



beograde

Welcome.

27/02/20

Group of companies



A NATURAL IN COMPOUNDS

Manufacturer of sustainable thermoplastic compounds



A NATURAL IN INNOVATION

Material science, prototyping & analytical service for sustainable thermoplastics



A NATURAL IN AUTOMATION

Designer & manufacturer of innovative machinery for sustainable thermoplastic processing



A NATURAL IN TOOLING

Designer & manufacturer of customized & innovative extrusion tooling



BIODEGRADABLE COMPOUNDS WITH A MATCHING LOOK



Innologic: Who we are



- Engineering company specialized in project work and pilot line set up
- Innologic is the Research & Development branch of Beologic
- Spin-off Beologic
- Product and technology independent
- Founded in 2013
- Headquarter 34000m² (office & production) based in Belgium
- 9 engineers (2019)
- 100% owned by Managing Director Marc Thometschek



What is our mission?

- Providing our customer partners with the most viable alternative for achieving even their most ambitious innovation objectives at every stage in the development process.

From concept creation to prototype development, internal and external validation to launch and commercialization.



Why are we unique?



- From **small** to **fully** engineered projects
 - Contract engineering
 - **Fast reaction time**
- **Total solution** for engineering, prototyping and preproduction
 - Target: “**90%** of the solution **within 100 days**”

Machines

- Wild range of lab scale machines:
 - Injection moulding machine
 - Twin screw extruders with underwater pelletizing
 - Physical foaming
 - Mechanical characterization (Tensile, Flexural, Impact)
 - Melt flow index (MFI)
- Differential scanning calorimetry (DSC)
- Thermo-gravimetric analysis (TGA)
- Fourier-transform infrared spectroscopy (FTIR)
- Accelerated weathering tester (QUV)

...





Beologic: Who we are



- Founded in 2000
- Compounding company specialized in the production of natural and mineral reinforced ready-to-use composite compounds
- Spin-off from a wood recycling company with an excellent know-how of the milling, sieving and drying process of natural fibers
- Headquarter 34000m² (office & production) based in Belgium
- 30 employees (2019)
- 100% Private owned by Managing Director Marc Thometschek



What is our mission?

- Our ambition is to **replace conventional plastics** by less harmful polymers, and it's driven by our strong belief in a **circular economy**
- To provide top quality sustainable thermoplastic compounds for most common polymer processes
- Combination excellent R&D with superior technical knowledge
- Our goal is to find the right balance between materials, processes, manufacturing and support in order to create real added value



Why are we unique?



- Product portfolio contains more than **2000 formulations**
 - Compound customized to **customer requirements**
 - Experience with: PVC, PP, PE, ABS, PLA, ...
 - Variety of fillers: **wood**, bamboo, flax, rice, cork, ...

Machines

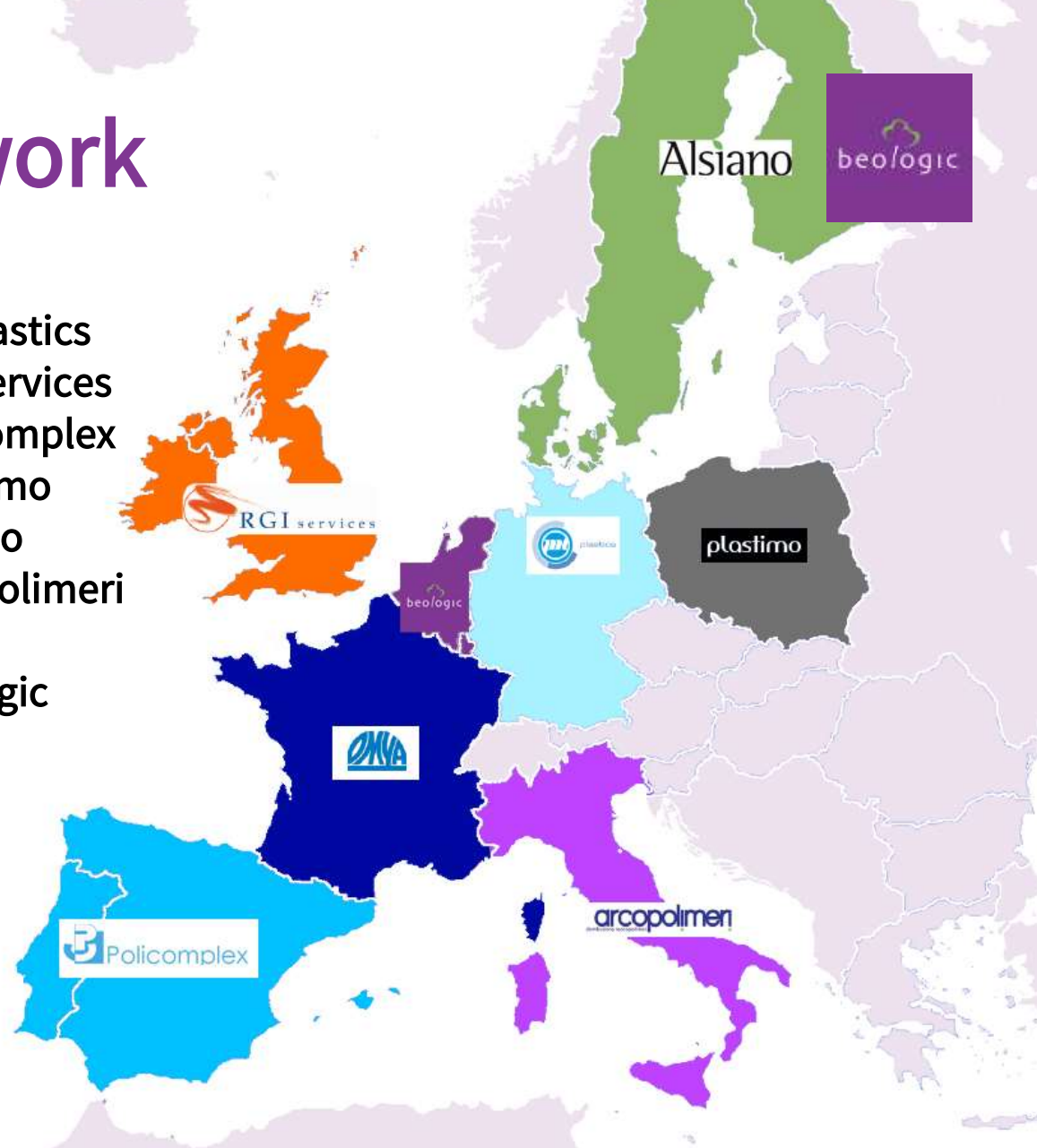
- Compounding
- Dry blending and mixing
- Conventional and cryogenic milling
 - Shredding and recycling
- Custom formula processing
 - Tolling services



Our sales network

- Germany
- UK
- Spain & Portugal
- Poland
- Scandinavia
- Italy
- France
- The rest of the world

ML Plastics
RGI Services
Policomplex
Plastimo
Alsiano
Arcopolimeri
Omya
Beologic



A logical product range



Compound where at least a part of the content comes from renewable resources.



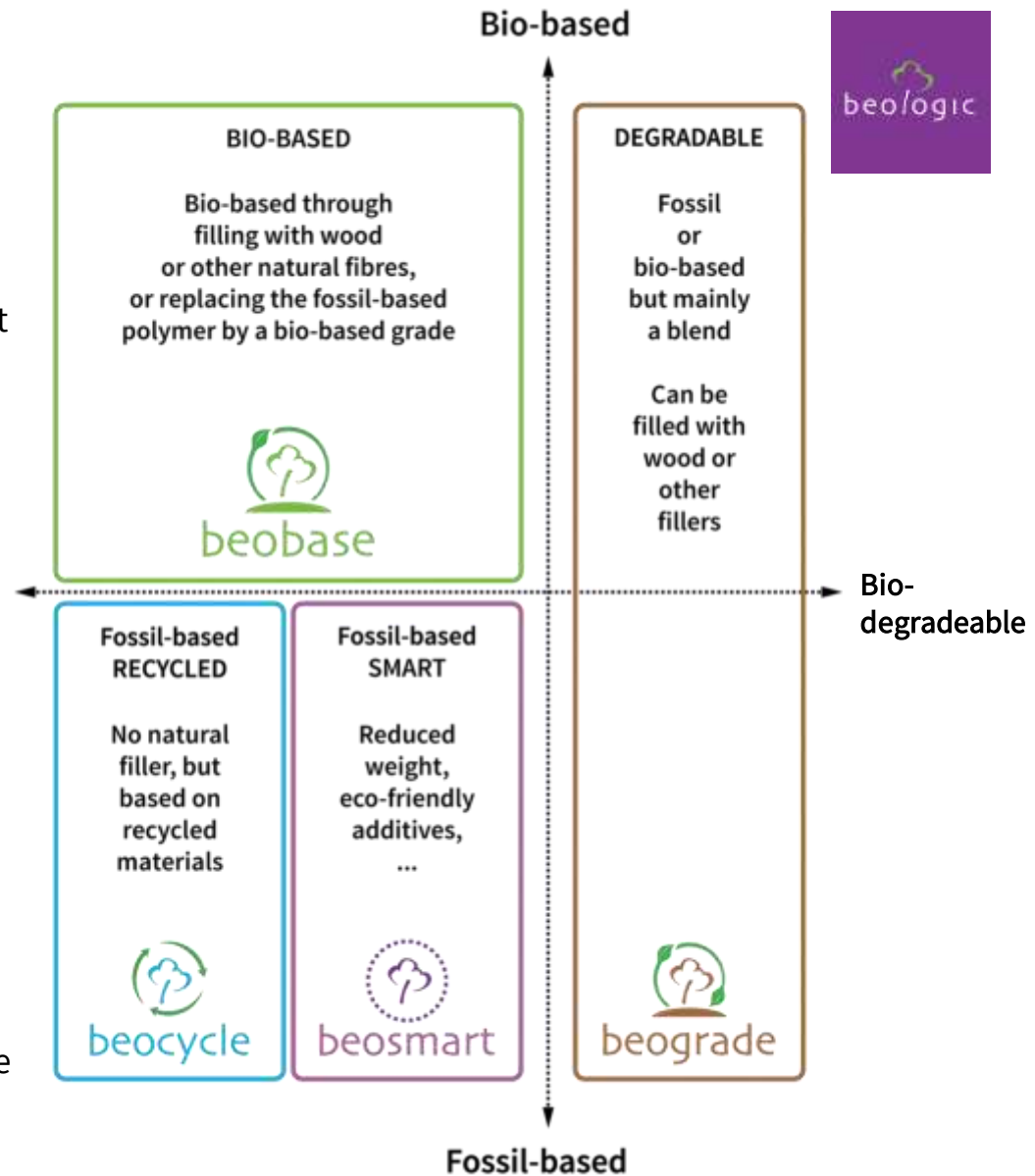
Compound that is designed to degrade under compost conditions. Containing renewable resources.



The beocycle family includes compounds based on recycled material.



Compound that presents features that make them more sustainable, e.g. by reducing the weight or by using eco-friendly additives.



Key challenges for existing biomaterials



PLA

Main drawbacks for PLA :

- Low impact strength and brittleness
- Low heat deflection temperature (HDT)
- Low crystallinity during processing
 - Hydroscopic



PBAT

Main drawbacks for PBAT :

- Low strength/modulus
- Opacity
- Depend to the oil resources



TPS

Main drawbacks for TPS :

- Sensitive to water disintegration
- Low chemical resistance
- Poor mechanical properties



PBS

Main drawbacks for PBS:

- Expensive material
- Low biodegradation rate
 - High density



PHA

Main drawbacks for PHA :

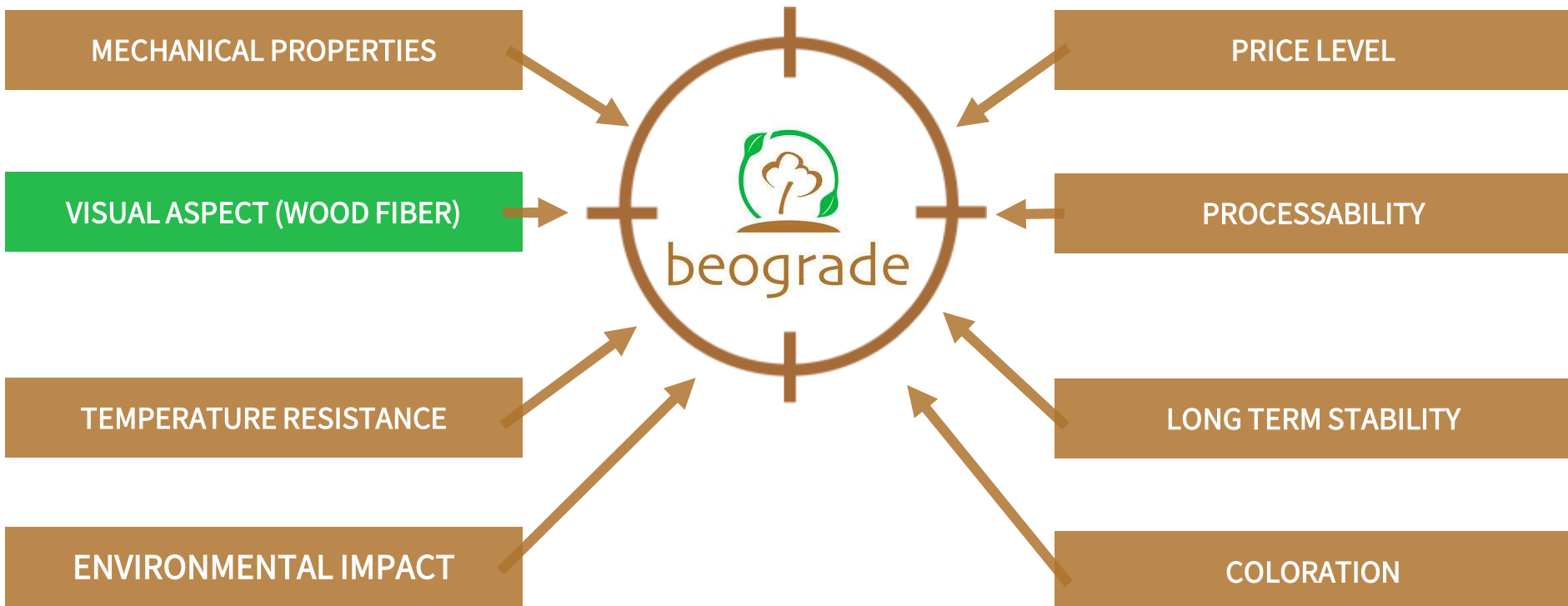
- Difficult to produce (produced by bacteria)
- Difficult to process (narrow processing windows)
- Thermal stability



Custom compound



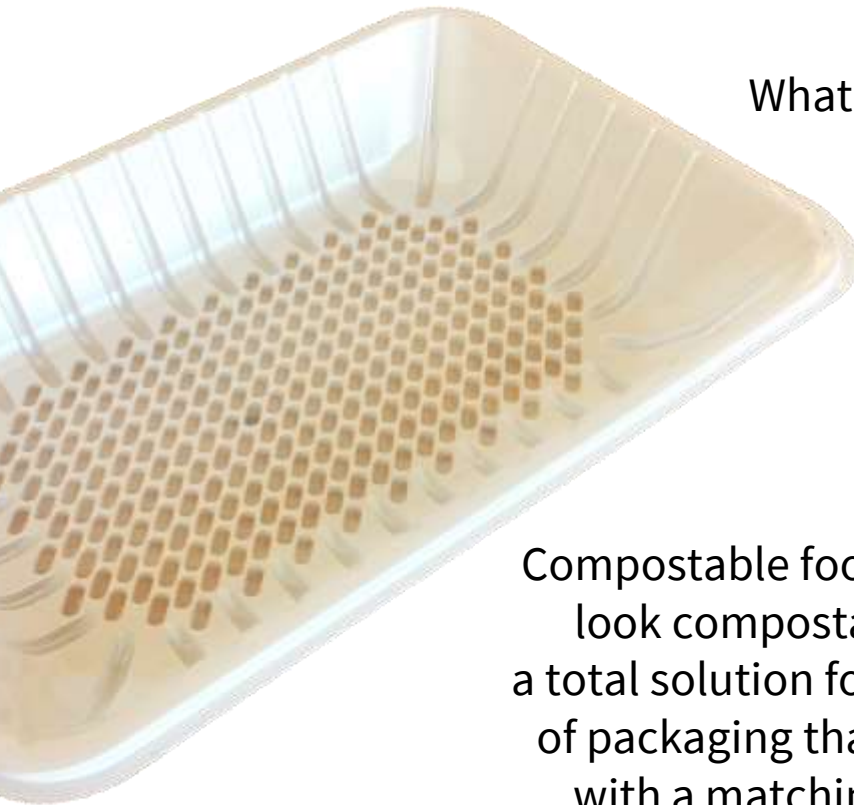
We develop new compounds to improve :



Visual aspect wood fiber



What is this made of?



Compostable food trays not always look compostable, so we offer a total solution for a new generation of packaging that is compostable, with a matching look and feel.



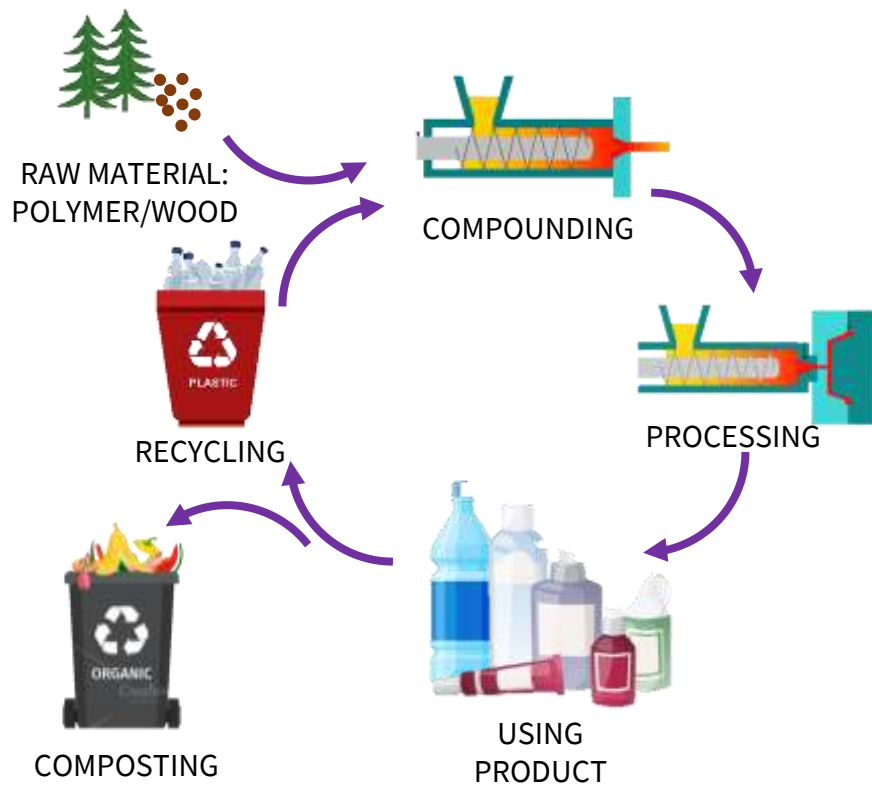
Beograde range



Article number	Application	Density	MFR (100°C/2,16 kg)	Tensile Modulus	Tensile Strength	Elongation at Yield	Elongation at break	Flexural Modulus	Charpy impact strength	Resin content	Wood fiber reinforced	Mineral filled	Translucent	Food Contact approved*	Biodegradability	Properties
UNIT		g/cm ³	g/10 min	MPa	MPa	%	%	MPa	KJ/m ²	-	%	-	-	-	-	
STANDARD			ISO 1133-1	ISO 527	ISO 527	ISO 527	ISO 527	ISO 527	ISO 179/1eA	-	-	-	-	EU 10/2011	EN 13432	
INJECTION MOLDING																
Beograde INJ033	980207033	Injection molding	1,25	38	2310	40	2,3	14	2060	7,5	***	✓		✓	✓	General purpose - High Strength High stiffness - High MFI
Beograde INJ038	980207038	Injection molding	1,23	17	1610	28	2,4	26	1350	12	***	✓		✓	✓	Alternative to PP - High impact Good flexibility
Beograde INJ039	980207039	Injection molding	1,37	19	3390	40	1,9	< 5	3040	5,5	****	✓		✓	✓	Easy to color - High stiffness Mineral filled
Beograde 10 INJ027	109007027	Injection molding	1,24	16,3	2580	34	2,3	< 5	2300	5	***	✓ ₁₀	✓	✓	✓*	Wood fiber for visual aspect
Beograde 20 INJ044	209007044	Injection molding	1,26	8,7	3290	35	2	< 5	3010	5,5	***	✓ ₂₀	✓	✓	✓*	Wood fiber for visual aspect
THERMOFORMING																
Beograde THF040	980207040	Thermoforming	1,35	2,9	3520	40	2	< 5	3100	10	****	✓		✓	✓	General purpose - High strength High stiffness - Low MFI - Glossy
Beograde 05 THF024	059507024	Thermoforming	1,24	3,9	1440	23	4,9	35	1210	31	***	✓ ₅	✓	✓	✓*	Wood fiber for visual aspect
EXTRUSION																
Beograde EXT041	980207041	Extrusion	1,3	3,7	3250	46	2,1	7	2790	6,5	***	✓		✓	✓	High strength - Rigid Melt stabilized - Good thermostability
Beograde EXT042	980207042	Extrusion	1,3	3,3	2090	31	2,3	26	1810	14	***	✓		✓	✓	Alternative to PP/PE High impact - Good flexibility
Beograde 10 EXT028	109007028	Extrusion	1,25	3,1	3640	47	2,1	< 5	3470	< 5	***	✓ ₁₀	✓	✓	✓*	Wood fiber for visual aspect
BOTTLING																
Beograde BTL035	980207035	Bottling	1,27	4,3	1340	23	4,3	178	1070	96	***	✓		✓	✓	Soft - Glossy Good mechanical properties
Beograde BTL043	980207043	Bottling	1,3	3,5	2660	38	2,1	9	2220	9	****	✓		✓	✓	Semi-rigid - High melt strength Excellent processability
Beograde 05 BTL023	059507023	Bottling	1,26	3,8	1440	19	9	250	1080	32	****	✓ ₅	✓	✓	✓*	Wood fiber for visual aspect
FILM EXTRUSION																
Beograde FLM045 T	980207046	Film extrusion	1,22	4,9	980	22	6,2	291	910	65,6	***	✓	✓	✓	✓	Transparent - Tear strength Thin film
Beograde FLM044 O	980207044	Film extrusion	1,28	3,6	1260	17	7,4	190	960	78,3	***	✓		✓	✓	Opaque - Glossy - Flexible



Our offer and support



1

YOUR NEED

Identify product and process needs

2

MATERIALS MATCH

Match suitable standard
Beograde ready to use

3

TRIAL TEST

With our technical support

4

FINE TUNING

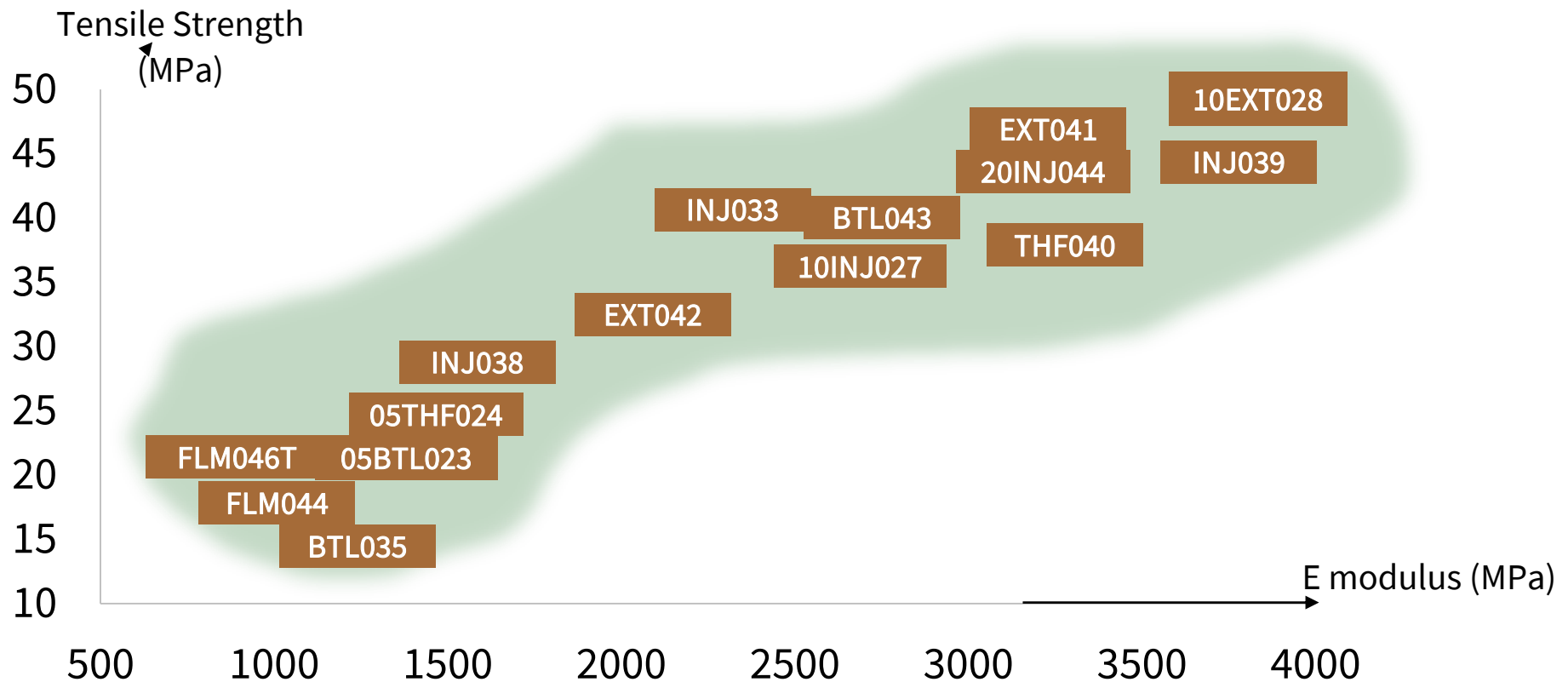
Optimize formulation and
process parameters

5

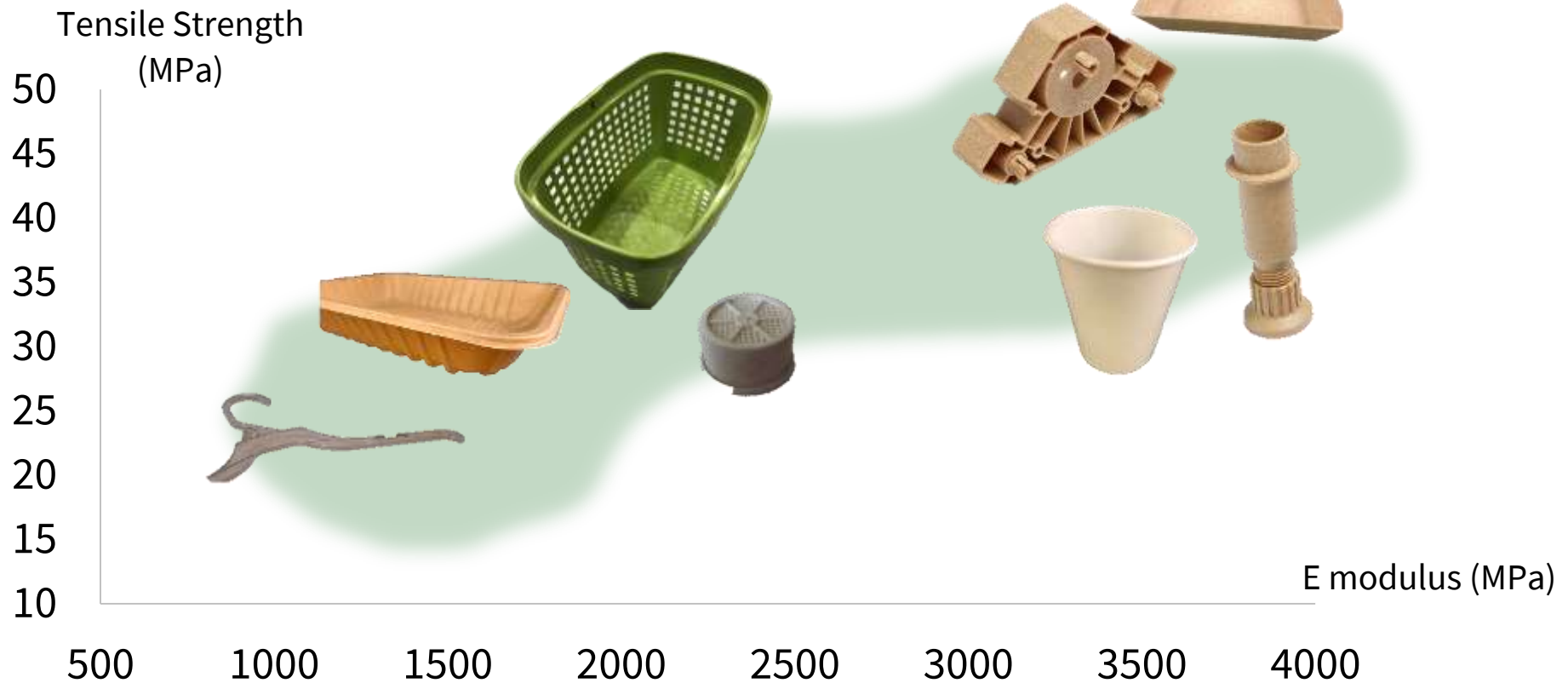
UP SCALING

Production and certification
final parts

Application



Application



General definition



BIOBASED

Polymers where at least a part of the content comes from renewable resources

Ex : PLA, PP/wood fiber



BIODEGRADABLE

Will degrade under the action of microorganisms

Ex : PLA, PBAT

COMPOSTABLE

Capable of undergoing biological decomposition in a compost site.

All compostable polymers are by default biodegradable but not vice versa.

BIOPOLYMERS

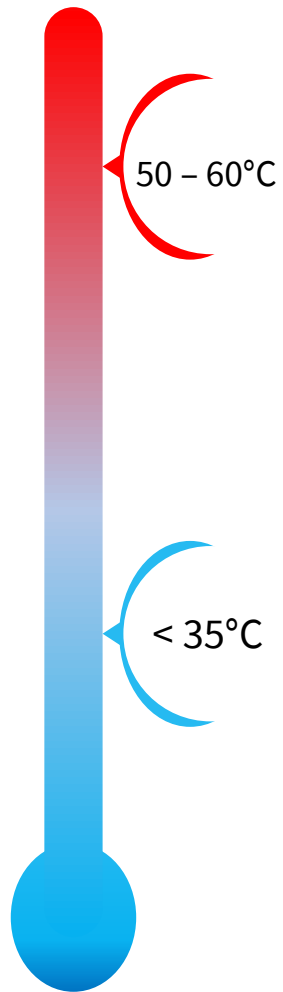
Polymers that are derived from renewable resources, as well as biological and fossil based biodegradable polymers

STANDARD EN 13432

- (1) disintegrate rapidly during the composting;
- (2) biodegrade quickly under the composting conditions;
- (3) not reduce the value or utility of the finished compost and the compost can support plant life;
- (4) not contain high amounts of regulated metals or any toxic materials.



Standard en 13432



At least 90% disintegration* within 3 months.
At least 90% biodegradation** within 6 months



At least 90% disintegration* within 6 months
At least 90% biodegradation** within a year

***Biodegradation** = materials break down chemically

****Disintegration** = materials break down physically

O₂ - H₂O - UV
Microorganism



CO₂ - CH₄ - H₂O
Biomass

1. TEMPERATURE

2. THICKNESS OF THE PRODUCT

Beograde examples



Why are we unique?



- Ability to **replace** fossil based plastics
- **Sustainability** visualized (by adding wood fiber)
 - Modified and **optimized** material
- Added value (Environmental benefits – long term investment, ...)
 - Technical support

New PLA flexible and transparent

The brittleness of PLA has been a big hurdle for its diverse applications especially in injection molding.

VIRGIN PLA



BEOGRADE
INJ034T



▪ Melt flow rate MFR (190°C/2.16Kg) (g/10 min)	20	45
▪ E-modulus (MPa)	3500	2030
▪ Tensile strength (Mpa)	50	28
▪ Tensile elongation at break (%)	3	240
▪ Charpy impact strength (23°C, notched)	2	5

Thank you for listening.

