

## **Critical Thinking Questions – Solid Waste Collection**

### **I. Introduction to Solid Waste Collection**

1. Describe the size of the solid waste collection industry in dollars. What are the major companies operating solid waste collections? Which companies operate in your city? What is the trend for growth in solid waste collection? Could be done as short answer or as a One Sentence Summary of who does what to whom, when, where, how and why? (see below for classroom activity suggestions).
2. A Garbage Timeline provides a history of activities related to solid waste management in the U.S. Select one point in the timeline and research it further. Write a summary describing this aspect of solid waste history
3. Describe publically operated solid waste collection and privately operated solid waste collection. What are the advantages and disadvantages of each? Describe the collection model used in your city.
4. What are the important variables to be considered with respect to solid waste collection. How do global collection rates vary by income level and region?
5. Emerging issues in solid waste management: Two emerging issues in solid waste collections are the impact of yard waste bans on solid waste collection activity and driverless vehicle technology. Develop a pro con grid on one of these topics. (this could be expanded to include many other emerging issues – these are just two examples)

### **II. Solid Waste Collection Vehicles**

1. Compare the following types of collection vehicles in terms of type of waste collected (commercial, residential); size of vehicle for waste collection; cost; degree of automation.
2. What are some advantages of automated or semi-automated waste collection over manual waste collection? What are some disadvantages?

### **III. Characterization and Modeling of Solid Waste Collection Systems**

1. How do various collection vehicles differ in terms of collections operations, both in terms of time or distances traveled
2. Using your collections model, provide the number of vehicles and the number of person-hours per week to collect solid waste in your community
3. Use your collections model and data on emissions from collection vehicles to estimate GHG emissions from waste collection activities
4. Conduct a sensitivity analysis on your model, what input variables resulted in the most significant change in your predictions for numbers of vehicles and person-hours?

#### **IV. Alternative Fuels and Emissions from Solid Waste Collection**

1. What is the average fuel efficiency for front loader, side loader and roll off collection vehicles? How does fuel efficiency compare for CNG and diesel fueled vehicles? What percentage of the current solid waste fleet is using alternative fuels?
2. Compare emissions for front, side and roll-off vehicles for both CNG and diesel-fueled vehicles.
3. Compare and contrast the following fuels for solid waste collection: diesel, natural gas, biogenic (LFG), and hydrogen in terms of environmental factors, security, operational issues, and financial issues. Which fuel option do you think is best for solid waste collection vehicles?