The 18th AIM International Workshop
NIES, Tsukuba, Japan
14-15 December 2012

Jakarta Low Carbon Scenarios for Passenger Transport Sector: An Exercise with AIM/Enduse

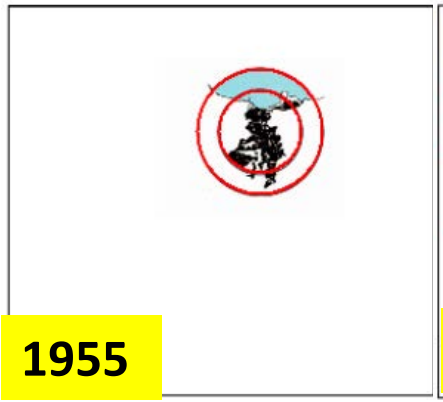
Toni Bakhtiar
Bogor Agricultural University, Indonesia

Background

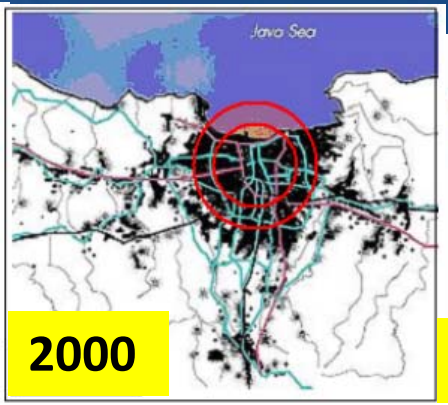
- Region: Jakarta
- Sector: Passenger Transport

About Jakarta

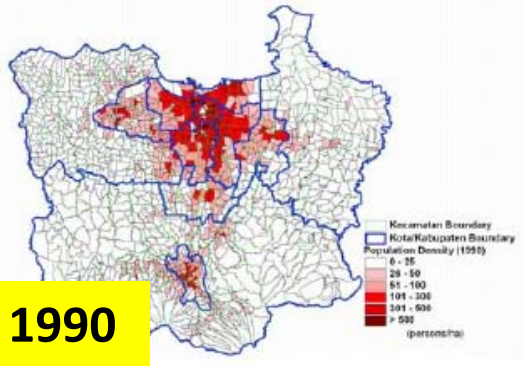
- Capital city of Indonesia
- Population (2010) : 9.6 million (#13 in the world), rate: 1.4%
- Density (2010) : 14500 people/km2
- Economic growth (2005-2011) : 6.5%
- R-GDP per capita (2005-2011) : USD4353



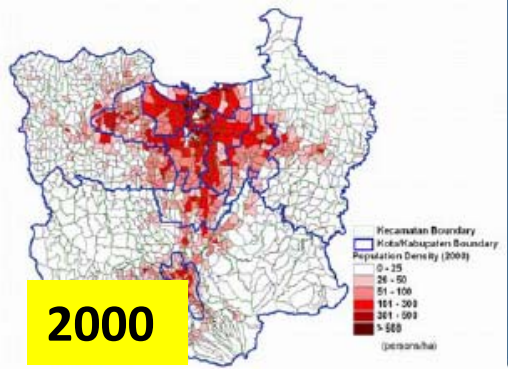
1955



2000



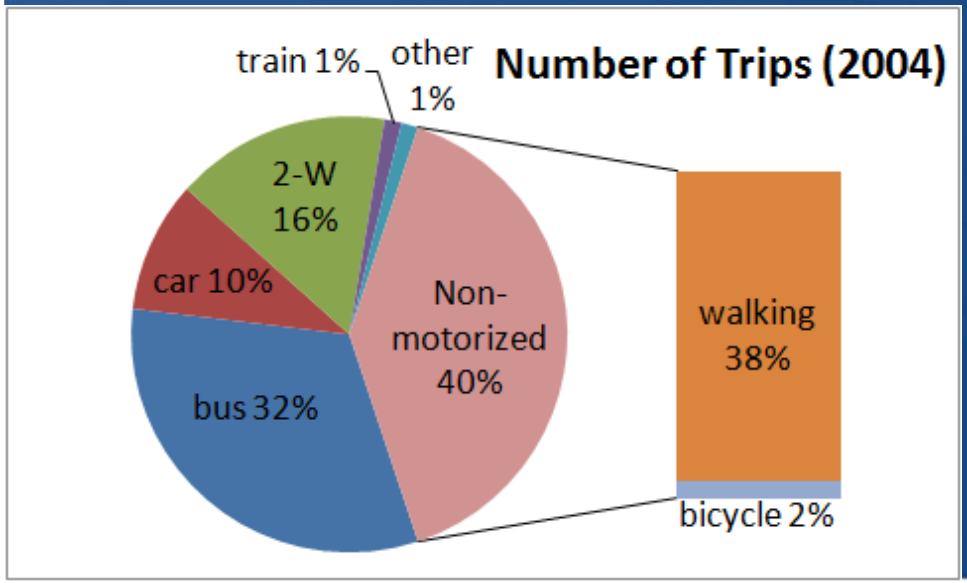
1990

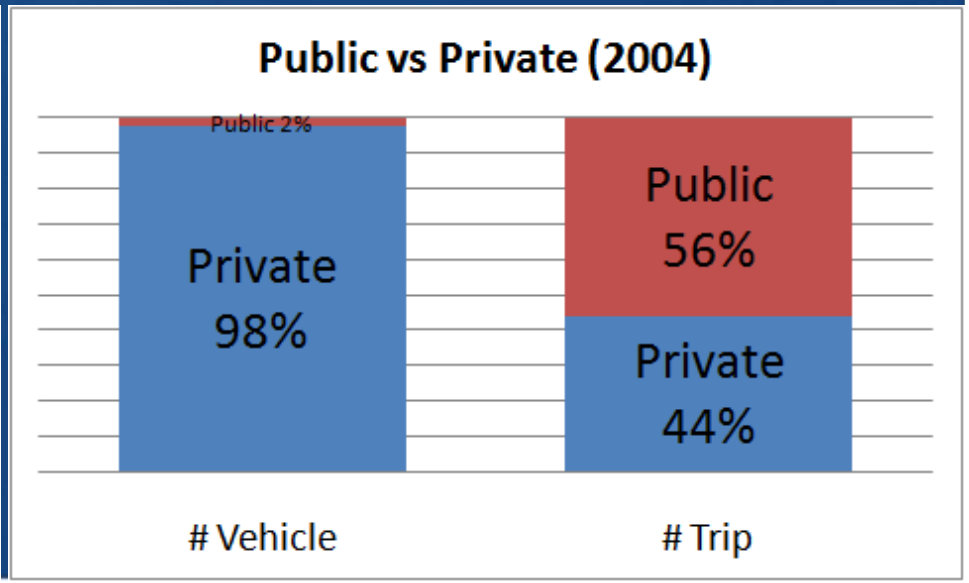


2000

Transport Facts

- Number of vehicles: 9.9 million (2-W), 3.5 million (4-W)
- Vehicle growth (2011): 11%, Road growth: 0.01%
- Road ratio: 6.3%
- Total road area ≈ total vehicle area
- Loss due to congestion (2004): USD 922 billion



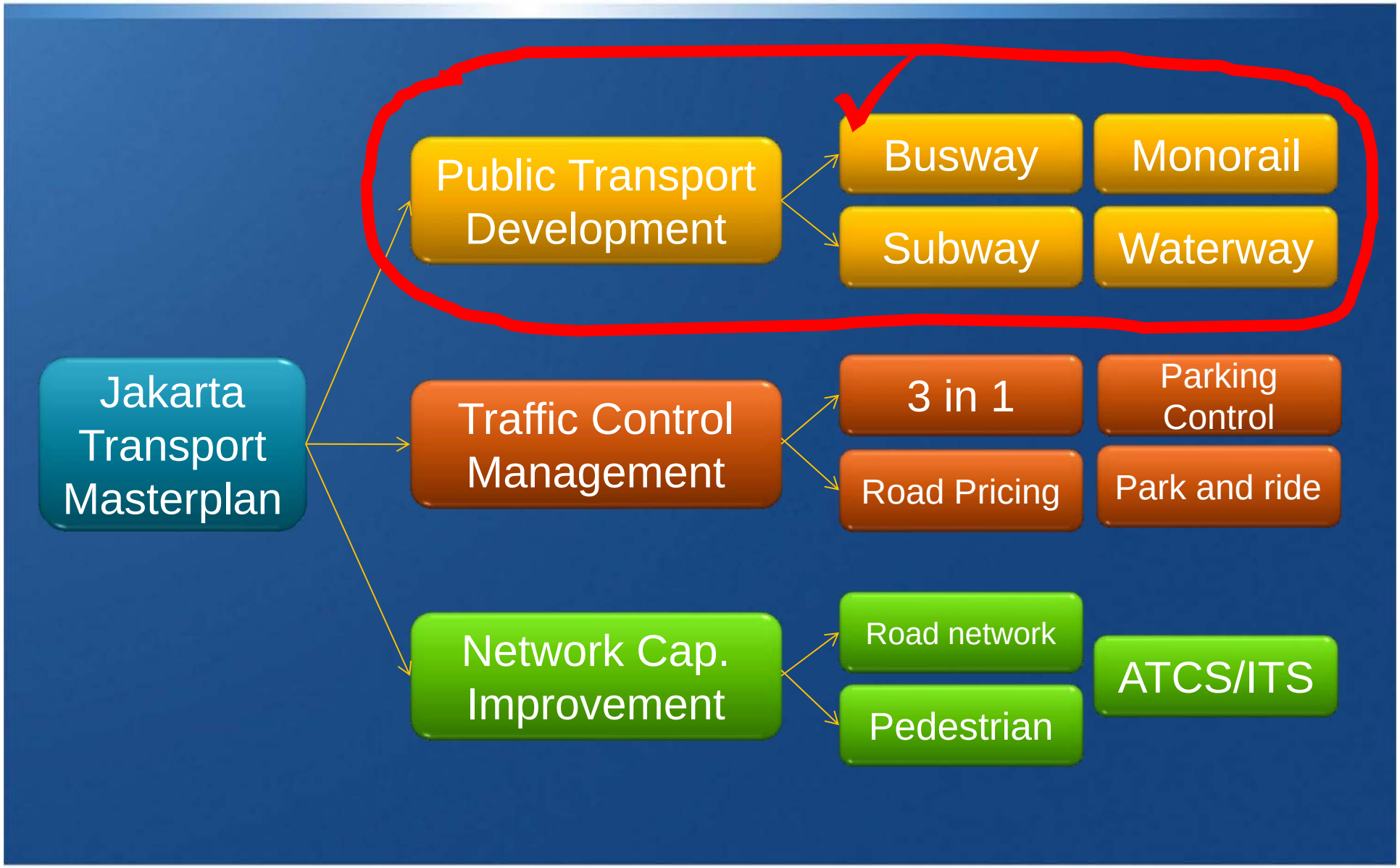


Objectives

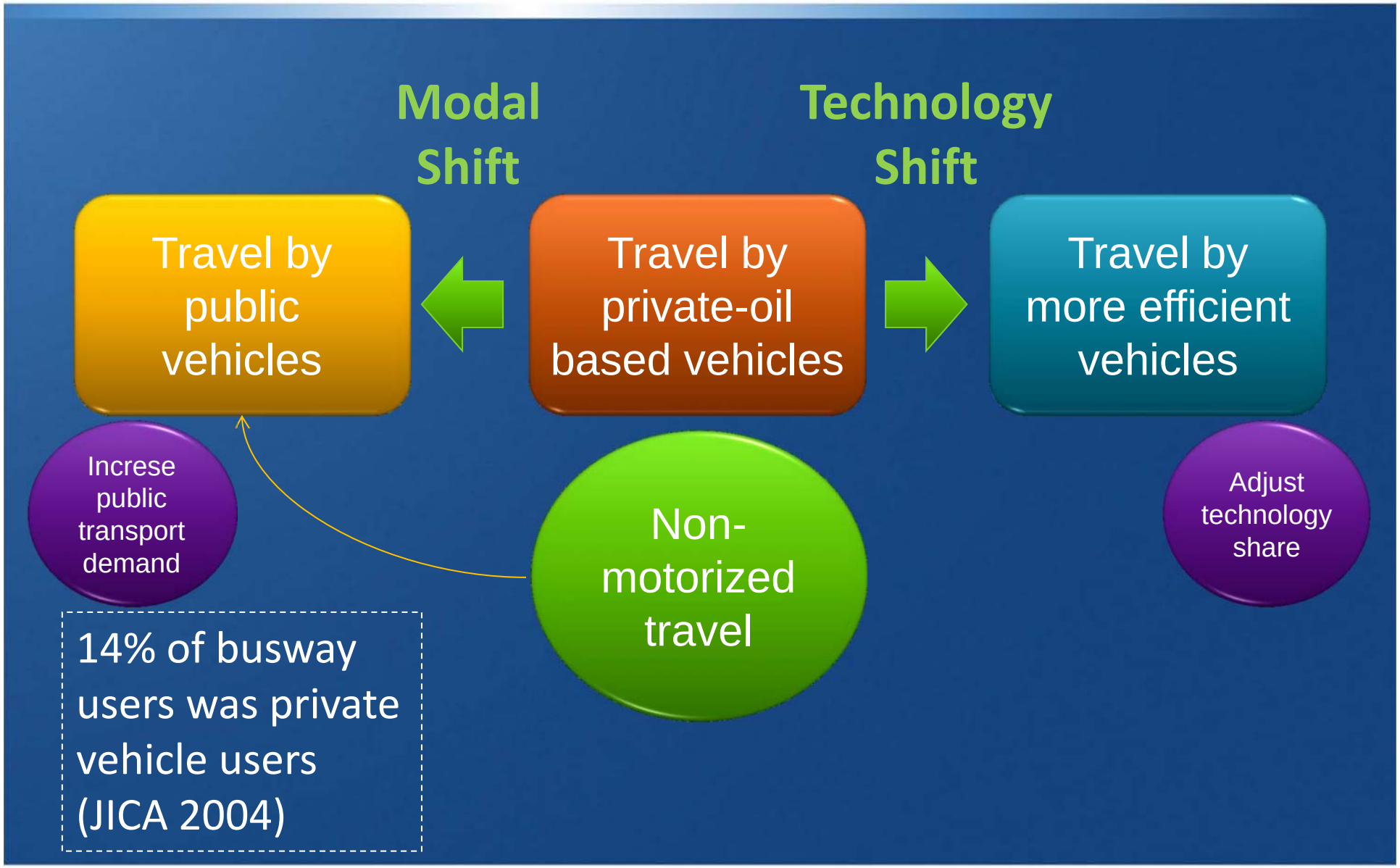
By using AIM/Enduse, we aim to:

1. study the impact of modal shift and technology shift in Jakarta passenger transport sector relating to CO2 reduction target,
2. in particular, analyze the viability of sustainable transport scenarios by introducing efficient technology, investment in MRT, and expanding the share of CNG based vehicle,
3. drawing the marginal abatement cost curve.

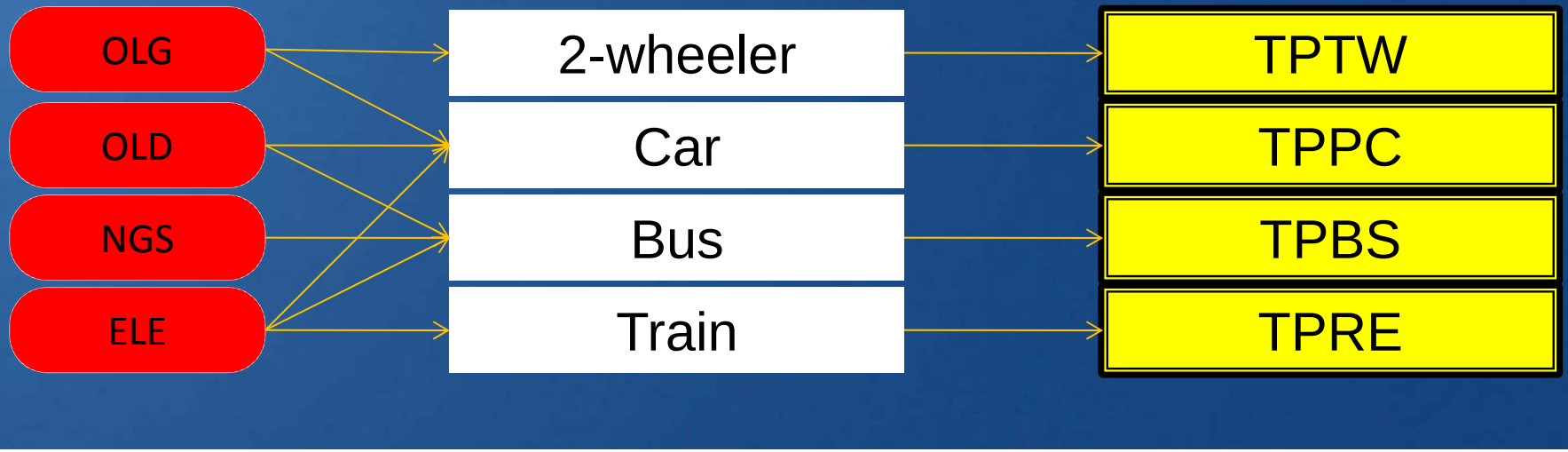
Transport Strategies



Low Carbon Transition



Scenario Assumptions



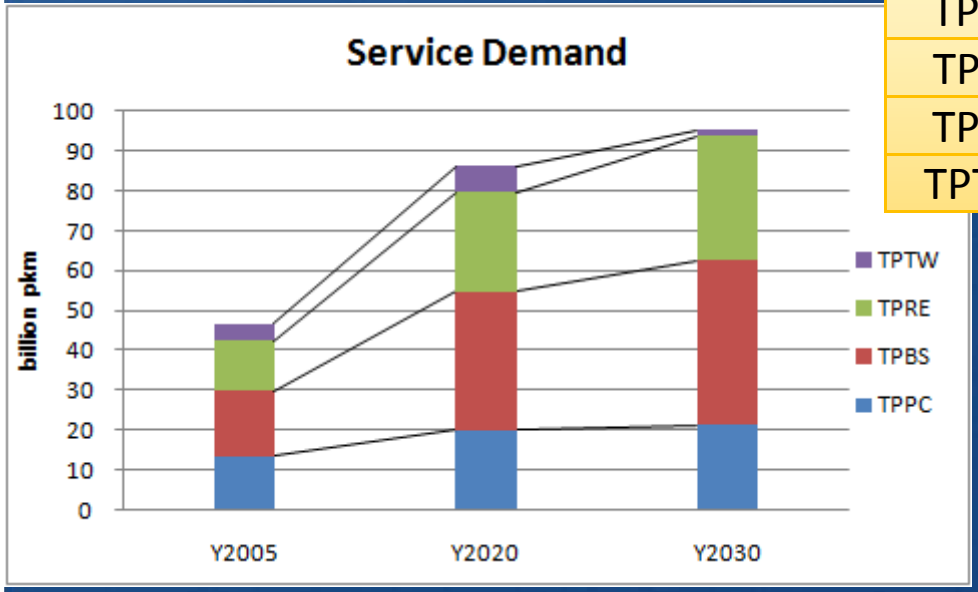
2-wheeler	Car	Bus	Train
Existing (INEFF) New (EFF, 44%)	Existing (INEFF) New (EFF, 15%) New (HEF1, 38%) New (HEF2, 50%) Hybrid (50%) Electric (64%) CNG (69%)	Existing (INEFF) New (EFF, 14%) New (HEF1, 45%) New (HEF2, 49%) Hybrid (61%) Electric (63%) CNG (64%)	Existing (INEFF) New (EFF, 45%) New (HEF1, 50%)

Scenario Assumptions

Base year: 2005, Target year: 2030

- Business as Usual (BL)
- Sustainable Transport (efficient vehiles, MRT, CNG-based): CM1: without carbon tax, CM2: with carbon tax.

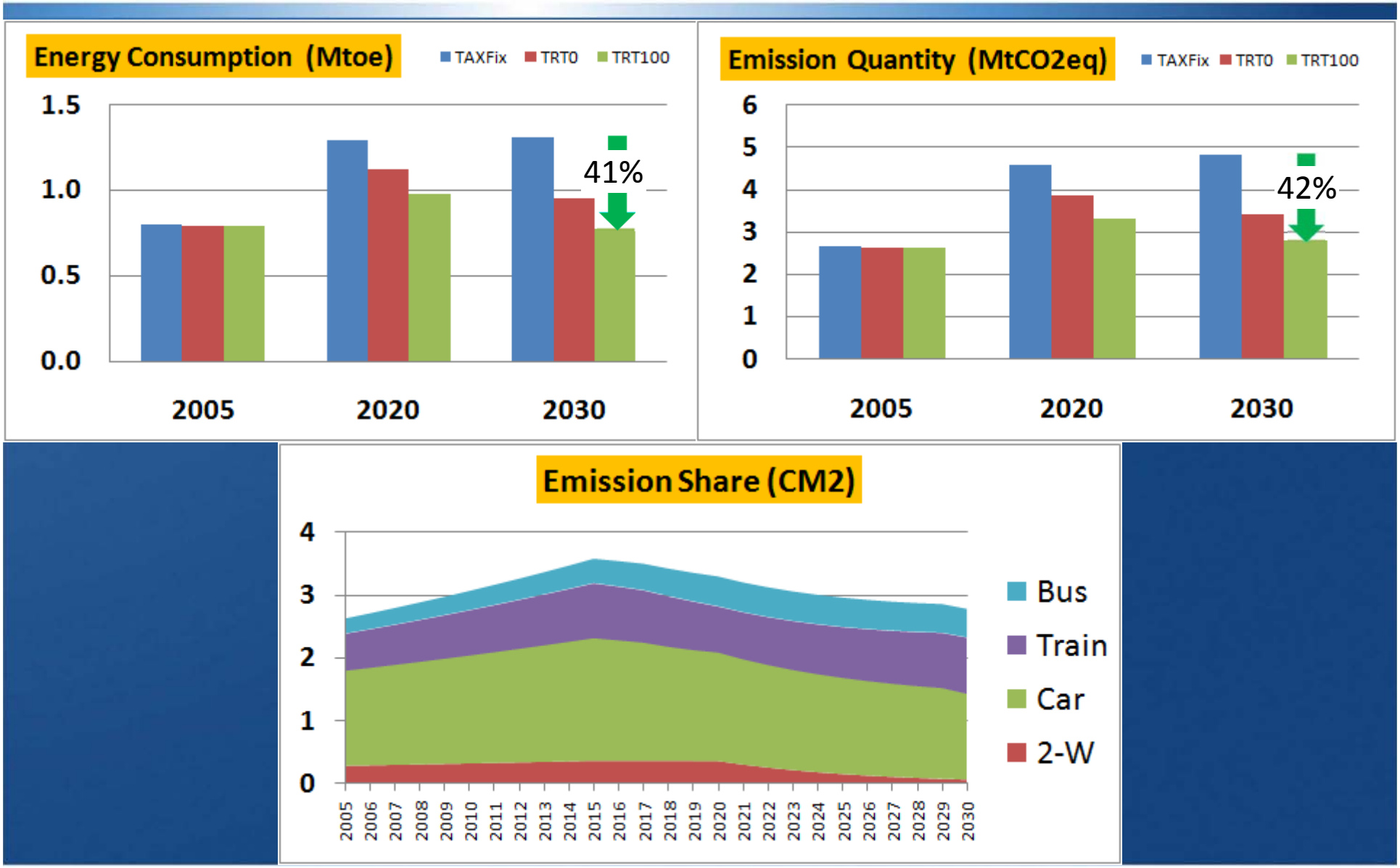
Case	Emission Tax	Energy Tax	Discount Rate
BL	T0	T0	H (12%)
CM1	T0	T0	H (12%)
CM2	T100	T0	H (12%)



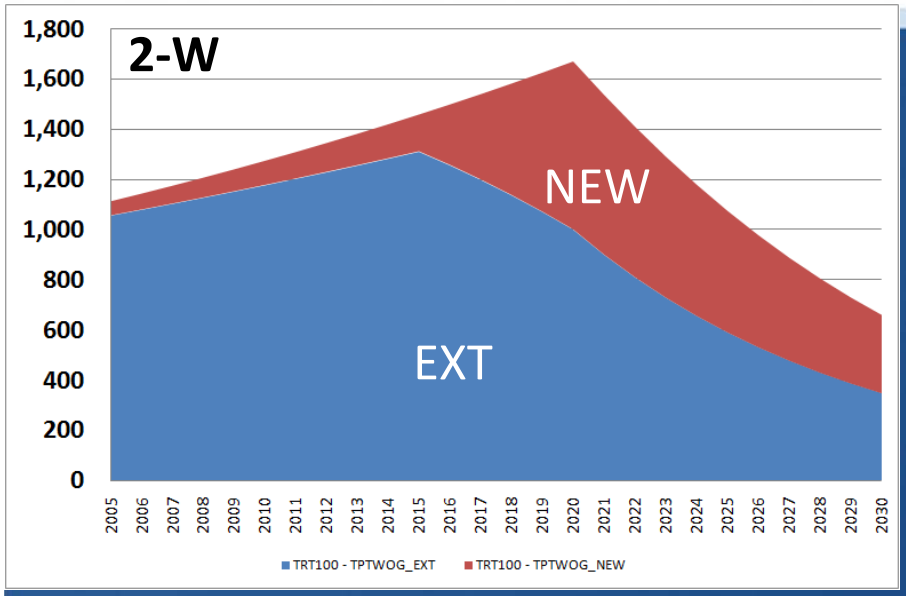
Service	2020/2005	2030/2005
TPPC	1.5	1.6
TPBS	2.1	2.5
TPRE	2	2.5
TPTW	1.5	0.35

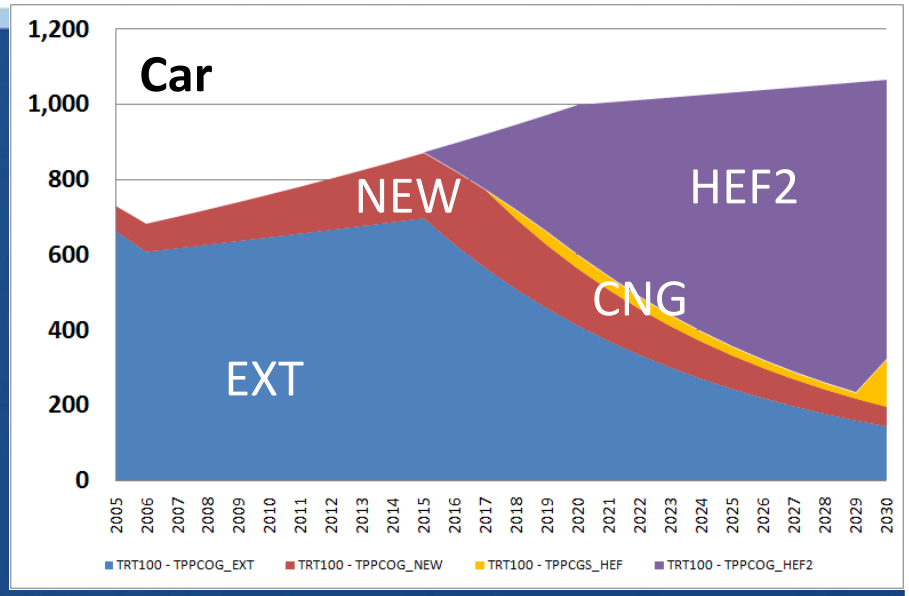
	EMF			Price		
Energy	2005	2020	2030	2005	2020	2030
OLG	2.9	2.9	2.9	0.297	0.481	0.587
OLD	3.1	3.1	3.1	0.297	0.481	0.587
NGS	2.35	2.35	2.35	0.191	0.388	0.459
ELY	6.24	7.07	7.07	0.346	0.664	0.547

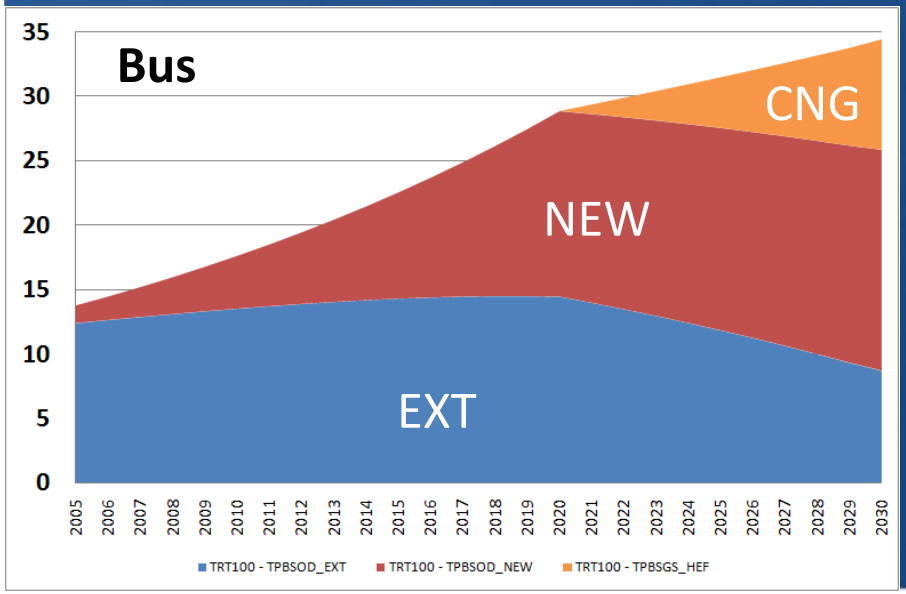
Result

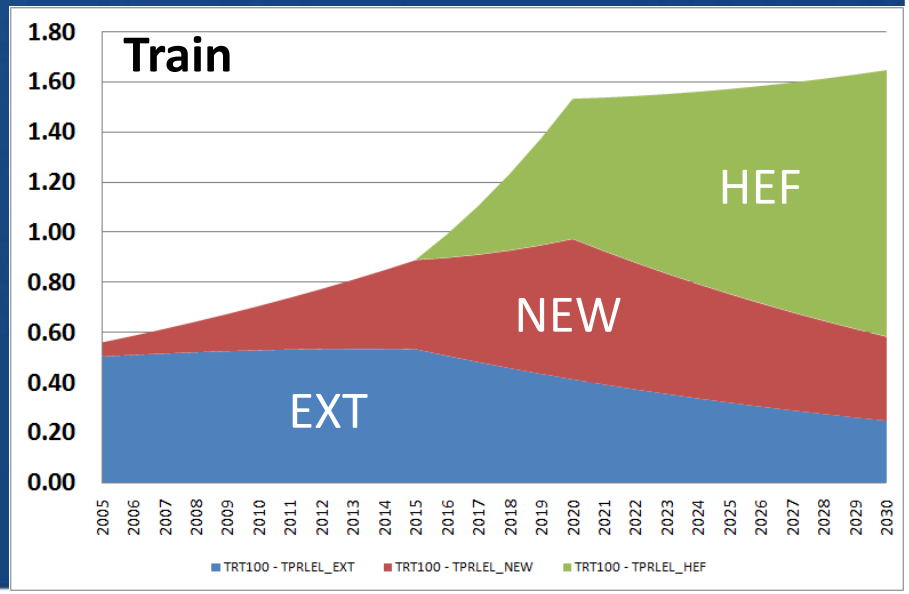

Energy Consumption (Mtoe)
TAXFix
TRT0
TRT100
1.5
1.0
0.5
0.0
41%
2005
2020
2030
Emission Quantity (MtCO2eq)
TAXFix
TRT0
TRT100
6
5
4
3
2
1
0
42%
2005
2020
2030
Emission Share (CM2)
4
3
2
1
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Bus
Train
Car
2-W

Technology Diffusion

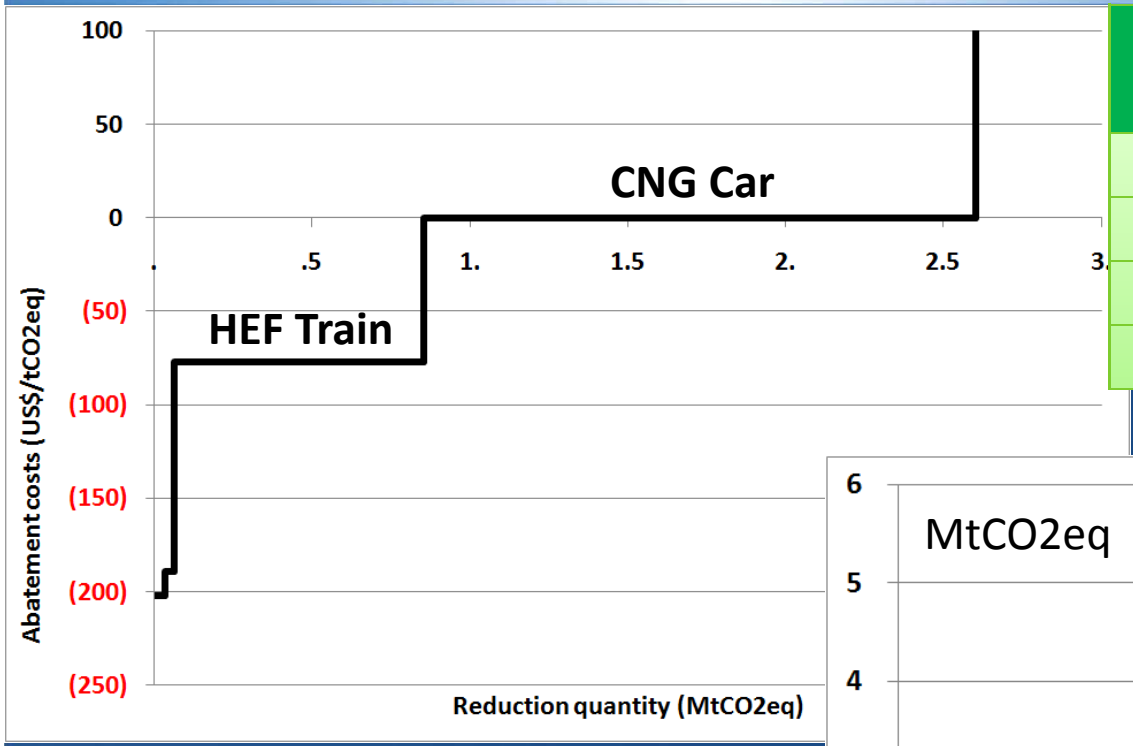




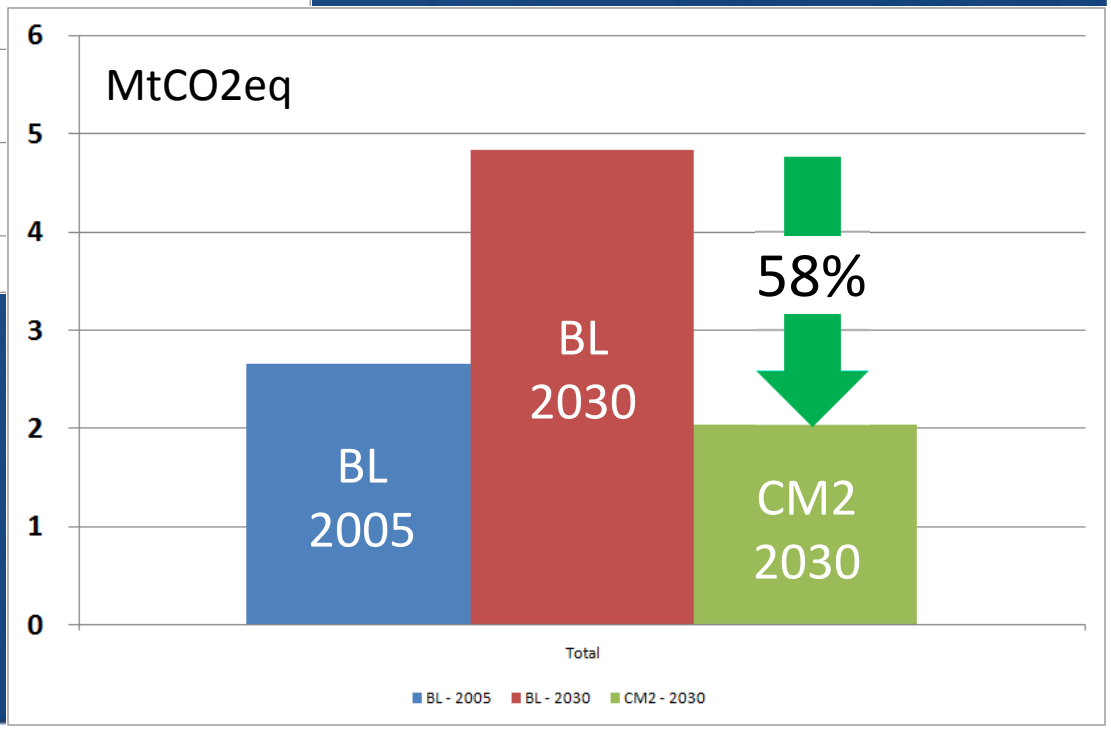




Abatement Cost



Technology	Benefit (m USD)	CO2 Reduction
CNG Car	0.6	36%
HEF Train	61.1	16%
NEW Bus	5.9	1%
NEW 2W	6.9	1%



Conclusion

1. Development of public transport should be carried-out immediately.
2. Introduction of CNG/HEFF transport require infrastructures.
3. MRT provides higher transport services with much lower stocks, cost, energy, and emission.
4. Energy saving potential: 46% from BAU.
5. Emission reduction: 46% from BAU.
6. HEF train provides the highest benefit and CNG car gives the most potential CO2 reduction based on MAC curve.