AIM-LCS Workshop 2008
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ESS and BCM Exercise Modeling Exercise Presentation by Thailand Team

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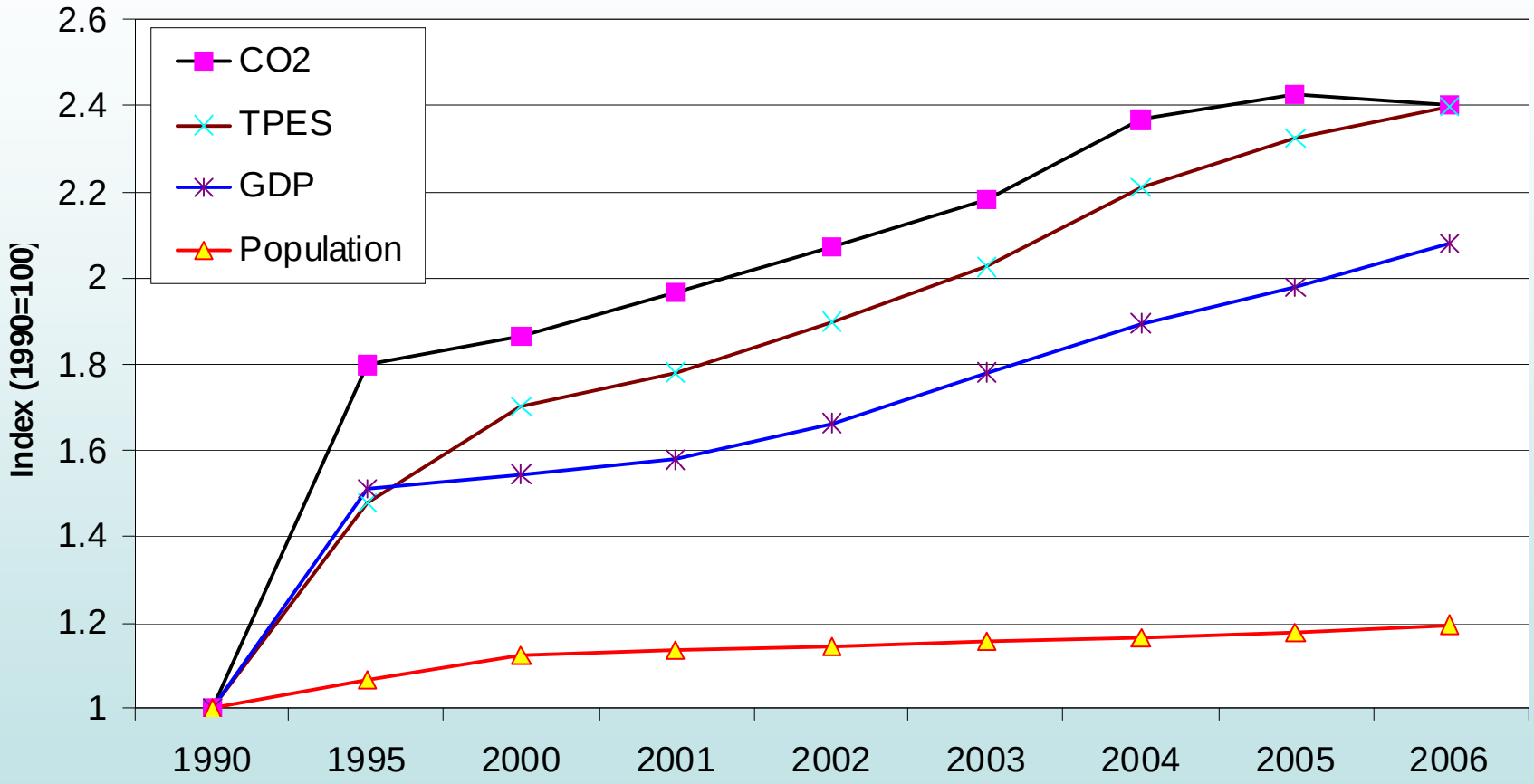
Brief Background

- **Location**:
  - Area of 513,115 km^2 and extends about 1,620 km from north to south and 775 kilometres from east to west.

- **Population:** 64.76 million
- **Population Density:** 126 people/km^2
- **GDP:** US $ 176 billion
- **GDP per capita:** US $ 2727 (year 2005)
- **Economy:** 2nd highest in the ASEAN region

CO_2, TPES, GDP and Population Growth during 1990-2006



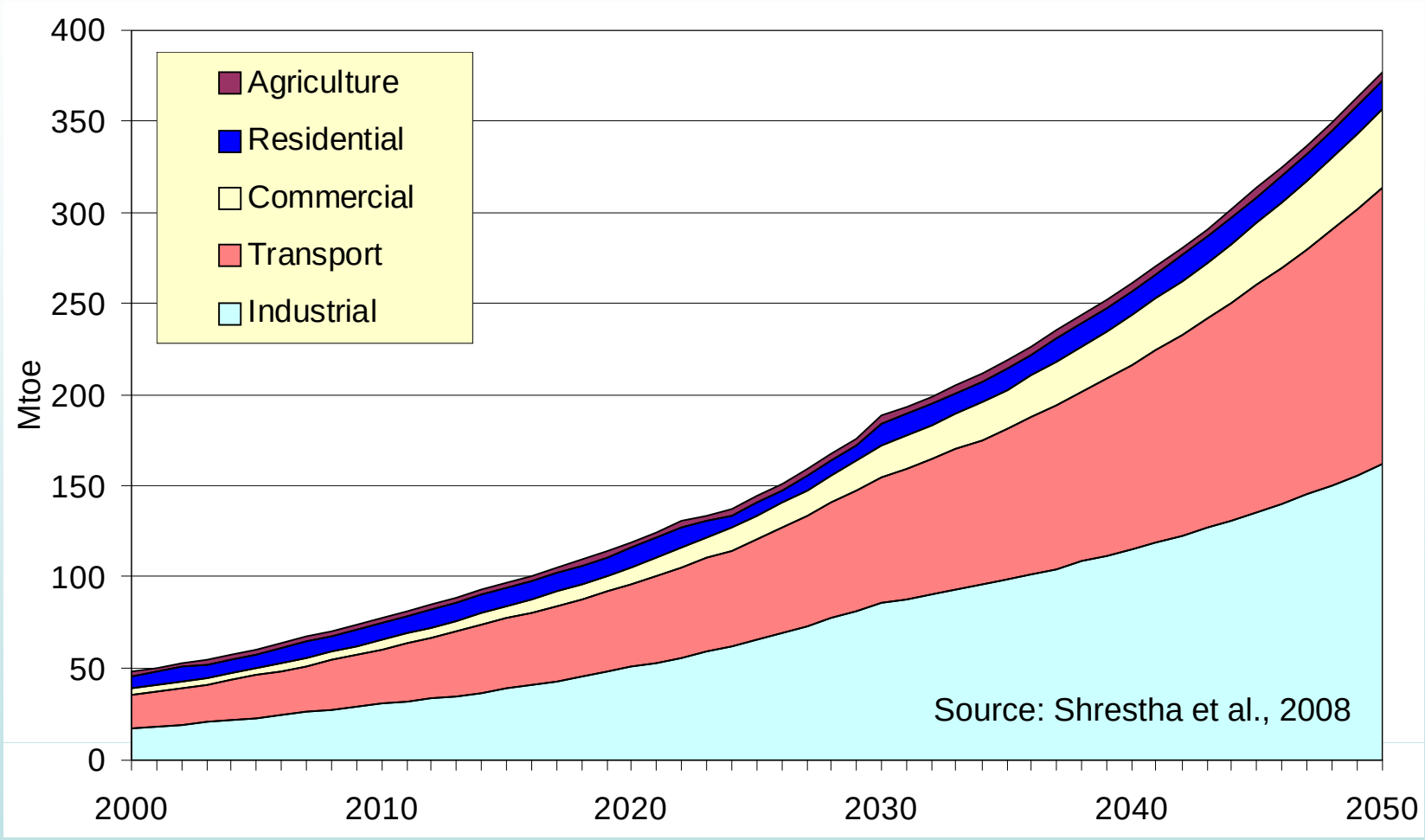
AAGR (2001-2006):

CO_2: 4.35% Population: 1.02%

TPES: 5.91% GDP: 5.07%

Source: DEDE, 2006, IMF, 2008, IEA, 2007 and 2008

Final Energy Demand during 2000-2050 in the Reference Scenario



Final Energy Demand in future would increase by **more than 6 folds** during 2000-2050.

Residential: decrease from 17% to 4%

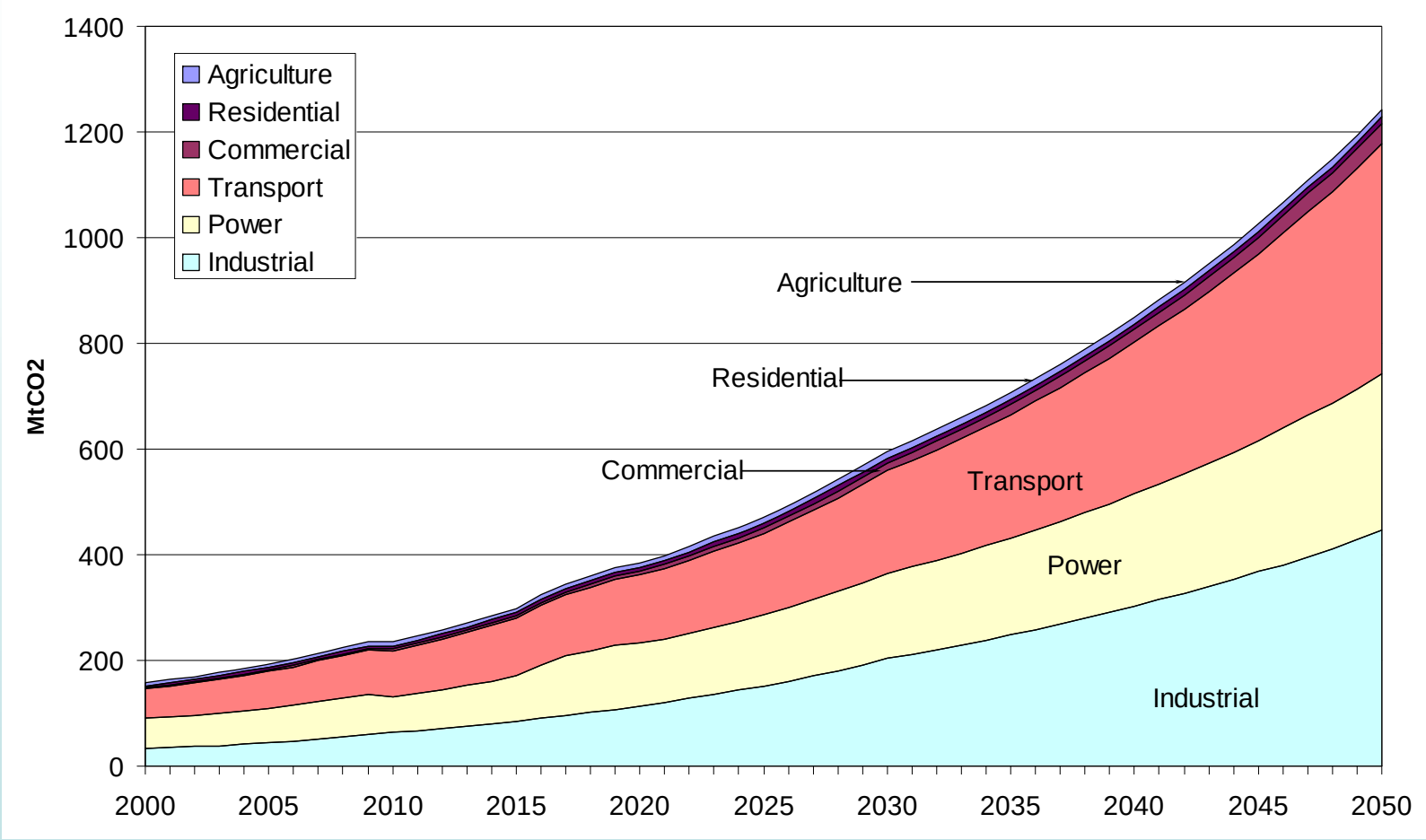
Agriculture: decrease from 4% to 1%

Industrial: increase from 33% to 41%

Commercial : Increase from 6% to 12%

Transport: Increase from 40% to 42%

Sectoral CO_2 emission during 2000-2050 in the Reference Scenario?



- Increase in CO_2 emission by more than 6 folds during 2000-2050.
- Industrial, Transport and Power sectors together account for 94% of the cumulative CO_2 emission during 2000-2050.

Path to Low Carbon Society by 2050

Our past studies (based on bottom up models) in developing LCS scenarios show that the two areas would be the main sector that larger CO2 emission reduction would be achieved:

a) transport and

b) electricity generation

The study also shows that unless we introduce some major policy changes in other sectors as well like fuel shifting, modal shift, the higher CO2 emission would not be possible in the current structure.

Path to Low Carbon Society by 2050

In this study, we have focused on the following sectors for ESS and BCM exercises:

- Residential
- Transport
- Electricity Generation

The issue of climate change would be of major concern.

- With the declining population growth, there would be growth in aging population and also a mature society.
- With the economy growing and declining population, the income/capita would rise. This makes shifting to cleaner fuel options and technology options affordable.
- The consumption of fossil fuel would be drastically reduced and cleaner fuel would be the major choice.
- As a result, the cost of fossil fuel would go up and people would be inclined to cleaner fuel use.

Residential and Power Generation

Residential Sector

In the residential sector, the following actions and strategy would be implemented:

- Energy efficiency (EE) labeling program for household appliances in phase wise: (EE would increase by 50% by 2020 and 75% by 2050 for all air conditioners manufactured in the country.)
- People will start insulating their homes from 2015 onward as a result there would be reduction of 2 Mtoe by 2050 .
- By 2050, oil based cooking will be shifted to electricity based cooking.
- The manufacturing capacity of domestic solar water heating systems would be developed by 2015; people would start utilizing solar water heating systems from 2020 onward.

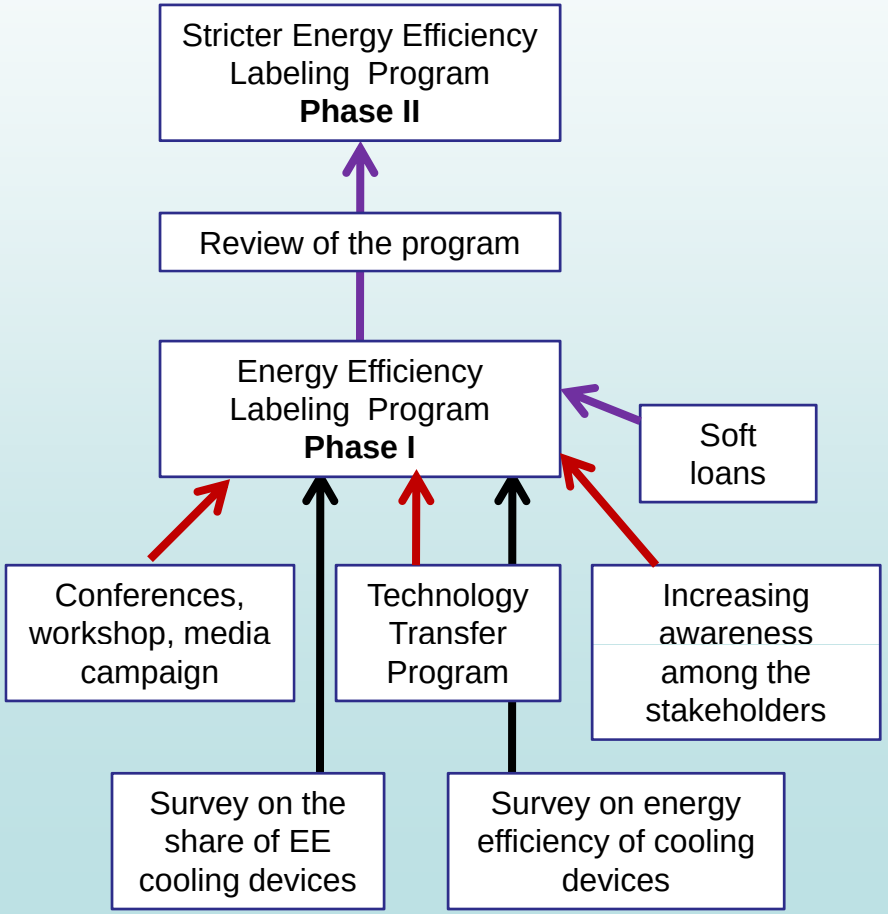
Electricity Generation Sector

With the increasing fuel shift towards electricity in residential sector, there would be a need to shift to cleaner fuel in electricity generation. Thus, the following actions and strategy would be implemented:

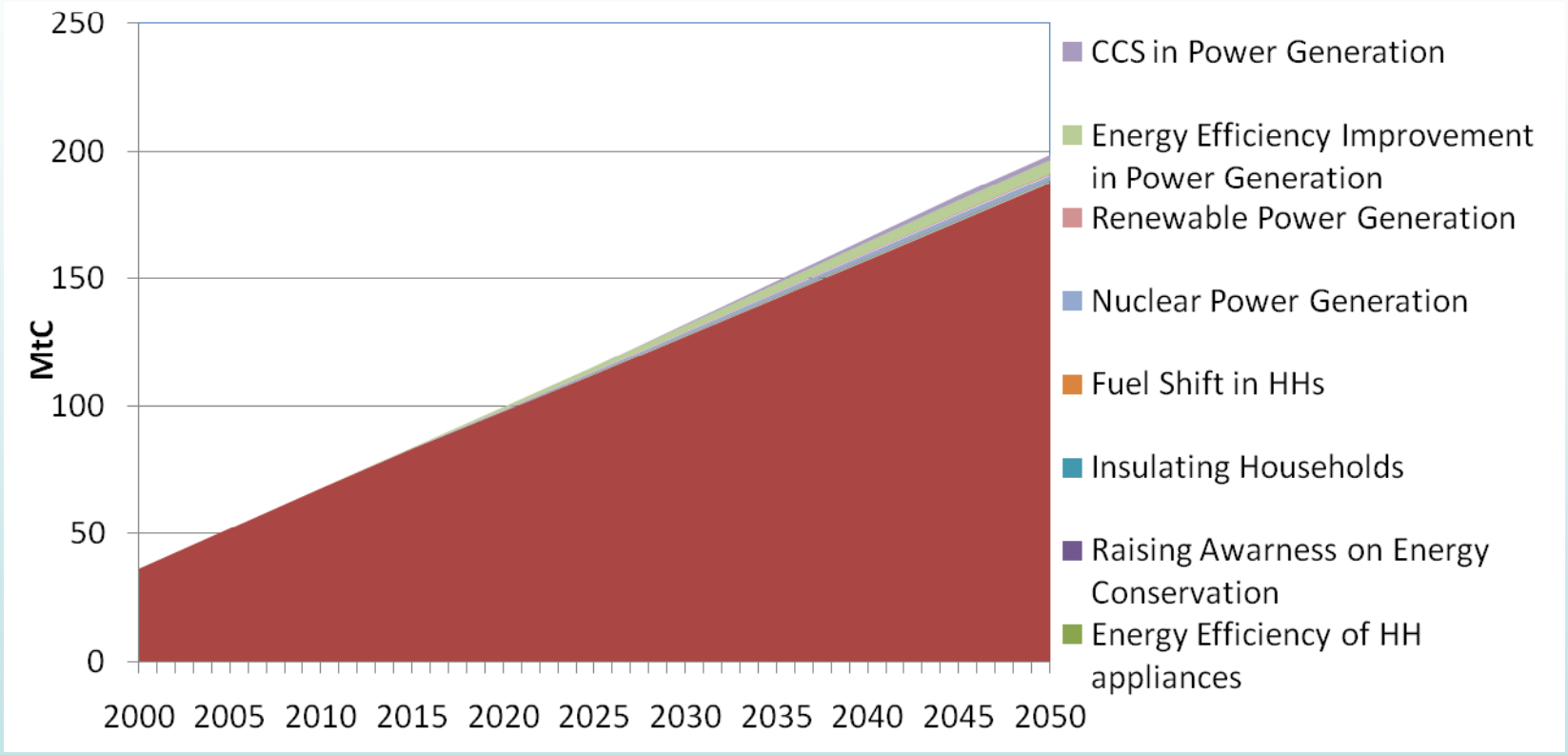
- With the expected growing economy, the electricity demand would significantly rise. At present, the power generation is heavily based on natural gas along with coal.
- In order to meet the power demand, nuclear power generation would be put as an option by 2020.
- With the technology transfer and improvement program in power generation, all fossil fuel power generation would achieve 50% efficiency by 2050.
- The Renewable Energy Portfolio Standard (RPS) scheme would be maintained; 6 Mtoe power generation would come from renewable energy resources.

Options: Energy Efficiency Improvement (an Example)

Energy Efficiency
Improvement in cooling
HH appliances

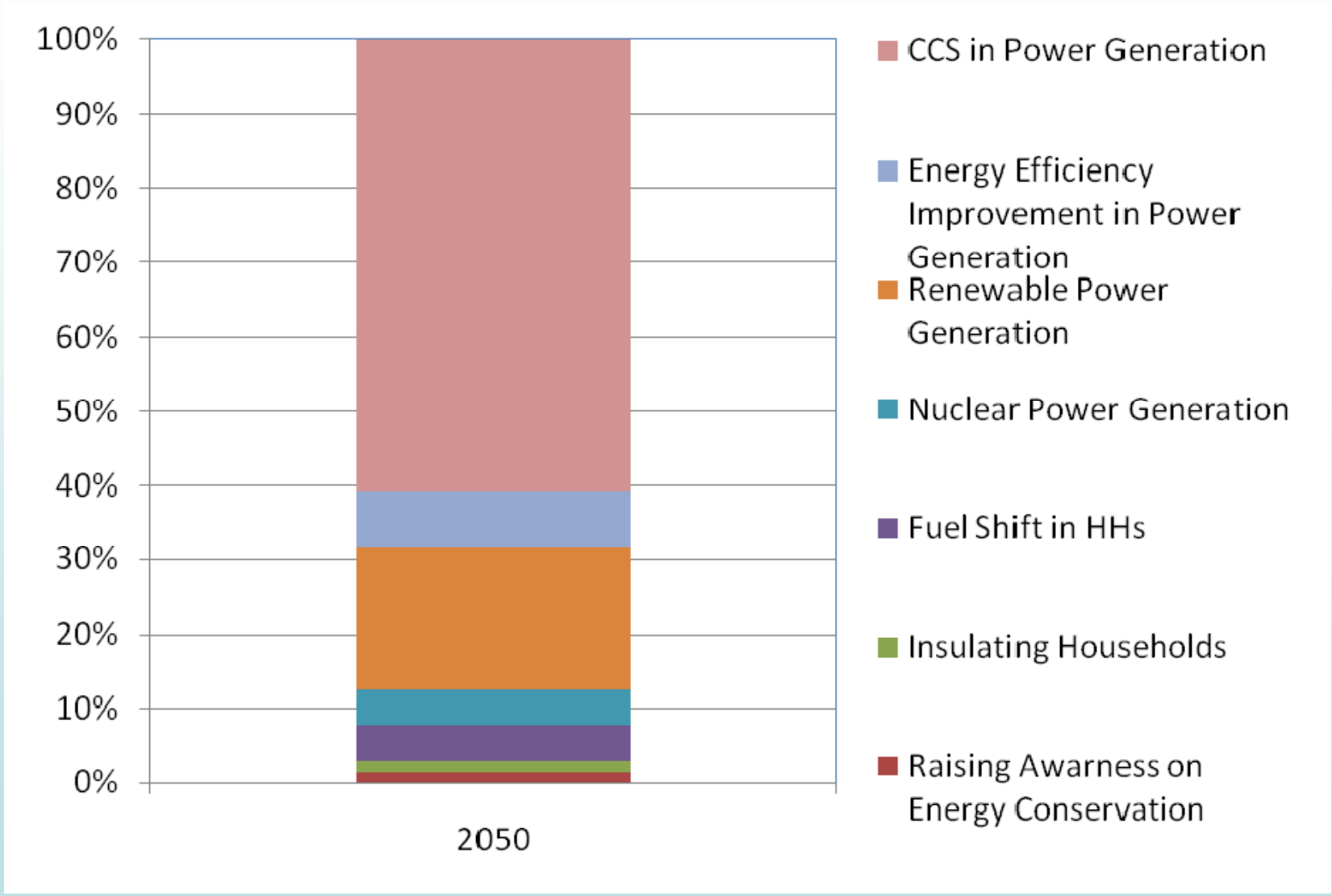


CO2 Reduction by intervention in Residential and Power Generation



Source: DEDE, 2006

CO2 Reduction by Different Options



ACTIONS

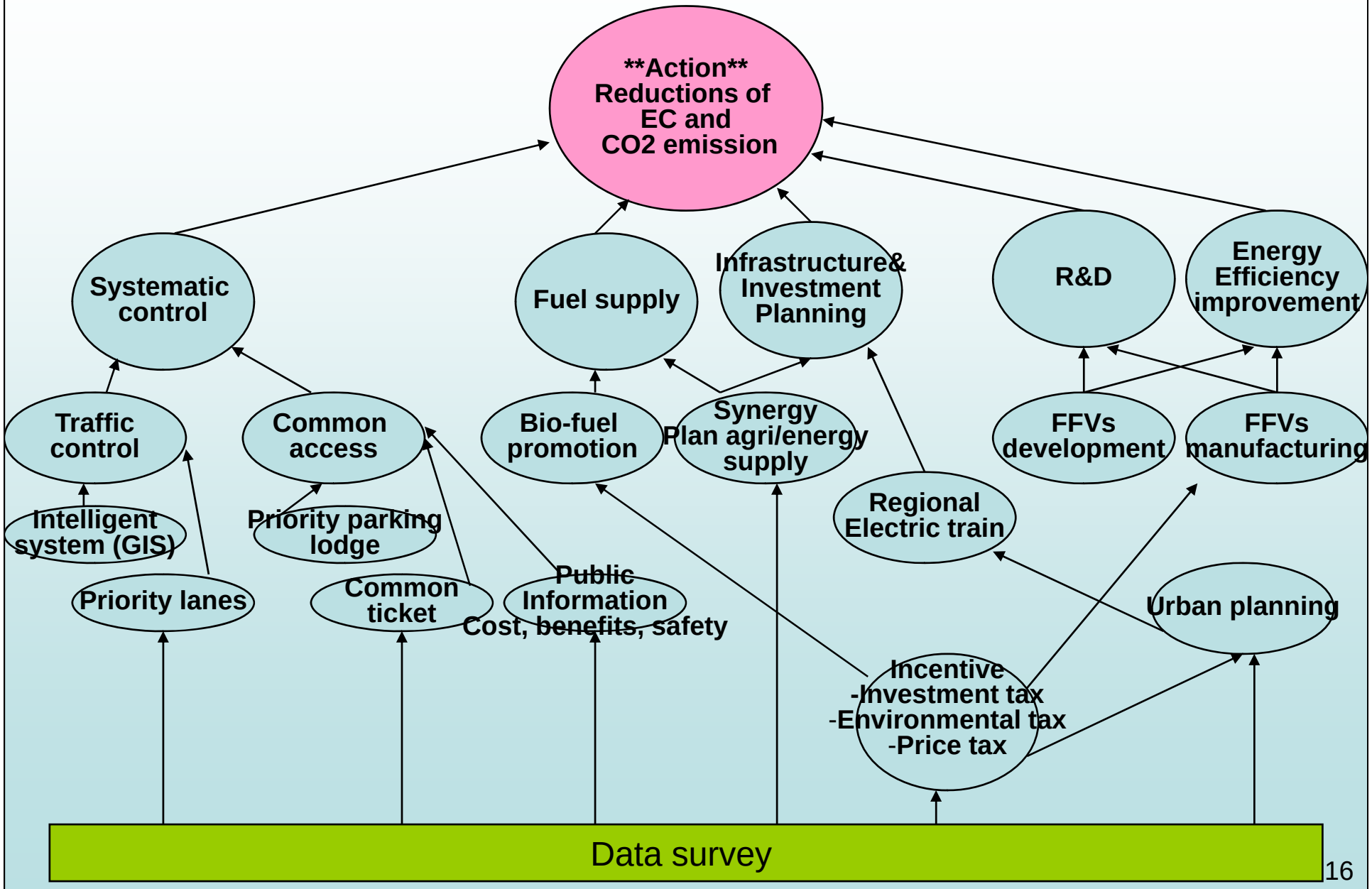
focused on

Transport passenger sector

Transport Sector Policies in Thailand

- **Biofuel development and promotion**
  - **Gasohol**
    - **Targeted replacement of gasoline fuel use.**
    - **Strategy to promote fuel-flex vehicles**
  - **Biodiesel**
    - **Targeted replacement of diesel fuel use.**
    - **Community level biodiesel production.**
- **Strategy to promote natural gas vehicles**
  - **Subsidy in compressed natural gas**
- **Development and Strategy to promote Mass Rapid Transits**
  - **Extending of electrified subways and sky trains.**
  - **Development of double track railways.**
  - **Development of intercity electric trains.**
  - **High speed electric engines to replace diesel engines in Railways.**

Actions in Passenger Transport Sector



Key Assumptions: Transport Sector

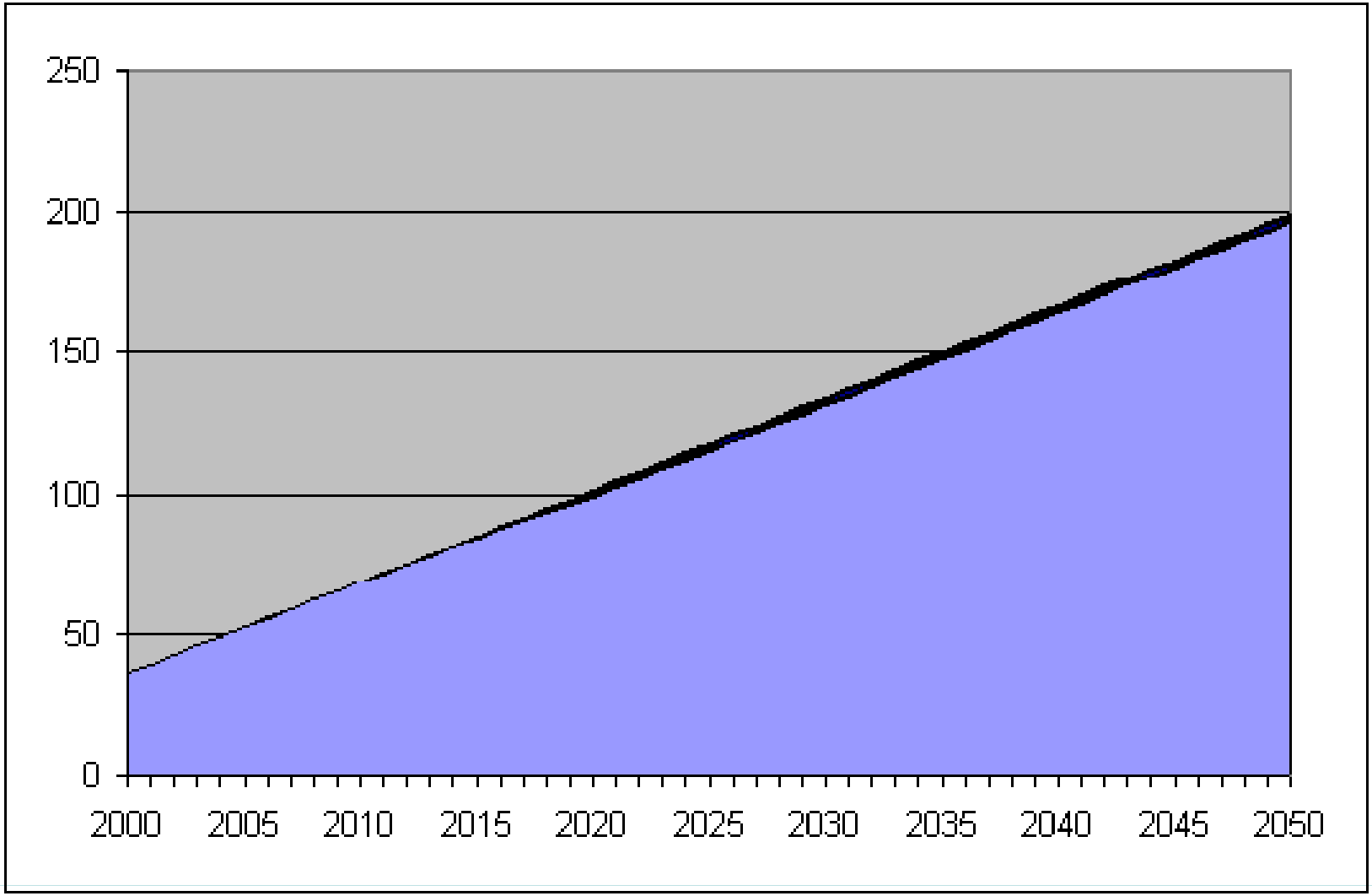
- Projection of service energy demand is based on sectoral value added
  - Moderate Growth for 2000-2050:
    - Personal passenger vehicles (PPV)
      - PPV-small: 4.5%
      - PPV-mini:4.5%
      - PPV-large:3.3%
    - Commercial passenger vehicles (CPV): 3.3%
    - Bus: 2.8%
    - Train: 3.3%
    - Ship: 2.8%
    - Air: 4.0%

Options	Descriptions	Commence	Durations (Years)
1	Sytematic Traffic Control	2015	5
2	Master plan for clean and green city	2015	15
3	Incentive tax to promote the clean-green of central urban areas	2020	5
5	High efficiency passenger vehicle	2020	20
6	High efficiency passenger bio-fuel vehicles	2010	20
7	Green tax for low environmental load vehicle	2020	30
8	Priority lanes and parkings lodge for environmental friendly vehicle	2020	30
9	Bus rapid track	2010	20
10	Common ticket for bus, train, ship	2010	20
11	High efficiency passenger railway (ELE, TRN)	2020	20
12	High efficiency passenger ship (OIL, SHP)	2020	20
13	High efficiency passenger Bio-alcohl ship (BMS, SHP)	2020	20
14	High efficiency passenger airplane (OIL, AIR)	2020	20
15	High efficiency passenger biofuel airplane (BMS, AIR)	2020	20
16	Improvement of the efficiency of public transportation	2010	40
17	R&D support for lighter and FFVs, maintenance, training, public hearing	2008	15
18	Promotion of biomass utilization	2008	0
19	Relaxation of regulations and cost reduction in certain regions	2010	15
20	Synergy plans for agriculture/forestry/energy	2010	20
21	Cost reduction of biomass conversion technology	2010	35
22	Soft loan at initial stage of efficient FFVs	2010	5
23	Modal shift to public transportation service	2008	20
24	Carbon tax on transportation energy	2010	10
25	Regional-electric train	2020	10
26	Fuel Shift for Mini Passenger vehicle	2010	40

Impacts of ACTIONS

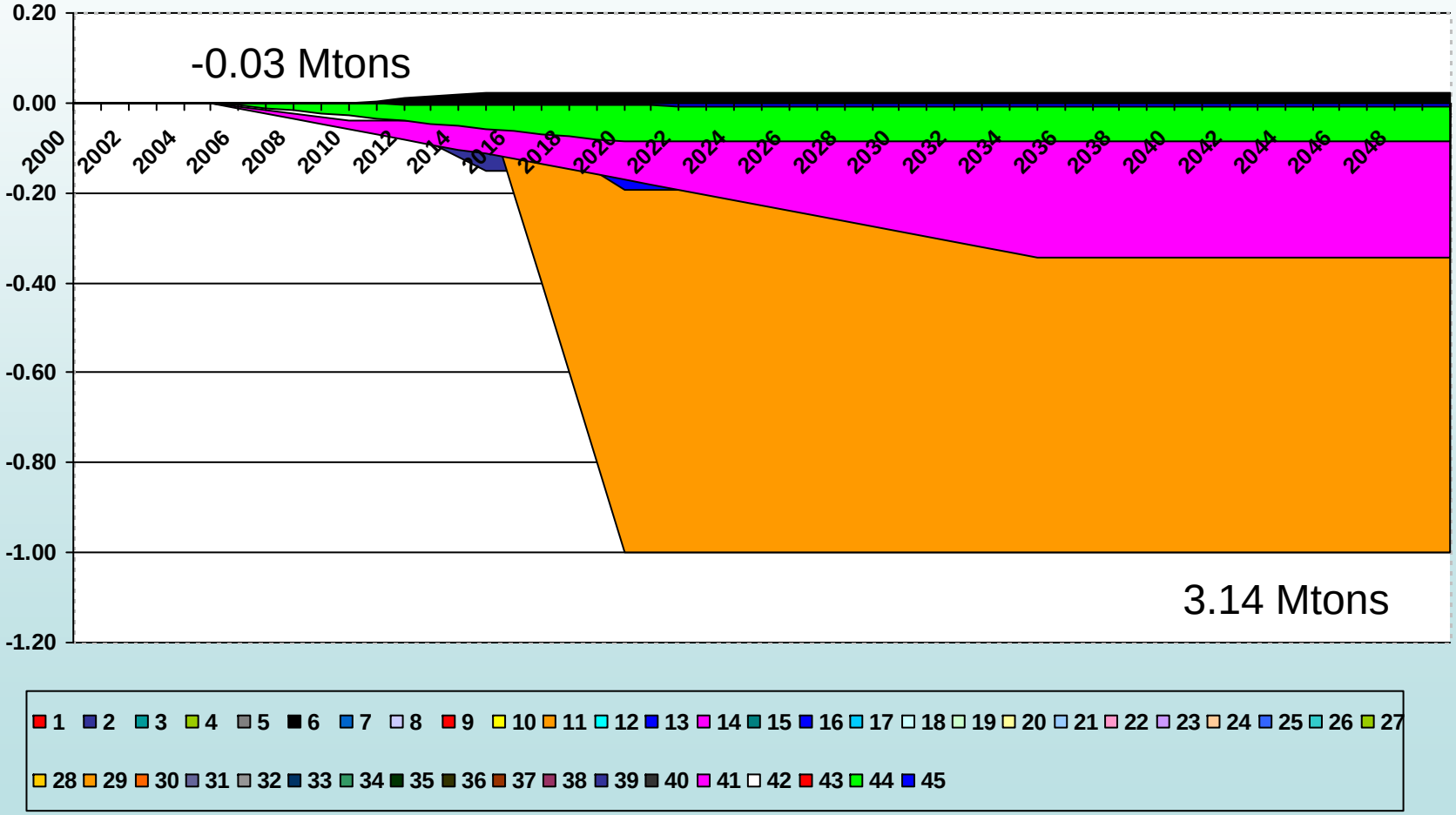
Preliminary Results

CO_2 Emission: BAU and Scenario Cases

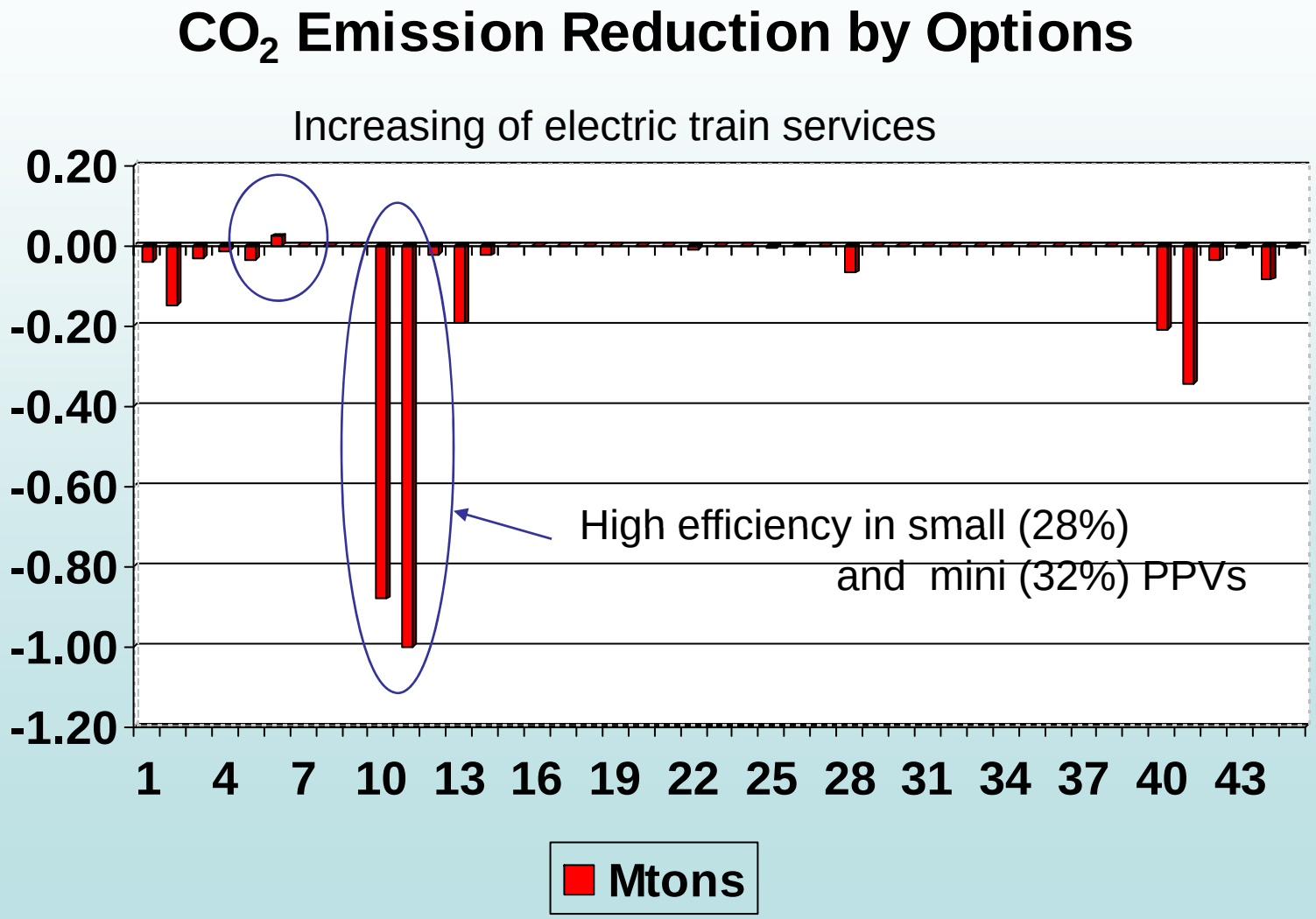


Impacts of the Action

Total CO_2 Emission Reduction



Impacts of the Action



Discussion on ESS and BCM

- Effectiveness: Reasonable – Back casting!
- Adding different options in two different sheets?
- Fuel share in intermittent years?
- Amount of CO2 reduction by policy options (may not directly reduce CO2)?
- Investment for cleaner fuel or technology options?
- Linking with other models?

Thank You!