

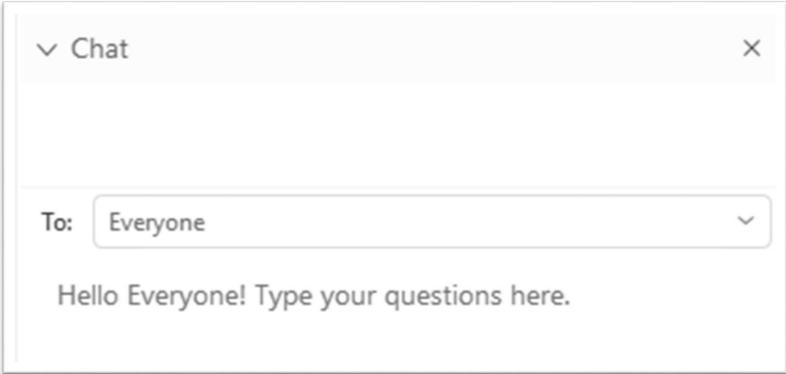


Recycling Development Center Advisory Board Meeting

August 11, 2021 | 9am – 12pm (Pacific time)

Participating in this meeting:

Anyone may use the chat box to ask questions:



Board members may unmute themselves.



We will have opportunities for public comments throughout the meeting.

*Note: we are **not** recording this meeting, meeting notes will be posted on the Advisory Board website.*

Agenda

- | | |
|----------|----------------------------------|
| 9:10 am | One time grant updates |
| 10:00 am | Board roundtable, agency updates |
| 10:30 am | Glass presentations |
| 11:20 am | Board glass discussion |
| 11:55 am | Wrap-up |

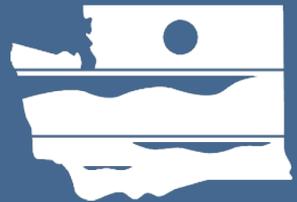
Center 2021 one-time grants

https://www.ezview.wa.gov/Portals/_1962/Documents/rdcab/2021-08-CenterGrants.pdf



Organization	Contact	Proposal	Amount
Chelan County - Public Works Department	Brenda Blanchfield	Purchased an Andela glass crusher/ pulverizer machine.	\$50,000
→ Jefferson County - Public Works / Solid Waste	Al Cairns	Market analysis of clean wood waste in Jefferson County.	\$4,361
→ King County - Solid Waste Division	Andy Smith	Infrastructure analysis and database and map of current facilities in WA, detailing the materials and capacity of each facility.	\$50,000
→ King County - Solid Waste Division	Andy Smith	WA Material Concierge : Secondary Material Market Business Assistance and Manufacturing Support.	\$50,000
→ Kittitas County - Solid Waste	Patti Stacey	Feasibility study and preliminary action plan, focused on recycling market development.	\$32,382
→ Leavenworth	Carl Florea	Researched operations for pickup and transport of commercial organic waste.	\$50,000
→ Lopez Island - Solid Waste Disposal District	Nikyta Palmisani	Begin the " ReMakery ", a Maker Space on Lopez Island that turns recyclable and reusable materials diverted from the recycling plaza and free store into usable and sellable goods.	\$50,000
→ Port of Port Townsend	Eron Berg	Feasibility study on the market for plastics in Jefferson County.	\$49,618
→ Seattle - Economic Development	Stephanie Gowing	Completed a Circular innovation challenge where applicants proposed product ideas & business plans for using regional recycled materials within a circular economy framework.	\$35,000
Seattle - Public Utilities Department	Katie Kennedy	Wood recycling/reuse, deconstruction, and salvage projects .	\$50,000
Tacoma - Environmental Services Department	Beth Jarot	Created a Washington materials marketplace .	\$25,000
Washington State University*	Karl Englund	Plastics recycling market development analysis of technology and economic feasibility to determine opportunities and gaps.	\$108,913*
Washington State University - energy extension*	Todd Currier	Solar photovoltaic module retirement study .	\$29,163*
Total Center investment in projects			\$ 584,437

* WSU studies included Center funding from Commerce



Center Grants

Andy Smith – King County

Kimberly Porsche – TetraTech (Jefferson County)

Stephanie Gowing – Seattle

Nikyta Palmisani – Lopez Island

Heleene Tambet – Waste Loop (City of Leavenworth)

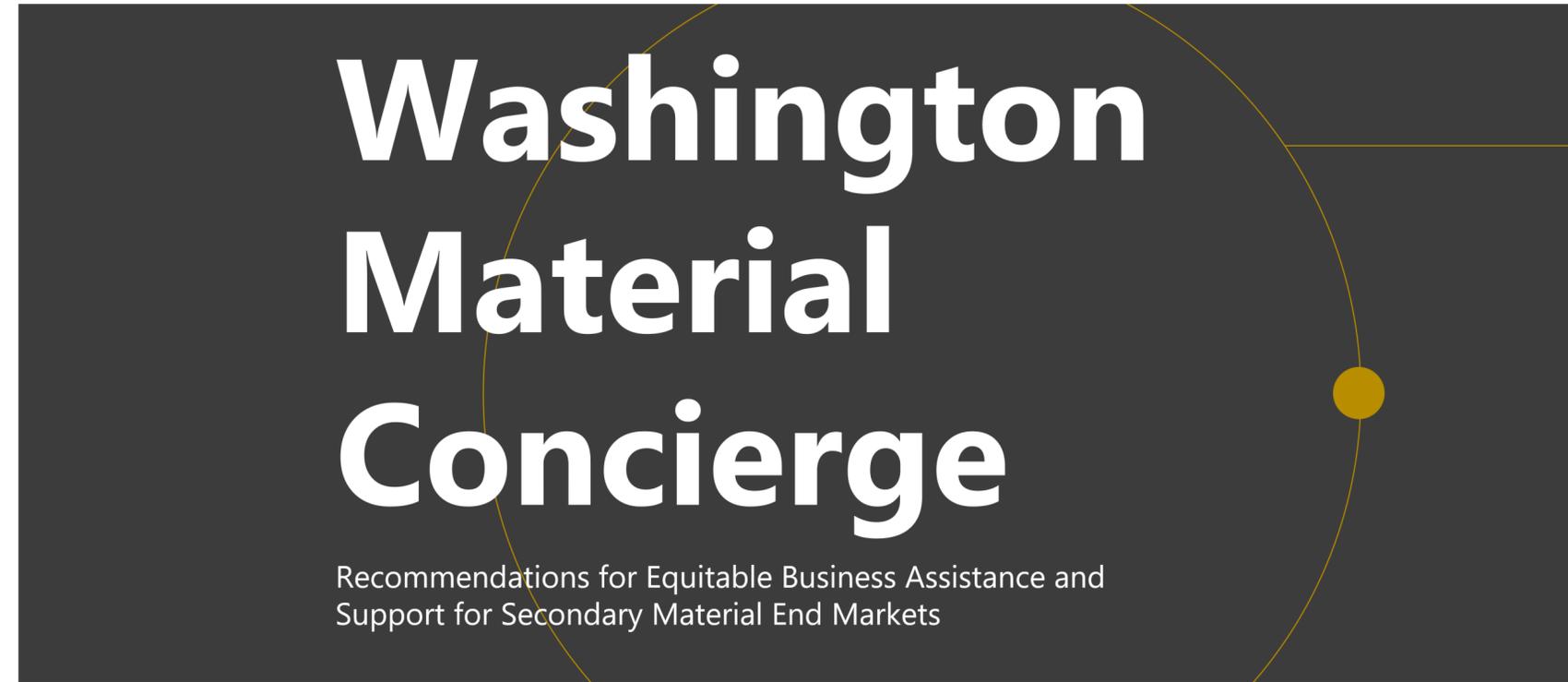


King County Solid Waste Division

Andy Smith & Emily Coleman

- Recycling Infrastructure in Washington
Grant amount \$50,0000
- Washington Material Concierge
Grant amount \$50,000





Emily Coleman · ecoleman@kingcounty.gov
Sustainable Purchasing Specialist

Andy Smith · andysmith@kingcounty.gov
Circular Economy Program Manager





THE MISSION

 **LinkUp** creates demand for recycled and reused materials, strives to develop the conditions for a thriving regional secondary material market, encourages investments in regional sorting and processing infrastructure, takes action to reduce the climate crisis and builds a King County where all people have equitable opportunities to prosper.

Recycling Infrastructure in Washington State

Material Recovery Facilities and Paper and Plastic
Reprocessors



Purpose

- Build a foundational dataset and visualization tool
- Ability to expand to additional materials or broader geographic scope in the future
- Enable better policy decisions for resource allocation to the recycling infrastructure system

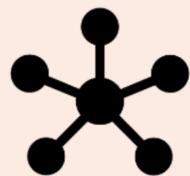
Approach and Data Sources



Began with available data sets and reports



Requested public records request from Ecology



Reached out to trade organizations to cross-reference information



Direct outreach to facilities

Research Limitations



Condensed timeframe



Limited public information



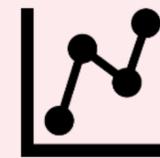
Unwillingness to participate



Confidentiality concerns



COVID-19 impacts



Lack of demographic data collection



Data uncertainty due to anticipated organizational changes

Washington Recycling Infrastructure Map

Published June 30, 2021



Washington Recycling Infrastructure Map

Filter Records

- Paper Facilities Only
- MRF Facility Only
- Plastic Facilities Only

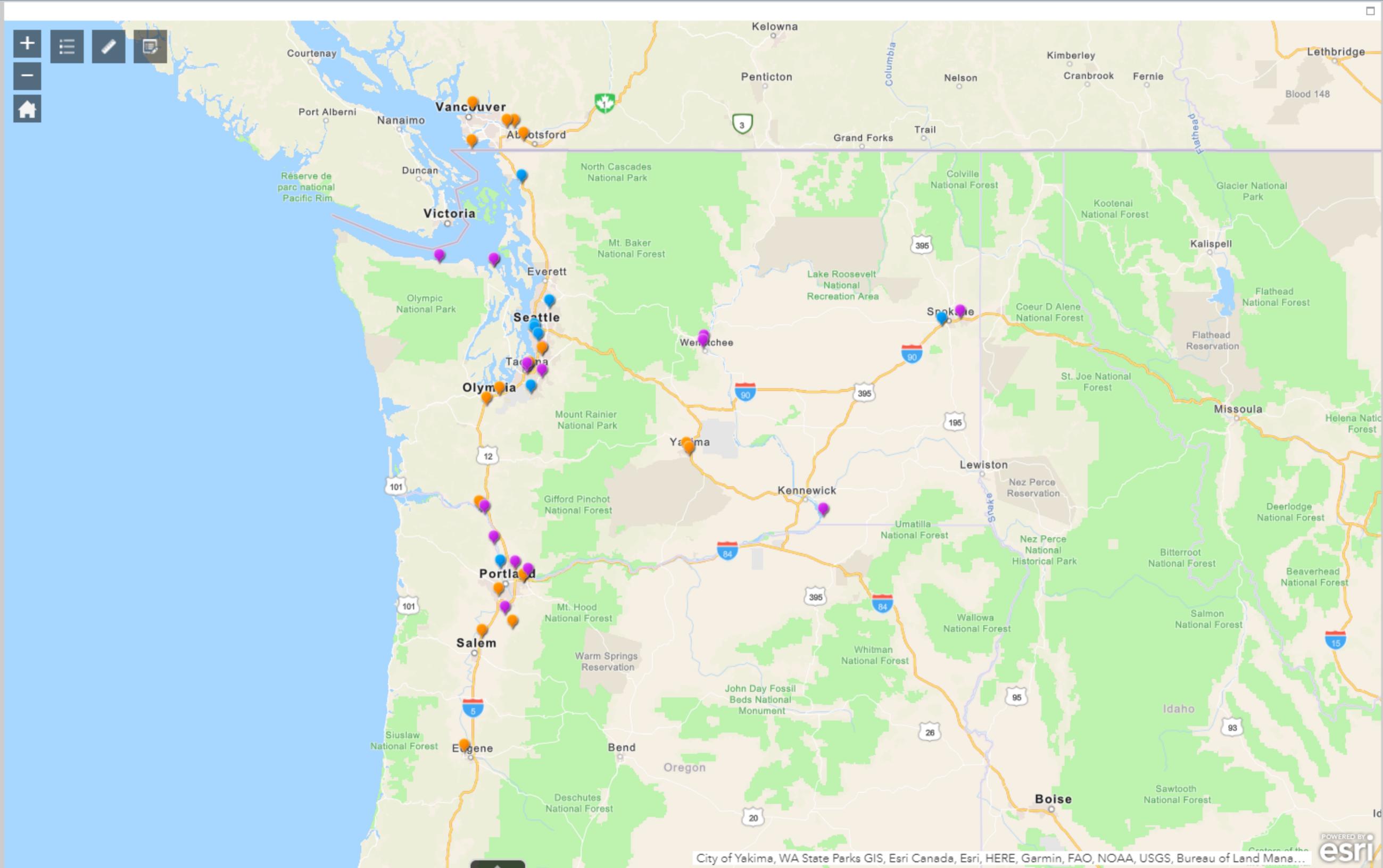


Map Overview

The Washington Recycling Infrastructure Map includes companies in the recycling value chain with facilities in Washington that collect, consolidate, and transfer recyclables, as well as companies that process the following materials generated in this state:

- Paper
- Plastic

Additional material categories will be added over time. The information available here is intended to help fill existing data gaps about material processing in Washington and serve as a resource to inform planning decisions and support business development and infrastructure investment for recycled materials.



Material Recovery Facilities

5 single-stream, with glass included

2 single-stream, without glass

2 multi-stream/source separated

2 MRFs with uncertain sources, most likely paper-only facilities serving the commercial sector

Facility Breakdown

Processors

6 plastic processors – little PCR processing

15 paper processors – 38% of recyclable paper collected in WA

Washington Recycling Infrastructure Dashboard

Washington Recycling Infrastructure Map



Search Facility by Product
No category selected

Washington Recycling Infrastructure Map includes companies in the recycling value chain with facilities in WA that collect, consolidate, transfer recyclables, as well as companies that reprocess the following materials:

- Paper
- Plastic

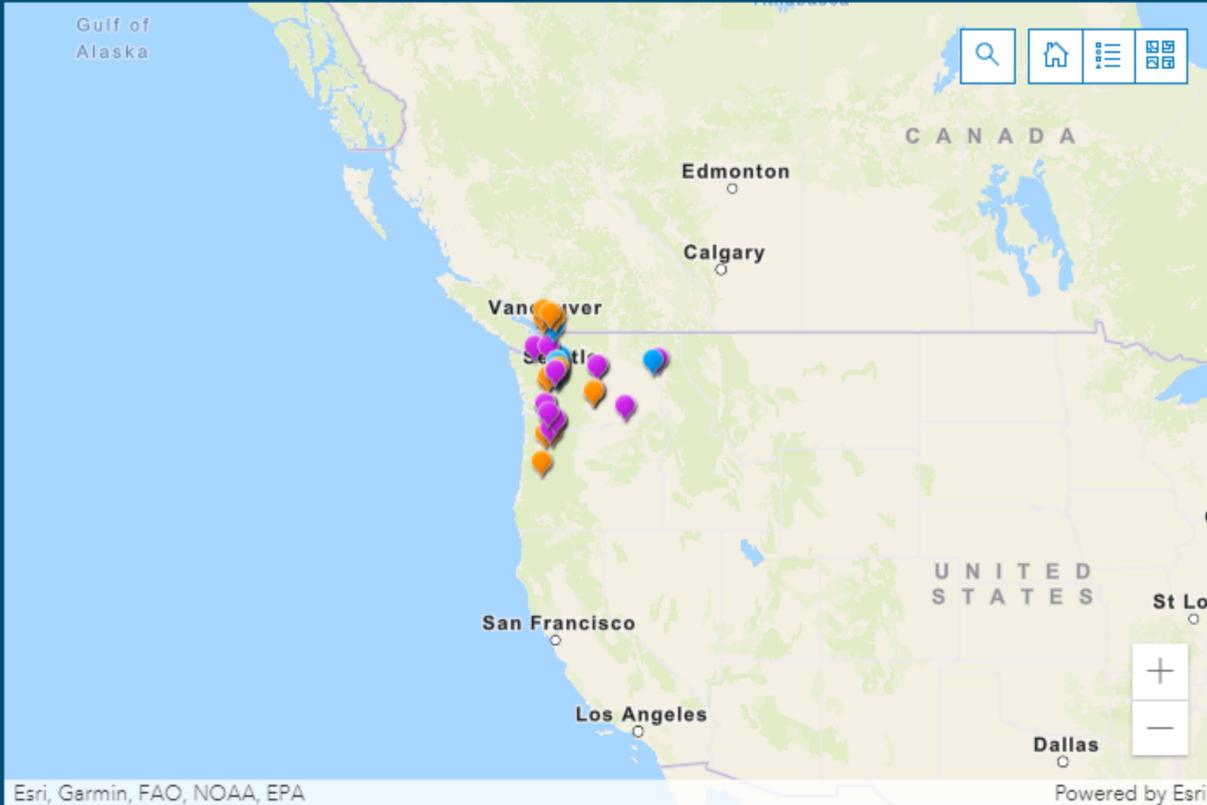
Additional material categories will be added over time. The information available here is intended to help to fill existing data gaps about material processing in Washington and serve as a resource to inform planning decisions and support business development and infrastructure investment for recycled materials.

If you are a material processor and your facility is not included on this map or your information is out of date, please fill out [this survey](#) to update your facility data. Thank you!

Admin Info

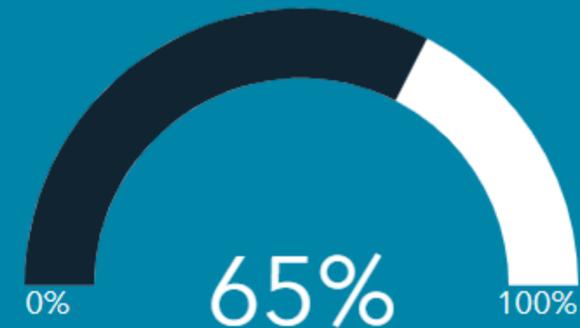
Disclaimer

Data used to produce this map and dashboard was compiled from company-submitted information. The Washington Department of Ecology assumes no responsibility or liability for any errors or omissions in the content, and the information provided includes no guarantees of completeness or accuracy.

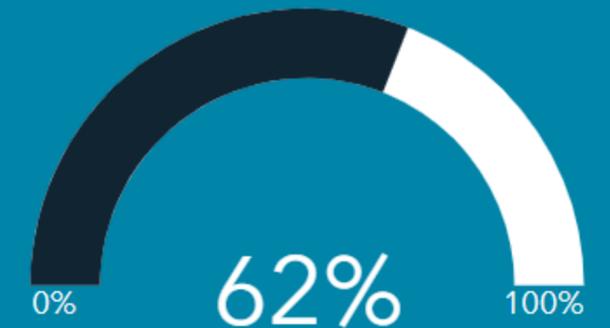


Total Facilities	MRF	Paper	Plastic
48	11	19	18
Total Operating Capacity	Total Operating Capacity (TPY)	Total Operating Capacity (TPY)	Total Operating Capacity (TPY)
2.7M Tons Per Year	1.2M MRF	1.6M Paper	19.1k Plastic
Estimated Throughput	Estimated Throughput (TPY)	Estimated Throughput (TPY)	
2.9M Tons Per Year	916.2k MRF	2M Paper	No data
Number of Reported Employees	Number of Reported Employees	Number of Reported Employees	
3.5k	140 MRF	3.3k Paper	No data

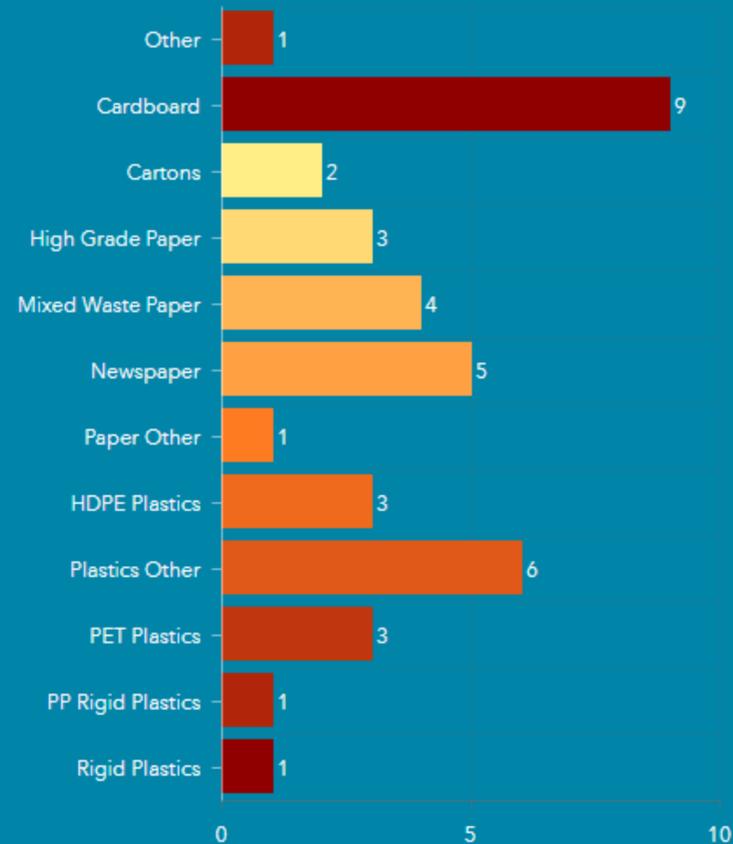
Percentage of recycled fiber sourced from Washington



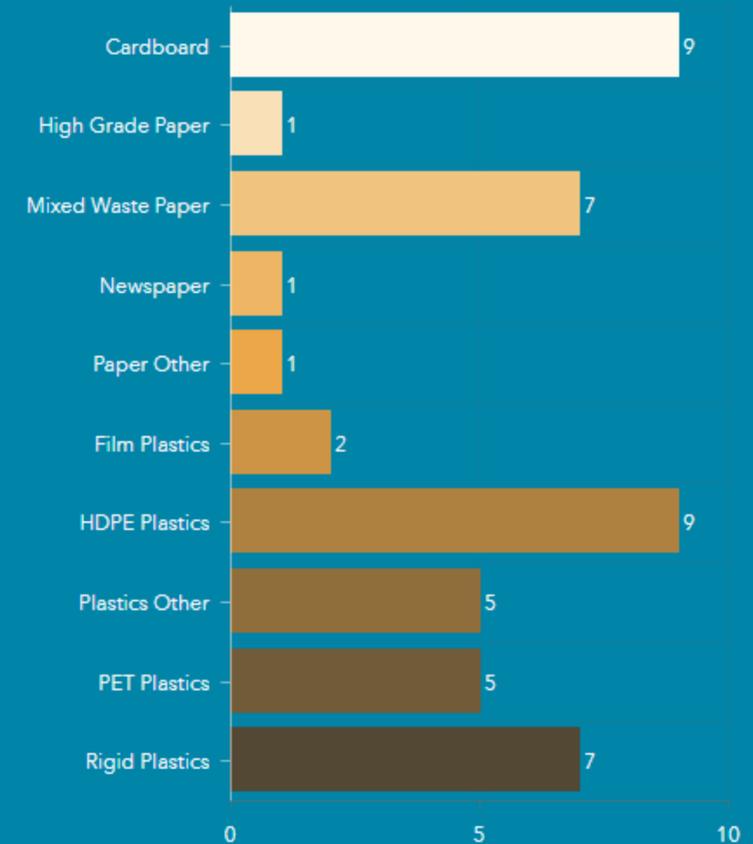
Percentage material MRFs receive from residential sector



Facility Count by Primary Type of Inbound Loads Received/Purchased



Facility Count by Type of Material Produced / Sold



Future R&D

- Further efforts to gather data from facilities
- Add other materials
- Host public tool at WA State level
- Allow facilities to update their own data with administrator approval



Report prepared by:



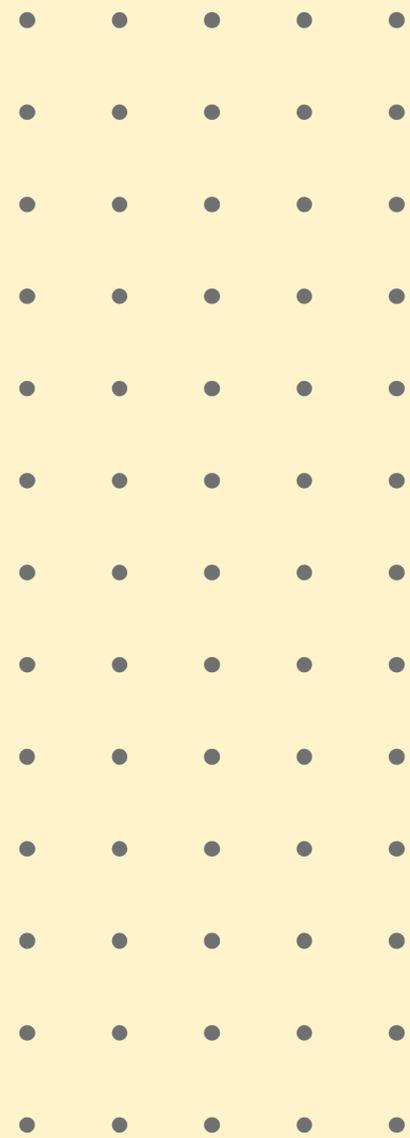
Washington Material Concierge

Recommendations for Equitable Business Assistance and
Support for Secondary Material End Markets





Purpose



Provide a framework for developing an equitable circular economy development program in Washington that focuses on secondary material business support, while considering the opportunities, needs, and impacts of overburdened communities.



MARKET DEVELOPMENT BEST PRACTICES

Elements to include
 The research led to the development of the following series of best practices that have successfully been used to support business assistance and development of secondary material end markets. These range from traditional economic development tools to coordination and facilitation of partnerships to strategy and material expertise. The following slides will define these elements and list considerations for employing an equity lens. It is important to note that funding is a key resource needed to support all of the elements. This report does not identify where specific funding should come from. Options may include federal, state and local funding in addition to private sector investment.

Economy	People	Materials		
Economic Development	Business Support	Fostering Partnership	Thought Leadership	System Expertise
R_C Recruitment	T_S Technical Support	N_T Networking	R_P Research/ Planning	M_E Materials Expertise
I_V Investment/ Grants	I_N Incubator/ Accelerator	P_F Process Facilitation	P_R Policy Recommendations	S_C Supply Chain
I_C Incentives/De-risking	B_S Business Plan Assistance	C_E Community Engagement	C_M Communications	T_C Technologies and Processes



	Economic Development			Business Support			Fostering Partnership			Thought Leadership			System Expertise		
	Rc RECRUITMENT	Iv INVESTMENTS / GRANTS	Ic INCENTIVES / DE-RISKING	Ts TECHNICAL SUPPORT	IN INCUBATOR / ACCELERATOR	Bs BUSINESS PLAN ASSISTANCE	NT NETWORKING	PF PROCESS FACILITATION	CE COMMUNITY ENGAGEMENT	RP RESEARCH / PLANNING	PR POLICY RECOMMENDATIONS	CM COMMS	ME MATERIALS EXPERTISE	Sc SUPPLY CHAIN	Tc TECHNOLOGY AND PROCESSES
<i>*Not an exhaustive list</i>															
King County		✓					✓			✓	✓				
SPU							✓			✓	✓				
RDC							✓	✓		✓	✓		✓		
Commerce	✓		✓				✓				✓				
Impact WA				✓			✓						✓	✓	
PNNL		✓			✓								✓	✓	✓
WSU				✓			✓	✓					✓	✓	✓
WEDFA		✓	✓												
WA SBA (no interview)						✓									
Front and Centered		✓		✓			✓	✓	✓	✓	✓	✓			
Blue Daisi				✓		✓		✓	✓	✓		✓	✓		✓
Seattle OED	✓	✓		✓		✓	✓		✓						

STRENGTHS AND OPPORTUNITIES



Thought leadership and supportive policy development is advancing in WA (e.g., EPR, recycled content, industrial symbiosis, single-use plastics, recycling labeling policies)



Growing collaboration between Depts. Of Ecology and Commerce around the Recycling Development Center



Strong support, subject matter expertise, and political will from local governments in multiple parts of the state



Strengthening statewide climate policy may be leveraged to support circular economy goals given the demonstrated lifecycle climate benefits of manufacturing with secondary materials



Robust network of clean energy/clean tech accelerators could add circular economy focus, or share best practices to support development of a circular economy accelerator



Strong presence of organizations that have supportive technical or material expertise (e.g., Center for Sustainable Infrastructure, Composite Recycling Technology Center, WSU, UW, Pacific Northwest National Lab, Impact Washington)



Strong community college system, technical colleges, and trade schools could be leveraged to support education, training, and green jobs in the service of the circular economy, green infrastructure, and a just transition

GAPS



Available resources are geared toward large businesses and capital projects, leaving **small businesses without support to start up and scale.**



Efforts are **siloed between general economic & technical support and secondary materials & supply chain expertise.**



An explicit equity lens and community engagement is absent for most existing support programs.



No entity is explicitly tasked with a strategic coordination role to align across silos and help stakeholders to identify, navigate, and access existing resources.



Efforts are **siloed between climate, equity, and circular economy.**

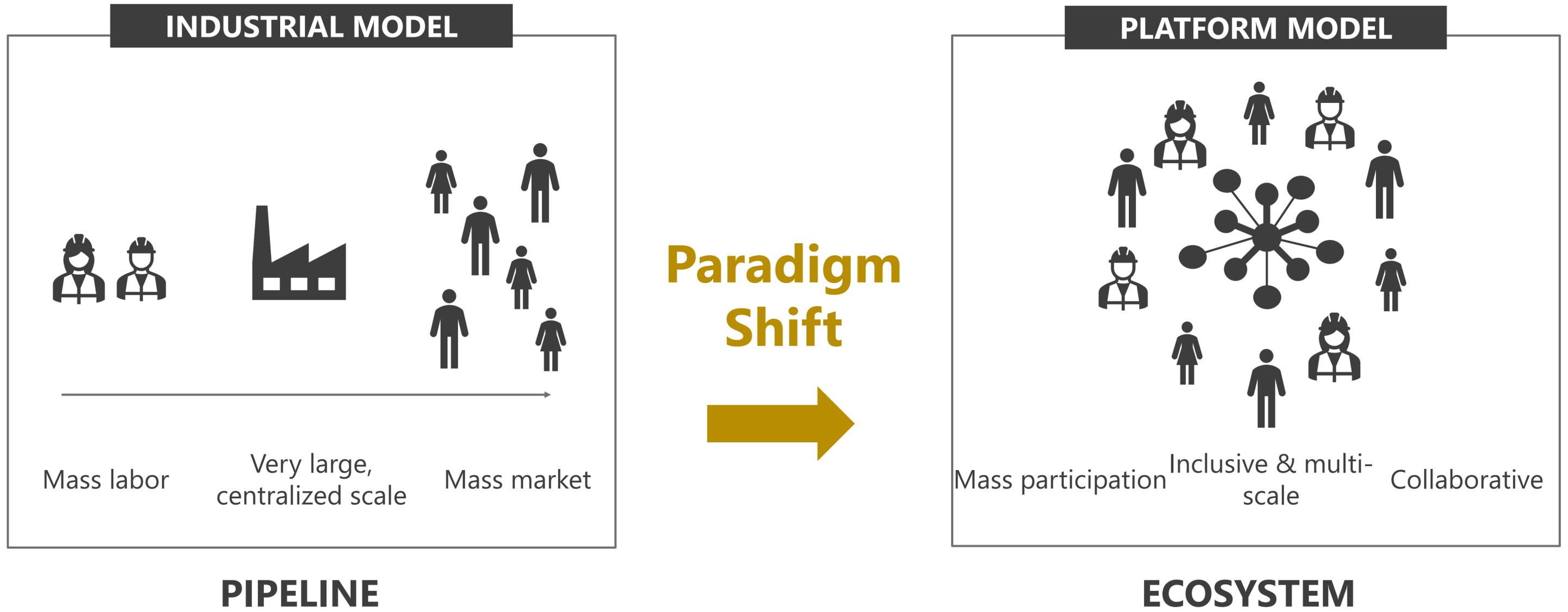


06

Key Recommendations

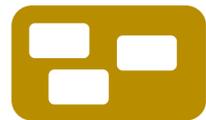


STRATEGIC CONCEPT: PLATFORM APPROACH



Shifting the paradigm: The core recommendation is to develop a platform to strategically coordinate the efforts around equitable business assistance and support for secondary material end markets. A just transition to a circular economy requires a paradigm shift from an industrial framework—characterized by unilateral and hierarchical decision-making and often results in a model where success drives success, leaving little room for innovation and new market entrants—to a platform framework. Platforms are characterized by inclusion, collaboration, and innovation with a focus on equitable distribution of resources for priority communities and small businesses, shared learning, development of partnerships, and process facilitation to help advance innovative ideas into investable, shovel-ready projects. [NextCycle Michigan](#) is a good example of a platform model. The following series of slides outlines recommendations around the design of this platform.

RECOMMENDATIONS ON PLATFORM DESIGN



Start with **strengths** and **gaps** in Washington



Center **materials** and **equity** in the waste hierarchy



Provide **tools** to support small businesses and innovative projects



Align **climate, circularity, and justice**



Leverage **Just Transition** frameworks



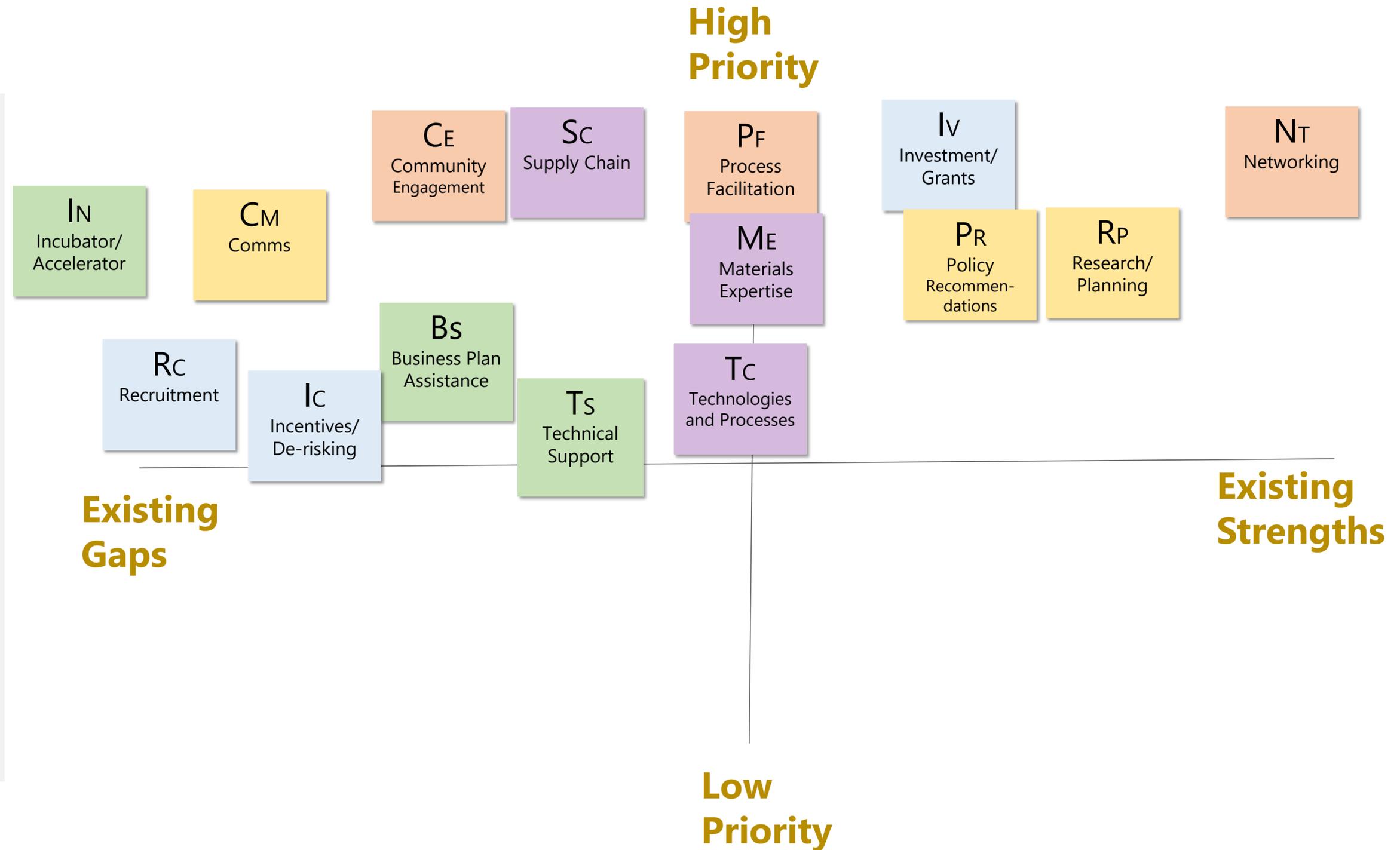
Engage in **co-designed** development of the platform



START WITH STRENGTHS AND GAPS IN WASHINGTON

Elements to build around

This chart organizes the inventory of Washington-based resources and demonstrates strengths and weaknesses based on the results.



CENTER MATERIALS AND EQUITY IN WASTE HIERARCHY

Think in systems

Equitable recycling end-market development and development of circular supply chains is needed. The approach must balance this with circular strategies that include interventions higher up the waste hierarchy.

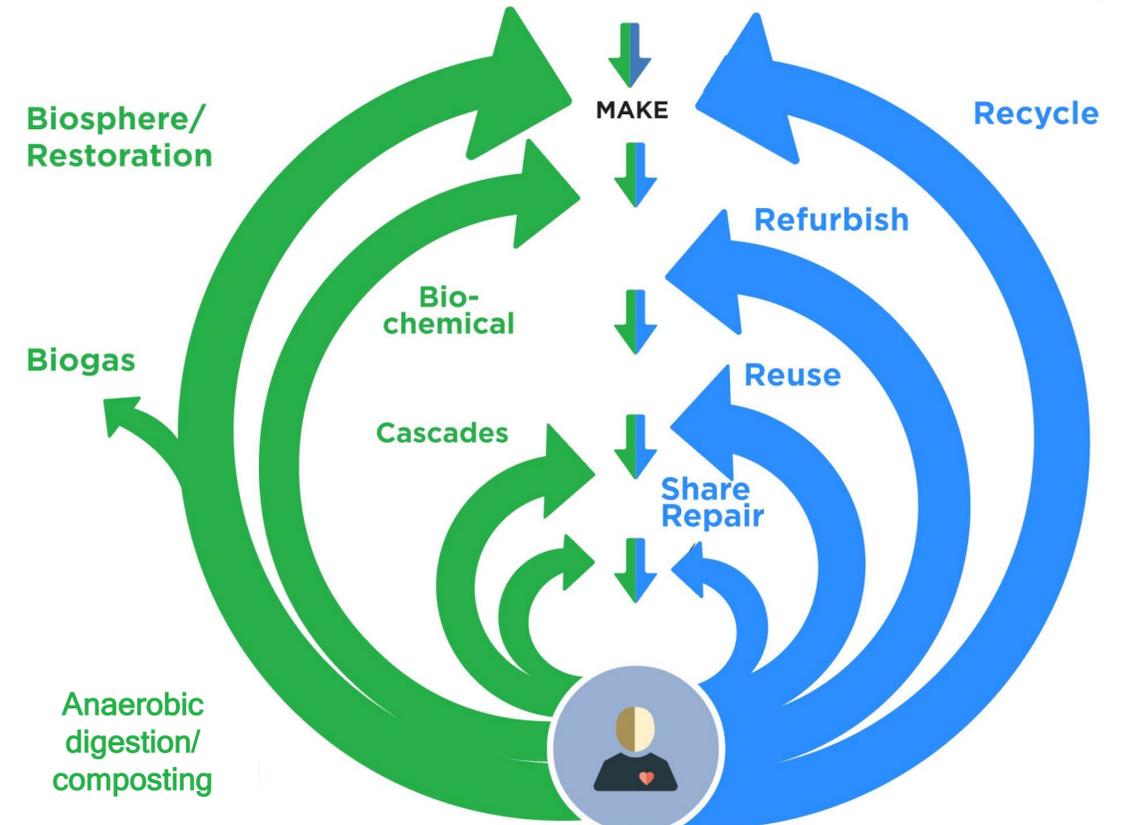
Care should be taken to not position overburdened communities into business models focused solely on processing of waste because solutions didn't balance upstream and downstream considerations and priorities.

PF Process Facilitation	CE Community Engagement	CM Comms	Sc Supply Chain
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PRINCIPLE 1
1 TRANSITION TO RENEWABLES



PRINCIPLE 2
2 CIRCULATE MATERIALS



PRINCIPLE 3
3 DESIGN OUT WASTE

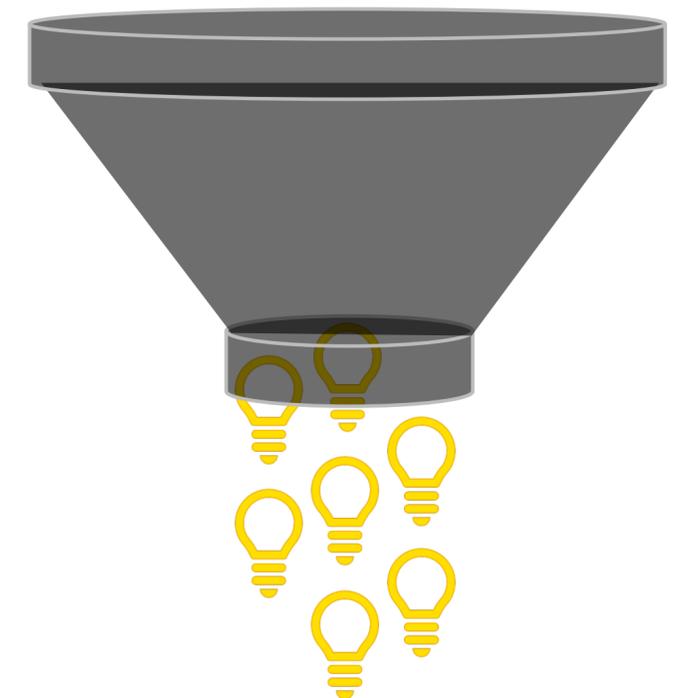
Credit: Kamal
Adapted from
MacArthur Found

PROVIDE TOOLS TO SUPPORT SMALL BUSINESSES AND INNOVATIVE PROJECTS

Business/project accelerator program tied to funding sources

There should be a core set of resources that can define the actionable value the platform brings. In general, the research pointed to a lack of support for small, new or innovative business models. Two of the most noticeable gaps and priorities in the analysis are **incubator/accelerator** and **business plan assistance**

This also relates to priorities around **investments/grants** and **process facilitation**. Having a defined source of funding involved is important to demonstrate value and commitment.

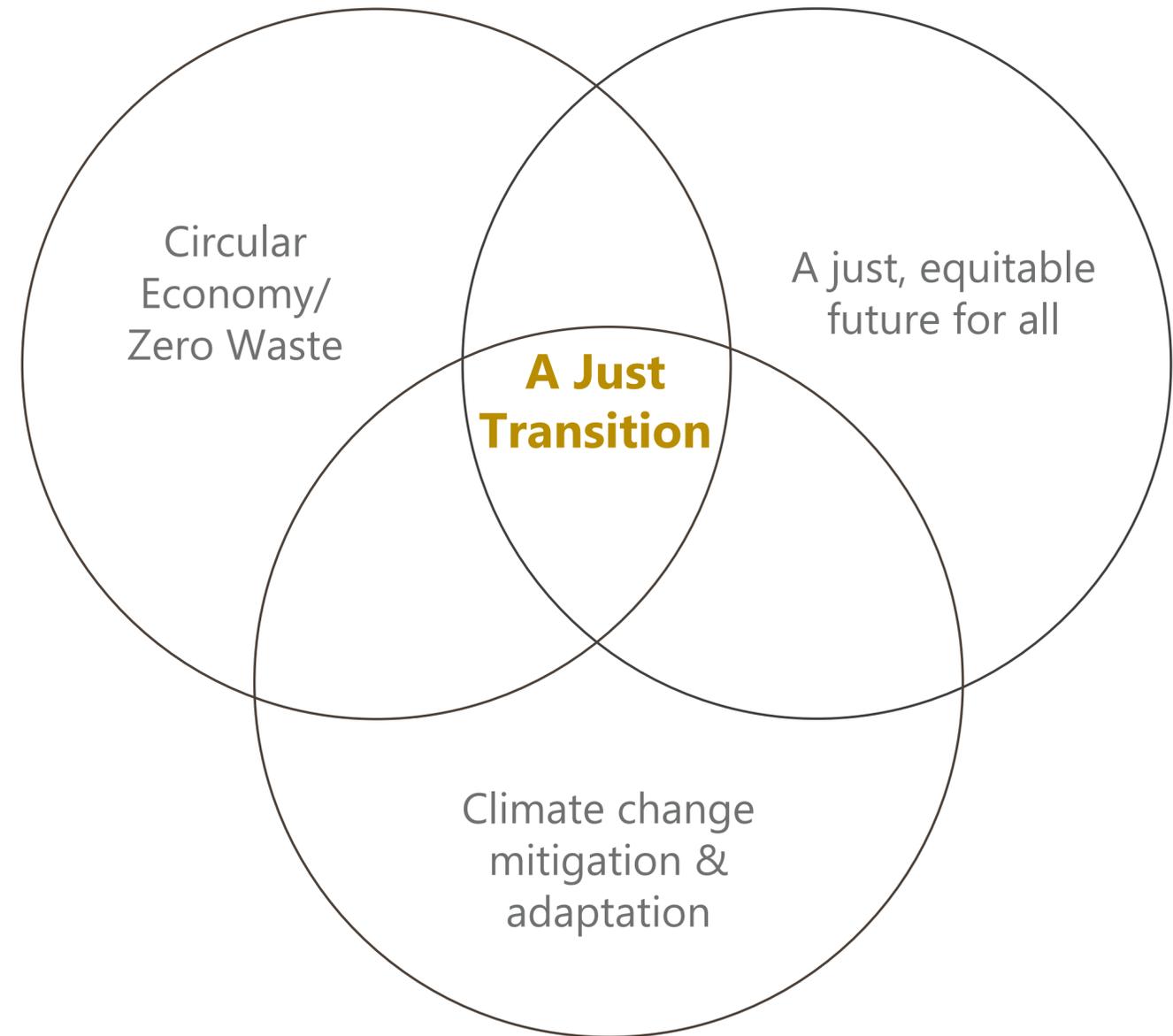


ALIGN CLIMATE, CIRCULARITY, & JUSTICE

Climate, circularity, and justice

Centering the platform in a way to focus on the overlap between these approaches is a key opportunity.

This can be in the form of creating open dialogue between organizations and individuals operating in these spheres; aligning strategies and messaging; broadening coalitions around policy and public campaigns; sharing resources and co-developing projects.



IN
Incubator/
Accelerator

NT
Networking

CE
Community
Engagement

CM
Comms

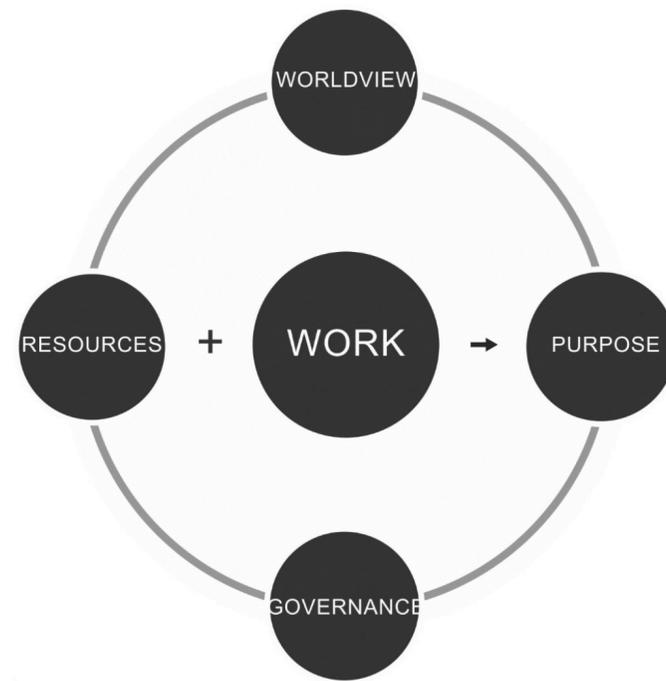
LEVERAGE JUST TRANSITION FRAMEWORKS

Common framework theme

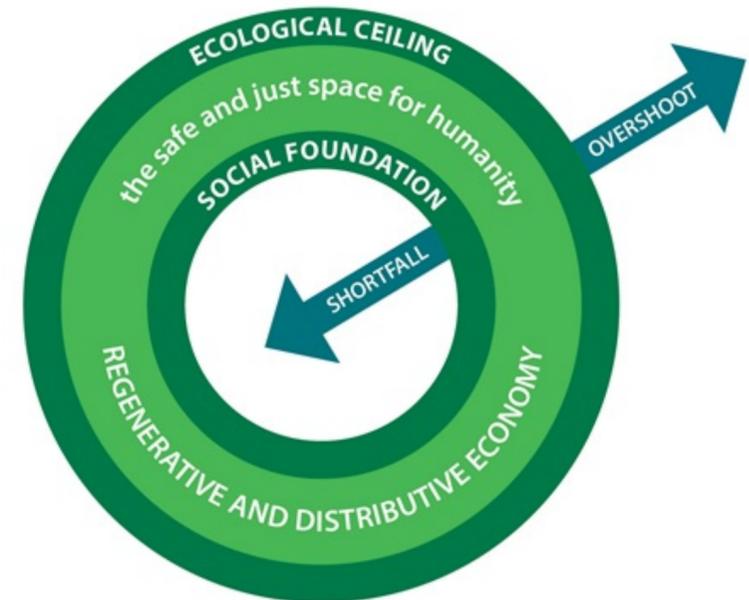
While there are multiple Just Transition models, the models pictured to the right are two frameworks that are gaining traction:

- Movement Generation is being leveraged by communities of color in the US. See example work in the [Appendix](#).
- Doughnut Economics is being seen as a more accessible, utilitarian approach to Just Transition and leveraged with governments, businesses, and communities. See example work in [Appendix](#).

Note: Some use the terms Just Transition and "Positive Transition" synonymously.



MOVEMENT GENERATION



DOUGHNUT ECONOMICS

NT Networking	PF Process Facilitation	CE Community Engagement	PR Policy Recs	RP Research/ Planning	CM Comms
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ENGAGE IN CO-DESIGNED DEVELOPMENT

Design with communities

Co-design can take many forms like:

- Collaborative research
- Forums, workshops, and conversations
- Visioning and mapping
- Design charrettes where communities help build and improve upon a process and/or prototype/pilot



NT Networking	PF Process Facilitation	CE Community Engagement	PR Policy Recs	RP Research/ Planning	CM Comms
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NEXT STEPS



Identify roles of local and state government.



Define funding needs and sources.



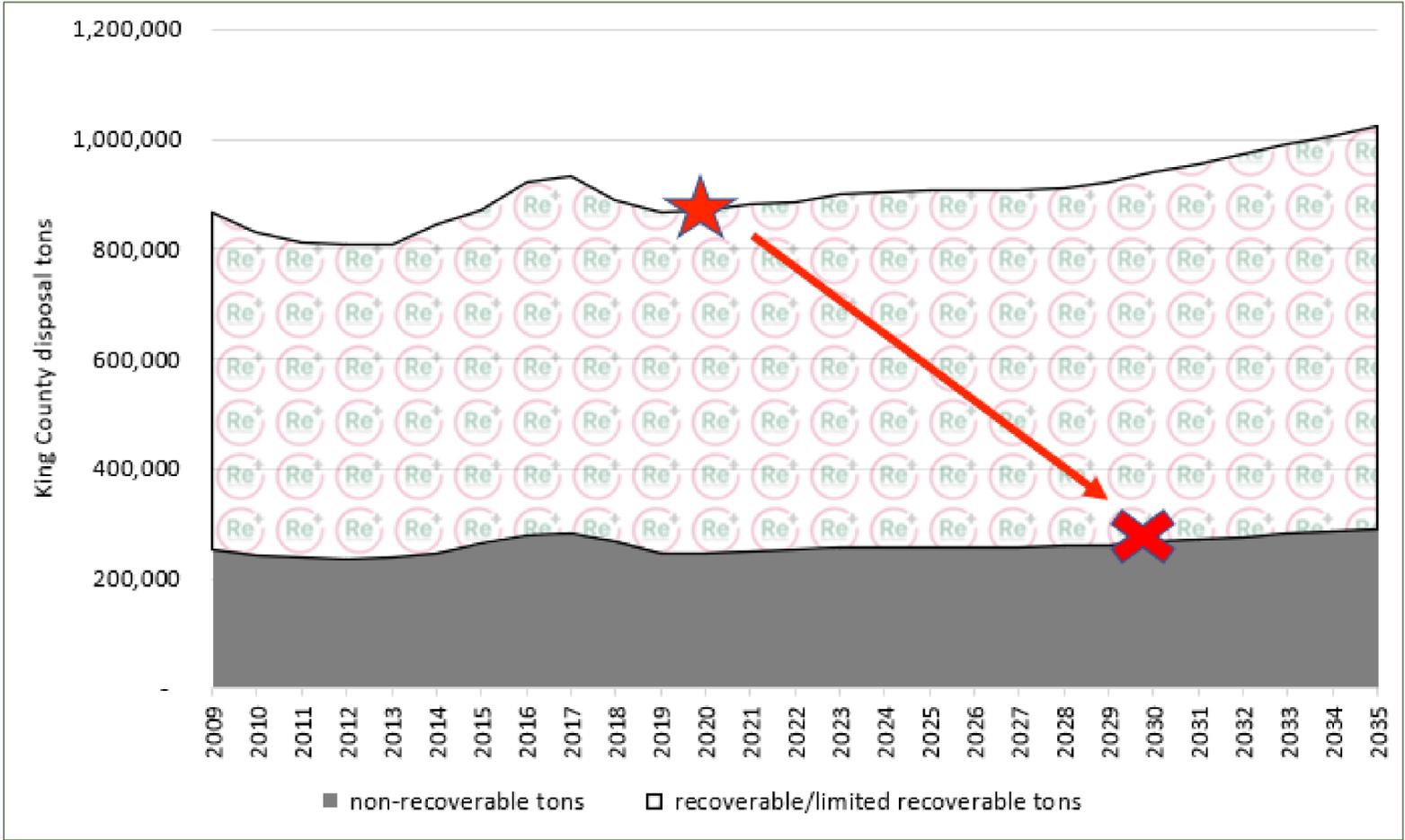
Further develop an initial list of climate, circularity, and justice stakeholders to engage.



Map out platform co-design process.

King County collects 43% of WA curbside materials...

Re



★ Current status

✘ KC code = Zero Waste of Resources 2030

... but Re+ will divert more: is the region prepared?

Circular Economy Innovation Platform

- **Combines technical support and public funding**
 - Competitive grant: 2022
 - Private sector, Community & NGO focus
 - Could help Re+ transition
- **Targets technology and new approaches for:**
 - Materials & prevention
 - Links to e-Tour opportunities
 - Support for underserved communities
- **Launch with Re+ plan**

WA Ecology funded work:
reimagining market development

MARKET DEVELOPMENT BEST PRACTICES

Economy		People		Materials
Economic Development	Business Support	Fostering Partnership	Thought Leadership	System Expertise
Rc Recruitment	Ts Technical Support	Nt Networking	Rp Research / Planning	Me Materials Expertise
Iv Investment / Grants	In Incubator / Accelerator	Pf Process Facilitation	Pr Policy Recommendations	Sc Supply Chain
Ic Incentives / De-risking	Bs Business Plan Assistance	Ce Community Engagement	Cm Communications	Tc Technologies and Processes

Developing King County's role:
Work in progress





Credits: this presentation was partially made with a template created by Slidesgo.

Port of Port Townsend

Eron Berg, Abigail Berg

Presentation by Kimberly Porsche, Tetra Tech

- Plastic pyrolysis feasibility study
Grant amount \$49,617





Pyrolysis Conversion of Plastics to Energy Feasibility Study

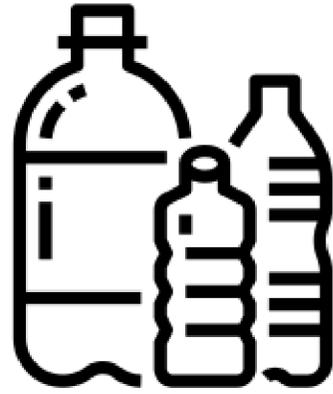
Recycling Development Center Advisory Board

August 11, 2021

Kimberly Porsche, P.E. Tetra Tech, Inc.



Feasibility Study Overview



Available Feedstock:

- 100-120 tons/year (Plastics Types #1, 2, & 5)

Potential Available Feedstock:

- Min 200 tons/year, Max 500 tons/year (#1-7, excluding #3)

Most Applicable Technology:



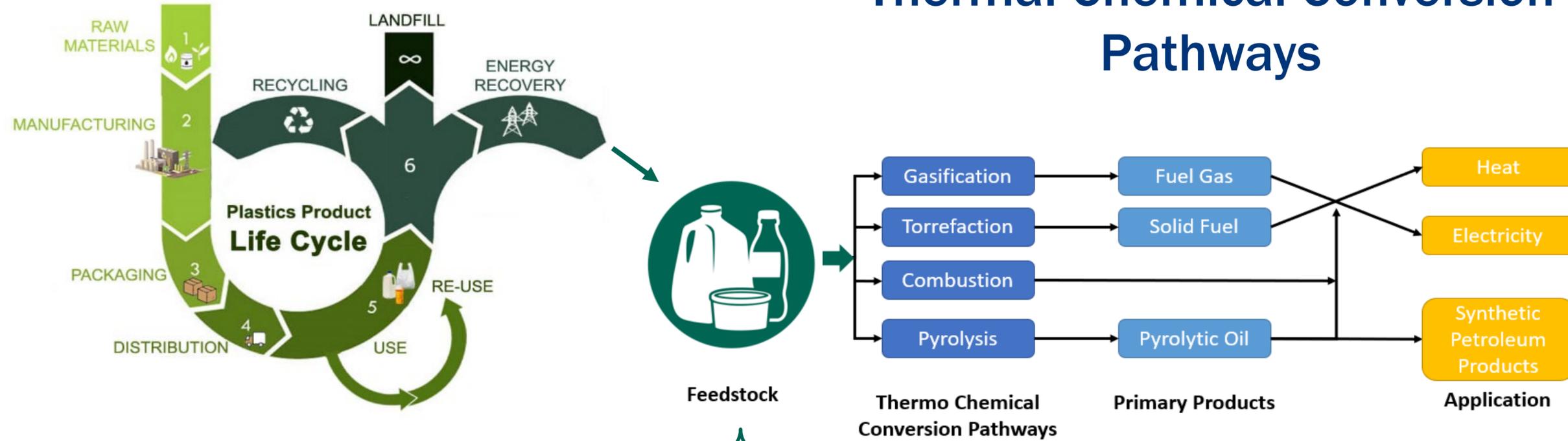
PDO Technologies

Financial Scenarios:

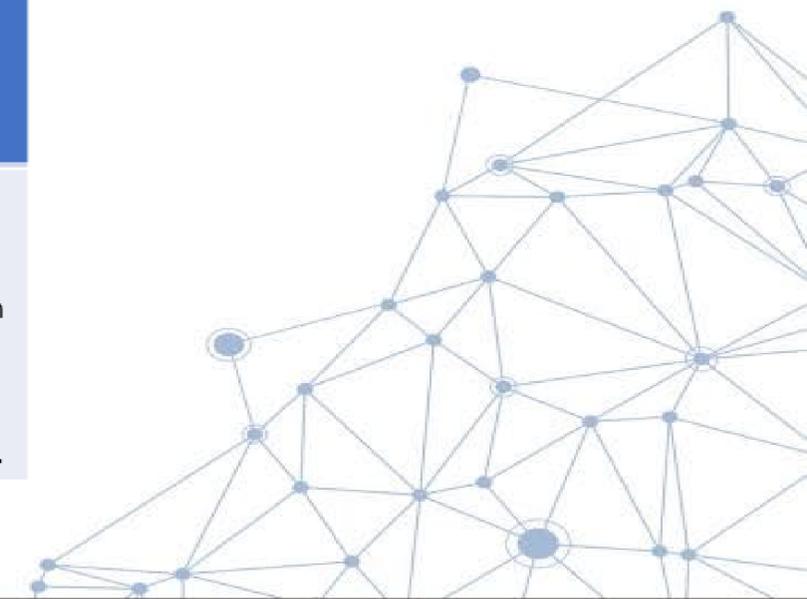
Parameter	Mobile Unit	Single Unit
CAPACITY	200 tons/year	500 tons/year
CAPEX	\$2.5M	\$2.2M
OPEX	\$0.22M/YR	\$0.28M/YR
PRODUCTS REVENUE	\$0.14M/YR	\$0.28M/YR
MINIMUM TIP FEE	\$0.70/lb	\$0.18/lb



Plastic Pyrolysis Overview



 PETE	 HDPE	 PVC	 LDPE	 PP	 PS	 OTHER	OTHER PLASTIC
Plastic drink bottles, fruit juice containers, cooking oil bottles	Milk jugs, dairy containers, water jugs, shampoo and washing soap containers	Trays for fruit and sweets, plastic packing (bubble foil) and food foils, some shower curtains & toys	Plastic bottles and containers, shopping bags, highly resistant sacks and wrappings	Plastic packaging, straws, reusable food containers	Rigid packaging, CD cases, vending cups, toys, plastic tableware	Baby bottles, toys, household products, durable plastic products	non-numbered plastic products such as toys, reusable containers, furniture, etc.



Feedstock Assessment

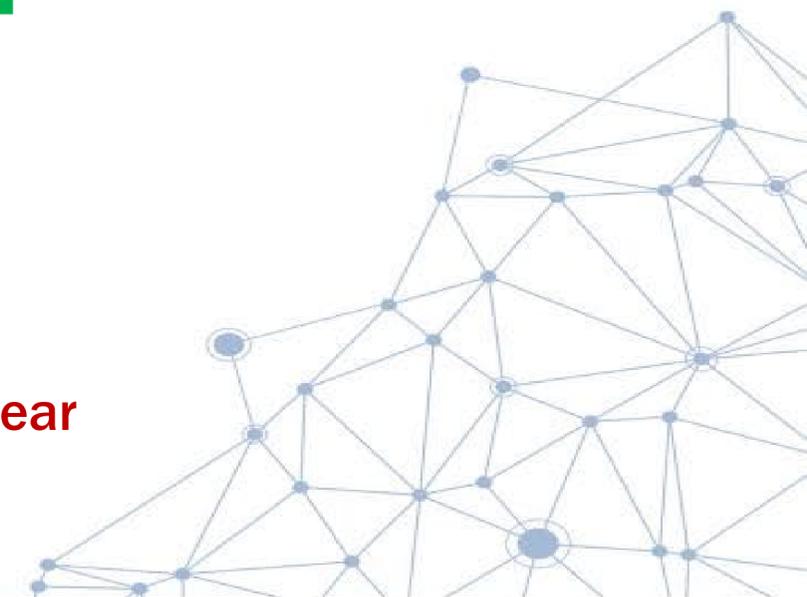
When in doubt, throw it out **Place in RECYCLING BINS** *More info on the back*

Place *clean and empty* recyclables *loose* in bins. *Please*— **NO** bagged or boxed recyclables in bins.

Mixed Paper	Plastic & Cans	Glass	Unwaxed Cardboard
 paper bags and cartons  newspaper  magazines  mail, catalogs, & office paper	 bottles, jugs  metal cans <i>NO loose lids</i>  aluminum pans, cans & foil  buckets <i>limit of 3</i>  plant pots <i>rigid plastic only; 12" max</i>  plastic tubs: dairy, salsa	 glass bottles & jars <i>no blue glass; no lids; labels OK</i>  NO dirty containers!	 <i>For all: flatten</i> <i>Curbside service: bundle & tie</i> CORRUGATED CARDBOARD only!  CLEAN pizza boxes

Total Recyclables Collected: ~3,600-4,000 tons/year
Tin, Aluminum, & Plastics (TAP): ~400-470 tons/year
Plastics only: ~100-120 tons/year
 This includes plastics types #1, #2, and select #5

Estimated Total Plastic Waste Generation for Jefferson County: ~575 tons/year



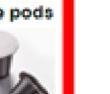
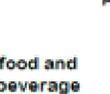
Limitations on Feedstock Sourcing



Curbside service issues

Recycling in Jefferson County  **Keep it CLEAN and EMPTY to keep it RECYCLABLE!**

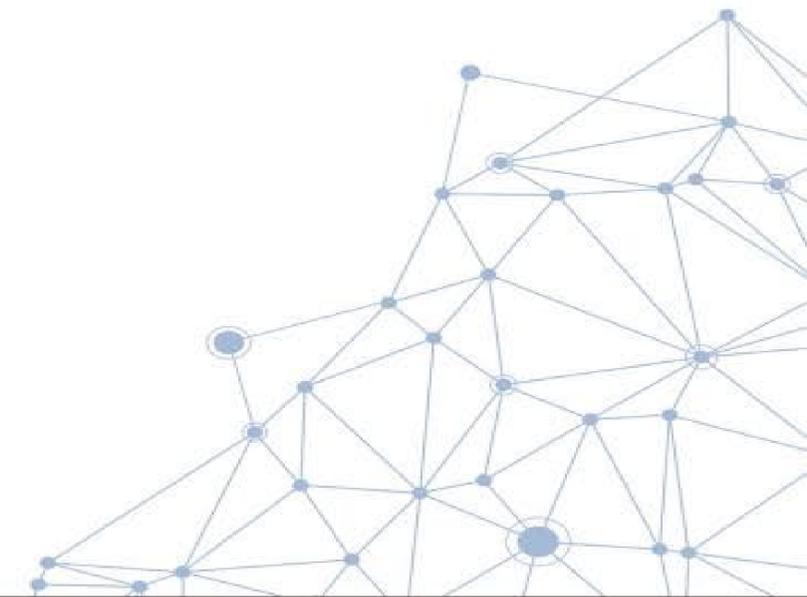
Please Place in the TRASH - they will CONTAMINATE the recycling!

 Plastic lids & caps	 clam shells	 deli containers	 plastic tubs	 coffee cups and lids - new and used	 metal lids	 drinking glasses	 light bulbs	 blue glass	 coffee pods
 crinkly plant pots	 plastic cups, straws & lids	 plastic utensils	 food and beverage cartons	 prescription bottles	 Pyrex glass	 plastic bags, plastic wrap (see back to recycle)			

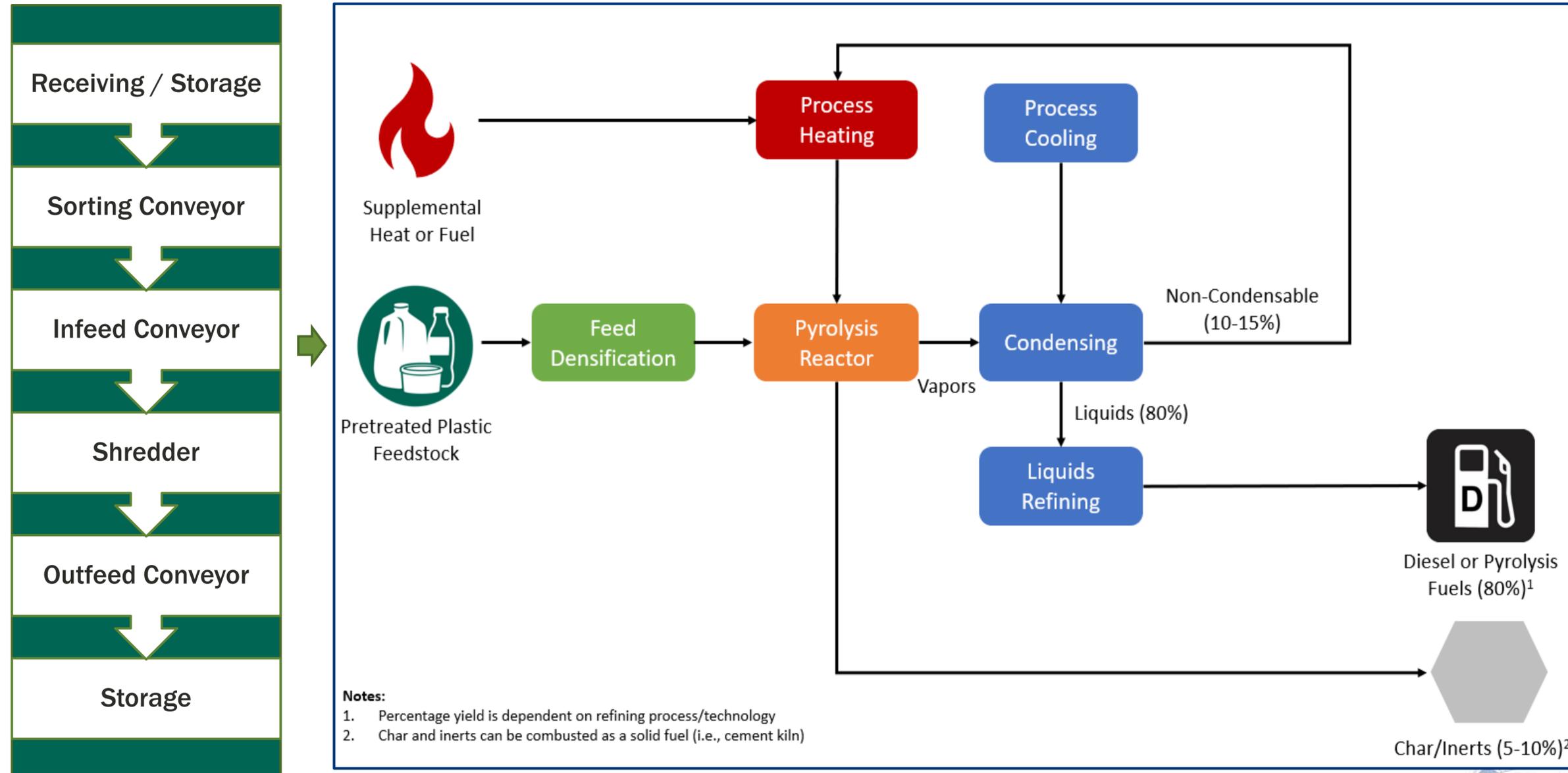
Contamination issues



Reduction of single-use plastics

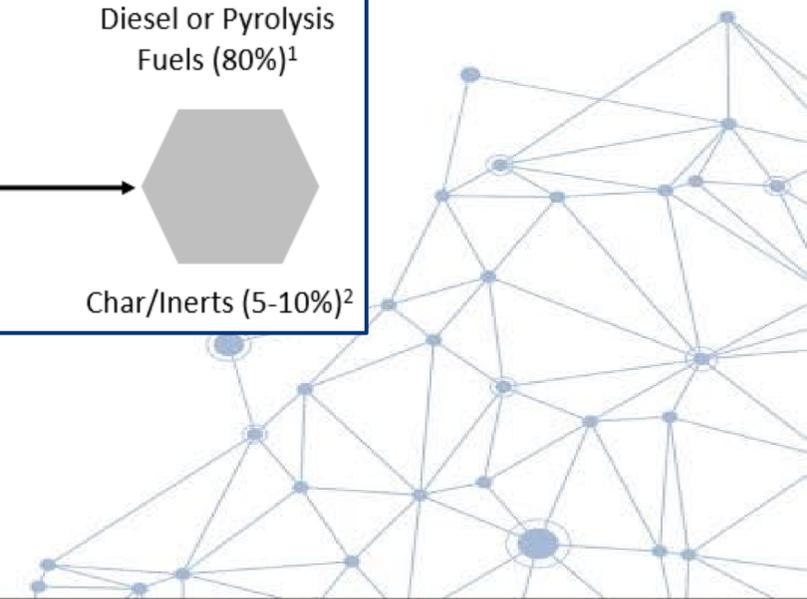


Pretreatment and Pyrolysis System



PRETREATMENT SYSTEM

PYROLYSIS SYSTEM



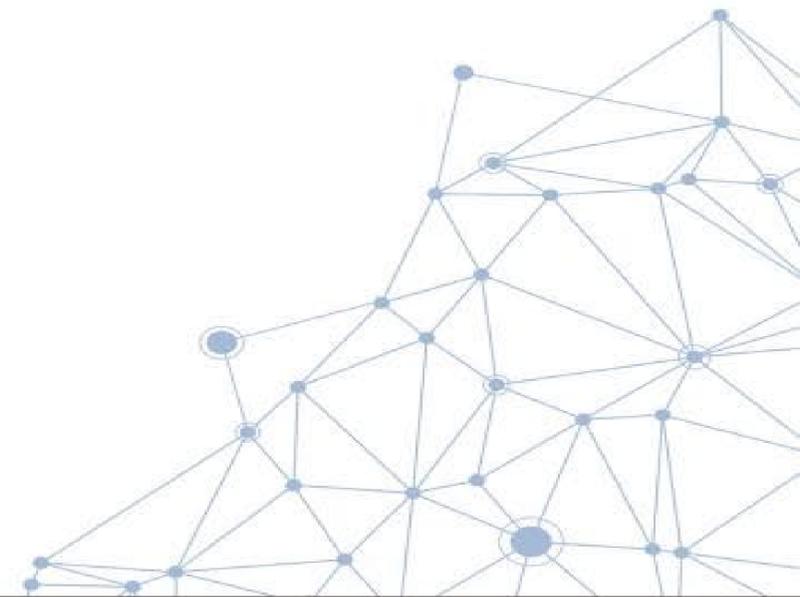
Conclusions & Recommendations

Feasibility is highly impacted by:

- Limitations on feedstock quantities and sourcing
- Project economics based on scale
- Offtake of products

Recommendations:

- Detailed waste composition study
- Options for larger scale project
- Consider locating near existing MRF facility
- Local/regional market assessment for products



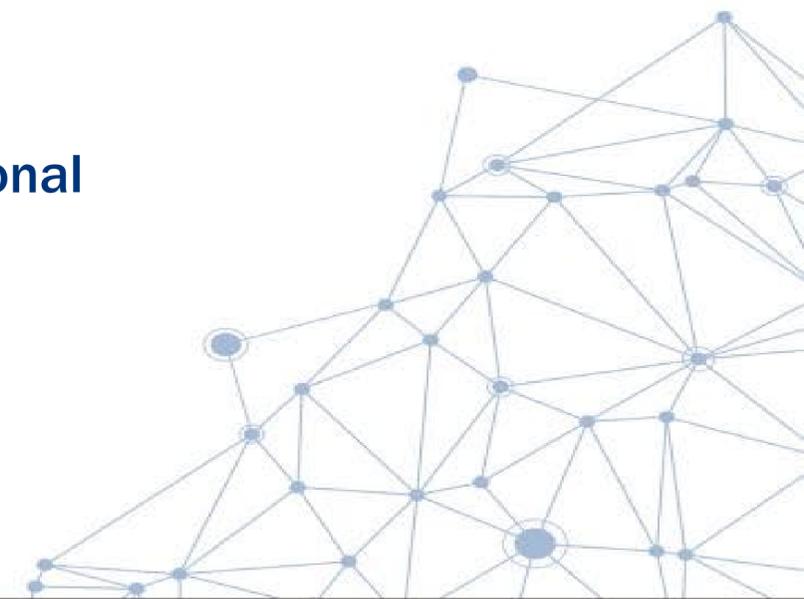
Thanks to our Project Team & Partners

Recycling Development Center grant received by the Port of Port Townsend from the Washington State Department of Ecology.

Tetra Tech would like to provide special thanks to:

- **Eron Berg** – Executive Director of the Port of Port Townsend
- **Eric Toews** – Deputy Director of the Port of Port Townsend
- **Pete Langley** – Port Foundry
- **Al Cairns** – Solid Waste Manger of Jefferson County Department of Public Works

Please contact Kimberly Porsche, P.E. (Kimberly.Porsche@tetrattech.com) for additional information or questions.



Seattle Office of Economic Development

Stephanie Gowing

- Circular innovation challenge
Grant amount \$35,000





Stephanie Gowing
Green Business Advocate
Seattle's Office of Economic
Development



Erin Nelson

Exec. Director

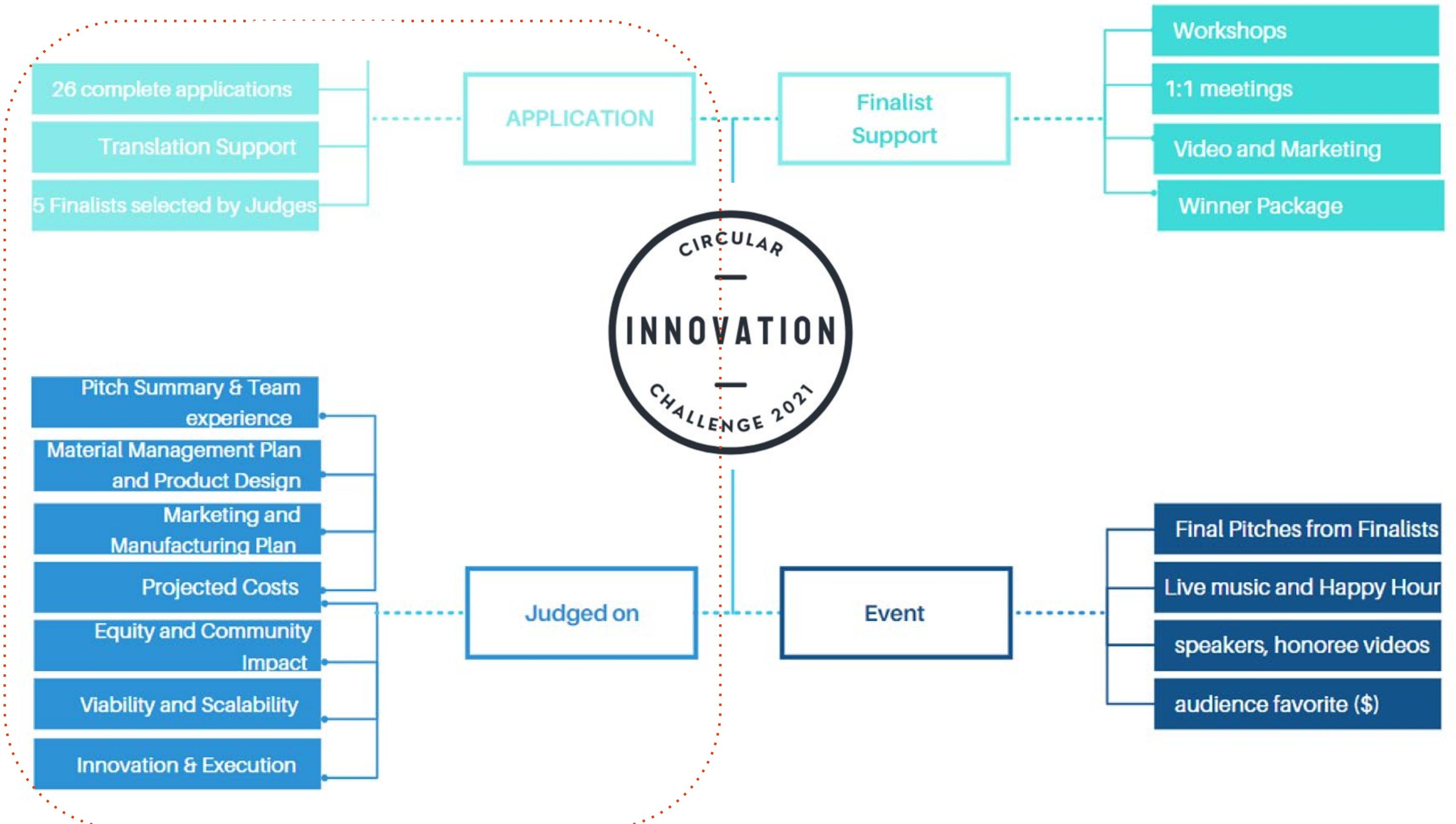
Seattle Good Business Network



**Nico Onoda-
McGuire**

Program Manager

Program Trailer [HERE](#)



2021 Judges



HEATHER TRIM

Zero Waste WA,
Executive Director

▶ [About Heather](#)



XENIA DOLOVOVA

Zero Waste WA, Waste
Reduction Program
Manager

▶ [About Xenia](#)



EMILY COLEMAN

King County,
Sustainable Purchasing
Specialist

▶ [About Emily](#)



ANDY SMITH

King County, Circular
Economy Program
Manager

▶ [About Andy](#)



NATASHA RIVERS

BECU, Sustainability &
Measurement Program
Manager

▶ [About Natasha](#)



MIGUEL MORENO

Impact WA, Small &
Rural Manufacturers

▶ [About Miguel](#)



SARAH O'SELL

ZVerse, B2B Software
Marketing and
Communications

▶ [About Sarah](#)



LAUREN BROHAWN

University of
Washington, Assistant
Director with the Buerk
Center for
Entrepreneurship

▶ [About Lauren](#)



MOJI IGUN

Blue Dadi Consulting,
Founder

▶ [About Moji](#)



ANDREW MANGAN

United States Business
Council for Sustainable
Development, Founder
& Executive Director

▶ [About Andy](#)



DIRK WASSINK

President, Second Use

▶ [About Dirk](#)



ALESSANDRA PISTOIA

Waste and Circular
Economy Program
Manager at Microsoft

▶ [About Alessandra](#)



BOB ZAK

Powerlight, COO

▶ [About Bob](#)



GAGE MITCHELL

Modern Species,
Founder & CEO

▶ [About Gage](#)



JOEL DASHNAW

Accountant Manager,
Republic Services

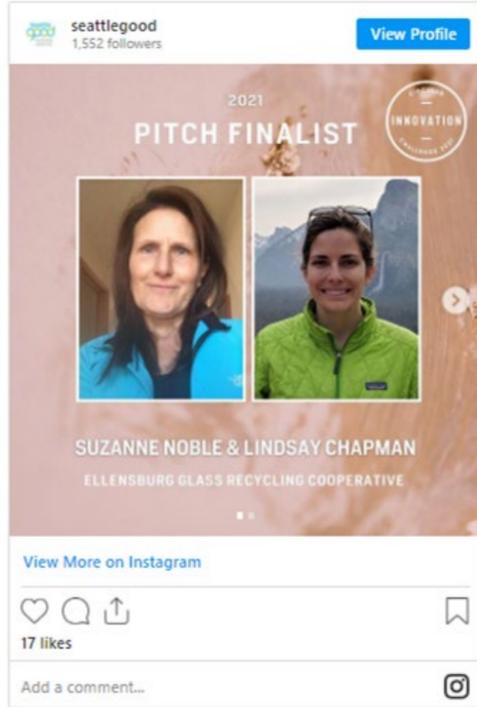
▶ [About Joel](#)



KAHREEN TEBEAU

Seattle Public Utilities
Senior Policy Advisor

Ellensburg Glass Recycling Cooperative (EGRC)



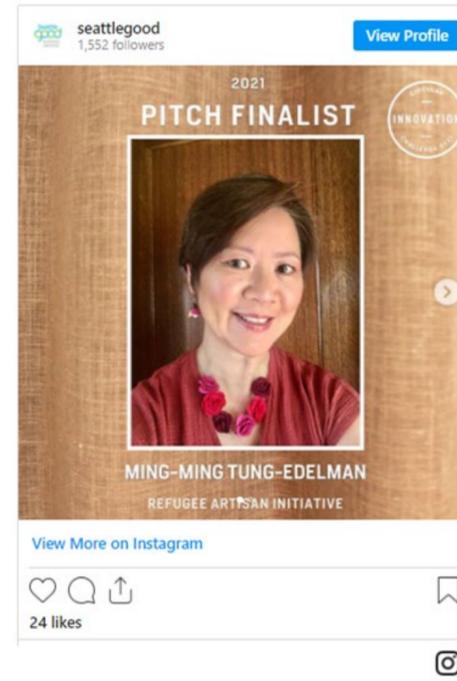
Product Idea: Desert Sand

"Glass sand has unlimited potential – it is non-toxic and even if we reuse and develop a sanitization facility and reuse bottles 50 times – eventually we will have to recycle them! Most community members agree that glass should be recycled so it is a non-partisan unifying endeavor."

-Suzanne Noble



Refugee Artisan Initiative



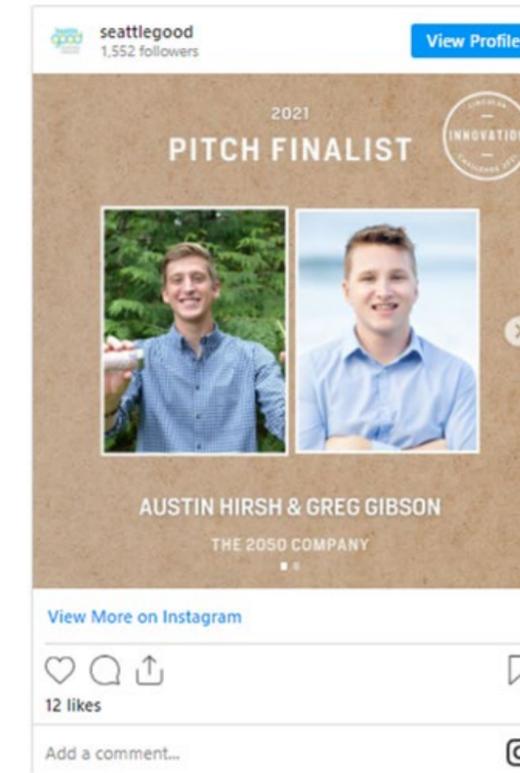
Product Idea: Zero Waste Pet Bedding & Accessory Collection

"As an immigrant and someone who cares deeply about our planet, I believe circular and equitable economy will make our world a better place. It's a win-win for everyone."

-Ming-Ming Tung-Edelman



The 2050 Company



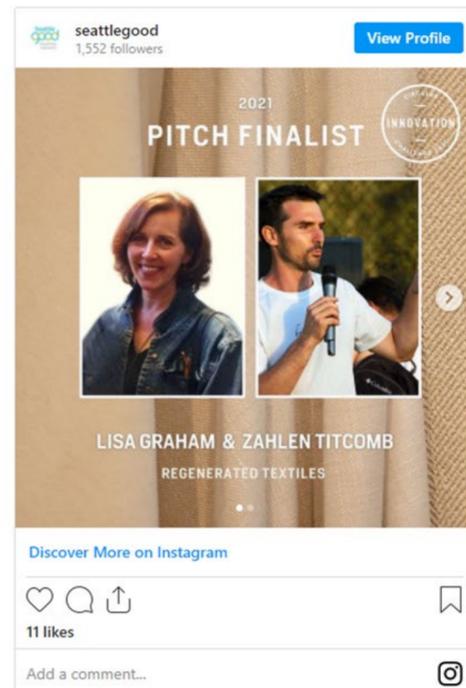
Product Idea: The 2050 Smoothie

"The 2050 Company is committed to creating value where there is currently waste. We all want to live in a better world a few decades from now, and Project Drawdown has identified reducing food waste as the #1 best way to prevent global warming of 2 degrees Celsius by 2050."

-Greg Gibson



Regenerated Textiles



Product Idea: Transform textile waste into local circular economy clothing

"Clothing is one of the tools we use to define our selves. I believe that if we can create momentum behind a circular business model in apparel, we can change the way people think about themselves, and in turn, affect the way they think about consumption."

-Zahlen Titcomb



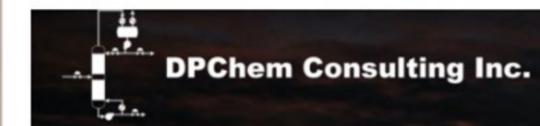
DPChem Consulting Inc.

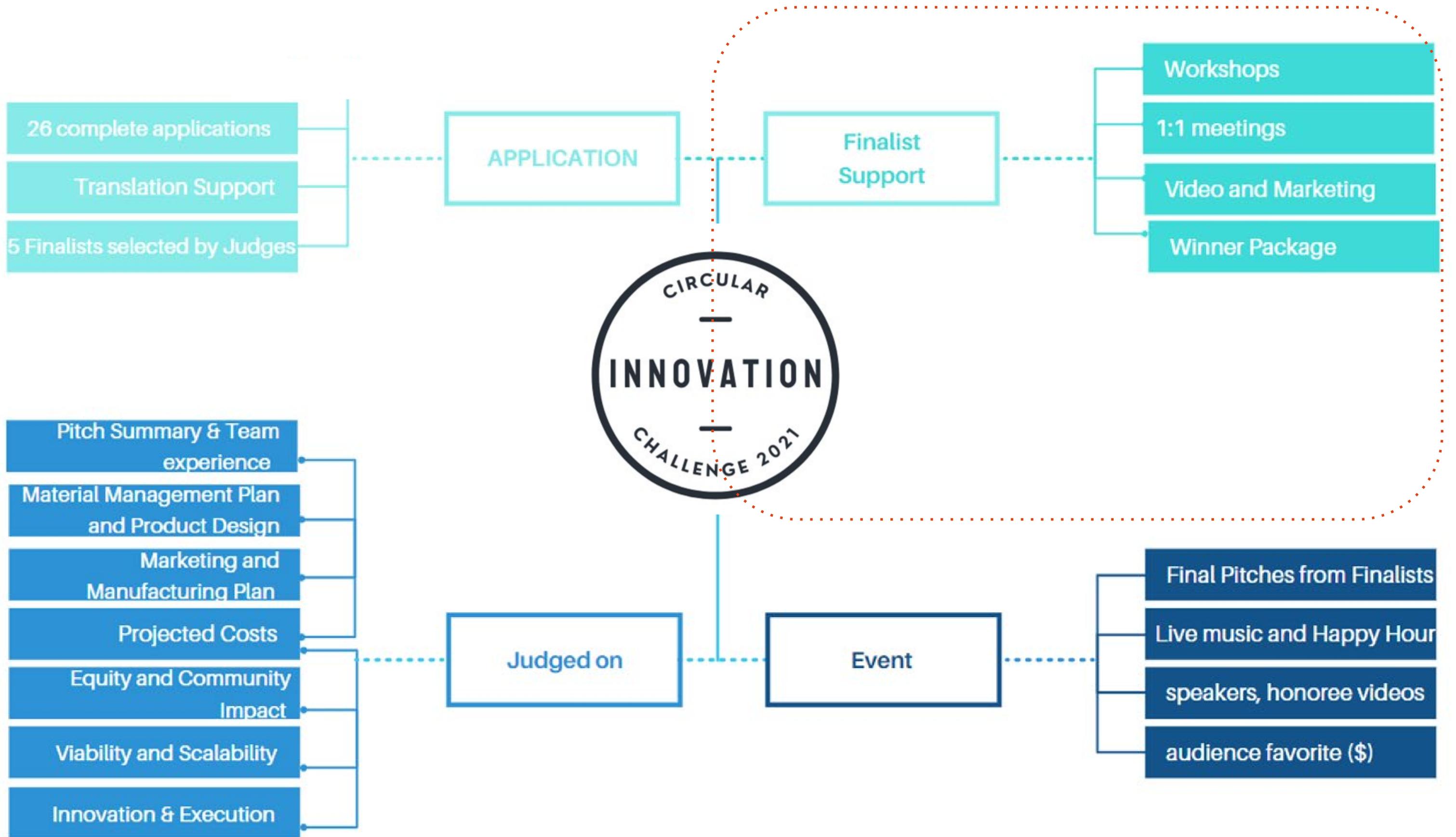


Product Idea: Brown Grease Biodiesel

"I have been involved in waste to energy/fuels projects for over 30 years, and feel that this technology is particularly applicable to today's waste disposal issues and energy needs."

-Daniel Parker







ADRIAN TAN

KING COUNTY, POLICY & MARKET DEVELOPMENT MANAGER

WORKSHOP 1: HOW READY IS YOUR PRODUCT FOR CIRCULAR BUSINESS?

WORKSHOP 2: CIRCULAR BUSINESS MODELS



RACHELLE AMES

CLEAN TECH ALLIANCE, SR. DIRECTOR, COMMERCIALIZATION & OUTREACH

WORKSHOP: 1/2 PITCH PREP HONING YOUR PRESENTATION AND PITCH DECK



ERIN GAGNON

RECOLOGY, GOVERNMENT AFFAIRS & COMMUNITY RELATIONS MANAGER

WORKSHOP: HOLISTIC CIRCULAR PRODUCT DESIGN



Jay LYMAN

SEATTLE PUBLIC LIBRARY, LIBRARIAN

WORKSHOP: BEYOND GOOGLE: DIY MARKET RESEARCH USING LIBRARY RESOURCES



BEHNOSH NAJAFI

CIRCULAR BY DESIGN, PRINCIPAL AND FOUNDER



YOLANDA SAITO

IMPACTI, DIRECTOR OF INNOVATION & PARTNERSHIPS

WORKSHOP: LEARN HOW YOUR CIRCULAR DESIGN MAKES GLOBAL IMPACT



NICK MENDOZA

FOUNDER & CEO, NEPTUNE FISH JERKY

WORKSHOP: 2/2 FINAL PITCH PREP



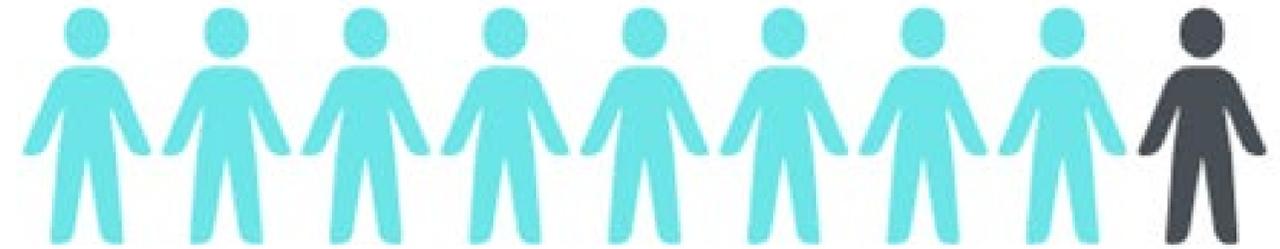
PETER BAILEY

ADROIT COLLECTIVE LLC

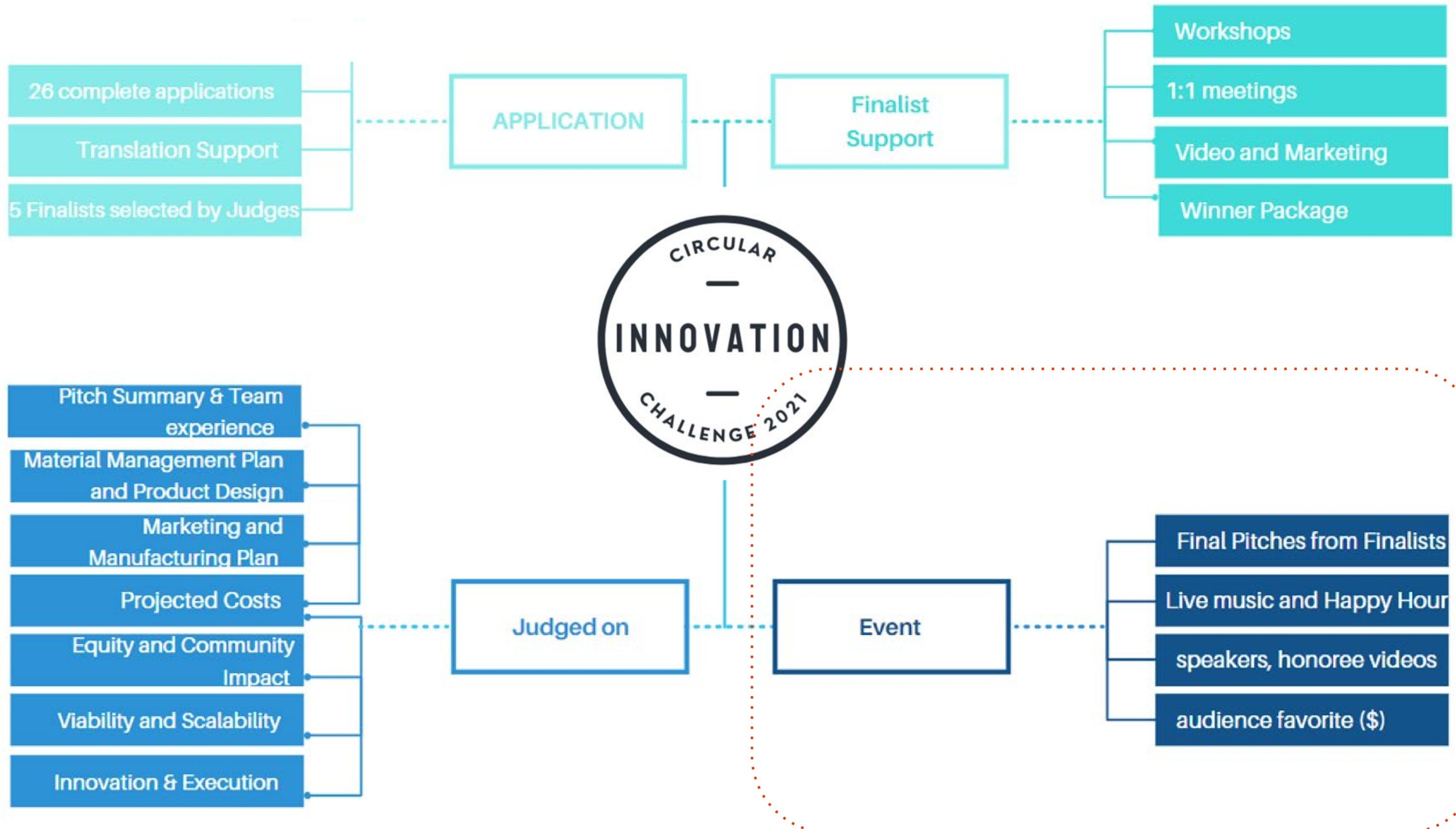
WORKSHOP: DESIGNING YOUR CIRCULAR BUSINESS MODEL



Over 60% of participants followed up with Mentors after each workshop



Only 1 workshop had less than 100% attendance rate





In 2018, Seattle-area employers advertised 44 open jobs that mentioned "circular-economy".

In 2020, that number has jumped to 450 job. More than 10x in 2 years

We should continue to support entrepreneurs and the circular marketplace

Proposals for 2022 Event

- Partner and grow to grow inclusive applicant pool
- Refine and increase the breadth of mentors and provided workshops for Circular Innovation Challenge participants and finalists
- Separate programing into 2 tracks.
 - startups/student teams with new product idea (needs prototyping)
 - startups/businesses pitching an expansion of existing/new product
- Seperate tracks based on specific material streams
- Leverage WA Material Marketplace



Program Trailer [HERE!](#)

Stephanie Gowing
Green Business Advocate
Seattle's Office of Economic
Development



Erin Nelson

Exec. Director
Seattle Good Business Network



**Nico Onoda-
McGuire**

Program Manager

Seattle Good Business Network

Lopez Island Solid Waste Disposal District

Nikyta Palmisani

- The ReMakery
Grant amount \$50,000





The ReMakery, Lopez Island

Dedicated to using materials from LSWDD's recycle plaza and free store

Nikyta Palmisani, August 2021

Thanks to the Department of Ecology Grant,
the ReMakery opened it's doors May 2021

From Recycle and Reuse to ReMade!

- LSWDD: community run drop box facility which handles island waste, self separated recycling, and free exchange of reusable items
- “Take It or Leave It” (TIOLI) free store, pre-Covid took in 24,000/lbs of donations per MONTH
- Housewares, clothing, textiles, tools, books, toys, furniture, electronics & appliances, etc
- What is not reused goes into recycle streams, only about 1,000/mo into landfill
- What was needed was a dedicated space, tools and instruction to turn these materials into new items locally to increase diversion



Thanks to the Dept of Ecology start up grant, the ReMakery opened May 2021 and offers:

-Classes & Workshops

-Repair Cafe's once a month

-A Maker in Residence Program

-Space, tools and instruction for the community to reuse, repurpose, repair and remake their own materials belongings



Two dedicated spaces:

Below: "Fiber" dedicated to textiles & jewelry making with sewing machines, sergers, hand tools, organized bins of textiles and materials, & Retail space



Above: "Spark" with laser cutter, 3D Printers, electronics tools, tools for repair cafes, and Maker in Residence Work spaces

About Systems Change

Not just arts and crafts

- Tours of the ReMakery educate visitors who might not know about LSWDD on the scale of materials donated to TIOLI and shipped off Lopez. Some examples:
- 4,000 lbs/week of new donations
- 1,000 lbs week of textiles recycled
- 300 lbs/week of books recycled
- How to increase the circular economy by local reuse to reduce emissions, transport, & waste





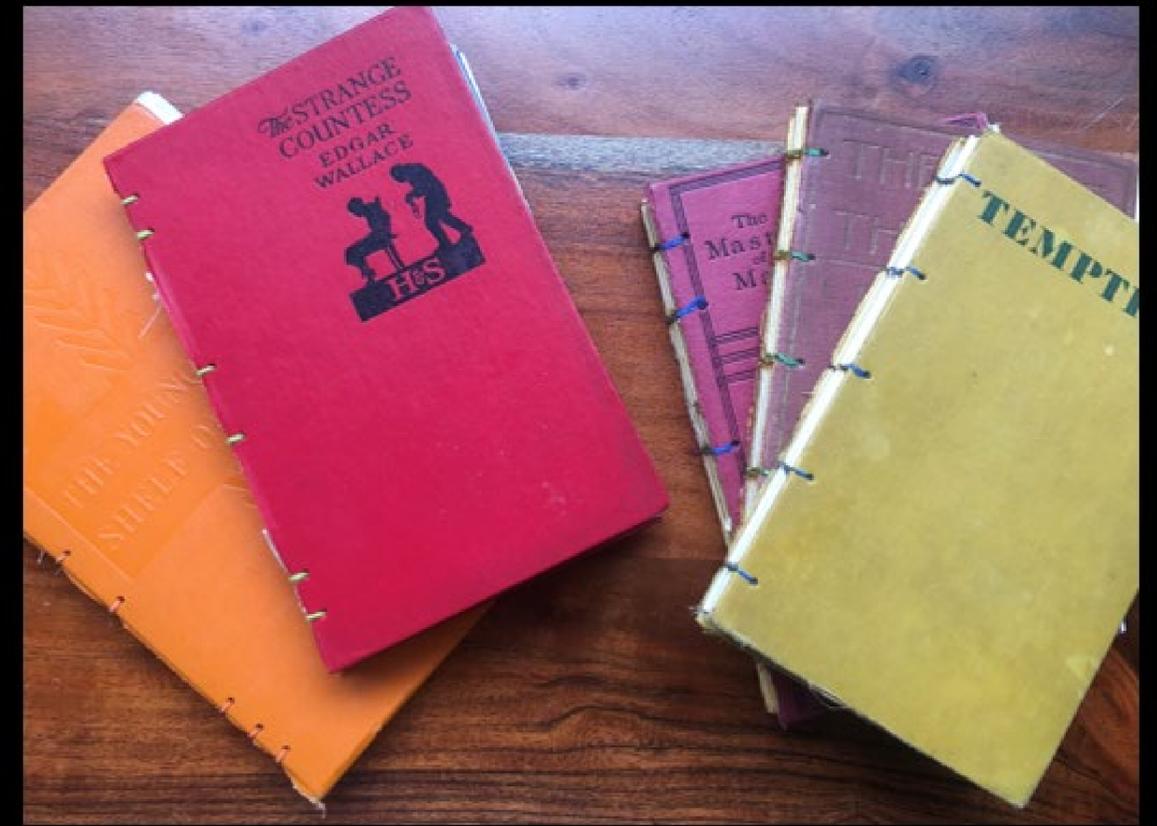
The LSWDD to
Remakery Pipeline:

Lopez citizens self
separate recyclables
at LSWDD

Volunteers at
Recycle plaza & TIOLI
help keep them
clean & organized

Organized materials
make it easy for
Makers to take & use
what they like

ReMakery gives a space
and tools for their
local transformation
& reuse



Class example:
A sweater
destined for recycling

Diverted into reuse

Deconstructed into
raw materials

Remade into new
object locally

Reused or sold locally

Increasing the
Circular Economy
On Lopez Island

Decreasing emissions
from transport and the
burning of fossil fuels

Upcycling materials that
might end up in landfill



Maker in Residence Program

- Free, 4 Week Program
- Dedicated workspace & unlimited access to ReMakery
- Unlimited access to LSWDD materials from recycle & TIOLI
- Makers offer a class or workshop during their residency
- Results in monthly art show educating the public
- Makers sell their creations, and a portion of the proceeds go back to the ReMakery
- Makers donate one piece to ReMakery permanent collection



Monthly Repair Cafes

Volunteers provide free simple repairs for electronics, small appliances, furniture, textiles, and jewelry



Circular Economy favorite example:

- Fabric scraps used to be recycled, now landfilled due to Covid breaks in supply chain
- One maker designed these cushions as ottomans, meditation cushions, dog beds
- She made a template
- Now Lopez textile artists, costumers, quilters now create these cushions, stuffed with their textile scraps
- Remakery then sells them





Empowering Our
Community to:

Reduce waste
Rethink recycling
Increase reuse
Value their belongings

Repair

Repurpose

Collaborate

Share resources & skills

Increase education
& engagement

Educate future generations

Increase entrepreneurship

Increase volunteerism

Be Part of a
Zero Waste Future!





www.lopezsolidwaste.org/remakery

Nikyta Palmisani: nikytap@lopezsolidwaste.org

City of Leavenworth

Carl Florea

Presentation by Heleene Tambet, Waste Loop

- Food waste collection feasibility study
Grant amount **\$32,382**



City of Leavenworth

Food waste collection feasibility study



Prepared by Waste Loop



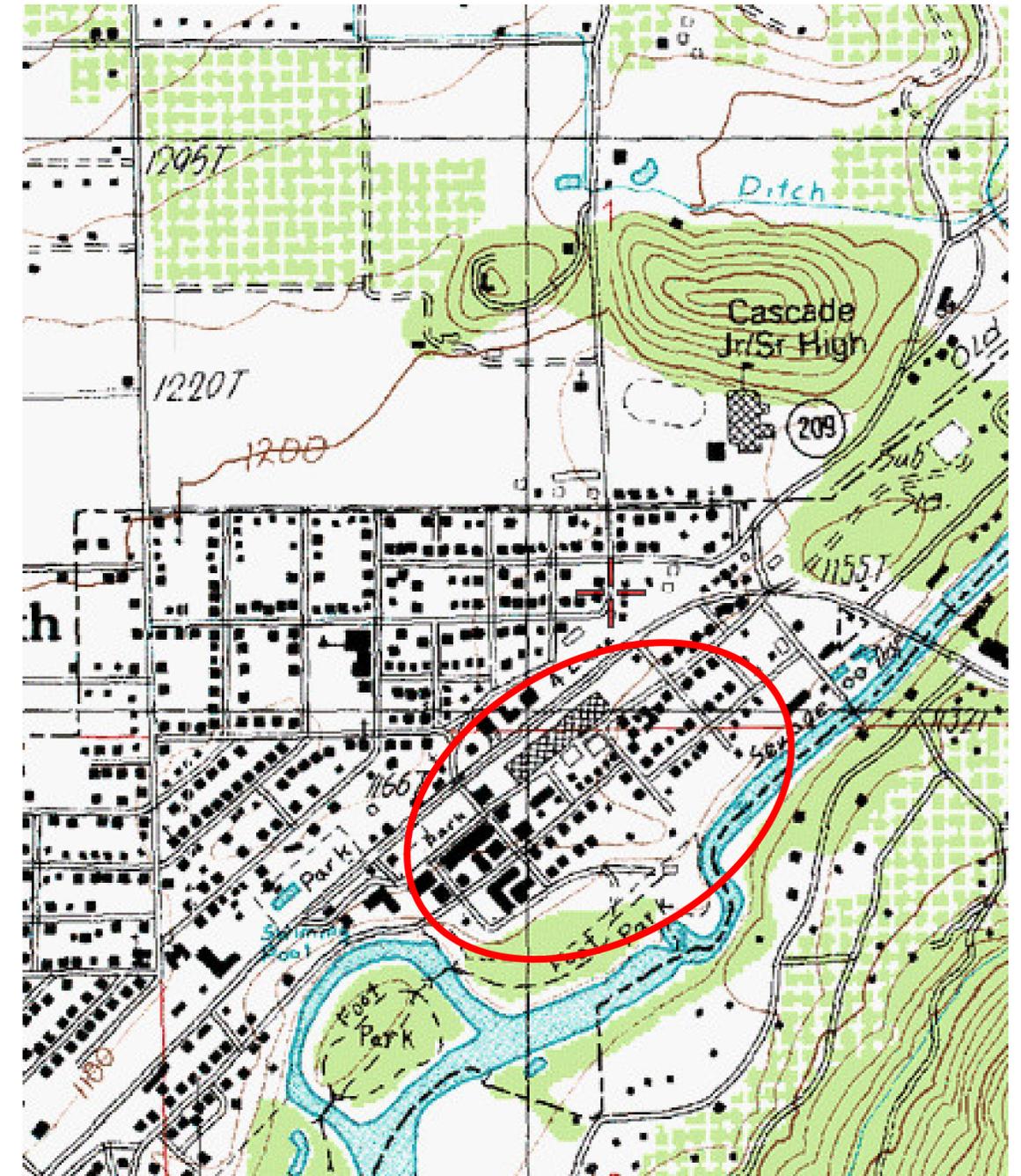
Heleene Tambet | August 11, 2021

Current waste operations

- The City hauled residential waste until Feb '19, now **only commercial waste**
 - Municipal solid waste & cardboard collected from 159 accounts
 - Waste Management covers residential waste & recycling within city limits and surrounding county
 - **No compost** for commercial or residential clients
 - Commercial waste logistics:
 - Each business' waste picked up 1–6x/week
 - In 2019, average of **189 tons and \$17,000 in tipping fees per month**, or \$202,000/year
 - Destination: Dryden Transfer Station
 - Waste Management governs the tipping fees, price increases have been 1%–3.5%/year
 - Yet the latest change from Jan '20 to the current rate (\$95/ton) is a **7.95% increase**
 - Winton MFG = **the first commercial composting facility** in Leavenworth & Wenatchee Valley
-

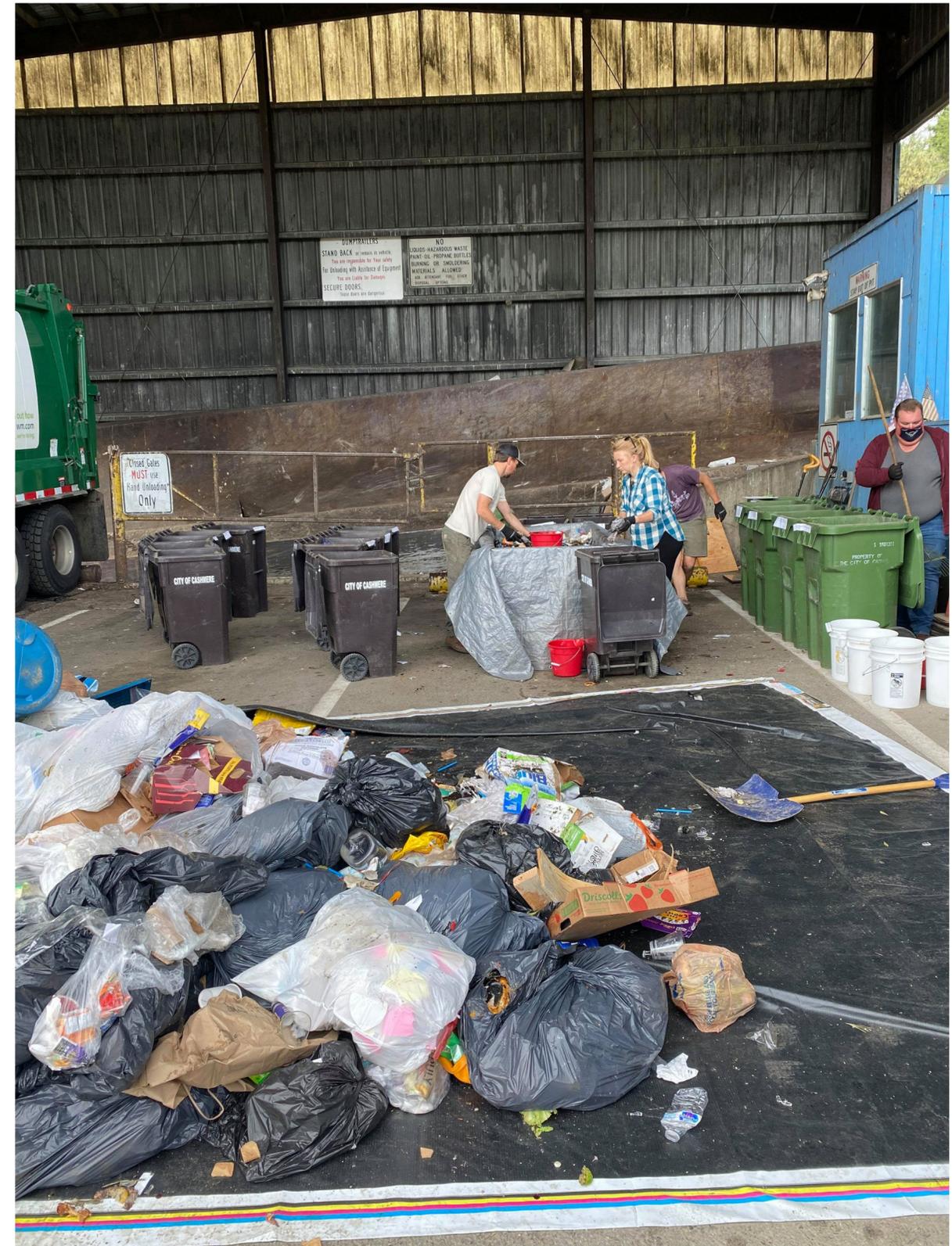
City-wide waste audits

- Objective
 - Estimate the **share of organic waste** within commercial waste stream
 - Assess **other diversion potential** for City's waste
- Methodology
 - Modified random sampling
 - Stratification by business types
 - Core downtown area (lots of restaurants)
 - All other commercial accounts (hotels, etc.)
 - Maximum # of samples given the labor constraints

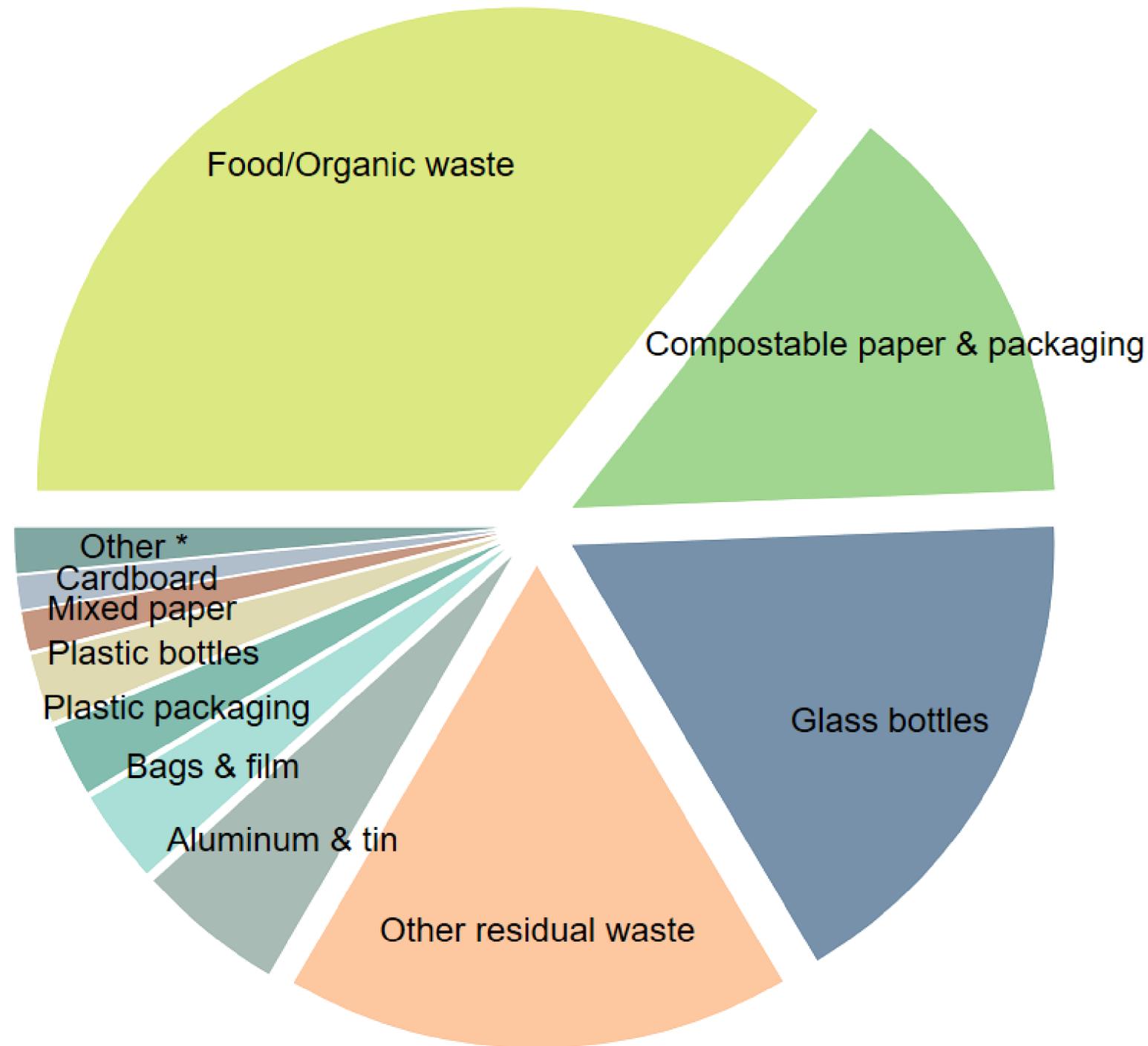


Logistics

- 10+ volunteers
- May 24 & June 7, 2021 (Mondays)
- Weekend's waste from two separate routes (strata)
 - Random samples pulled from each truck
- 15 waste categories
 - Compostability defined based on the capacity of the new facility

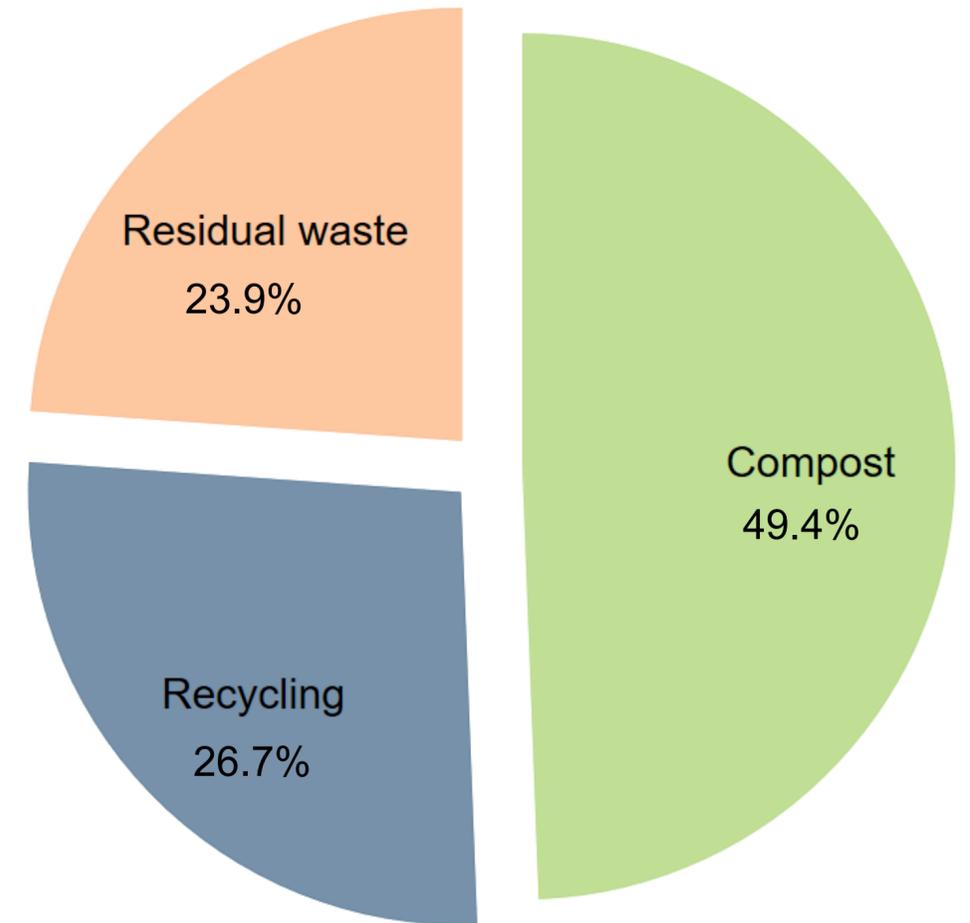
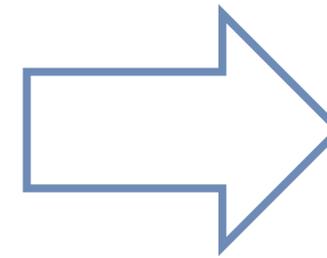
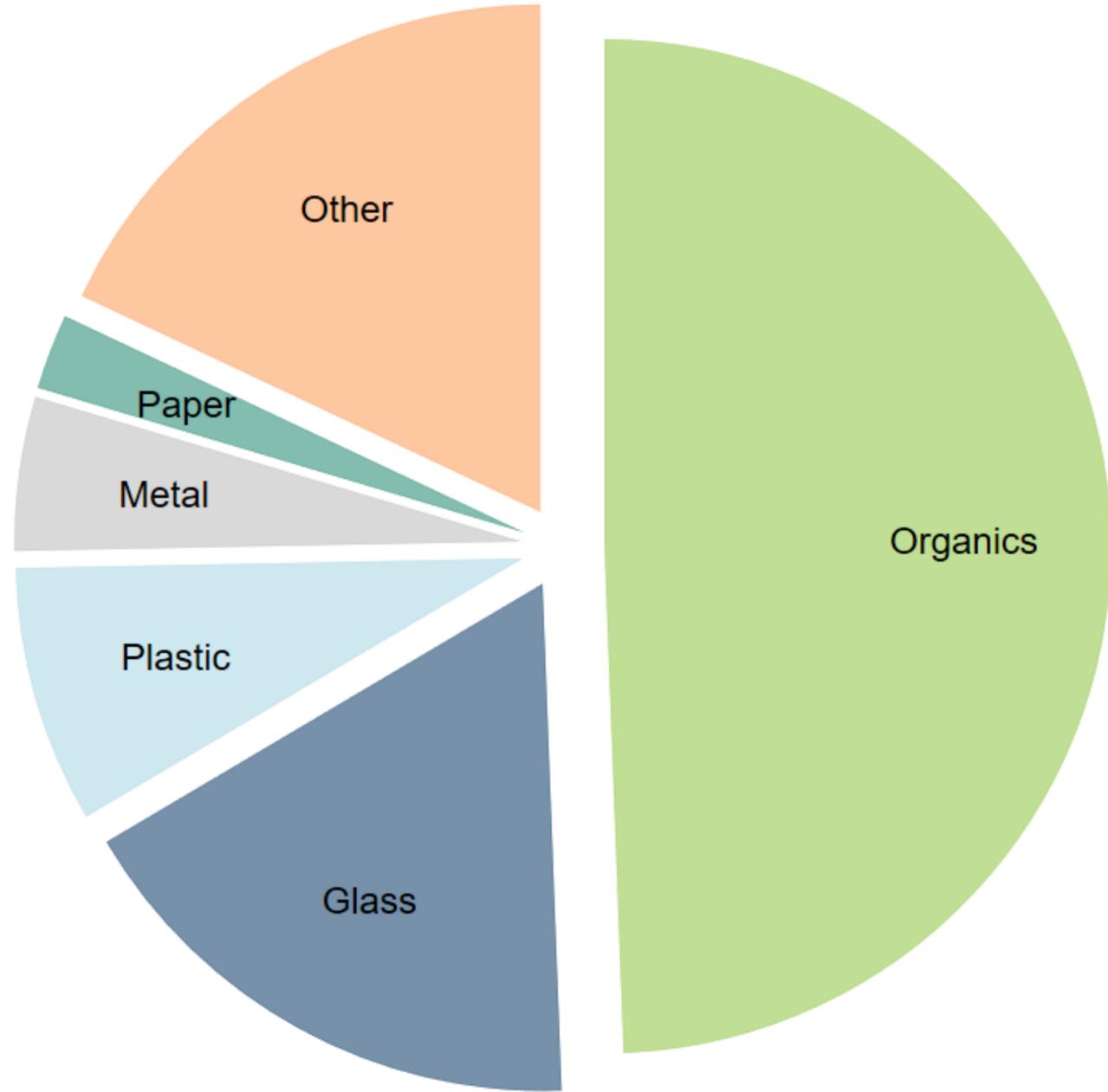


Results



- Weight of all waste surveyed = 2386.1 lbs.
- Differences between the two audits:
 - Compost 55% (downtown) vs 43% (other commercial)
 - Aluminum 2% vs 8%
- Final results: averaged over the shares from the two days

* Other here includes all categories that represented <1% of the total weight: electronics (0.6%), tetra packs (0.4%), styrofoam (0.4%), batteries (0.1%)

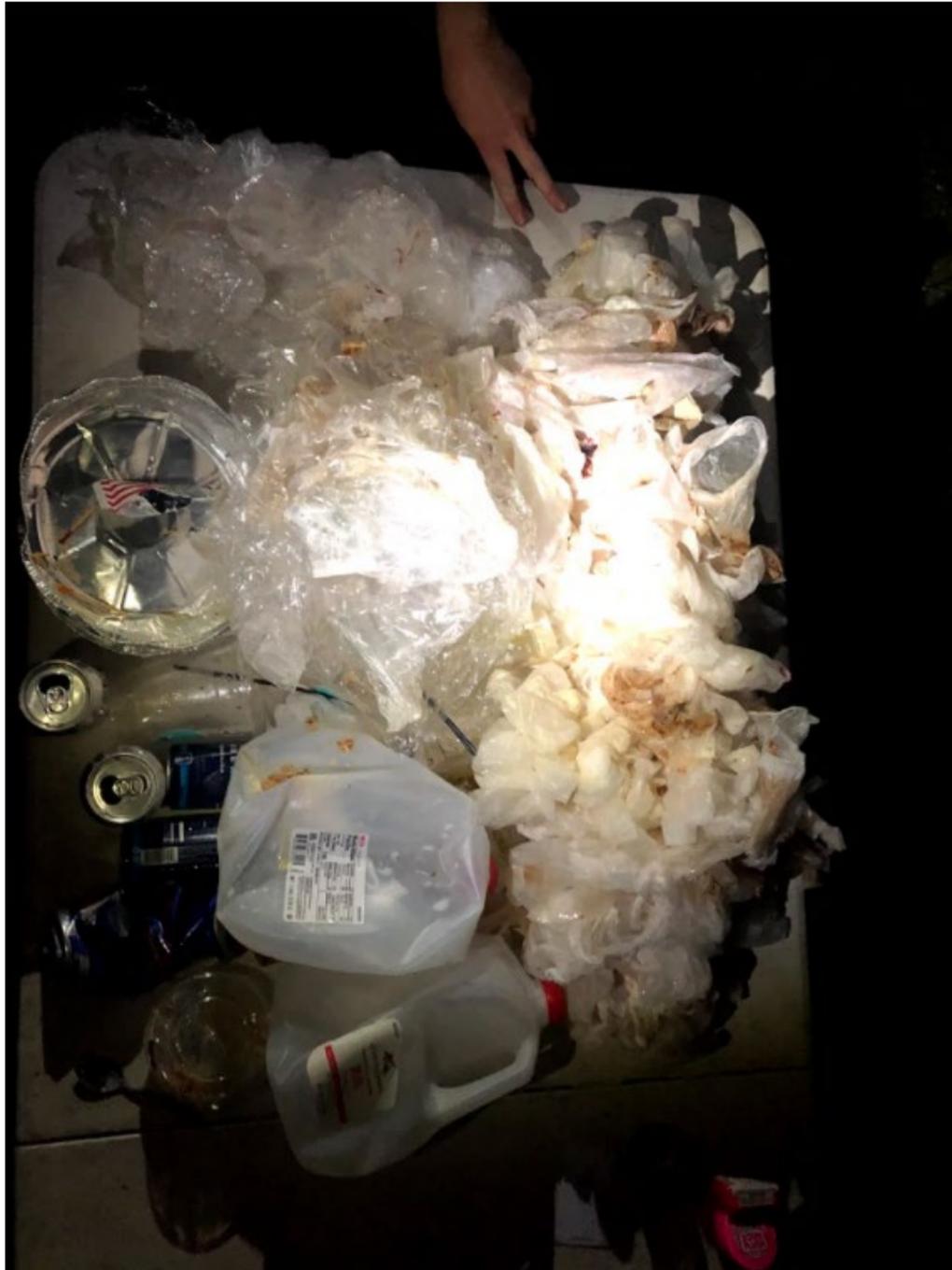


Categories are aggregated as: compost (food/organic waste, compostable paper & packaging), recycling (cardboard, mixed paper, glass bottles, plastic bottles, aluminum & tin), residual waste (plastic packaging, bags & film, styrofoam, electronics, tetra packs, batteries, all other residual waste)

Categories are aggregated as: organics (food/organic waste, compostable paper & packaging), paper (cardboard, mixed paper), glass (glass bottles), plastic (plastic bottles, plastic packaging, bags & film, styrofoam), metal (aluminum & tin), other (all residual waste, electronics, tetra packs, batteries)

Restaurant audits

- **Goal:** assess the share of compostable waste in food service businesses specifically
- 4 restaurants >> 1 day's worth of waste from each
- On average, **83.7% of all waste** was compostable
- Businesses' sales data was used to compare the audit day to annual sales volume:
 - The largest of the businesses could have diverted 34,510 lbs. of waste in 2019 if composting had been an option
 - Collectively, the businesses could have diverted over **69,500 lbs. of waste in 2019 alone** if composting had been an option



Results

		München Haus	Yodelin Broth Company	Whistle-punk Ice Cream	Icicle Brewing	AVERAGE
WASTE BY WEIGHT	Total weight (lbs.)	172.2	231.1	35.2	24.8	
	% compost	79.8%	97.0%	81.3%	76.6%	83.7%
	% trash	20.2%	3.0%	18.7%	23.4%	16.3%
WASTE BY VOLUME	Total volume (gal)	230	120	30	36	
	% compost	60.0%	75.0%	50.0%	66.7%	62.9%
	% trash	40.0%	25.0%	50.0%	33.3%	37.1%
2019 PROJECTIONS	Total weight (lbs.)	43,251	31,514	N/A	5,893	
	Compost weight (lbs.)	34,510	30,559	N/A	4,515	
	Trash weight (lbs.)	8,741	955	N/A	1,378	
2019 PROJECTIONS	Total volume (gal)	57,768	16,364	N/A	8,555	
	Compost volume (gal)	34,661	12,273	N/A	5,703	
	Trash volume (gal)	23,107	4,091	N/A	2,852	

Lessons learnt

- In ideal conditions, 50+% City's commercial waste could be diverted as compost
 - Up to \$100,000 could be saved/re-channeled towards compost thanks to reduced tipping fees
 - In reality, a smaller percentage due to practical reasons, awareness/cooperation of staff, visitors, etc.
- Finding alternatives to small things matters
 - E.g., 8 lbs. of rubber gloves
 - Condiment containers
- Strategic targeting of compostables
 - E.g., coffee in hotels
- Many restaurants interested in conscious practices



Next steps

- Winton MFG = the first commercial composting facility in Leavenworth & Wenatchee Valley
 - In long-term, options for collection and hauling services: the Public Works Department, Waste Management, or a private organization
 - Aim to launch a pilot program to collect & haul food waste in 2022
 - 1-2 years
 - Businesses joining on voluntary basis
 - Drop-off sites for residential compost
 - The City & Waste Loop have purchased a hauling truck and have toter carts
 - Costs covered by a mix of funds
 - Identifiable designation to those participating
 - Follow best practices determined by a review of food waste collection operations *
-

Next steps (cont.)

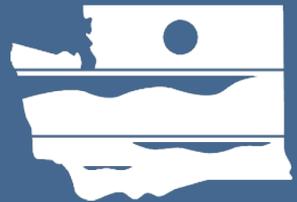
- Initial Community Composting survey conducted in June 2021 (N=99):
 - 89% would be interested in utilizing a food waste drop-off point in town
 - 68% would be interested in a food waste pickup service
 - Surveys with downtown businesses will be next
 - Concerns, willingness to pay/not pay, needs in terms of infrastructure
 - Seeking opportunities to work with the school district (educational programs), the farmers market (outreach, perhaps compost drop-off), and develop educational materials in English & Spanish
-

Thank you!



* Appendix: Best practices identified through review of compost operations

1. A customized organic waste management plan for each business
 2. Staff training & orientation (practicalities but also the 'big picture' of importance of organics diversion)
 3. Supplying both the primary 'kitchen' container and the secondary larger tote container (rolling toter carts, "engineered" for venting, locking)
 4. Provision of free signs & educational material >> incentive for customers
 5. Personalized organic waste diversion statistics for each business >> marketing material
 6. Reciprocal promotions for participating businesses
-



Center Updates

Board member roundtable

Ecology update

Commerce update

Subcommittee update

Attendee comments



Board roundtable:

Corinne Drennan



Karl Englund



Kyla Fisher



Deb Geiger



Margo Gillaspay



Nina Goodrich



Sego Jackson



Allen Langdon



Scott Morgan



Mike Range



Derek Ruckman



Tim Shestek



Jay Simmons



Heather Trim



Agency updates:

Kara Steward



Brian Young



Board subcommittee update:

Corinne Drennan



Karl Englund



Kyla Fisher



Deb Geiger



Margo Gillaspay



Nina Goodrich



Sego Jackson



Allen Langdon



Scott Morgan



Mike Range



Derek Ruckman



Tim Shestek



Jay Simmons

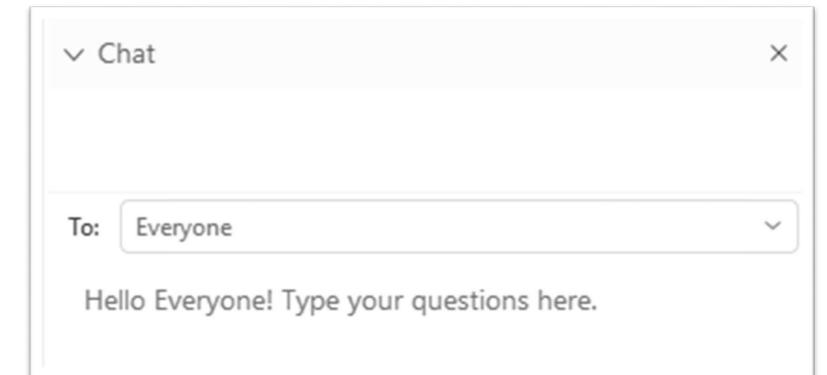
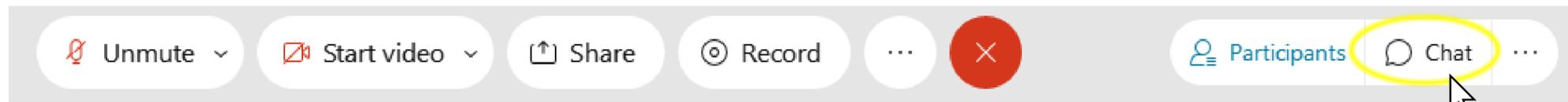


Heather Trim

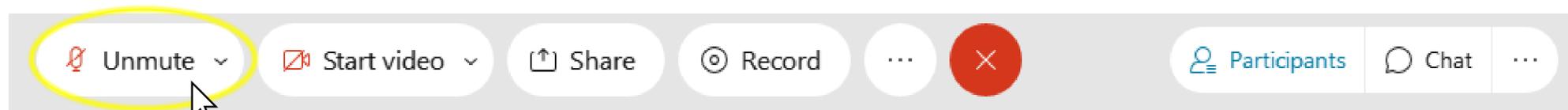


Attendee comments:

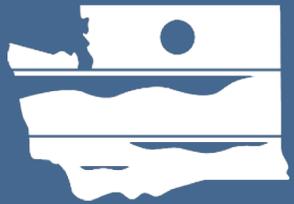
Anyone may use the chat box to ask questions:



Board members may unmute themselves.



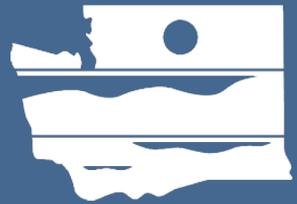
We will read comments from the chat box or unmute attendees for brief comments.



Quick break

5 minutes





Glass presentations

Brian Kristofic – Ardagh

James Nordmeyer – Owens-Illinois

Archie Filshill – AeroAggregates





Ardagh Glass Packaging

Brian Kristofic – Director, Sustainability

Glass food and beverage packaging: Infinitely recyclable

Brian Kristofic – Director – Sustainability
Ardagh Glass Packaging – North America

8/11/21



Our sustainability mission

Provide a packaging solution to our customers that has the least impact on our environment.
Work together with our communities to drive common benefit.

Our approach to sustainability

Our vision is to be the preferred sustainable packaging partner to the world's leading brands



Environmental

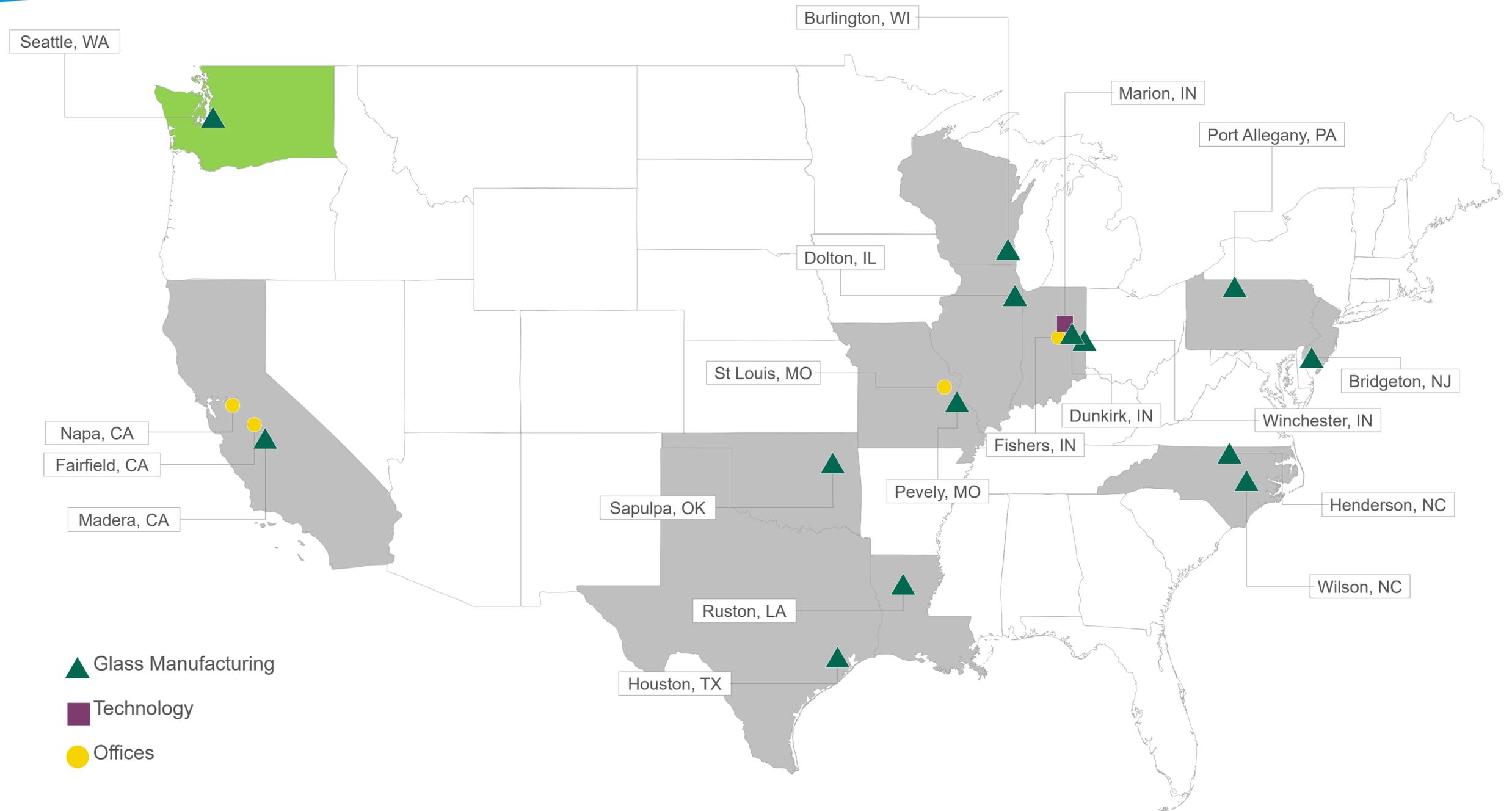


Economic



Social & ethical

14 Glass plants serving local and national markets



Our people and products

- ~4,700 employees in the United States
- ~7 billion glass bottles and jars produced each year
- All 14 facilities ISO 14001:2015 certified



Ardagh in Seattle:

- Approximately 350 employees – over 300 United Steelworkers – producing Clear, Green, and Amber bottles primarily supporting Washington's wine producers
- Located next to our major glass cullet supplier: Strategic Materials
- Supporting STEM education through Project Lead The Way – a 10-year, \$50 Million commitment in the communities in which we operate
 - \$90K granted in our first year to Seattle Public Schools and Highline School District

Glass: A sustainable package



Protects the Product

- Excellent shelf life (guards against moisture and oxygen invasion)
- Maintains true taste



Protects the Consumer

- Chemically inert
 - No protective coating inside
 - Does not leech harmful chemicals into the product
- Rated GRAS (Generally Recognized As Safe) by the FDA



Protects the Environment

- 100% and endlessly recyclable
- Recycled glass reduces energy consumption for melting and producing containers

Material reuse



Europe

Steel

80%

Association of European Producers of steel for packaging (APEAL)

Aluminium

75%

European Aluminium EA

Glass

76%

European Container Glass Federation (FEVE)

North America

Steel

71%

Steel Recycling Institute

Aluminium

55%

Aluminium Association

Glass

34%

Glass Packaging Institute (GPI)

Brazil

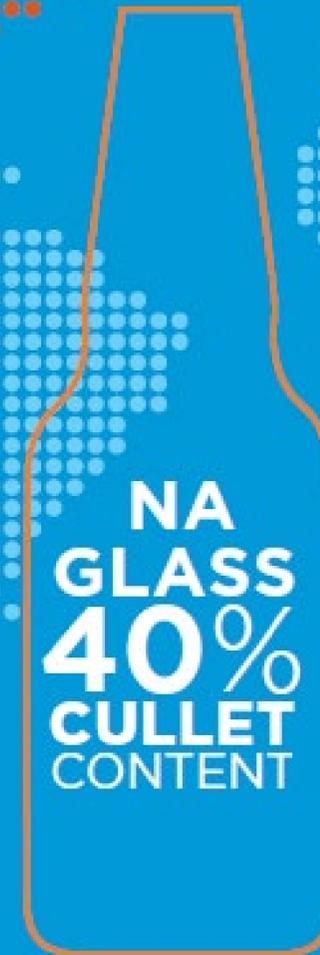
Steel

98%

Abralatas

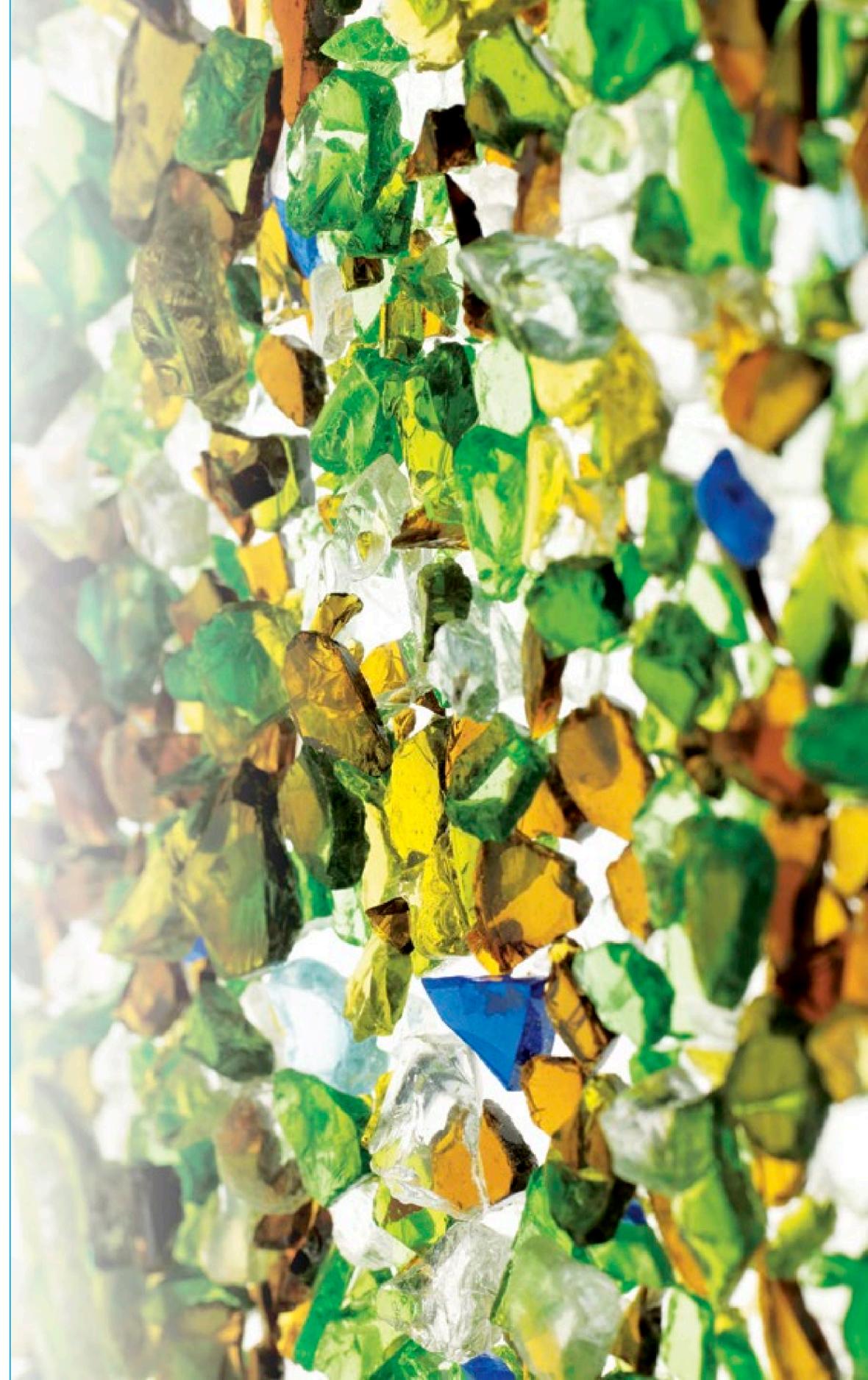


¹Recycling rates



Glass: More cullet is important...

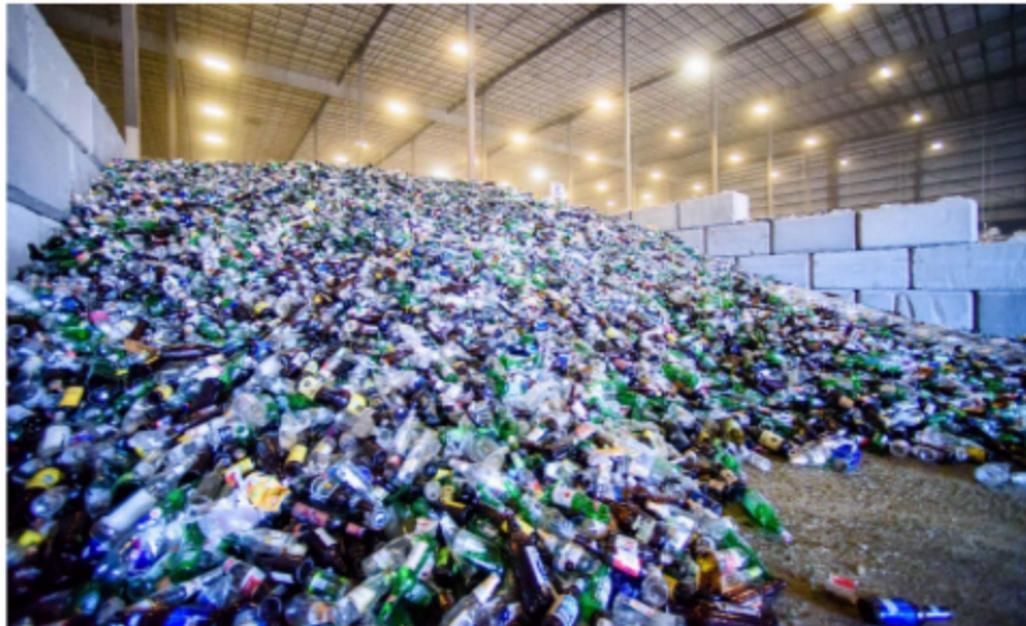
- A 10% increase in cullet reduces:
 - Energy requirements by 2-3%
 - Particulates by 8%
 - Nitrogen Oxide by 4%
 - Sulfur Oxides by 10%
- Extends furnace life
- Saves natural resources
 - One ton of cullet saves 1.125 tons of natural resources
 - Reduces energy for mining and transportation
- For every six tons of recycled glass used, one ton of CO₂ is reduced



...but quality is critical...

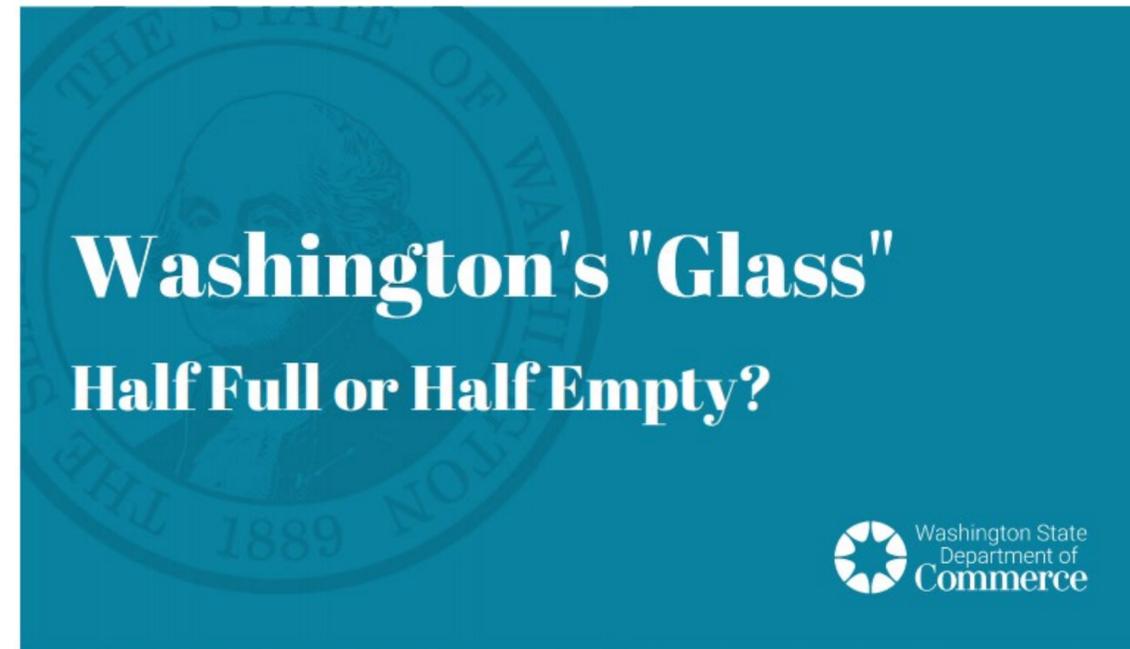
From the June Recycling Development Center Advisory Board Meeting...

Glass supply



Deposit vs MRF

...and demands a shift from “quantity to quality”



October 31, 2020

REPORT TO THE LEGISLATURE

An Examination of Glass Recycling in Washington State

Recommendations

1. Implement glass improvement programs at collection and materials recovery facilities to shift focus from quantity to quality. Promote programs that have clearly demonstrated their ability to produce high-quality recycled glass suitable for reuse in the manufacture of new glass containers, such as those that separate glass from other materials collected from curbside residences.

Thank you

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ArdaghGlassPackaging





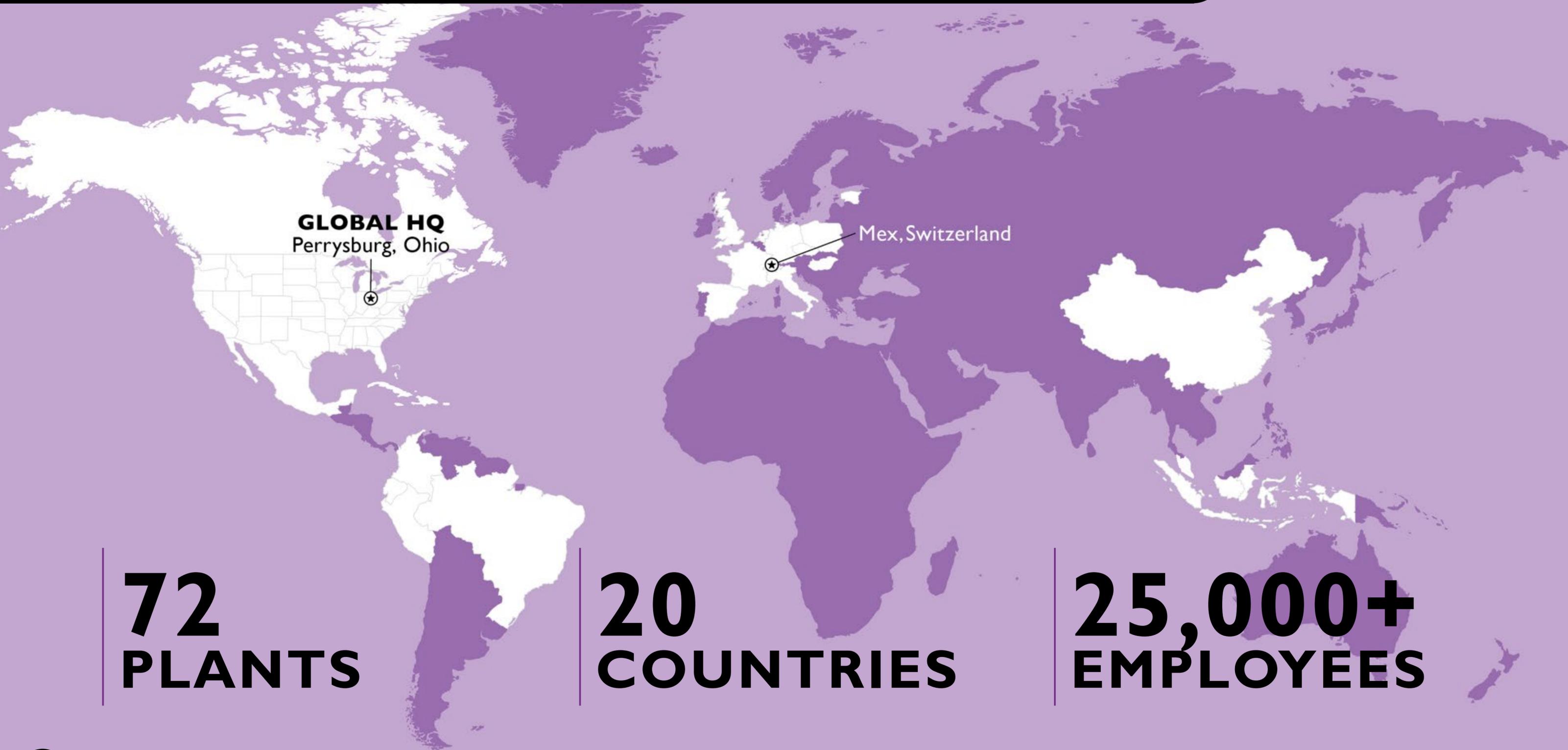
Owens-Illinois Glass

James Nordmeyer, VP Global Sustainability



**GLASS RECYCLING
AUGUST 2021**

OUR GLOBAL LOCATIONS



72
PLANTS

20
COUNTRIES

25,000+
EMPLOYEES

GLOBAL HQ
Perrysburg, Ohio





**AT O-I GLASS
WE LOVE GLASS
AND WE'RE PROUD
TO BE ONE OF THE
LEADING PRODUCERS
OF GLASS BOTTLES
AND JARS AROUND
THE GLOBE.**

Our Vision is as clear as the glass we make:

We will be the most innovative, sustainable, and chosen supplier of brand-building packaging solutions.



We have made **Washington** our home since 2015 and the **PNW** since 1956

Over 100 employees in **WA** and over 300 in the **PNW**

Our Corporate Headquarters are located **Perrysburg, OH**

We have wonderful customers in **PNW**



We currently have **3 Manufacturing sites** in the Pacific Northwest:

- ✓ Kalama, OH
- ✓ Portland, OR
- ✓ Glass to Glass LLC





GLASS RECYCLING-MYTH VS FACTS

MYTHS

FACTS

“Glass cannot be recycled.”



Glass is 100% infinitely recyclable without a loss in quality or purity. 33.1% of glass, food, and beverage containers were recycled in the US. Recycled glass can be substituted for up to 95% of raw materials.

“Glass needs to be color sorted, washed, and label taken off before recycling it.”



Mix colored glass and broken glass with labels from packaging can be deposited into a recycling glass bin.

“Recycled glass has no value.”



Recycled glass has value. Some cities and town received Revenue for every ton of recycled glass.

“There are no glass recycling processors or end user near us.”



There are 63 cullet processors and 44 glass manufacturing plants in the US. In the PNW there are 2-glass cullet processing facilities and 2-Glass packaging plants that benefit from recycling. Currently, our Kalama and Portland facilities plant uses 80k tons of recycled glass. Glass collected in the PNW services container plants in WA, OR, CA, CO and TX.

Current as of December 10, 2020

3. Consumers around the world disagree on what packaging is most sustainable, but agree on the least sustainable options.

Ranked top 3 Ranked lowest 3

How sustainable do you think each of these packaging types is?

Packaging substrates ranked by number of respondents who indicated “extremely” or “very” strong.

										
Paper-based cartons	1	2	4	3	3	4	4	1	4	5
Glass bottles and jars	2	1	1	1	1	6	6	3	7	7
Plastic films made from renewable raw materials that can be compostable	3	4	2	2	2	1	1	4	1	1
Flexible paper	4	3	5	4	6	5	5	2	5	6
Plastic bottles and containers that are fully recyclable	5	5	3	6	4	2	2	5	2	3
Plastic films that are fully recyclable	6	7	6	5	5	3	3	6	3	2
Metal containers	7	6	7	8	8	8	8	7	8	8
Plastic bottles and containers made from recycled plastic materials	8	8	8	7	7	7	7	9	6	4
Aluminum foil wraps	9	9	9	9	9	9	10	8	9	9
Packaging combining plastic, paper, and aluminium foil	10	10	10	10	10	10	9	10	10	10

Source: McKinsey Packaging Survey

McKinsey & Company 21

WORKING TOGETHER TOWARDS THE SAME VISION

- To provide glass recycling to the community
- To reduce landfill waste
- To reduce carbon emissions and energy use
- To increase recycled content in our glass packaging
- To invest in the communities, we serve





**SOUTHWESTERN PA
A TRAVELING BIN STORY.**
A traveling bin that collects glass in different locations of Pennsylvania. Collected over 8 Million pounds of bottles, jars, and jugs in 2020



**ARLINGTON, VA
SAVING GLASS RECYCLING.**
Arlington reinstated glass recycling via drop-off program. Currently the County sell for \$15/ton the glass



**GLASS4GOOD
CONVERTING GLASS INTO
GOOD.** O-I is converting glass collected in Danville, VA into a charitable donation



**PERRYSBURG, OH
GLASS CITY RECYCLING.**
O-I partners with the city on a glass recycling program for its residents to recycle glass

ENGINEERING EMOTIONS

On April 25, 2019, Arlington County asked its resident to stop placing glass in their blue recycling carts

2 years later....

- The county has established **5 drop off sites** evenly around the county to collect glass
- Every Arlington Home is **2.25 miles** from a glass recycling bin
- The county has recycled over **5 million pounds** of glass as of March 2021
- For Every ton recycled, the county received **\$15**
- A **\$37,500** in total revenue from this program



The Traveling Glass Recycling Bin Program and “Pop-up” Glass Recycling Events

Bin are deployed on weekly basis around Western PA for Glass recycling by the Pennsylvania Recycling Council

O-I and CAP Glass partnered with PRC to launch these programs

- Over 30 Western PA Communities Served including Pittsburgh Metro Area
- 27 Pop Glass Events in 2019, with up to 30 tons of collection in first 5 hours.
- About 200 tons collected per week and more that 4000 tons per year of glass is collected from programs. Pittsburgh Area brought in the most glass
- Over 10,000 Households have participated
- Many of the communities have opted for permanent bins due to residents' strong participation





Aero Aggregates

Archie Filshill

Ultra-Lightweight Aggregates and Insulating Fill

Archie Filshill, Ph.D., ENV SP
archie@aeroaggregates.com



HIGHLY FRICTIONAL • NON-LEACHING • ROT-RESISTANT • NON-FLAMMABLE • DURABLE • SAFE

made in the USA from recycled container glass

UL-FGA[®]

Ultra-Lightweight

Good Insulator

**High Friction
Angle**

Seismic Designs

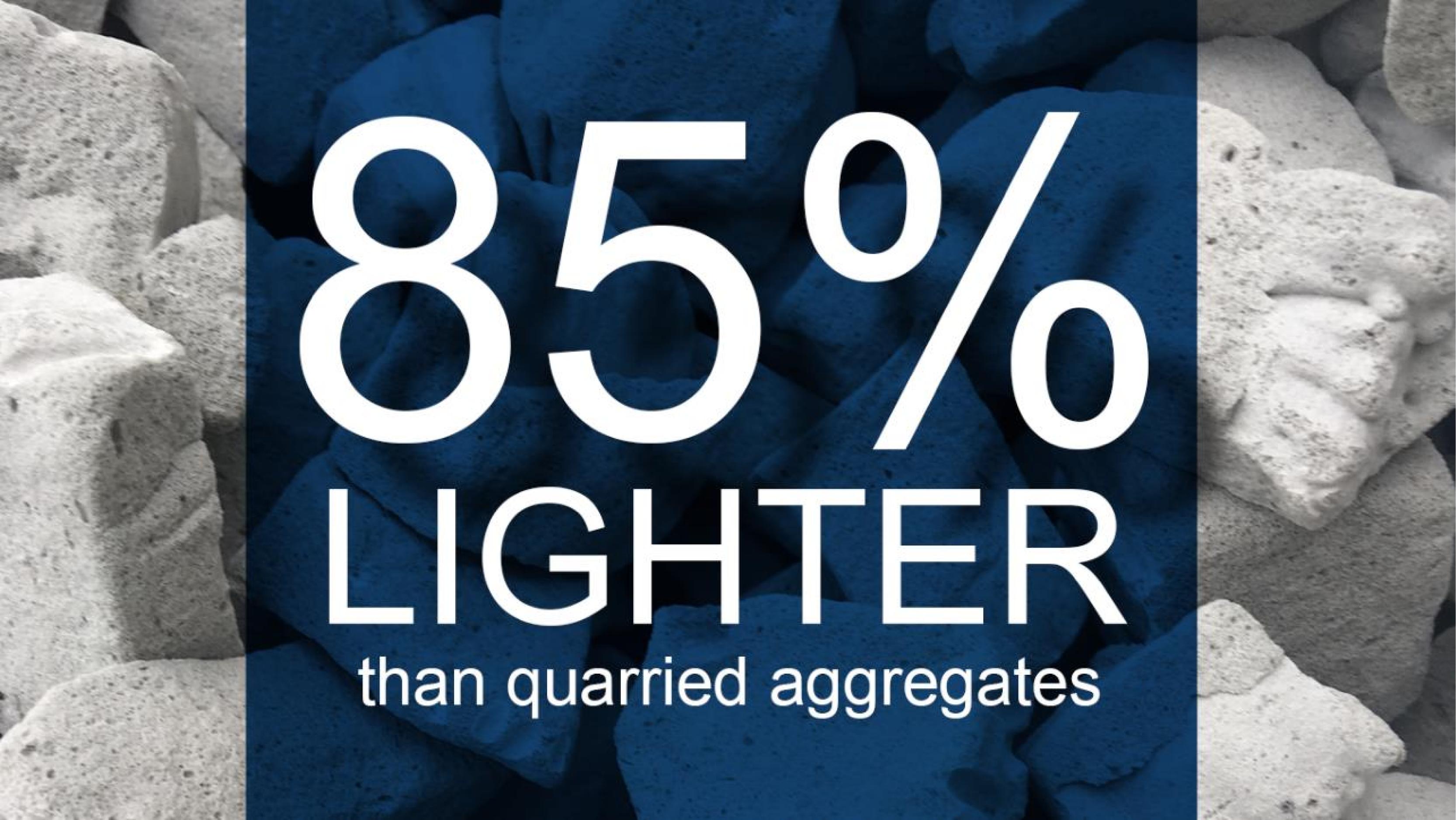


Frost Resistant

Capillary Break

Free-Draining

Load-Bearing



85%

LIGHTER

than quarried aggregates



**Made From
100% Recycled
Curbside Glass**



Types of Glass

- All glass is received from regional MRFs
- Mixed colored cullet and/or fines
- Small amount of contamination allowed and CSP



Mixed Color cullet cleaned and milled into powder

A person's hands are shown holding a small amount of dark, granular material, likely glass powder, over a large pile of the same material on a conveyor belt. The background is a blue-tinted image of industrial machinery.

1

**100% Curbside Glass
Powder Mixed With
Foaming Agent**

2

Mixture Heated & Softened Through Kiln



**140m
Bottles
Recycled
Per Year**

**equivalent*



Closed Cell Applications

Infrastructure



Resiliency



Patent Pending

Insulation



Foundations

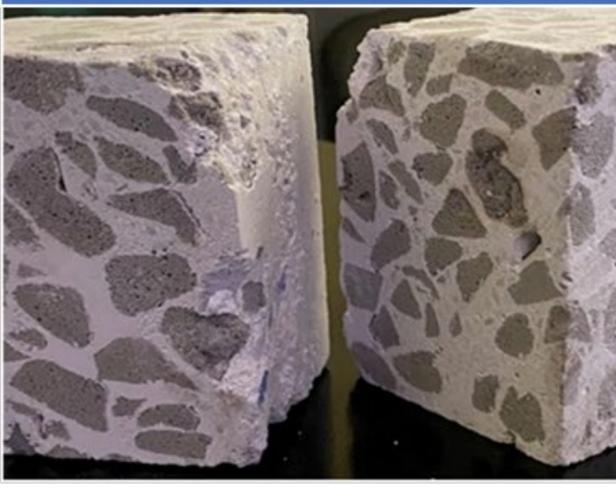


Concrete Blocks



Patent Pending

Lightweight Concrete



Patent Pending

Open Cell Applications

Green Roofs



Consumer



Agriculture



Water/Air Treatment



Filter Media



Patent Pending

Floating Water Treatment



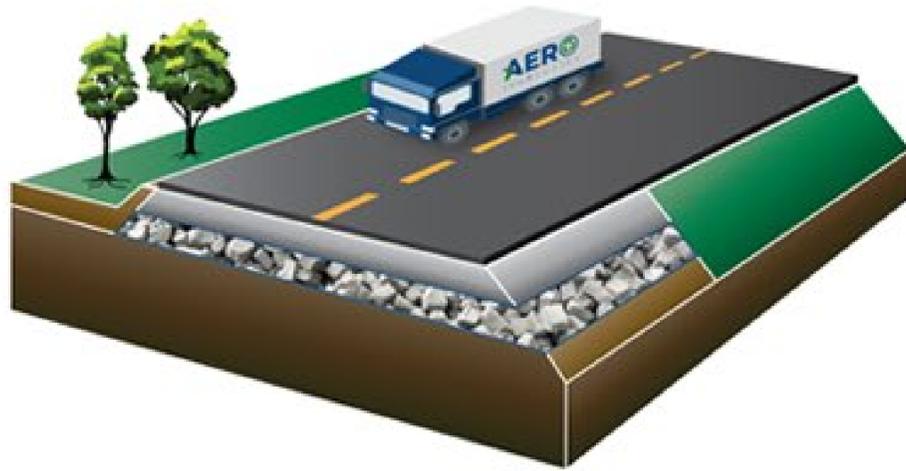
Patented

A construction site background featuring a white truck with a trailer on the left, a large pile of gravel in the foreground, and various construction equipment in the distance. A dark blue diagonal overlay covers the right side of the image, where the text is placed.

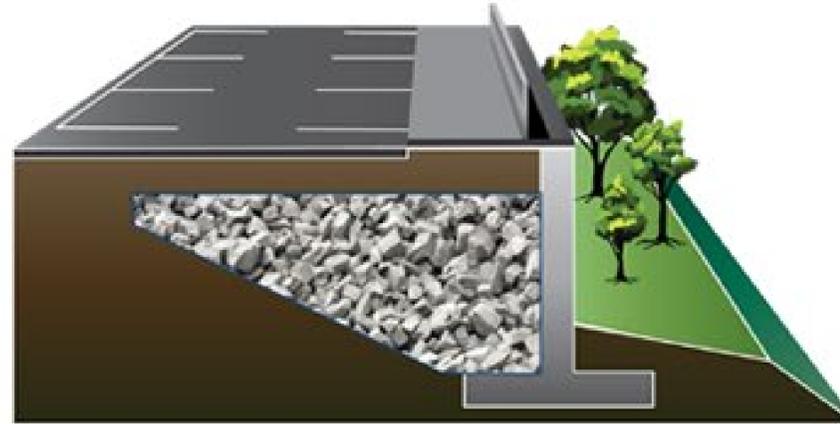
UL-FGA[®] Applications

INFRASTRUCTURE

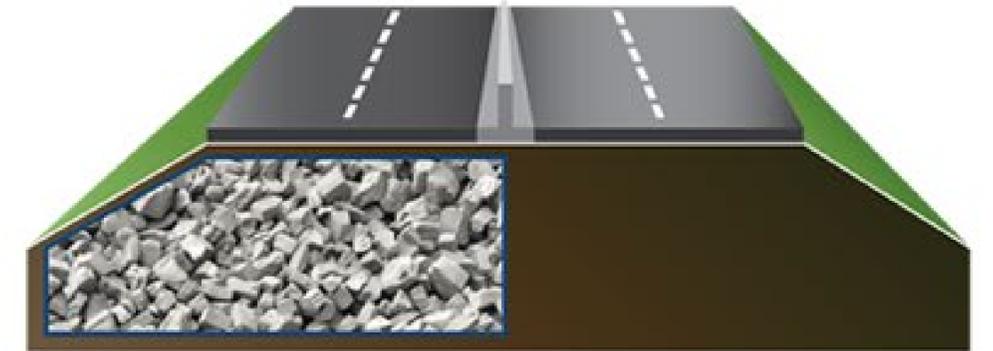
INFRASTRUCTURE APPLICATIONS



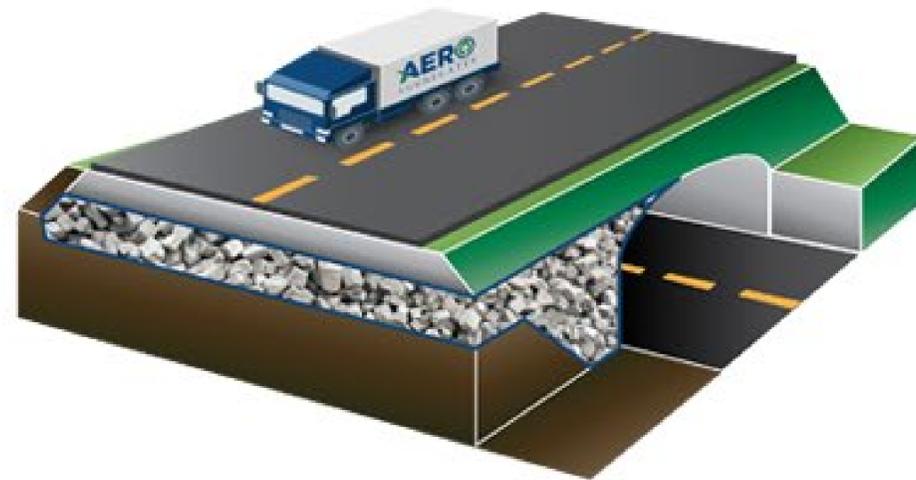
Embankments



**Retaining Walls &
Bridge Abutments**



Roadway Widening



Tunnels & Culverts



Utilities

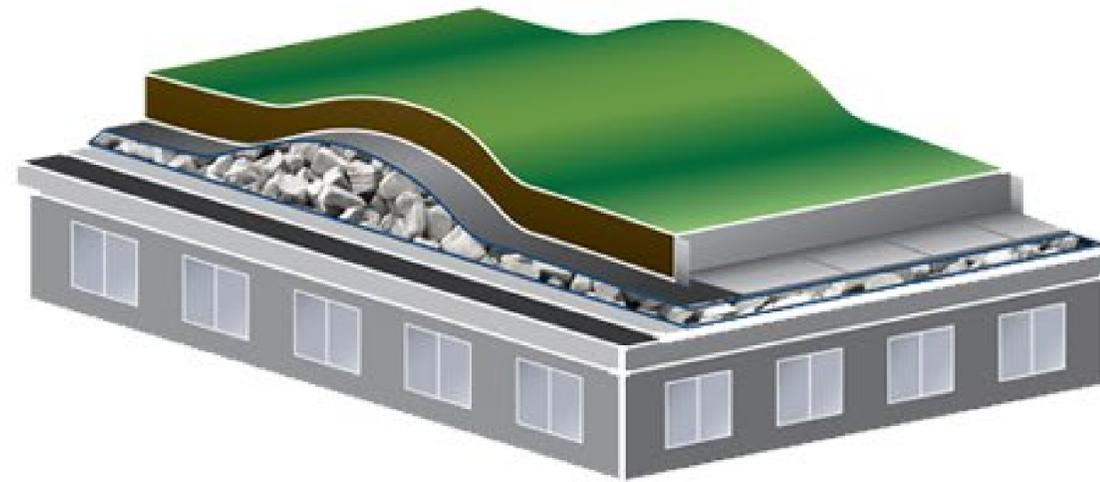


Load Distribution

COMMERCIAL CONSTRUCTION



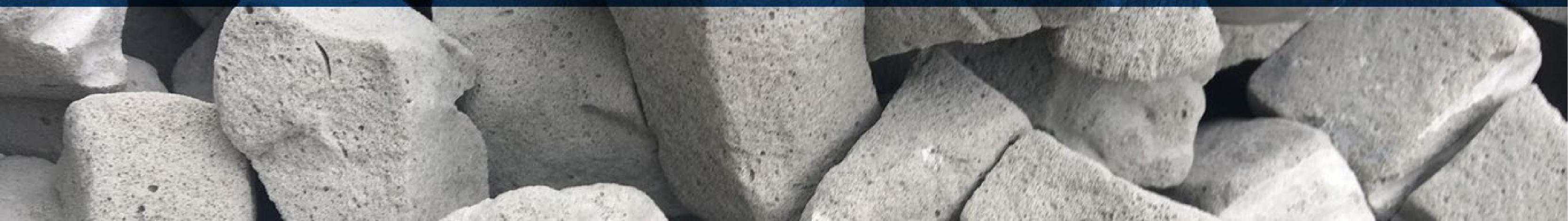
**Foundation
Walls & Slabs**



Greenroofs



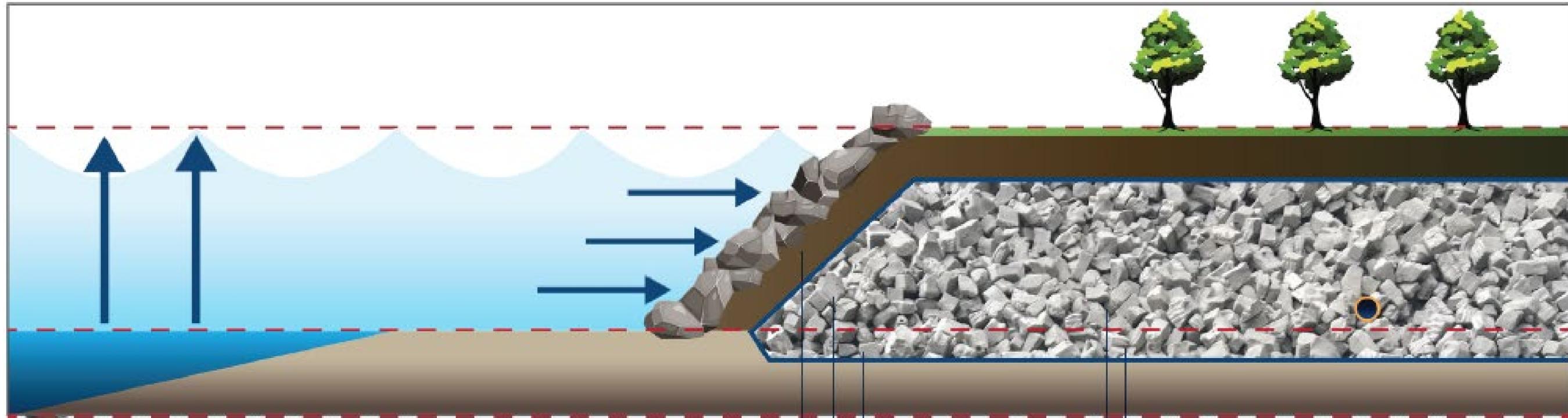
Plaza Decks





Sea Levels & Severe Weather

Application Areas - Resiliency



UL-FGA BENEFITS

- Quick & easy to install
- Ultra-lightweight
- Frost proof
- Stability
- Excellent drainage properties
- Not weather sensitive

STABILITY
Designs up to 45°
without additional
reinforcement

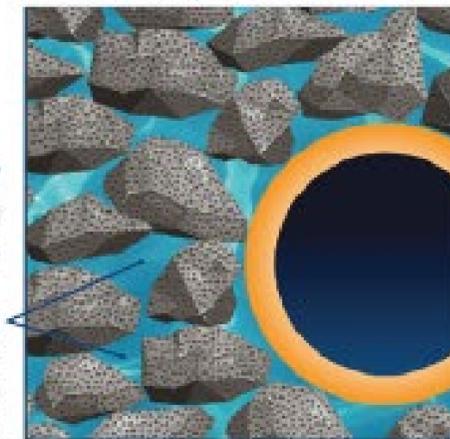
ULTRA-LIGHTWEIGHT
80% lighter than gravel.
No foundation required

LOAD CARRYING CAPACITY
Can be used for all load classes



RODENT RESISTANT
Resists burrowing
animals and insects

STORMWATER STORAGE
40% void space for additional
stormwater storage
and promotes infiltration





AvalonBay Long Island, NY

- 10-acre site
- 6' to raise above Sandy Storm elevation
- Reduce truck traffic by over 1,200 trucks
- Stormwater storage credit within FGA



AvalonBay, Long Island, NY

Foamed Glass Aggregate: An Engineered, Sustainable Construction Material

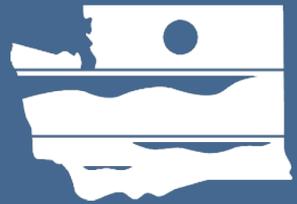
- 
- Ultra Lightweight Fill
 - Predictable Material Behavior
 - High Friction Angle
 - Chemically Non-reactive
 - UV stable
 - Volume Stable
 - Durable/ Freeze-Thaw tested
 - 100% Recycled Glass
 - Post-Consumer
 - Lower Carbon Footprint
 - Lower Total Energy
 - Fewer trucks required for delivery
 - Accelerated Construction:
 - Less equipment and time for installation
 - Not weather sensitive
 - Ideal for seismic designs
 - Non reactive and durable

Discussion

Glass recycling:

- Status
- Challenges
- Goals
- Actions
- Recommendations





Meeting wrap-up



Wrap up

Next meeting:

- Wednesday, October 13, 2021
- Topic: Glass or other material summary

Tasks from today:

- Notes from today will be posted next week
- Finalize the glass summary
- Start next material topic





See you at the October 13th meeting

Link to the next webex meeting will be included in an email update next week with today's notes.