



World-leading biomaterials technology

Low carbon footprint Bio-materials: Bio-composite Solutions for a Sustainable Planet for Industrial, Agricultural, Consumer and Automotive Applications

COMPETITIVE GREEN TECHNOLOGIES
World leading bio-materials technology

ISO 9001:2015 Certified Company

Circular Economy – Innovation for Industrial, Consumer and Automotive Industries



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Competitive Green Technologies: Delivering Ubiquitous Sustainable Material Solutions



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Our Mission, Values and Vision:

Mission: (why we exist)

- Create ubiquitous sustainable solutions as we reduce global dependence on non-renewable resources by creating innovative, globally scalable, competitive bio-composite resins for food, auto and consumer markets.
- Add value to undervalued biomass, wood waste, co-products and by-products of Agriculture and food processing industries.

Values: (what we swear by)

- Financial independence.
- Independence of thought.
- Mutual respect of intellectual property of all collaborators.
- Not setting our name to anything we will *ever* have reason to be ashamed of.

Vision: (what we will spare no effort in achieving)

- A billion people on Planet Earth will use our sustainable bio-composites every day by 2025.



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Sustainability

Reduced dependence on non-renewable resources for

1. Consumer Rigid Packaging
2. Consumer Flexible Packaging
3. Healthcare sectors
4. Other industrial and agricultural applications

Actionable knowledge, innovation and market access for the ubiquitous adoption of sustainable materials



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Why We Focus on Sustainable Materials

- Allows us to make responsible choices– through our Environmentally & Socially responsible™ resins.
- Climate change is real. It is causing havoc. While we learn to adapt, we must do what is within our power to mitigate climate change by making choices in materials to lower the carbon footprint.
- The average person in the developed world throws away 80 Kilos of plastic each year to landfill.
- There are 500 times more pieces of microplastic in the sea than there are stars in our galaxy.
- 8.3 Billion metric tons of plastic has been produced since the 1950's. 79% of that has been landfilled / incinerated - **half the weight of our planet! By 2035, a full planet-load is projected to be landfilled/incinerated!**



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Sustainable Materials

- **Bio-based** – using renewable resources-based materials (examples: natural fibres, bio-plastics like PHA, PLA, bio-PE)
- **Bio-Circular** – using renewable resources-based materials and recycled materials.
- **Organically Recyclable/Bio-Recyclable:** Becomes compost and emanates CO₂ and H₂O during bio-degradation – not adding to GHGs due to ‘new carbon’ content in material. No microplastics



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Our business model:

- Work very closely with brand owners and OEMs. Understand material properties needed and why and the performance needs of the part being made from the material
- Work with the University of Guelph's Bioproducts Discovery and Development Centre – our technology collaborators – along the OEM/Brand Owner as needed.
- Do trial after compounding with designated eco-system partner of the OEM/Brand Owner
- Iterate as necessary
- Commercialize
- Pay University royalty fees for licensed technologies



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What have we achieved so far:

- First in the world barrier and non-barrier, circular economy mono-layer compostable resins to substitute single-use landfill destined plastic – in 1800 stores in NA and now in Europe effective Sept 2022.
- **One billion single serve coffee pods landmark – March 21, 2021 – using our resins.**
<https://products.bpiworld.org/companies/competitive-green-technologies>
<https://www.dincertco.tuv.com/companies/85090?locale=en>
- **First in the world light-weight biocarbon-based recyclable resins to substitute non-renewable reinforcements filled composites – on-road since March 2020 – Ford Motor Company and now Mercedes.**
- **Discovery of biocarbon from ‘waste’ biomass** – different wood fibres like pine, birch, eucalyptus, etc.; coffee chaff, soya husk, oat hulls, miscanthus, rich husk, rice husk ash, etc.– patented technology.
- Sponsored the research Chair to The University of Guelph: <https://news.uoguelph.ca/2023/09/new-gift-to-u-of-g-to-fund-research-chair-in-sustainable-materials/>
- **.....And where are we headed:**
 - Home Compostable and Universally biodegradable Biomaterials launch – single use packaging
 - Increased use of Biocarbon and invention and commercialization of **Bio-graphene** from **Biocarbon**.



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Press releases:

CNN, USA. Ford is turning McDonald's coffee waste into headlights. December 4th, 2019

- <https://www.cnn.com/2019/12/04/business/ford-mcdonalds-coffee-chaff/index.html>

The Seattle Times, USA. McDonald's and Ford writing a new punchline: Coffee so strong ... you can build car parts out of it. December 5th, 2019

- <https://www.seattletimes.com/business/mcdonalds-and-ford-writing-a-new-punchline-coffee-so-strong-you-can-build-car-parts-out-of-it/>

CNBC, USA. Ford is making car parts—with waste from McDonald's coffee beans. December 4th, 2019.

- <https://www.cnbc.com/2019/12/04/ford-is-making-car-parts-with-waste-from-mcdonalds-coffee-beans.html>

The Times, UK. Wake up and smell the coffee: Ford has a bright idea for headlamps. January 3rd, 2020

- <https://www.thetimes.co.uk/article/wake-up-and-smell-the-coffee-ford-has-a-bright-idea-for-headlamps-0sxpnrkq>

The Economic Times, India. Ford is using McDonald's coffee waste to make car parts. January 9th 2020

- <https://economictimes.indiatimes.com/news/international/business/ford-is-using-mcdonalds-coffee-waste-to-make-car-parts/caffeine-boost/slideshow/73167360.cms>



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Manufacturing and marketing of bio-composite resins





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Leamington, ON

CANADA – 70,000 tons per year (operations since Nov 2015)



Sigillo, PG

ITALY – 5,000 tons per year (started operations in March 2022)



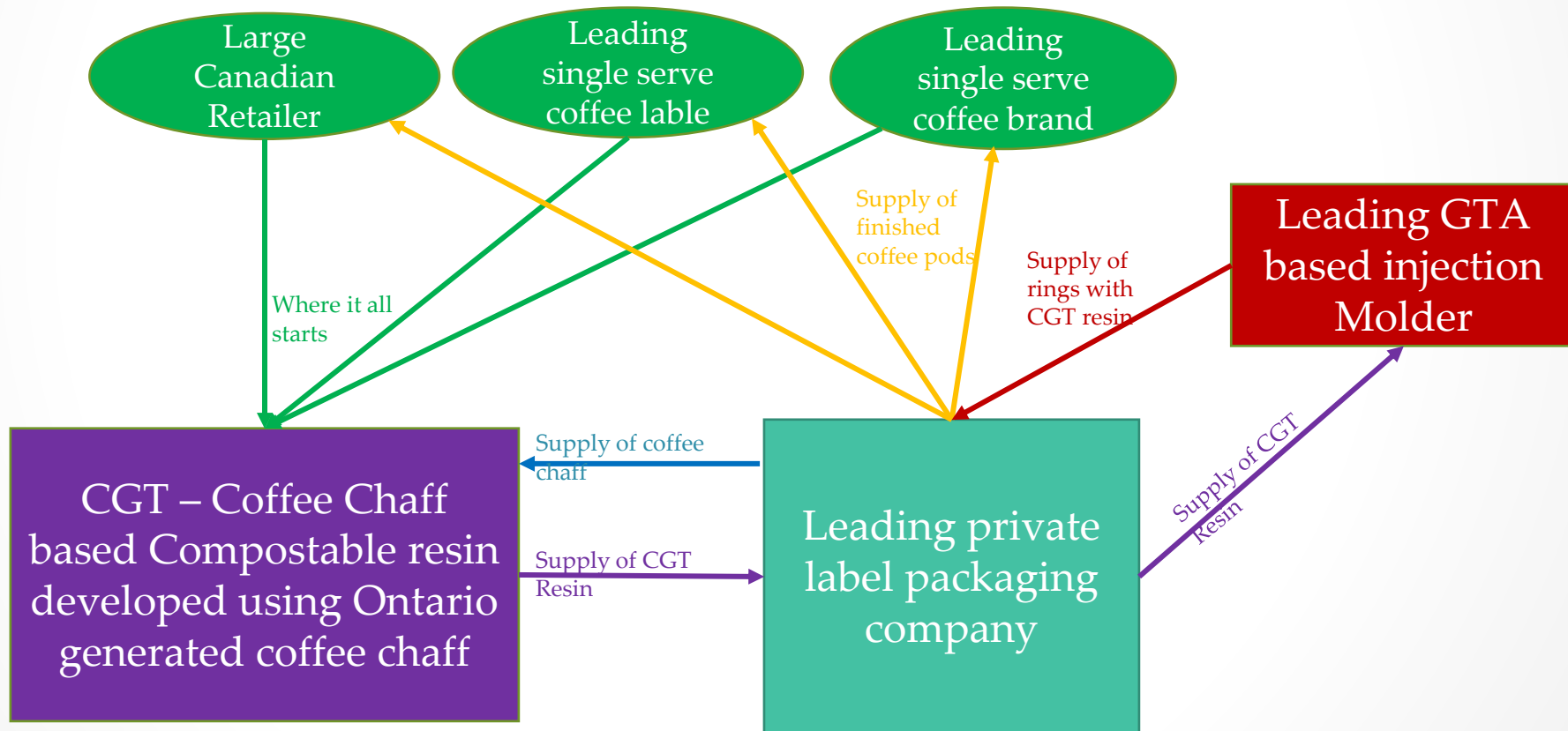
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Our Approach is to work with the Brand Owner's Eco-system



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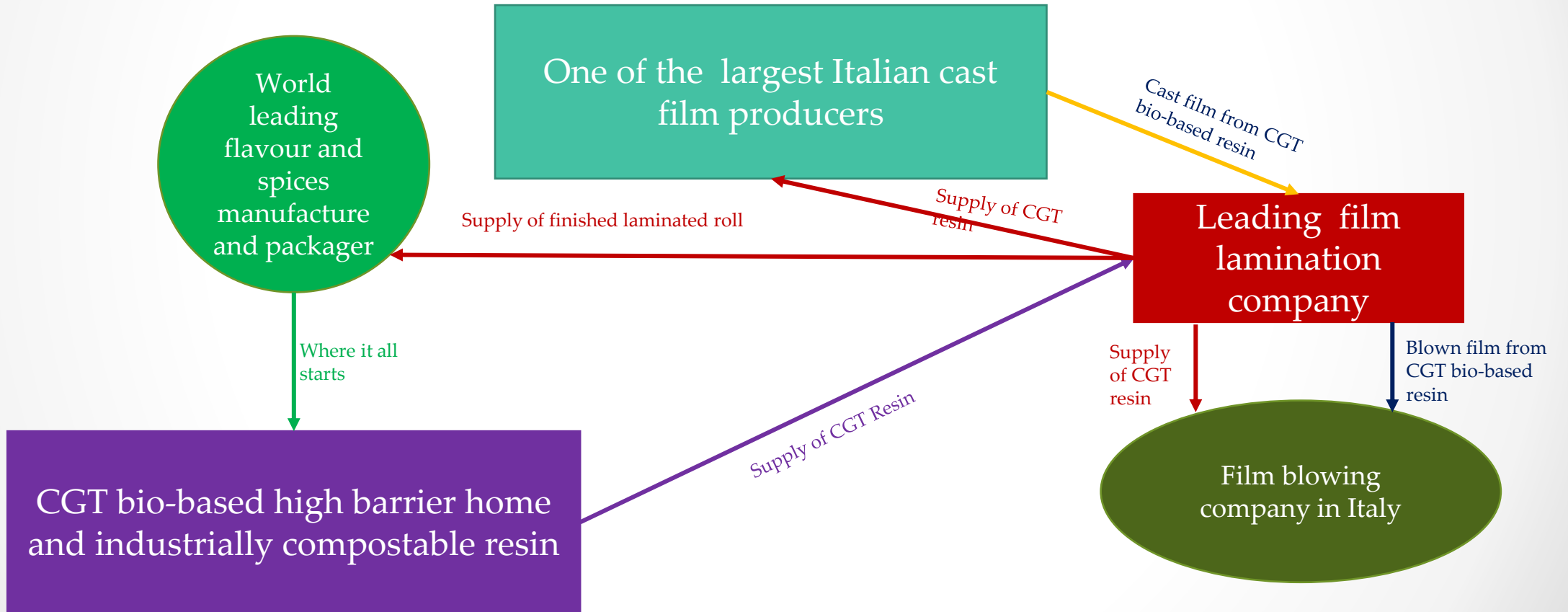
Ecosystem Example: Rigid Packaging





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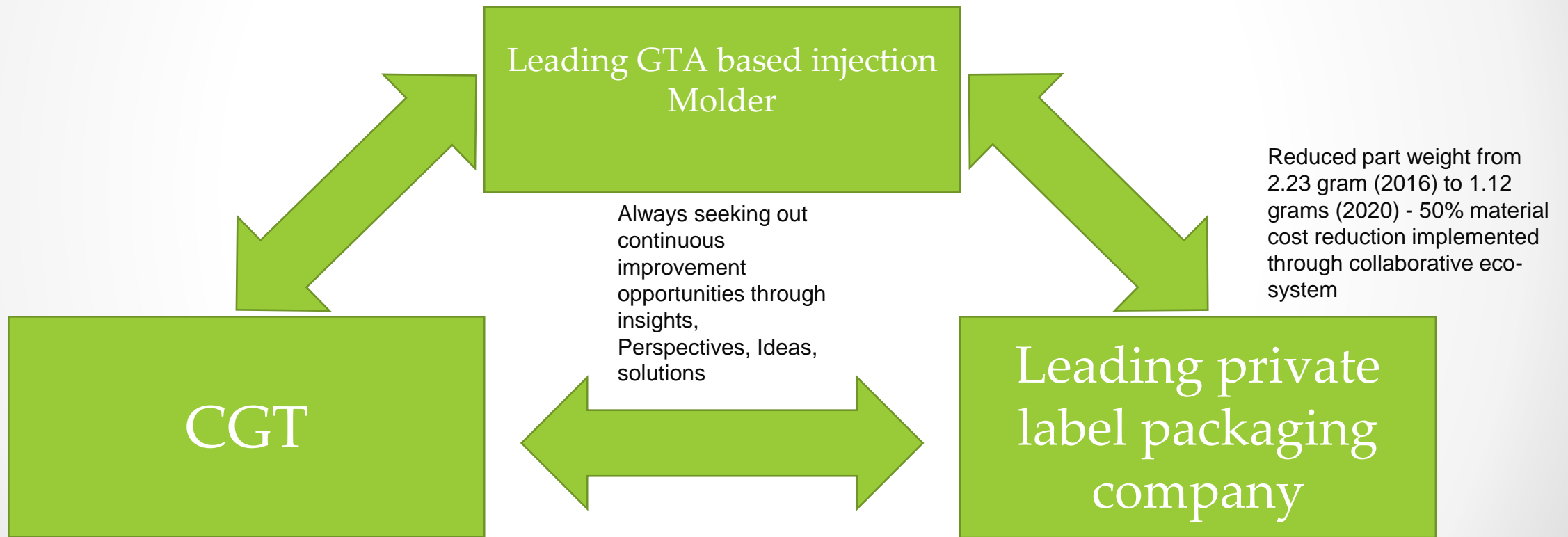
Ecosystem Example: Flexible Packaging





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Ecosystem Example: Single Serve Coffee Pod – 8 months on 1800 stores shop shelves from start of project!





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Bio-composite Compostable Resins Rigid & Flexible Packaging



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Compostable Resins

- Monolayer Barrier And High Heat Deflection Temperature Compostable Packaging.
- Plant-based succinates, lactates, adipic acid and sebacic acid formulations.
- No micro-plastics
- Becomes soil compost in a managed environment Composting facility.
- Break-down in unmanaged environment like a landfill several orders of magnitude faster. Breaks down to carbon dioxide and water as stand-alone packaging – near-net zero addition to GHGs.



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Competitive AND Compostable



Panel on McCafé compostable coffee pods
Sold in supermarkets in Canada and USA –
ONE BILLION SOLD AS OF MARCH 22, 2021



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Contains 25% coffee chaff.
This is skin of the coffee
bean - the so-called 'waste'
product of coffee roasting.
Circular Economy!

100% COMPOSTABLE PODS · GODETS

McCafé® Keurig® Compatible Pods use 100% compostable technology certified by BPI™
Les godets compatibles McCafé de Keurig® entièrement compostables sont certifiés par BPI™

COMPATIBLE LID: Developed using paper and other compostable materials.
THE RING: Made using coffee bean skins and other compostable materials.
THE FILTER: Developed using plant-based materials.

COVERCLE COMPATIBLE: conçu à partir de papier et d'autres matières compostables.
ANNEAU: fait d'enveloppes des grains de café et d'autres matières compostables.
FILTRE: conçu à partir de matières végétales.

PürPod 100 | **BPI** | **COMPOSTABLE**

For collection in municipal programs. Where approved. Pour la collecte dans les programmes municipaux, où approuvés. CERT # 10528537

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Enjoy McCafé® Premium Roast Coffee at home!
Savourez le café de torréfaction supérieure McCafé® dans le confort de votre foyer!

CGT makes the resin
for the structural ring



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Coffee chaff – ‘waste’ from coffee roasting - Pioneering Circular Economy - bio-composite resins

Coffee chaff –
a very valuable ‘waste’!

We pick up 500 tons per
month of coffee chaff
from roasting facilities in
Canada



‘There is no such thing
as waste – in a Circular Economy,
all waste is a product looking for
an opportunity’.





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Competitive AND Compostable



Competitively priced, 100% compostable, single serve coffee pods
Vs
Landfill destined single serve coffee pods @ same consumer price point



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Compostable Applications – Single Use Flexible Packaging

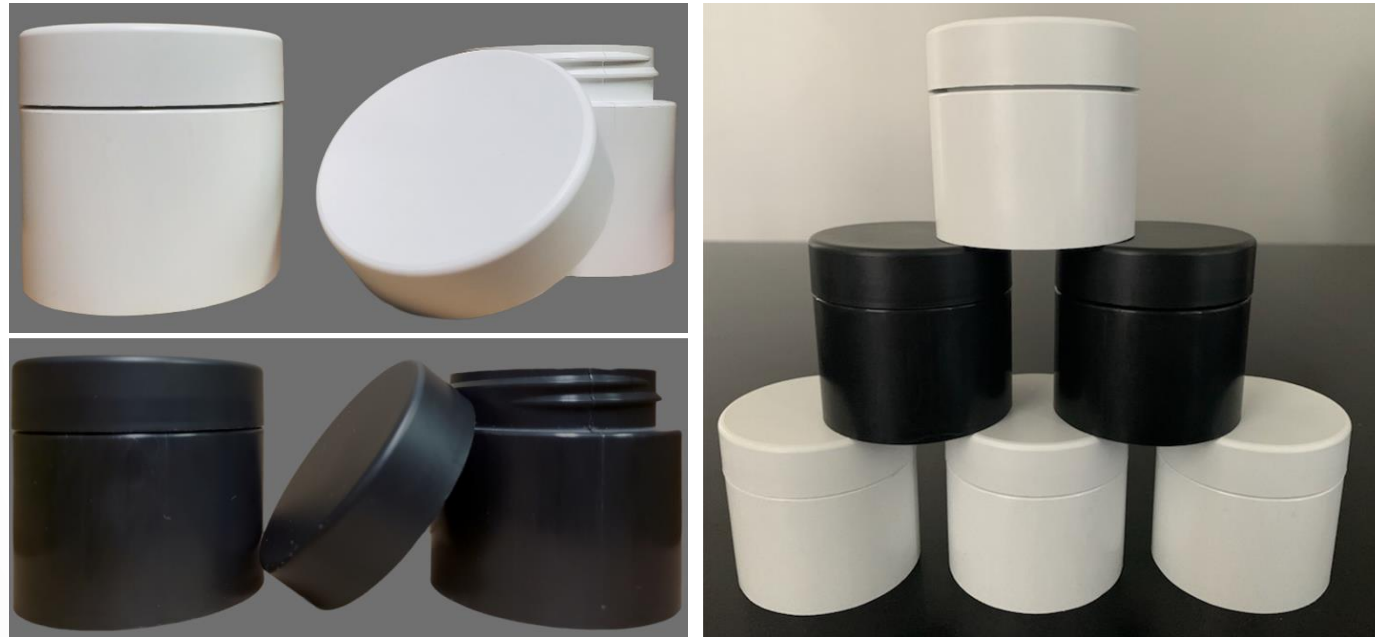


100% Compostable
Flexible Packaging
with Child-Resistant
Zipper



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Compostable Applications – Single Use CR Rigid Packaging



100% Compostable Jars and
Child-Resistant Certified Lids



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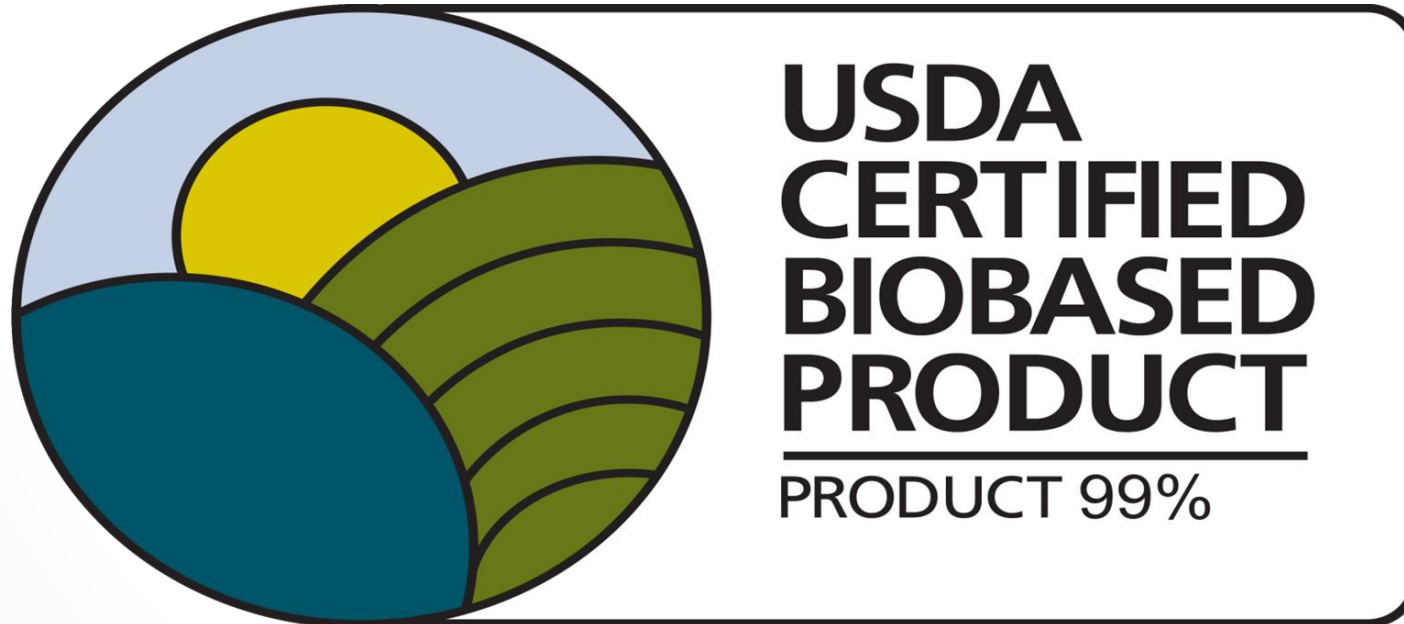
Recyclable and Lightweight Resins Automotive

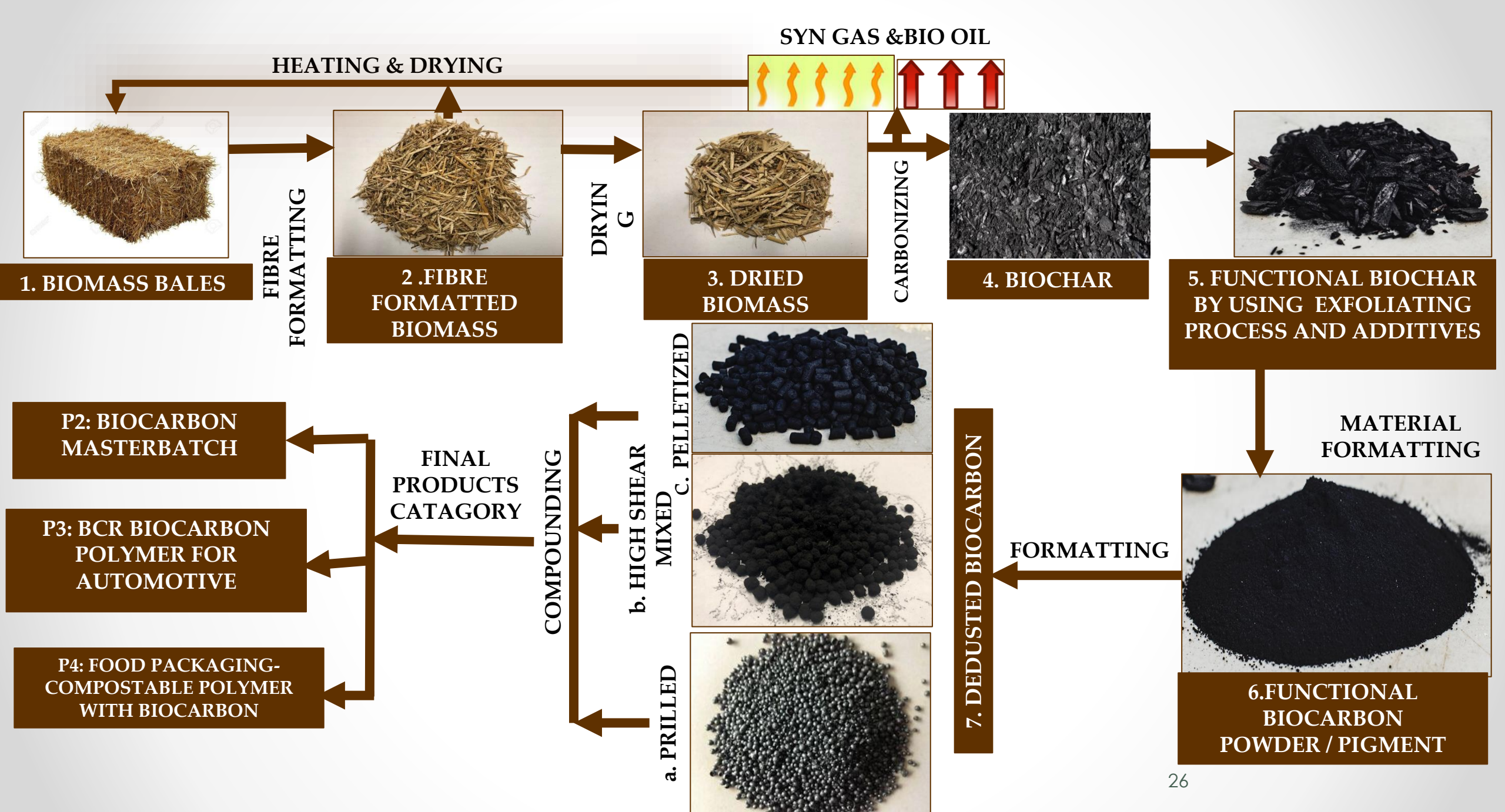


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Patented BIOCARBON is USDA Certified 99% New Carbon

NEGATIVE carbon footprint! – a first in the world: - 2.07 CO₂/Kg equivalent/KG!!

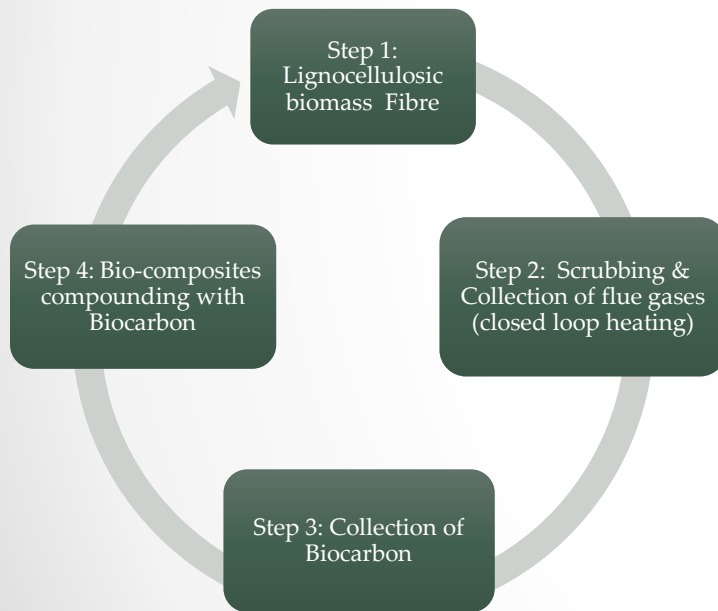






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Fully integrated operation - Closed Loop Bio-refinery for making biocarbon from Agri and Food Processing Waste and Compounding biocarbon to make bio-composite resins

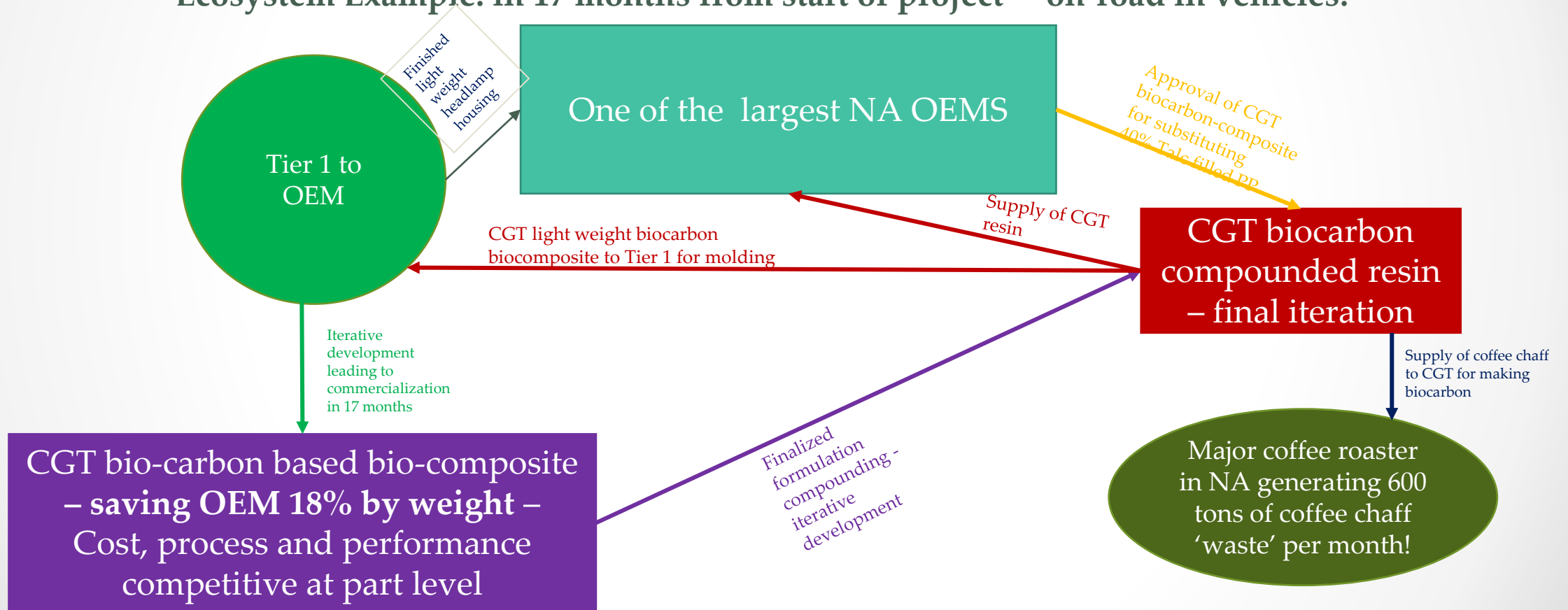


- Step 1: Lignocellulosic biomass - Surface treatment - Fibre formatting.
- Step 2: Torrefaction / Pyrolysis under controlled conditions of formatted fibre and Concurrent collection of flue gases (closed loop heating) and Bio-oil (bio-chemicals).
- Step 3: Collection of Biocarbon – typical yield varies from 20% - 35% dependent on: a) biomass used and b) desired mechanical properties for use in bio-composites.
- Step 4: Surface and particle size treatment of bio-carbon for making it suitable for value added use in bio-composites and being able to be compatibilized with polymer matrices.



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Ecosystem Example: in 17 months from start of project – on-road in vehicles!





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Windsor

Leamington, Ont. envirotech company helps create car parts from coffee waste



Competitive Green Technologies uses coffee chaff to create biocarbon

CBC News - Posted: Dec 10, 2019 8:45 PM ET | Last Updated: December 10, 2019



Leamington, Ont.'s Competitive Green Technologies turns coffee chaff into car parts. (Tahmina Aziz/CBC)

<https://www.cbc.ca/news/canada/windsor/envirotech-company-car-parts-coffee-waste-1.5391763>

<https://www.cnbc.com/2019/12/04/ford-is-making-car-partswith-waste-from-mcdonalds-coffee-beans.html>



RESTAURANTS

Ford is making car parts—with waste from McDonald's coffee beans

PUBLISHED WED, DEC 4 2019 6:00 AM EST | UPDATED WED, DEC 4 2019 6:01 AM EST

Amelia Lucas
@THXAMELIAN

SHARE f t in e

KEY POINTS

- Ford is making headlamp housings that use discarded coffee chaff from McDonald's.
- Chaff is the husk of the coffee bean that comes off during roasting.
- The automaker is looking for more ways to collaborate with McDonald's.





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P2: BIOBLAKR® - Carbon Black Masterbatch Replacement



Pop Bottle Tray
Used By Coca-Cola



Storage Bin
Used By Uline



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P3: Light-weight biocarbon based Resin__ Ford Lincoln headlamp housings – on-road since March 2020



Original 40% Talc Filled
Polypropylene Part
– 989 grams



22% Bio-Carbon Filled
Polypropylene Substitute
– 824 grams – 17% weight saving!





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Comparison: Mechanical Properties of 32% TFPP Vs patented Biocarbon filled PP Lightweight Bio-composite

Property	32%-33%TFPP	BCR-HMS 30-40
MFI	15	16
Tensile Strength	28 MPa	55 MPa
Tensile Modulus	2.9 GPa	3 GPa
Flexural Strength	40 Mpa	47 Mpa
Flexural Modulus	3.0 GPa	3.3 GPa
Impact – Notched Izod	30 J/m @ 23 C	35 J/m
Impact – Un-notched Izod	300 J/m @ 23 C	270 J/m
Specific Gravity	1.16 gm/cc	1.02 gm/cc
Odor Number	Rating 3 max	Rating 2.5
Flammability	100 mm/mn max	42 mm/mn



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Comparison: Mechanical Properties of 40% TFPP Vs patented Biocarbon filled PP Lightweight Bio-composite

Property	38%-40%TFPP	BCR HMS 30-40
MFI	12	12
Tensile Strength	29 MPa	55 MPa
Tensile Modulus	2.5 GPa	3 GPa
Flexural Strength	43 Mpa	47 Mpa
Flexural Modulus	3.6 GPa	3.3 GPa
Impact – Notched Izod	23 J/m @ 23 C	35 J/m
Impact – Un-notched Izod	225 J/m @ 23 C	270 J/m
Specific Gravity	1.23 gm/cc	1.02 gm/cc
Odor Number	Rating 3 max	Rating 2.5
Flammability	100 mm/mn max	42 mm/mn



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Who did we meet in this trip thanks to Saiolan and Hazi:

- Eduardo Marquez and Finn Trueisen – Ebaki
- Mikel Garay Ugarte – Biotermiaki
- Julen uriarte – EtoriDiego Gonzalas – Grupo Baron de Ley
- Judith Martinez – Erreka
- Itziar Elisalt – Tajo
- Fernandes Aitzol – Axalko

We believe that there is potential here in Basque country to add value to wood biomass and create value addition that will be sustainable in the short and long-term as industry shifts happen and the need for sustainable solutions in plastics industry continues to grow.



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One Understanding Is Key to Commercialization of Innovation

- **Academia – industry collaboration:**

Mutual respect for IP: Academia – chemistry and Industry – scale-up and commercialization process.

- **Customer-centric biomaterial development:**

Identify systemic needs of the market segment, differentiated value proposition and commercialization potential upfront – not the relentless pursuit of irrelevant perfection.

- **Alignment and trust amongst all stake holders:**

Mutual vulnerability and mutual benefit – farmers, compounder, academia, molder, customer.

- **Iterative development process – no slam dunks:**

Commitment to success – perseverant effort.



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Muchas Gracias & Eskerrik Asko