Thailand's Low Carbon Land Transportation– The AIM/Enduse Modeling

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Introduction – The Thai transport sector is vital to the CO_2 emission mitigation targets of Thailand as a country. In addition to this, a sustainable transportation sector is vital in enhancing energy security of Thailand, since 60% of the imported oil is used by the transport sector. The objective of the poster is to model the Thai land transport sector using AIM/Enduse, in a way which is as representative as possible of the actual situation.

Scenario setting – In addition to the BAU case, a control scenario (named CM) which includes all the counter-measures (CMs) along with three designed LCS scenarios, named LCS_Low, LCS and LCS_High are analysed. The LCS scenarios increase in the intensity and penetration rates of the CMs. In addition to this, Emission Reduction Target (ERT) and Emission Tax (ET) scenarios are also run. ERT30, ERT40 and ERT50 give a reduction of 30%, 40% and 50% respectively, in comparison to BAU in 2050. ET of 50 USD/t-CO_2, 100 USD/t-CO_2, 200 USD/t-CO_2 and 500 USD/t-CO_2 are also analysed.

The CMs included in the design of the system are classified into three categories which are advanced technologies, modal changes and fuel switching. The advanced technologies are higher efficiency vehicles, hybrid vehicles, plug-in hybrid technology and electric vehicle technology. Modal switching involves changes from private passenger travel modes to public modes. The fuel switching CMs are the biofuels and blended fuels being introduced into the fuel mix of the transportation system.

Results – The highest cumulative reduction of 1,344 Mt-CO_2 is given by ERT50 scenario, followed by LCS_High scenario with a cumulative reduction of 1,228 Mt-CO_2. Yet, the interesting point of analyses is the trend of CO_2 emissions, which in the LCS_High scenario shows a peak around the 2030s and then shows decline. This feature is not visibly present in the ERT50 scenario. Another interesting aspect to note is the change in the transportation system and in the travel demand supply in the LCS scenarios which move away from private travel means to public travel means, where as in the ET and ERT scenarios, the change is not abjectly visible. The reduction in the year 2050, in the LCS_High scenario is 65 Mt-CO_2, which is approximately 54% lower than in the BAU case in 2050.

Conclusion – Whilst all the scenarios analysed provide mitigation in terms of CO_2 emissions, it makes greater sense to also analyse the general trend of energy consumption and CO_2 emissions. The designed LCS scenarios of LCS and LCS_High scenarios show a decreasing trend of CO_2 emissions, which leads to a decoupling of emissions and travel demand. Whilst it should be acknowledged that they are highly ambitious scenarios, the increase of sustainability of the transportation sector should also be considered while emission mitigation is being discussed in the transportation sector. A more public transport oriented transport sector is more feasible in the longer term for sustained emission mitigation, along with higher productivity and enhanced energy security.