Materials circularity: the way to a sustainable future

SYFA Conference 2022

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Today's Agenda

- A snapshot of Eastman
- The challenges we all face
- The opportunity – circularity in materials, enabled by molecular recycling
- Eastman's molecular recycling technologies
- Sustainability and consumer preference in apparel

Snapshot of Eastman

- Fortune 500 specialty materials company with 2021 revenue of ~$10.5B
- Global manufacturer and marketer of advanced materials and specialty additives
- Operates four business segments
- Global team of ~14,000
- Serving customers in >100 countries
- Sustainability strategy commitment to **mitigating climate change**, **mainstreaming circularity** and **caring for people and society**

TOP 100 BARRON'S Most Sustainable Companies 2021

FORTUNE CHANGE THE WORLD 2021

REFOCUS SUSTAINABILITY & RECYCLING SUMMIT SUSTAINABILITY INNOVATION AWARD

WSJ 100 MOST SUSTAINABLY MANAGED COMPANIES 2020

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We are in a Global Crisis

CLIMATE

Enabling consumer energy efficiency
Reduce and reuse

PLASTIC WASTE

Recycled/bio content
Biodegradation

10 BILLION

Quality of life
Product safety

Environmental Concerns

Percentage of consumers concerned about the following environmental or social issues

U.S.	UK	Germany	France
Air quality **85%**	Ocean pollution **88%**	Ocean pollution **90%**	Ocean pollution **88%**
Water quality **85%**	Increasing waste **82%**	Climate change **81%**	Nat. resource depletion **86%**
Ocean pollution **83%**	Single-use plastics **82%**	Increasing waste **79%**	Chemicals in products **85%**

Blaming Brands

Percent of U.S. & European consumers who agree with the following statements about brands & retailers

Be penalized for not solving the waste crisis

63% 62%

Responsible for the plastic waste crisis

67% 61%

Wish they made it easier to find sustainable products

71% 75%

Need to do more to help me live a sustainable life

71% 69%

European Consumers U.S. Consumers

Plastics are essential …
but the waste issue must be solved

HYDRATE

Plastics help to deliver hydration to those who need it

FEED

Advanced packaging technologies preserve fruits, vegetables, & meats

CARE

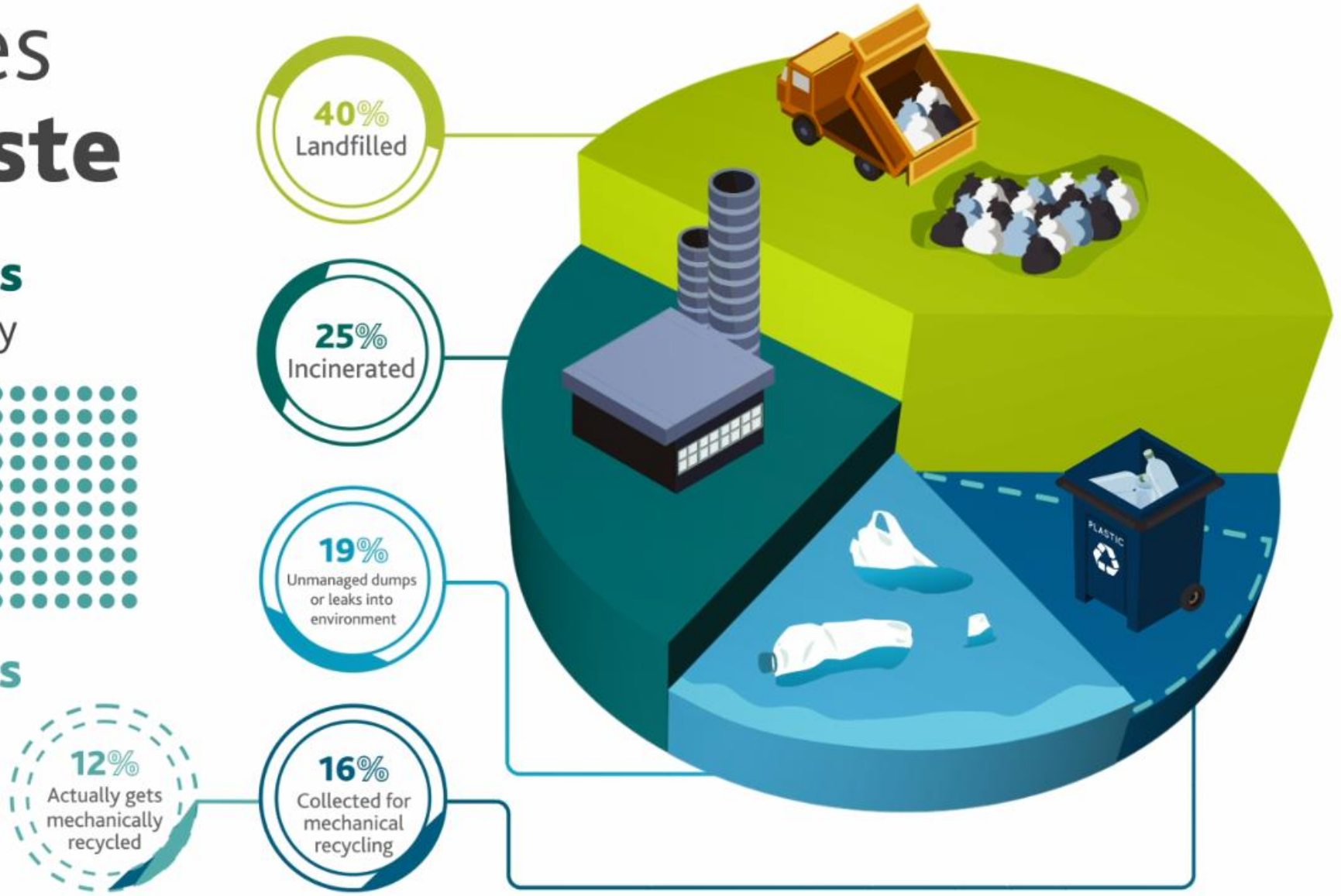
Plastics improve sterility, patient safety, and comfort in therapies

REDUCE **REUSE** **RECYCLE**

Opportunities **going to waste**

300 million metric tons
of plastics are produced globally

260 million metric tons
of plastics are disposed



Circular economy is a new vector of significant growth for materials industry

- Global brands making significant commitments to reduce plastic waste and climate impact
- Eastman is a leader in molecular recycling technologies addressing plastic waste and climate, scaling up across the world
- Circular economy creating new growth opportunities for our biodegradable cellulosic biopolymers
- Providing material solutions without compromise in performance

Today- Materials Companies Leverage Fossil Fuel based Feedstocks

These materials/plastics are made mostly from **carbon** 6 C Carbon 12.011 , **hydrogen** 1 H Hydrogen 1.008 , **and oxygen** 8 O Oxygen 15.999

Coal

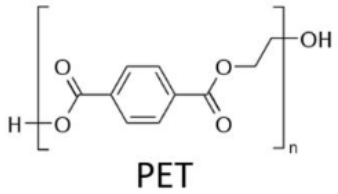
Oil

Natural Gas

Air (Oxygen)

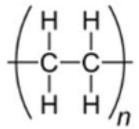
6 C Carbon 12.011 1 H Hydrogen 1.008 8 O Oxygen 15.999

Chemical Companies



PET

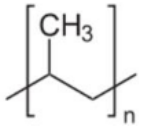
1 PETE



Polyethylene

2 HDPE 4 LDPE

Polypropylene



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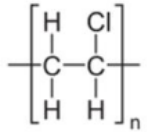
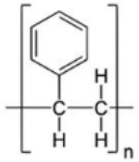


PVC

3 V

Polystyrene



6 PS

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Future- Materials Companies Leverage Waste as Feedstocks

These materials/plastics are made mostly from **carbon** 6 C Carbon 12.011, **hydrogen** 1 H Hydrogen 1.008, **and oxygen** 8 O Oxygen 15.999

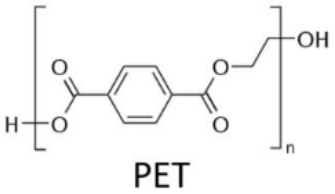
Plastic & Textile Waste
(Carbon, Hydrogen, and Oxygen)





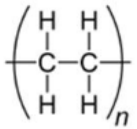

6 C Carbon 12.011 | 1 H Hydrogen 1.008 | 8 O Oxygen 15.999

Advanced or Chemical or Molecular Recycling



PET

1 PETE



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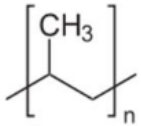
Polypropylene 

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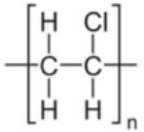

PVC

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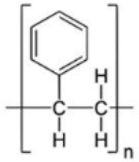
Polystyrene 

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Mechanical and molecular recycling

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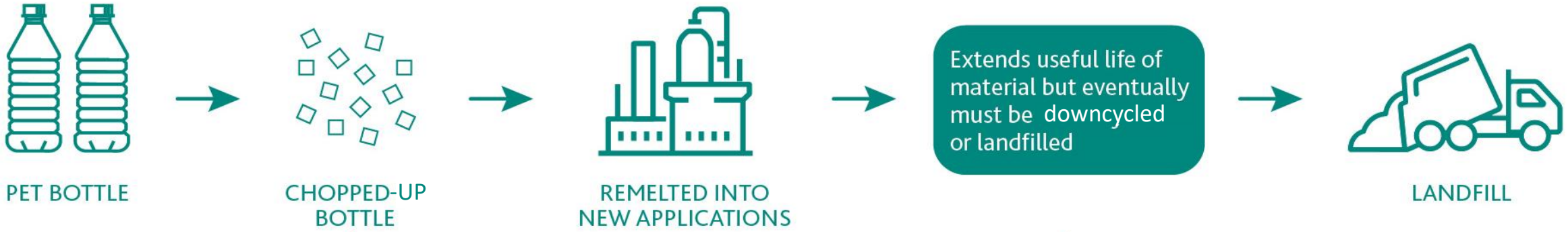
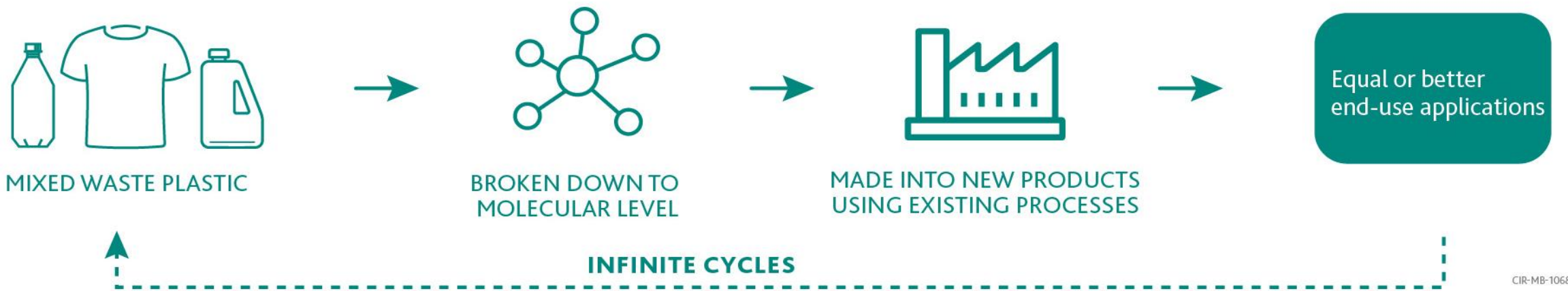
MECHANICAL RECYCLING



MOLECULAR RECYCLING



Both mechanical and molecular recycling are required to eliminate waste and create a truly circular economy

MECHANICAL RECYCLING
Most carbon efficient when possible

Optimal GHG footprint; existing infrastructure

Limited to clean sources; majority must be downcycled or not recycled at all

Performance and quality limitations

Quality degrades with each cycle … eventually, everything becomes waste

MOLECULAR RECYCLING TECHNOLOGY
Necessary to renew material and avoid end of life

Eastman technologies deliver an improved GHG footprint when compared to processes using fossil feedstocks

Can recycle materials that have little value or can not be mechanically recycled

No performance trade-offs; upcycles the material back to premium quality and performance

Enables infinite ability to recycle polymer for a truly circular economy

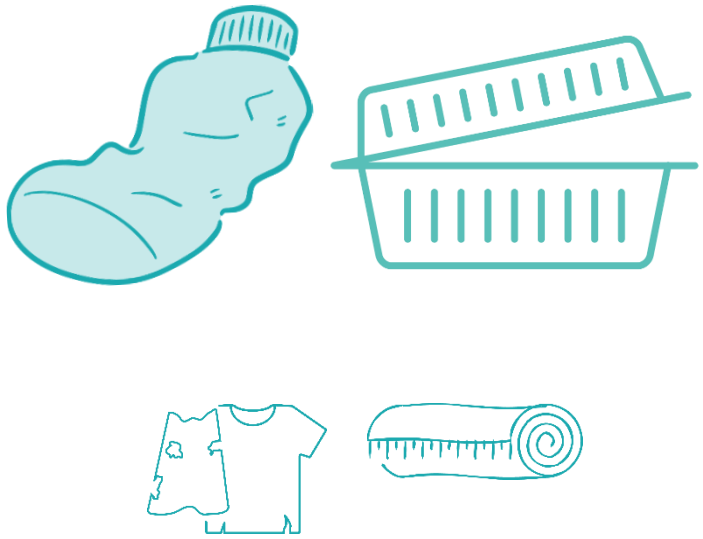
What does 250,000,000 pounds of waste plastic look like?

250,000,000 pounds of plastic waste would fill Neyland Stadium in Knoxville, TN over 2x!

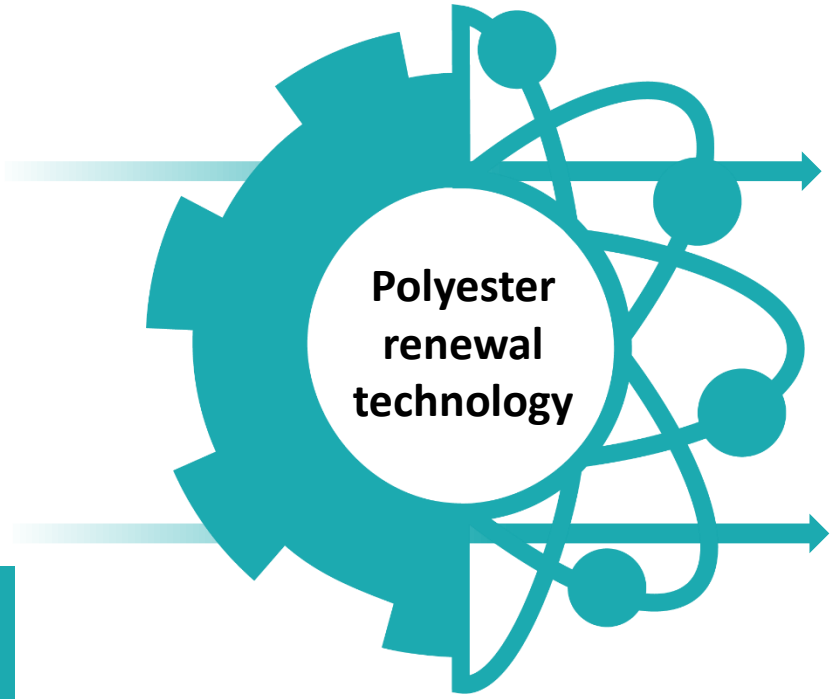
We will be processing this volume of plastic waste each year starting in 2023.

Creating value from waste with polyester renewal technology

Feedstocks



PET waste including colored PET, films, and fibers from textiles and carpets



End products

20%–30% LOWER GHG

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PRT molecular recycling investments

Our 'circular contracting' model to scaling up PRT technology

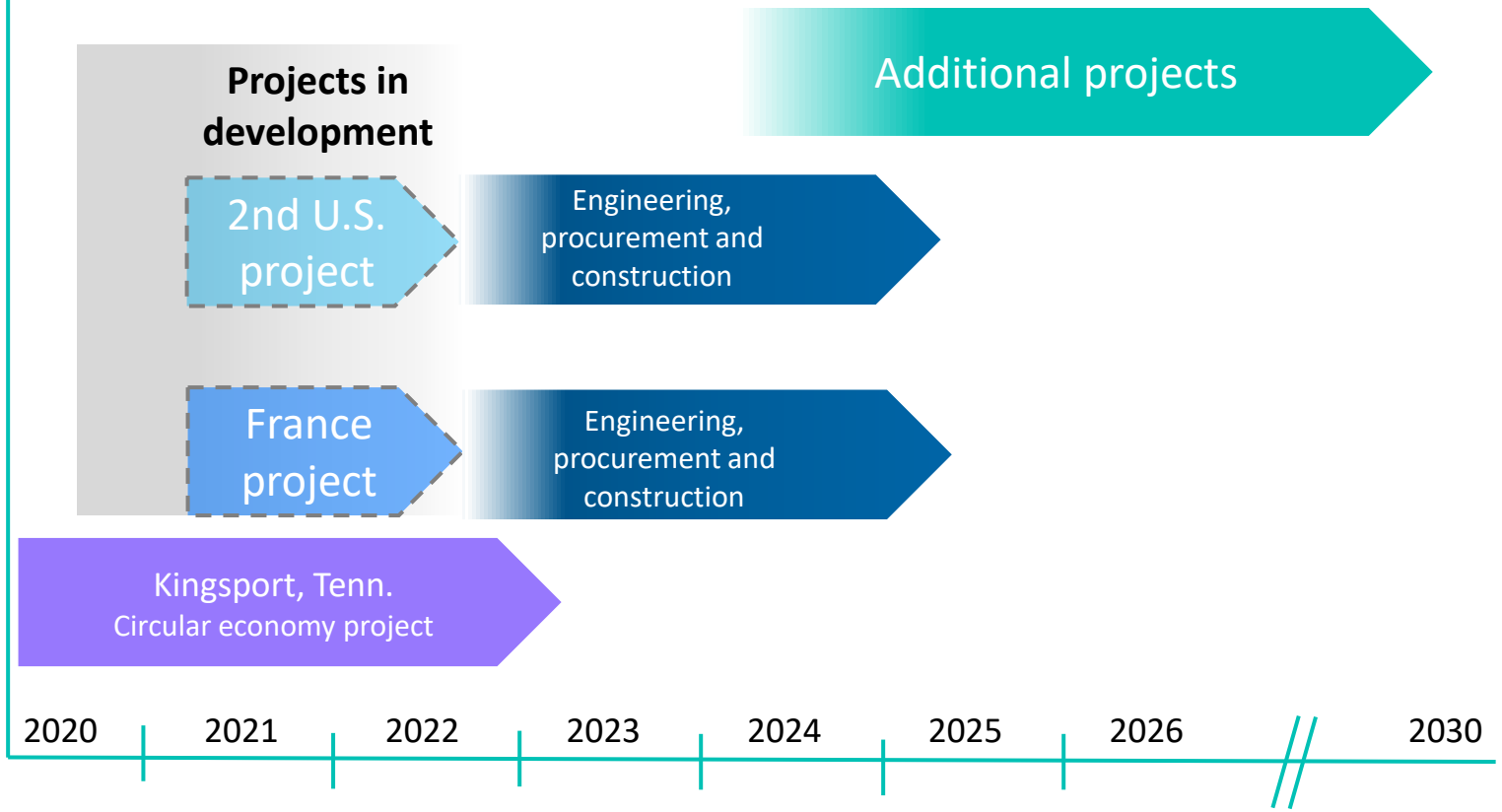
Building facilities to provide copolyester, PET and textiles

Long-term take or pay cost pass through customer contracts

Long-term feedstock supply agreements

Providing advantaged technology, construction and operational expertise

Projected timeline for completion of PRT projects



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Eastman makes a significant additional investment in Europe!

January 17, 2022: French President Emmanuel Macron and Eastman CEO Mark Costa jointly announced:

Up to
$1 Billion
Investment

The world's largest plastic to plastic recycling facility

Recycle
160 kmt
of hard-to-recycle plastic waste

Located in
France

Enables up to
80% GHG
Reduction*

*versus traditional methods, GHG reduction for final product depends on specific grade and composition

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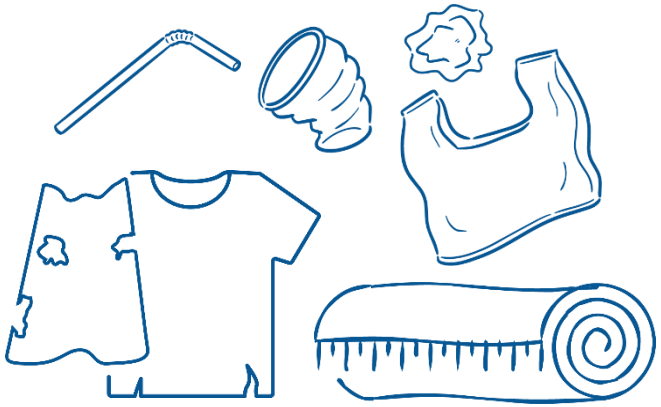
Creating value from bio-content and waste

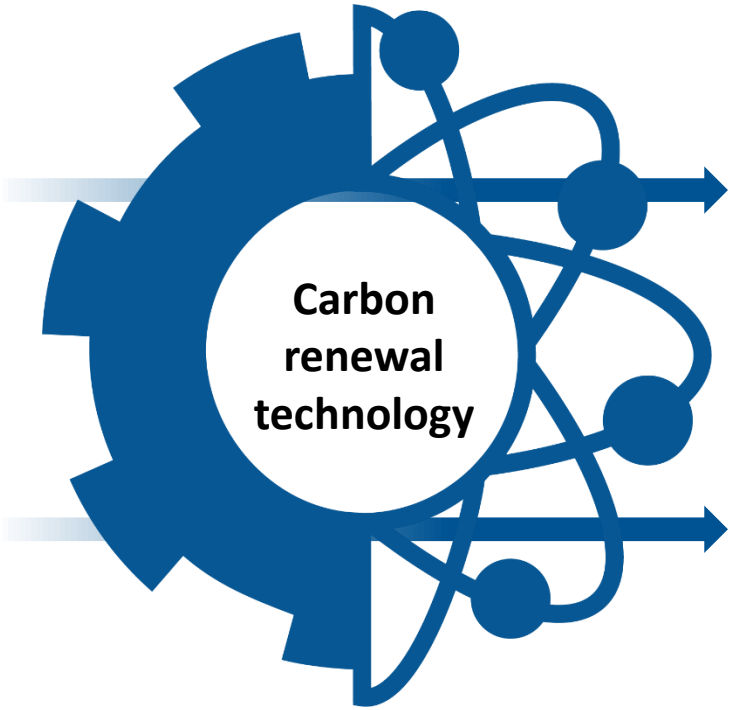
Biodegradable cellulosic biopolymer with carbon renewal technology

Feedstocks

Wood pulp from sustainably managed forests

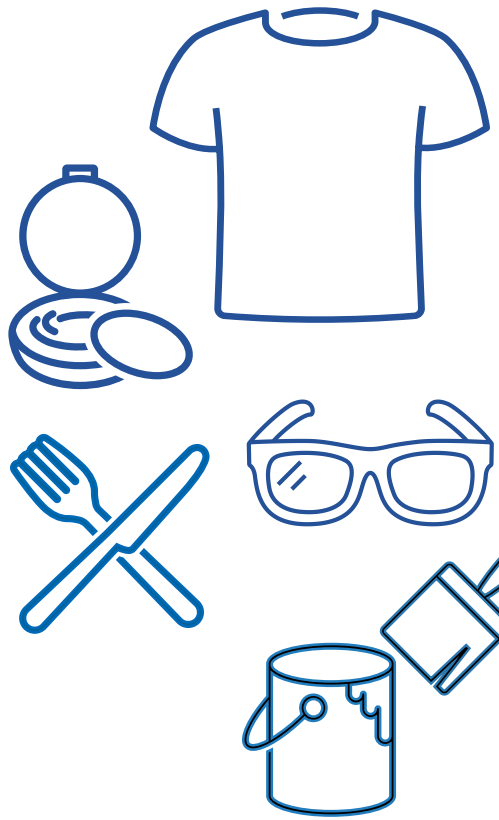
A wide array of mixed plastic waste, textiles, carpet, etc.





End products

(~60% bio-content, ~40% from recycled plastic waste)



20%–50% LOWER GHG[1]

[1]*Lower GHG of process to produce intermediates vs. fossil feedstocks. Does not include benefits of electricity/steam.*

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Cellulosic stream being reinvented:
Bio-content, recycled content and biodegradability

Beginning of life — *responsibly sourced*

60% biobased content from sustainably sourced wood pulp[1]

FSC www.fsc.org FSC® C140711 The mark of responsible forestry

PEFC PEFC/29-31-359 Promoting Sustainable Forest Management www.pefc.org

USDA CERTIFIED BIOBASED PRODUCT PRODUCT 59%

+ 40% certified[2] recycled content

ISCC International Sustainability & Carbon Certification

End of life — *certified biodegradable*

Range of biodegradation certifications

naia RENEW

Eastman AVENTA™ compostable materials

SOIL: OK bio-degradable TÜV AUSTRIA SOIL S0717

OK compost TÜV AUSTRIA INDUSTRIAL S0717

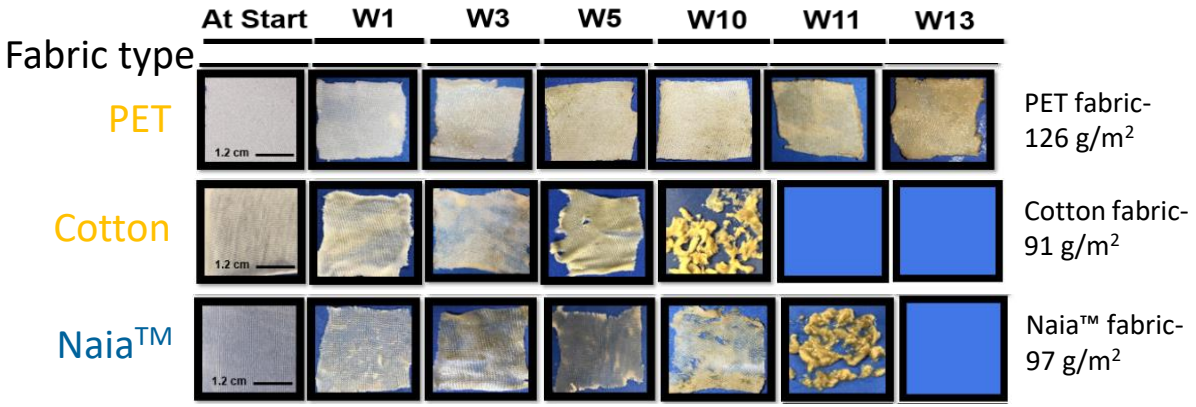
WATER: OK bio-degradable TÜV AUSTRIA WATER S0717

HOME: OK compost TÜV AUSTRIA HOME S0717

Ocean biodegradation study[3]

Time (weeks)

WOODS HOLE OCEANOGRAPHIC INSTITUTION



Method: Articles were exposed to a continuous flow of seawater pumped from 300 m offshore from the Vineyard Sound (Massachusetts, U.S.)

[1]*Eastman holds the Forest Stewardship Council® (FSC®) Chain of Custody certification (license code FSC-C140711), representing the traceability of its wood-based raw materials*

[2]*Recycled content is achieved by allocation of recycled plastics using an ISCC-certified mass balance process.*

[3]*Study led by Woods Hole Oceanographic Institute, Massachusetts, USA. Mazzotta, M. et al. ES&T Lett., Manuscript in press.*

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Eastman launched Naia™ Renew for textiles

Creating value from waste

A cellulose acetate fiber produced from sustainably sourced wood pulp and acetyl sourced from a variety of recycled waste material

60% renewable wood pulp

40% certified[a] recycled waste materials

Certified biodegradable

Same quality fiber without compromise

Reduced carbon footprint by ~35%[b]

Solution for hard-to-recycle waste material

Low-impact production **at scale available now**

Eastman Naia™ Renew

A sustainable fiber with a compelling value proposition

Comfort

Luxury

Ease of care

>25 brands now adopting Naia™

H&M

EVERLANE

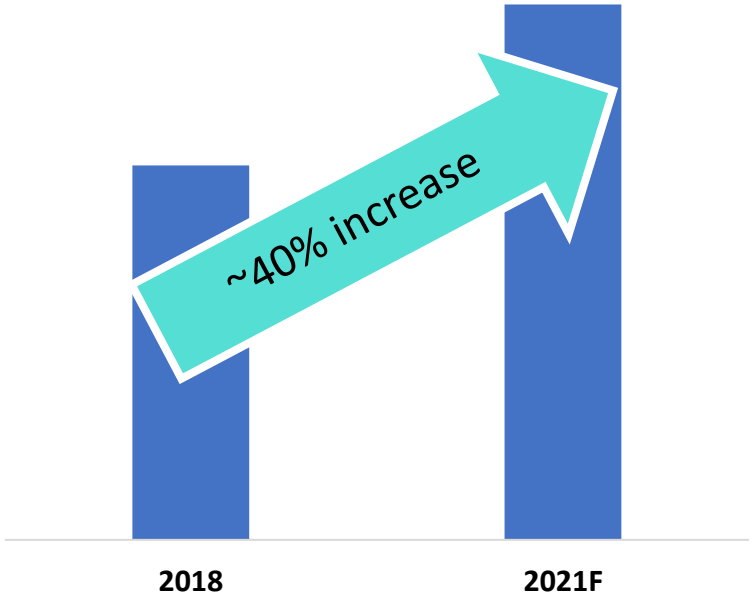
LAFAYETTE 148 NEW YORK

VINCE.

GAP

NA-KD

Naia™ growing at >2X other sustainable fibers



Naia™ margin growth

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Consumer Wish List

Percent of consumers wanting the following from loungewear brands & retailers

More comfortable fabrics

80% 70%

More versatile loungewear

76% 66%

More loungewear items

67% 64%

More sustainable loungewear

66% 67%

New & different fibers

56% 58%

U.S. Consumers European Consumers*

*Europe = UK, Germany, Spain

Fiber Features

Percentage of U.S. & European consumers likely to purchase based on loungewear fiber features

Do not pill
80%

Keep looking new
79%

Easy care
78%

Breathability
77%

Resist bacteria, odor
75%

Keep cool
74%

Lower impact
71%

Hypoallergenic
70%

Reduce landfill waste
70%

Plants, recycled materials
68%

Drape
64%

Sheen / luster
48%

Materials Matter

What makes loungewear sustainable among U.S. & European consumers (unaided)

"Made of natural fibers."- U.S.

"Fair working conditions. More sustainable fibers, offers when you hand in garments that are no longer worn."- Germany

"Environmentally sourced fibers." - U.K.

"Be made with quality and sustainable materials." - Spain

"That it lasts."
- Spain

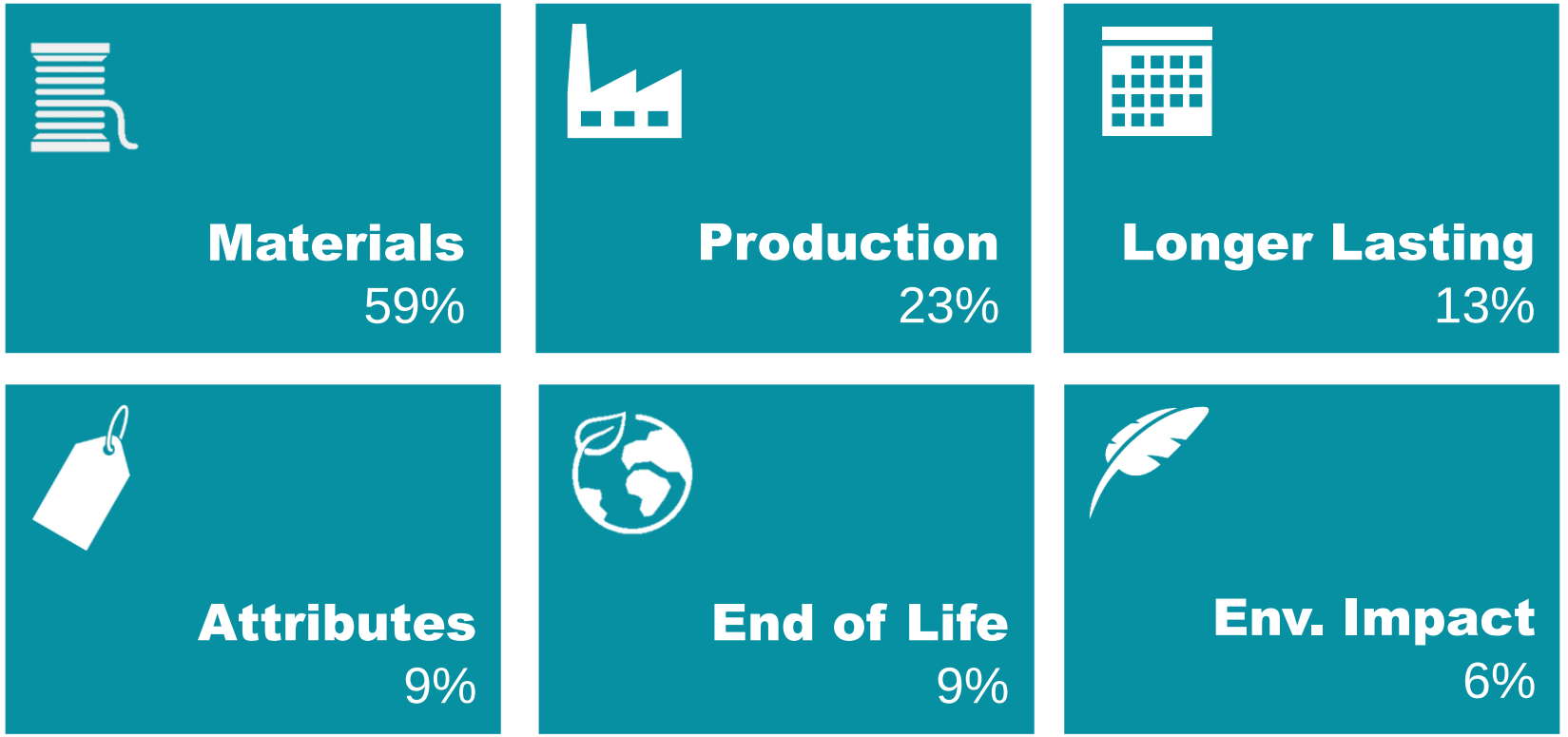
"Natural fibers or if they are artificial then maybe from recycled material." – U.K.

"Use substances that do not harm the environment, and do not allow child labor or people with poor working conditions."
- Germany

"Using fibers or threads that are made of recycled materials and can be recycled again. And do not use a lot of water in manufacturing."
- U.S.

Materials Matter

What makes loungewear sustainable among U.S. & European consumers (unaided)



Renew polymers continue to gain momentum in the market and adoption by leading brands

Key takeaways…

- No single solution will solve the world's waste and climate challenges.
- Molecular recycling can play an important role by complementing traditional mechanical recycling.
- Eastman is investing in innovations and partnerships to catalyze the creation of a circular economy.
- Sustainability and circularity are becoming more important influencers of consumer choice in many markets, including textiles

Thank you!
Questions?

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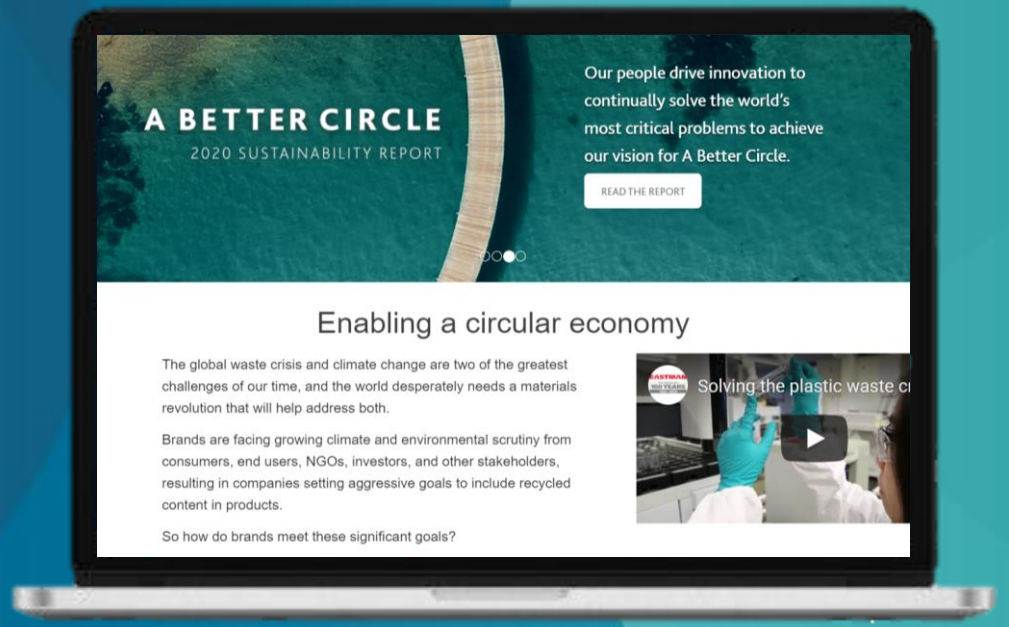
Find more resources at Eastman.com/circular



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