

SHC 7.2 - Supporting the Waste Measurement Program: Promoting Transparency, Quality, and Reproducibility

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Advancing Sustainable Materials Management: 2018 Fact Sheet

Assessing Trends in Materials Generation and
Management in the United States

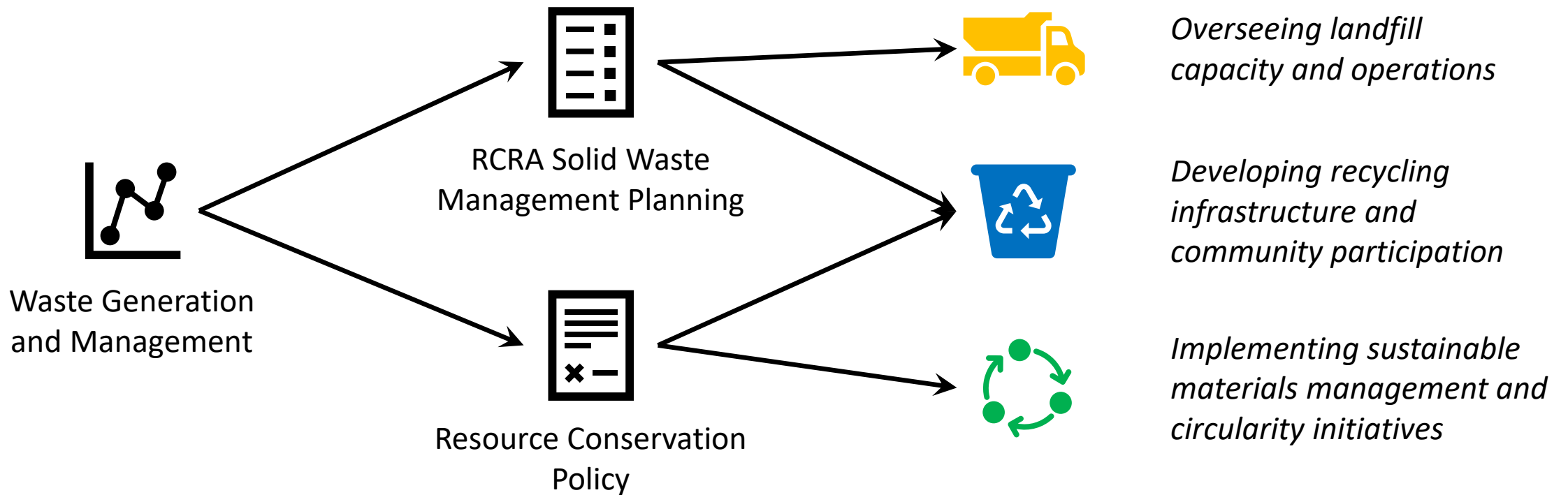


Disclaimer

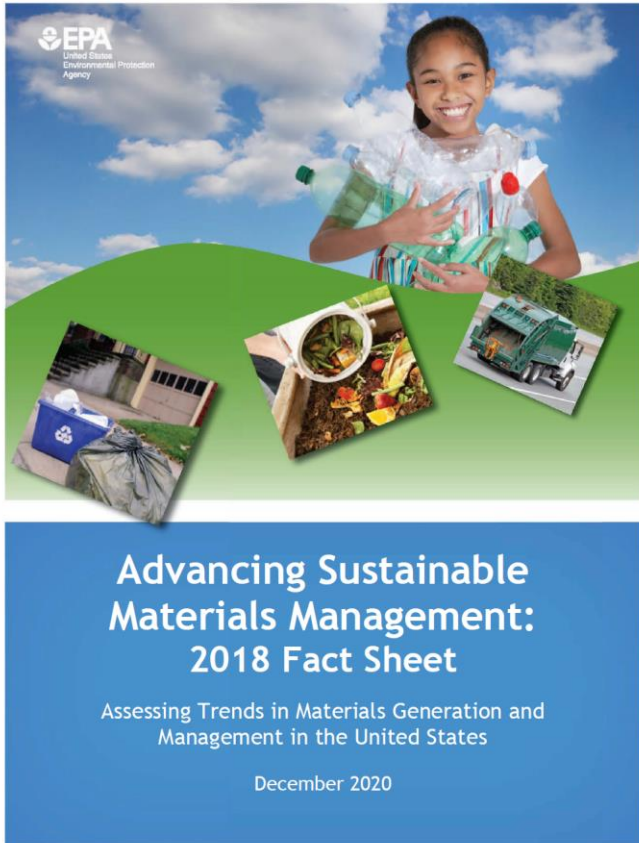
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Waste Measurement at EPA

- EPA's Office of Resource Conservation and Recovery (ORCR) provides national statistics on waste management to assist States and communities.



Communicating Waste Measurement: EPA's Facts and Figures Reporting Program



- National waste generation and management estimates from 1960-2018
- Historically focused on municipal solid waste (MSW) and includes 25 product groups involving 13 materials
- Recently developed stand-alone methods for construction and demolition debris (CDD) and food waste <Not included in report>
- Focus here on MSW with subsequent talks on research related to plastics (SHC 7.2) and food waste (SHC 7.4)

Waste Measurement Modeling Support (SHC 7.2)

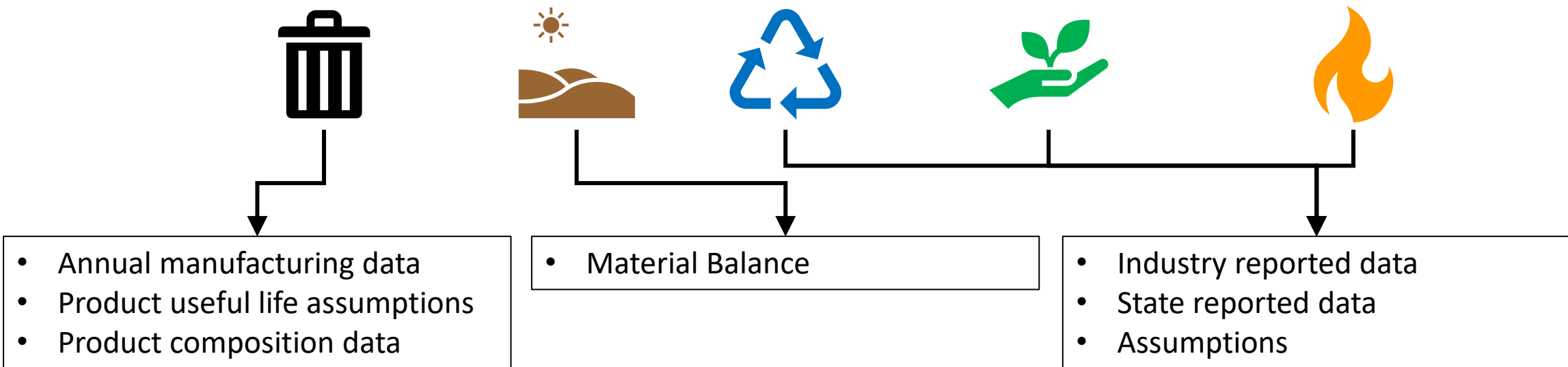
- Research Needs:

- Improve **transparency** and communication of MSW models (7.2.1)
- Provide **critical analysis** of MSW modeling approaches (7.2.2)
- **Fill data gaps** regarding end-of-life processes for key materials of concern (7.2.3, 7.2.4, 7.2.5)
- **Evaluate** different **metrics** for recycling and develop methods for calculating them (7.2.1)
<Crucial for **America Recycles** campaign>



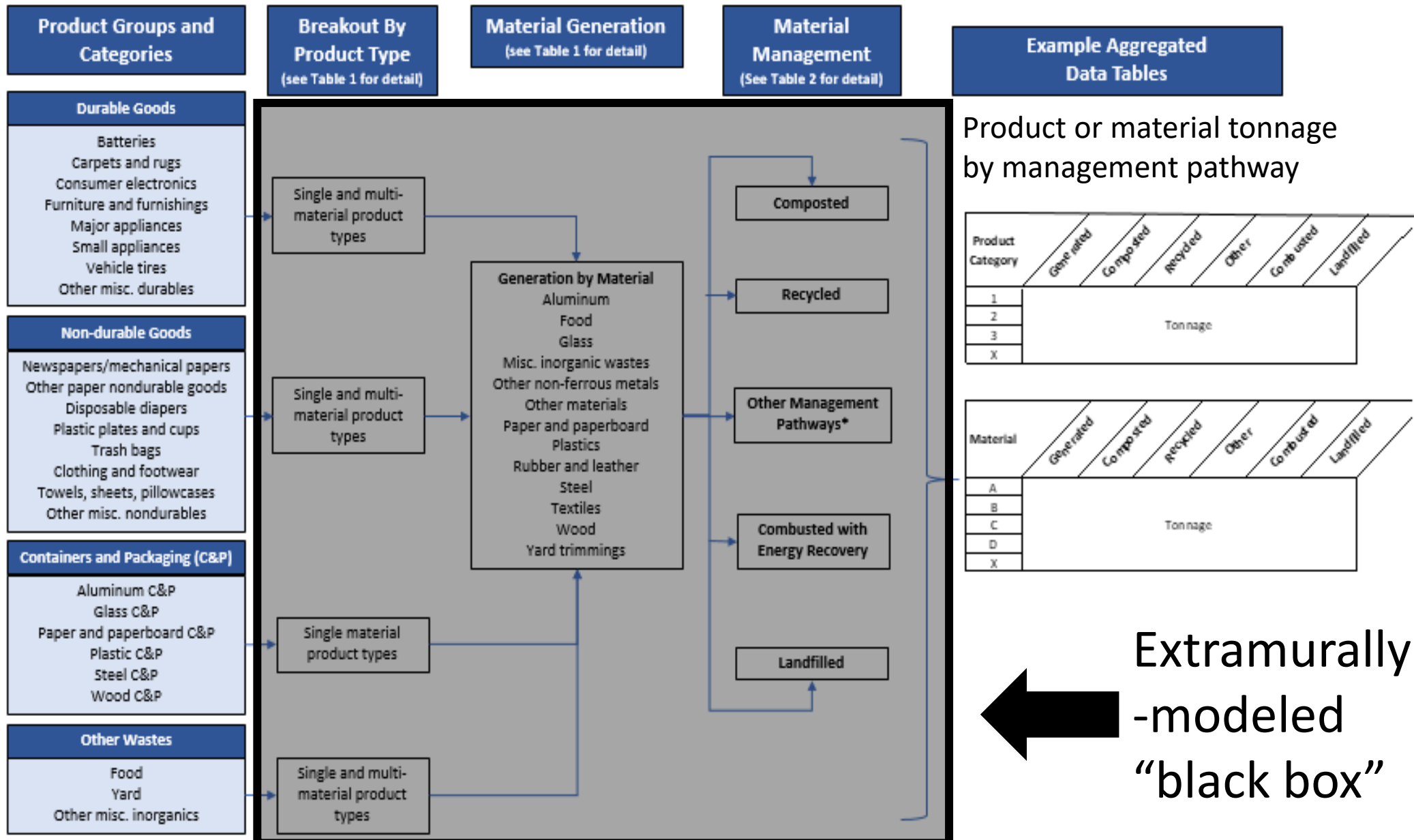
The Facts and Figures Model

Generation = Landfill + Recycle + Compost + Energy Recovery



- The Facts and Figures models are a complex blend of industry data, government data, and assumptions.
- Landfill tonnage is the remainder after accounting for other pathways.

The Facts and Figure Review Challenge

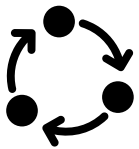


7.2.1 - Model Review and Data Quality (DQ) Assessment

- Unbiased review of all products and factors for the most recent year (2018)
 - Each product and factor scored 1 (highest) - 5 (lowest) based on average of five indicators¹
 - Uses approach analogous to specifying significant figures for laboratory data

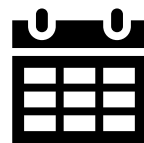
Flow Reliability

- How trustworthy is the data or information source?



Temporal Correlation

- How recent is the data?



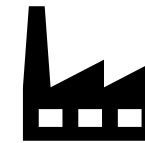
Geographical Correlation

- How well does it represent entire US?



Technological Correlation

- Are current technologies reflected?



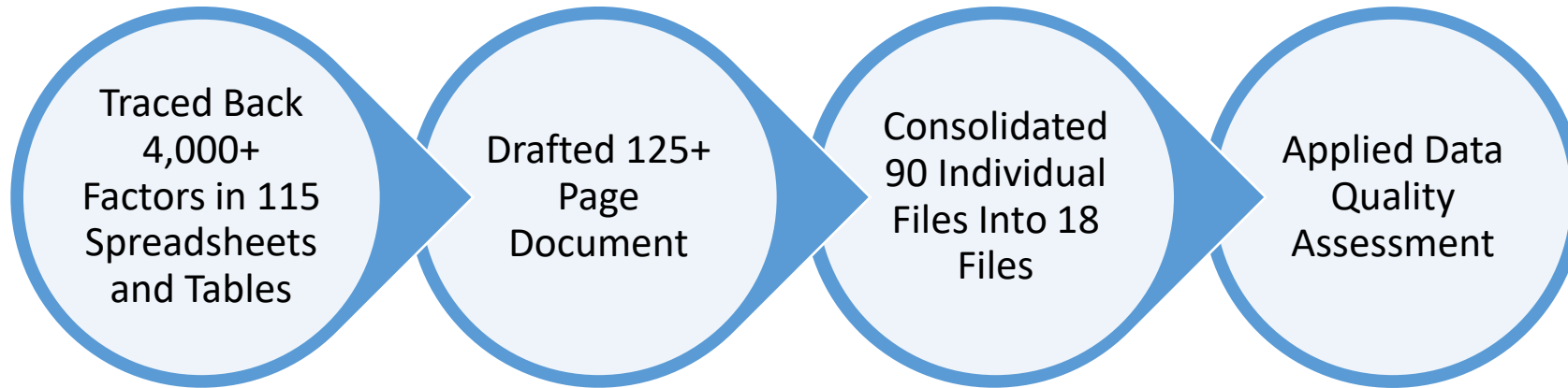
Data Collection Methods

- Is the data representative of the entire market?



1. Edelen, A. AND W. Ingwersen. Guidance on Data Quality Assessment for Life Cycle Inventory Data. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-16/096, 2016.

Applying DQ Assessment



Final Result

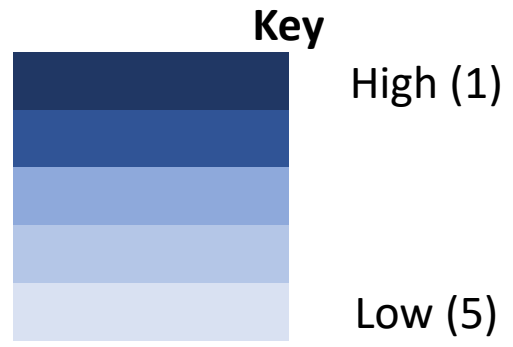
Enhanced
Messaging and
Presentation of
Report

- A collaborative effort between SHC and ORCR
 - Establish a DQ review process consistent with USEEIO platform that can be applied to other ORCR products
 - Shared process promotes ownership and action

Team Members

- Matt Pasquali, ORISE at RCB
- Valerie Vines, ORISE at RCB
- Dave Meyer, ORD

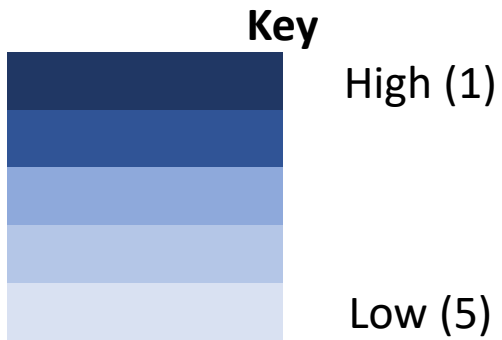
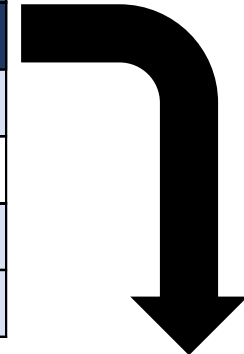
DQ Results



<i>Product Category</i>	Generation	Recovered	Recycle Rate
	Data Quality	Data Quality	Data Quality
Durable Goods			
Major Appliances			
Small Appliances			
Furniture & Furnishings			
Carpets & Rugs			
Rubber Tires			
Batteries, Lead-Acid			
Other Miscellaneous Durables			
Non Durable Goods			
Paper Products			
Other Non-Packaging Paper			
Clothing			
Footwear			
Towels, Sheets, & Pillowcases			
Miscellaneous Nondurables			
Products: Other Wastes			
Yard Wastes			
Miscellaneous Inorganic Wastes			

DQ Results: The Influence of Single Products

Containers and Packaging	Generation	Recovered	Recycle Rate
Glass			
Steel			
Aluminum			
Paper & Paperboard			
Plastics		CBI	CBI
Wood			
Other Miscellaneous Packaging			



<i>Aluminum Containers & Packaging</i>	Generation	Recovered	Recycle Rate
<i>Products</i>	Data Quality	Data Quality	Data Quality
Beer & Soft Drink Cans			
Food & Other Cans			
Foil			
Closures			

Key Findings for Existing Facts and Figures Model

21% of factors are measured

- Data reported by industry or states
- Typically score high in data quality assessment

75% of factors involve some degree of calculations or conversions

- Scores vary from high to low

4% of factors are based on assumptions

- Not data-based
- Low data quality scores

35% of factors scored 'Medium' to 'Low'

- Drive down overall data quality scores
- Often related to changing data availability and outdated data

14 products contain at least one assumed factor

- Drive down overall data quality scores

Where Do We Go From Here?

- With waning data availability, EPA has decided to **explore other waste modeling approaches.**
- Research will shift from making improvements to **developing a next-generation model.**
- **Lessons learned** to guide development:

Economic Sensitivity

- Must be able to reflect disruptive events (e.g., pandemic)

Primary Data

- Key to higher quality but must be transparent

Data Availability

- Must be regular, reproducible, and transparent

Waste Modeling Using an Input-Output Framework (SHC 7.2.2)

- Tested the use of IO modeling to estimate commercial MSW as part of SHC 7.1
- IO platform as basis for other ORCR tools (SHC 7.1) means consistency



Full length article

Analyzing economy-scale solid waste generation using the United States environmentally-extended input-output model

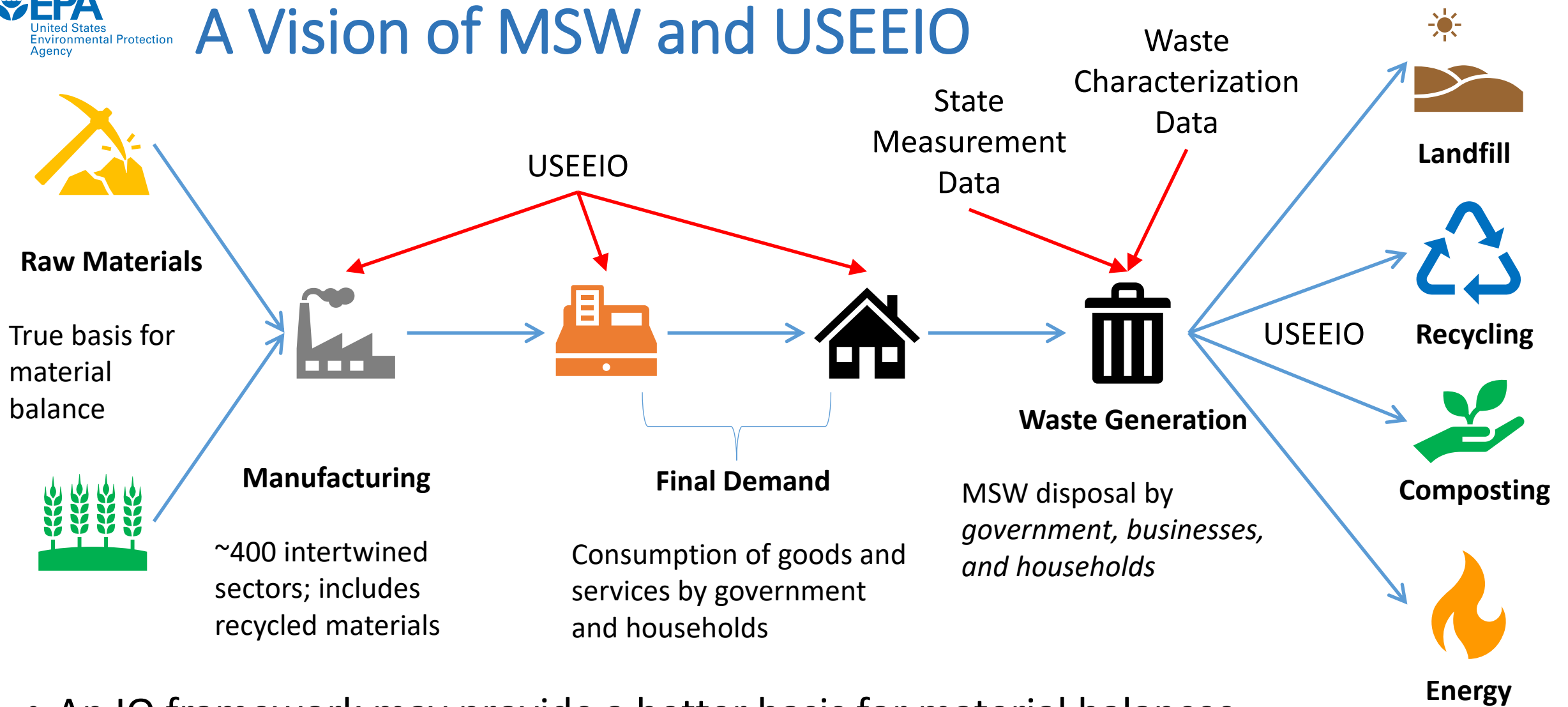
David E. Meyer^{a,*}, Mo Li^b, Wesley W. Ingwersen^a



Critical Review Product

- Evaluating pros and cons of multiple approaches, including IO
- Considering how to expand commercial MSW model to full MSW model
 - Leveraging USEEIO disaggregation work being done in SHC 7.1
- Working with ORCR to understand State Measurements Program
- Helping ORCR develop an Information Collection Request (ICR) for better waste data

A Vision of MSW and USEEIO



- An IO framework may provide a better basis for material balances
- Using measured waste data will provide more realistic bounds for estimates
- It may be possible to use this approach to account for leakage (trash)

Next Steps for Supporting the Waste Measurements Program

- **Finish Critical Review** of Waste Estimation Methodologies
- Work with ORCR partners to **specify features and constraints** of next-generation waste modeling framework
- **Incorporate data needs** into ICRs when possible
- Work with USEEIO team to develop and **test MSW estimation methods** using IO platform
 - Short term – satellite accounts
 - Long term – physical input output hybrid models and material tracking



Feel Free to Discuss!

"A single conversation across the table with a wise person is worth a month's study of books"

- Chinese Proverb