

Effects of Thermal Properties of Aggregate Materials on Energy Consumption and Ghg Emissions of Transportation Infrastructure Assets Construction: Case Study for Japan

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Abstract : Transportation infrastructure assets can be considered as backbone of transportation system. They are routinely developed and or maintained which can be used effectively for movement of passengers, commodities and providing vital services. However, the infrastructure assets construction, maintenance and rehabilitation significantly depend on non-renewable natural resources, such as carbon-based energy carriers and aggregate materials. In this study, effects of thermal properties of aggregate materials were characterized for production of hot-mix asphalt in Japan, as a case study. The results indicated that incorporation of the aggregate with lower required heat energy significantly reduces fuel consumption greenhouse gas emission, irrespective of physical property of aggregate. The results also clearly showed that as 75% high-energy limestone is replaced with low-energy limestone in producing an asphalt mixture at 180 °C, 97,879 Japanese households would be energized per annum using the saved energy without any modification in the current asphalt mixing plants.

Keywords : zero energy infrastructure, sustainable development, greenhouse gas emission, asphalt pavement

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