

EVIDENCE-BASED PRACTICES FOR SUSTAINABLE SOLID WASTE MANAGEMENT IN A DESERT CITY (PHOENIX, AZ)

INTRODUCTION

The City of Phoenix has aspired to divert at least 40% of waste from the landfill by the year 2020. With increasing climate change impacts from greenhouse gas emissions as well as health hazards and pollution associated with solid waste land-filling, the need to transform how we view and use waste is as pressing as ever. This case study was developed as an initial report to inform such strategy development for Phoenix. We present here an overview of best practices from around the world of cities that have achieved inspiring rates of waste diversion, an initial list of indicators and sustainability targets to help the track its future progress towards goals, and future recommendations for the city of Phoenix.

The climate of Phoenix as desert city poses issues for waste practices such as composting, challenges that have not yet been addressed in similar cities in the US Southwest. These types of challenges are difficult to address in our scope of work but we see Phoenix as potentially becoming one of the most innovative cities to address such challenges.

BEST PRACTICES

There are several best practices from municipalities that can be discussed in relation to the challenges the City of Phoenix faces. Undoubtedly, the most successful cities in terms of diversion and in encouraging residential and private sector recycling have all passed comparatively stringent measures for their populations. Recycling mandates have been passed in leading cities such as San Francisco, Seattle, and San Diego. The West Coast leads these efforts, have been highly committed in terms of policy. Plastic bag bans, Extended Producer Responsibility and more have all been symbolic and practical commitments made by these cities. However, even progressive cities have received some measure of opposition to these stringent municipal decisions. The City of Phoenix may not have as favorable of a political climate, so it is difficult to apply such models to the culture of the local area. However, mandates are always accompanied by a strong base in education and service offerings by the city. Mandates serve to reinforce a culture which already exists for adopting cities.



Figure 1. Phoenix recovery facility (Photo: City of Phoenix Department of Public Works)

Mandates can also be progressive and begin with the more stringent regulation of large commercial entities, based on either the number of employees or the amount of waste produced. For example, the City of Chicago requires businesses to comply with a recycling threshold in order to receive a permit. Introducing regulation this way may be more favorable compared to the mandates leading cities have passed, which may be seen as too radical for Phoenix.

This being said, public-private partnerships as well as incentives for the private sectors are offered in progressive areas as well. It is important to provide meaningful incentives for commercial entities, as well as the means for businesses to easily access city recycling services. Business recognition programs, grant funding, auditing services and free assistance are commonly offered by cities with high diversion rates. Free recycling services to businesses that comply with certain ordinances are also strong incentives. For example, the state of California used to have a grants and funding system for commercial industry.

In terms of technology, cities have taken different approaches in sorting black bin waste as well as blue bin waste. However, it is much more conventional to sort recyclables only. In addition, several waste to energy and advanced thermal technology (ATT) plants have been constructed in cities around the world. These are also quite popular in Europe. In addition, since the City of Phoenix has recently launched a pilot program for organics, examining models such as San Jose's food waste to energy facility would be helpful for long term planning. Investigation on such a facility's applicability to Phoenix's specifications would have to be completed.

GOAL	INDICATORS
Equitable governance in SWM systems	User /provider inclusivity Institutional coherence
Environmental control and protection SWM systems	Controlled Disposal Greenhouse Gas Emissions (GHG) of SWM systems
Protection of public health and access in SWM systems	Households with three-tier collection service Commercial facilities with access to composting facility
Focus on resource management and value in SWM systems	Source Reduction Waste Contamination Waste Diversion

Table 2. Goals and indicators for sustainable solid waste management (SWM) systems (Adapted from Wilson et al. 2014)

The best practices for managing food waste in more sustainable ways for the city of Phoenix include targeting upstream and downstream practices. Upstream practices include conducting waste characterization assessments, establishing standard operating procedures for restaurant disposal¹, and seeking collaborative partnerships with donation agencies for excess food. The state of Massachusetts² as well as New York City have developed similar voluntary programs for supermarkets, stadiums and arenas to donate excess food to needed services³. Incorporating food waste in existing yard waste composting facilities has also been undertaken by various cities in developing a food waste program. This type of retrofitting has been undertaken by Portland and San Diego. The phased development of the "Green Organics Curbside Collection" program in Phoenix could provide a platform for such an integration to be implemented to address food waste throughout the city.

Best management practices for education and outreach to community residents include elementary educational programs, annual specialty recycling events, community composting centers, and public-private partnerships. For outreach and education for the business and private sector, many of the case comparison cities provide assistance programs for businesses as well as exemplary policies for city buildings and departments. Cities such as Los Angeles and Toronto engage in public-private partnerships to provide waste characterization studies as well as support for zero waste or waste reduction strategies for businesses and health facilities.

To reduce contamination, targeted education has worked for cities such as San Jose, Los Angeles and San Diego. In general, there should be a dual focus on behavior change and education, with continual reporting from any MRF processing facilities to gauge success.

INDICATORS AND TARGETS

Given the complex, integrated nature of sustainable waste management systems, assessing the sustainability of a current system or planning for a future system cannot be done with only looking at diversion and contamination rates for waste. Using these rates as the primary and only indicators to track progress does not address waste reduced at the source (upstream drivers) as well as additional drivers in the system (such as access to service, user/provider inclusivity in the SWM systems, and the degree to which reduction of solid waste is a priority for local governments)⁴. We provide in Figure 2 a list of compiled indicators to help assess the sustainability of waste management practices for Phoenix in the future⁴. The indicators were selected to address a set of goals for sustainable waste management. These goals and indicators are based on a review of scientific literature and reference documents.

CORRELATION BETWEEN CONTAMINATION AND DIVERSION

Cities with high diversion levels have struggled with reducing contamination. Stringent regulation and programs such as Pay as You Throw, less frequent garbage collection, and smaller black bin containers for garbage may result in high contamination rates, as well as illegal dumping. These issues can be mitigated somewhat with education initiatives. New programs and technologies are often met with higher rates of contamination until residents are able to adjust.

RECOMMENDATIONS FOR PHOENIX

Moving forward, the city of Phoenix would be best suited to pursue public-private partnerships in moving towards the city's "40 by 20" goal. Given the political environment of the Valley, a cultural shift in how the city and its residents view waste is essential to this program's success. Focus should be put on building a strong infrastructure of programs geared towards increasing diversion and decreasing contamination. Public-private partnerships can provide the city spaces for collaboration and innovation between government and businesses. Such partnerships can also provide strategies for addressing issues such as food waste and educational outreach. Some of the most challenging barriers in addressing waste streams throughout the city include the political environment as well as community and resident perceptions of issues of waste. In addition to providing economic incentives on a commercial as well as residential scale, education and outreach provide the most promising coping strategies for overcoming these barriers.

1. EPA. (2013). Shopping for Change: MassDEP Supermarket Recycling Program.

2. Food Waste Reduction Alliance (2014). Best Practices & Emerging Solutions Toolkit. Food. Marking Institute, Grocery Manufacturers Association, & National Restaurant Association.

3. Science Applications International Corporation. (2000). NYC WasteLe\$\$ Report.

4. Wilson, D; Rodic, L; Cowing, M; Velis, C; Whiteman, A; Scheinberg, A; Vilches, R; Masterson, D; Stretz, J; Oelz, B. (2014). 'Wasteaware' benchmark indicators for integrated sustainable waste management in cities. *Waste Management*.