Supplementary materials

The Energy and Carbon Footprint of an Urban Waste Collection Fleet: A Case Study in Central Italy

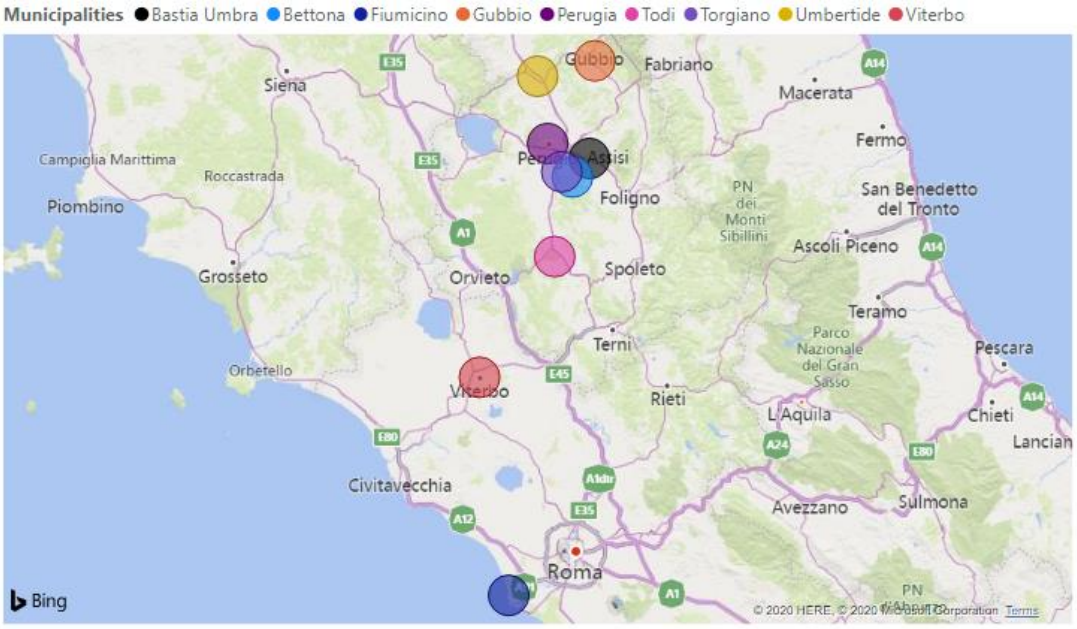

Figure S1. Municipalities served by the MSW collection fleet.

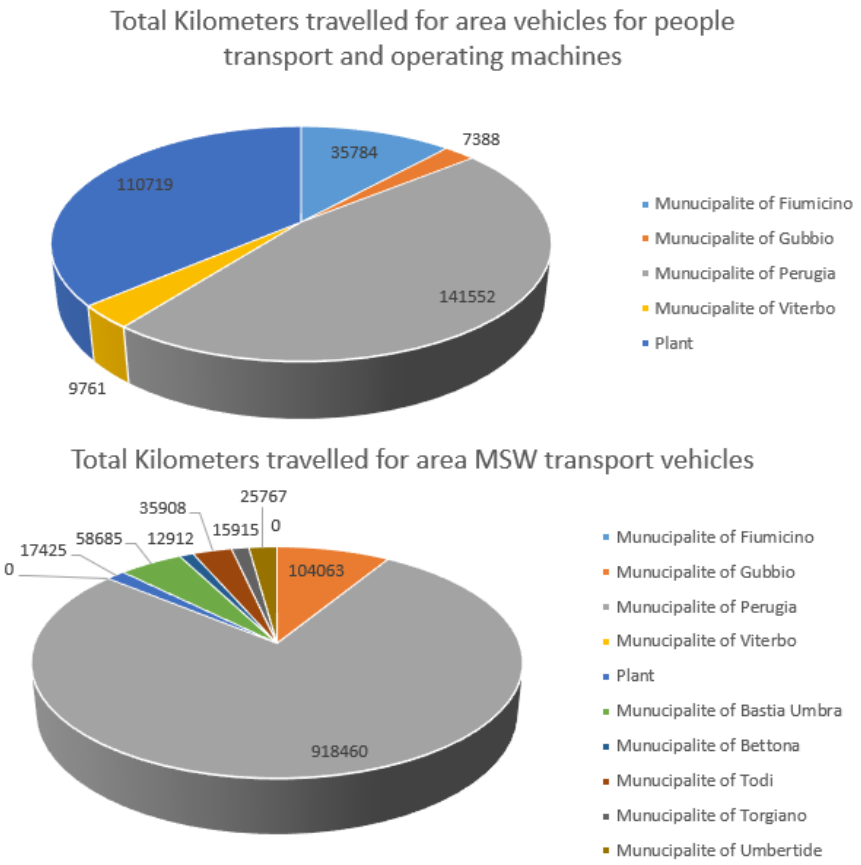

Figure S2. Kilometers travelled by: 1) vehicles for people transport (cars and trucks) and operating machines; 2) MSW transport vehicles. Vehicles travel in different areas of Central Italy. By dividing the categories of vehicles into vehicles: 1) for people transport (cars and trucks) and operating machines; 2) MSW transport vehicles, the following Figure shows the number of kilometers traveled by each category of vehicles in the served Municipalities and plants.

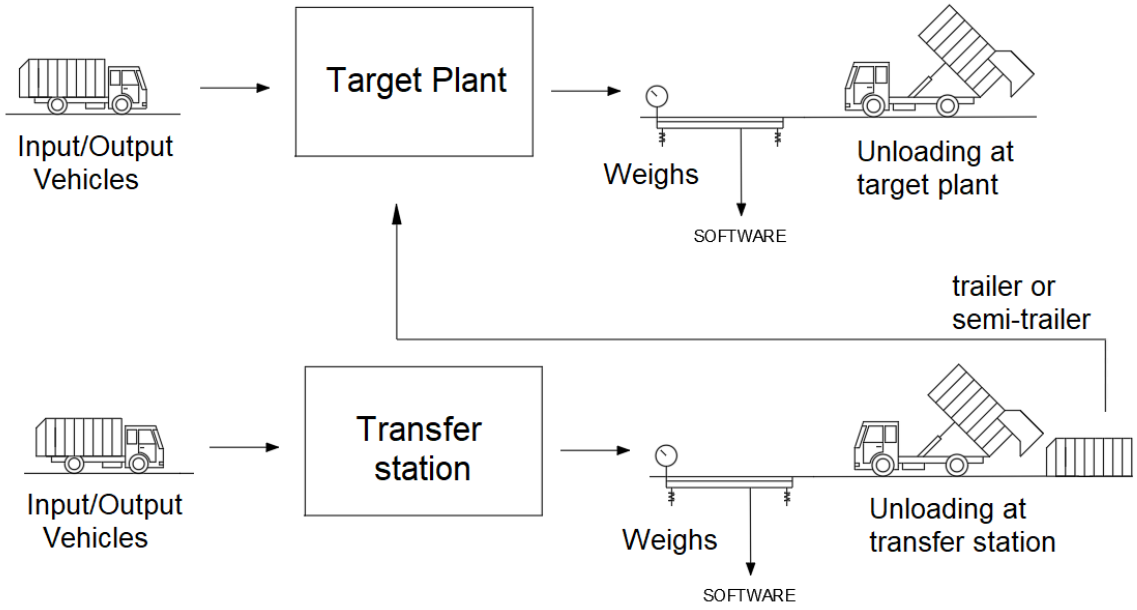

Figure S3. Waste routes.

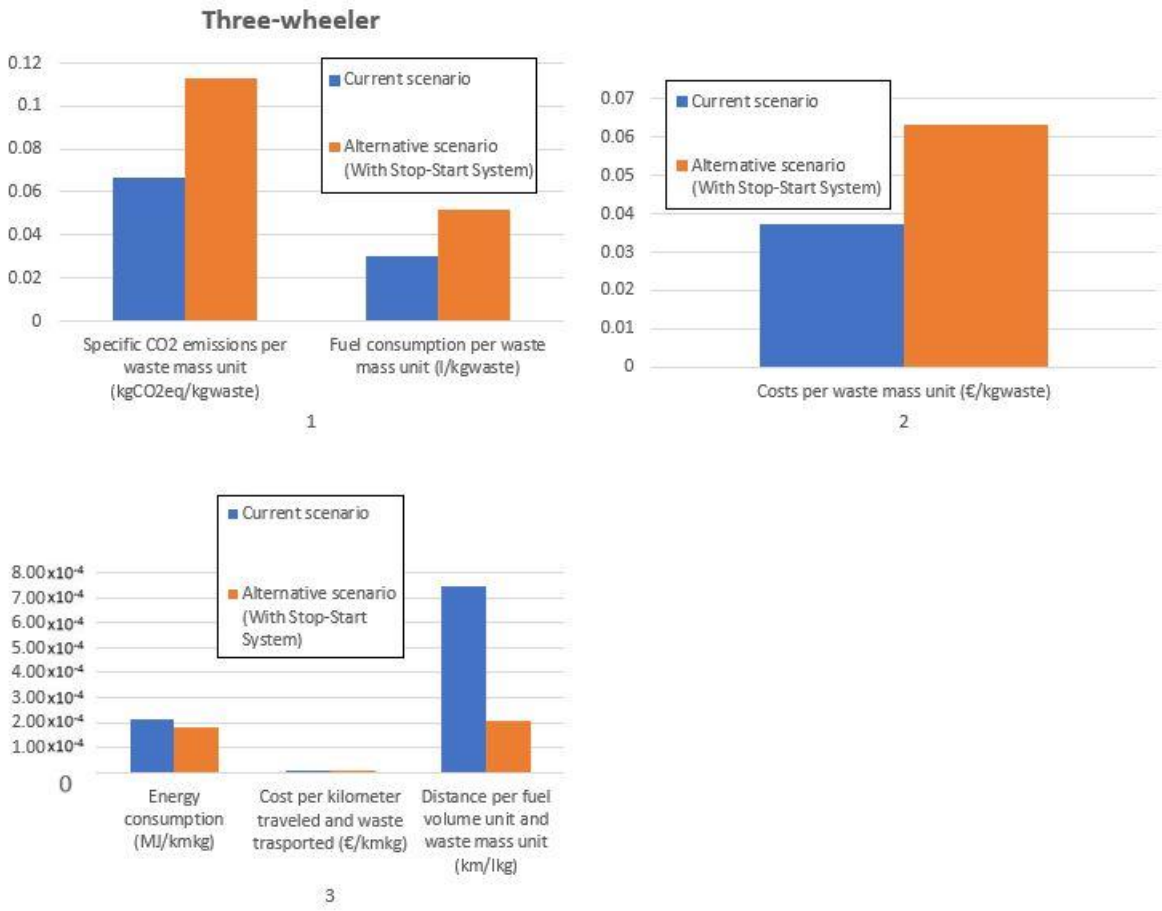

Figure S4. Comparison between the current scenario and the alternative scenario (with Stop-Start System) – Three-wheelers - (Graph 1: specific CO_2 emissions and fuel consumption per waste mass

unit, Graph 2: specific costs per waste mass unit, Graph 3: specific energy consumption, costs and distance)..

Table S1. Chemical-physical properties of fuels.

Properties	Gasoline	Diesel	LPG	CNG
LCV [MJ kg^{-1}]	42.82	42.78	46.13	50
Density [kg l^{-1}]	0.74	0.84	0.56	0.00072
CO_2 [kg_{CO2eq} l^{-1}]	2.203	2.688	1.519	0.00197
CO_2 [kg_{CO2eq} kg^{-1}]	2,97	3,19	2,712	2,746