Can Compostable Products Help Spokane Become More Sustainable?

A Report on Sustainability Studies in the Netherlands

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Summary Paragraph/Abstract

As Spokane grows and the undeniable effects of climate change have rattled this community in recent years an increased focus on sustainable development is more important than ever. Proper planning and integration of sustainable solutions are vital for cities as the effects of climate change take hold. This integration into every fiber of a city makes Civil Engineers vital to the changes needed to make cites resilient. Using the Netherlands as a case study, Municipal Solid Waste (MSW) was targeted for Spokane to help reach target carbon dioxide emission goals and further the ability of the city to manage the road ahead. Specifically, a suggestion to draft legislation for the residents to vote on to decrease the amount of greenhouse gasses (GHG) emitted by the Spokane Waste to Energy plant (WTE) by requiring five categories of single-use items be compostable. A vote is suggested to ensure rapid implementation and reduced pushback. The five suggested item categories are:

1. Utensils
2. Straws and stirrers
3. Beverage lids
4. Cups (hot and cold), plates, and bowls
5. Takeout packaging

An alternate solution of incentivization for businesses was also provided. Either of these solutions help the City improve its readiness by reducing costs allowing for redirection of funds to other high-risk areas, ensuring a local supply chain for compost to grow food and reduced GHG emissions.

Chapter 1 – Cities and Sustainability

What is sustainability?

The 1987 definition from a John Ayers reading defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their needs" (Ayers, 2017). When looking at a city, one must consider the three pillars of sustainability, or the three 'Ps" (people, prosperity, and planet). Ultimately, because the other two are encompassed within it, the planet "P" or the environment is something not measured by the 1987 definition. Without a healthy environment it's hard to call something sustainable or healthy, given that we live in that environment any degradation of it impacts the ability of future generations to meet their basic needs (Ayers, 2017). Analogous to a fish in a tank, if you add a toxin slowly, it's only going to kill the fish once it reaches a certain threshold. Before this level it may have other effects, like affecting the ability of a given fish species to reproduce, thereby impacting future generations. A succinct way of thinking about this is 'Living in harmony with the planet and nature'.

Resiliency is also a factor in this. A city that is prepared for things that are potentially coming its way is more likely to be financially stable and more able to support its citizens when emergencies, natural disasters or climate change occurs. The fiscal stability of a city is also a crucial factor in resiliency as cities have a limited amount of funds to raise from their tax base. Using these resources appropriately to expand and support the city versus rebuilding the same infrastructure that keeps getting destroyed is part of the sustainability of a locale.

What can cities do?

Sustainability is important at a city level for a variety of reasons. Individual cities will have unique problems to face that a larger government policy may not adequately cover. For example, a coastal city like Seattle is looking at the limiting resource of space and the necessity to use vertical space appropriately and prepare for the possibility of rising sea levels due to climate change. Whereas a city like Spokane has a limited resource of water, for drinking and irrigation, they must continue to look at ways to incorporate resiliency in planning, as far as drought and heat tolerances goes because of environmental changes. Looking at just these two

cities you can see why a federal policy, or a state level policy may not address the concern of one city versus the other and is important to incorporate at a city level. A broad-brush approach could leave them completely unprepared and in effect due to economic and time constraints hamper the sustainability of an individual city. It is also important to note that we saw in the movie Urban Green that both a top down and a bottom-up approach can be effective ways to institute policy changes. (Urban Green, 2016) It is important for cities to view themselves as part of the greater ecosystem and stay sustainable for water, food, and energy. To track of an ecological footprint, one must look at a larger scale because regional differences like grocery or energy supply chains can vary so greatly. At a local level people also have more buy-in, so getting involvement from the community in a top-down approach is more practical. Just as passing the threshold in a bottom-up movement happens faster as well.

Why is action needed now?

In the next 30 years it's estimated that the urban population will double (Urban Green, 2016). Civil Engineers (CEs) need to use today's resources wisely to prepare for the future, if made or used in an unsustainable manner, A city or region may be too far behind the curve to persevere. Three key actions for cities to lower their impact and be more sustainable are to:

- Try to become low carbon, with less fossil fuels reliance & more renewable energies.
- Become resilient to climate change based on locale (i.e., rising sea levels in Seattle, drought, and elevated temperatures in Spokane).
- Evaluate local biodiversity and see how that can help.

These three items are things Civil Engineers can have a huge influence on. For the structural engineer and engineering manager it can be building site location, development, or materials along with integrating biodiversity or other local resources into their site planning. An environmental engineer can affect this by evaluating local biodiversity and ensuring the city is taking care of the rivers or waters available. They can preserve them by controlling limiting nutrients and preventing future eutrophication, preventing other water pollution, or ensuring that the air pollution does not contaminate water supplies. For a traffic engineer it's integrating into the city planning low carbon transportation options while avoiding fossil fuels and incorporating things like bike lanes or mass transit especially if they can run on renewable energies.

Geotechnical engineers could be preparing for more extreme events when evaluating soil as it dries or become saturated. These steps can often be incorporated into the design process which is managed almost exclusively by the engineers and the stakeholders bringing forth plans that incorporate these ideas and is imperative in driving change.

The rest of this report will take a detailed look at Municipal Solid waste in Spokane and the Netherland to find ways for Spokane to sustainably improve in this area as desired in the Spokane Sustainability and Action Plan (SAP). Chapter 2 will explore waste in the US, Spokane and the Netherlands and illustrate the need for improvement. Chapter 3 will examine a specific example Spokane can take to improve its sustainability around waste. Chapter 4 will provide a conclusion and ways to use this report further. References will be in the final section for additional depth of knowledge if needed.

Chapter 2 – Waste diversion, Composting and Circular Economy

Waste Diversion & Material Conservation

Waste diversion and material conservation are important topics in developing sustainability in cities because they can have immediate fiscal impacts in the community along with the long-term benefits of reduced carbon output. The goal in Spokane, is #### defined as materials use, reuse and conservation, and environmental stewardship (Spokane Sustainability Action Subcommittee, 2019).

Waste In Spokane

`In 2018, the residents of Spokane County sent 310,677 tons of waste that was burned at the Waste-to-Energy (WTE) Plant incinerator, which is around 3.3 pounds per person per day. In

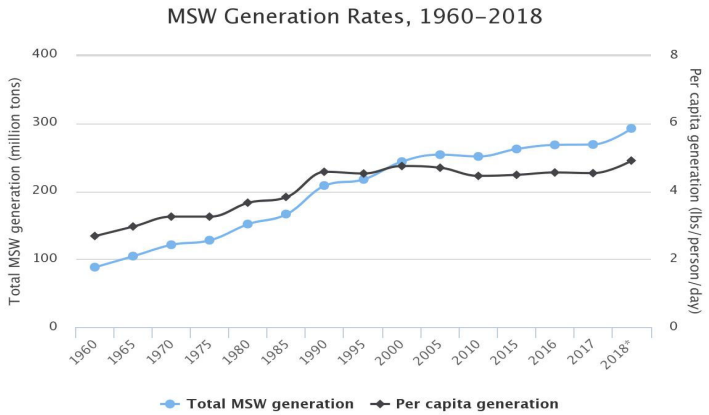

Figure 1. MSW Generation Rates (U.S. short tons & lbs./day), 1960 to 2018 (*(US EPA,*

2016 this resulted in 236,000 metric tons of carbon dioxide Greenhouse Gas emissions (GHG) (Spokane Sustainability Action Subcommittee, 2019). This number must be reduced to meet Spokane's GHG emissions goals. In Figure 1, it is shown the Municipal Solid Waste (MSW) generation in the US is almost two times higher than it was 60 years ago and trending upward. Based on Spokane's WTE per capita numbers it is safe to assume the per capita generation rate mirrors the 2018 national average. Approximately 1.6 pounds per person per day are diverted away from the WTE plant via composting or recycling currently.

To meet the City of Spokane's 2050 goal of a 95% reduction GHG emissions, waste diversion and material conservation sections are an important target reduction area as there is readily identifiable room for improvement here that can provide both environmental and economic benefits if transitioned to a more circular economy. In Figure 2, (MSW generation and recycling) its clear recycling helps recover some materials, but the WTE plant is not the best and highest use for some (~50%) of the remaining materials. Food waste, yard trimmings, part of the

Total MSW Generation (by material), 2018
292.4 million Tons (before recycling)

Total Recycling (by material), 2018
69.1 million Tons

Figure 2. US MSW generation and recycling.

remaining paper (often contaminated with food) and some of the wood all biological materials are better served by composting. This is because the energy and nutrient in these materials are not efficiently recovered by burning. It is a better use to keep the nutrients plants need to grow in our circular economy by composting to fertilizer. Table 1 shows that there is room to increase recycling and composting in all categories, except batteries where recycling statistics are a sign that we can reach prominent levels given the right circumstances and drive.

Table 1. Recycling and composting percentages by material 2018 *(US EPA, 2018)*

Paper and Paperboard	68%
Glass	25%

Plastics	9%
Yard Trimmings	63%
Lead-acid Batteries	99%

Spokane compared to the Netherlands

Looking at US EPA, Spokane's SAP recommendations & personal observations in The Netherlands, Spokane seems to be like the Netherlands as far as final MSW disposition goes sending what is possible to the WTE plane and the rest to landfill. Table 2 further details some notable differences between Spokane and The Netherlands regarding MSW.

Table 2: MSW clear differences between The Netherlands and Spokane

	Spokane	The Netherlands
Annual MSW production	1205 lbs. (Spokane Sustainability Action Subcommittee, 2019)	1131 lbs. (513kg) (Tiseo, 2020)
Final MSW disposition (Not recycled or composted)	WTE (primary) Landfill (secondary) (Spokane Sustainability Action Subcommittee, 2019)	WTE (primary) Landfill (secondary) (Rotterdam, 2019)
Personal responsibility for waste Generation	Unknown	Yes
Clear Facilities available in all neighborhoods	No	Yes
Packaging Legislation	• Plastic bag ban • XPS(Styrofoam) ban (eff. 2024) (WA State Department of Ecology, 2021)	• Plastic bag ban • SUP plastics ban • Extended Producer (NL Times, 2021) (NL Times, 2022)

With further examination, it is plain something else is going on. The people of the Netherlands, have come to view their waste stream as a resource. This comes either as saved energy resources or actual materials recovered. The Dutch are now embracing a circular economy. To help educate the public and get everyone onboard the city of Rotterdam put out an entire publication on circular economy goals in 2018 to raise and set citywide goals to move on from the linear, consume and dump economy model (Rotterdam, 2019). This seems to have educated people in the area and helped them Focus on waste, as a resource and seems to have shifted the publics' feelings on waste as well. An informal survey of vendors in Gouda, NL on market day yielded promising insight. The vendors primarily used paper bags and wrapped food items in waxed paper instead of plastic wrap or bags, an example from Delft can be seen in Figure 3. When questioned as to why the majority consensus (5/6) simplified to it is the right thing to do for the

Figure 3: Paper packaging for bulk candies bought at market in Delft, in Spokane a plastic bag would be typical

environment, the Dutch people want the world to know they care and are trying to prevent sea level rise (Personal communication, May 19,2022). The last part shows that they understand their dire position with 50% of their landmass less than 3 ft above Mean Sea Level (MSL) (Meijer, 2022). The lone dissenting voice cited sustainable packaging rules and lower costs of paper bags. Continued questioning also had the others talk about how the bag law may have slightly accelerated the decision for some, even though they started doing it before the deadline got too close.

Co-Benefits

The co-benefits of transitioning to a circular economy are many. The economic impacts would be first felt with a reduction in city spending for waste residual deposition and reduction of cost in resource procurements. By shifting our consumption habits, we could decrease energy expenditure for manufacturing processes reducing the need/demand for energy in our local markets. This would allow for its reallocation toward heating or cooling as climate change takes hold, increasing our resiliency to heat. The cost savings could free up resource to reduce hunger and food insecurities in our community as well (Spokane Sustainability Action Subcommittee, 2019). By reusing and reallocating our precious limited resources, on this planet and in our corner of the globe, we can reduce our impact on the environment and move closer towards a harmonious relationship.

Chapter 3 – Promoting and Diverting Compostable Single Use Products

A potential strategy seen in use in The Netherlands that the City of Spokane could consider to help meet their SAP goals is draft local ordinance for the people to vote on promoting the use of compostable packaging and foodservice ware. A five-category[1] reusable or compostable requirement (when provided) in Spokane for all businesses would help accomplish *Waste Diversion & Material Conservation* Goal 1, through Strategy 1, Priority Action WD 1.2 – "Promote and facilitate the use of compostable packaging and foodservice ware" (Spokane Sustainability Action Subcommittee, 2019). It is suggested this encompass dine-in and takeout options as well as breakrooms and cafeterias for maximum reach. The five suggested item categories are:

1. Utensils
2. Straws and stirrers
3. Beverage lids
4. Cups (hot and cold), plates, and bowls
5. Takeout packaging

Some of these items are illustrated in figure 4. Making these changes in Spokane is likely to have the following benefits:

[1] EPS (Styrofoam) containers/ coolers were left off this list as WA state already has a law in-place that does not go into effect until 2024) (WA State Department of Ecology, 2021)

- Reduce MSW cost by diverting single use items to compost.
- Reduce GHG emission and help keep valuable nutrients in circulation as compost, further reducing GHG emissions by reducing the need to buy fertilizer.
- Increase the availability of compost locally allowing for cheaper produce or increased urban canopy to reduce heat island effects. Thus, furthering the goal of supplying equity and Environmental Justice.

Figure 4: Suggested Items required to be reusable or compostable (Image Credit - WA Department of Ecology)

Another way to conduct the same thing without legislation is to incentivize business by offering reduced or free compost pickup if the businesses switch to the items on the list. These options are not unrealistic as they are already in place in the Netherlands. Figures 5 and 6 illustrate that an entire takeout breakfast for two with coffee or pastry snack can be packaged completely of compostable materials from the current supply chain. Adopting either strategy would move Spokane's toward a circular economy and away from a linear waste cycle by diverting this waste, through the green bin program, away from the WTE plant and towards beneficial compost. This is allowing for these products to be reused at a better and higher use than as bottom ash or in a landfill.

Figure 5: A takeout breakfast for two; all materials are compostable

Figure 6: Compostable packaging with a Dutch apple pie snack

In the Netherlands, the word "solidarity" is often cited as one reason culturally they have been successful in large scale adoption of change. This is the reason bicycles work so well and why the large dams they've made are also successful. This is European word that is not often used in American English, 'neighborly' is used instead. Spokane is a city of great neighbors that have pulled together many times before and continue to. Culturally speaking, Spokane is just as ready as the Netherlands to adopt drastic change when necessary and prudent. Americans in general however are used to a little more voice in their legislative processes making a vote of the people imperative if widespread adoption is wanted quickly. If this is forced upon people they may resist out of spite delaying and progress that could be made in the meantime.

Chapter 4 – Conclusions and Recommendations

Proper planning and integration of sustainable solutions are vital for cities as the effects of climate change take hold. This integration into every fiber of a city makes Civil Engineers vital to the changes needed to make cites resilient to the climate change we have as well as prevent the worsening of the situation. By using the Netherlands as a case study, Municipal Solid Waste (MSW) was targeted for Spokane to help reach target carbon dioxide emission goals and further the ability of the city to manage the road ahead. Transitioning to a circular economy and viewing our waste as a resource are key. By have endues in mind before using a product we can ensure highest and best use. Based on the Netherlands case study a suggestion to draft legislation for the residents to vote on was proposed. The purpose of this legislation is to decrease the amount of greenhouse gasses (GHG) emitted by the Spokane Waste to energy plant by requiring

that five categories of single use items be compostable for all business in Spokane. The five suggested item categories are:

6. Utensils
7. Straws and stirrers
8. Beverage lids
9. Cups (hot and cold), plates, and bowls
10. Takeout packaging

An alternate solution of incentivization for businesses was also provided. Either of these solutions help the City improve its readiness by reducing costs allowing for redirection of funds, ensuring a local supply chain for compost to grow food and reduced GHG emissions.

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