THAILAND Making Transport More Energy Efficient

2nd ATRAN Symposium

"Transportation for Sustainable Development under Global Financial Crisis: Opportunity or Disaster?"

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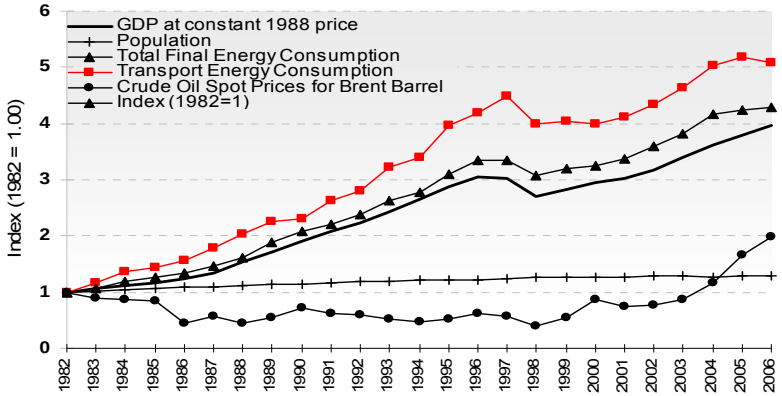
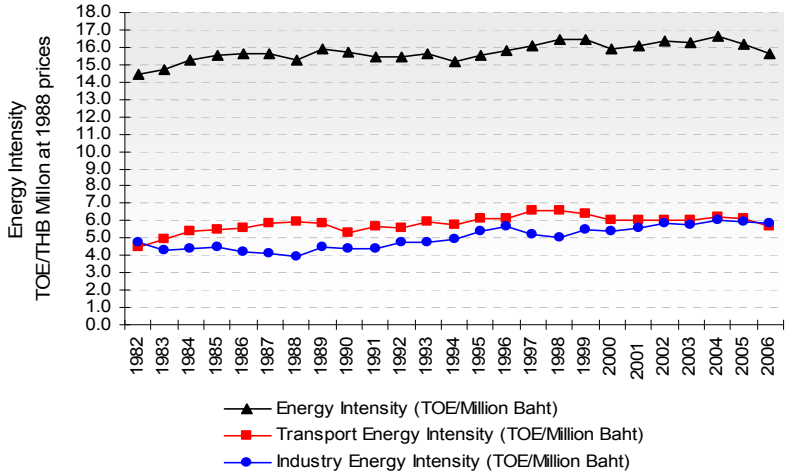
Thailand's Transport–Energy Overview



Source: Consolidated & calculated from Bank of Thailand (BOT) and Department of Alternative Energy Development and Efficiency (DEDE)



GHG Emissions by Sector	**2002**		**2006**	
	1,000 tons of CO_2 Equivalent	**%**	**1,000 tons of CO_2 Equivalent**	**%**
Transport	48,110	29.29%	48,388	26.32%
Electricity	63,542	38.69%	68,849	37.45%
Manufacturing	37,198	22.65%	42,207	22.96%
Residential and Commercial	5,514	3.36%	14,254	7.75%
Others	9,872	6.01%	10,162	5.53%
Total	**164,236**	**100%**	**183,859**	**100%**

Source: Calculated from Department of Alternative Energy Development and Efficiency data

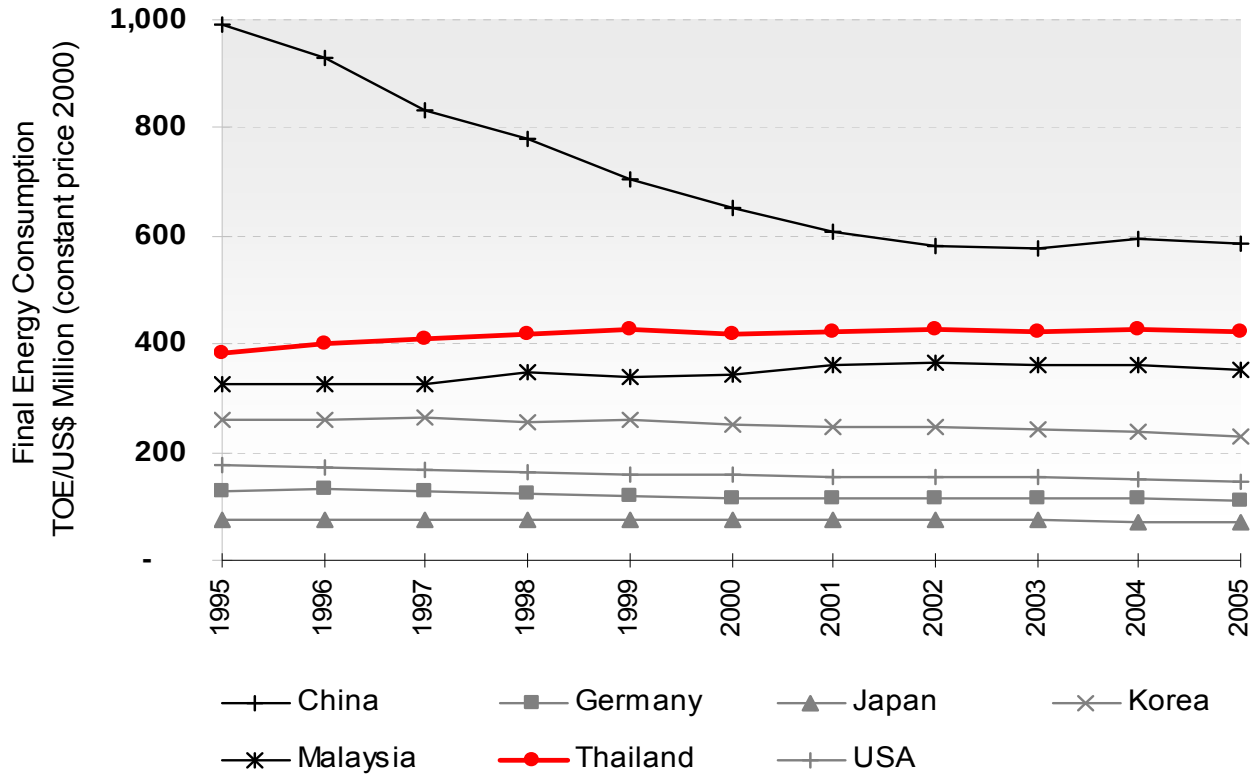
Note: GHG emissions shown here included CO2 and CH4. The conversion factors used are based on IPCC 1996 revised guideline. The emissions of other greenhouse gases excluded in this figure are negligible compared to the total.

Patterns of Energy Consumption in Thailand

- Little diversification in energy mix and tiny share from renewable energy make Thailand highly vulnerable to energy prices rise
- Manufacturing and transport are the two biggest consumers of energy
- High reliance on petroleum products
- 72% of total petroleum products are consumed by the transport sector
- 76% of transport energy consumption was consumed in the road sector

Thailand Transport Energy Use: How Thailand compares to other countries

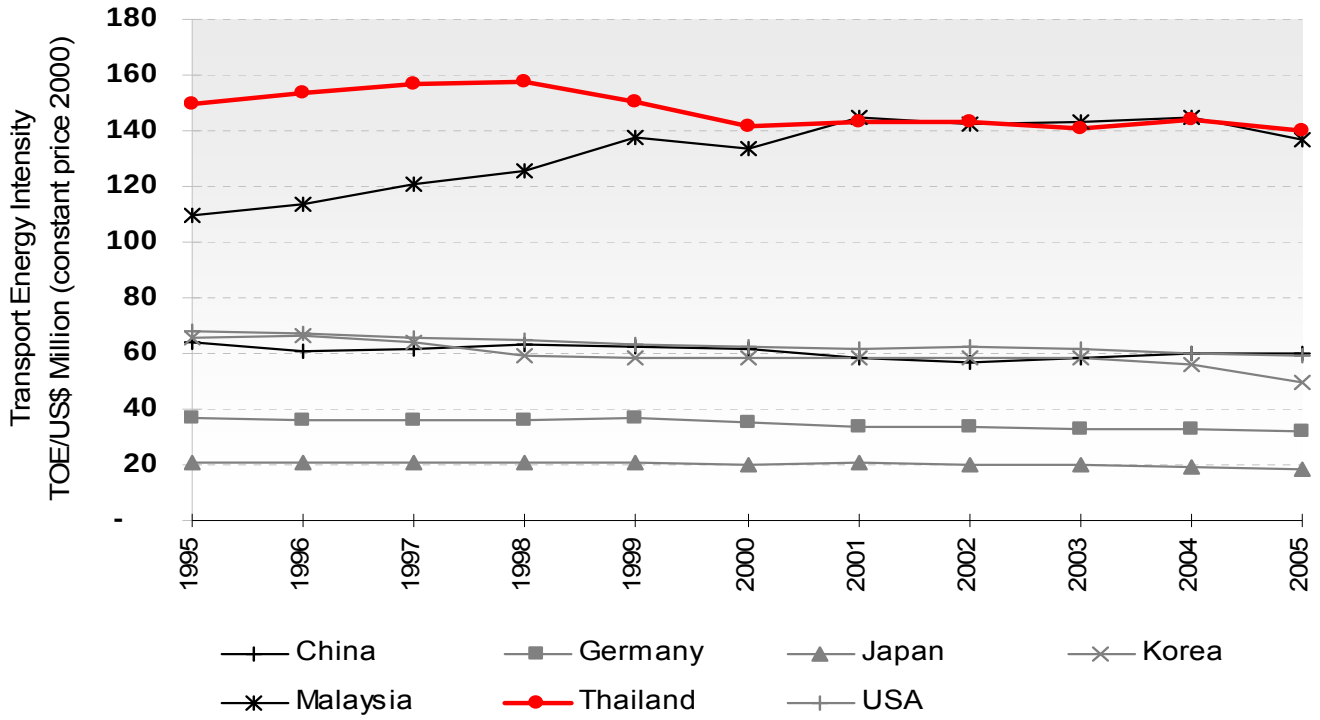
- High and unchanged level of energy intensity in the last 25 years
- Potential energy savings, given that other countries can do it



Source: IEA-OECD

Thailand Transport Energy Use: How Thailand Compares to Other Countries

- Also high level of transport energy intensity
- Other intensity indicators (e.g. road sector energy intensity, diesel intensity and motor gasoline intensity) also show similar trends

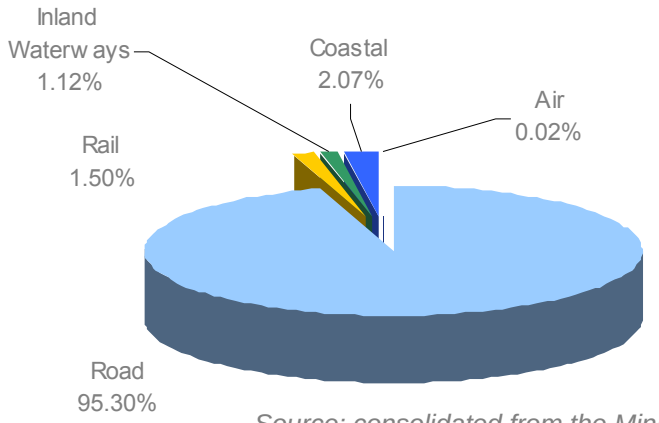


Source: IEA-OECD

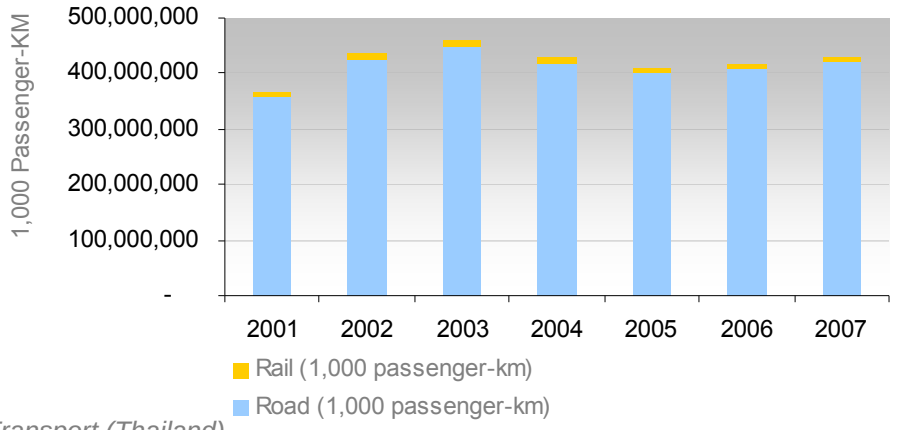
What Contributed to the Low Energy Efficiency in Transport?

1. **Economic structure**
   - Spatial distribution do not impose unusual requirements for land transport/fuel consumption in land transport (i.e. high concentration of activities around Bangkok and eastern seaboard)
   - Potential energy saving from focused policy that promotes higher value-added production and/or less energy-intensive sectors (e.g. service sector)
2. **Modal splits**
   - Freight and passenger transport overwhelmingly dominated by road
   - Limited role of rail, high motorization rate and dependence on road impacted negatively on eneryg efficiency of the transport sector

Modal Shares in Freight Transport (Tonne-KM) 2006



Modal Shares in Passenger Land Transport (Passenger-KM)



Source: consolidated from the Ministry of Transport (Thailand)

What Contributed to the Low Energy Efficiency in Transport?

3. Vehicles Types and Fuels Used

- Old fleet, fuel-inefficient vehicles
- Diesel dominates buses and trucks
- Overall, gasoline still dominates fuel use in transport sector

	Bangkok					The rest of the country				
	Gasoline	Diesel	LPG+	NGV+	Electricity & Others	Gasoline	Diesel	LPG+	NGV+	Electricity & Others
Cars & Pickups	75.4%	21.0%	2.5%	0.6%	0.5%	64.8%	32.1%	2.0%	0.2%	0.9%
Motorcycles	100.0%	0.0%	0.0%	0.0%	0.0%	99.96%	0.00%	0.00%	0.00%	0.03%
Taxi+	10.9%	0.6%	72.9%	15.5%	0.0%	43.3%	2.7%	53.5%	0.0%	0.5%
Others	0.2%	95.9%	0.0%	0.0%	3.9%	3.5%	94.3%	0.1%	0.0%	2.2%
Buses	0.9%	91.0%	3.5%	4.4%	0.1%	7.4%	91.1%	0.9%	0.4%	0.3%
Trucks	4.0%	92.8%	0.3%	0.1%	2.7%	5.3%	91.9%	0.2%	0.0%	2.5%
OVERALL	**70.4%**	**26.1%**	**2.3%**	**0.5%**	**0.7%**	**76.2%**	**22.9%**	**0.3%**	**0.0%**	**0.6%**

Source: Department of Land Transport

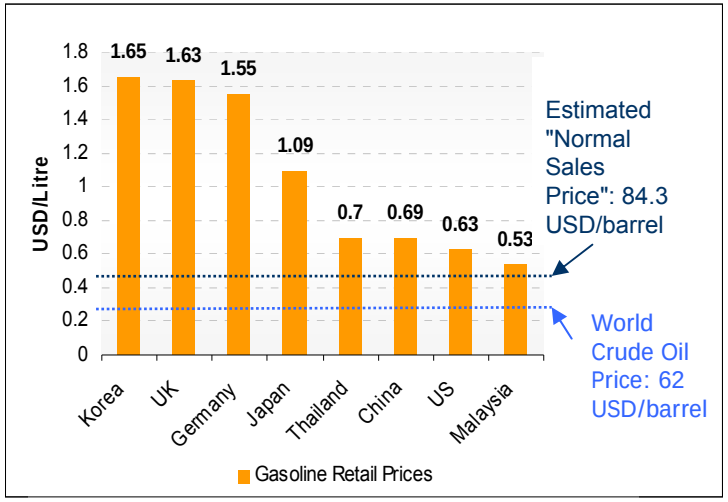
4. Fuel Economy

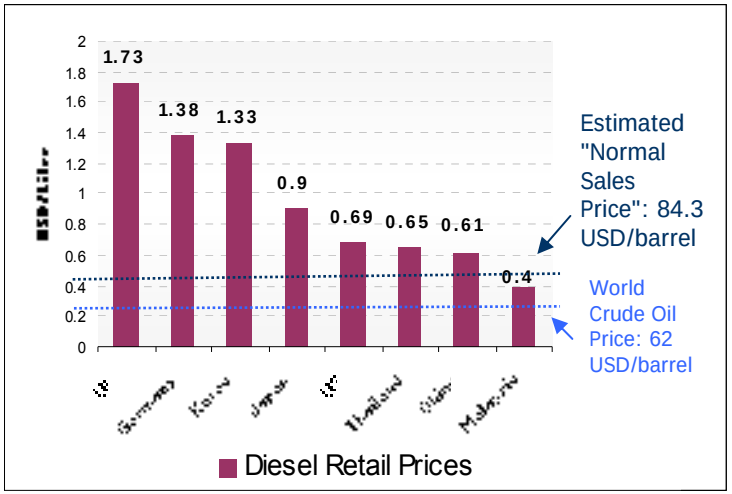
- No fuel economy standards/regulations currently applied
- Actual average fuel economy data for current vehicle fleet is not available
- Estimates: passenger cars (25-33 mpg), which is 25-30% lower than international best standards (e.g. Japan and Europe)

What Contributed to the Low Energy Efficiency in Transport?

5. Fuel Prices

- Relative low fuel prices/fuel tax by international comparison
- Implies that there's more room to exercise pricing policy





A Note on Affordability

- Monthly energy expenditure grew 35% while average monthly income grew by 19% during 2004-2006 ➔ Tax-based measure might affect affordability
- However, lower-income groups spend lower share of their income on petroleum products ➔ The burden of fuel tax increase will be more on the richer households

Policy Directions

- Thailand has great potential to realize efficieny gains in the transport sector
- Two main sub-sectors: Intercity and Urban Transport

Intercity Transport	Urban Transport
➢ Rail modernization and reform • Particularly in freight ➢ Improving efficiency in truck transport • Improving soft infrastructure (policies & regulations) in truck industry • Review current vehicle taxation and charges (undifferentiated by age/emissions/energy performance) • Long-term policy on types of fuel ➢ Intercity passenger transport • Improved highway management • Rail passenger improvement • Fuel efficiency in both buses and private vehicles	➢ Addressing congestion • Improved traffic management • Improved road user pricing ➢ Public transport development • Bus and BMTA reforms • Introducing BRT • Integrated public transport ➢ Vehicle standards • The use of alternative fuels • Vehicle efficiency standards • Trucks and buses age limits

A Simple Quantitative Analysis of Policy Options

Policy and Technology Options

Freight Transport Options

- A1 Non-fixed route truck use 25% CNG
- A2 More efficient freight rail
- A3 Fuel Economy improvement in diesel vehicles
- A4 More efficient and higher payload trucks

Interurban Passenger Options

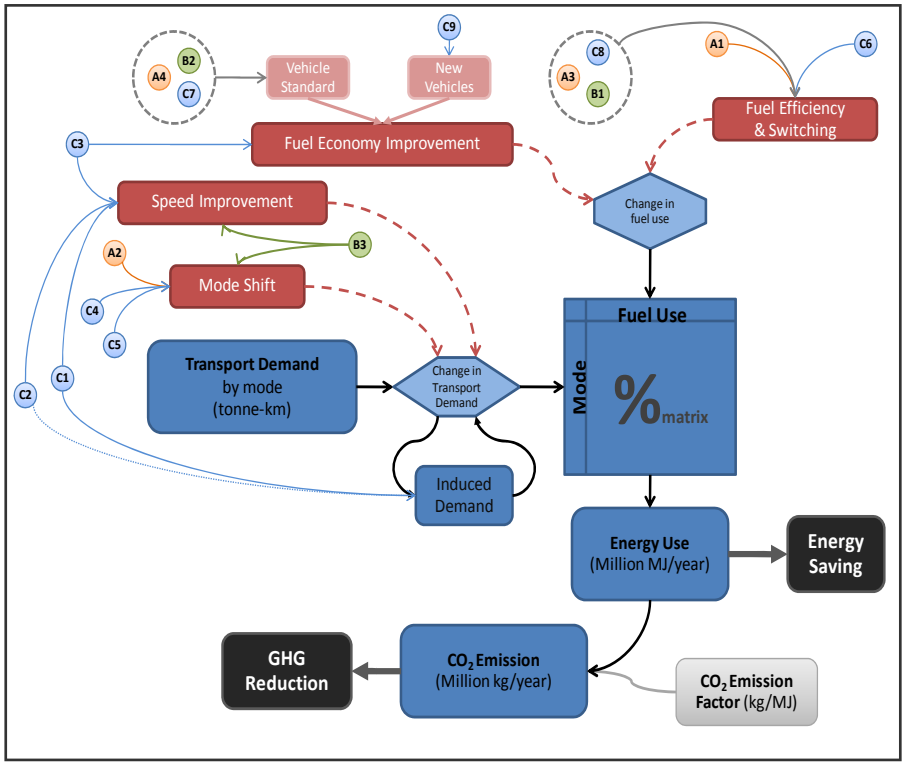
- B1 Fuel economy improvement in diesel vehicles
- B2 Improve passenger car's fuel efficiency standard
- B3 Improving passenger train

Urban Passenger Options

- C1 Improve traffic management
- C2 Improve road user pricing
- C3 Improve bus industry's efficiency
- C4 Introduce BRT
- C5 Integrate MRT/Bus/Walking
- C6 Use CNG in bus fleet
- C7 Improve vehicle fuel efficiency standard
- C8 Fuel Economy improvement in BMTA diesel vehicles
- C9 Age limits for all heavy Bangkok buses

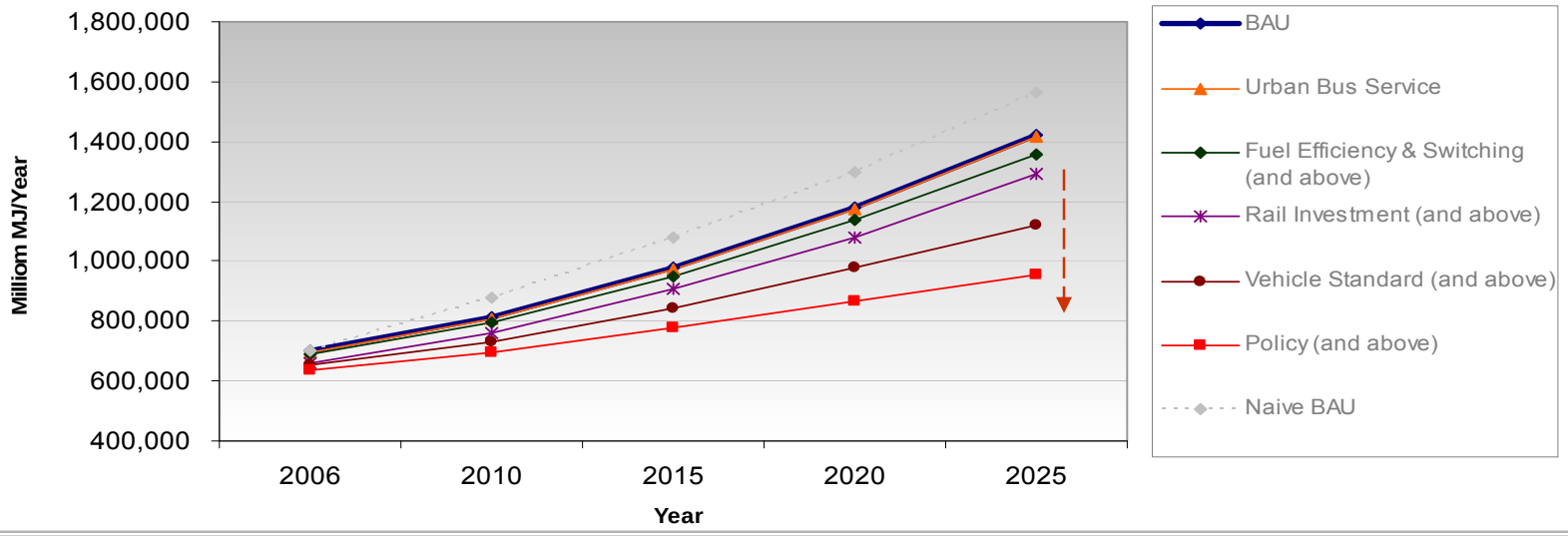
Joint Options

- D1 Fuel economy improvements in private sector's vehicles
- D2 Railway investment



A Simple Quantitative Analysis of Policy Options

	Policy Options*			Total Cost (THB Million)	Annual Energy Reduction by 2025
	Freight	***Interurban***	***Urban***		
Fuel Efficiency & Switching	A1,A3	B1	C6,C8	114,980	4.0%
Better Vehicle Standards	A4	B2	C7	114,544	11.9%
Rail Investment & Reform	A2	B3	C5	378,607	4.8%
Better Urban Bus Service			C4,C9	41,037	0.5%
Policy & Pricing			C1,C2,C3	5,000	11.9%

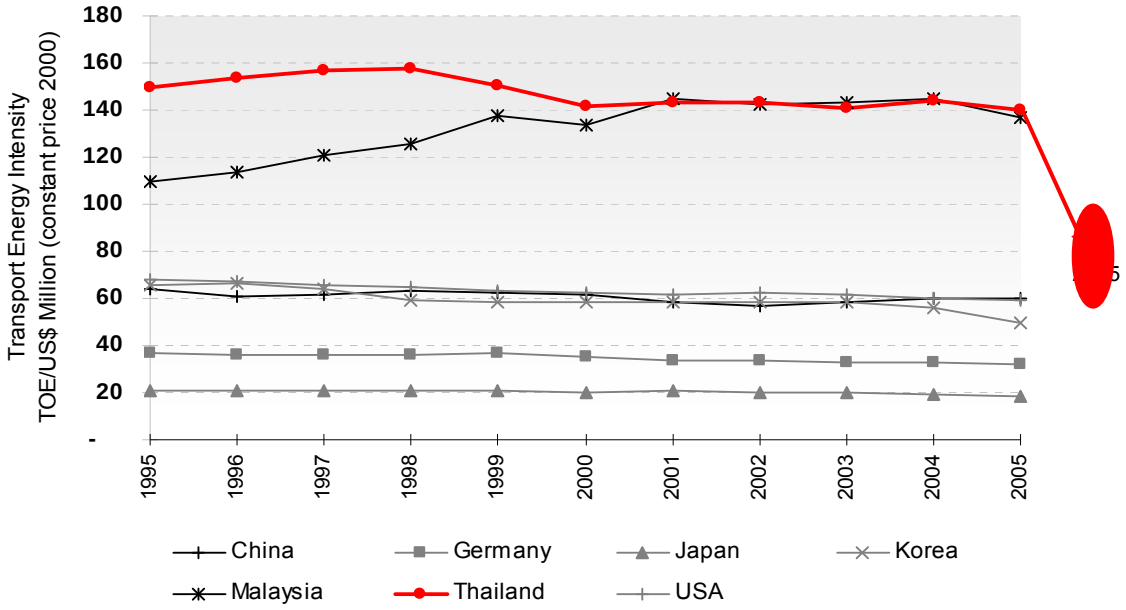


A Simple Quantitative Analysis of Policy Options

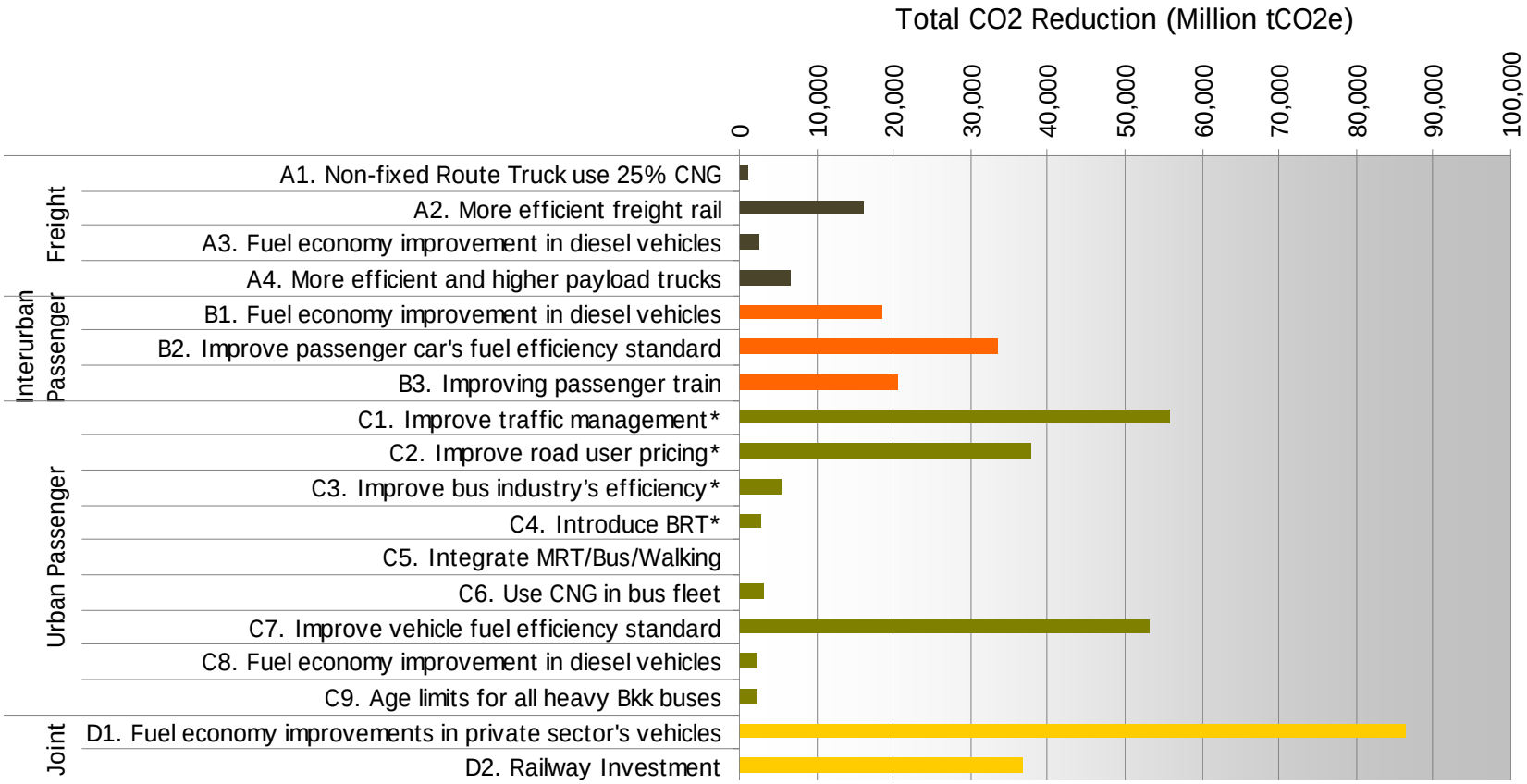
- If all of the selected policy options are successfully implemented, the transport sector's fuel use during 2025 can be reduced by approximately 33% from the business as usual case (note: BAU already assumes some energy efficiency improvement)
- Even so, it still hasn't reached US' 2005 level
- Suggesting that technological potentials exist even for today

Largest gains are from..

- "Better Vehicle Standards" (11.9%), which is more efficient and higher payload trucks and improved passenger's fuel efficiency standards
- "Suitable Policies and Pricing" (15%), which is improved traffic management, better road user pricing, and improved bus industry's efficiency



Estimated Carbon Emission Reduction



Making things happen

- To implement the policy options, political and institutional impediments must be overcome
- Pricing mechanism can be used to induce behavioral changes/sectoral adjustment (e.g. fuel pricing, vehicle taxes/charges)
- Strong institutional support & facilitation required
  - Clear policy & implementation strategy
  - Strengthened policy coordination
  - Public acceptance/awareness
  - Mainstream this agenda into public policy making
  - Build institutional capacity of government agencies