

# How Biomaterials Innovation Can Help Reduce Plastic Pollution



*Michael A. Saltzberg, Ph.D.*

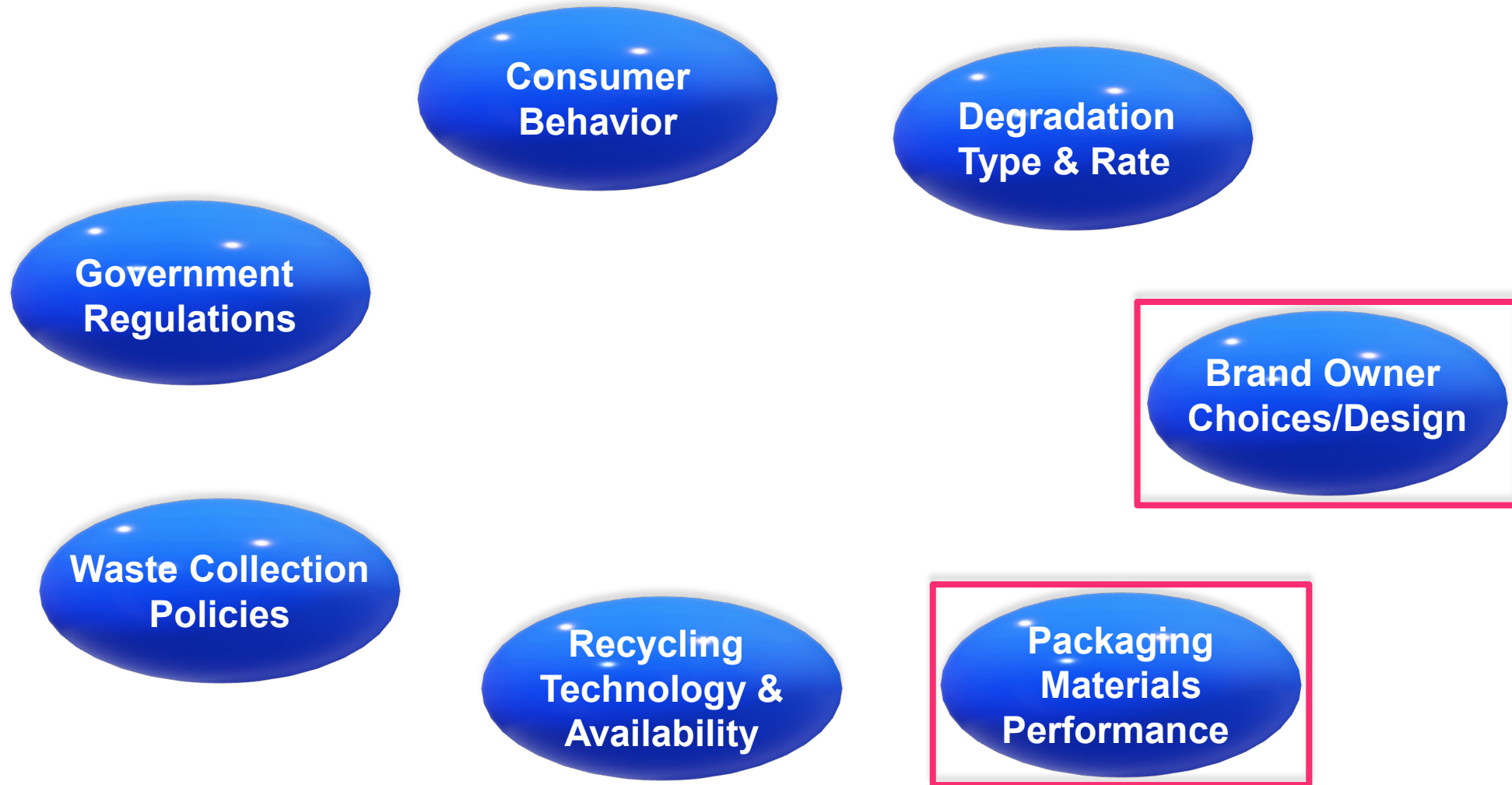
*Business Director, DuPont Biomaterials*

*11 September 2019*



UNITED NATIONS CONFERENCE ON  
**TRADE AND DEVELOPMENT**  
PROSPERITY FOR ALL

# Ocean Plastics Pollution is an Incredibly Complex Issue



- Safety/Freshness
- Convenience
- Affordability



**Plastics Bring a Lot of Value**

---



## But that Value Comes with Massive Costs

---

- Fossil-based impacts on climate
- Persistence in the environment
- Impact on wildlife

---

Can we innovate  
using new materials  
that maintain the  
value and mitigate  
the costs?

---

---

# Example # 1: Using Less Plastic to do the Same Job

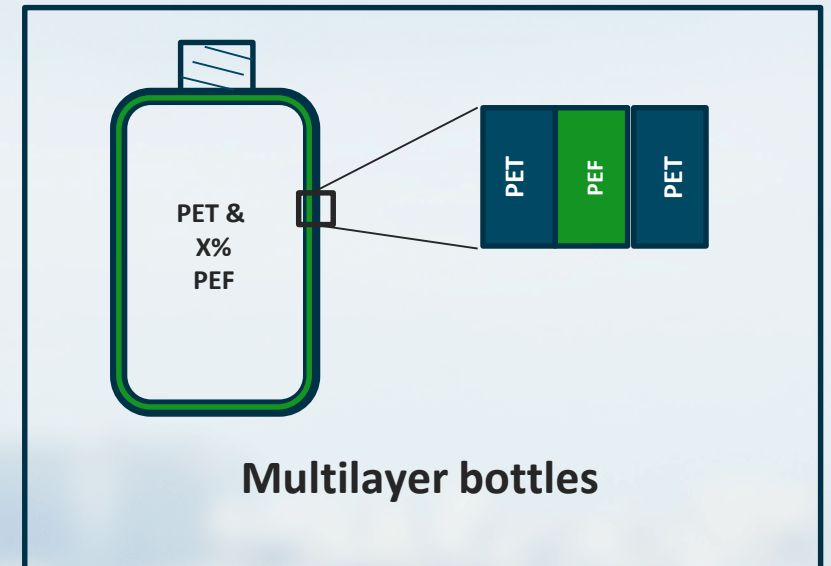
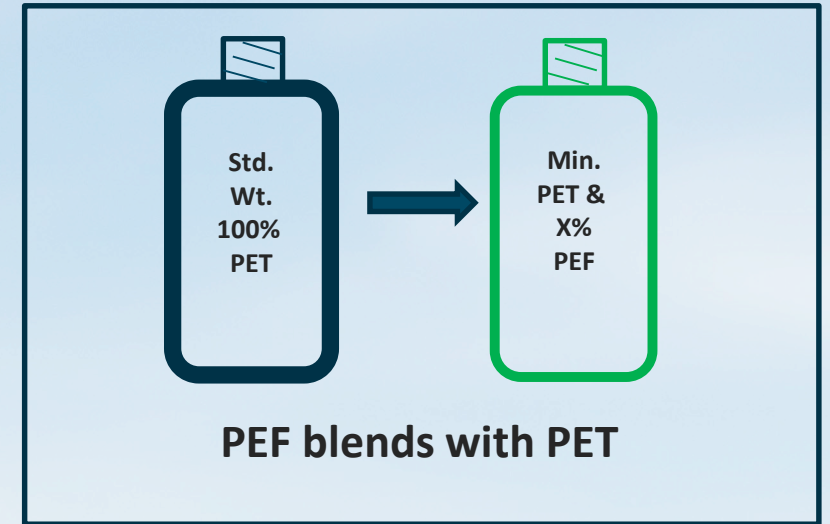


10-30% thicker walls

- PET bottles are recyclable, unbreakable, and conveniently re-closable
- However, carbonated beverage bottles use ~10-30% more plastic than water bottles
- Driven by need to preserve freshness—PET cannot keep the carbonation inside
- Can we reduce the amount of plastic needed to preserve shelf life?

# PEF: A New Polymer with ~10x Better Barrier than PET

- PEF is made from abundant renewable resources (corn starch)
- PEF allows ~10-20% light-weighting at same cost
- PEF blend/multi-layer bottles are recyclable in the existing PET stream



- Paper and cotton are made from cellulose—a natural material composed of sugars
- These “polysaccharides” are truly biodegradable since microbes recognize them as food
- Most synthetic polymers are completely inert; a few are somewhat biodegradable



Natural Products are Biodegradable

# Cellulose/Paper is Often Mixed with Plastic

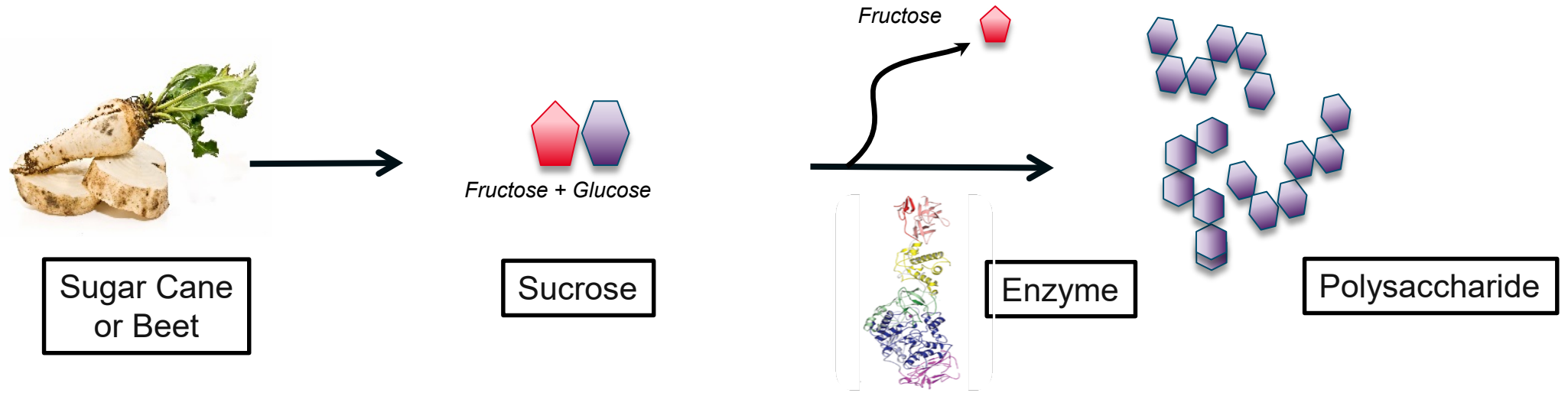
- Paper cups and many cardboard boxes are coated with plastic to make them water- and grease-proof
- Cellulose-based wipes often have plastic binders to give them the required strength
- Paper-based packages cannot be used in many applications due to other performance deficiencies



What if we could replace that plastic with a biodegradable polysaccharide material?



# Example # 2: Learning from Nature to Make New Materials



- Nature makes polysaccharides inside plants using protein-based catalysts called enzymes
- We can mimic this process to turn cane or beet sugar into polysaccharides with a variety of properties
- These materials provide performance like synthetic polymers but are marine biodegradable
- The process is low-energy and produces almost no waste

# Some Applications of Engineered Polysaccharides



Plastic-free grease barrier for paper-based dry food packaging



Enabling higher recycled content in cardboard



Replacing latex for plastic-free wipes



Improving performance and biodegradability of biopolymers

# Biomaterials Innovation is Part of the Solution to Ocean Pollution

- Moving from fossil-based materials to plant-based materials to reduce climate impact
- Light-weighting plastic packages while maintaining performance and recyclability
- Enabling truly biodegradable solutions by enhancing the performance of paper-based and biopolymer materials



© 2019 DuPont. All rights reserved. DuPont™, the DuPont Oval Logo, and all trademarks and service marks denoted with ™, SM or ® are owned by affiliates of DuPont de Nemours, Inc. unless otherwise noted. Nothing contained herein shall be construed as a representation that any recommendations, use or resale of the product or process described herein is permitted and complies with the rules or regulations of any countries, regions, localities, etc., or does not infringe upon patents or other intellectual property rights of third parties.

The information provided herein is based on data DuPont believes to be reliable, to the best of its knowledge and is provided at the request of and without charge to our customers. Accordingly, DuPont does not guarantee or warrant such information and assumes no liability for its use. If this product literature is translated, the original English version will control and DuPont hereby disclaims responsibility for any errors caused by translation. This document is subject to change without further notice.