Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2020-63
Project Title:	Spatial and temporal variations of oxygenated volatile organic compounds (OVOCs) and their ozone formation potential (OFP) in Hong Kong
Principal Investigator:	Dr Ho Kin Fai, Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong
Total Approved Grant:	$976,500
Duration:	1/4/2021 to 31/8/2023
Project Status/Remarks:	Completed
Project Scope:	The aim of this project is to determine the spatial and temporal variations of OVOC and to estimate their ozone formation potential in Hong Kong. In Hong Kong, the unhealthy ozone (O_3) level has been increasing over the past 20 years. This problem can only be understood and solved with a thorough understanding of the source emissions, transport, chemical transformations of their precursors (oxides of nitrogen, carbon monoxide, and VOCs). OVOCs belong to the large family of VOCs present in the global atmosphere. These compounds include carbonyls, alcohols, acrylates, ether, and acetates. However, limited observations of OVOCs in Hong Kong and Greater Bay Area have been made. In this study, OVOC levels will be determined in order to investigate their spatial and temporal variations in urban and roadside environment of Hong Kong. The quantification of relative contributions of primary and secondary sources of OVOC will be determined by regression analysis. The Maximum Increment Reactivity values will be adopted to estimate the OFPs of different OVOC species. The results and implications from this study can help the local governments to take efficient O_3 control strategies, which are of urgent need for their current VOC control practice.
Summary of the Findings/Outcomes:	Oxygenated volatile organic compounds (OVOCs) are complex compounds present in the atmosphere, originating from direct emissions or formed through photochemical reactions of hydrocarbons. They play a crucial role in O_3 production, making it essential to determine their concentration levels, evaluate their O_3 production potential, pinpoint the key species involved in O_3 formation, identify and mitigate OVOC sources. These steps are crucial for developing more effective measures for managing O_3 levels. In this project, we conducted a comprehensive analysis and comparison of various OVOC characteristics at urban and roadside sites during the summer and winter seasons. The results revealed higher urban OVOC levels and greater ozone-forming potentials compared to those observed at roadside sites. Non-combustion sources, such as vehicle evaporation and volatile chemical products, were identified as dominant contributors to OVOCs. Their influence was more pronounced during the summer than the winter at both sampling sites. Therefore, implementing robust emissions management strategies for non-

	combustion sources, including measures to control fuel evaporation and regulate volatile chemical products, holds the potential to significantly reduced OVOC levels and their associated O_3 formation potential. Such reduction would be instrumental in mitigating O_3 concentrations and improving air quality.