Time Series Estimation and Projection of GHG Emissions

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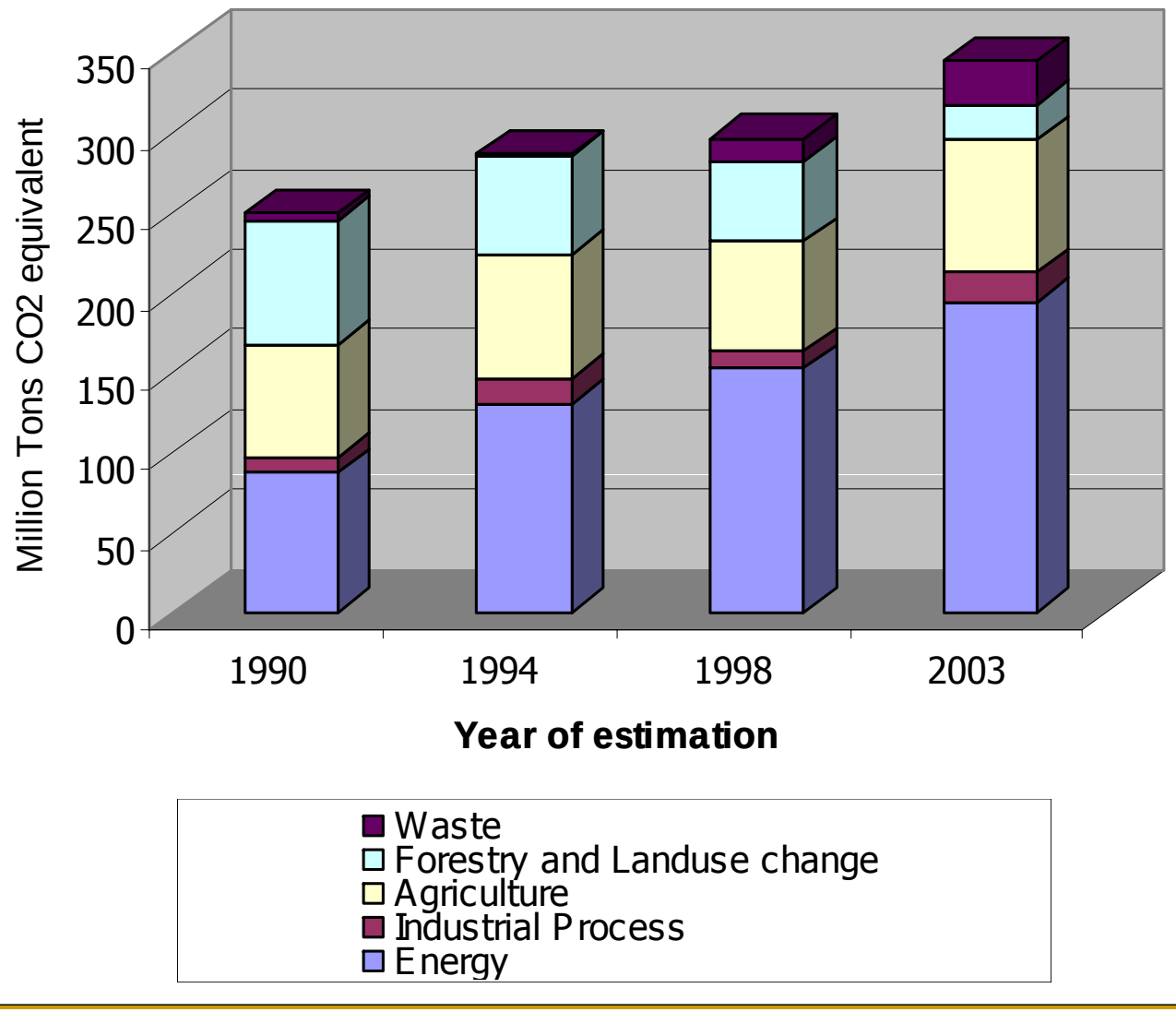
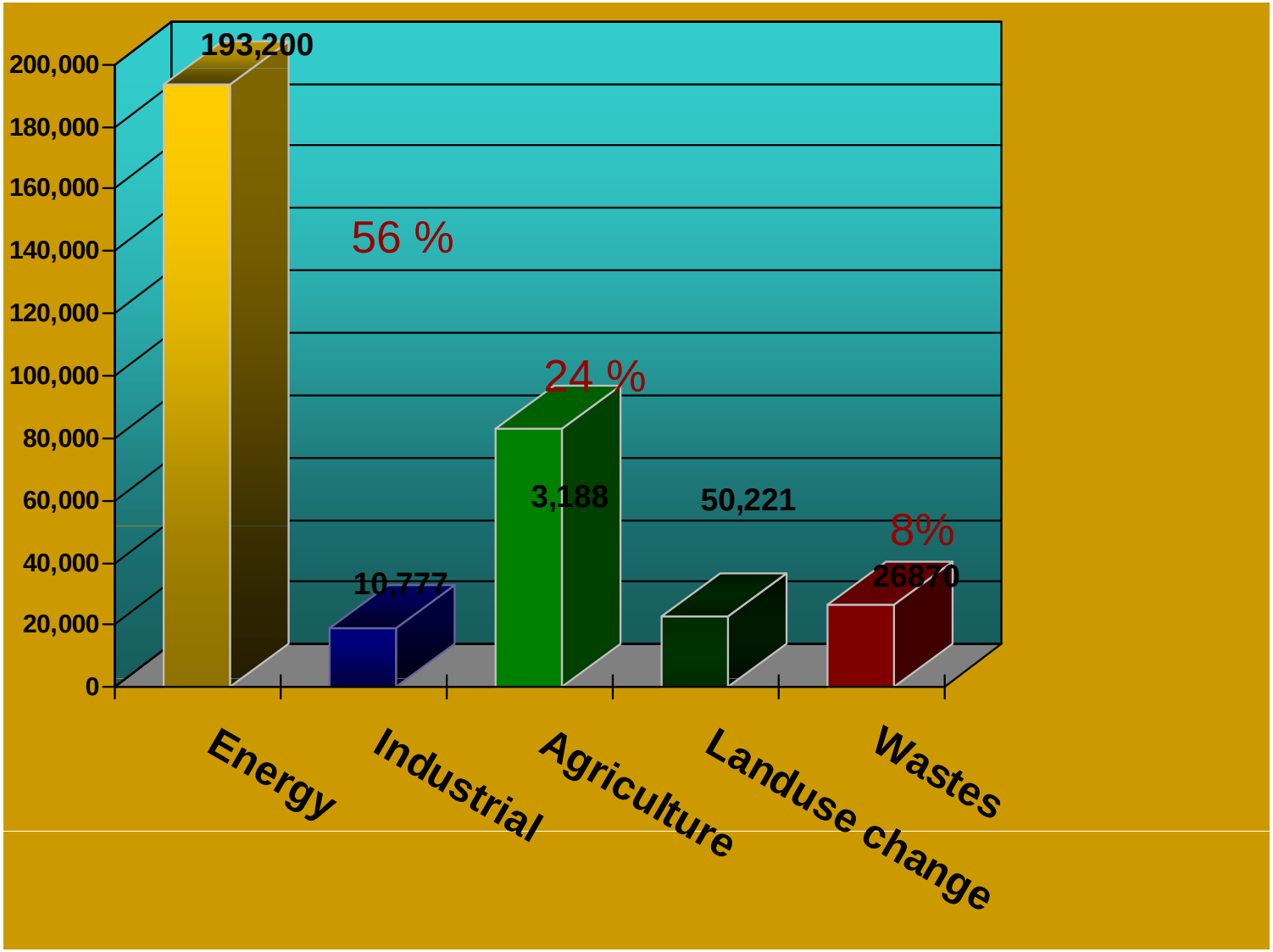
National total GHG emission

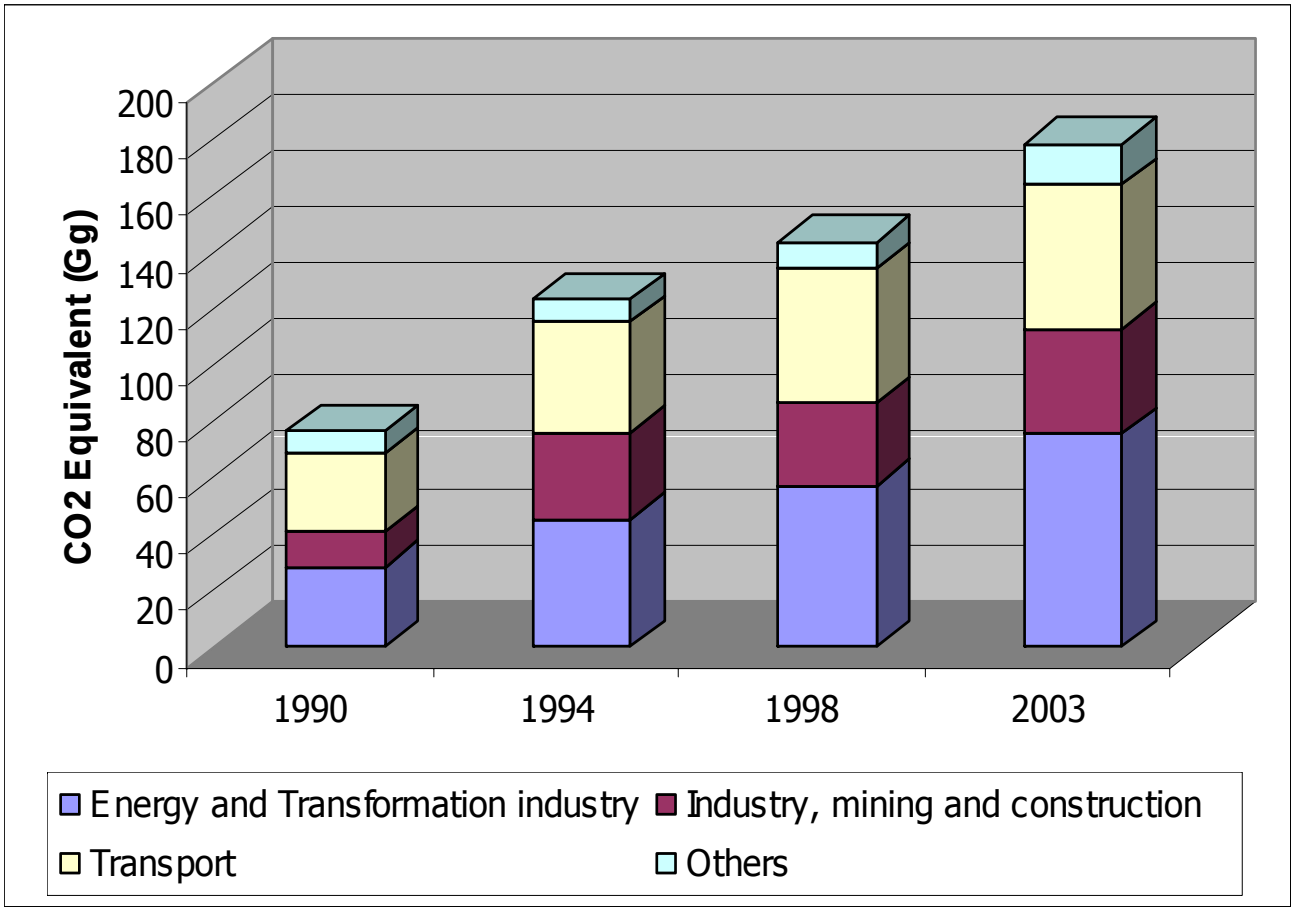


1990 : Report from TEI
1994 : Initial national communication
1998 : National Strategic Studies
2003 : ERM report



GHG Emission by sector 2003

Emission from energy sub-categories



1990 : Report from TEI
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Time series estimations : Energy sector

- Method applied
  - IPCC 1996 revised GL
- Data used in estimation
  - Statistical report from Ministry of Energy
  - GDP form Office of National Economics and Social Development Board

GHG Emission from Energy sector

Three major sub-categories

Electricity

- Thermal power plant
- Combined cycle power plant
- Gas turbine power plant
- Diesel power plant
- Cogeneration power plant
- Gas engine power plant (2004)

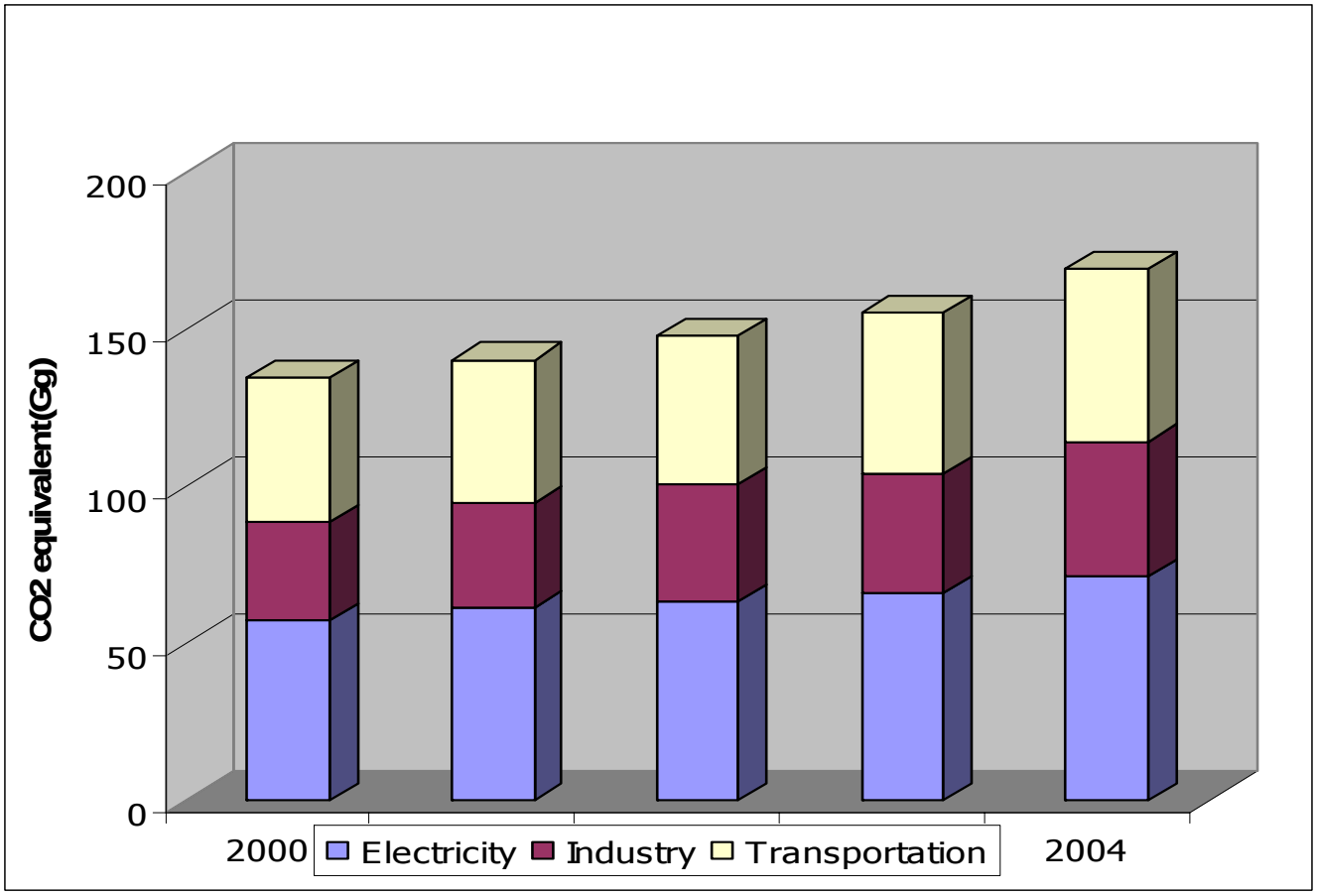
Industry

- Food and beverages
- Textiles
- Wood and furniture
- Paper
- Chemical
- Non-Metallic
- Basic Metal
- Fabricated metal
- Other (Unclassified)

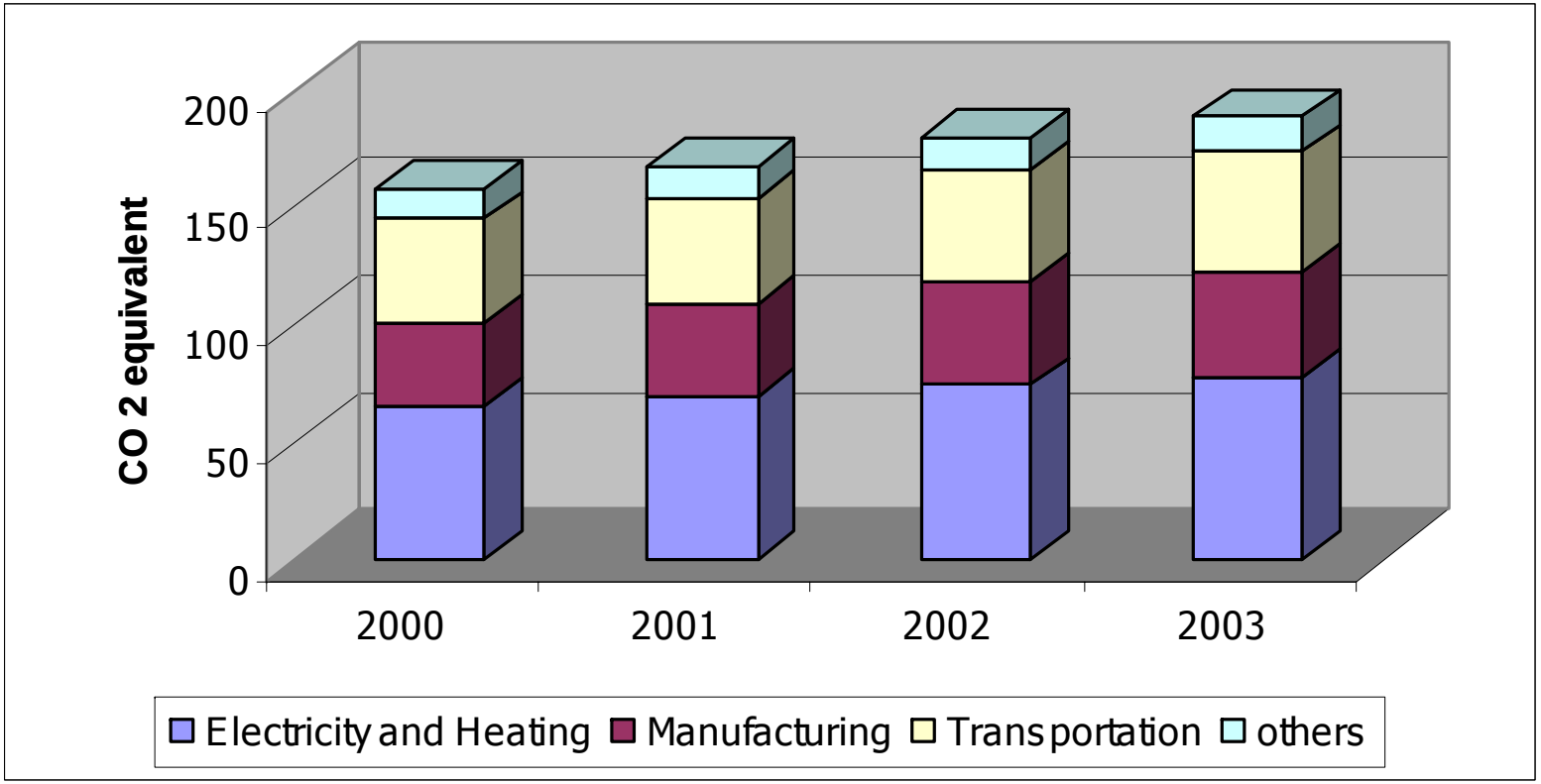
Transportation

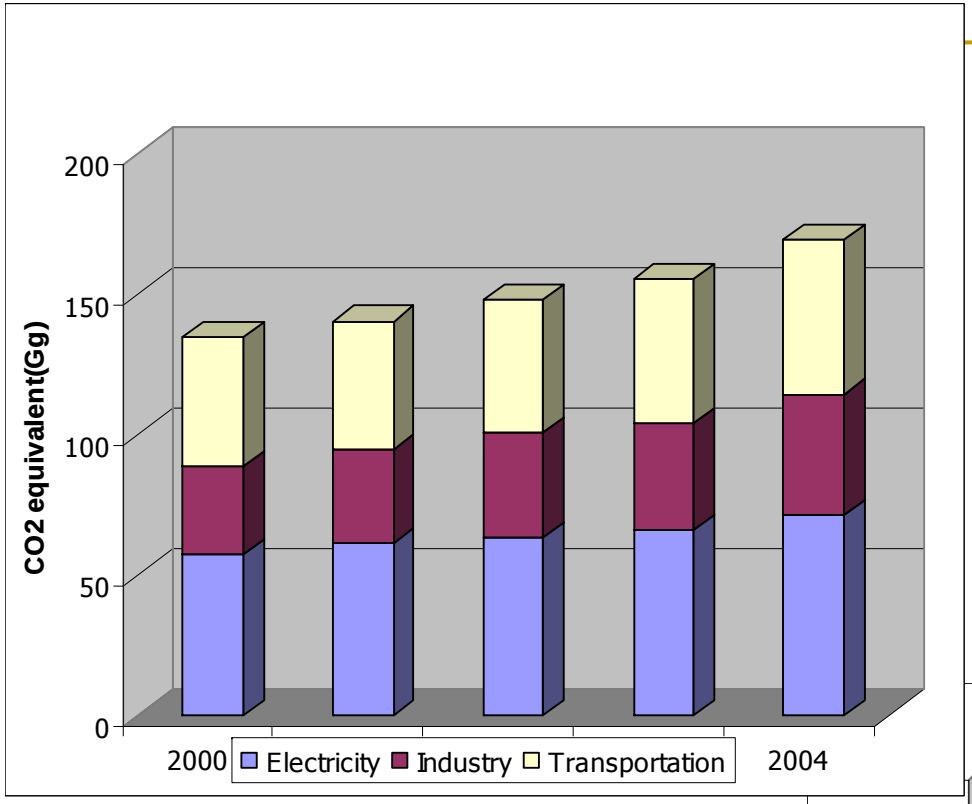
- Road transport
- Rail transport
- Air transport
- Water transport

Time series emission from energy sub-categories
Activity data from Ministry of Energy



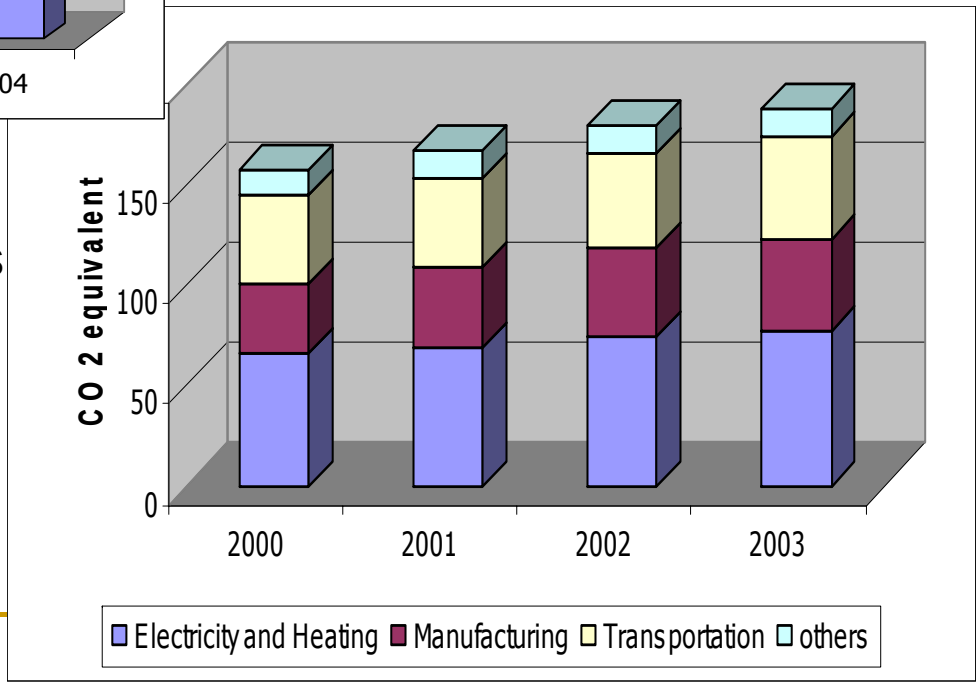
Emission from energy sub-categories CAIT data



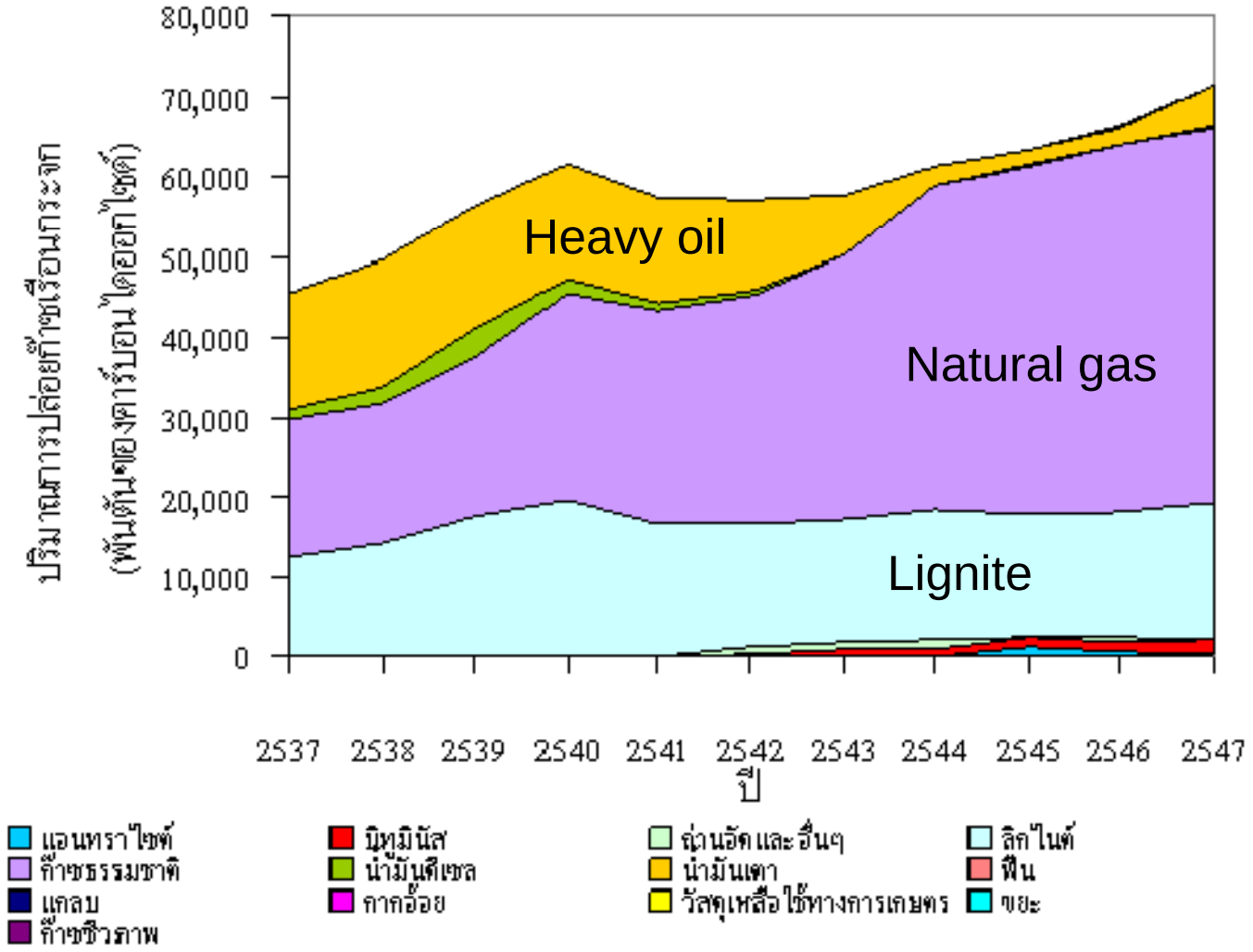


Emission from energy sub categories
National data

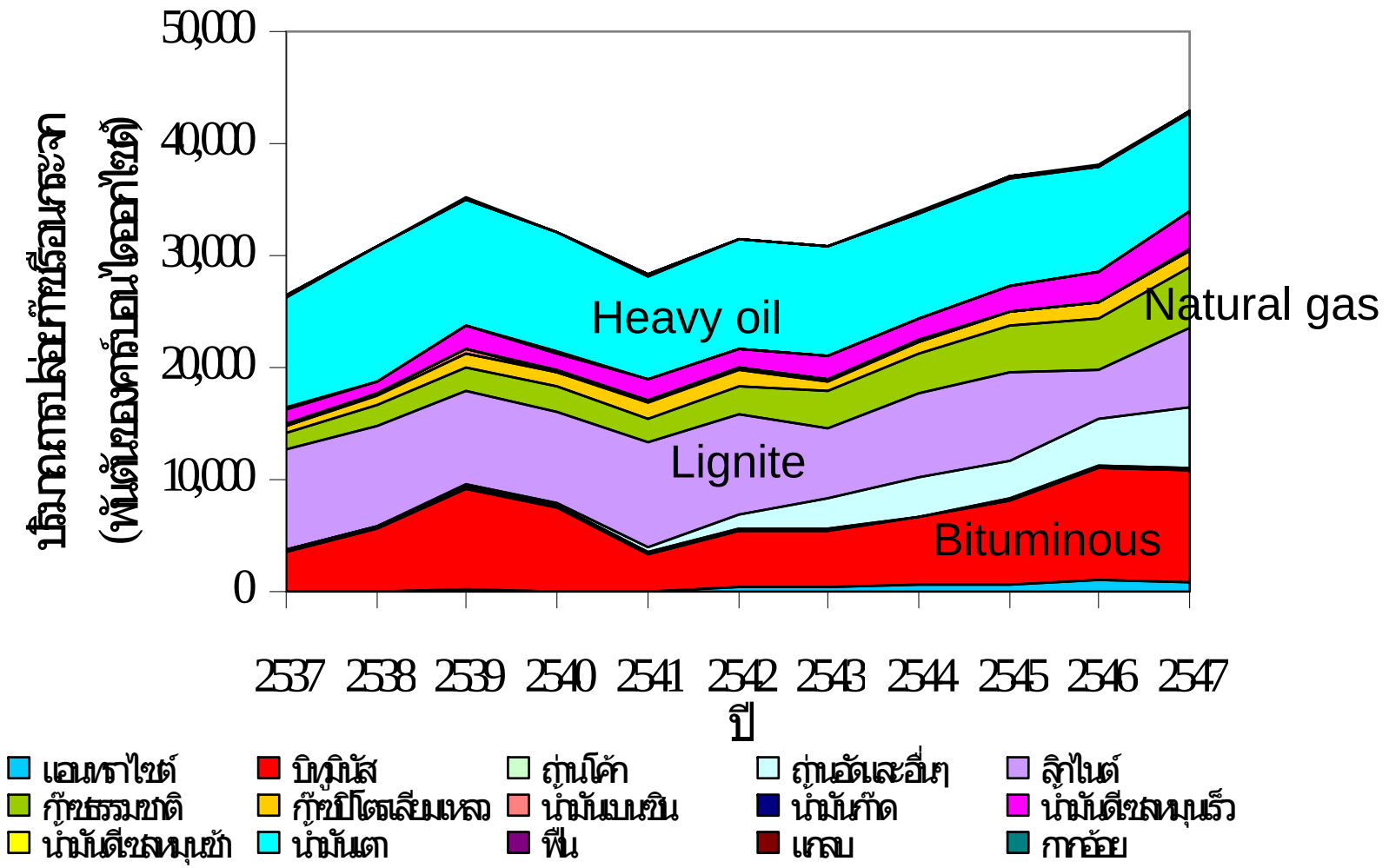
Emission from energy sub categories
CAIT data



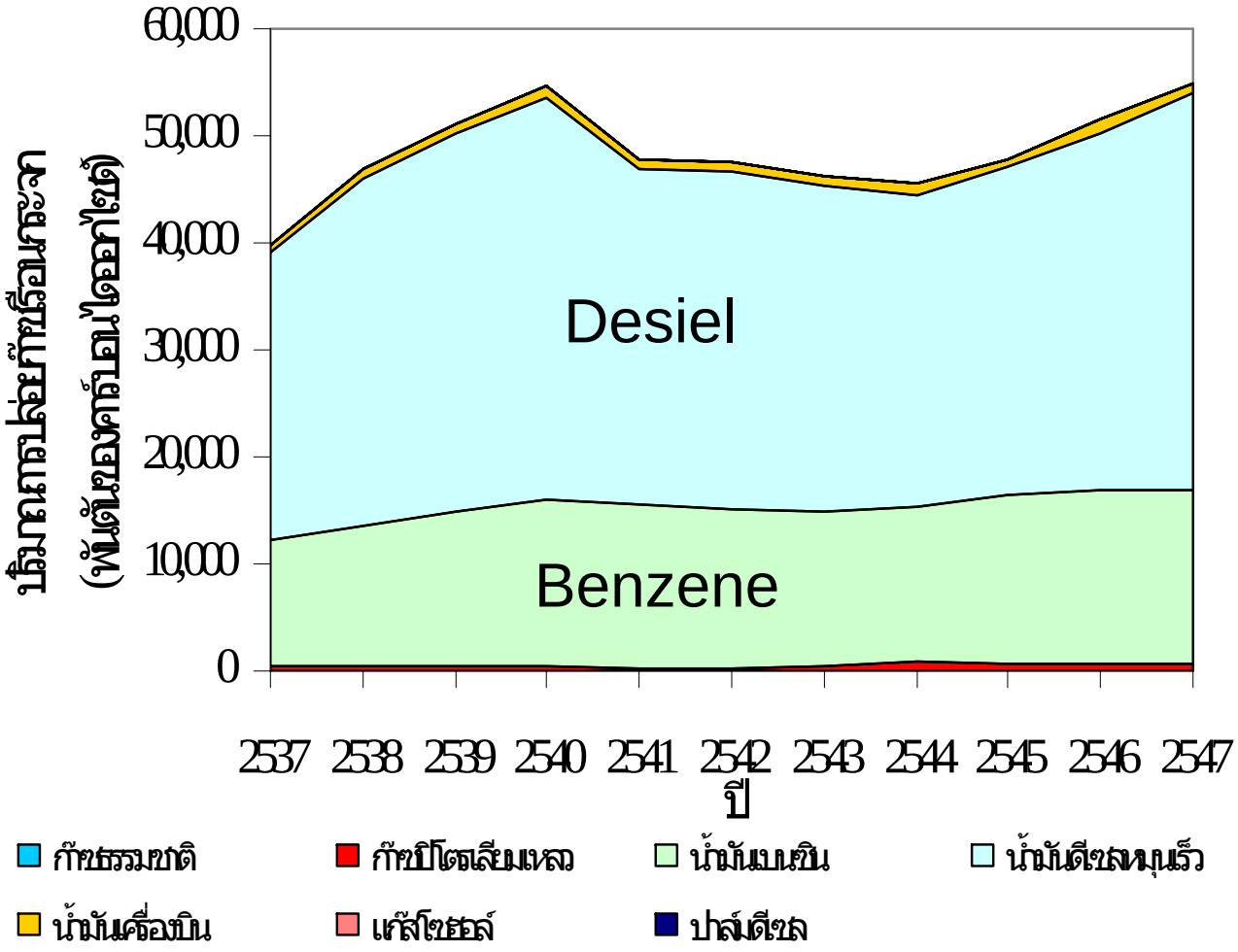
- Analysis of emission by sub-categories



Thousand tons of CO2 from **energy and transformation** from 1994-2004



Thousand tons of CO2 from **Industry** from 1994-2004

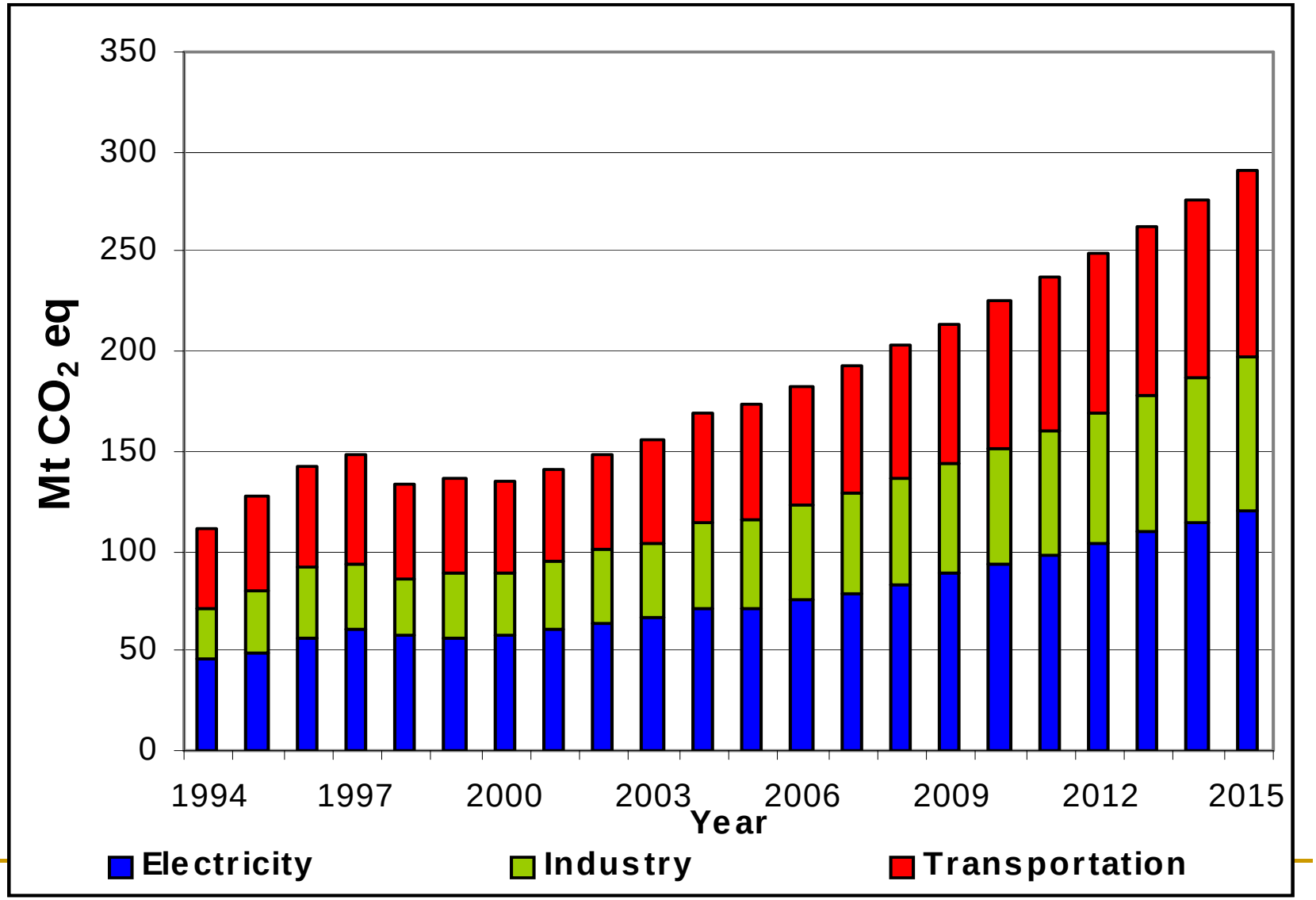


Thousand tons of CO2 from **Transport** from 1994-2004

Projection of emission

- **Estimate GHG emission of energy sector (past-present) : Using data energy consumption from "Thailand Energy Situation (DEDE)" since 1994-2004**
- **Forecast GHG emission from energy sector : using correlation GDP growth rate and population to fuel consumption in future**

GHGs emission under base case (BAU)



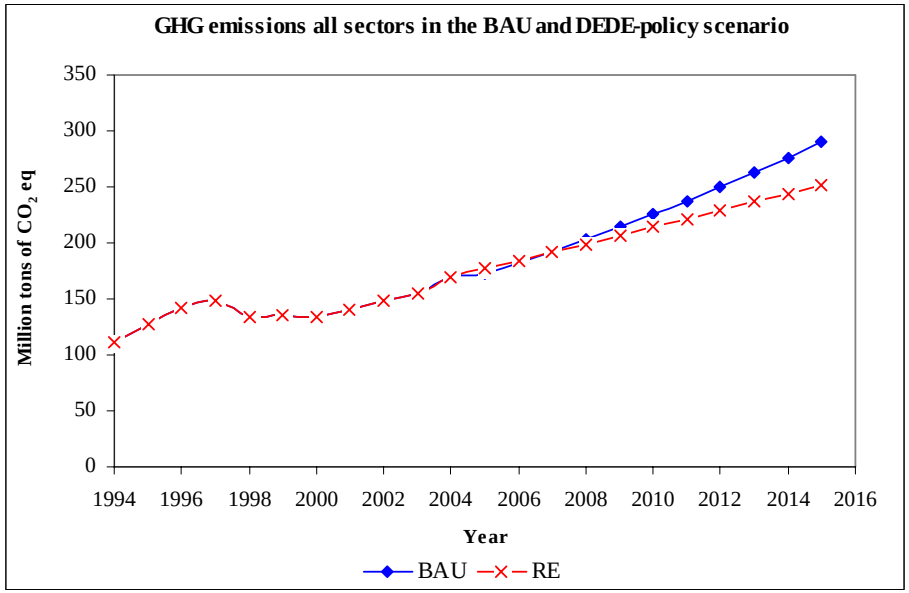
GHGs emission under policy and planning

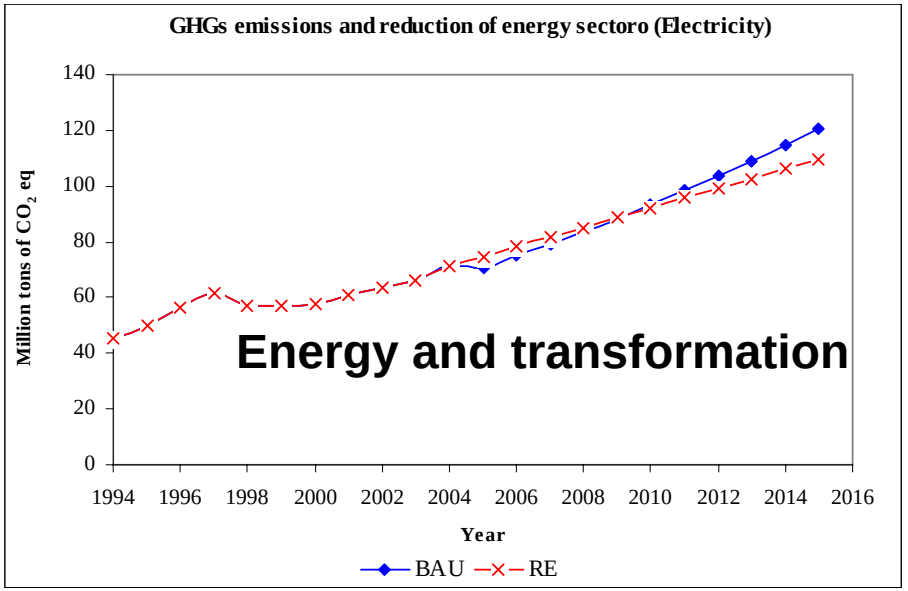
Department of Alternative Energy Development and Efficiency (DEDE)

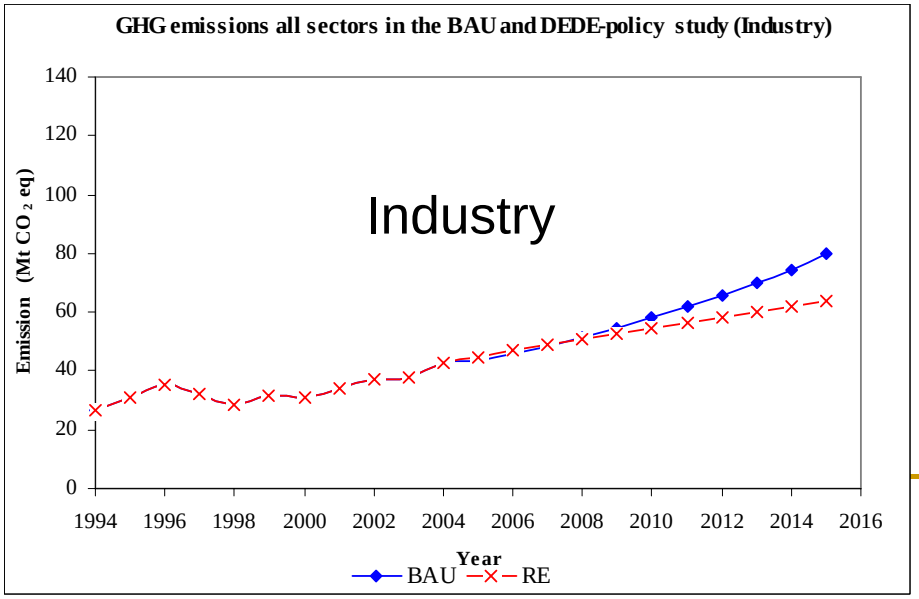
Policy and plan of DEDE Study

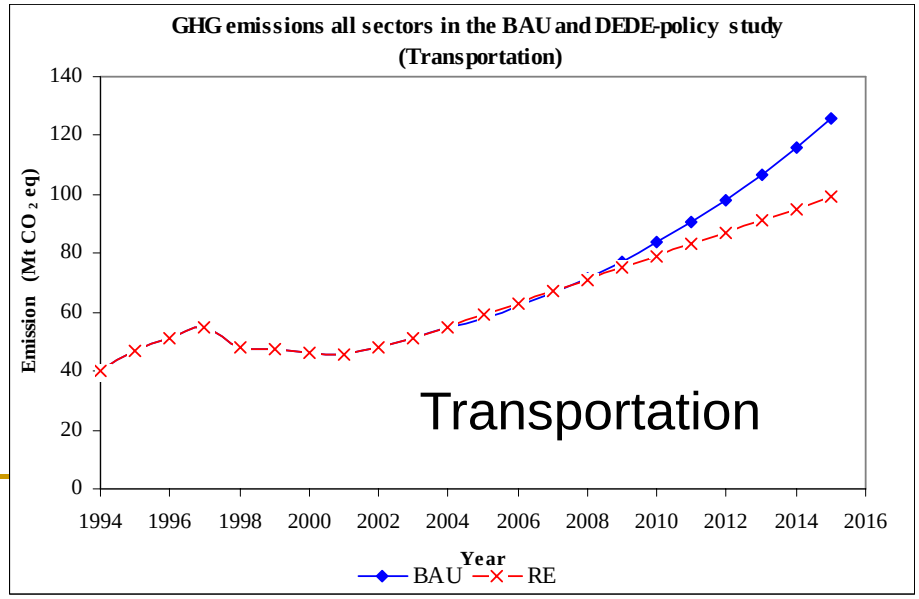
	Energy reducing (Ktoe)	GHG emission reducing (Mt CO_2 equivalent)
Renewable Energy at 2011 (RE)		
Electricity	1,169	2.7
Industry	1,650	5.3
Transportation	2,484	7.5
Total	**5,303**	**15.5**
GHG emission under scenario DEDE in 2011 **GHG emission under BAU in 2011**		**222 (Mt CO2 equivalent)** **235.5 (Mt CO2 equivalent)**

DEDE Study

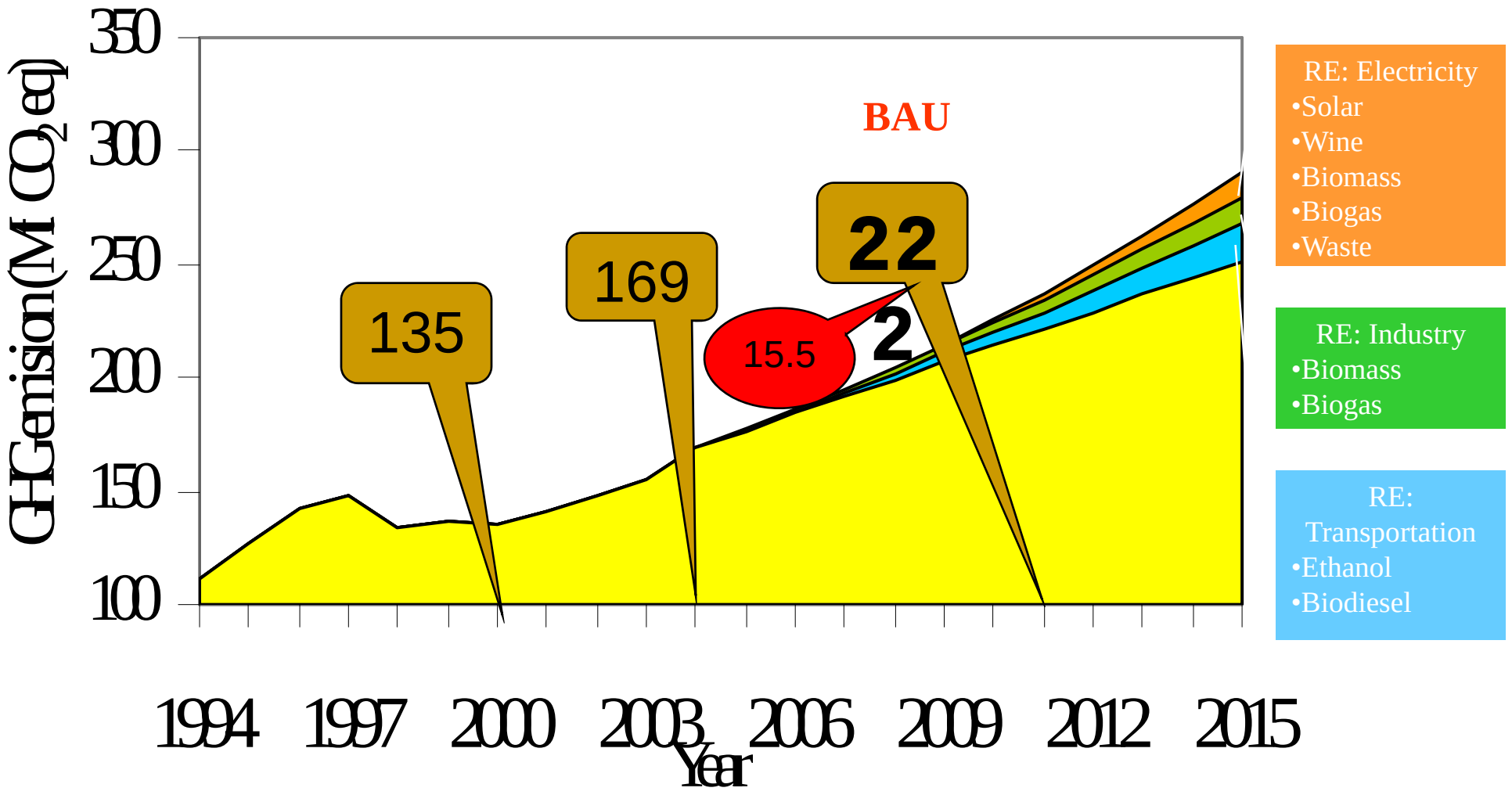

GHG emissions all sectors in the BAU and DEDE-policy scenario
Million tons of CO_2 eq
350
300
250
200
150
100
50
0
1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
Year
BAU
RE


GHGs emissions and reduction of energy sectoro (Electricity)
Million tons of CO_2 eq
140
120
100
80
60
40
20
0
Energy and transformation
1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
Year
BAU
RE


GHG emissions all sectors in the BAU and DEDE-policy study (Industry)
Emission (Mt CO_2 eq)
140
120
100
80
60
40
20
0
Industry
1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
Year
BAU
RE


GHG emissions all sectors in the BAU and DEDE-policy study (Transportation)
Emission (Mt CO_2 eq)
140
120
100
80
60
40
20
0
Transportation
1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
Year
BAU
RE

DEDE Study



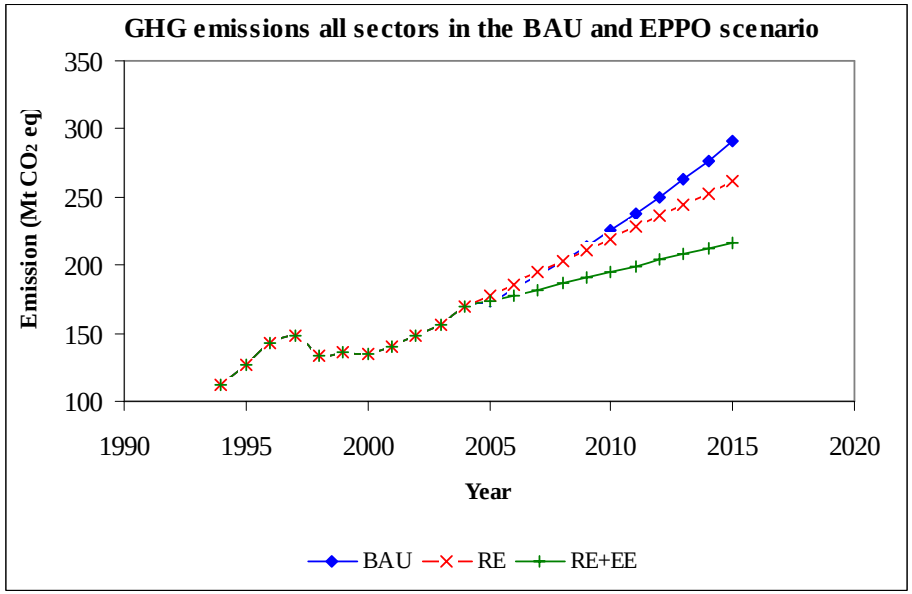
RE = Renewable Energy

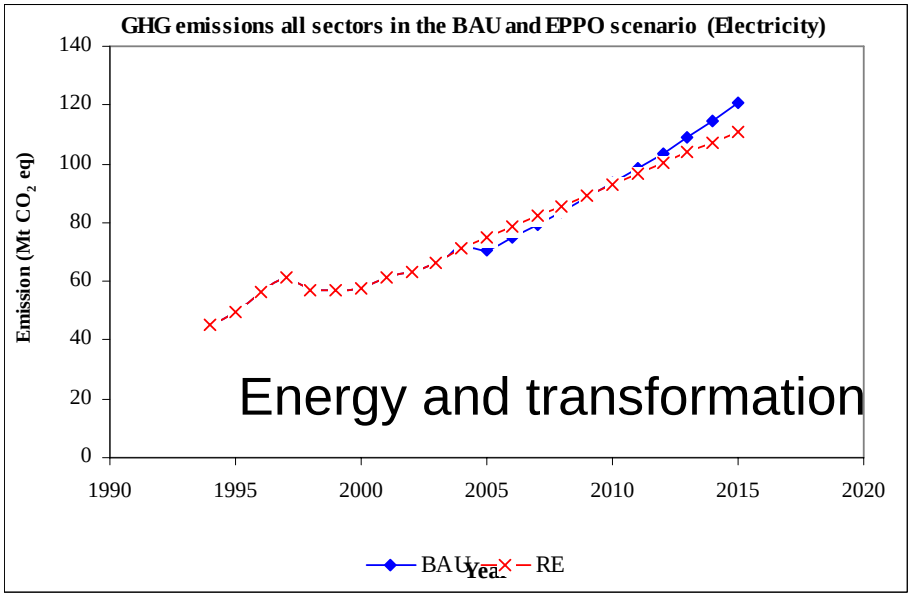
GHGs emission under policy and plan of Energy Policy and Planning Office (EPPO)

Policy and plan of EPPO Study

	Energy reducing (Ktoe)	**GHG emission reducing (Mt CO_2 equivalent)**
Renewable Energy at 2011 (RE)		
Electricity	741	1.7
Industry	453	1.4
Transportation	2,074	6.3
Energy Efficiency at 2011 (EE)		
Industry	3,411	9.0
Transportation	6,269	19.2
Total	**12,948**	**37.6**
GHG emission under scenario of EPPO in 2011 **GHG Emission BAU in 2011**		**200(Mt CO_2 equivalent)** **237.6 (Mt CO_2 equivalent)**

EPPO Study


GHG emissions all sectors in the BAU and EPPO scenario
Emission (Mt CO2 eq)
350
300
250
200
150
100
1990
1995
2000
2005
2010
2015
2020
Year
BAU
RE
RE+EE


GHG emissions all sectors in the BAU and EPPO scenario (Electricity)
Emission (Mt CO2 eq)
140
120
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1990
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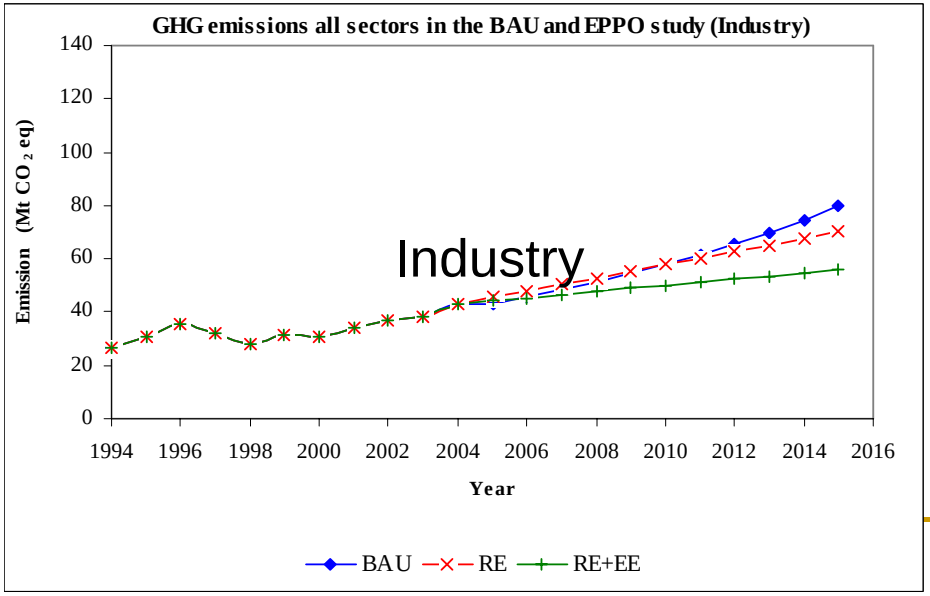
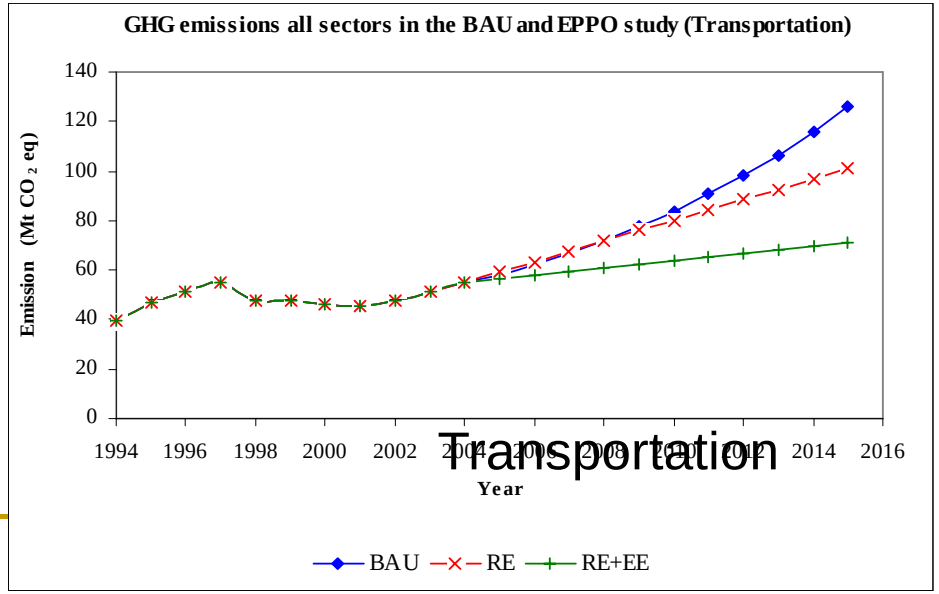
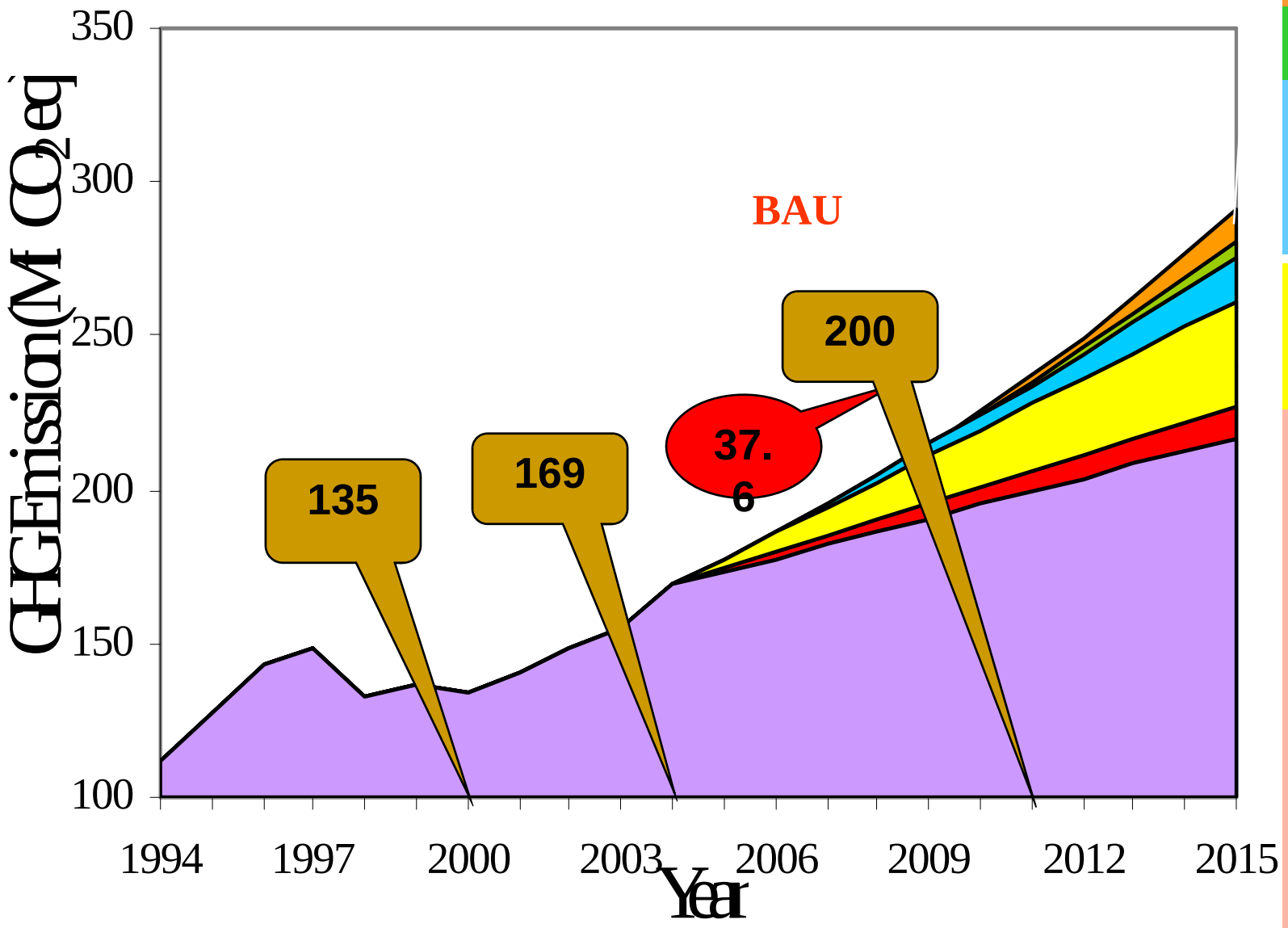
2020
Energy and transformation
BAU
RE


GHG emissions all sectors in the BAU and EPPO study (Industry)
Emission (Mt CO2 eq)
140
120
100
80
60
40
20
0
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Industry
BAU
RE
RE+EE


GHG emissions all sectors in the BAU and EPPO study (Transportation)
Emission (Mt CO2 eq)
140
120
100
80
60
40
20
0
1994
1996
1998
2000
2002
2014
2016
Year
Transportation
BAU
RE
RE+EE

EPPO Study



RE: Electricity
•Solar
•Wind

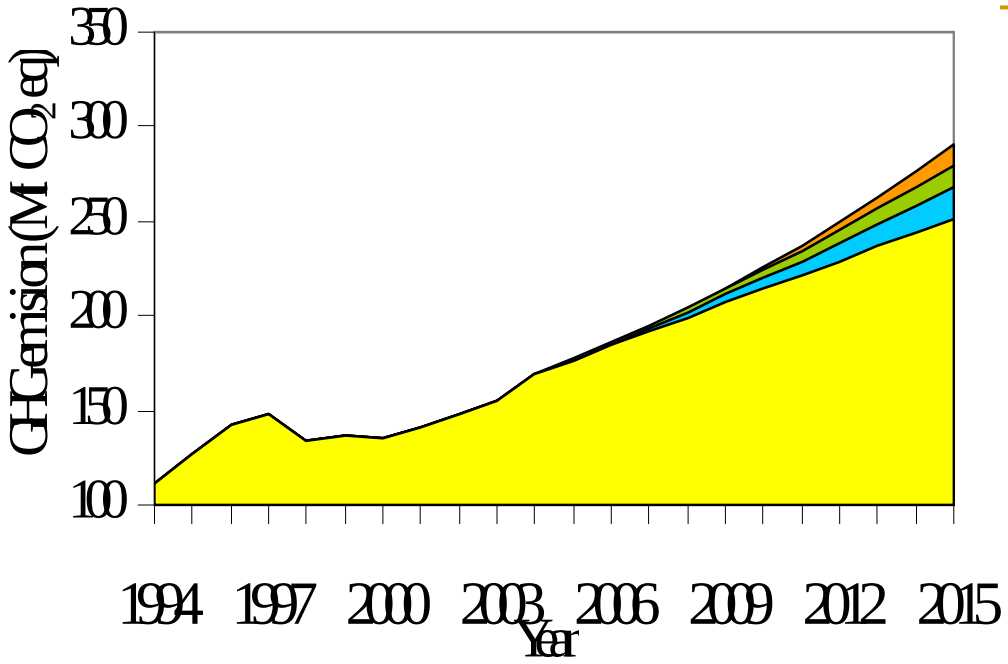
RE: Industry
•Biomass

RE: Transportation
•Ethanol
•Biodiesel

EE: Industry
•Tax exemption
•Soft loan promotion

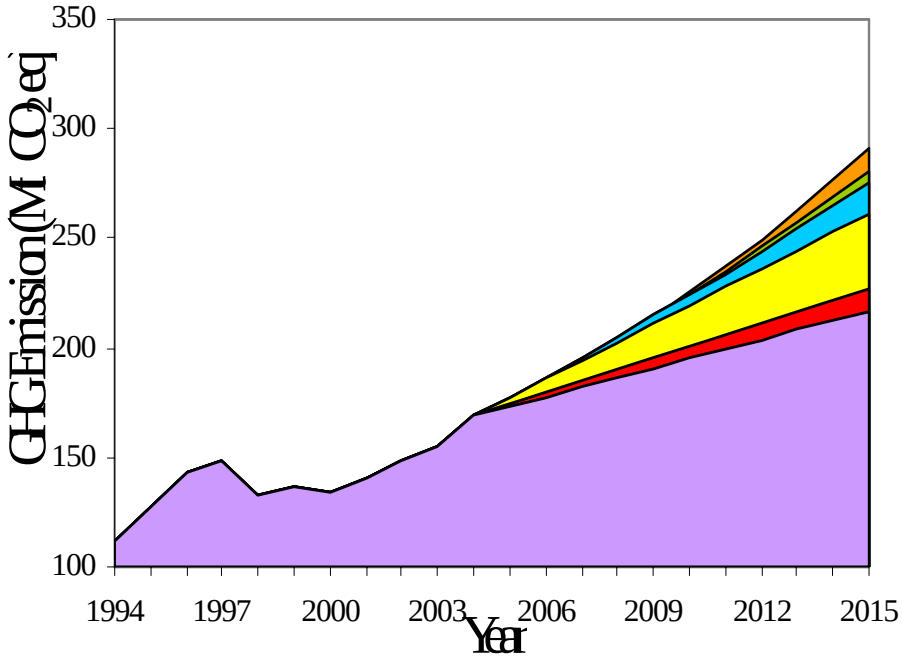
EE: Transportation
•Mass transit
• Rail way and water way promotion
•Promote Logistic Depot
• Networking
•Tax measure
•Traffic management
•Increase car efficiency

RE = Renewable Energy **EE** = Energy Efficiency

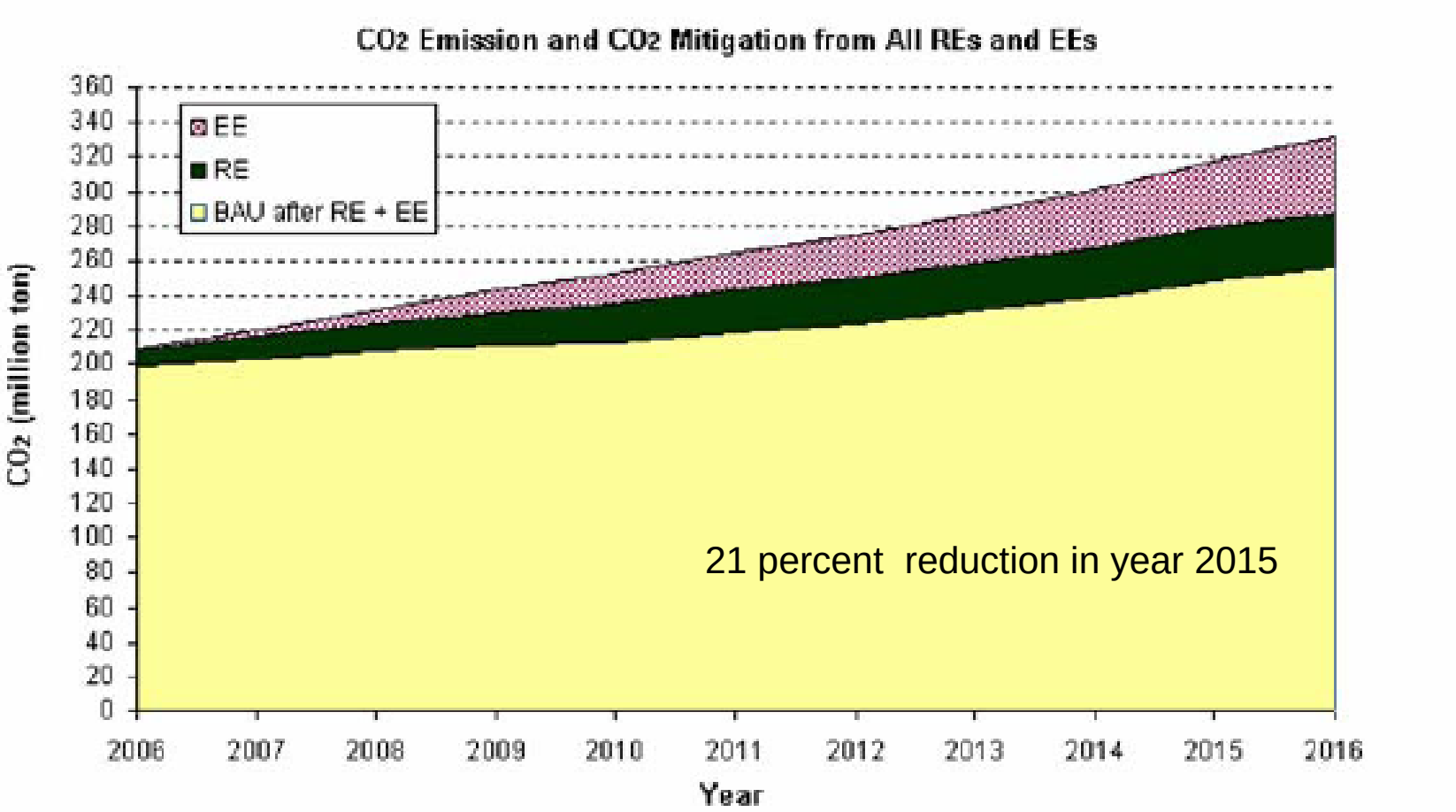


DEDE : 6.6 % reduction (2011)
RE only

EPPO : 16.0 % reduction (2011)
RE and extremely plan for EE



Comparison to LEAP model



Contribution of energy saving and renewable energy Substitution in CO2 mitigation

Conclusion

- Time series estimation help analysis historical activities of the country and to see trend in the future
- Use only one national data source (most reliable) to avoid confusing and controversy
- Historical tracking of data is important

Acknowledgement

- Energy policy project supported by EPPO and TRF
- GHG mitigation option project supported by TRF

Thank you and Kop khun Ka