Health impacts from the changes in carbon and TRAPs emissions in the projected electric vehicle growth scenarios in Malaysia

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Emissions from the road transport is the second largest contributor to the total carbon dioxide emissions in Malaysia at 21% in 2016. Motor vehicles also contributed over 70 % of air pollution in the urban areas. Transport-related air pollutants (TRAPs) such as NOx, SO2, NH3, and particulate matter pose significant threats to the urban population's health. Electric vehicle (EV) is an innovative transport technology that has emerged over the past decade with zero tailpipe emissions. Malaysia has targeted to deploy 885,000 EV cars on the road by 2030 in the Low Carbon Mobility Blueprint. This study aims to quantify the health co-benefits of electric vehicle adoption from their impacts on air quality in Malaysia. Two EV uptake scenarios were modelled, i.e. Low Carbon Mobility Blueprint (LCMB) Scenario, and Revised EV Adoption (REVA) Scenario up to 2040. Under each uptake scenario, baseline and four electricity generation mix scenarios were set considering the potential transition in the electricity power sources in Malaysia. We used comparative health impact assessment to estimate the potential increase or decrease in burden of diseases (BoD) from the emissions in each scenario. Intake fractions were used for converting emissions to ambient exposures, while local exposure-risk functions were used to calculate the burden from respiratory diseases (PM2.5, NOx, SO2, CO), cardiovascular diseases and lung cancer (PM2.5). Results showed that along with a net reduction of carbon emissions across all scenarios, there would be reduced BoD (DALYs-Disability Adjusted Life Years) from NOx and SO2 by -72 to -531 DALYs per 1,000 population, and increased BoD from PM2.5 and CO by 1 to 94 DALYs per 1,000 population. The scale of reduction in BoD is significantly larger than the scale of increase, indicating potential net positive health impacts from the electric vehicle adoption in the scenarios. The cost savings from the reduced BoD of respiratory mortality could reach up to RM 22 billion per year in 2040.

Dr Kwan has a background in Environmental and Occupational Health before pursuing her PhD in Community Health. Previously, she was a program specific researcher at the Center for Southeast Asian Studies (CSEAS) in Kyoto University, Japan, before her attachment with Universiti Kebangsaan Malaysia (UKM). She specializes in quantifying health co-benefits and impact assessments of climate change mitigations in transport sector. She also studies the effects of spatial built environment on non-communicable diseases, including cardiovascular and mental health in cities. In her recent work, she looks into the child sensitivity of national policy frameworks in response to the impacts of climate change and environmental degradation. She is also involved in consultancy projects with the industries.