Potential Study of Diversified Transportation Energy Mix in ASEAN countries

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1. Purpose

Background

- Increasing import dependency of oil, and resulting trade balance deficit are common issues in ASEAN countries as economy grows.
- Each Govt. is trying to conserve oil by implementing energy policy to promote use of biofuels as transport fuel.
- Gaps between introduction target and possible supply are foreseen.

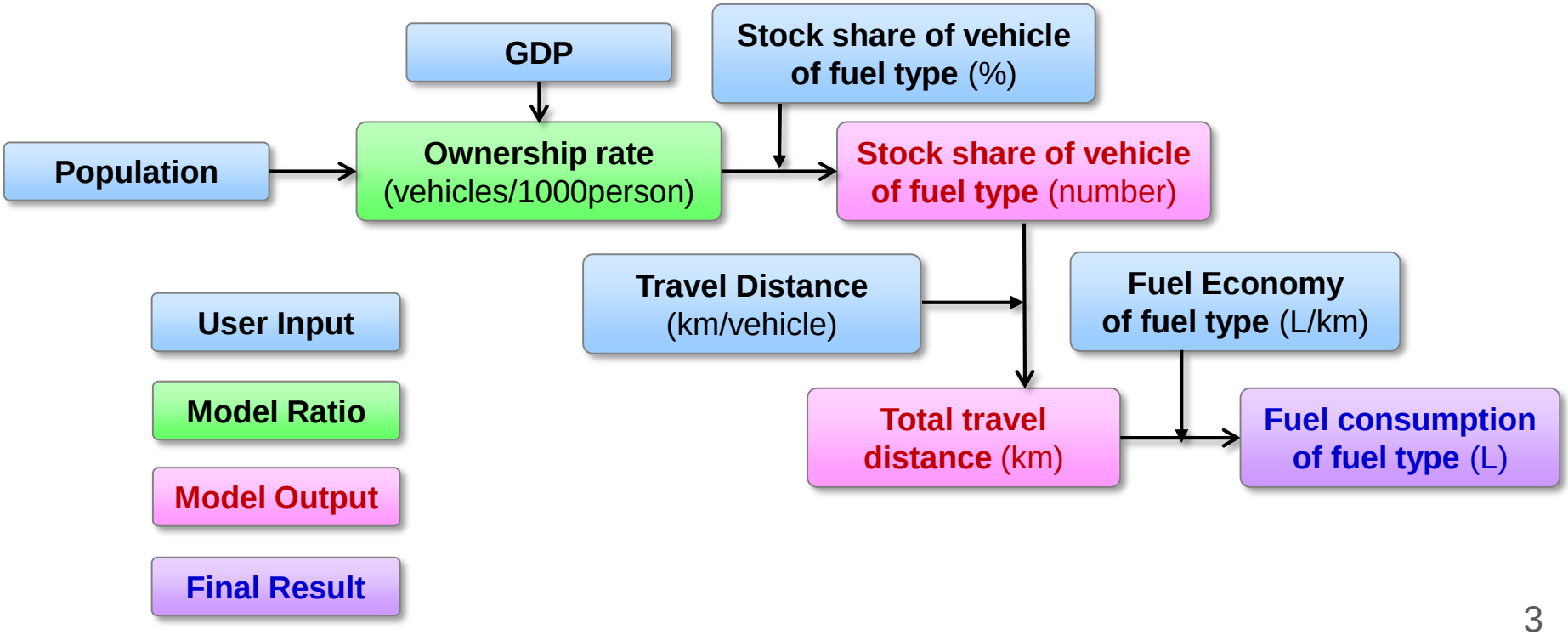
Research contents

- Measures for mitigating energy issues in transport sector (eg. gap between energy supply and demand) and policy target are proposed.
- 5 countries in ASEAN (Thailand, Indonesia, Malaysia, Philippines and Vietnam) are covered by considering their economy, energy status and automotive market scale.

2. Model description

Calculation model of transport energy mix

- In order to estimate energy consumptions, ASIF type models for 5 countries were developed.
- Below shows the calculation flow in the model.



3. Analysis step and scenarios

Analysis step and scenarios

- The following analysis step and scenarios are investigated.
- Estimate energy consumption from 2015 to 2030.

No	Scenario	Analysis contents
1	**BAU case**	• Energy policies about energy conservation, alternative energy introduction are basically not taken into account. • Possible blend rates of biofuels are considered under the current production status.
2	**Biofuel case**	• Assume that blend rate/amount of biofuels are fully achieved according to energy policies. • Assume plausible biofuel introductions in addition to the ***BAU case***.
3	**Reduction case**	• Assume that reduction target of oil/energy consumptions are fully achieved in addition to the ***BAU case***.
4	**Alternative case**	• Measures to minimize gaps between the ***BAU/Reduction case*** and policy targets are investigated. • Supply ability of domestic resources, together with oil refining/biofuel. production capacity and fuel-cost effectiveness are considered.

4. Political background

Energy policies in 5 countries

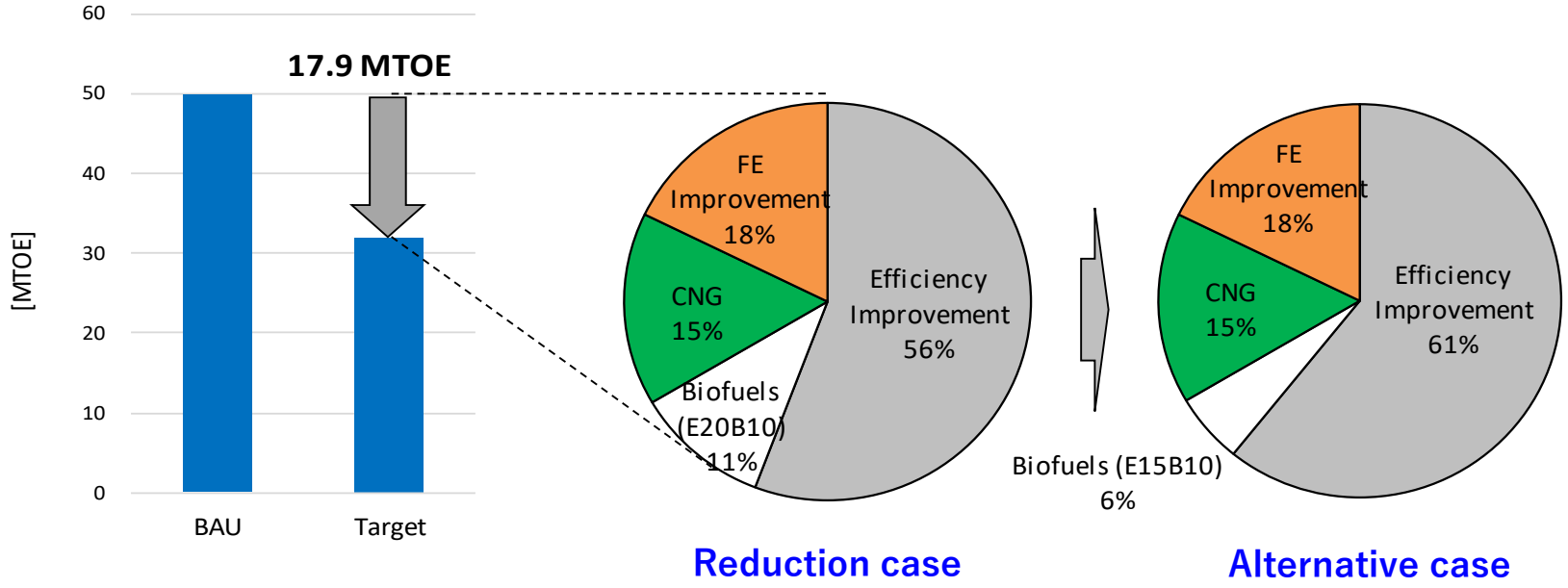
- Below shows the energy policies taken into account in the analysis.

Country	Energy policy
Thailand	• **AEDP 2015-2036**: 11.3 million L/day of ethanol (up to E20/E85) and 14 million L/day of biodiesel (up to B10/B20) at 2036. • **EEP 2015-2036**: 46.2% reduction of transport energy consumption compared to BAU by 2036.
Indonesia	• **KEN**: consume 72 mtoe of oil (68% of total oil consumption in transport sector) in 2030 • **Ministry of Energy and Mineral Resources Regulation No.20/2014**: mandatory of biofuel content E20 and B30 by 2030. • **RUEN**: introduce biodiesel of 5.73 million kL, 2 million units of CNG vehicle in 2025.
Philippines	• **PEP 2012-2030**: road transportation accounts for ca.75-80% of total transportation energy consumption in 2030 and use of alternative fuels. • **NBP 2013-2030**: ethanol and biodiesel up to E20 and B20 until 2025.
Malaysia	• **NAP 2014**: promote EEV (energy efficient & advanced technology vehicle) • **11th Malaysian Plan (2016-2020)**: energy (oil) reduction by introducing EEV, biodiesel (B15) and CNG use in transport sector.
Vietnam	• **Law on Economical and Efficient Use of Energy, 50/2010/QH12**: better fuel economy vehicles by introducing Energy Efficiency Labeling scheme. • **Biofuel Roadmap**: ethanol (E5 as of 2015 and up to E10 as of 2017) and biodiesel (B5 as of 2015).

5. Results (Thailand)

■ Study result & alternative proposal for Thailand

- Required oil consumption in 2030 is 50 → 32 MTOE (▲17.9 MTOE)
- In the alternative case, supply ability of domestic resources, together with oil refining/biofuels production capacity and cost effectiveness (fuel costs) are evaluated, and more realistic combination of oil reduction measures is proposed compared to reduction case.



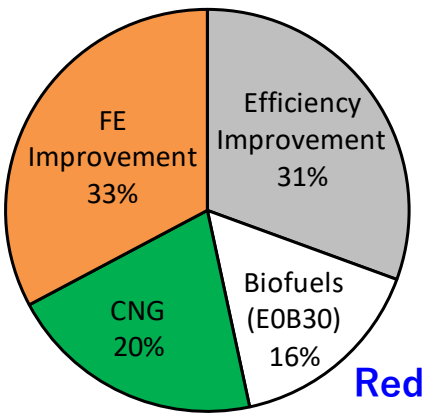
Reduction target of oil consumptions (@2030)

Contributions by each countermeasure

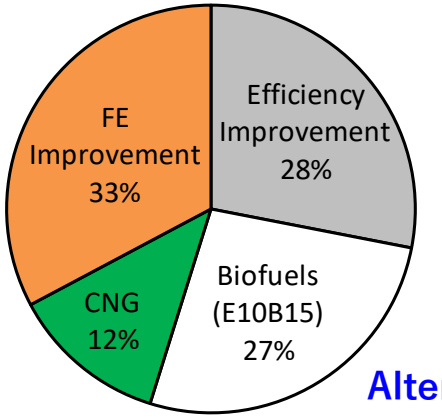
5. Results (Indonesia & Philippines)

Study result & alternative proposal for Indonesia

- Required oil consumption in 2030 is 116 → 75 MTOE (▲40.8 MTOE)



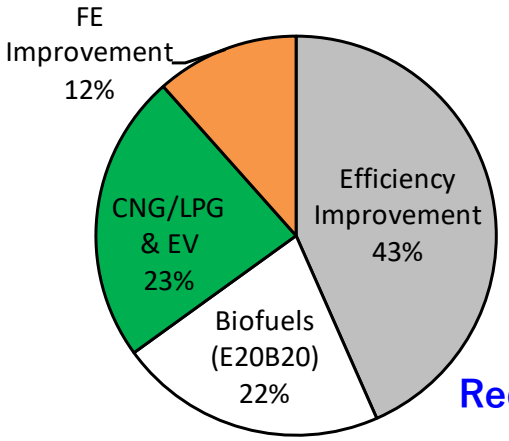
Reduction case



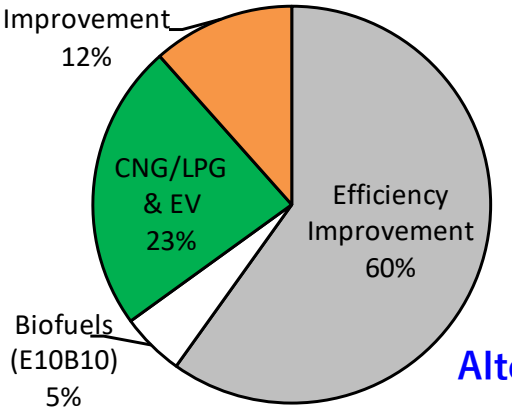
Alternative case

Study result & alternative proposal for Philippines

- Required oil consumption in 2030 is 19 → 7 MTOE (▲12.2 MTOE)



Reduction case

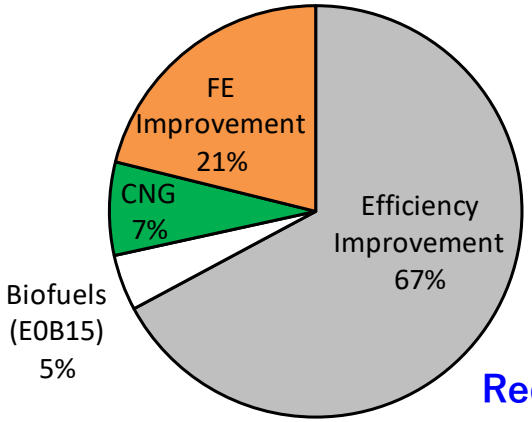


Alternative case

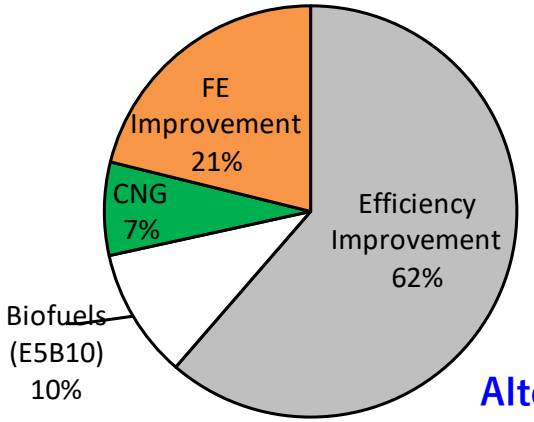
5. Results (Malaysia & Vietnam)

Study result & alternative proposal for Malaysia

- Required oil consumption in 2030 is 37 → 24 MTOE (▲13.1 MTOE)



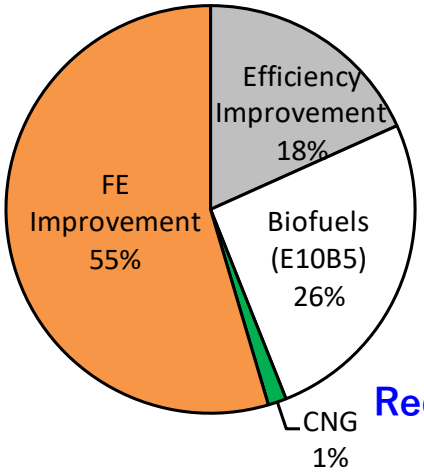
Reduction case



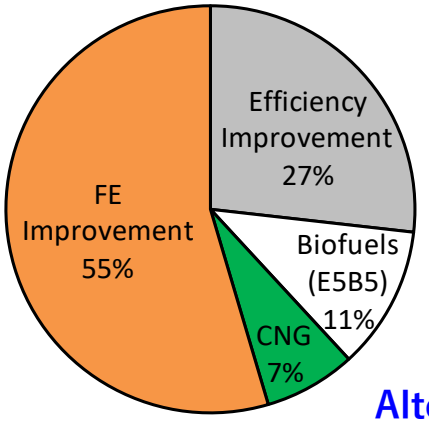
Alternative case

Study result & alternative proposal for Vietnam

- Required oil consumption in 2030 is 35 → 28 MTOE (▲7.1 MTOE)



Reduction case



Alternative case

5. Results (domestic biofuels supply ability)

■ Biofuels supply/demand status in 5 countries at 2030

- Table below shows the domestic supply conditions of biofuels.

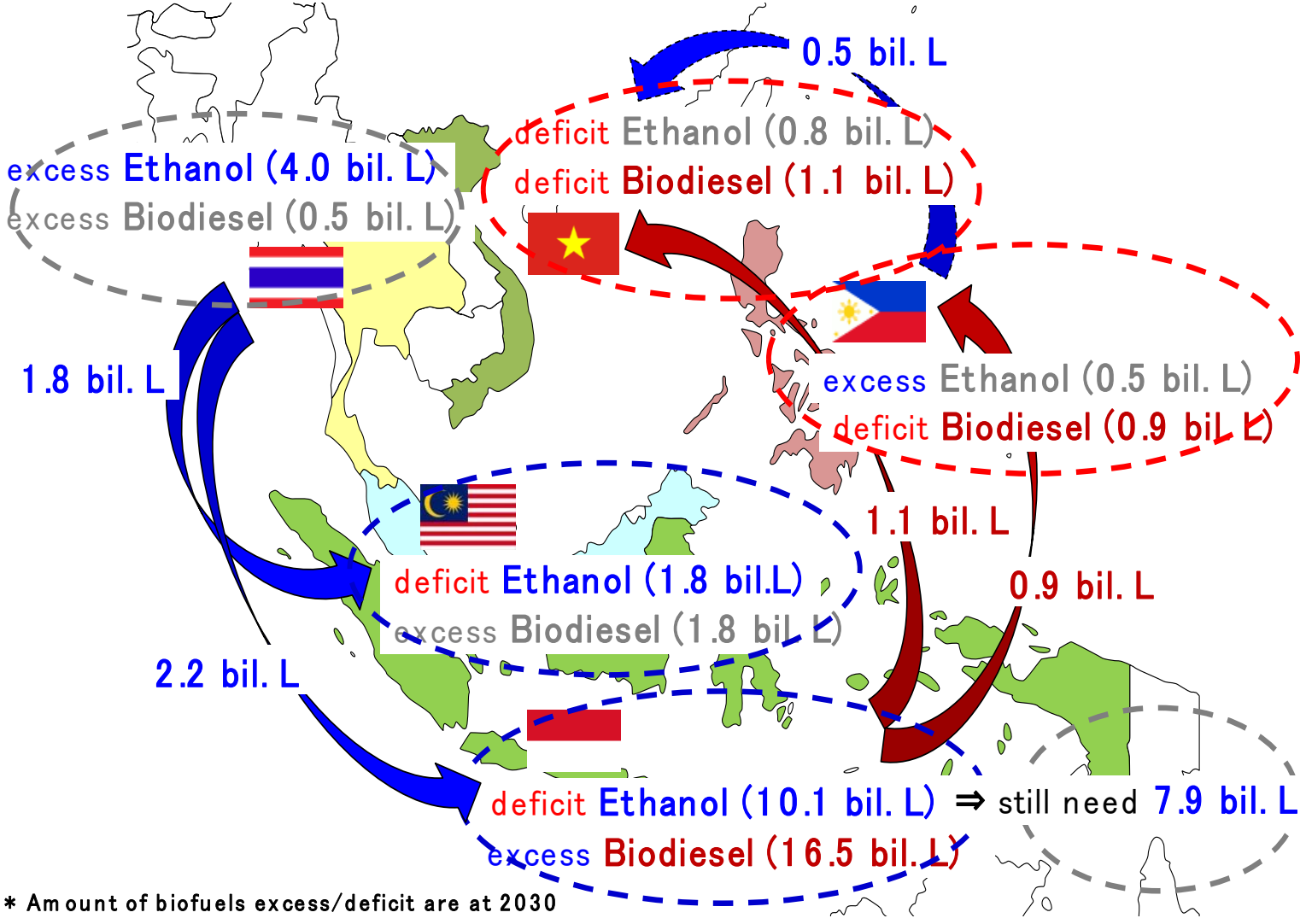
	Ethanol for gasoline blend			Biodiesel for diesel blend		
	Supply (billion L)	Demand (billion L)	Excess/ Deficit	Supply (billion L)	Demand (billion L)	Excess/ Deficit
Thailand (TH)	**8.3**	**4.3**	**4.0** billion L	**5.2**	**4.7**	**0.5** billion L
Indonesia (IN)	**0.8**	**10.9**	**▲10.1** billion L	**24**	**7.5**	**16.5** billion L
Philippines (PH)	**1.5**	**1.0**	**0.5** billion L	**0.8**	**1.7**	**▲0.9** billion L
Malaysia (MA)	**-**	**1.8**	**▲1.8** billion L	**3.4**	**1.6**	**1.8** billion L
Vietnam (VN)	**0.6**	**1.4**	**▲0.8** billion L	**-**	**1.1**	**▲1.1** billion L

* **Blue deficit**; shall be covered by the country's own effort first,
Red deficit; can be fulfilled by means of regional cooperation through trading of biofuels

6. Discussion

ASEAN Biofuels Balancing Concept

- Possibility of multi-national cooperation for biofuel security.



* Amount of biofuels excess/deficit are at 2030

7. Necessary measures

Measures to realize the biofuel security concept

- In order to realize biofuels security concept through multi-national cooperation in practice, introduction of measures to get rid of barriers to prevent trading of biofuels between the countries are key to success. Effective measures are;
  - ① to harmonize biofuels quality standards among the ASEAN countries.
  - ② not to specify feedstock for biofuels production only to domestic resources, performance-based and feedstock-neutral specifications are required.

- Additional use of biodiesel as well as enhancement of ethanol production in ASEAN are crucial. Recommendation to the governments of ASEAN countries are;
  - ① to produce next generation biofuels such as cellulosic ethanol and bio hydro-fined diesel (BHD) or hydrogenated vegetable oil (HVO)
  - ② to introduce mechanism to promote biofuels.

Thank you for
your kind attention

Terima kasih