

**BPSA Sustainability Committee**

**Sustainable Bioprocessing  
with SUTs: Data, Practices  
& Innovations**

**Webinar**

**November 17, 2025**



Bio-Process Systems Alliance

*Advancing Single-Use Worldwide*

# Thank You To Our Sponsors



Rely on it.



# *Our Panel of Industry Experts:*



**Magali Barbaroux**  
*Sartorius*  
**BPSA Sustainability  
Committee Chair**



**Caroline Calmels**  
*Saint-Gobain*



**Dianne Heiler**  
*Repligen Corporation*  
**BPSA Board Member**

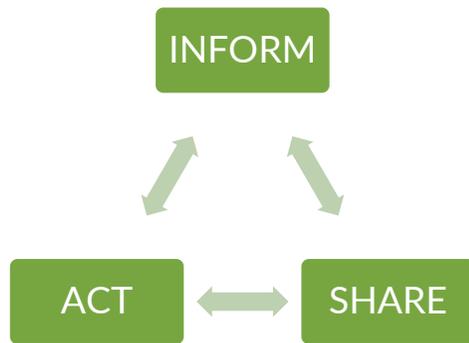
# Agenda

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- Introduction and genesis of this webinar
- How does SUT unlock and advance sustainability in the bioprocessing industry?
- Example of innovation and collaborations to make SUT more sustainable

# The Sustainability Committee is a Technical Committee

*Board Sponsor* : Brian Chung, Syensqo | *Committee chair* : Magali Barbaroux, Sartorius



## Mission

- Provide members information on how SUT support biomanufacturing call for sustainability & takes actions to prove BPSA seriously tackle sustainability concerns.
- Allow members to be informed on environmental sustainability tools and trends in the biomanufacturing and polymer industry, to share ideas and good practices.

- Monthly sustainability spotlights to learn from internal members and external guests
- Team projects to generate and diffuse collective knowledge → today's webinar

# Genesis of this “infographic” project



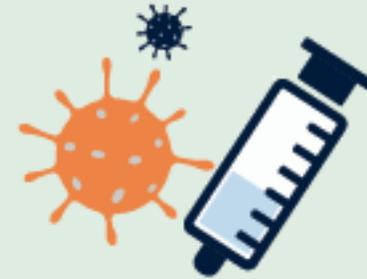
- Single-Use (SU) biomanufacturing equipment, introduced 20 years ago, is now standard in drug production processes.
- Growing environmental awareness is raising concerns about plastic waste, especially among younger generations unfamiliar with the SUT revolution.
- We identified the need for a simple but documented industry message about SUT and sustainability, linked to the UN Sustainability Development Goals



# SUTs contribute to faster drug developments

## *SUTs Save Lives:*

Medications and vaccines can be now be developed and manufacturing much more quickly.



SUTs allow :



Faster set-up and batch iteration



Flexible process configuration

**SUSTAINABLE  
DEVELOPMENT  
GOALS**

SUTs can contribute  
to the advancement  
of the United  
Nations Sustainable  
Development Goals\*\*

**3** GOOD HEALTH  
AND WELL-BEING



# SUTs are proven to conserve resources

## SUTs Conserve Resources



87% less water\* – reduced cleaning



95% fewer caustic chemicals\* – less cleaning & sterilization



30% less electricity\* – smaller footprint facilities

\* on average

SUSTAINABLE  
DEVELOPMENT  
GOALS

SUTs can contribute  
to the advancement  
of the United  
Nations Sustainable  
Development Goals\*\*

6 CLEAN WATER  
AND SANITATION



# SUTs generate relatively low plastic waste

## *SUTs Generate Low Levels of Plastic Waste Annually*

0.002%

4,500 – 11,700 tons  
Biomanufacturing

99,998%

442,300,000 tons  
Total Worldwide

**SUSTAINABLE  
DEVELOPMENT  
GOALS**

SUTs can contribute  
to the advancement  
of the United  
Nations Sustainable  
Development Goals\*\*

**12** RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION



# We continue to innovate & make SUTs more sustainable

## *We Continue to Innovate and Make SUTs More Sustainable*

Emerging bioprocessing technologies promise to increase efficiency and yield, decarbonize and reduce material consumption, and improve processes and logistics for a more circular supply chain



Bioprocessing  
efficiency  
improvement



Eco-Design  
guidelines for  
continuous  
improvement



Bio-Based  
carbon plastics  
under development  
and evaluation



Recycling  
circular  
opportunities

SUSTAINABLE  
DEVELOPMENT  
GOALS

SUTs can contribute  
to the advancement  
of the United  
Nations Sustainable  
Development Goals\*\*

17 PARTNERSHIPS  
FOR THE GOALS



# Examples of innovations and collaborations from BPSA members

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- Sustainable and Carbon-Certified Materials with ISCC PLUS certification
- Packaging Optimization for Increased Circularity
- Supply Chain & Sustainability: a strategic alliance for the future



Magali Barbaroux  
*Sartorius*  
BPSA Sustainability  
Committee Chair

# Sustainable and Carbon-Certified Materials

With ISCC PLUS Certification

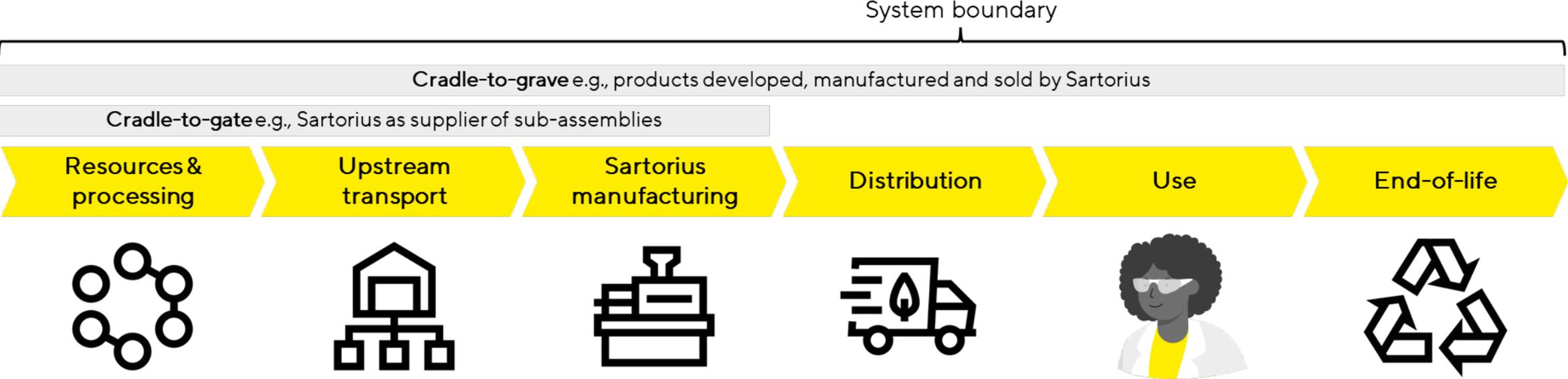


ISCC PLUS: Sustainable and Carbon-Certified Materials at Sartorius

SARTORIUS

Simplifying Progress

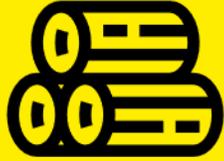
# Life Cycle Stages



More than 80% of the environmental impact of a product is determined at the design stage.

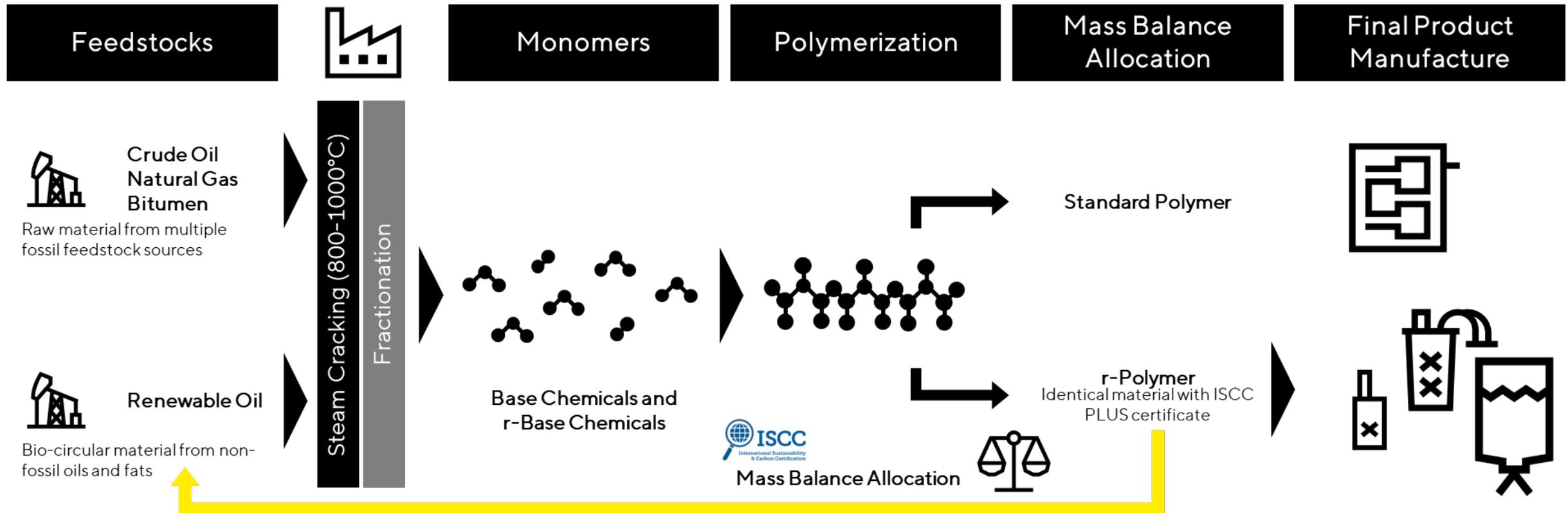
Build Up, 2012

# Disconnection from Virgin Fossil feedstock : The Origin of Polymers

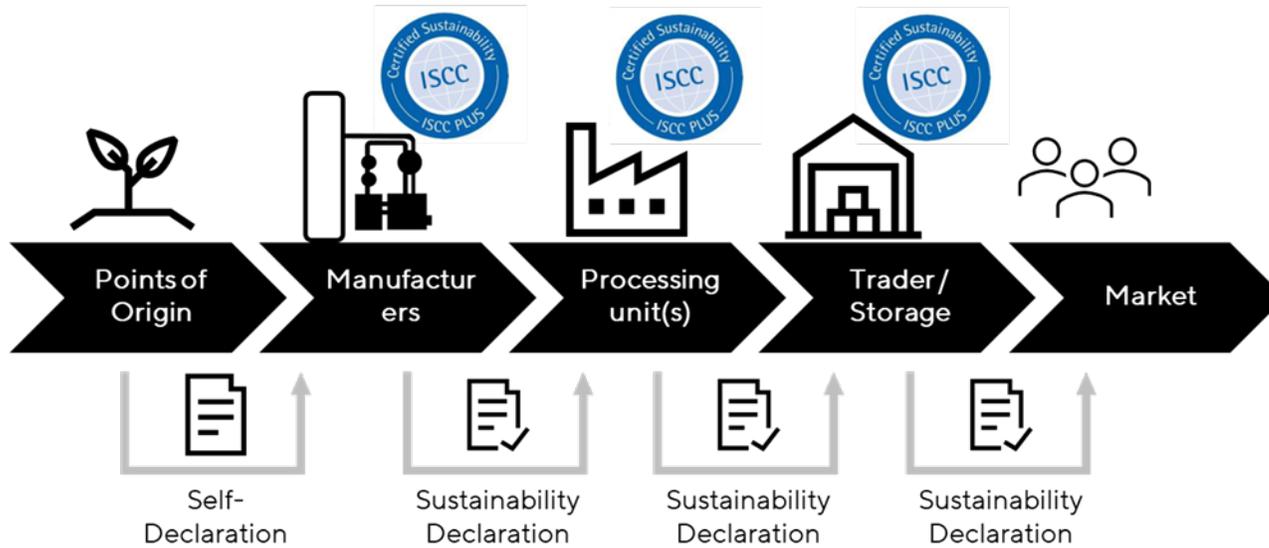
Bio		Bio-Circular		Circular	
					
<ul style="list-style-type: none"> <li>▪ Agricultural sources</li> <li>▪ Examples: corn, canola, sugarcane, cotton</li> <li>▪ Compete with food production</li> </ul>		<ul style="list-style-type: none"> <li>▪ Waste and byproducts</li> <li>▪ Examples: tall oil, used cooking oil, forestry residues, straw</li> <li>▪ Contribute to circularity</li> </ul>		<ul style="list-style-type: none"> <li>▪ Waste and carbon capture</li> <li>▪ Examples: mixed plastics, textiles, used tires, post-industrial CO<sub>2</sub></li> <li>▪ High energy consumption</li> </ul>	

For the time being, in the framework for green house emission, the main benefit of biocircular polymers and ISCC+ certification is the transition to renewable source of carbon and disconnection from fossil resource.

# From Feedstocks to Final Products: The Mass Balance Approach



# International Sustainability and Carbon Certification PLUS



- Materials and Resources
- ISCC PLUS globally applicable sustainability certification system going on along supply chain, each party transforming material needs to be certified
- Mass balance approach, meaning that for each ton of renewable feedstock fed into the production facility, a proportion of the output can be claimed as renewable
- Sustainability declaration communicates sustainability goals and achievements to customers and regulatory bodies

- All sites that handle the material up to the final product need to be certified by ISCC+
- Only products from certified supply chains can be claimed renewable

[Biobased, biodegradable and compostable plastics - European Commission \(europa.eu\)](https://ec.europa.eu/biobased-plastics/)

In the future ISCC PLUS tracking process may be supported by SAP Green Token SaaS. (require SAP S4 Hana) [SAP Green Token | Sustainability Tracking Software](#)

# Available today and more to come from Sartorius

Up to 85% Biocircular Material



The image shows a Sartorius bioreactor system, including a large cylindrical vessel with a stirrer and a smaller component to its left. Both are filled with a yellow liquid. The bioreactor has several white tubes connected to its top.



SUPPORTING THE BIOECONOMY  
ISCC  
CERTIFIED

Up to 90% Biocircular Material



The image shows a clear, rectangular Sartorius bioreactor lid with the brand name 'SARTORIUS' embossed on it. It has several ports and connectors on its edges.



SUPPORTING THE BIOECONOMY  
ISCC  
CERTIFIED

Up to 71% Biocircular Material

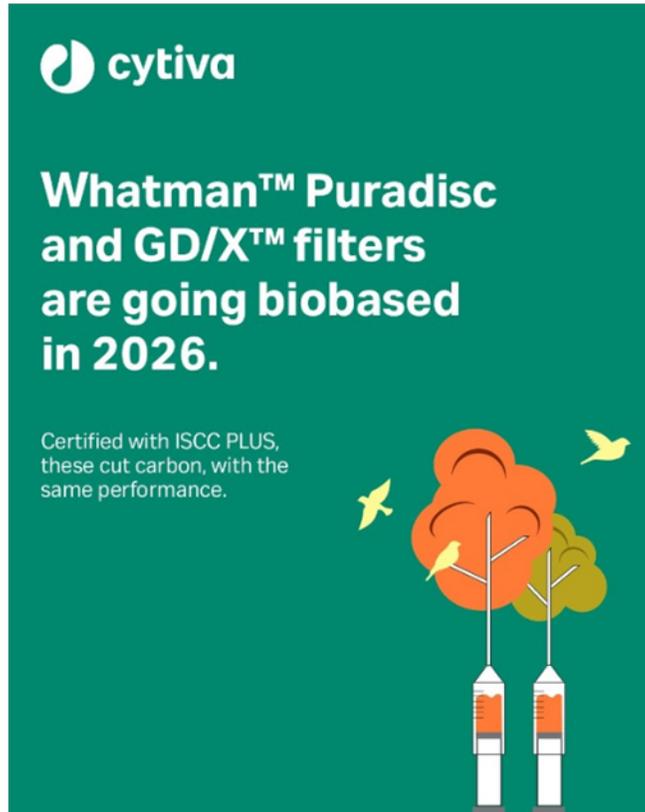


The image shows three Sartorius bioreactors: a large white cylindrical vessel, a smaller white cylindrical vessel, and a white flexible bag. All are connected to white tubing.



SUPPORTING THE BIOECONOMY  
ISCC  
CERTIFIED

# And from other BPSA members



**cytiva**

## Whatman™ Puradisc and GD/X™ filters are going biobased in 2026.

Certified with ISCC PLUS, these cut carbon, with the same performance.



[https://www.linkedin.com/posts/cytiva\\_our-filters-are-going-biobased-in-2026-activity-7387097776045858818-dM73/](https://www.linkedin.com/posts/cytiva_our-filters-are-going-biobased-in-2026-activity-7387097776045858818-dM73/)

## Thermo Fisher Scientific enhances biologics manufacturing sustainability with biobased solutions

Published: 1-Jul-2024

Manufacturing Sustainability Cell & Gene Therapy

The single use, plant-based film for bioprocessing containers can reduce the carbon footprint of biologics manufacturing by eliminating the need for plastic resin

<https://www.manufacturingchemist.com/Thermo-Fisher-Scientific-biologics-manufacturing-biobased-film>



**MERCK** Products | Type in Product Names, Product Numbers, or CAS Numbers to see suggestions. IL EN

Products Applications Services Resources Support Login

Home > Sustainability & Social Responsibility > Greener Products & Solutions > ISCC PLUS Certified Materials

### Sustainability & Social Responsibility

- Greener Products & Solutions
- ISCC PLUS Certified Materials**



**ISCC PLUS Certified Materials**

We're producing more sustainable plastics by incorporating polymers from renewable sources and decreasing our reliance on traditional petroleum sources. This shift gives us the opportunity to significantly reduce our carbon footprint for plastic production.



<https://www.merckmillipore.com/IL/en/life-science/ssbi/greener-products-solutions/iscc-plus-certified-materials>



**Dianne Heiler**  
*Repligen Corporation*  
**BPSA Board Member**

# Packaging Optimization Leads to Circularity

Starting points and brief  
case studies (8) for inspiration

# Optimize Packaging for Increased Circularity



- **Specify** higher recycled-content (PCR, PIR) for fiber and plastic materials



- **Conduct** fragility testing on high-value products for right-sized packaging



- **Design** packaging for increased ease of use (fewer parts) and recyclability (fewer materials)



- **Improve** packaging for next-gen products by removing or reducing plastic components and using non-wood bases



- **Question** the need for double-bagging and consider use of monomer materials for films, bags and shrouds



- **Engage with suppliers on sustainability, encourage and incentivize** for increased recycled content offerings, certifications such as ISO and FSC, transitioning to renewable energy & electricity, reduced waste generation and increased diversion from landfill, etc.

**Tip:** Opportunities can require varying levels of effort and deliver varying degrees of impact, so prioritize what's best for your situation.

# Right-sized & Renewable Materials Packaging

## KrosFlo® KR2i Packaging Reductions\*

**OLD**  
14 boxes  
15 box labels  
Resin-based void-fill  
100% recyclable materials

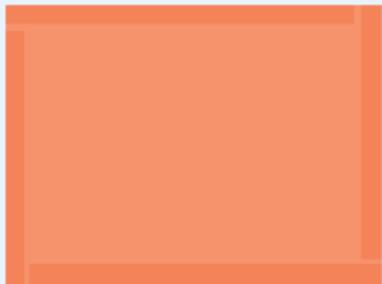


**NEW**  
1 box with custom inserts  
1 box label  
Fiber-based void-fill  
100% renewable materials



## OPUS® 45cm Packaging Reductions\*

**OLD**



**NEW**

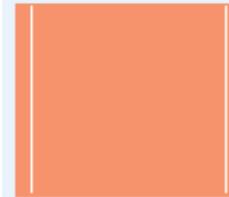


- ↓58% material weight
- ↓26% volume

Strategic use of bare product fragility (damage boundary) testing can inform packaging performance and design requirements, such as cushioning, material selection and structural geometry

## Protein A ELISA Kit Packaging Reductions\*

**OLD**



**NEW**



- ↓21% less material
- ↓41% smaller footprint when setup
- ↓32% lower domestic freight fees
- ↓63% lower international freight fees

## XCell ATF® Packaging Reductions\*

**OLD**



- ↓66% material weight
- ↓25% volume

**#4**

\* Images are representative of the redesign concept and not the actual packaging configuration.

# Reduced Plastic Packaging-1

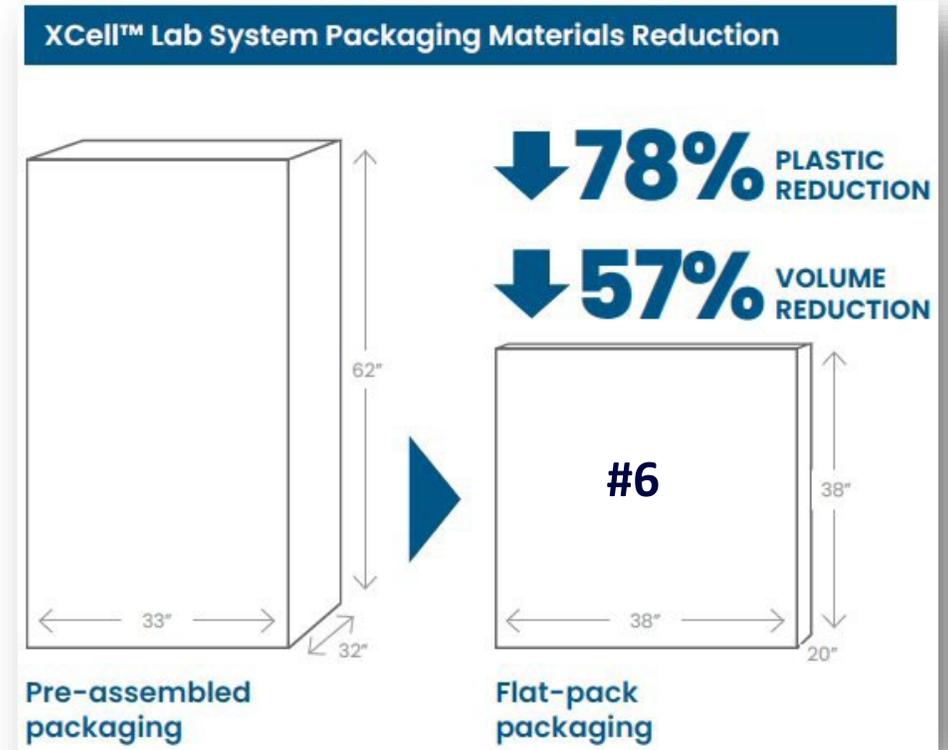


Replaced 3-piece plastic tube-plus-cap and overpack box design with 1-piece 100% ship-ready fiber-based carton that maximized space and reduced risk

- ↓ **81%** REDUCTION IN MATERIAL WEIGHT PER UNIT
- ↓ **90%** REDUCTION IN SHIPPING VOLUME
- ↓ **83%** REDUCTION IN SHIPPING RELATED GHG EMISSIONS



*No more rolling within warehouse racking*



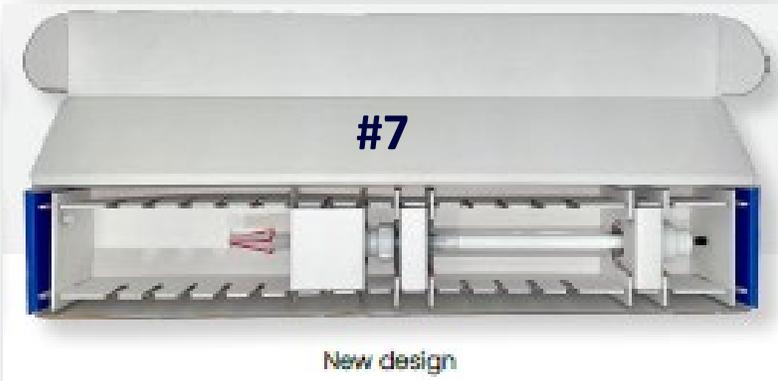
# Reduced Plastic Packaging-2

## OPUS® ValiChrom® Pre-packed Chromatography Columns



↓ **757 lb.**

REDUCTION IN ANNUAL  
ON-SITE PLASTIC WASTE



↓ **118 lb.**

REDUCTION IN ANNUAL  
CORRUGATED  
FIBERBOARD WASTE

## CTech™ SoloVPE® PLUS System



↓ **54%**

REDUCTION IN SAME  
RECYCLED-CONTENT PE  
FOAM CUSHIONING  
MATERIAL

↓ **3%**

REDUCTION IN PER PACK  
SHIPPING WEIGHT



**Caroline Calmels**  
*Saint-Gobain*

# Supply Chain & Sustainability

A Strategic Alliance For The Future

# To make our Supply chain & Operation more sustainable



**Localizing Production**



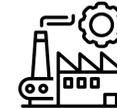
**Decarbonization Transport**



**Sustainable Packaging**



**Sustainable Manufacturing**



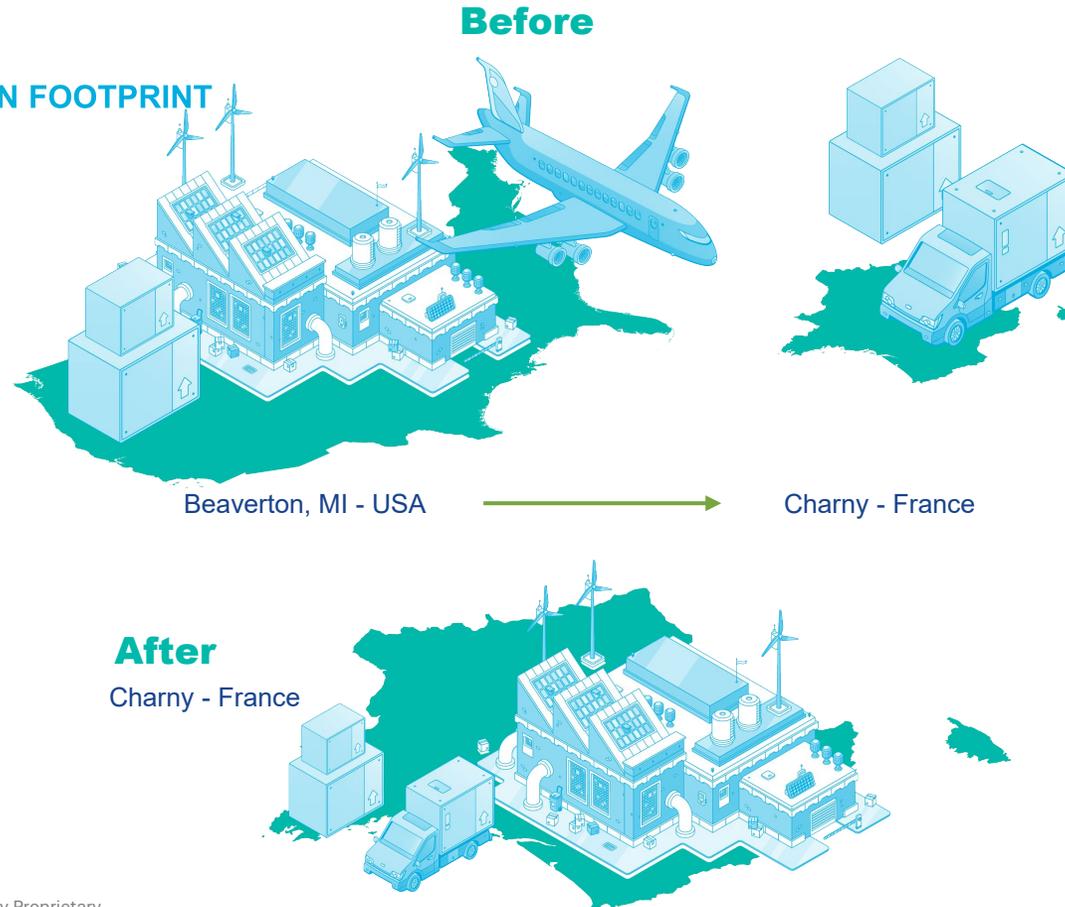
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# Localizing Production

## TECH TRANSFER: REDUCING OUR CARBON FOOTPRINT

Saint-Gobain is dedicated to creating sustainable solutions that drive positive environmental change. The localization initiatives for our various products underscore this commitment. One early outcome of this strategic shift has been a significant reduction of CO<sub>2</sub> emissions by 32,000 kg annually\* (as calculated for our Sani-Tech® STHT®-R silicone tubing) and exemplifies our focus on more local manufacturing. This switch impacts European customers.

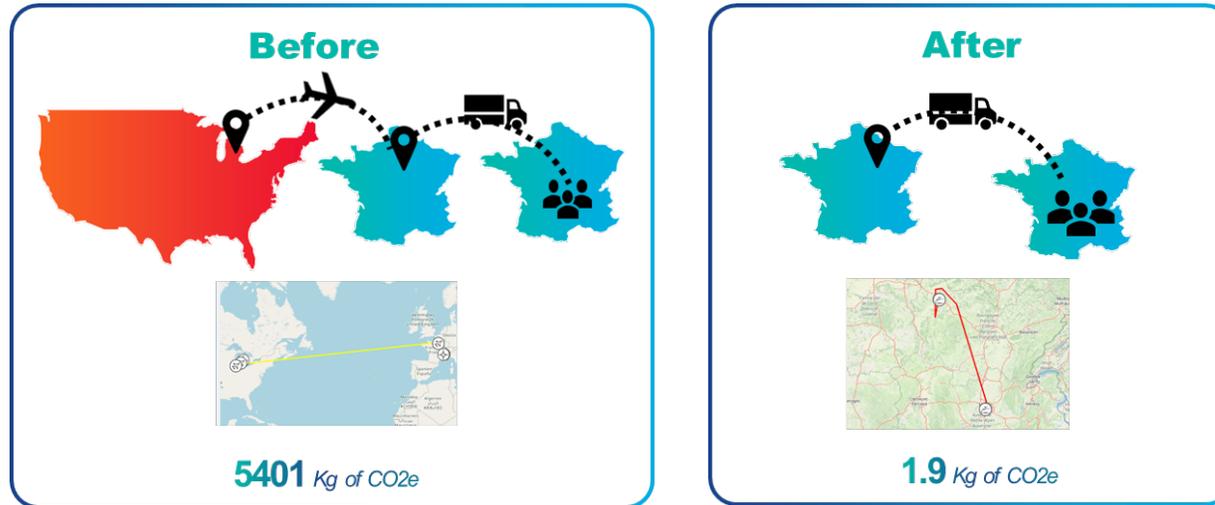


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# Localizing Production

Following the localization of production, CO<sub>2</sub> emissions for the same delivery have been reduced from 5401 kg to just 1.9 kg (reduction of 97% of CO<sub>2</sub> emission).



CO<sub>2</sub> EMISSION: ↓  
COST: ↓  
LEAD TIME: ↓

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# Decarbonization Transport

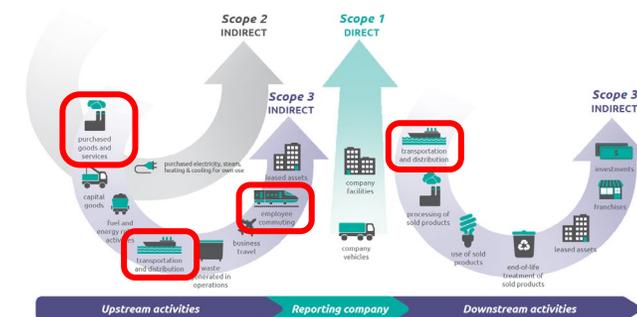
## Our transportation decarbonization plan

2022-2024	2025	2026-2028
<ul style="list-style-type: none"> <li>Utilize <b>ocean freight</b> instead of air freight through improved planning and forecast methods</li> <li>Consolidate shipments for <b>full container freight</b></li> <li>Sourcing <b>Raw Material</b> more regionally</li> </ul>	<ul style="list-style-type: none"> <li><b>Supplier mapping</b> to identify location of suppliers and Prioritize local suppliers or local plants of global suppliers</li> <li>Integrate the sustainability score <b>Ecovadis</b> in the supplier evaluation matrix</li> </ul>	<ul style="list-style-type: none"> <li>Explore transport partnerships with lower carbon consumption : <b>hydrogen / biogas / B100 biodiesel / EV truck solutions</b> for long haul transport</li> <li><b>Responsible purchasing:</b> Prioritize supplier with lower carbon consumption</li> </ul>

### Employee Commuting

- Remote work** is widely implemented where applicable, in alignment with role requirements and operational feasibility

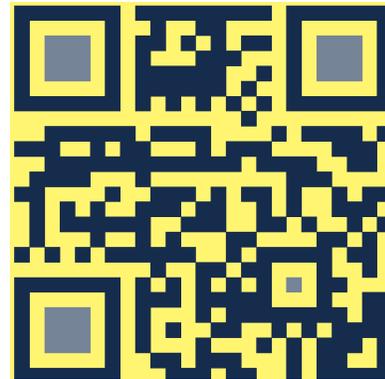
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# Infographic available on the BPSA website

One pager that can be used by all members and other industry groups to introduce SUT and sustainability.

To download, scan or visit our website: [bpsalliance.org/bpsa-sustainability-resources](https://bpsalliance.org/bpsa-sustainability-resources)



Download, share, advertise, value, use, reference, advocate!

Join us and share.

## Single-Use Technologies (SUTs) improve healthcare outcomes and reduce environmental impacts.

BPSA members have been transforming the biomanufacturing industry for over 20 years.



SUTs can contribute to the advancement of the United Nations Sustainable Development Goals\*\*

### SUTs Save Lives:

Medications and vaccines can now be developed and manufactured much more quickly.



### SUTs allow:

Faster setup and batch iteration

Flexible process configuration

### 3 GOOD HEALTH AND WELL-BEING



### SUTs Conserve Resources

87% less water\* – reduced cleaning

95% fewer caustic chemicals\* – less cleaning & sterilization

30% less electricity\* – smaller footprint facilities

\*on average

### 6 CLEAN WATER AND SANITATION



### SUTs Generate Low Levels of Plastic Waste Annually

0.002%

4,500 - 11,700 tons  
Biomanufacturing

99.998%

442,300,000 tons  
Total worldwide

### 12 RESPONSIBLE CONSUMPTION AND PRODUCTION



### We Continue to Innovate and Make SUTs More Sustainable

Emerging bioprocessing technologies promise to increase efficiency and yield, decarbonize and reduce material consumption, and improve processes and logistics for a more circular supply chain.



Bioprocessing efficiency improvement



Eco-Design guidelines for continuous improvement



Bio-Based carbon plastics under development and evaluation



Recycling circular opportunities

### 17 PARTNERSHIPS FOR THE GOALS



Learn more about SUTs advantages and impacts.

This QR code link also shares the references used to create this piece.



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Bio-Process Systems Alliance  
Advancing Single-Use Worldwide

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Pavlik, Jens Witte, Dan Ramos, Michael Oppenheim  
Jie Cao

# Questions?

Please submit your questions through the Q&A feature.

# Thank You!

For questions, contact:

[bpsa@socma.org](mailto:bpsa@socma.org)

For additional BPSA resources, visit:

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