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Entitled

Assessment of Carbon Emissions of Road Projects and Development of a Framework for Carbon Footprint Calculation of Roads in the City of Abu Dhabi

by

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Abstract

Climate change has become a global issue affecting the environment and human health. Transportation is a major contributor of greenhouse gases (GHG) emissions, with road transport being responsible for more than half of these emissions. The main objective of this thesis was to estimate the carbon footprint associated with road projects in the city of Abu Dhabi following a comprehensive approach that considers all activities within the life cycle of roads. Three cases were considered including, Al Rahba City internal road network, the upgrading of Al Salam Street, and the widening of the Eastern Corniche Road. A carbon footprint estimation model (referred to as RoadCO_2) was developed to estimate GHG emissions of the three road cases. The methodology suggested by the Intergovernmental Panel on Climate Change was adopted in constructing the model. Results revealed that the total emissions from the construction of the investigated road cases are about 43, 292, and 16 thousand tons CO_2eq, respectively. Equipment used in construction contributed about 70%, 15% and 21% of the emissions of the construction phase, respectively. The rest of the emissions during construction originated from the use of construction materials and their associated transport. Upgrading of Al Salam Street project produced the highest emissions from construction materials due to the construction of a tunnel. Annual total emissions during the operation phase of Al Salam Street was estimated to be over 10**8** thousand tons CO_2eq/yr, whereas emissions during the operation phase for Al Rahba City internal roads were about 15 thousand tons CO_2eq/yr, and those for the Corniche Road were 91 thousand tons CO_2eq/yr. For the three cases, emissions were generated mainly during the operation phase (94% or more), with the main contributor being vehicle movement, followed to a lesser extent by street lighting.

Keywords: Carbon footprint, Greenhouse gases, Road projects.