



JUNE 8-11

2020 SUMMIT

A Virtual Leadership Symposium

Learn more: betterbuildingsolutioncenter.energy.gov/summit

U.S. DEPARTMENT OF
ENERGY



Early Best Practices from the Waste Reduction Pilot

Thursday, June 11th, 2020

11:00 AM – 12:30 PM ET



Bruce Lung

Better Plants Industrial Sr.
Technical Advisor, BGS LLC



Hannah Debelius

ORISE Fellow, DOE

Agenda

1

Introductions, Program Updates, and Early Results

2

Mark Pannell, Volvo Group N. America: Landfill-Free with SRF

3

Bill Whitfield, Shorenstein Properties: Waste Management and Engagement Across a Portfolio

4

Q&A and Discussion

Thank you, Waste Pilot Participants

Industrial

- Armstrong Flooring
- AstraZeneca
- Bristol-Myers Squibb
- Electrolux
- Flowers Foods
- FMC Chemicals
- General Motors
- HARBEC
- Johnson Controls
- Los Angeles
Department of Water
and Power

Industrial

- Martin Guitar
- Nissan North America
- NSK Americas
- PaperWorks Industries
- PPC Online
- Schneider Electric
- Steelcase, Inc.
- Sugar Creek Packing
Co.
- United Technologies
Corporation (UTC)
- Volvo Group North
America

Commercial

- Beaverton, Oregon
- Commonwealth Partners
- The Hartford Financial Services Group
- Jamestown, LP
- Lawrence Berkeley National Laboratory
- New Bedford Housing Authority
- Parkway
- Shorenstein Properties, LLC
- Sprint
- Tenderloin Neighborhood Development
Corporation
- The Tower Companies
- UW Health
- The West Palm Beach VA Medical
Center*

*(part of the U.S. Dept. of Veterans
Affairs' Sunshine Healthcare Network)

Pilot Overview

- [The Pilot](#) was launched to address the 2.7 billion tons of industrial solid waste and more than 260 million tons of municipal solid waste the U.S. generates annually.
- DOE will work with pilot participants to help them develop or refine goals, identify benchmarks, determine performance metrics, track performance, and validate results.
- Will convene partners in quarterly webinars and in sessions at Summits
- Minimum of one year (CY2020), with potential for one additional year
- Registration closed in January 2020 but an audit option is available. Email Bruce Lung and Hannah Debelius for more information*

Waste Pilot Team

DOE

- Robert Bruce Lung, Senior Technical Advisor, BGS LLC, AMO
- Eli Levine, AMO
- Ethan Rogers, Fellow, AMO
- Hannah Debelius, ORISE Fellow, BTO

ICF

- Clifton Yin, embedded in AMO
- Kate Rubin
- Zach Abrams

RE Tech Advisors

- Andrea Doukakis

Please go to www.slido.com

using your mobile device or web browser

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#BBSummit

Select “Early Best Practices From The Waste Pilot” from the dropdown

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#BBSummit2020

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- @BetterBldgsDOE
- @BetterPlantsDOE

LinkedIn:

- www.linkedin.com/company/better-buildings/
- www.linkedin.com/showcase/better-plants/

Polls #1 and #2 - Quick Survey

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Select “Early Best Practices From The
Waste Pilot” from the dropdown

Early Results

Industrial

- 100% want to learn/share best practices from other partners
- 88% implemented past waste reduction efforts
- 80% reduce waste because of corporate sustainability goals
- 60% hope to access innovation from DOE
- 50% interested in DOE recognition
- 40% want help with waste data

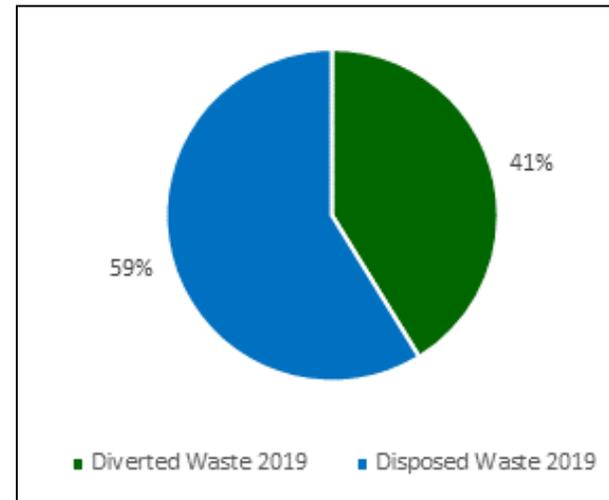
Commercial

- 60% have time-bound, measurable goals
- 50% are tracking waste by weight
- 40% of partners have goals that are diversion rates, 75% of which are 75% or higher
- Common challenges include
 - Accurate metrics
 - Regional requirements
 - Capacity for waste audits
- Most commonly, partners have already conducted staff trainings and engagement efforts

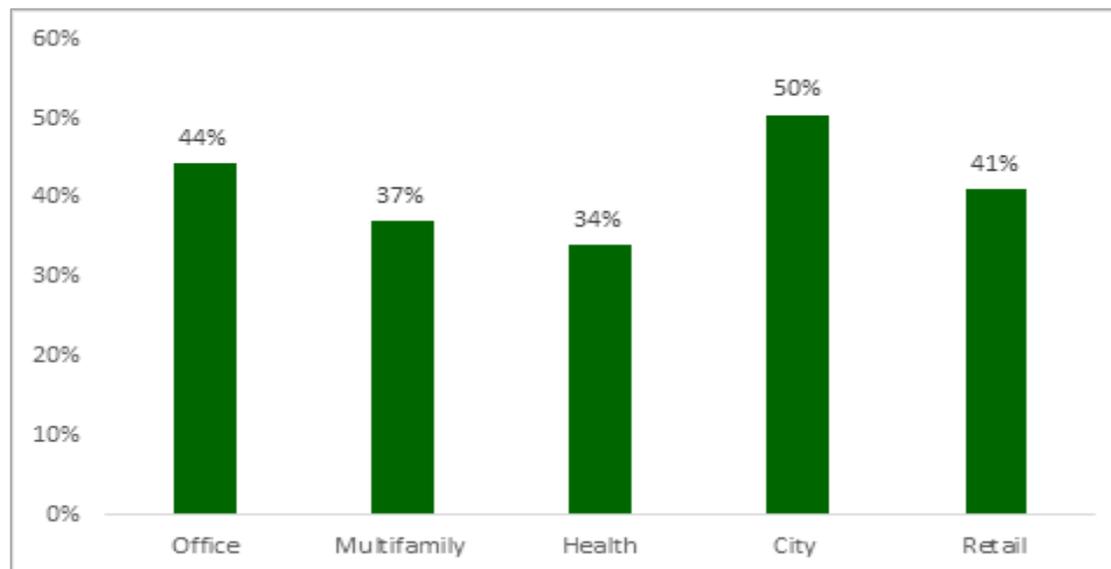
Early Data Findings

- Nearly half of all commercial sector pilot partners have a diversion rate of 50% or more.
- Partners diverted 1.9 million tons from landfill, enough to fill more than 135 thousand trash trucks.
- Partners often use outreach and education to increase diversion rates and reduce contamination in bins.
- One pilot partner, FMC Chemicals, is working with a third party to recover the energy in its waste solvents; around 125,000 MMBtus are being recovered annually.

2019 Program Wide Waste Diverted



2019 Waste Diversion Rate by Industry



New Resources

Shorenstein Properties: Improved Waste Diversion With Training And Audits – [Link](#)

Bristol-Myers Squibb: Application Of Principles Of Green Chemistry Leads To Significant Reductions In Material Waste – [Link](#)

BBBP Waste Reduction Pilot 1st Quarterly Call Webinar – [Link](#)

BBBP Waste Reduction Pilot 2nd Quarterly Call Webinar – [Link](#)

Find monthly email updates under “other resources” on the Waste Reduction Pilot page – [Link](#)

Next Steps for DOE

- Support pilot program and efforts:
 - Establish links between energy efficiency and waste reduction
 - Determine how DOE can contribute to waste reduction
 - Understand appropriate goals for partners going forward
 - Contribute to efforts to establish a circular economy
- Identify technology gaps that can inform R&D
- Potential solutions
 - Guidance materials
 - Case studies
 - Analytical/modeling frameworks
 - Facilitate sharing best practices
- Establish link with energy
 - Energy performance
 - Energy recovery
 - Resilience

Polls #4 and #5

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Select “Early Best Practices From The
Waste Pilot” from the dropdown

AMO Work

- Technical Partnerships:
 - Analyze potential for energy recovery
 - Develop metrics & modeling frameworks
 - Leverage existing tools/practices, e.g. Principles of Green Chemistry
- Strategic Analysis Group/Consortia:
- Circular Economy
 - Sector Analyses
 - Iron & Steel
 - Aluminum
 - Paper
 - Yogurt
 - Glass
 - Plastics innovation challenge

Green Chemistry

Everyone's Doing It!

The 12 Principles of Green Chemistry

A framework for designing or improving materials, products, processes and systems.

1. Prevent Waste
2. Atom Economy
3. Less Hazardous Synthesis
4. Design Benign Chemicals
5. Benign Solvents & Auxiliaries
6. Design for Energy Efficiency
7. Use of Renewable Feedstocks
8. Reduce Derivatives
9. Catalysis (vs. Stoichiometric)
10. Design for Degradation
11. Real-Time Analysis for Pollution Prevention
12. Inherently Benign Chemistry for Accident Prevention

*Anastas, P. T.; Warner, J. C. Green Chemistry: Theory and Practice, Oxford University Press: New York, 1998, p.30. By permission of Oxford University Press.

www.acs.org/greenchemistry

Contributing to Circular Economy

- Data analysis and modeling practices
 - Modeling different recycling processes & quantifying energy savings potential
- Identify best practices for:
 - OEM companies
 - Supply chains
- Technology Analyses
 - Recycled composite for use as feedstocks in additive manufacturing
- Evaluate impacts across sectors & at various product life cycles
 - Techno-economic assessment of critical material recycling



Figure credit: Designing for a circular economy – lessons from the great recovery. March 2016. RSA Action and Research Center.

Example: Plastics Innovation Challenge (PIC)

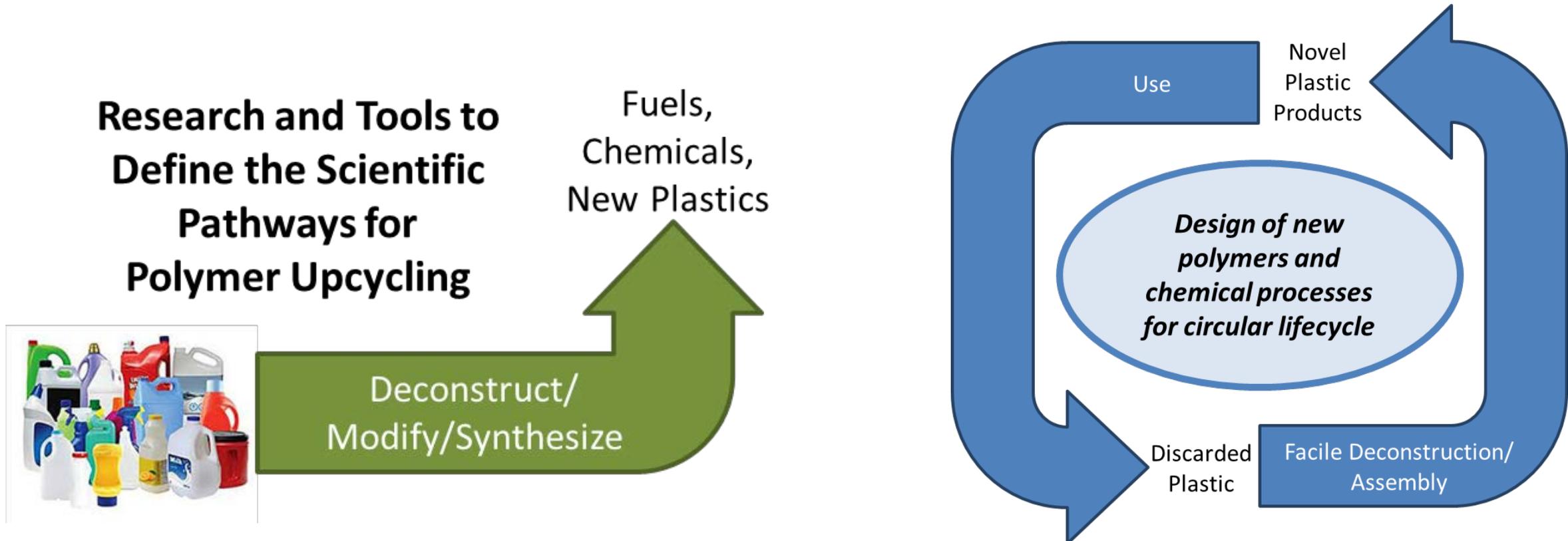
Goal: Dramatically reduce plastic waste and position the US as a leader in advanced plastic recycling technologies.

PIC goals are for the U.S. to reach the following by 2030:

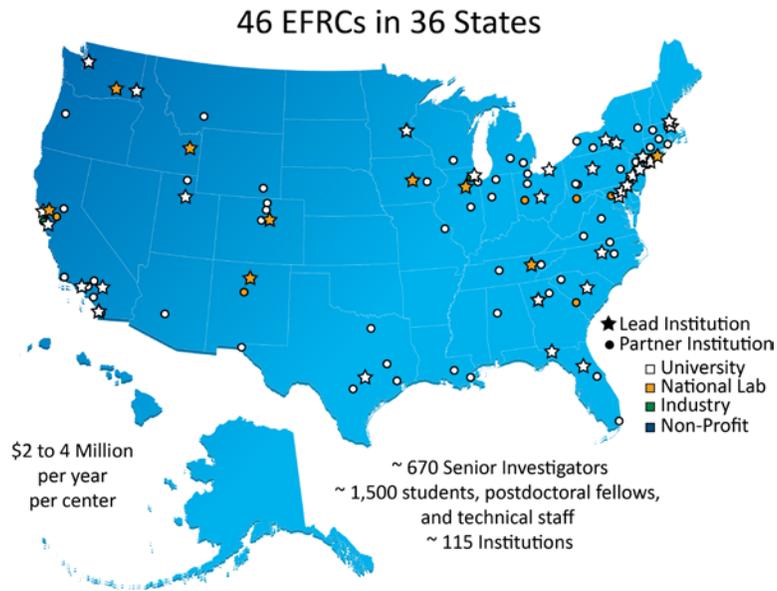
- **Collection:** Develop novel collection technologies.
- **Deconstruction:** Develop biological and chemical methods for deconstructing plastic waste into useful chemical streams.
- **Upcycling:** Develop technologies to upcycle waste chemical streams into higher-value products.
- **Design for recyclability:** Develop new plastics that are recyclable-by-design and can be scaled for domestic manufacturability.
- **Commercialization:** Support a domestic plastics upcycling supply chain for U.S. companies to scale and deploy new technologies.

Plastics Innovation Challenge (PIC)

- Basic and applied research:
 - Polymer upcycling – turning discarded plastics into high-value products
 - Circular lifecycle – greatly extending the useful lifetimes of polymers



Plastics Innovation Challenge (PIC)

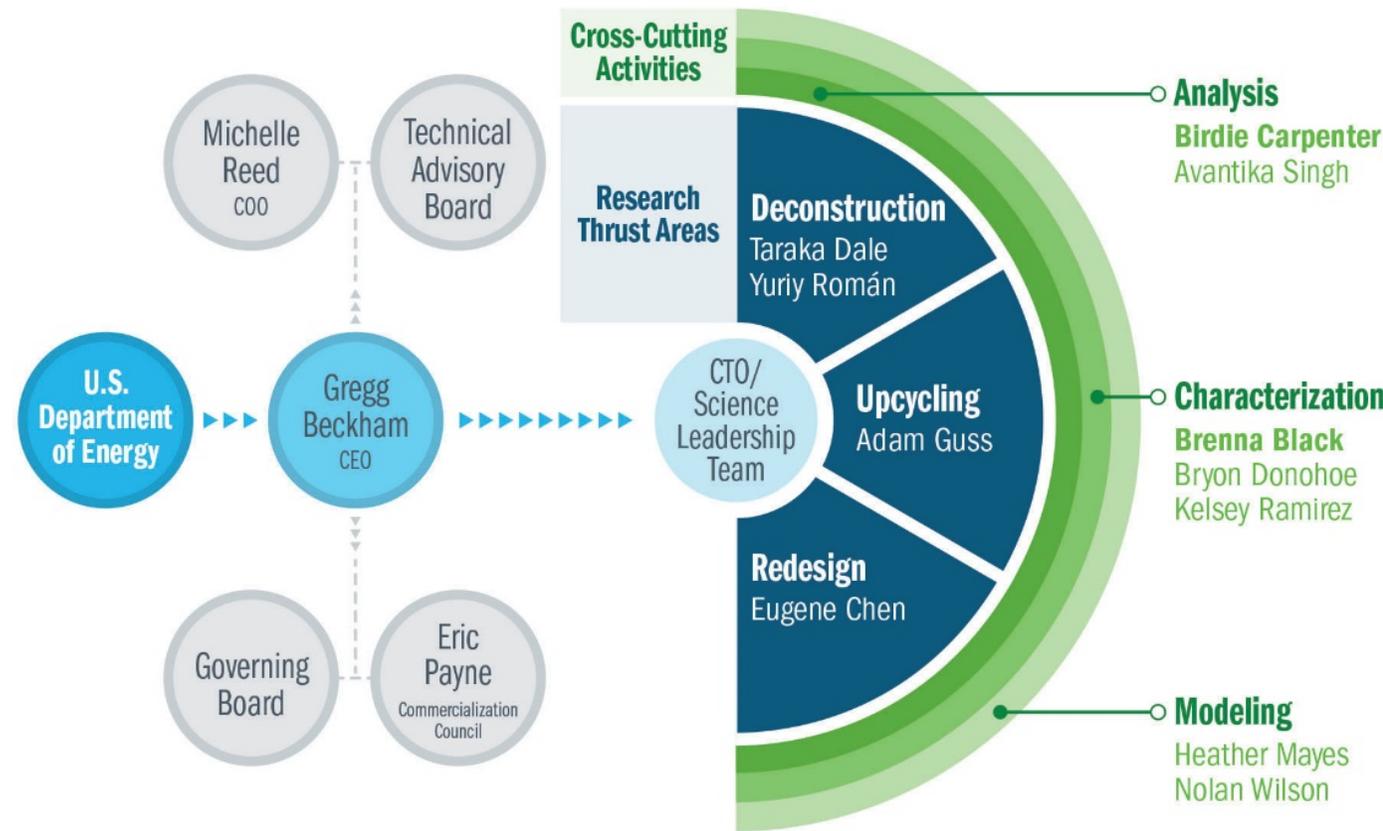


- DOE is funding research in plastics recycling and upcycling through:
 - Emerging Frontiers Research Centers (Office of Science)
 - REMADE Institute (AMO)
 - BOTTLE Consortium (AMO/BETO)
 - REUSE program (ARPA-E)
- Ensuring coordination across DOE and across agencies (NSF, EPA, Commerce)
- Connected to broader EERE Circular Economy initiatives, including analysis led by SPIA.

BOTTLE Consortium Work to Date

- Completed market assessment for 19 major commodity plastics.
- Established key partnerships and structure for the Consortium.
- Reaching out to industry to expand membership.
- For more information: www.bottle.org

BOTTLE Structure



Today's Presenters



Mark Pannell
Volvo Group North America



Bill Whitfield
Shorenstein Properties



Mark Pannell

Volvo Group North America

Submit Questions

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VOLVO
VOLVO GROUP

The Volvo Group.

100,000 employees. 190 markets.
Production facilities in 18 countries.

We are one of the world's leading
manufacturers of trucks, buses,
construction equipment, and marine
and industrial engines.

A first-person perspective from the driver's seat of a truck. The view is through the windshield and side mirrors. In the foreground, the driver's hands are on the steering wheel. Outside, a city street is visible with a paved sidewalk and a road. Two cyclists are riding past on the sidewalk. The background shows buildings with windows and a clear sky. The text is overlaid on the left side of the image.

Driving prosperity, in all aspects of the word, means that the impact on the environment and the usage of our societies limited resources are considered in our activities.



Volvo Group North America

Environmental Achievements

Our Environmental Journey

2003	2005	2008	2009	2010	2011	2012	2013
<p>All manufacturing plants in North America are ISO 14001 Environmental Management System certified.</p> <p>Volvo Trucks North America and Mack Trucks Inc. Join the EPA Climate Leaders Program.</p>	<p>Volvo Trucks New River Valley plant wins the Virginia Governors Award – Gold Award for Environmental Excellence</p>	<p>Mack Trucks meets Climate Leaders greenhouse gas reduction Goal and re-pledges.</p> <p>Volvo Trucks New River Valley plant wins the Virginia Governors Award – Gold Award for Wastewater Recycling</p>	<p>Volvo Trucks New River Valley plant joins the US Department of Energy Save Energy Now program.</p>	<p>The Volvo Group becomes the world's first automotive manufacturer to join the WWF Climate Savers Program.</p>	<p>Volvo Trucks New River Valley plant becomes the first facility in the US to achieve dual ISO 50001/SEP certification (Platinum).</p> <p>Mack Trucks Lehigh Valley Operations plant pilots the EDF Climate Corps Fellow Program.</p>	<p>Volvo Energy Network North America is founded.</p> <p>Volvo Trucks New River Valley plant wins the Virginia Governors Award – Bronze Award for Energy Conservation.</p> <p>The Volvo Group meets WWF Climate Saver goals and set new goals.</p>	<p>Mack Trucks Lehigh Valley Operations plant achieves ISO 50001/SEP platinum-level certification <u>and</u> meets second Climate Leaders greenhouse gas reduction Goal.</p> <p>Volvo Group North America (VGNA) joins the DOE Better Plants Program at a corporate level.</p>

Our Environmental Journey Continues

2014

Hagerstown Powertrain plant achieves ISO 50001/SEP platinum-level certification.

VGNA raises Better Plants Program participation to Challenge Level.

2015

VGNA achieves the Industrial Energy Technology Conference Award.

VGNA achieves Better Plants Goal (26.8 % improvement in Energy Performance) and re-pledges.

2018

Volvo Trucks New River Valley plant achieves the first Volvo Group Landfill Free Certification

2019

Volvo Group North America manufacturing facilities switch to 100% renewable energy.

Mack Trucks LVO Powertrain Middletown plant achieve Volvo Group Landfill Free Certification.

VGNA joins the Better Plants Supply Chain Program.

Hagerstown Powertrain diverts most landfill waste to cutting-edge SRF facility.

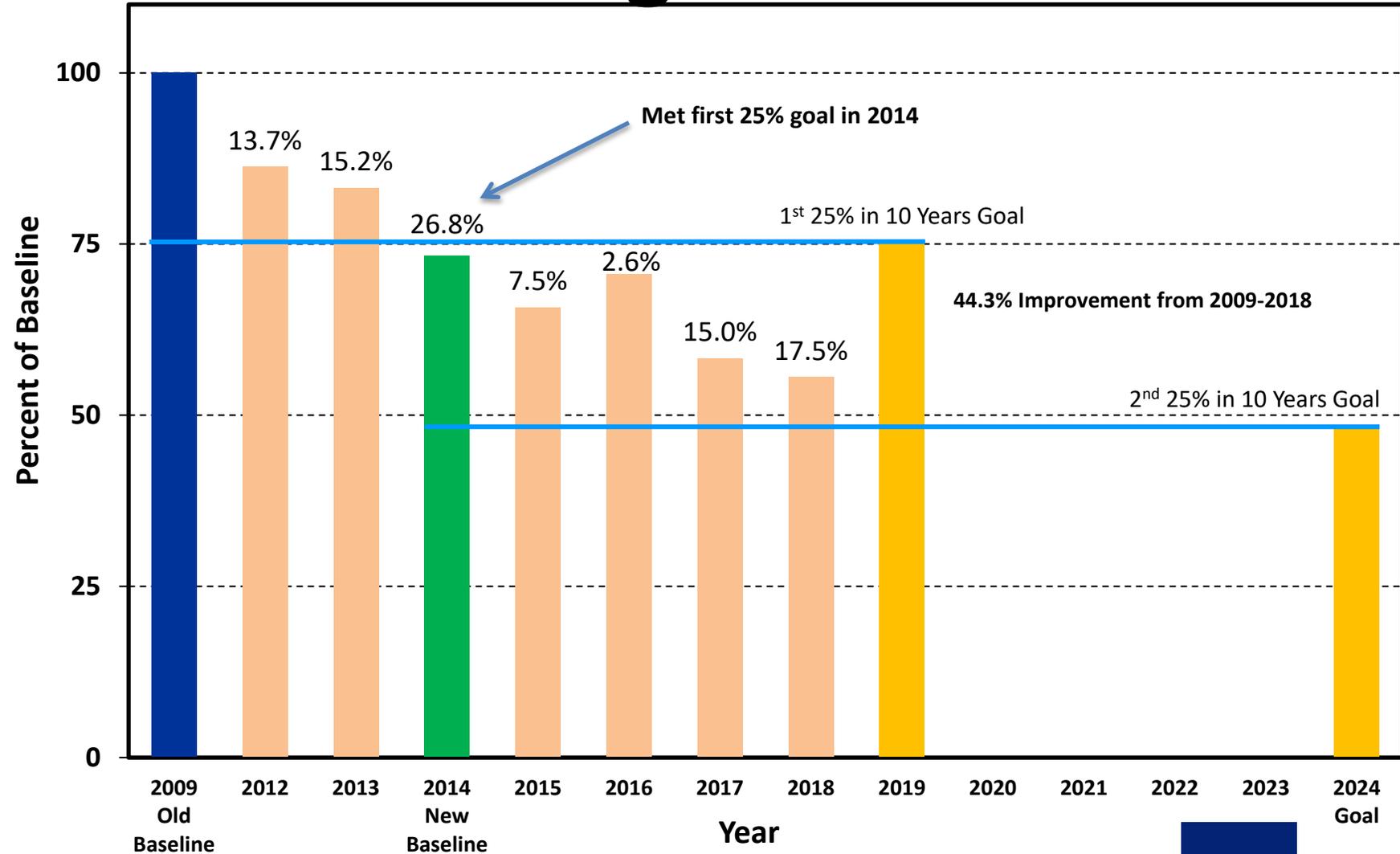
2020

Hagerstown Powertrain plant set to re-certify for ISO 50001/SEP platinum-level certification for the third time.

WWF goal of 13,487 MWh reduction over 6 years has been reached.

US DOE Better Plants Program

- Volvo Group committed to reducing energy consumption by 25% over a ten year period (2009 baseline) and met the goal 5 years early
- Committed to an additional 25% reduction in 2014.



Renewable energy

- The following facilities, located in non-regulated electricity markets, purchase renewable energy to match their yearly electricity usage (297,919 MWh in 2019)
 - Lehigh Valley Operations
 - Hagerstown
 - Shippensburg
 - Middletown
 - Plattsburgh
 - Joliet
 - Elkridge
 - Allentown



- Hagerstown Powertrain has completed two solar installations with a capacity of 3.5 MW
 - Solar parking lot canopy – 1.3 MW
 - Ground mount installation – 2.2 MW



Landfill-free facilities

- New River Valley became the first facility to receive the Volvo Group Landfill-free certification in 2018
- Lehigh Valley Operations and Middletown Remanufacturing received the certification in 2019
- Hagerstown began the 12 month Landfill-free certification journey in Q4-2019



An aerial photograph of a large industrial facility, likely a Volvo Group factory, taken at dusk. The sky is a mix of orange, pink, and blue. In the foreground, a tall, white, lattice-structured water tower stands prominently. The tower's tank is marked with the Volvo logo and the word 'VOLVO'. A road with white lane markings curves through the lower right portion of the image. The factory complex in the background consists of several large, interconnected buildings with flat roofs. The surrounding area is a mix of greenery and some smaller structures.

VOLVO
VOLVO GROUP

Landfill Free - SRF

Mark Pannell - Environmental & Energy Manager

Volvo Group Trucks – Hagerstown, MD

Our Products.

Rear Axle

11L Engine

13L Engine

AMT

T300

**Mack
Trucks**



MP7



MP8



mDRIVE



**Volvo
Trucks NA**



D11



D13



I-Shift

**Prevost |
Volvo Bus**



D13



I-Shift

Component Machining: Crankshafts | Camshafts | Rear Pinion, Power Divider & Carrier Housings | Gears & Shafts

We Deliver.

HAGERSTOWN ★



MACK TRUCKS

Lehigh Valley, PA
Latin America



VOLVO TRUCKS

New River Valley, VA



VOLVO BUS

Mexico City, Mexico



PREVOST

Sainte-Claire, Canada
Plattsburg, NY

Volvo Group Trucks

Mark Pannell
Environmental & Energy Manager

VOLVO
VOLVO GROUP



Volvo Group Trucks
Mark Pannell
Environmental & Energy Manager

HAGERSTOWN, MD

We Are the Heart.

We are a unique team of 1,800 members, combining Technology, Purchasing, & Operations on one campus.

We develop & produce the heart of the vehicle, blending powertrain engineering & innovation with lean manufacturing & automation.



Landfill Free Overview

- Volvo Group has established the definition of “Landfill Free” as that where less than 1% of the facilities waste can ultimately go to a landfill for final disposal. This may occur when residual materials cannot be recycled or treated.
- This does not apply to Construction & Demolition (C&D) debris, only normal production waste.



Waste To Energy (WTE)

- Most facilities have achieved landfill free status by sending their waste to Waste To Energy facilities (WTE). This is the most common method of achieving the landfill free status.
- Plant Trash is transported directly to a WTE facility that directly burns the waste material for the BTU value to generate steam and ultimately electricity.
- Hagerstown has explored the WTE option but due to high cost and other developments has chosen to select Solid Recovered Fuel (SRF) as our path to landfill free.

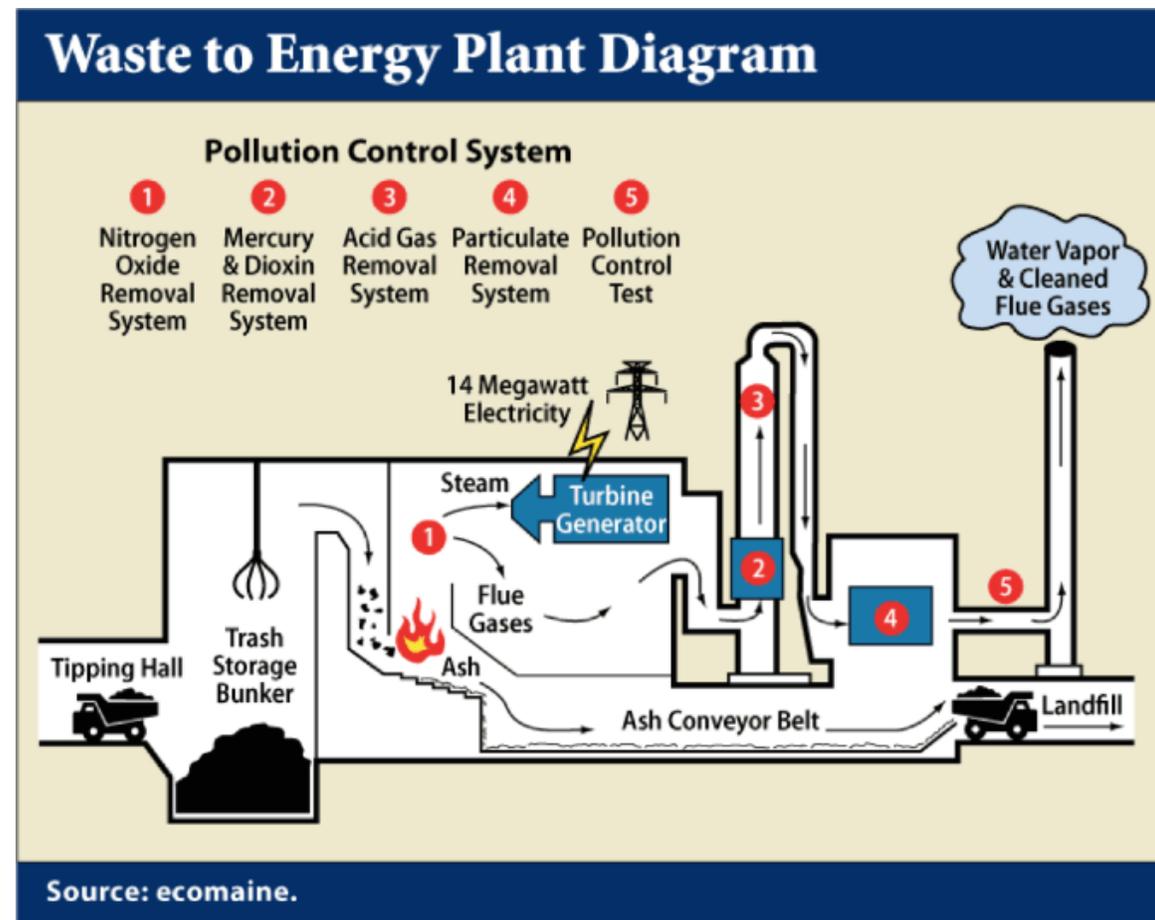
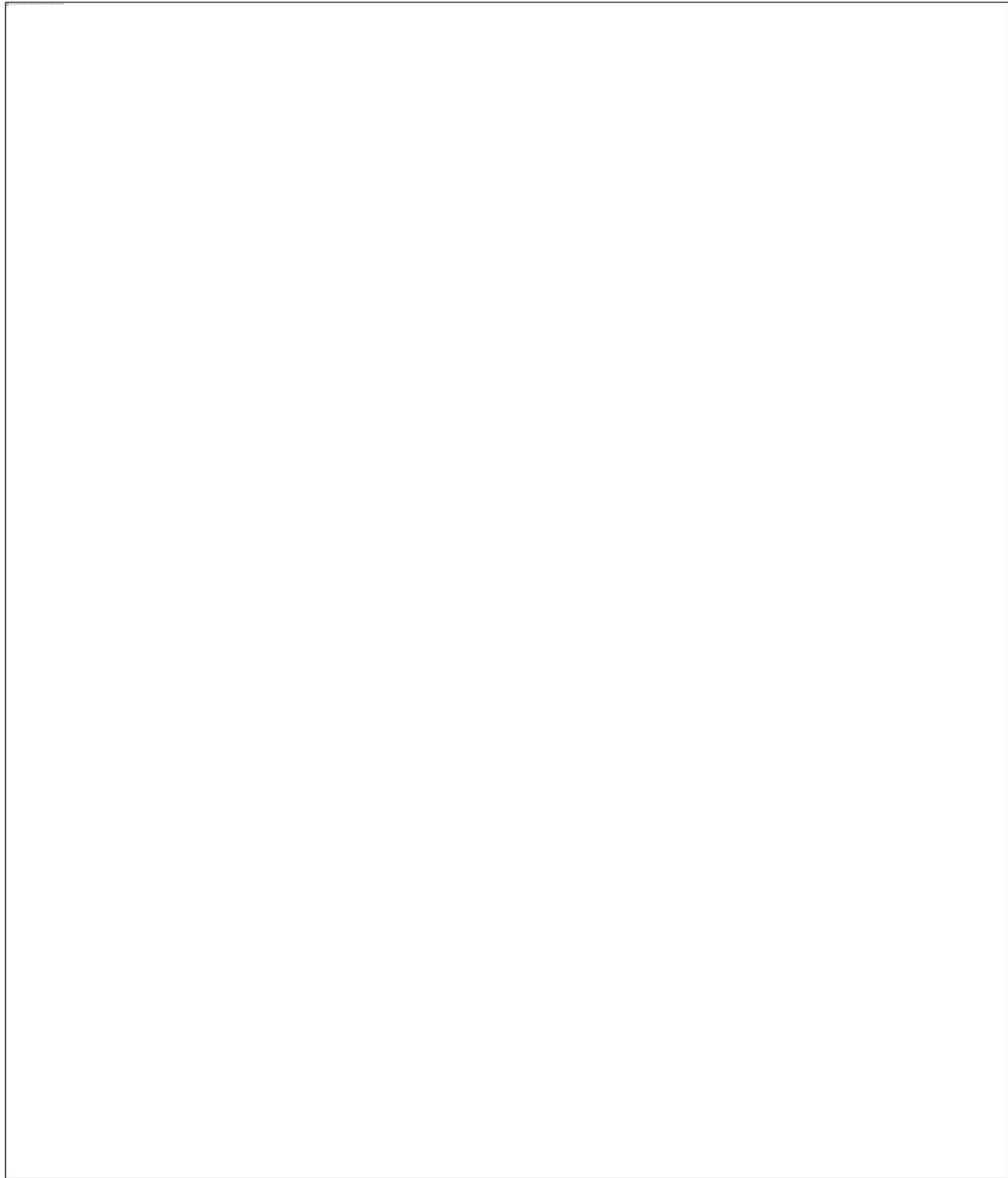


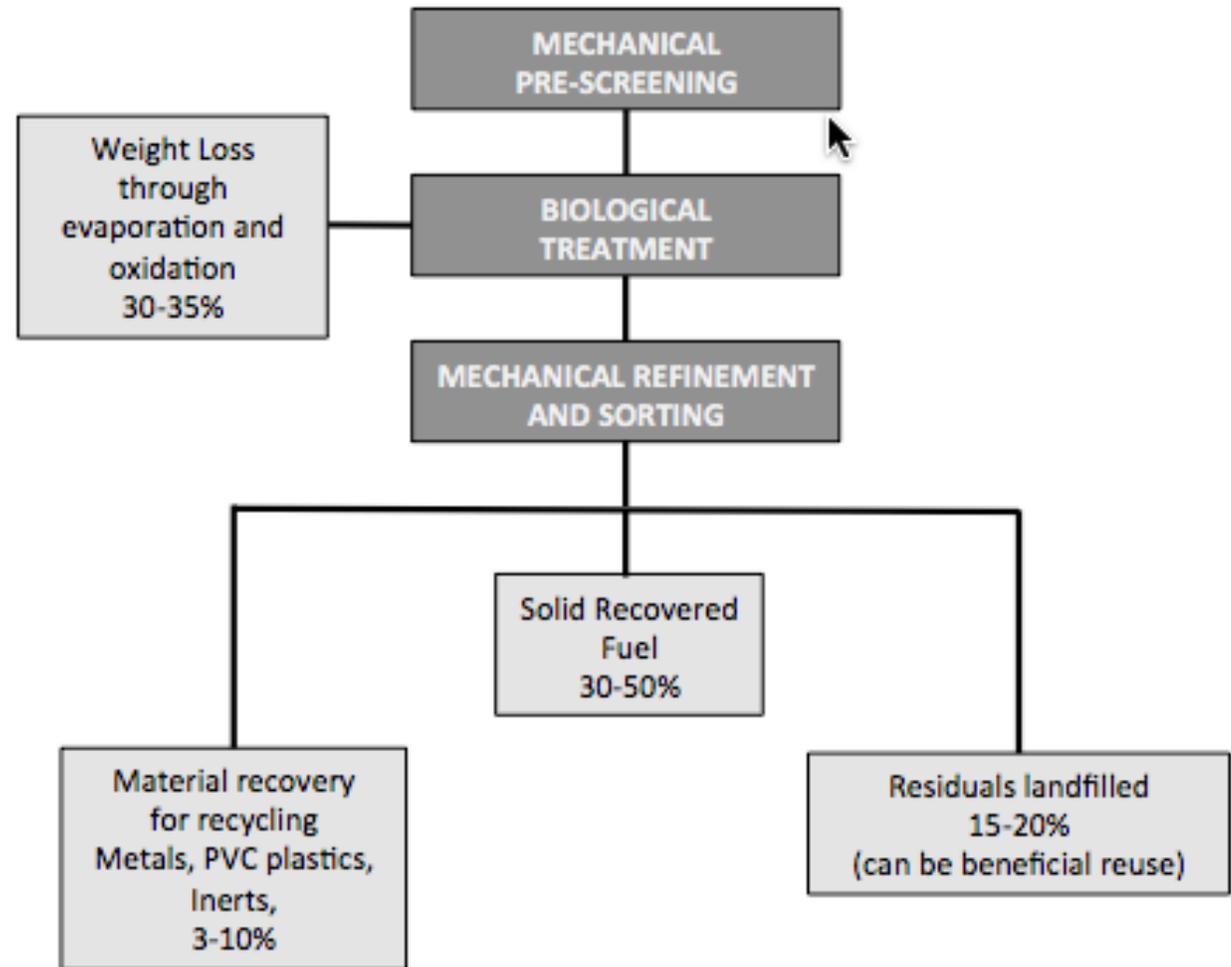
Figure 1 typical WTE diagram



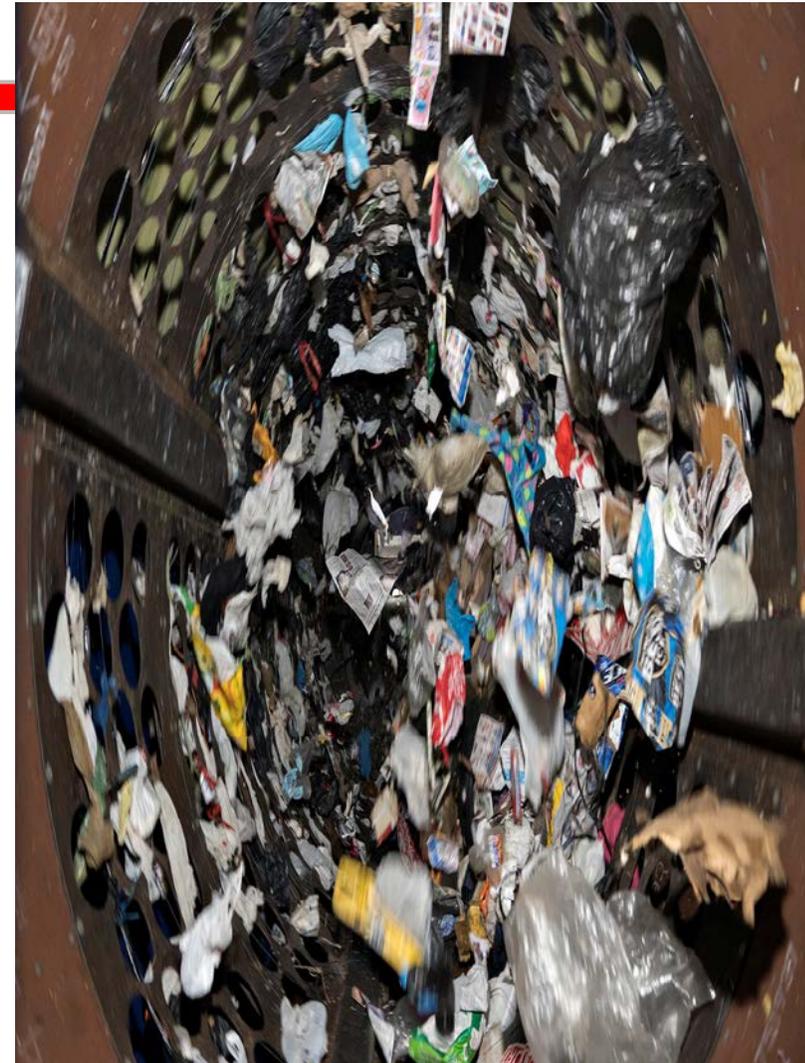
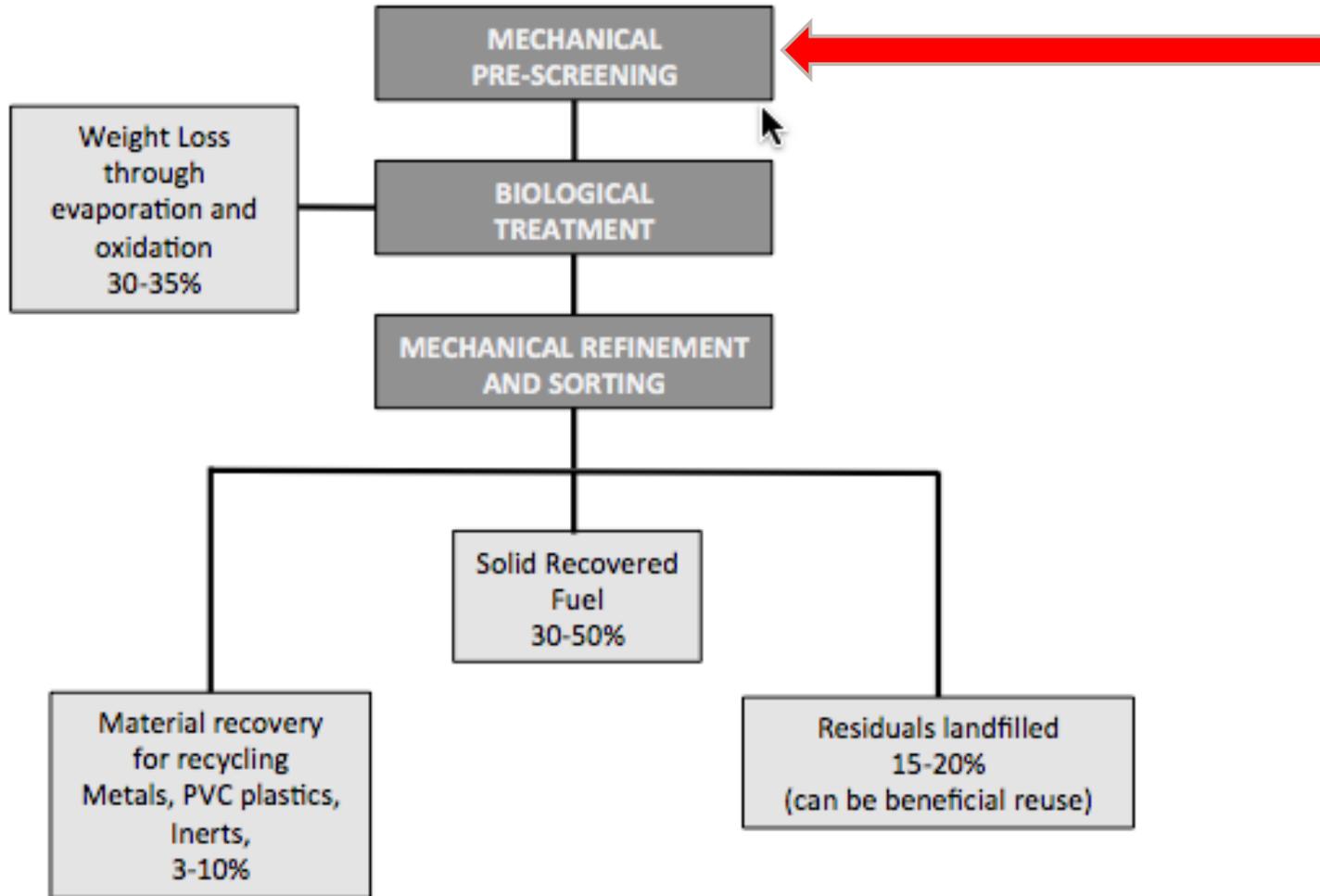
SRF Overview

- Utilizes mechanical and biological treatments to convert municipal solid waste into an EPA recognized alternative renewable fuel called Solid Recovered Fuel (SRF)
- Does not combust the waste in the manufacturing process
- Uses a combination of automated sorting equipment, enhanced biological composting, and mechanical refinement

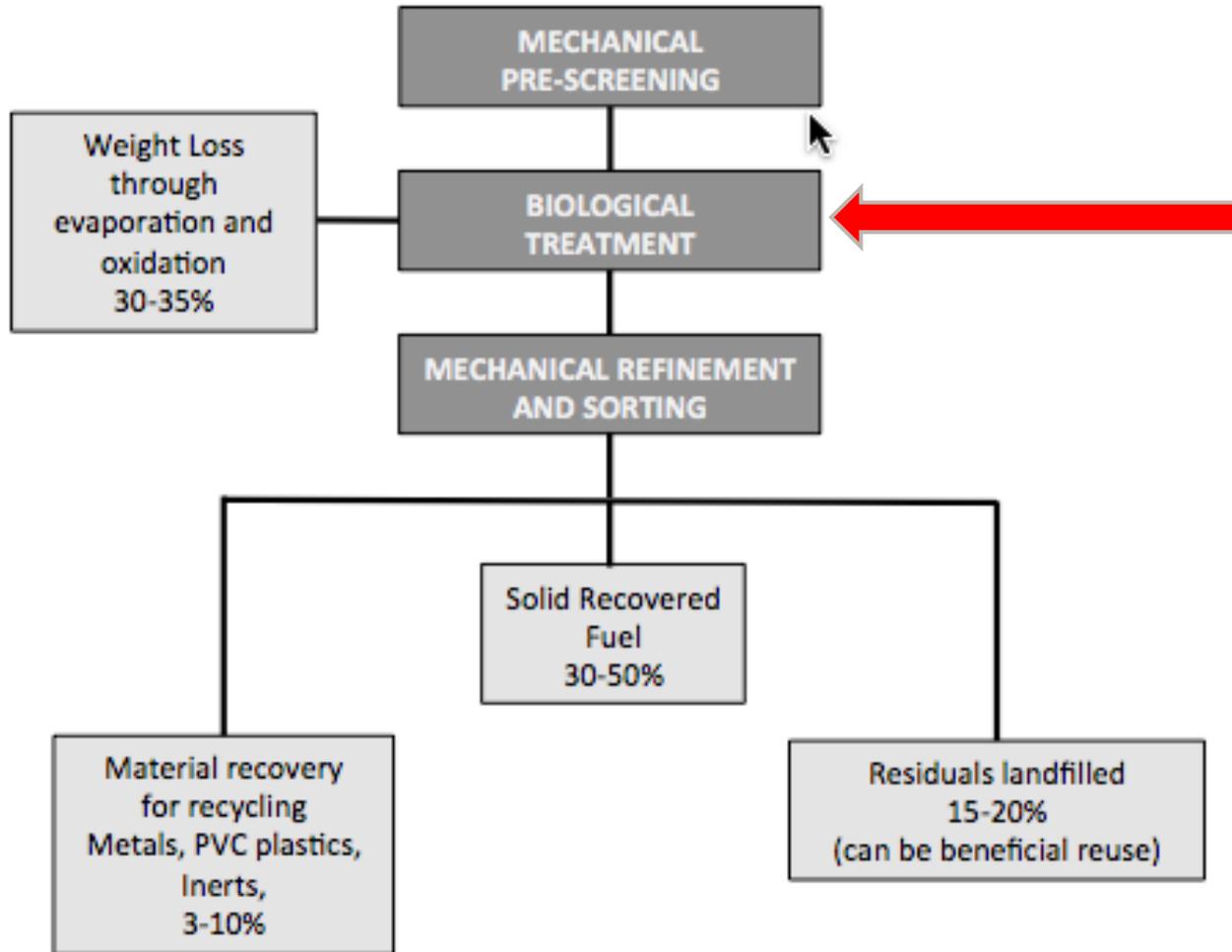
The Mechanical Biological Process



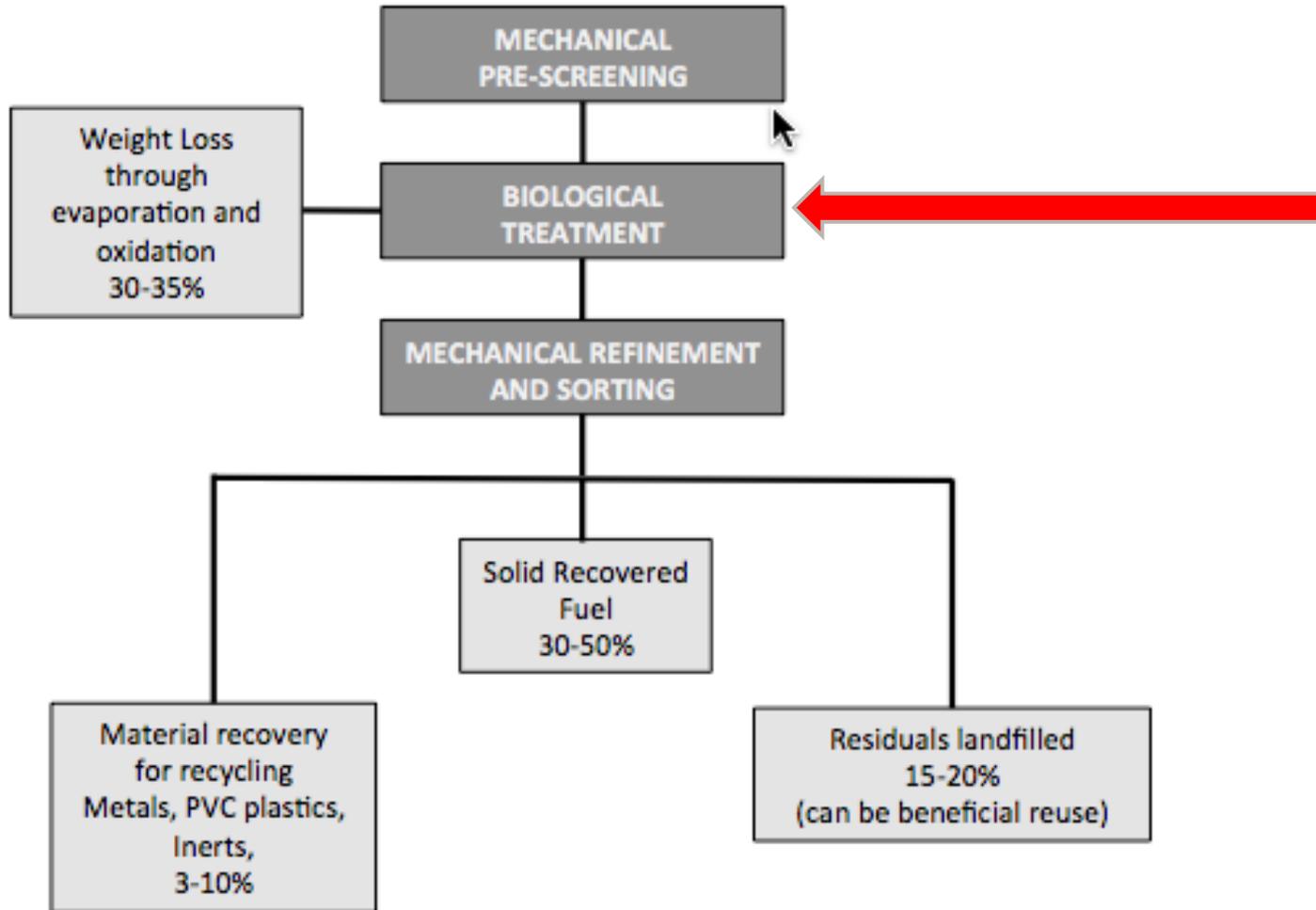
SRF - The Mechanical Biological Process



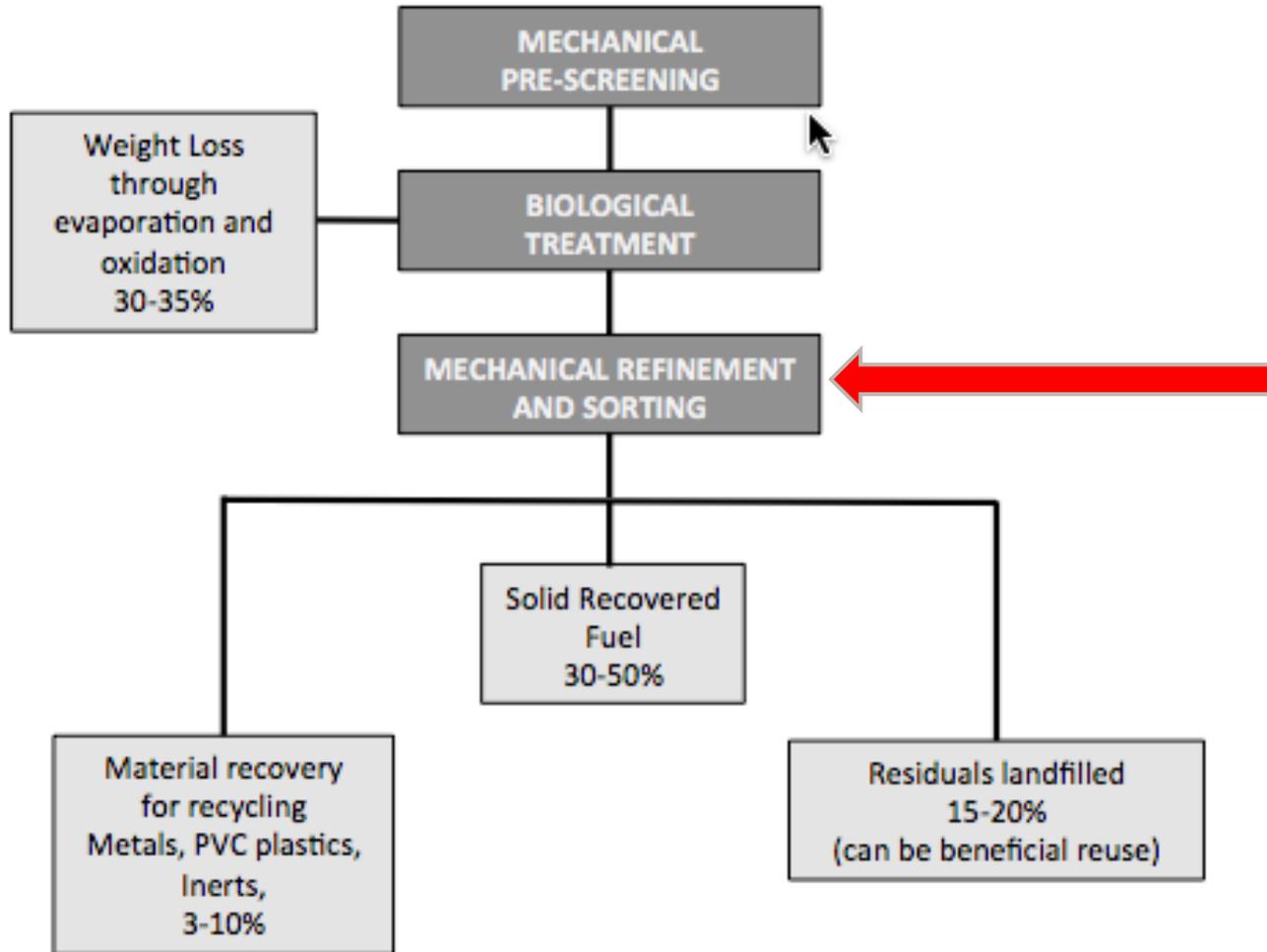
SRF - The Mechanical Biological Process



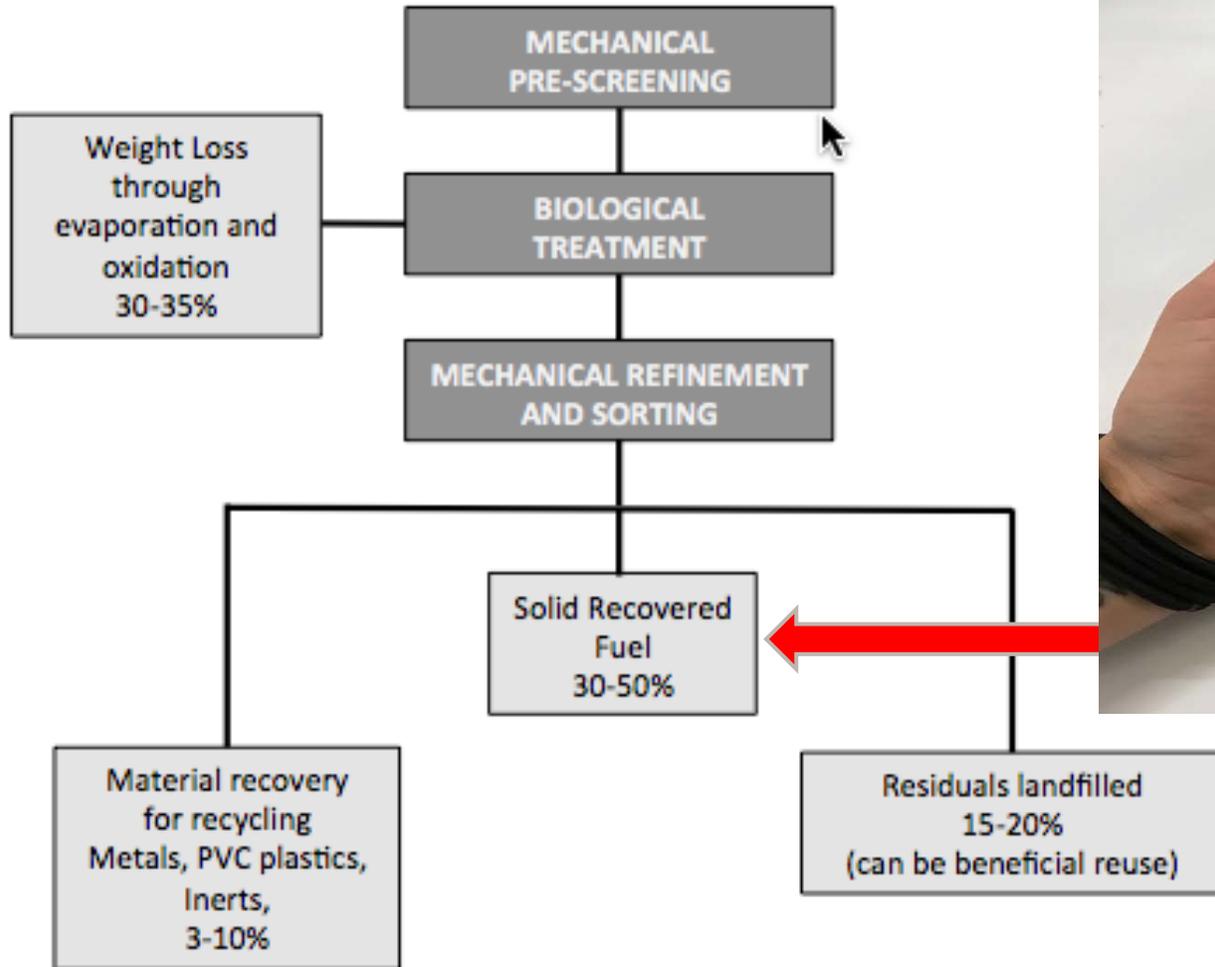
SRF - The Mechanical Biological Process



SRF - The Mechanical Biological Process



SRF - The Mechanical Biological Process



SRF Benefits

- Our Plant Trash will be turned into a product that will be sold.
- High calorific value – one ton of coal is equivalent to approximately one and a half tons of SRF
- SRF is marketed to off-site industrial Users
 - Cement Industry
 - Lime Kilns
 - Steel mills



Thank You.

volvogroup.com/hagerstown

Volvo Group Trucks
Mark Pannell
Environmental & Energy Manager



VOLVO
VOLVO GROUP



Bill Whitfield

Shorenstein Properties

Submit Questions

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SUSTAINABILITY AT SHORENSTEIN

Better Buildings Summit

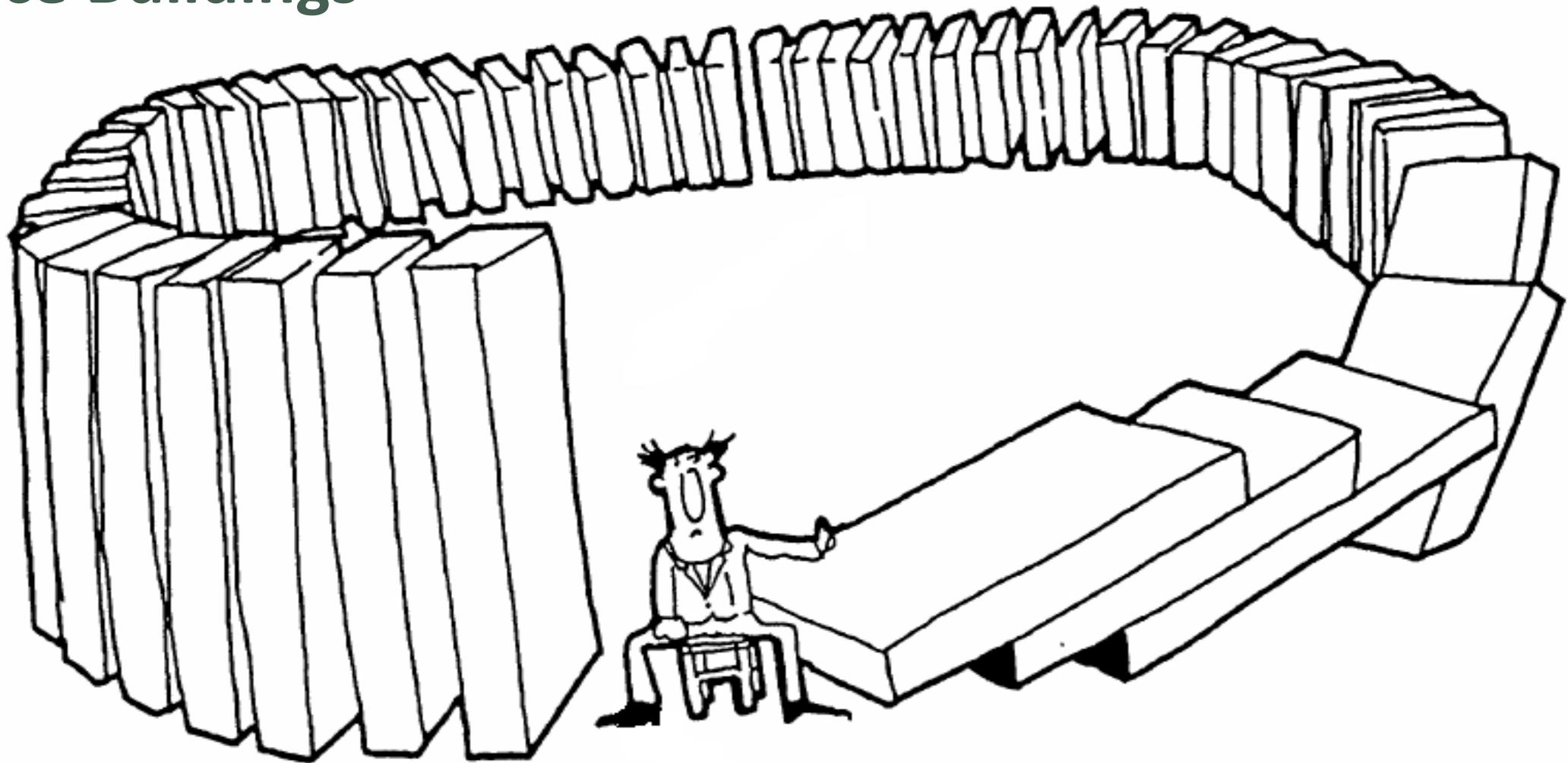
6/11/20

Ten Things to Talk About

- **What We Do**
- **How We Do It**
- **Waste Reduction**
- **Composting**
- **Messaging**
- **Sustainability**
- **Our Successes**
- **Bill Ranting**
- **Thank You**



Office Buildings



Corporate – Building Teams – Tenants – Retail – Public

What We Do

- **Employee Sustainability Training (New Hire - Ongoing)**
- **Policies (Sustainability - ENERGY STAR - Waste - Tenant Engagement)**
- **Goals (Company wide – Building level)**
- **Collect Data monthly (ENERGY STAR)**
- **Quarterly Reports (Share – Identify Trends – Action Plan)**
- **Recycling Training (In Person – On Line)**
- **Brochures (Customizable)**
- **Support tenants (Bins – Signage)**
- **Trash Audits (Annually)**



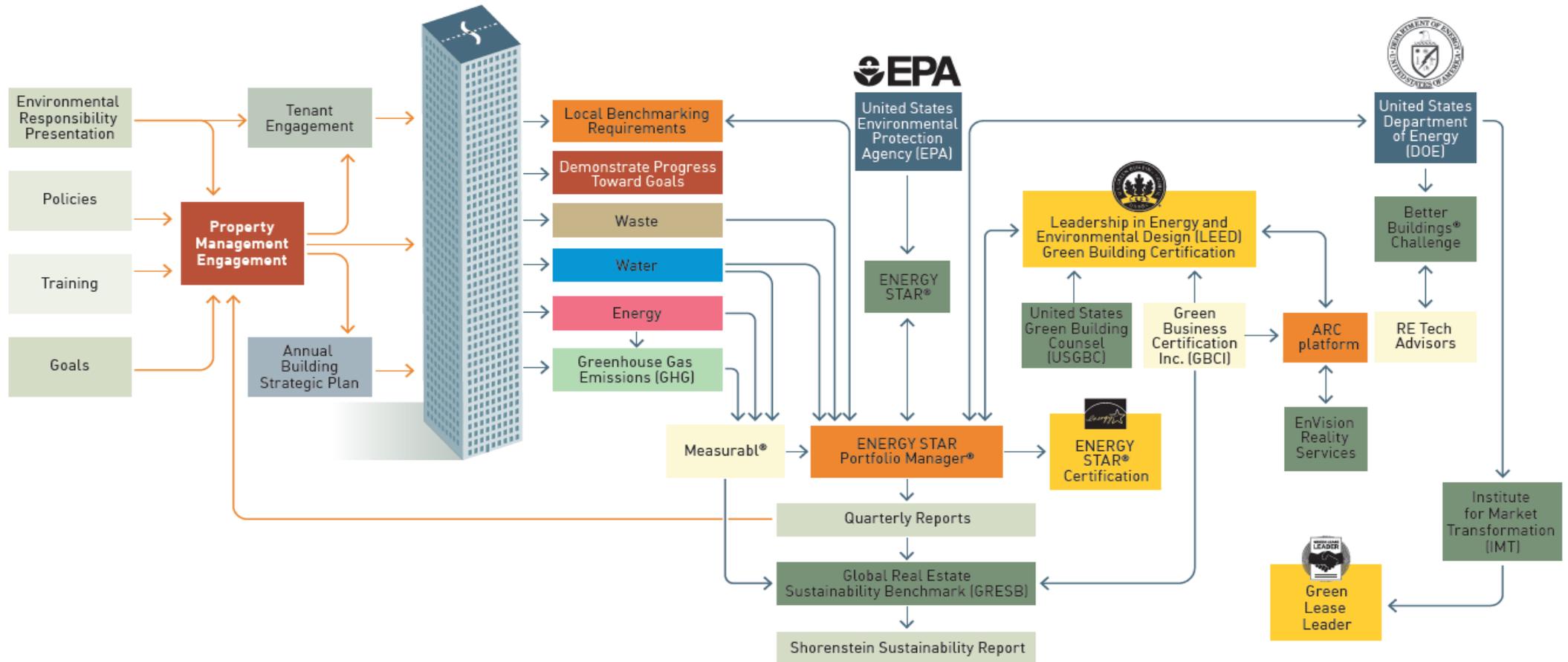
Poll # 6

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Select “Early Best Practices From The
Waste Pilot” from the dropdown

How We Do It

2020 Sustainability at Shorenstein



Waste Reduction

Reduce

Reuse

Recycle

Rot



Composting

60% of what goes into landfill is compostable



Messaging



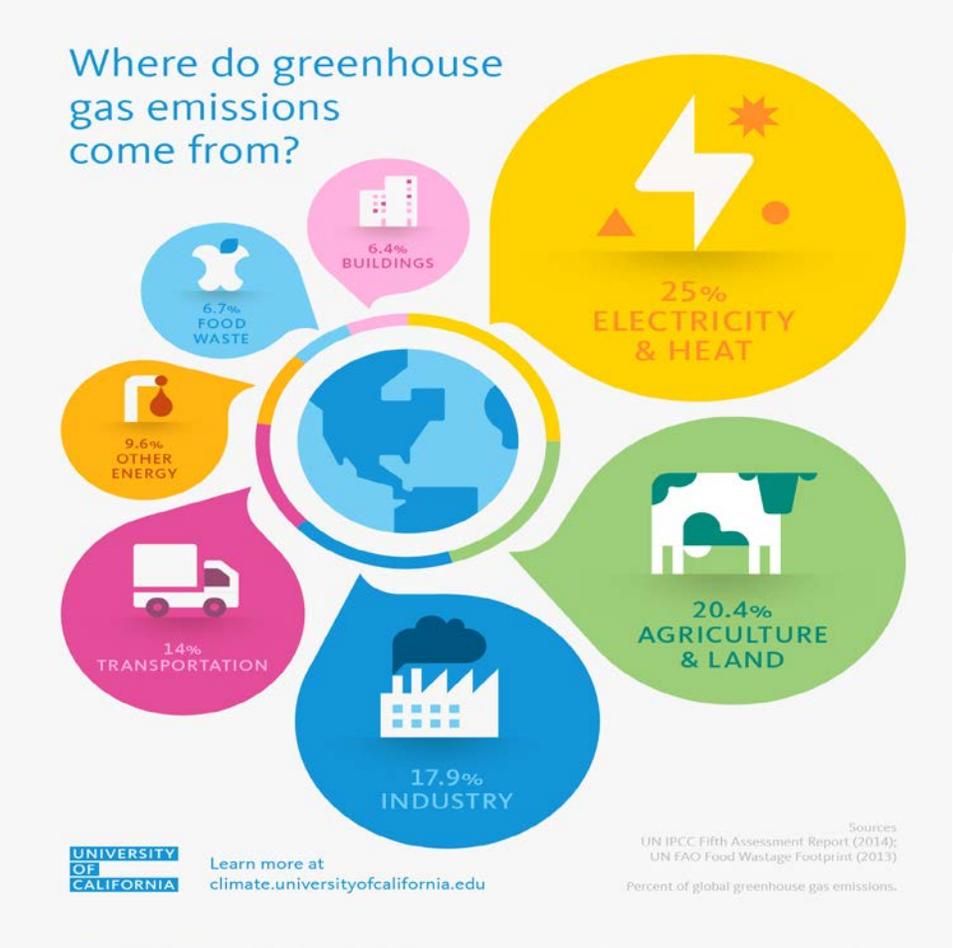
14%
Other

25%
Recycle

40%
Compost

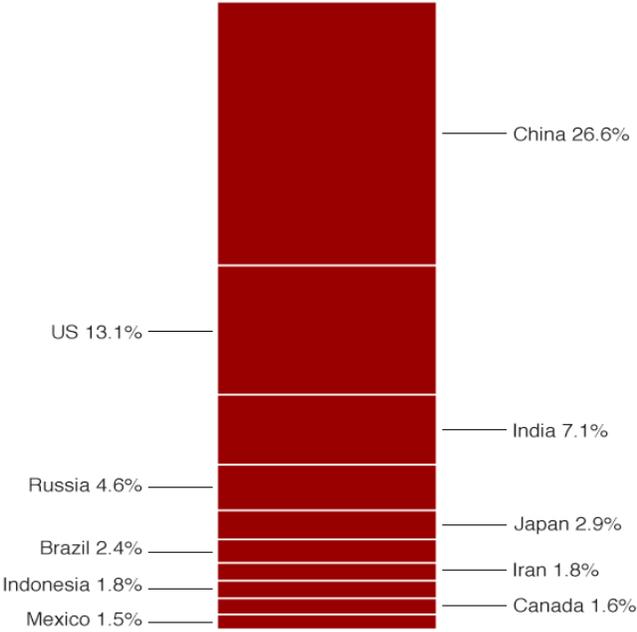
21%
Paper

Sustainability



World's top greenhouse gas emitters

The top 10 greenhouse gas emitters make up 60% of total emissions

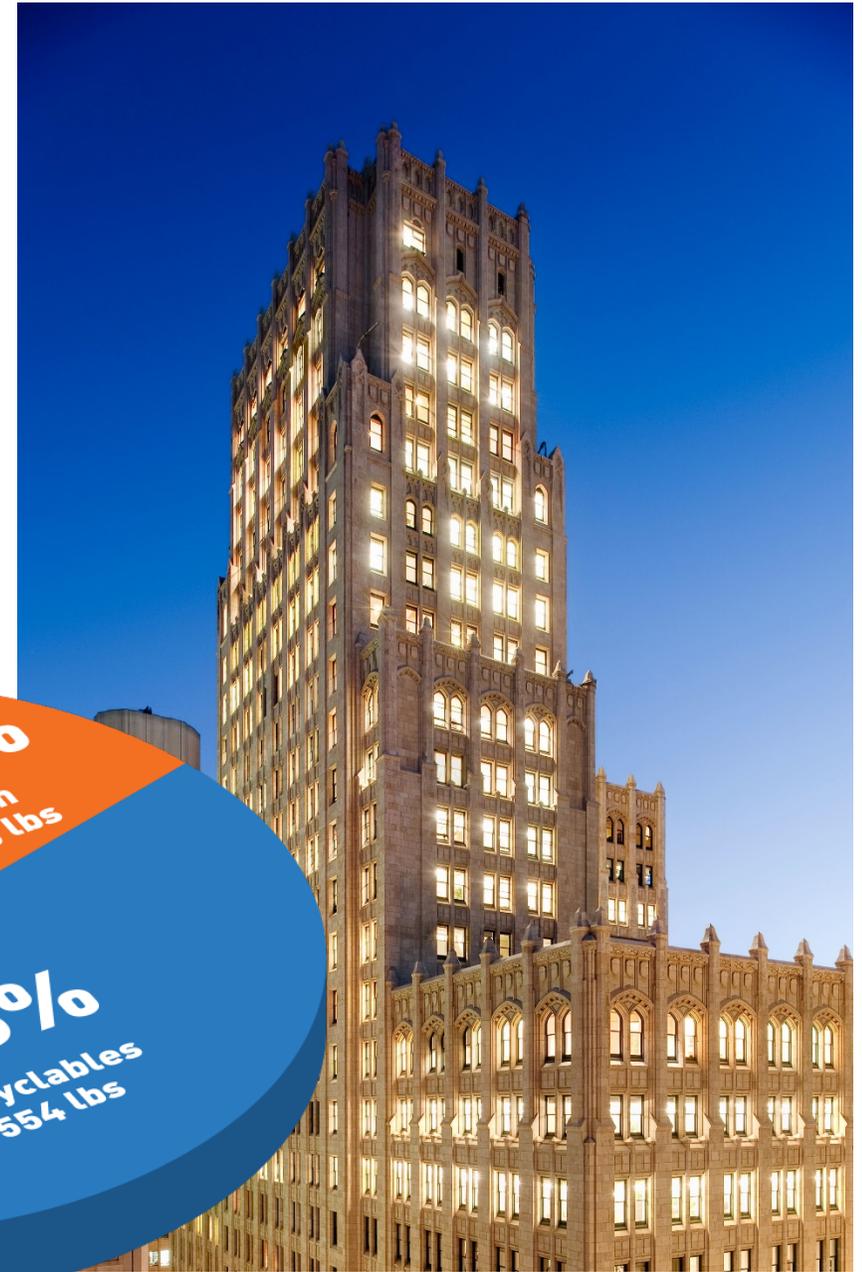
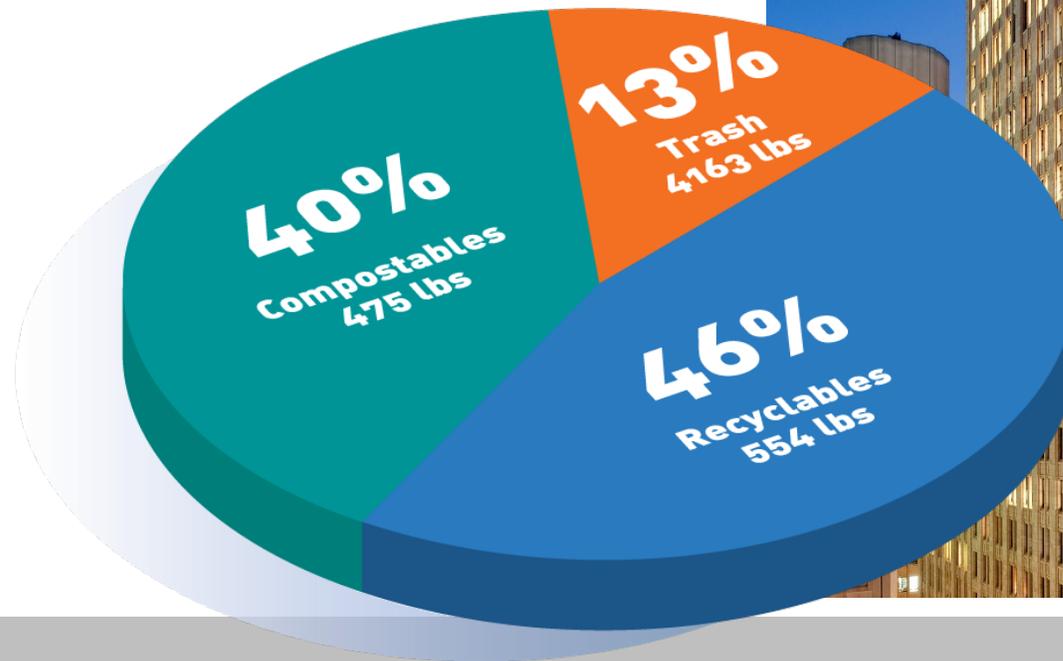


Source: EC Joint Research Centre/PBL Netherlands Environmental Assessment Agency



Our Successes

- Robust Program in Place
- Policies
- Individual Stats
- Portfolio Wide Success
- Better Buildings Waste Pilot



What's Next



- **Statistics**
- **Root Causes**
- **National Guidelines**
- **Initial Responsibility**
- **Plastics**
- **Behavior**
- **Participation**
- **Education**

SUSTAINABILITY AT SHORENSTEIN

Thank You

6/11/20

Speaker Q & A

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Select “Early Best Practices From The Waste Pilot” from the dropdown

Better Buildings: Summer Webinar Series



**BEHIND THE METER
DISTRIBUTED ENERGY
RESOURCES:**
BEST PRACTICES FOR INTEGRATING
DERS INTO COMMERCIAL BUILDINGS

July 8



**NEXT-GENERATION BUILDING
PERFORMANCE POLICIES:**
MAXIMIZING ENERGY SAVINGS AND
ENVIRONMENTAL IMPACTS

July 16



**EVERYONE HAS A
DATA CENTER:**
HOW TO BE AN ENERGY
CHAMPION FOR YOURS

July 28



**PROGRAM DESIGN WITH
EVERYONE IN MIND:**
LOW-INCOME SOLAR
PROGRAM STRATEGIES

July 9



**STRATEGIES TO COMBINE
ENERGY + HEALTH UPGRADES
IN MULTIFAMILY HOUSING**

July 21



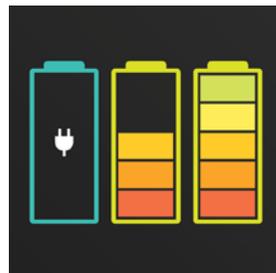
**SUCCEED WITH
SUBMETERING:**
HOW TO MAKE THE BUSINESS CASE

August 4



THE DYNAMIC DUO:
UNLEASH PUBLIC SECTOR ENERGY
SAVINGS WITH FINANCING AND
TECHNICAL ASSISTANCE

July 14



CASE IN POINT:
OREGON'S RECENT EFFORTS TO
REDUCE PLUG LOAD ENERGY
CONSUMPTION

July 22



Additional Questions?

Please Contact Us



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