AIM/CGE: Thailand

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Presentation outline

PART A

- **Brief background of Thailand**
  - **Energy**
  - **Economy**
  - **Environment**

PART B

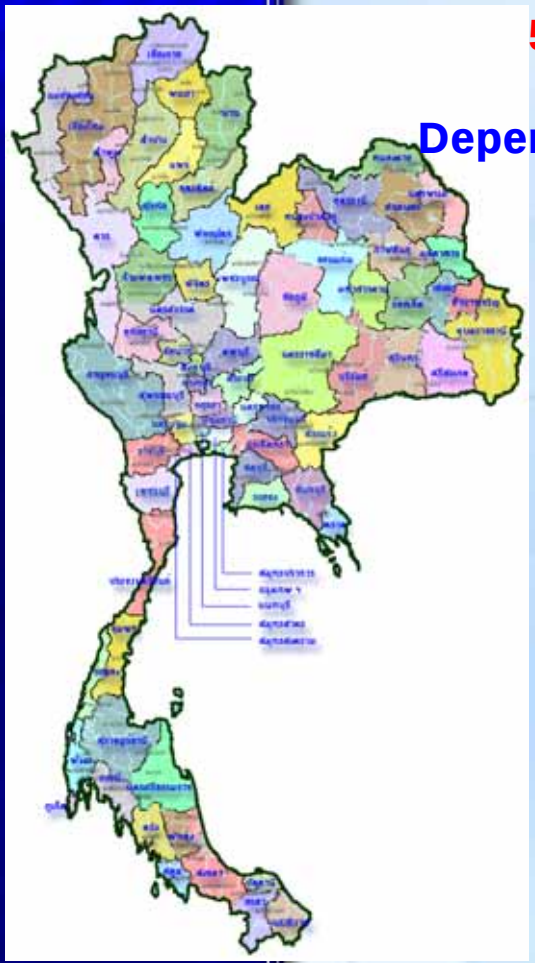
- **AIM/CGE Thailand**
  - **General information of the model**
  - **Analysis of the benchmark year (STATIC)**
  - **Analysis of future years (DYNAMIC)**

PART C

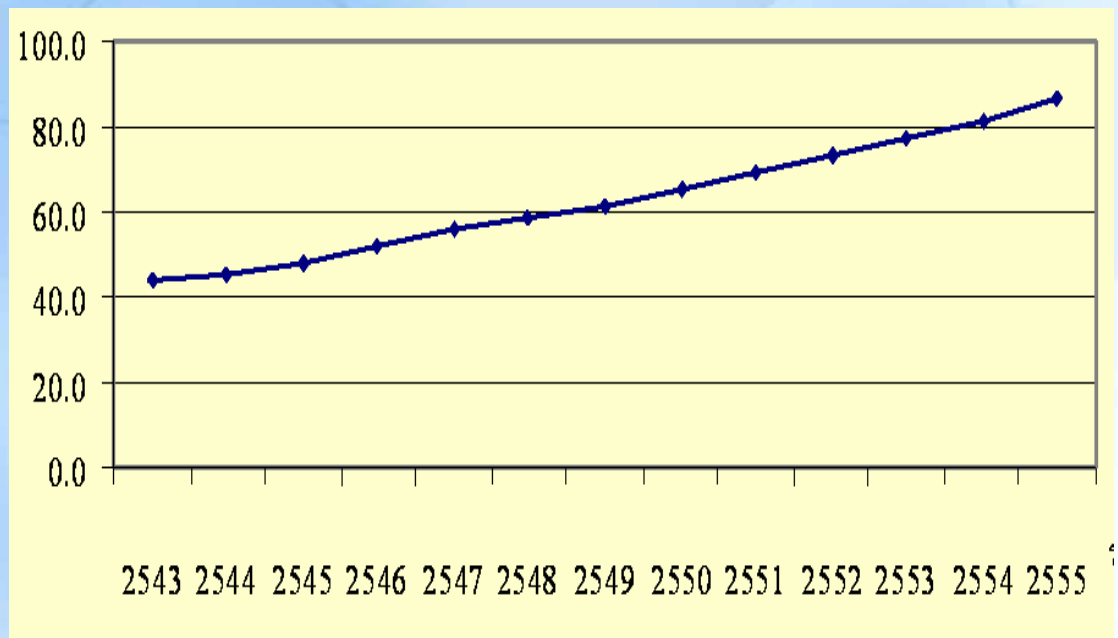
- **Future direction**

PART A

Introduction



541,000 million Baht (13.5 billion USD) of oil import in 2004,
(14.1% of all commodity import)
Dependency on imported energy (in % of primary energy supply)
increases from 52% in 2000 to 57% in 2004



Rising demand of fuel, especially in transport sector
Diesel demand would be increased to 85 million litres/day by 2012

Thailand's Position

Convention

- Thailand Signed the UNFCCC in June 1992 at UNCED and Ratified the UNFCCC in December 1994; and

Kyoto Protocol

- Thailand signed the Kyoto Protocol in February 1999 and Ratified on 28 August 2002.

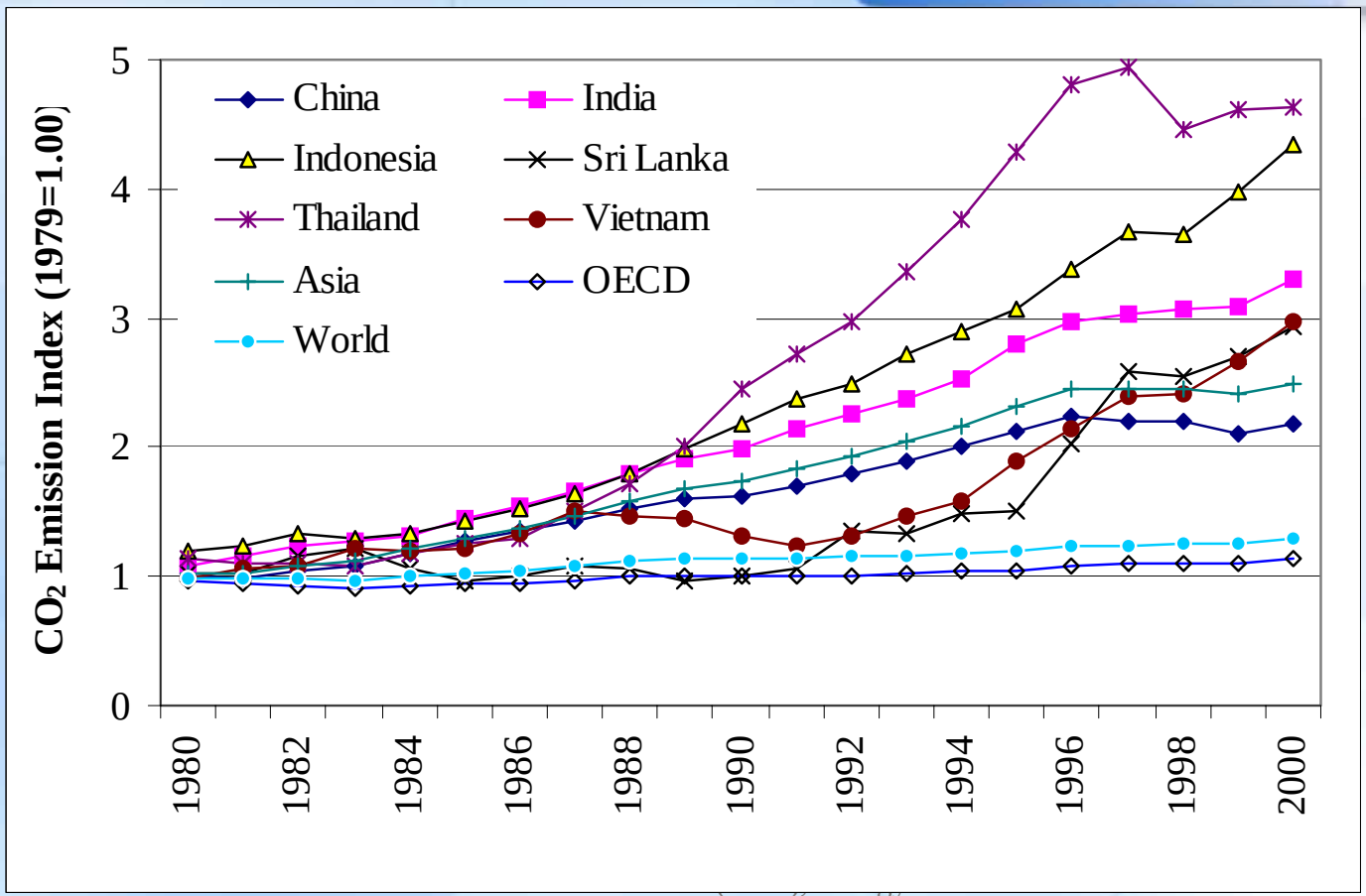
Energy-Environment Context: Thailand (2004)

- **Population: 64 Millions**
- **GDP: 163.5 Billion USD; 6.2%** 
- **Total Primary Energy Supply: 98 million toe; 6.06%** 
- **Final Energy Consumption: 61 million toe; 8.51%** 
- **Energy related CO_2 emissions: 180.68 million tons; 5.43%** 
- **Energy Intensity: 15.56 toe/ million Baht$_{1988\ price}$**

  (2.1% from 2003) 
- **CO_2 Intensity: 128.59 t-CO2/million Baht$_{1988\ price}$**

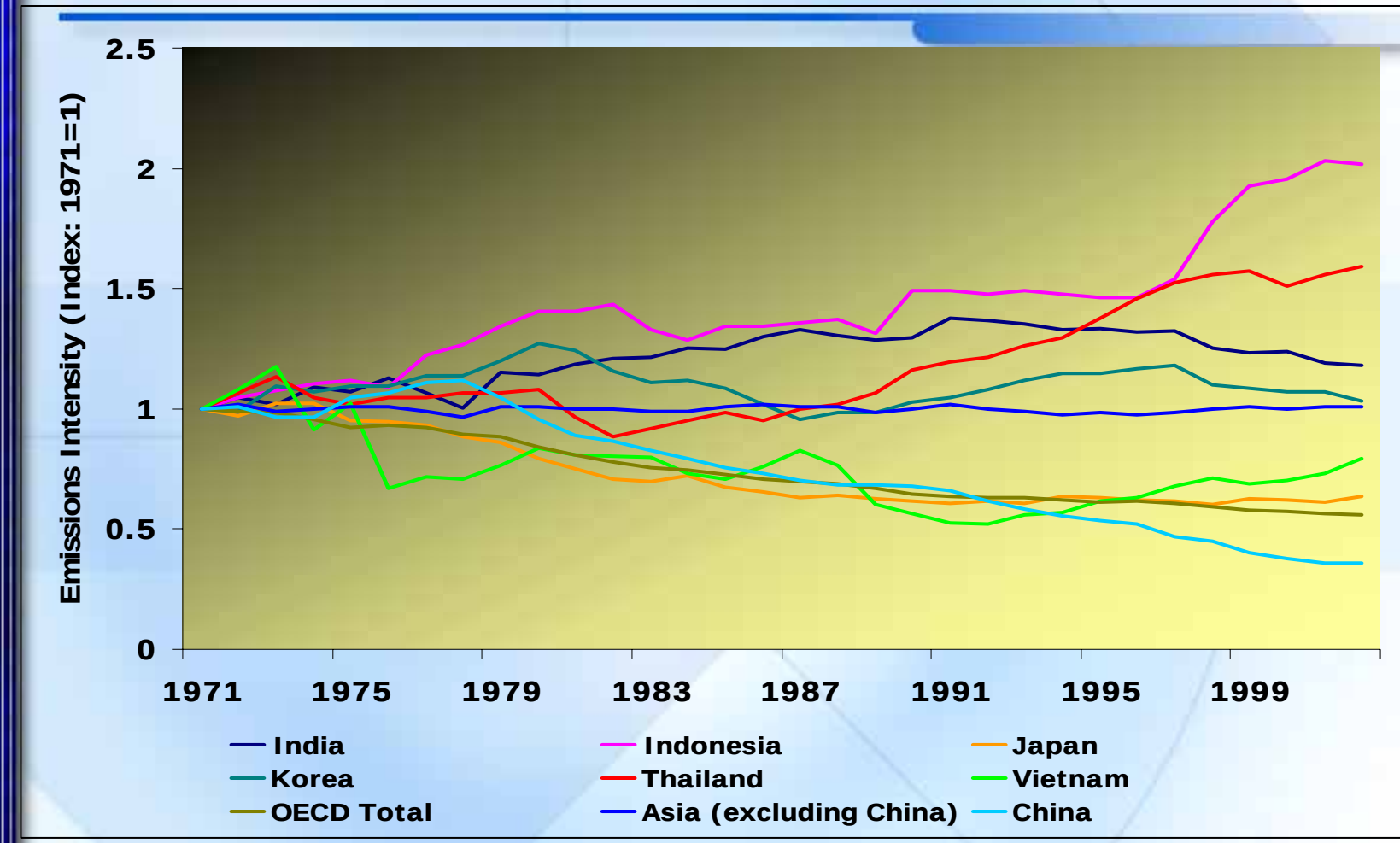
  (1.61% from 2003) 

CO_2 emissions during 1980-2000



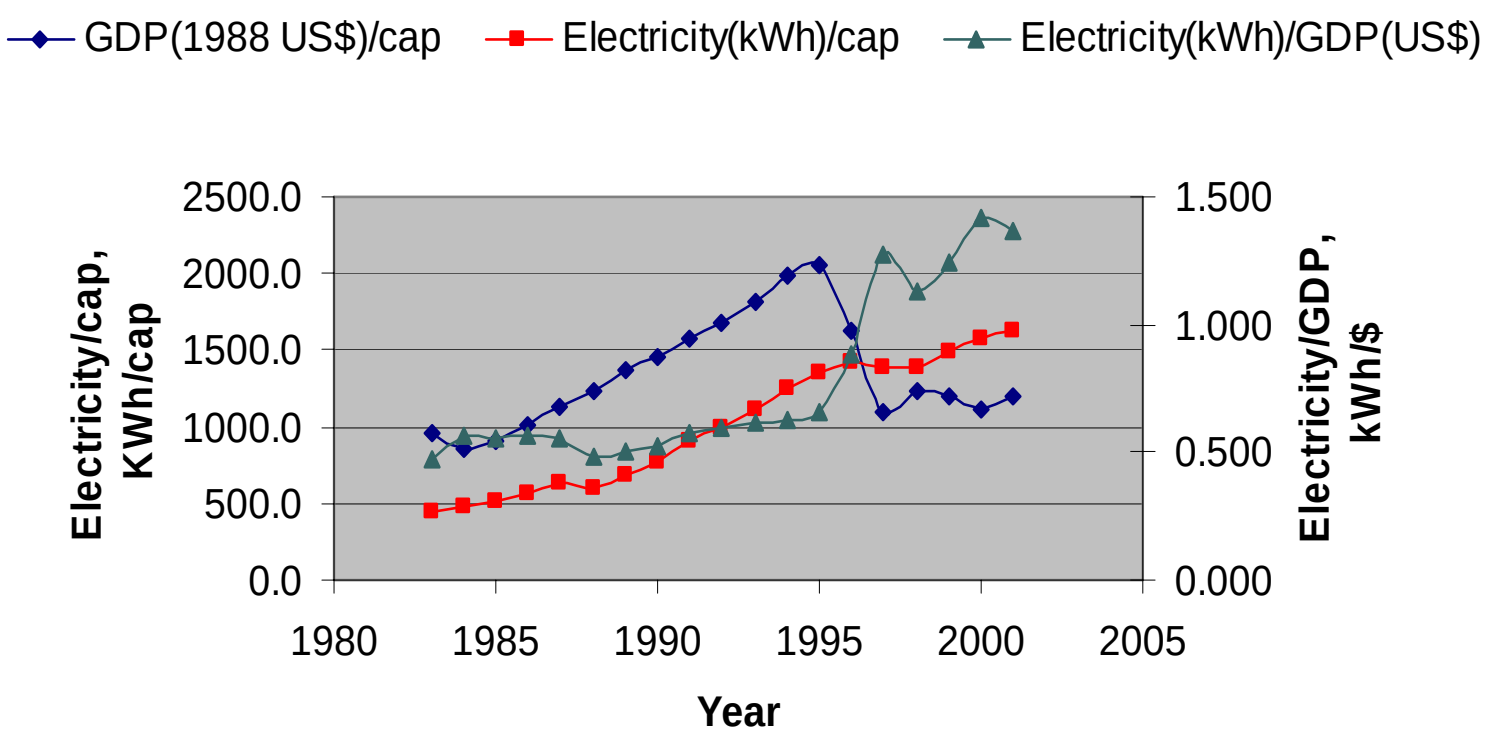
- **CO2 emissions in 2000 compared to 1980**
  - **Over 2 times in China and Developing Asian countries**
  - **Over 4 times in Thailand and Indonesia**
  - **Less than 1.5 times in OECD countries**

CO_2 Emissions Intensity (CO_2 per GDP_{MER})



CO_2 emissions intensity has been increasing in Thailand after 1990.

Thai GDP and Electricity Consumption



- ✧ Energy consumption has grown to 5 folds from 1980s.
- ✧ Energy efficiency has not improved, but worsens since 1997.

- Significant energy efficiency improvement has not been observed despite implementation of many programs.

Climate Change Management

1. GHGs emission reduction without negative impact on development

1.1 GHGs reduction from Sources
Renewable energy, Transport, EE, and Waste Management
1.2 Carbon sink → Later, Not now !!

2. Capacity Building, Public Awareness and Public Participation
→ Mainly on human resources
→ CC promotion through academic curriculum

3. Structural Strengthening and Legal Amendment

4. Research and Development on Climate Change to be the foundation for impact mitigation and adaptation

Thailand Energy Strategies

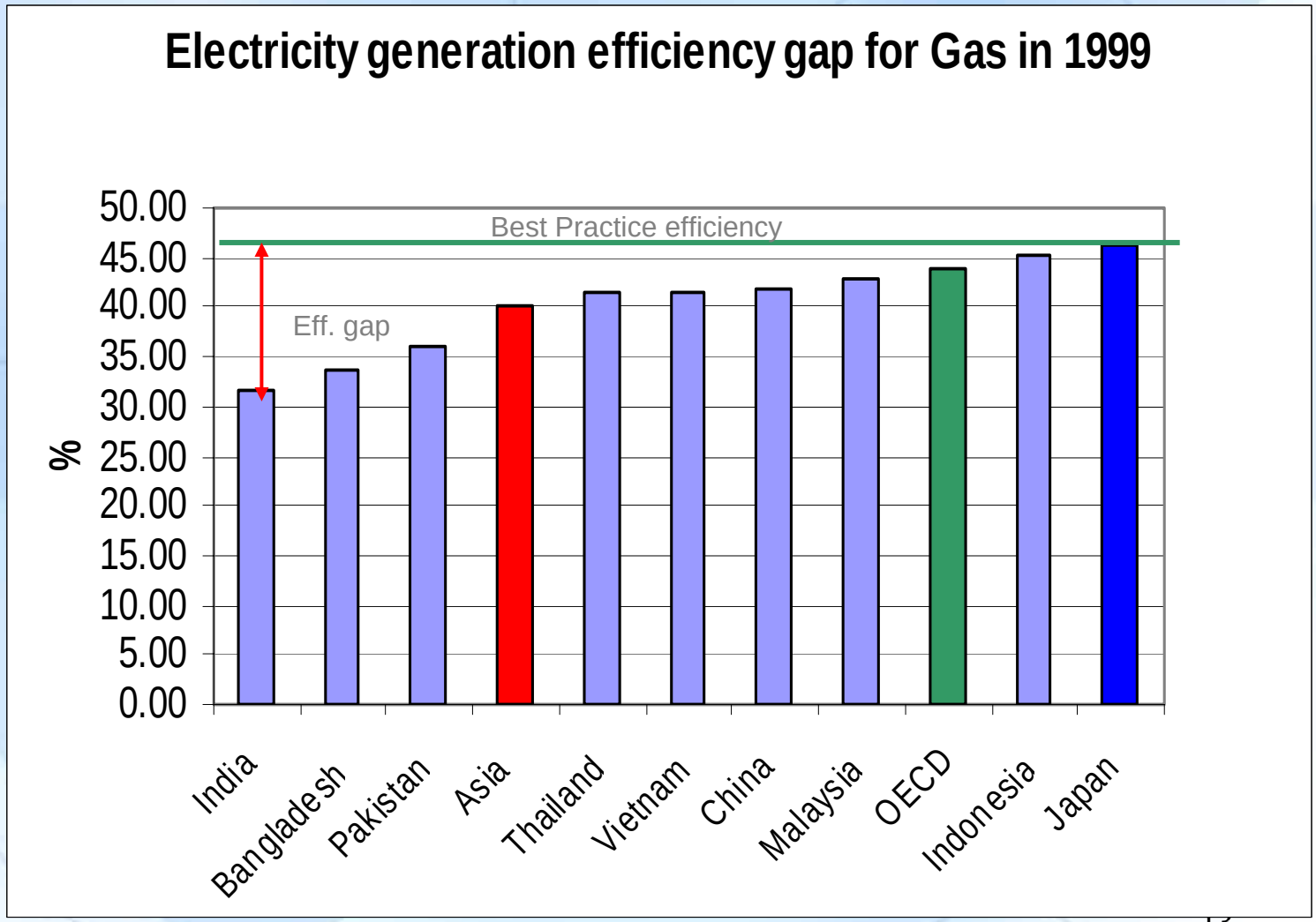
- The high elasticity of energy consumption growth to growth in GDP of 1.4 to 1 has prompted the government to set a target of reducing this elasticity to 1:1 and set 4 strategies on energy:

1. improvement on efficiency of energy utilization,
2. utilization of renewable energy to increase to 8%,
3. improvement of energy security by ensuring that sufficient reserves are maintained, and
4. to turn Thailand into an energy trading hub.

Thailand Energy Strategies and potential contribution from Research

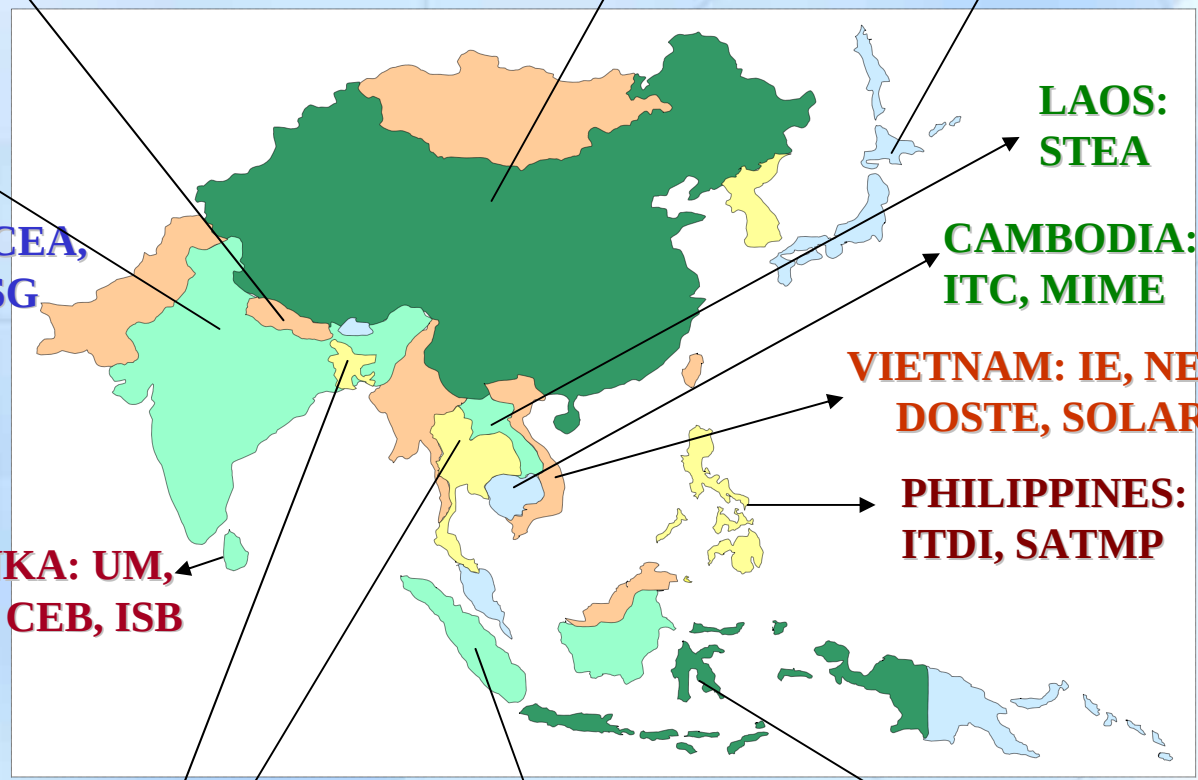
Strategy	Research Topics
1. E. Efficiency	Energy conservation for industry, commercial and residential buildings
2. Renewable Energy	Development of renewable energy technologies, and their applications
3. Energy Security	ASEAN Power Grid and Gas Grid. Energy substitution
4. Energy Hub	Creation of energy markets. Trading of electric power in GMS and ASEAN.

Electricity Generation Efficiency Gaps - Gas



Data source: IEA, 2002

Collaborating Institutions (Research) Within Asia and the Pacific



NEPAL: CRE, RECAST, RONAST

CHINA: CRED, ERI, CESTT

JAPAN

LAOS: STEA

INDIA: IISc, IIT, CEA, IGIDR, PSG

CAMBODIA: ITC, MIME

VIETNAM: IE, NEDCEN, DOSTE, SOLARLAB

PHILIPPINES: UP, ITDI, SATMP

SRI LANKA: UM, SLEMA, CEB, ISB

BANGLADESH: BIT, GS

MALAYSIA: FRI

INDONESIA: CU, ITB

THAILAND: EPPO, DEDE, SIIT




PART B

1. General Information of Thai Model

- Benchmark year: 2000
- Time horizon: 30 years (2000 to 2030)
- The 2000 IO table is published by the NESDB
- CO2 emissions

1.1 Data Preparation
1.2 Sector/Commodity Classification
1.3 GDP Discrepancy
1.4 Sectoral Structure of the Thai economy

1.1 Data Preparation

- Step 1: The original IO (180x180)
  - Aggregated to 29x29
  - Aggregated to 23x23
- Step 2: Disaggregation of energy sector/commodity
  - Petroleum products sector into 6 commodities
  - Electricity commodity into 5 sectors
- Step 3: AIM/CGE data set
  - Static part (U, V, ENE, ER)
  - Dynamic part (FCF, GR_E_I, GR_L_I, INT_PRI, Growth)

1.2 Sector/Commodity Classification

23 Sectors/commodities

1	Agriculture, livestock, forestry, fishery	19	Commercials
2	Mining coal, lignite	20	Land transport
3	Crude petroleum	21	Water transport
4	Mining NG	22	Air transport
5	Other mining	23	Others
6	Food, beverage, tobacco		**11 Energy types**
7	Textile and woods	9A	Gasoline
8	Paper and printings	9B	Diesel
10	Chemical, phrama	9C	Jet fuel
11	Manu rubber, plastic	9D	Fuel oil
12	Manu non-metallic	9E	LPG
13	Metals, metal products	9F	Kerosene
14	Computer, machinery	17A	Electricity by hydro
15	Motor vehicle, equipment	17B	Electricity by oils
16	Other manus	17C	Electricity by coal and lignite
18	Construction	17D	Electricity by natural gas
		17E	Electricity by renewables

1.3 GDP Discrepancy

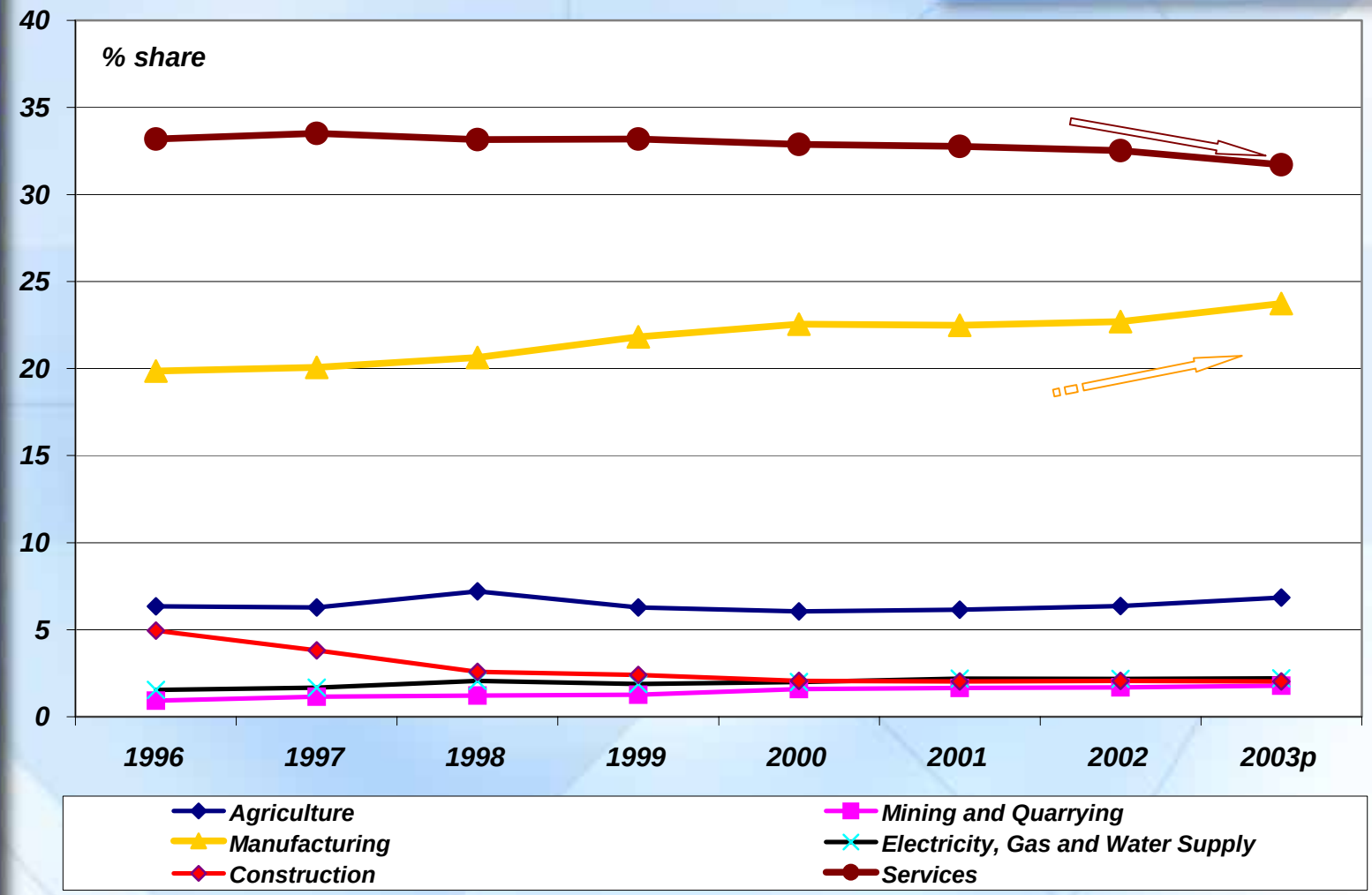
Item	Agriculture	Others	Total interm	A_CON	A_INV	A_STK	A_EXP	A_IMP
Agriculture	55895	11534	655430	236523	836	(13034)	37276	(59132)
Air transport	929	4509	70809	21914	0	0	48065	(16069)
Others	4160	59072	223359	364389	0	0	87639	(79863)
Total intermed	**454389**	**346881**	**8151972**	**3169621**	**1255021**	**25879**	**3245813**	**(2871184)**
wage salary	103204	504474	1609453					
operating surplu	269904	134591	2493198					
depreciation	29682	83481	734076					
indirec taxes	413	16911	384138					
Total VA	**403203**	**739457**	**5220865**	**GDP from earning approach**				

GDP from product approach **5220865**

Difference by 6.1 %

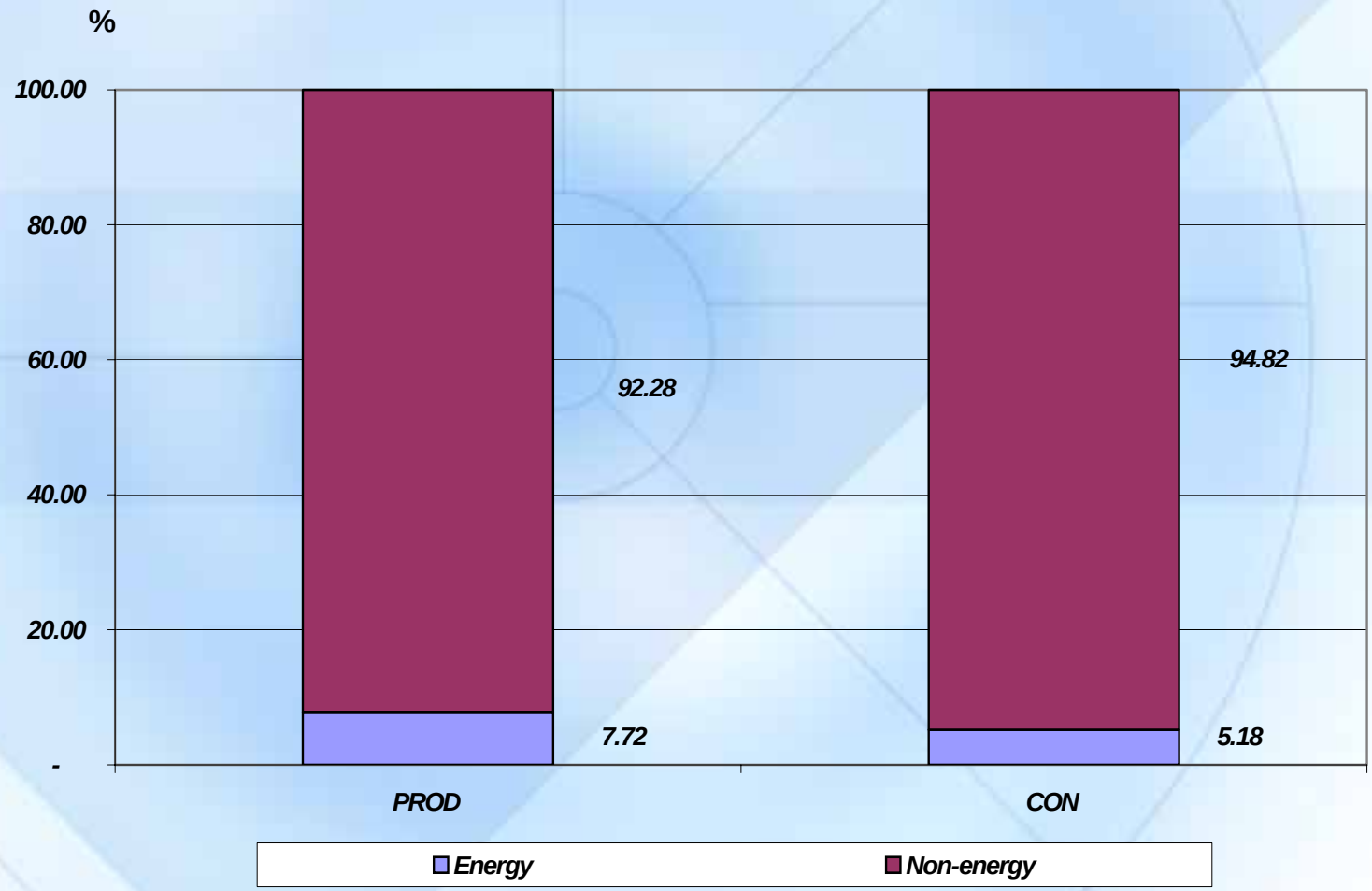
Domestic Product (Millions of Baht)	2000
Net Domestic Product at Factor Cost	3,712,111
Provision for Consumption of Fixed Capital	728,308
Indirect Taxes	505,778
Less : Subsidies	23,466
Gross Domestic Product at Market Prices	4,922,731
Private Consumption Expenditure	2,762,925
General Government Consumption Expenditu	557,807
Gross Domestic Fixed Capital Formation	1,081,420
Change in Inventories	42,744
Exports of Goods and Services	3,287,284
Less : Imports of Goods and Services	2,862,305
Statistical Discrepancy	52,856
Expenditure on Gross Domestic Product	4,922,731

1.4 Sectoral Structure of the Thai economy (1996-2003)



2. Analysis of Benchmark Year 2000 (Static)

2.1 Features of economic activity

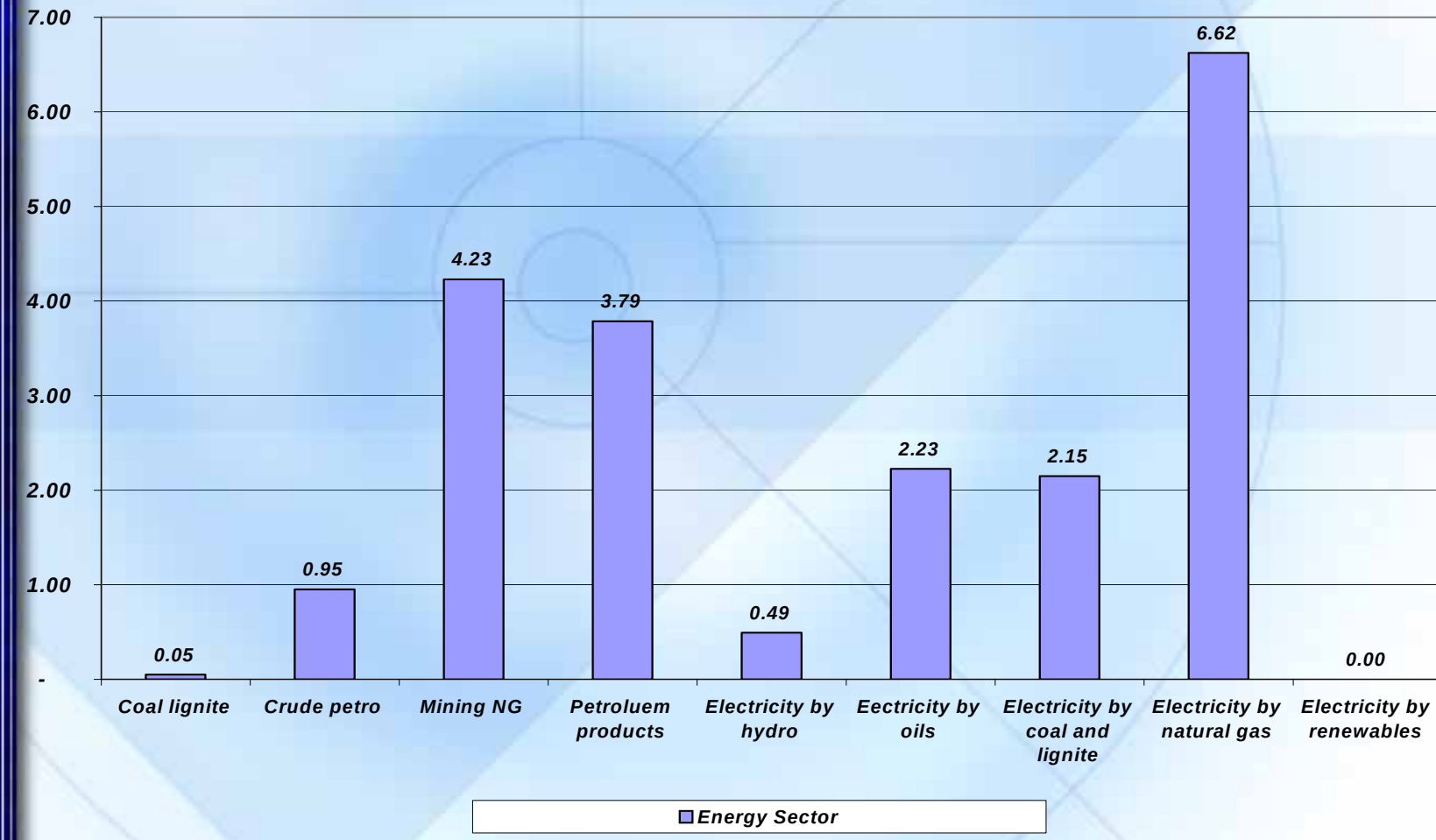


2. Analysis of Benchmark Year 2000 (Static)

- 2.2 Features of economic activity - energy sector

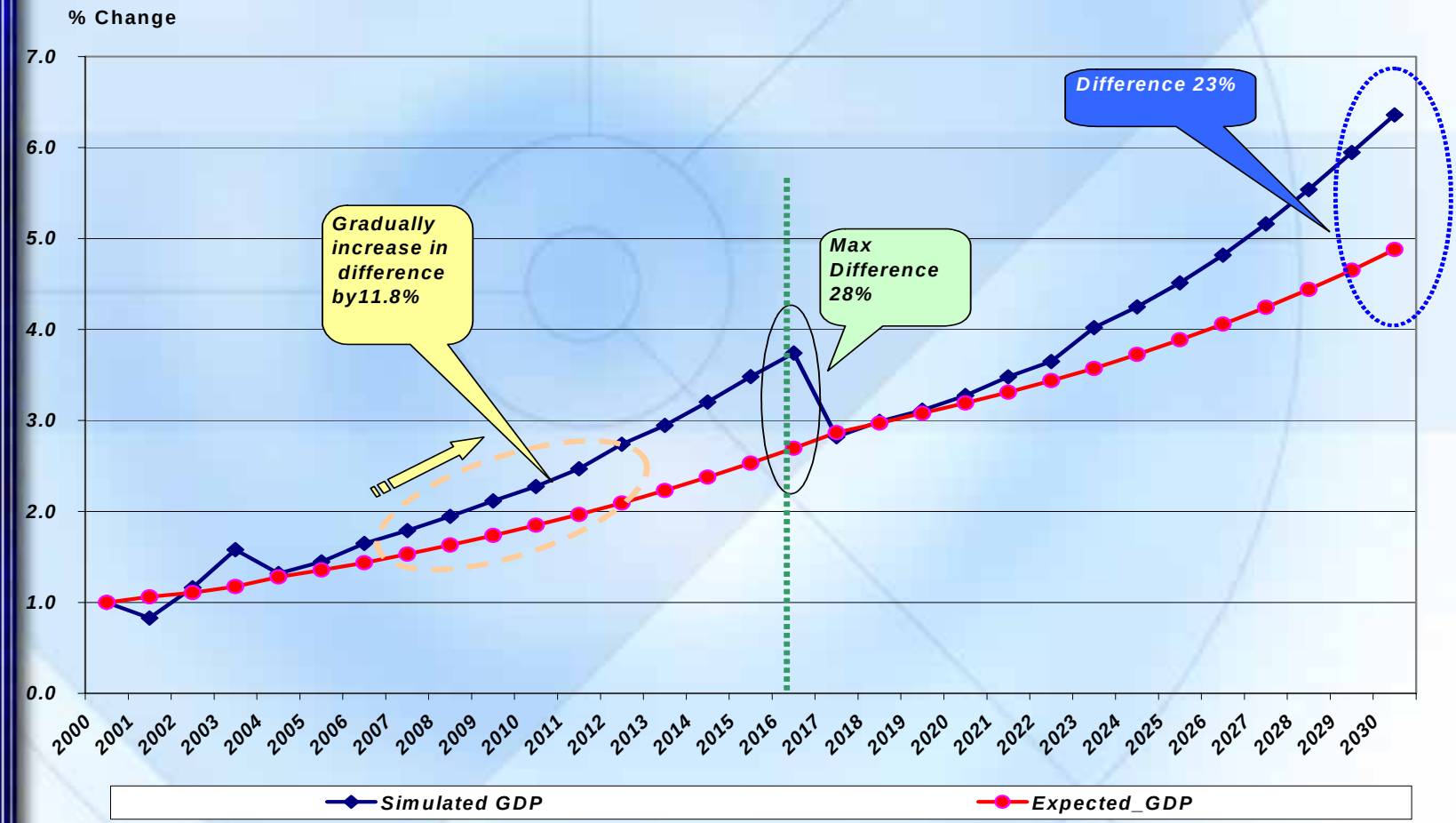
2. Analysis of Benchmark Year 2000 (static)

2.3 Features of the environment



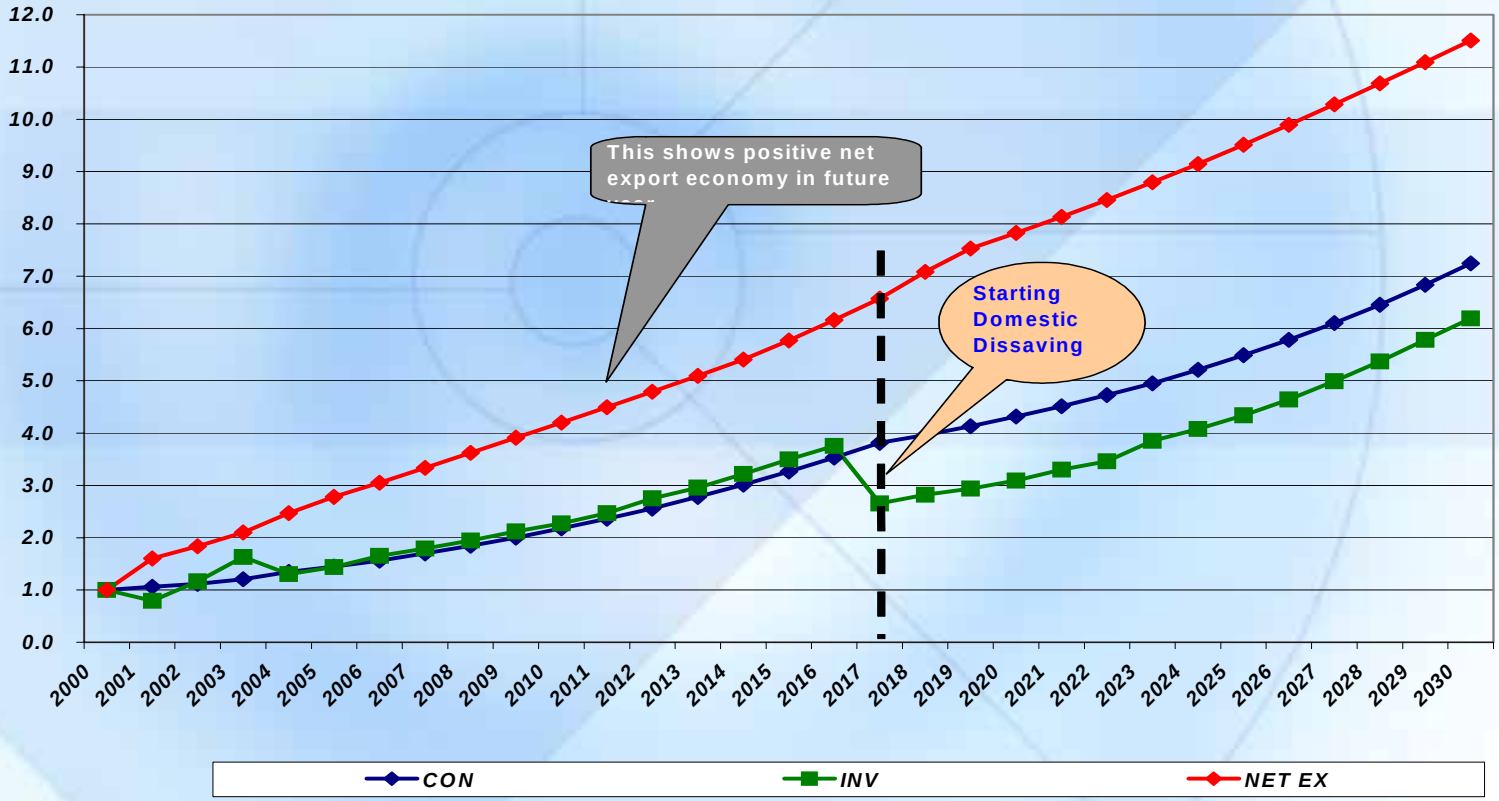
3. Analysis of Future Years (Dynamic)

3.1 Simulated GDP vs Expected GDP (Index 2000 = 1)



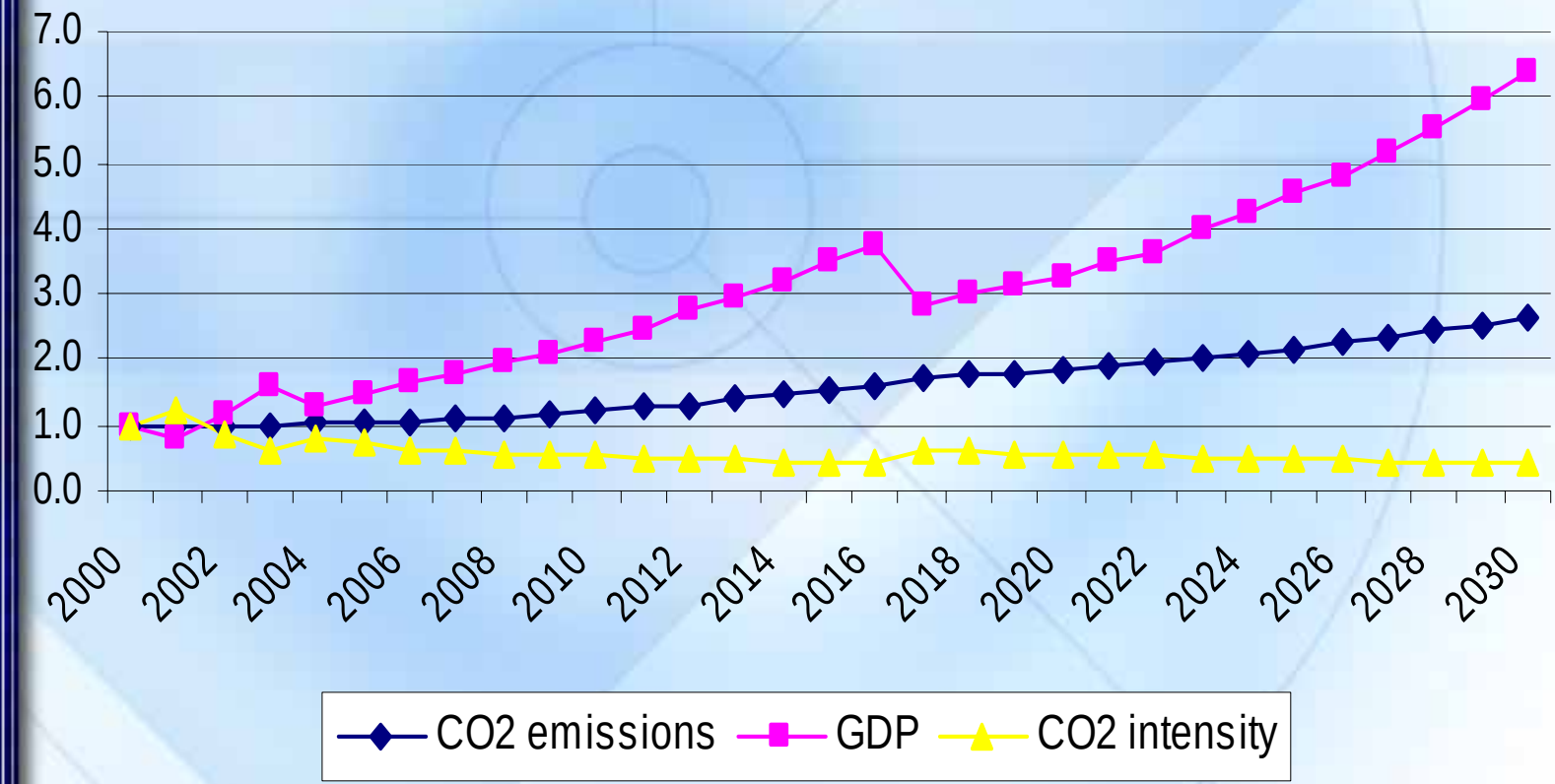
3. Analysis of Future Years (Dynamic)

- 3.2 GDP Components: Consumption, Investment, Net export



3. Analysis of Future Years

3.3 CO2, GDP and CO2 intensity [Index (2000=1)]



PART C

4. Proposal of scenario and policy to protect environment

Technology and Institutions

- Energy efficiency improvement
- Renewable Portfolio Standard (RPS)
- Carbon and energy taxes
- CO2 emissions co-benefits (SO2 and NOx)
- Domestic S emission trading among utilities and industries

Management

- Waste management
- Preference change

5.Impact on environment and economy

Post-Kyoto and beyond vision

“GHGs emission reduction without negative impact on economic development”

Using AIM family of models to analyze issues related:

- How much CO2 and other air pollutant emissions can be reduced through energy efficiency improvement?
- What is the role of renewable energy sources (wind, solar, hydro)?
- What would be impact on economy and how much improvement on environment could be achieved if we introduce carbon/energy taxes?
- Potential of CDM projects related to energy?

6. Policy for treating environment problems

- Energy related air pollutants (both GHGs and local air pollutants)
- Waste management
- Water pollution

Thank you