

# The Region 7 International Air Team

Presents Its Work

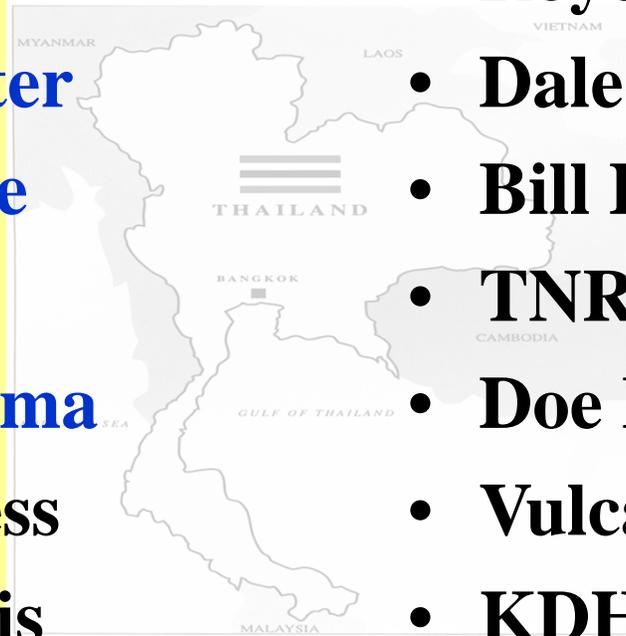
On The

The Map Ta Phut Air Quality Study

Map Ta Phut, Thailand

# Thailand Contributions

- **Josh Tapp**
- **Royan Teter**
- **Mick Daye**
- **Thien Bui**
- **Scott Postma**
- **Bill Fairless**
- **Mike Davis**
- **Jon Knodel**
- **Royce Kemp**
- **Dale Armstrong**
- **Bill Landis**
- **TNRCC**
- **Doe Run**
- **Vulcan Chemicals**
- **KDHE**
- **MDNR**



# FACTS ABOUT THAILAND



## **GEOGRAPHY**

Thailand has a land area of 513,115 sq. km. bordered by Malaysia (South), Myanmar (West & North), Laos (North & East) and Cambodia (Southeast). Thailand's landscape is classified into four regions North, Northeast, Central and South.

## **POPULATION**

60 Million (1997). Bangkok about 10 million.

## **CLIMATE**

Temperature varies from 38°C to 19°C; humidity from 82.8% to 66%

## **SEASONS**

Hot (March to May)  
Rainy (June to October) and  
Cool (November to February)

## **RELIGION**

Buddhist 95%, Muslim 4%,  
Christian / others 1%

## **LANGUAGE**

Thai is national language.  
English is widely understood.

## **GOVERNMENT**

Democratic Government



MYANMAR

LAOS

VIETNAM



THAILAND

BANGKOK



CAMBODIA

ANDAMAN SEA

GULF OF THAILAND

Map Ta Phut

MALAYSIA

**ZONE 1 (6 Central Provinces)**

- 1. Bangkok
- 2. Samut Prakan
- 3. Samut Sakhon
- 5. Nakhon Pathom,
- 5. Nonthaburi
- 6. Pathum Thani

**Bangkok**

- Bangchan Industrial Estate
- Lad Krabang Industrial Estate

**Samut Prakarn**

- Bangplee Industrial Estate
- Bangpoo Industrial Estate
- Gemopolis Industrial Estate

**Samut Sakhon**

- Samut Sakhon Industrial Estate

**ZONE 2 (12 Provinces)**

**Ayuthaya**

- Bangpa-In Industrial Estate
- Hi-Tech Industrial Estate
- Saha Rattana Nakorn

**Chachoengsao**

- Gateway City Industrial Estate
- Wellgrow Industrial Estate

**Chonburi**

- Amata Nakhon Industrial Estate
- Chonburi Industrial Estate
- Laem Chabang Industrial Estate \*
- Pinthong Industrial Estate

**Rachaburi**

- Rachaburi Industrial Estate

**Saraburi**

- Nong Khae Industrial Estate
- Saraburi Industrial Estate

**ZONE 3 (Remaining Provinces)**

**Rayong \***

- Amata City Industrial Estate
- Eastern Industrial Estate
- Eastern Seaboard Industrial
- Map Ta Phut Industrial Estate
- Padaeng Industrial Estate
- Thai Singapore 21 Industrial Estate

**Other Provinces**

- Khon Kaen Mini Industrial Estate
- Northern Region Industrial Estate
- Pichit Industrial Estate
- Southern Industrial Estate

**\*Special Privileges**

- Rayong Province and Laem Chabang Industrial Estate are entitled to Zone 3 Incentives and Privileges by IEAT even though being in Investment Zone 2

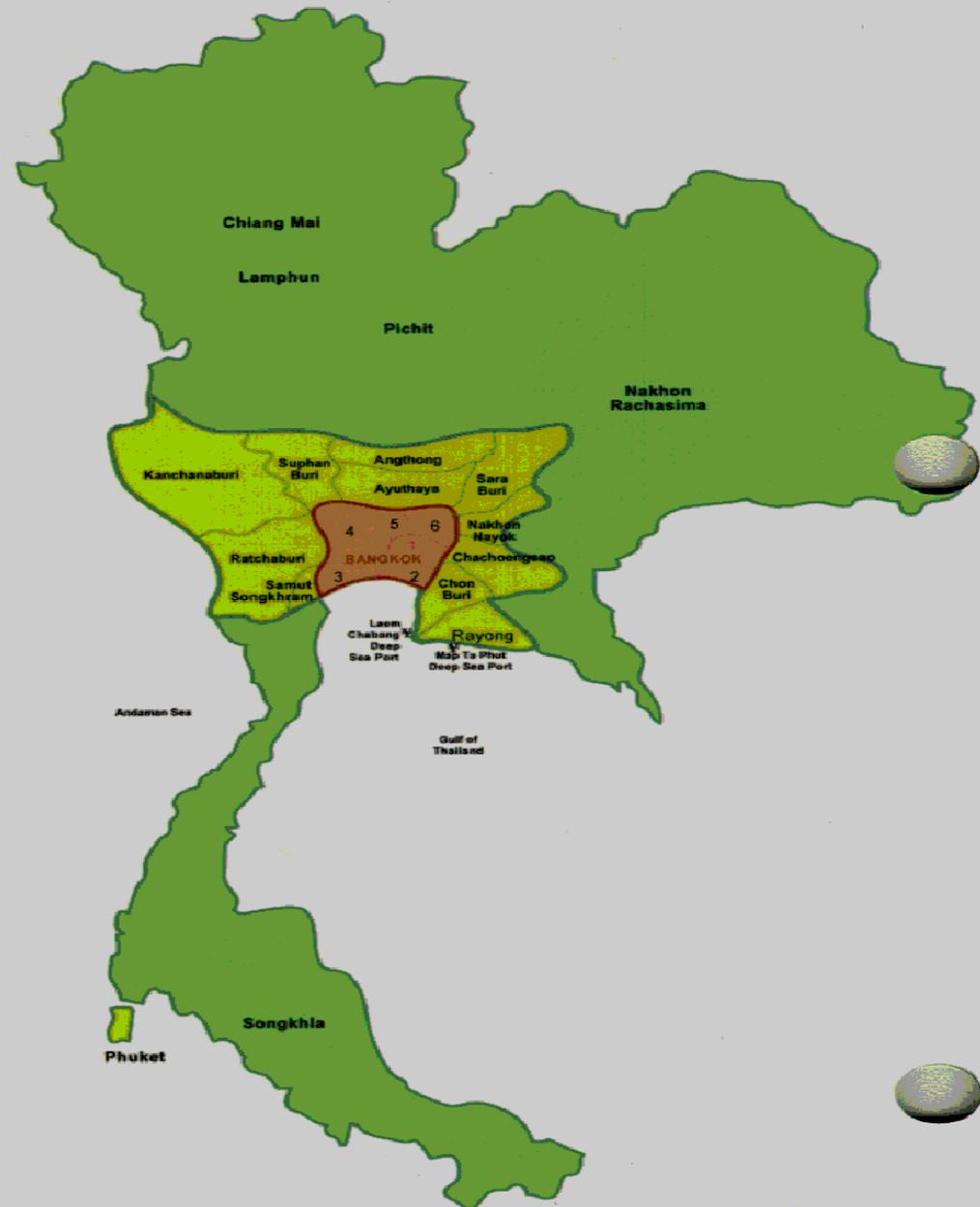


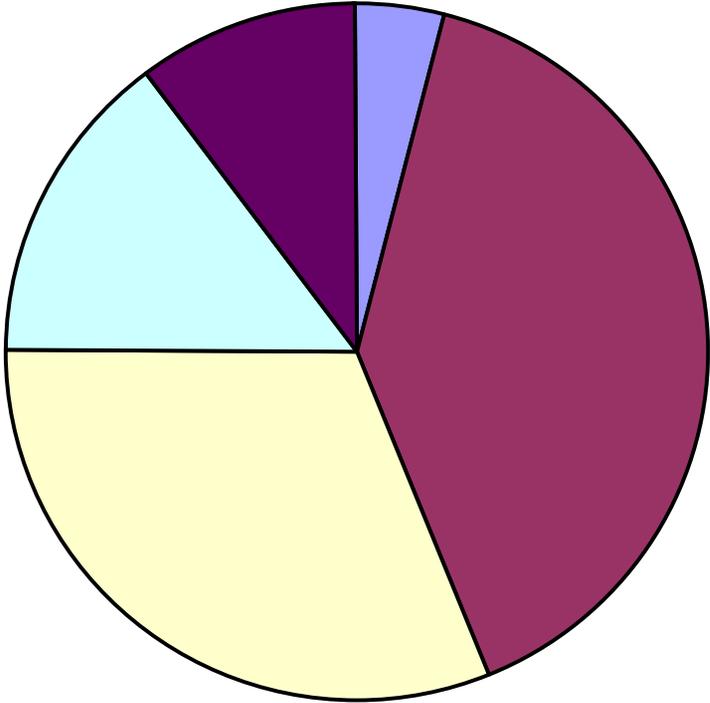


Figure 2.2.2-2 Meteorological Monitor Network Surrounding Area of Map Ta Phut Industrial Estate, Rayong Province

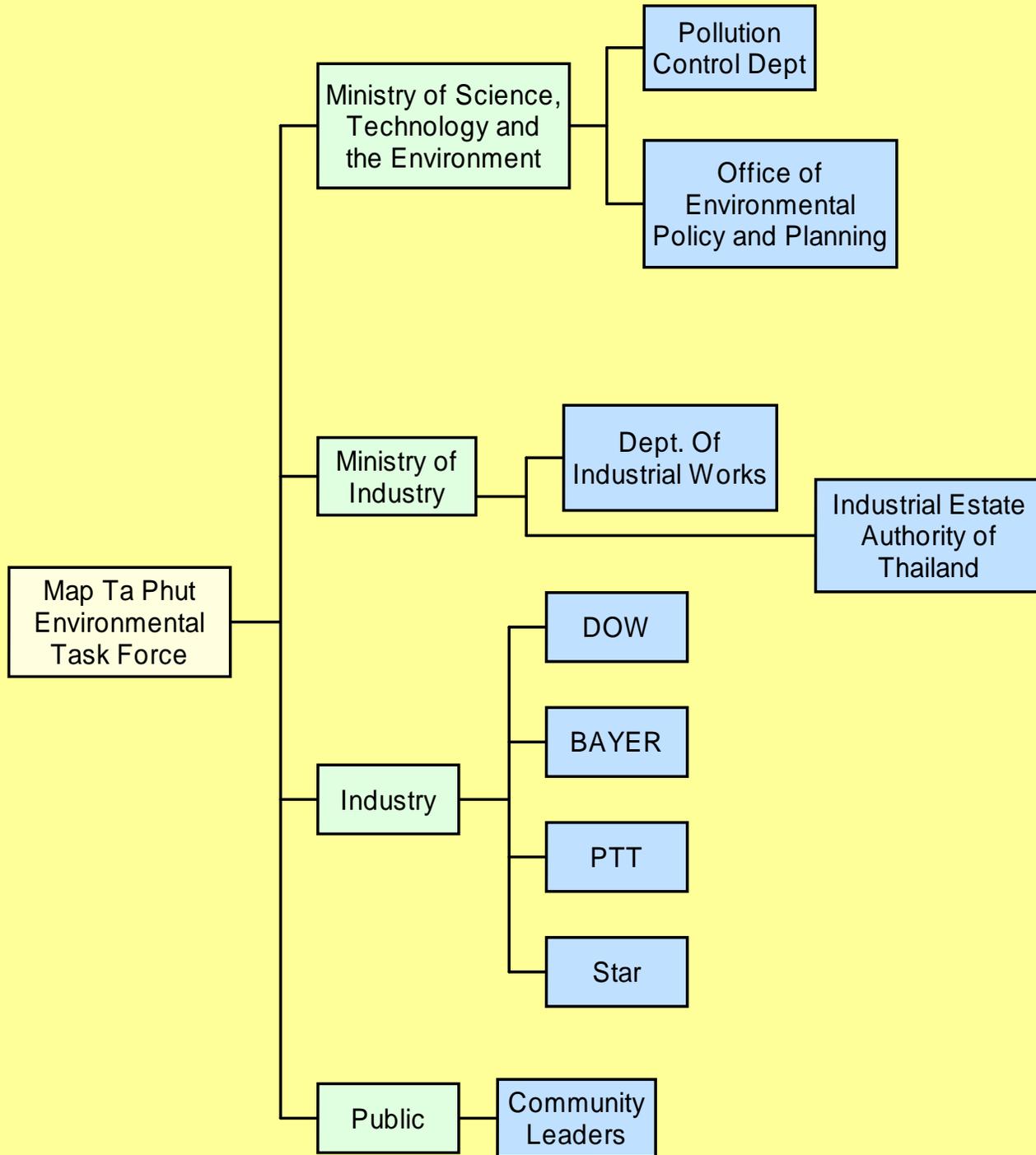




# Map Ta Phut By Industrial Sector



- Oil Refining (2 plants)
- Petrochemical (19 plants)
- Chemical and Fertilizer (15 plants)
- Steel (7 plants)
- Utilities (5 plants)



# Original Study

- Objective I: Criteria Pollutant Investigation
- Objective II: Health Investigation
- Objective III: Odor Investigation
- Objective IV: Emissions Standards Eval.
- Objective V: Community Communication

# Revised Study

- Objective I: Criteria Pollutant Investigation
- Objective V: Community Communication

# Three Part Study

- Part One: Determine the ability of the selected air dispersion model to predict ambient air concentrations of PM10, SO2 and NO2 air pollutants.
- Part Two: Characterize the growth potential of the Map Ta Phut Industrial Estate.
- Part Three: Explain the results to the impacted communities.

# Monitoring Protocol

- \* Quality Assurance Procedures
- \* Monitoring Equipment Specifications
- \* Siting Criteria
- \* Site Operation Procedures
- \* Audit Forms

# Quality Assurance

- \*Tested Equipment
- \*Calibration Procedures
- \*Traceable Standards
- \*Quality Control Checks
- \*Audits
- \*Maintenance

# Quality Monitoring Sites

- \*Obstruction
- \*Unrestricted Air Flow
- \*Spacing From Road
- \*Vertical Probe Placement
- \*Vicinity to Sources











# Emission Inventory (EI)

- What is an EI?
- How is an EI derived?
- What are the EI needs for the MTP study?
- What challenges have arisen?
- What's next?

# What is an EI?

- Source type (point, area, volume, area, mobile)
- Process rates
- Emission rates
- Stack parameters (dimensions, exit speed, temp, configuration, rain caps)
- Locational data (emission points, buildings)
- Operating schedules
- Emission control information (type, efficiency)
- Upsets

# How is an EI derived?

- Questionnaires
  - Stack tests
  - Emission factors
  - Continuous Emission Monitoring Systems (CEMS)
- Emission Models

# What EI data are required for the MTP study?

- Hourly emissions reflective of the study period (actual emissions)
- Hourly emissions reflective of maximum operations (allowable emissions)

# Stack Tests at M.T.P. IE

- Refusal to perform PM10 or cascade sampling
- PM10 = Front half plus M202
- First time performing M202
- One run tests standard
- CEMS are not RATA
- Test Reports not submitted for review
- 9 of 12 tests were above standard
- 8 of those 9 were twice the standard or more
- Very limited or non existent enforcement

# What EI challenges have arisen?

- Historical data is of unknown or poor quality
  - Lack of adequate records
  - Lack of standard protocols
  - CEMS have never been certified
  - Poor or no QA/QC
  - Lack of a central database
  - Poorly maintained equipment
- Contractor Resistance
- No authority to compel submission of data
- Facilities are unaccustomed to keeping detailed records
- Uncertainty in emission estimates (area, mobile)
- Language barriers

## In summary...

- An EI is an accounting of all emissions and modeling parameters needed to simulate air quality within a given study area
- EI methods include the use of testing, questionnaires, mass balance, and CEMS
- Actual and allowable emission inventories are required to support the MTP study
- Data quality issues pose the greatest challenges
- Data collection and modeling are next













# AIR QUALITY MODELING

- CALMET/CALPUFF MODEL
- SHORT TERM
- NEAR FIELD
- SEA-LAND BREEZE
- ELEVATED TERRAIN
- METEOROLOGICAL DATA
  - COMPUTER GENERATED MM5
  - LOCAL OBSERVATIONS

# AIR QUALITY MODELING

- FUTURE REGION 7 APPLICATIONS
- COMPLEX SITUATIONS
  - WEEPING WATER, NEBRASKA
  - HOLCIM, MISSOURI
  - HERCULAEUM, MISSOURI

# Unique Obstacles

- Language
- Number of Players: 4  
Gov, 4 Ind, EPA,  
SECOT
- Donated Equipment
- Monitor Siting  
Limitations
- Open Burning
- R7/MTP Distance
- R7/MTP Time
- Spare Parts
- Calibration Gases
- Accurate Ambient Air  
Data
- Accurate CEM Data

# Unique Benefits

- Build Technical Infrastructure
- Build Knowledge
- Refine Environmental Practices
- Archetype for Future Studies
- Smart Planning
- Exposure Characterization
- Learn as we Teach
- Improve Understanding of Infrastructure Requirements
- Reduce Global Air Pollution













## Land Prices and Tariffs

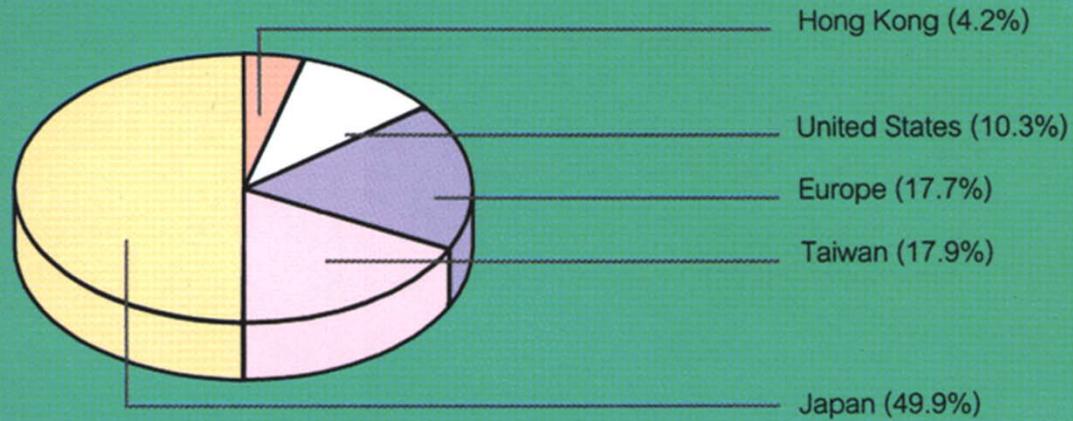
	Industrial Land US\$ / per sq. m.	Import Tax Machinery Equipment	Import Tax Raw Material
THAILAND	25 - 90	Zone 1 : Pay 50% Zone 2 : Pay 50% Zone 3 : Free	Zone 1 : Exemption for 1 year if export at least 30 % Zone 2 : Exemption for 1 year if export at least 30 % Zone 3 : Exemption for 5 years if export at least 30 % and pay 25 % for 5 years for domestic sales except Laem Chabang Industrial Estate
China	337 - 485	Exemption of Industrial and Commercial Consolidated Tax (ICCT) for exporting 100% of production	
Indonesia	45 - 150	Exemptions for 2 years and exemption of VAT and business tax for exporting 100% of production	
Malaysia	180 - 460	Exemptions for exporting 100% of production for machinery and raw materials not produced locally. Certain Items exempted for domestic sales. Raw materials with tariff less than 3% are not exempted	
Philippines	77 - 97	Exemption for industries based in industrial estates or exporting 100% of the production. Partially exemption for raw materials for exporting 100% of production	

## Corporate Income Tax

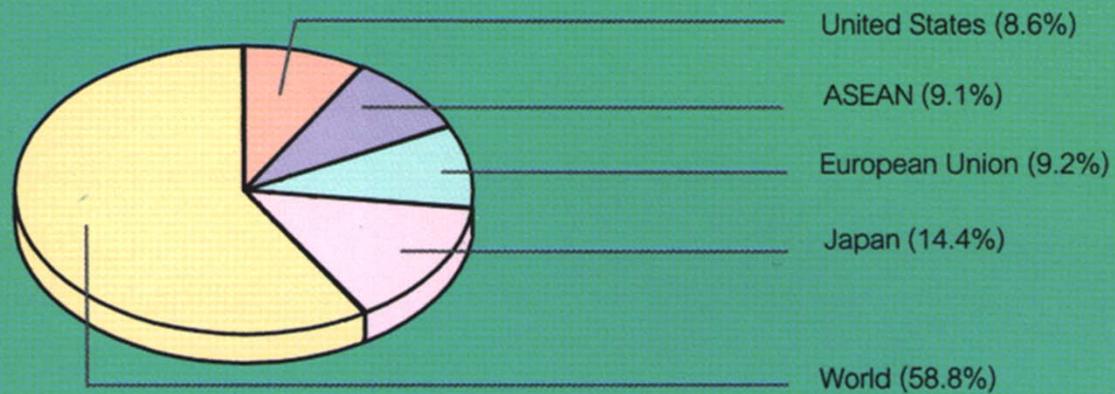
	TAX	INCENTIVES
THAILAND	30%	Zone 1 : 100% Exemption for 3 years if located in an industrial estate. Zone 2 : 100% Exemption for 7 years if located in an industrial estate Zone 3 : 100% Exemption for 8 years + reduction of 50% for another 5 years.
China	30%	Special Economic Zone (SEZ) : 15% Economic and Technological Development Zones (ETDZ) : 15% Open Coastal Cities/Urban Districts : 15-24%
Indonesia	10-30%	Limited tax concessions for companies investing in national priority industries which boost exports or which contribute to national development.
Malaysia	35%	Should apply for "Pioneer" status to obtain exemption from the payment of income tax. Such companies pay tax on 30% of their profit for five years period.
Philippines	30%	Should apply for "Pioneer" status to obtain partial exemption from the payment of income tax for six years and non Pioneer firms for four years.

# ECONOMIC DEVELOPMENT

## TOP FOREIGN INVESTORS IN THAILAND (1995)



## THAILAND'S TOTAL TRADE WITH MAIN PARTNERS



# ACCEPTABLE MODEL PERFORMANCE

