MAXIMIZING VEHICLE FUEL ECONOMY IMPROVEMENT IN APEC REGION

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Overview

The Asia-Pacific Economic Cooperation (APEC) region accounts for 40% of the global population and 57% of the global GDP. The APEC region consumes approximately 5,000 Mtoe (Million Tonnes of Oil Equivalent), about 60% of the world's energy consumption. Transport sector shares about one-fourth of the total energy demand in APEC region and will grow by over 60% within the next 30 years, with the highest growth rate among other economic sectors (APERC, 2013). The transport sector very much relies on fossil oil which is a major source of greenhouse gas emissions. Fuel economy improvement is one of the promising policies to realizing energy efficiency in the transport sector since best practices on technology and policy are existing and ready to implement. This paper aims to examine impact of a maximum case of vehicle fuel economy improvement policy in APEC region called "MAX scenario", comparing to "BAU scenario" which includes existing policies.

Methods

A vehicle fleet model is prepared for estimating energy demand in the transport sector for 21 APEC member economies from 2012 to 2040. The model uses a system dynamics approach, implemented in the STELLA modeling software. The vehicle fleet model consists of four main sub-models including vehicle ownership model, vehicle stock turnover model, vehicle consumer choice model, and vehicle travel elasticity model. Fuel economy is key parameter of the model to evaluate the impact between BAU and MAX scenarios. The assumption for fuel economy in case of BAU and MAX scenarios is based on the fuel economy survey and the Global Fuel Economy Initative (GFEI)'s target (Korner et al, 2014). In BAU scenario, fuel economy is assumed as current rates of improvement, 1% per year for the economies has not implemented fuel economy standard and labelling policy and 2% per year for the economies has already implemented the policy. In MAX scenario, fuel economy for all APEC economies is applied by the GFEI target as 2.7% per year (see Table 1).

Table 1 Assumption of fuel economy improvements for light vehicles

Scenario	Group of economies	Fuel economy improvement (percent per year)	
		2012-2030	2030-2040
BAU	A	1.0%	1.0%
	B	2.0%	1.0%
MAX	A	2.7%	2.7%
	B	2.7%	2.7%

Group A is economy where vehicle fuel economy labelling and standard policy has <u>not</u> been currently implemented, which include Brunei Darussalam, Indonesia, Malaysia, Mexico, PNG, Peru, Philippines, Russia, Thailand

Group B is economy where vehicle fuel economy labelling and standard policy has been currently implemented, which include Australia, Canada, Chile, China, Hong Kong, Japan, Korea, New Zealand, Singapore, US, Viet Nam, Chinese Taipei

Results

Figure 1 shows energy demand for the road transport sector in APEC region comparing between BAU and MAX scenarios. In MAX scenario, road transport energy demand will grow at annual average 0.9%, while BAU scenario will grow at 1.7%. Energy demand in MAX scenario will peak before 2030, about 10 years earlier than BAU scenario. Figure 2 shows energy saving in the road transport sector by MAX scenario compared to BAU scenario. Energy saving in 2020, 2030 and 2040 will be 50, 200 and 400 Mtoe per year, respectively. China is the largest energy saving contributor, followed by the US and the group of Southeast Asia economies . Table 2 shows vehicle stock by technology for BAU and MAX scenarios. In MAX scenario, share of electric drive vehicles will be increased significantly comparing to BAU scenario; e.g., hybrid vehicles will be 25% from 15%, plug-in hybrid vehicles will be 12% from 8% and battery electric vehicles will be 6% from 3%.

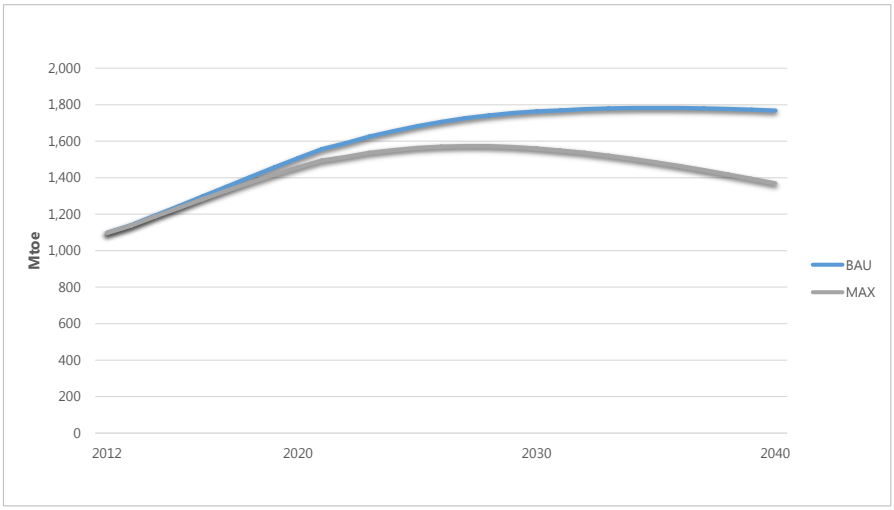

Figure 1 Road transport energy demand for BAU and MAX scenarios

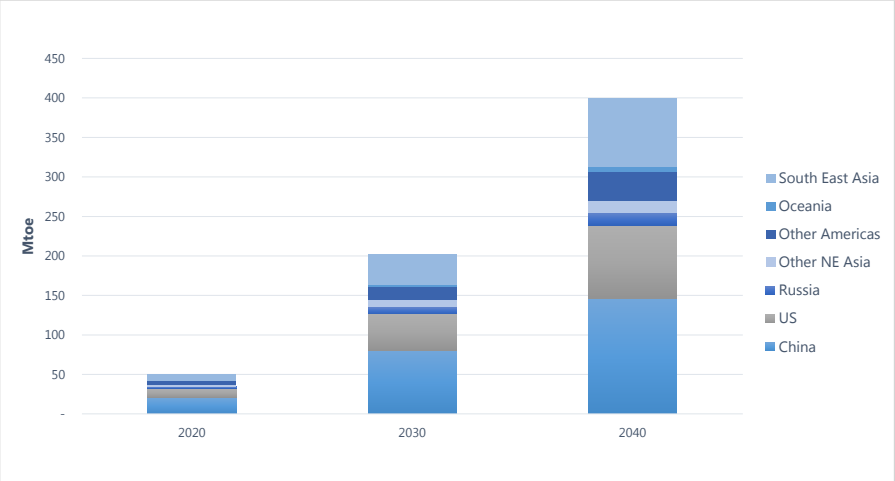

Figure 2 Energy saving of the road transport sector by APEC regional grouping

Table 2 Vehicle stock by technology for BAU and MAX scenarios

Vehicle Technology	Number of Vehicles (million)			% Share		
	2012	BAU 2040	MAX 2040	2012	BAU 2040	MAX 2040
Gasoline	505	733	553	79	48	36
Diesel	115	313	252	18	21	17
LPG	6	26	17	1	2	1
CNG	6	54	38	1	4	3
Hybrid	4	232	376	1	15	25
Plug-in hybrid	0.0	119	178	0	8	12
Battery electric vehicle	0.2	41	95	0	3	6
Fuel cell electric vehicle	0.0	0.9	9	0	0.1	0.6
Total	637	1,519	1,519	100	100	100

Conclusions

Strong policy in fuel economy reguration and high efficiency vehicle promotion can deliver a crucial reduction of energy consumption in the transport sector of APEC region. To do this, vehicle fuel economy standards and labelling must be implemented throughout APEC region in the short-term period and vehicle fuel economy standards must be upgraded every few years to ensure higher energy saving. By implementing the mentioned high fuel economy improvement policies, energy demand in the transport sector can be curbed and the peak is occurred earlier than that would be happed by our existing efforts.

References

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