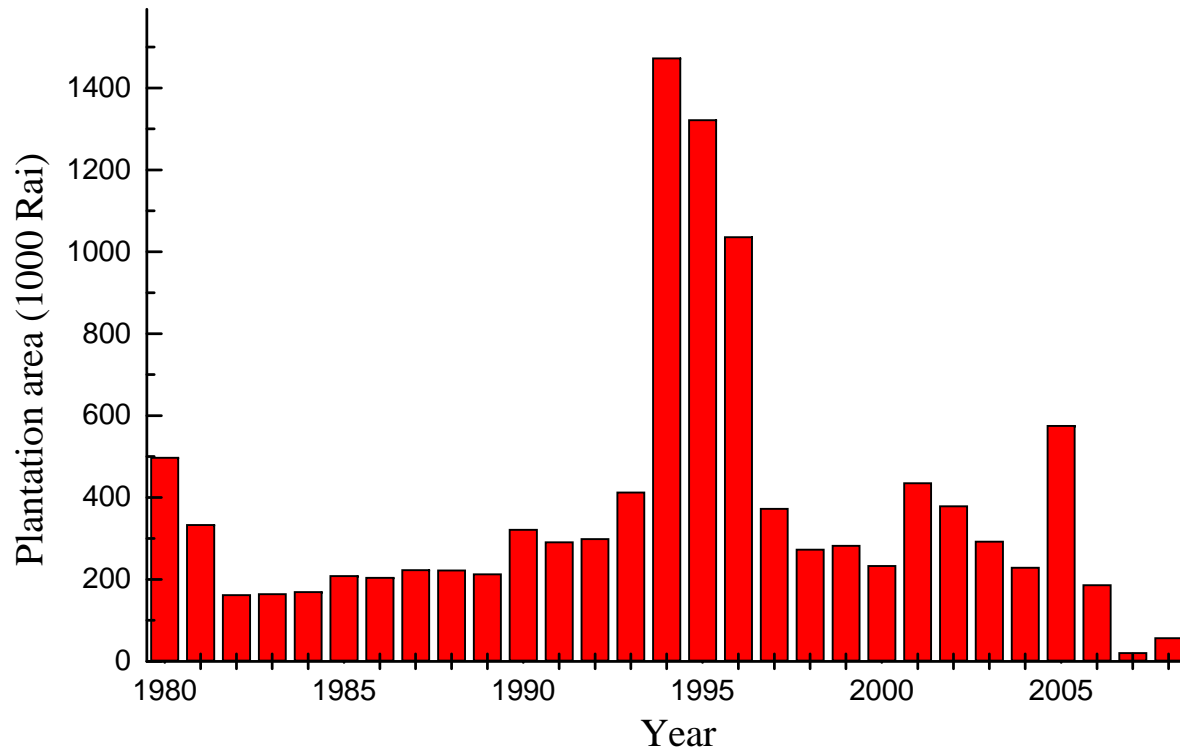

Population 1990-2008

Effect of data collection system change

Methane and nitrous oxide from domestic wastewater
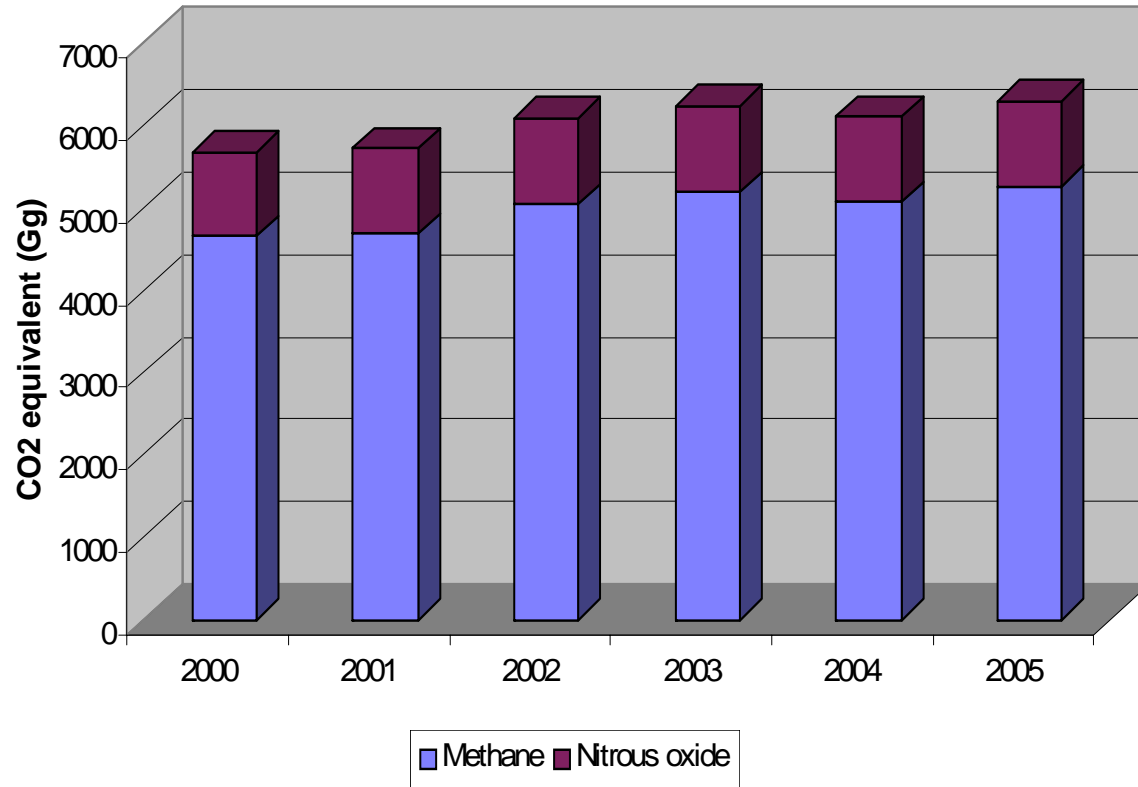
Problems in LULUCF

Plantation area from 1980-2007
data collected from three sources from Gov. department

Plantation Area from

- Plantation area from private sector was available only in 2000, 2004 and 2005. They are Eucalyptus and legume sp (Krathin thepa)

- Interpolation was done with simple calculation

- The nature of plantation for private sector is that there is a cycle of planting and cutting if looking through the area records. We thus estimate the area of plantation (mostly Eucalyptus) from the trends (slope estimate from regression).

- Degraded forest area change due to deforestation was also do the similar ways

- Regenerated forest, since only two data points are available (year 2000 and 2005), we just averaged this into change per year, and added it up the number into the missing years between 2000-2005.

- Area in 2001 = area in 2000+that average value,

- and area in 2002 = area in 2001+ the sameaverage value, and so on.

LULUCF : Data set change

Cluster location 20 x 20 kilometers grid
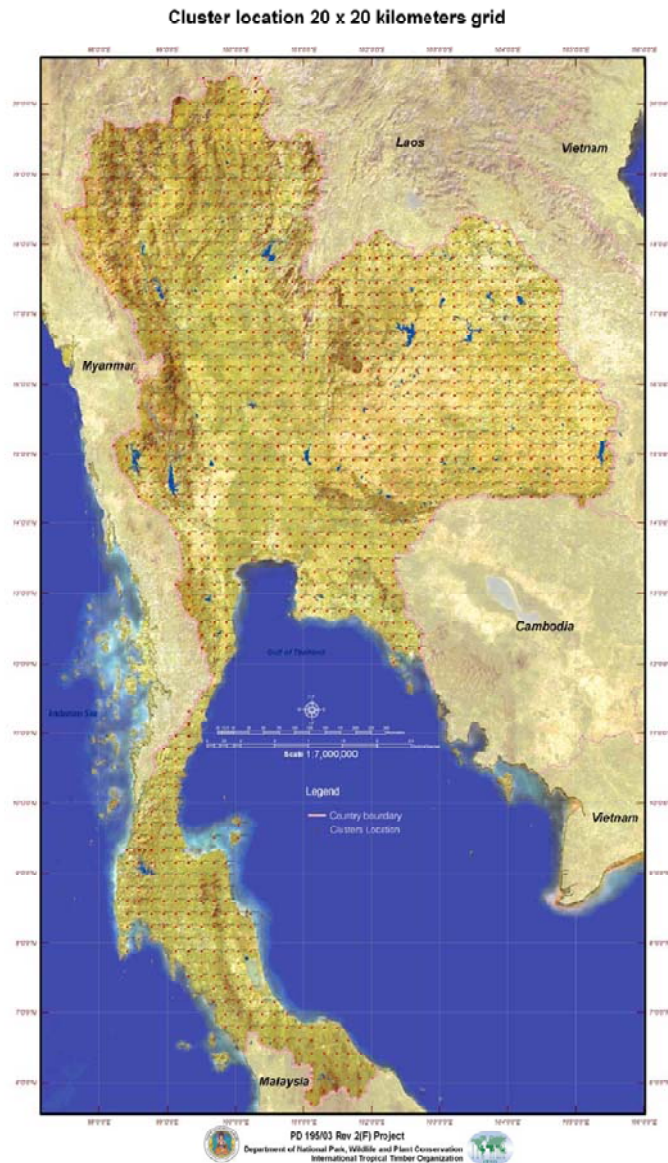
- Since 2005 Department of Natural Park. Wild life and Plant Conservation with International Tropical Timber Organization (ITTO) had set up the project of sampling design, plot establishment and estimation methods for national forest resources monitoring information sytem

- The project used Landsat TM and GIS data at 20x20 km with 425 sampling plot cover major plants in the forest of Thailand

- Project finish in 2007 and hope to be the good data source for LULUCF sector in Thailand

- Higher tier in LULUCF can also be possible.

Problems encounter

- Data missing
- Different data set
- New data set

Thank you and Kop khun Ka