



DUPONT BIOMATERIALS

Growing Jobs and Rural Economies: The Farm Bill's Energy Title

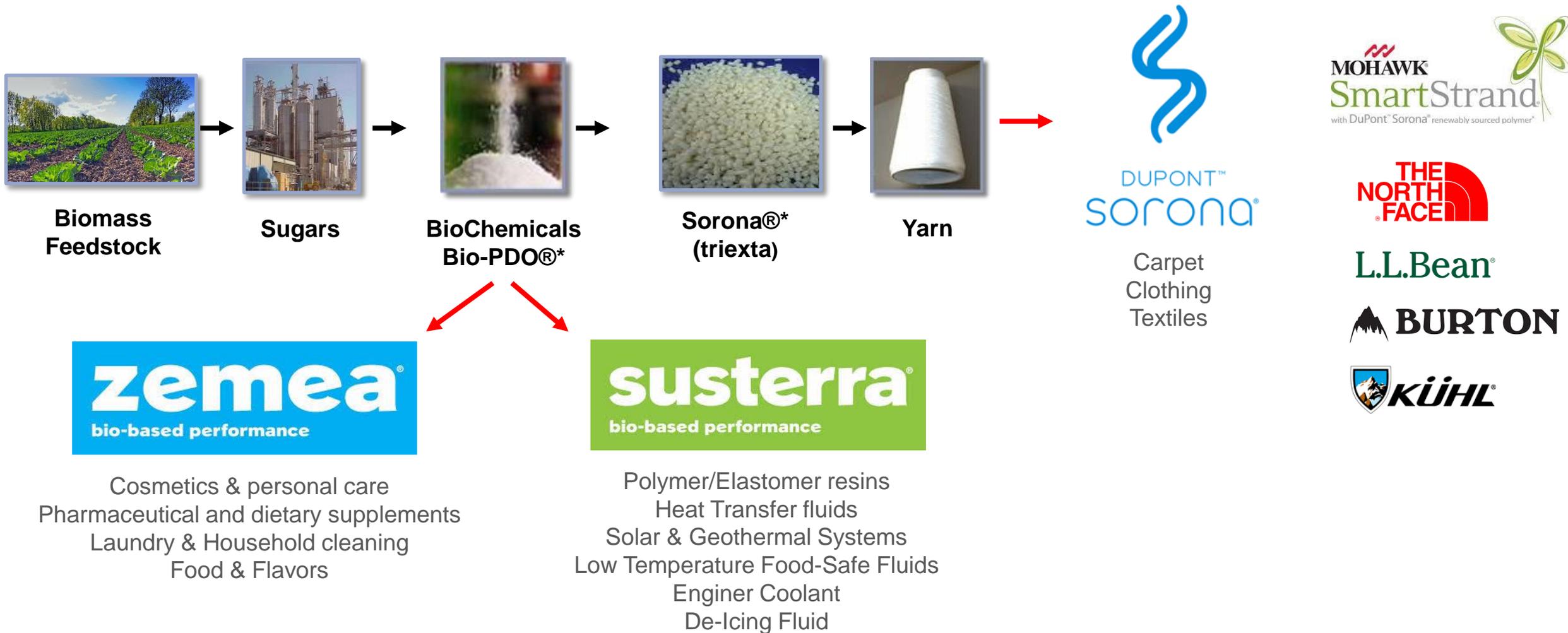
John Sagrati – Business Development Manager, DuPont Industrial Biosciences

RETHINK RENEWABLE PERFORMANCE

DuPont Biomaterials' differentiated value proposition



RENEWABLY SOURCED 1,3 PROPANEDIOL





Responsible Materials

Need to be genuinely responsible
Environmentally
Socially

Need to be identifiable

Need to be publicized/promoted



USDA BIOPREFERRED

Sorona® renewably sourced fiber is one of the first 11 products approved as part of the United States Department of Agriculture (USDA) BioPreferred Program for certified bio-based products.

DuPont's BioPreferred Materials



BioPreferred

<input type="checkbox"/> USDA Certified Biobased <input type="checkbox"/> Mandatory Federal Purchasing		<input type="text" value="SEARCH ALL FIELDS"/> <input type="button" value="Compare"/>	
	Product	Company	
	PDA049B	Everest Textile Co., Ltd.	<input type="checkbox"/>
	FP SmartStrand Contract with Dupont Sorona	Mohawk Industries Inc.	<input type="checkbox"/>
	FP <i>SmartStrand Residential with Dupont Sorona Polymer</i>	<i>Mohawk Industries Inc.</i>	<input type="checkbox"/>
	Sorona Polymer	DuPont Industrial Biosciences	<input type="checkbox"/>
	Susterra® FG	DuPont Tate & Lyle Bio Products Company, LLC	<input type="checkbox"/>
	Susterra® P1000	DuPont Tate & Lyle Bio Products Company, LLC	<input type="checkbox"/>
	Susterra® Propanediol (1,3 Propanediol)	DuPont Tate & Lyle Bio Products Company, LLC	<input type="checkbox"/>
	Zemea® Propanediol	DuPont Tate & Lyle Bio Products Company, LLC	<input type="checkbox"/>
	Zemea® Select	DuPont Tate & Lyle Bio Products Company, LLC	<input type="checkbox"/>
	Zemea® USP FCC	DuPont Tate & Lyle Bio Products Company, LLC	<input type="checkbox"/>
	Zemea® USP NF	DuPont Tate & Lyle Bio Products Company, LLC	<input type="checkbox"/>

THANK YOU FOR YOUR TIME



Learn more about DuPont Biomaterials



biosciences.dupont.com/biomaterials



@DuPontBiobased



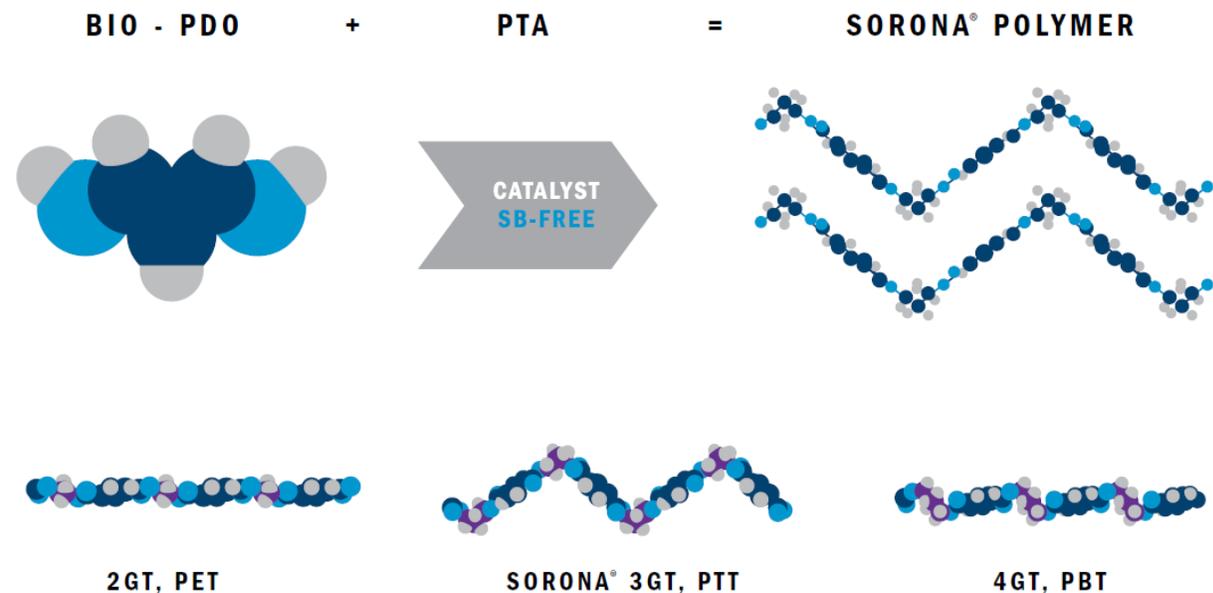
DuPont

BACKUP SLIDES -



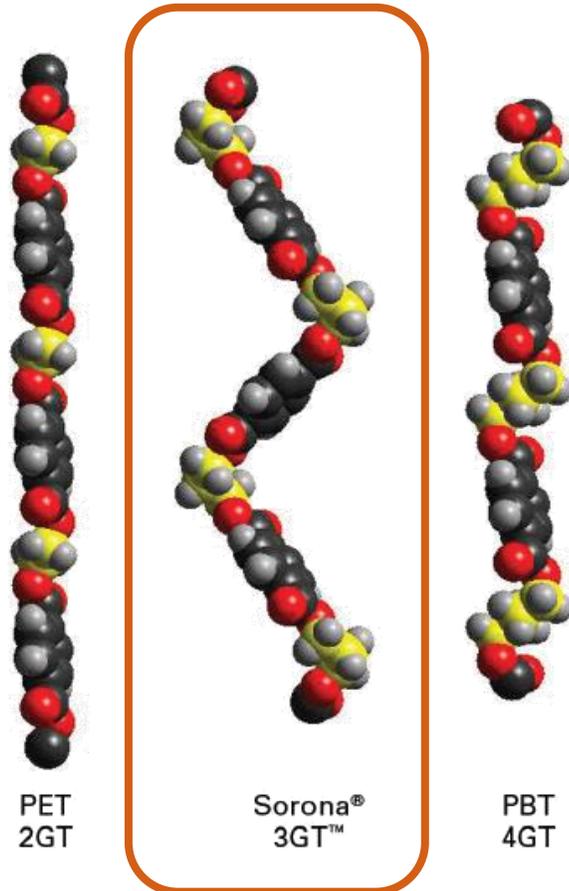
SORONA® & BIO-PDO™

- Bio-PDO™ from DuPont Tate & Lyle Bioproducts JV is made from industrial dent corn starch
- Sorona® polymer is used in carpets and apparel fabrics
- Bio-PDO™ is used in consumer (cosmetics, food & flavors, laundry) and industrial products (polyurethanes, heat transfer fluids)

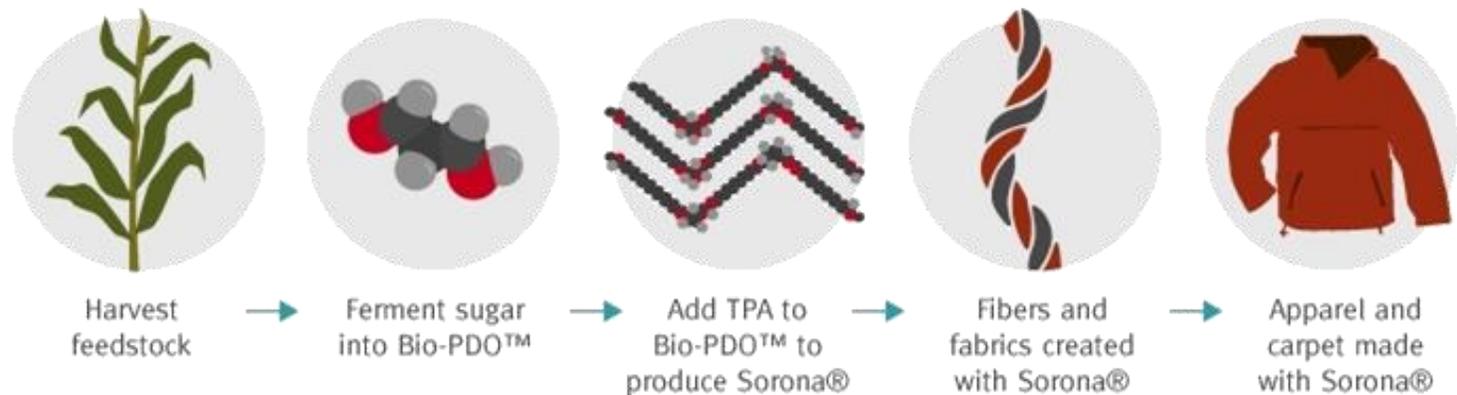


Sorona® Polymer Benefits

The molecular structure and crystalline morphology gives Sorona® unique properties in textile fibers.



- Sorona® is bio-based PTT (polytrimethyleneterephthalate), made in part from renewable feedstock.
- U.S. FTC granted a new generic (triexta) for Sorona® in 2009, based on the unique combination of attributes and benefits
- Properties differ from other existing fibers, combining many of the best benefits into a single product



OUR JOURNEY CREATING BIOMATERIALS FOR HIGH-PERFORMANCE PRODUCTS

Our Challenge: How do we build a regenerative economy where 9.7 billion people can thrive? *Let's Solve.*

We begin with efficient, renewable industrial crops from already cultivated land

Only source sugar from increasingly efficient industrial crops grown on already cultivated land.

For centuries, society has used land to grow other valuable products, with less than 1/3 of global arable land used to grow food (only 0.01% used for advanced biomaterials).

We use the plant's most efficient natural energy source: sugar

Nature uses photosynthesis to efficiently make sugar.

We lower our footprint by using only the naturally efficient sugars (from 1st generation feedstock), leaving the rest of the plant for other products.

DuPont is a leader in advancing technologies to extract sugars from 2nd generation crop residue.

We use innovative science to turn these crops into high-performance materials

We use patented scientific expertise turn the sugars into unique, high-performance materials.

Thanks to our research, these renewable polymers are used to make advanced, responsible products.

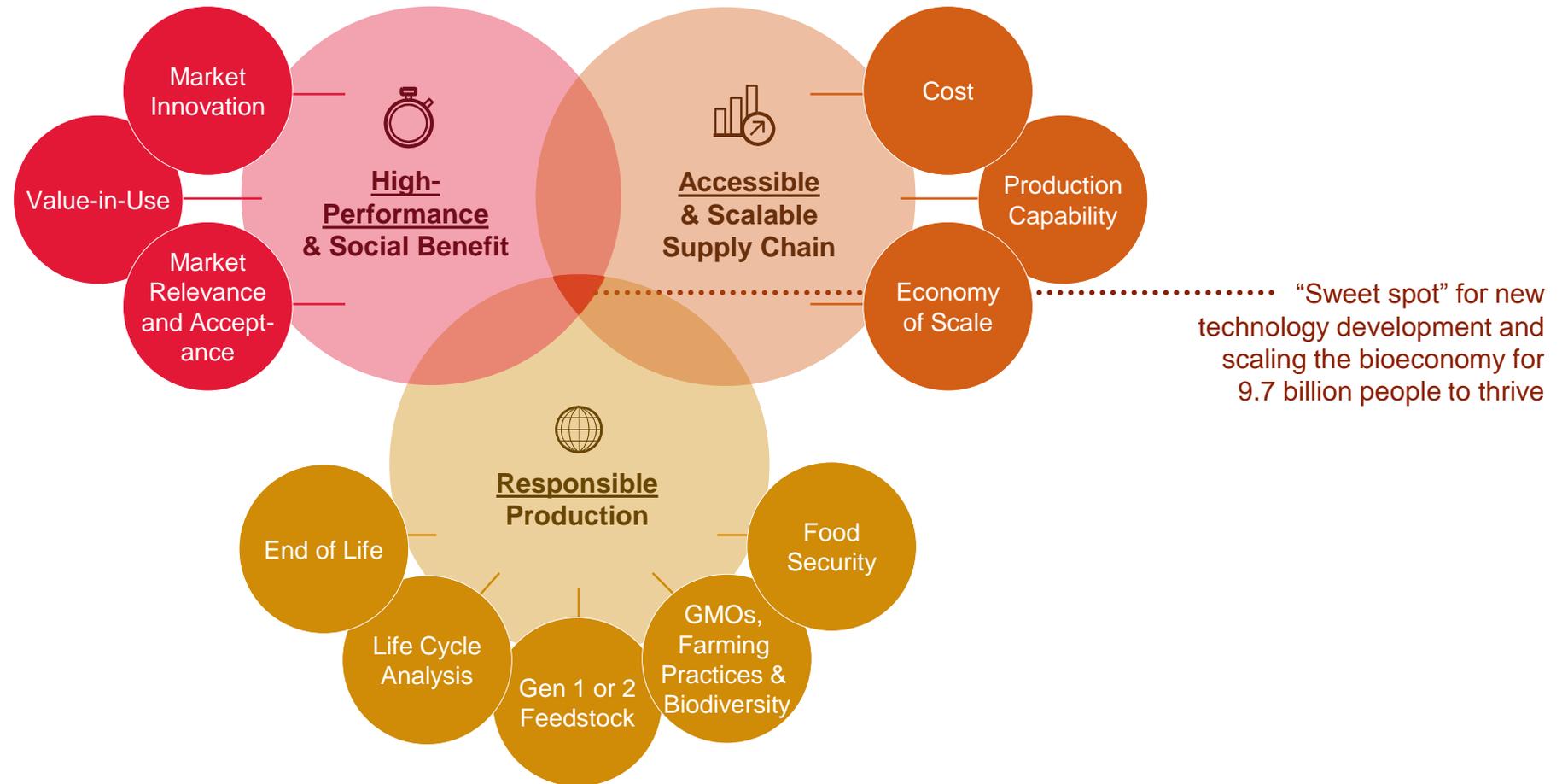
We build an integrated supply chain to scale these performance polymers

We deliver advanced biomaterials and then train all value chain partners in how to best use them.

This helps create more accessible, renewable products that perform better.

DuPont biomaterials improve products for good to build a bioeconomy that will last.

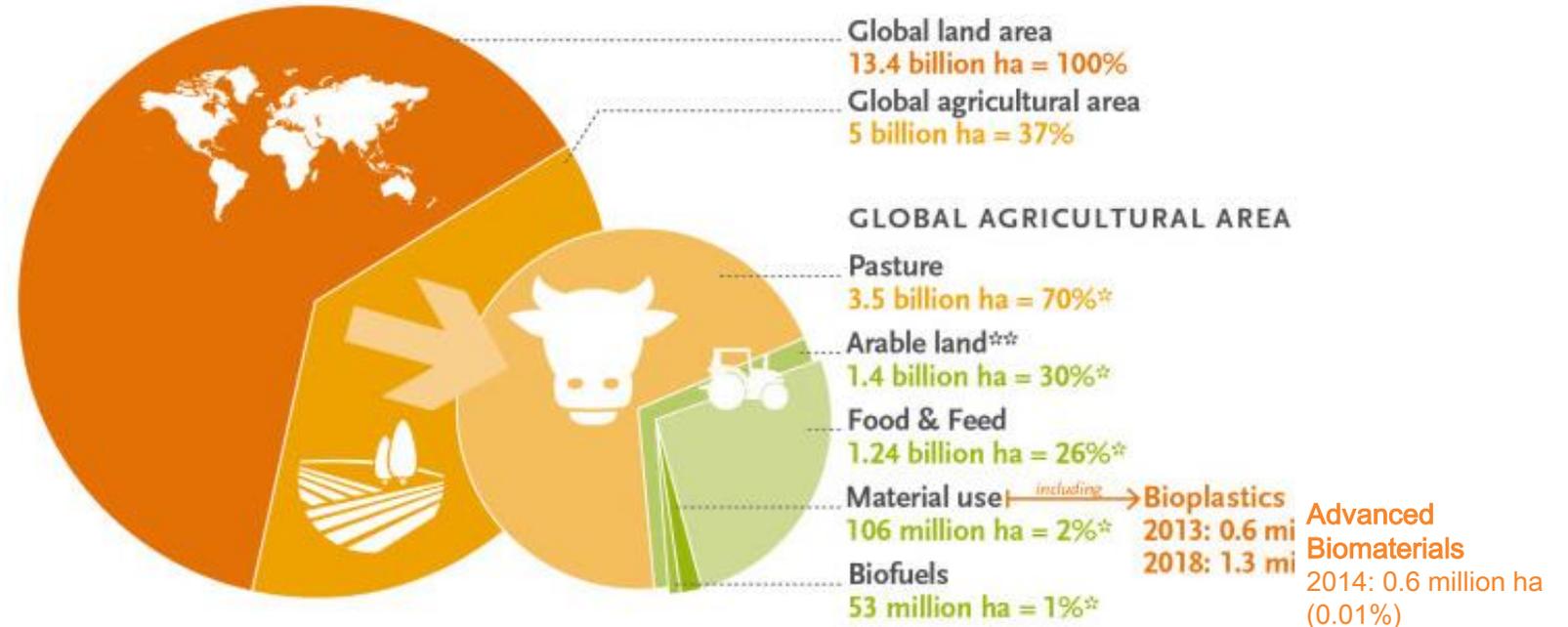
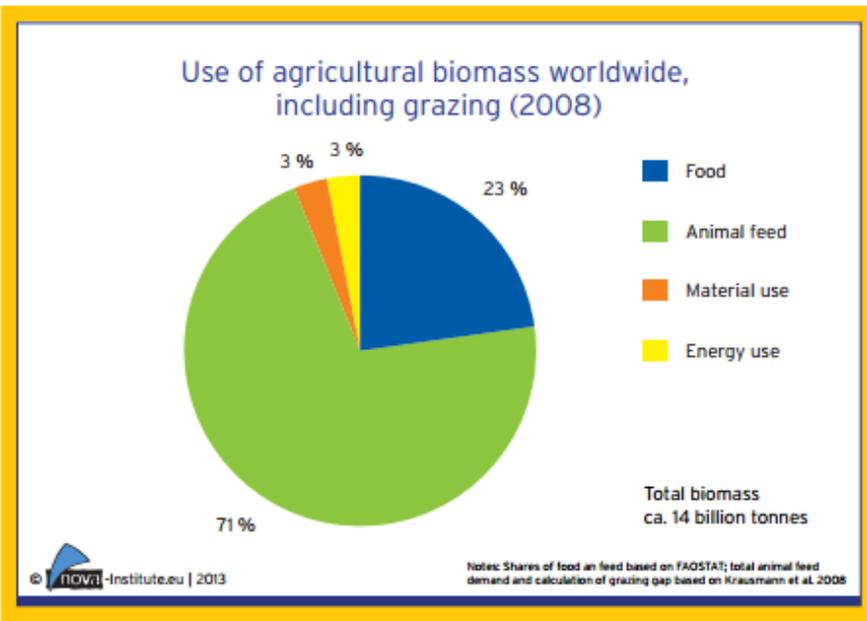
WE CONSIDER A RANGE OF IMPORTANT, INTER-CONNECTED SUSTAINABILITY FACTORS TO DELIVER INNOVATIVE TECHNOLOGIES



WE USE LESS THAN A THIRD OF GLOBAL ARABLE LAND TO GROW FOOD AND FOR CENTURIES WE'VE USED LAND TO GROW OTHER VALUABLE PRODUCTS

We use 80 times more arable land to make paper than high-performance biomaterials.

(Not to mention 30 times more land for cotton, 4x more for tobacco and 500x more for wood products.)



Sources: European Bioplastics, Institute for Bioplastics and Biocomposites, nova-Institute, 2015

Figure 2: Worldwide allocation of biomass, including grazing, by production target (main product) in 2008. Respective amounts include raw materials and their by-products, even if their uses fall into different categories.

SAMPLE CASE STUDY: THE IMPACT OF SORONA® ON LAND USE IS MINIMAL

Land Needed to Grow Corn for Sorona® in One Car:

- We can make two car mats from Sorona® made with corn grown on land the size of one mat.



- Premise: 2,400g Sorona®.
- Requires sugars from 2.7 M² of farmland, for one growing season. The other parts of the corn grown from the same land produce a range of other valuable bi-products.

Land Needed to Grow One 50%Sorona®/50% Cotton T-Shirt:

- We can make more than 11 Sorona® shirts or one cotton shirt from on the same amount of land (Sorona® is 11.5 times more land-efficient than cotton).



- Premise: 67g Sorona® (1/2 shirt), 186g of cotton (1/2 shirt).
- Sorona® production requires sugars from <0.1 M² of farmland, for one growing season. The other parts of the corn grown from the same land produce a range of other valuable bi-products.
- Cotton production requires 1.17 M² of farmland, for one growing season.

1ST GENERATION IS THE MOST RESOURCE EFFICIENT, RENEWABLE FEEDSTOCK

Our Challenge: How do we build a regenerative economy where 9.7 billion people can thrive? *Let's Solve.*

Among the crops grown to produce materials, annually renewable starch crops are the most (1) resource-efficient, (2) high-performing and (3) scalable in order to produce biomaterials accessible to everyone.

Natural Starch Crops

E.g. Corn, Sugar Beets

- Requires fewer natural resources (land, water, energy, fertilizers) to grow
- High performance & scalable using existing technology
- Wide variety of applications
- Uses only sugars leaving the rest of the plant for valuable bi-products

Natural Fiber Crops

E.g. Cotton, Flax, Beech, Bamboo

- More resource intensive, including high water and energy use
- More land needed
- Lower performance
- Limited applications

Fossil Fuels

E.g. Crude Oil

- Non-renewable with significant environmental and public health impacts from extraction and use
- Recycling fossil fuels is valuable but has limited applications

DUPONT BIOMATERIALS USE THE STARCH FROM INDUSTRIAL CROPS LIKE YELLOW DENT CORN AND SUGAR BEET. THE REST OF THE PLANT IS USED FOR OTHER VALUABLE PRODUCTS

Yellow Dent Corn Components:

- 62% Starch
- 19.2% Protein & Fiber
- 15% Moisture
- 3.8% Corn Oil

