Water bus emission factor model in Venice area

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Human activities in urban areas strongly affect air quality. In order to characterize the main sources, emission inventories are requested by legislation. The water cities, in particular, need an appropriate regulation that take into account boats and ships for inland waters. The general concern for the impact of air pollutant emissions on the environment has led to the introduction of numerous regulations targeting land based emission sources. In contrast, marine emissions to the air from ships have largely been exempt from this development. Over the past decades, however, the air emissions from shipping have been the subject of increasing attention. Research and development efforts have focused on characterizing the problem at hand (Lloyd's Register Engineering Services, 1995; Cooper et al., 1996; EMEP, 2009) and offering suitable abatement solutions (Swedish Maritime Administration, 1994; Cooper and Andreasso, 1999). In the wake of these advances, regulatory work on a global scale is being dealt with by the International Maritime Organisation (IMO, 2002). Despite this some specific scenarios could not be considered because of their peculiarity. Venice, as a *water town* in its historical part, is a very distinctive case where transport is supplied by marine systems. In the historical center the canals serves as roads and beyond the road/rail land entrances at the northern edge of the town, transportation within it remains entirely on water or on foot. Venice is the largest urban car-free area of Europe. The main transportation means are motorized public and private boats. In order to better investigate on the impact of these vehicles on the Venice area, an emission factor model was implemented: *Water Bus Emission factor Model (WATERBUS)*. The WATERBUS model was developed using a bottom-up approach and tested on the public ACTV boats that furnished the data. The preliminary results were obtained and compared with local measurements.

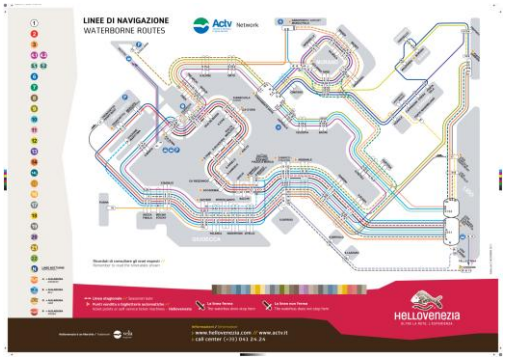

Figure 1. Water bus transport plan (ACTV).

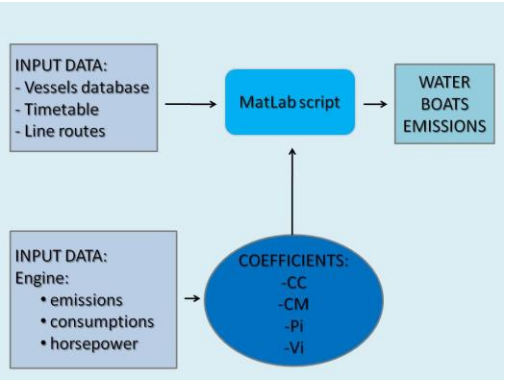

Figure 2. Flow chart of the waterbus model.

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