

Assessment of Food Waste Generation in China's Dining Scenarios and Its Environmental Implications

¹Yueyao Song, ¹Feng Zhu, ¹Chi Zhang, ²Dianlei Liu, ¹Shizhao Zhang, ¹Tianhang Li and
¹Jianguo Liu

¹*School of Environment, Tsinghua University, Beijing, China*

²*Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China*

Abstract

This study rethought the food waste in China, highlighting that the edible portion of cooked food waste (EFW) is the real food waste. Surveys revealed that EFW amounts for restaurants, takeaway services, canteens, and household meals were 84.6, 57.5, 60.4, and 24.6 g/(person-meal), respectively. The percentages of EFW in food waste (FW) generated per person per meal in the four scenarios were 50.5%, 52.2%, 47.2%, and 27.6% respectively, suggesting that EFW is not synonymous with FW, but significantly lower. Restaurant dining waste has decreased compared to the average waste of 93.0 g/(person-meal) in the 2018 China Urban Dining Food Waste Report, indicating that the implementation of *Anti-Food Waste Law of the People's Republic of China* has achieved initial results. Greenhouse gas (GHG) and typical pollutant emissions were assessed for the four scenarios, with emission patterns consistently ranking as restaurant > canteen > takeaway > households. GHG emissions per person per meal in the four scenarios ranged from 52~185 g CO₂-eq, photochemical oxidant formation potential varied from 28~388 mg NMVOC-eq, and particulate matter formation potential spanned from -15~203 mg PM₁₀-eq. In terms of the overall EFW generation process, the processing and cooking segments were the key GHG and environmental pollutant emission segments for the four scenarios, while the procurement, transportation, storage, sales, and distribution segments had less environmental impact. With respect to residual food disposal, the management of FW from restaurants and canteens is relatively standardised, where all FW can be collected and transported centrally for oil and grease extraction, followed by entering the anaerobic digestion treatment process. FW generated by takeaway services and households is sorted into anaerobic fermentation or industrial composting treatment systems in regions where waste classification is more effective, but this has not yet been achieved nationwide. Finally, we recommend that China should initiate a more extensive and continuous monitoring project in the future, establish artificial intelligence-based monitoring platforms in representative regions, and create a network for monitoring FW. Additionally, a hierarchy of FW management in China should be established as soon as possible. This hierarchy would clarify the types, sources, and amount of FW that are

appropriate for each level and quantify the corresponding FW reduction and recovery potential.

Keywords: Food Waste; Carbon Neutrality; Life Cycle Assessment; Environmental impact; Challenges and Perspective

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