

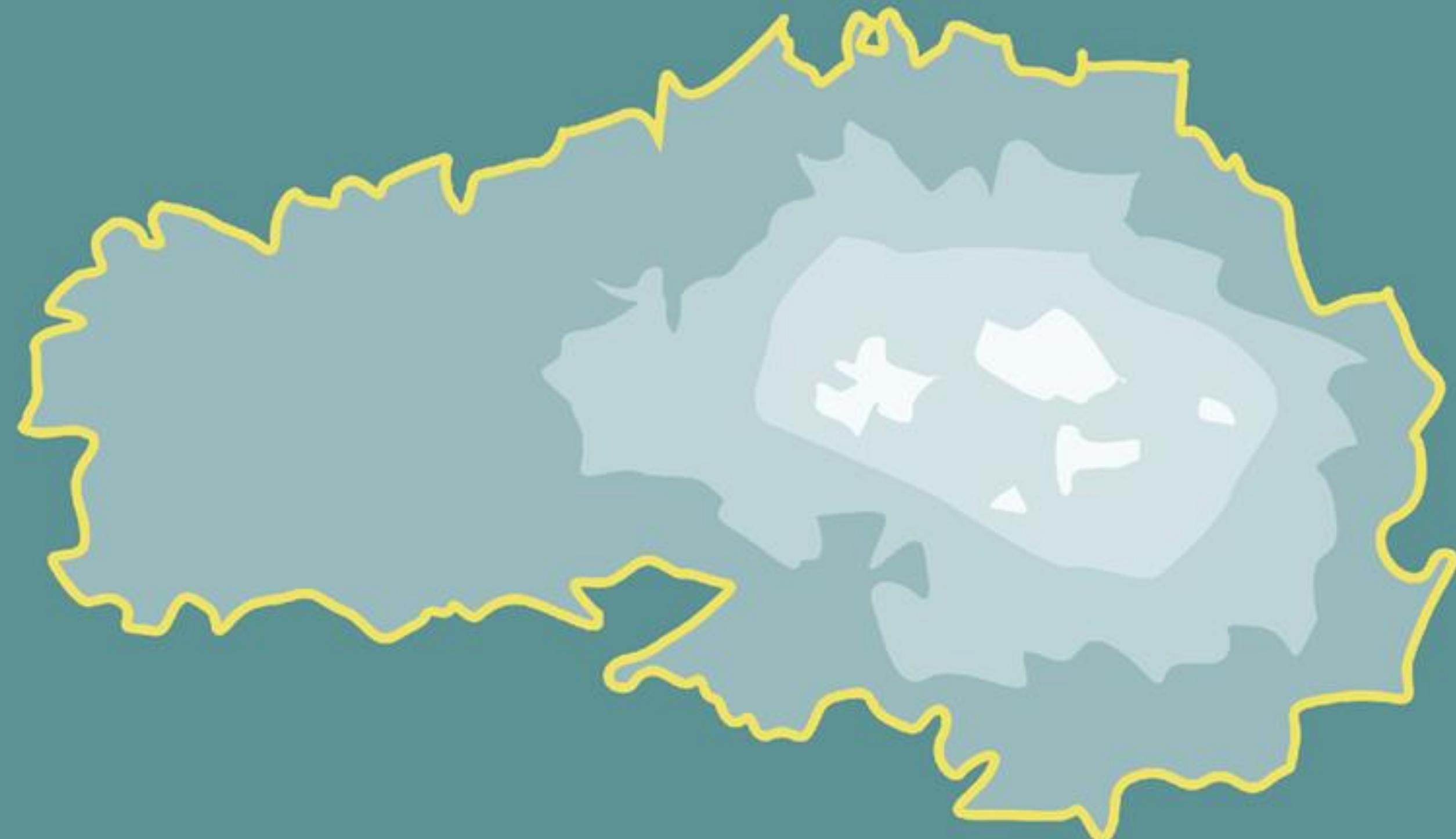
beworm

@TUM – SUSTAINABLE ENTREPRENEURSHIP

A GLOBAL THREAD...



...AND A LOCKED RESOURCE!



UNITED STATES

1.6 mio km² of plastic waste



MEXICO

...AND A LOCKED RESOURCE!



UNITED STATES



MEXICO

How can we unlock it?

WITH THE POWER OF NATURE!

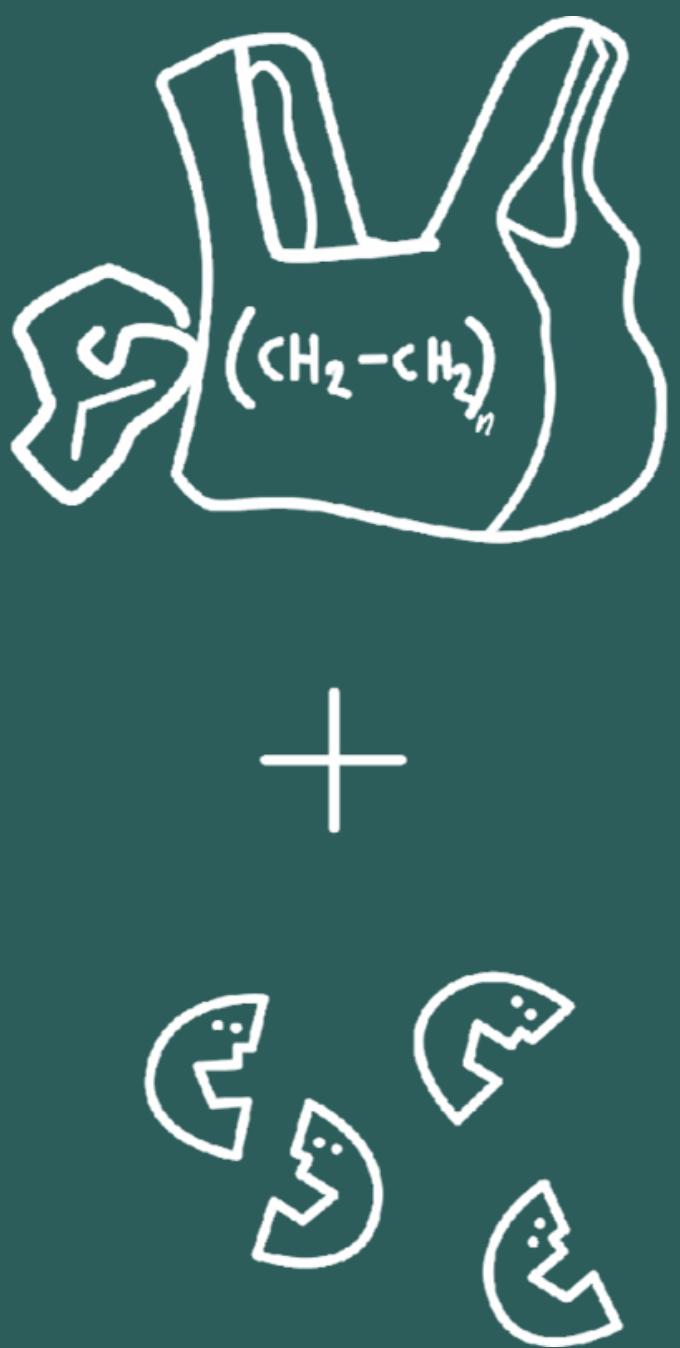


A NATURAL PROCESS...

Organisms &
microorganisms
produce **enzymes**



Polyethylene = composed of
hydrocarbon chains



A white plus sign.

A white right-pointing arrow indicating the flow of the process.

Enzymes split
up the long
hydrocarbon chains
into **shorter fragments**

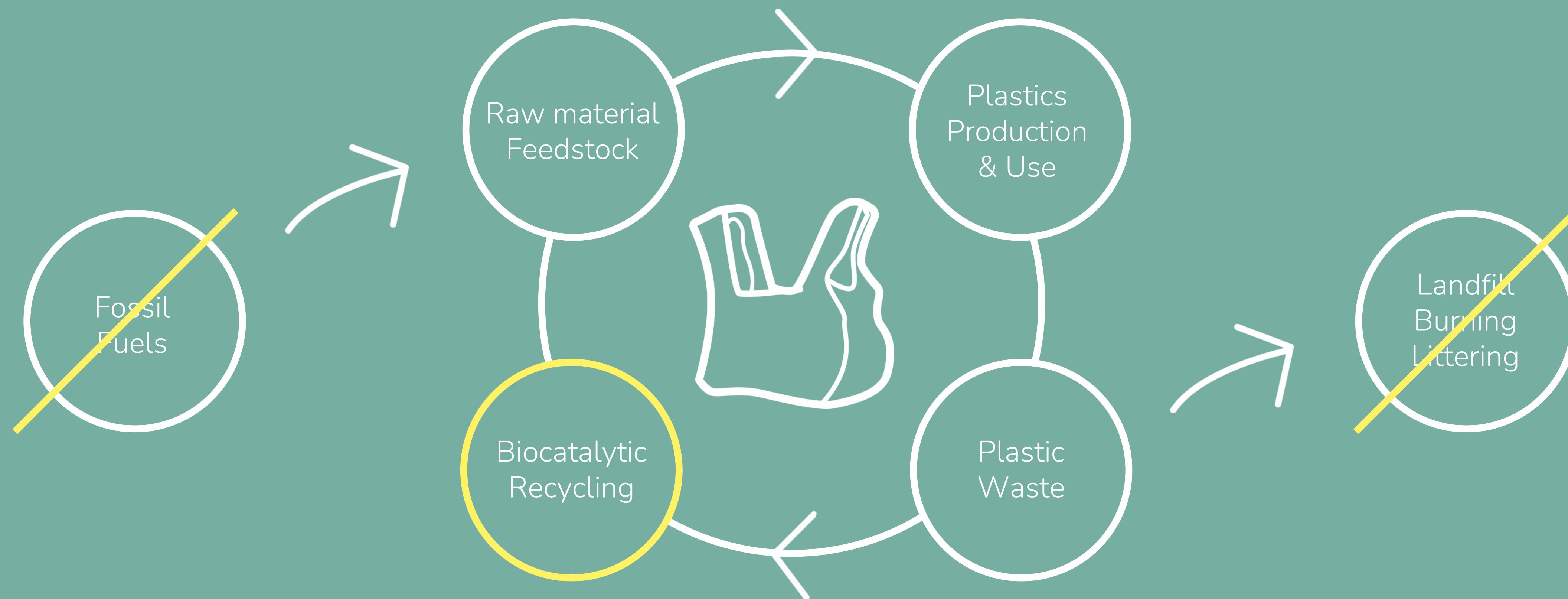


Short chain alkanes =
**Recovered raw
materials**

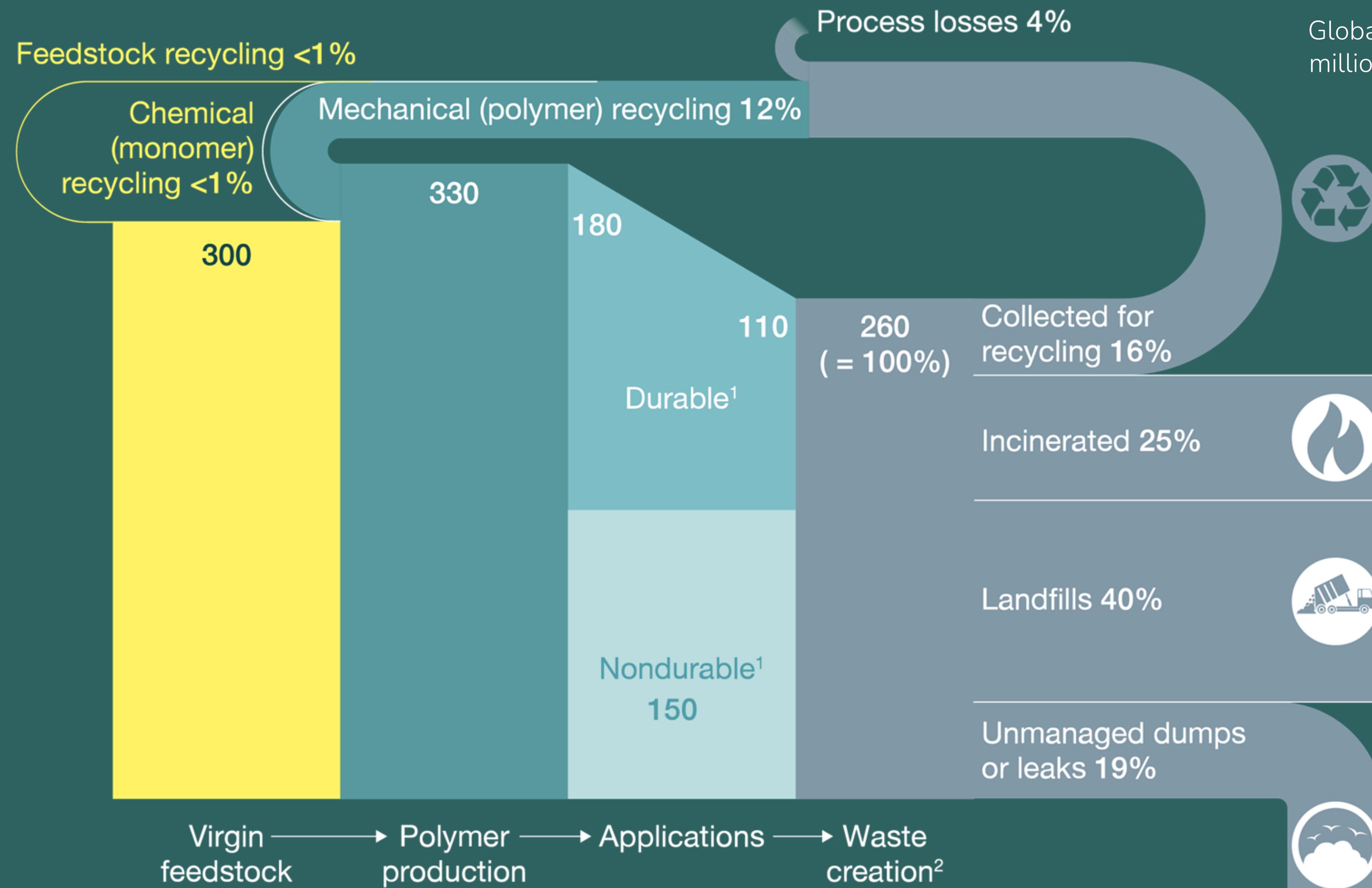
A white right-pointing arrow indicating the flow of the process.



We are developing a **biocatalytic recycling process**
that turns **Polyethylene plastics** into
virgin like raw materials and closes the loop!

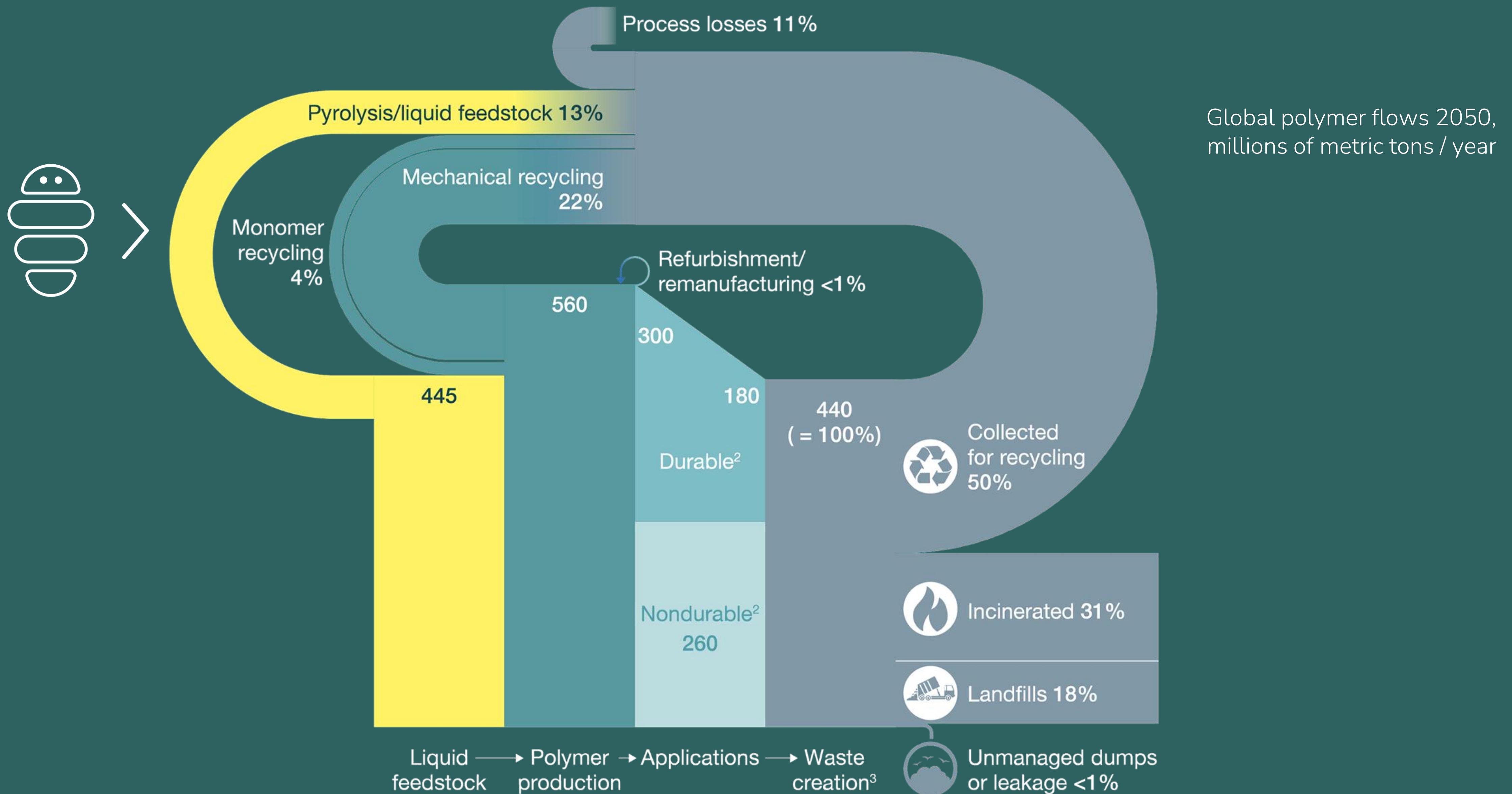


INCREASING CAPACITIES...



Global polymer flows 2016,
millions of metric tons / year

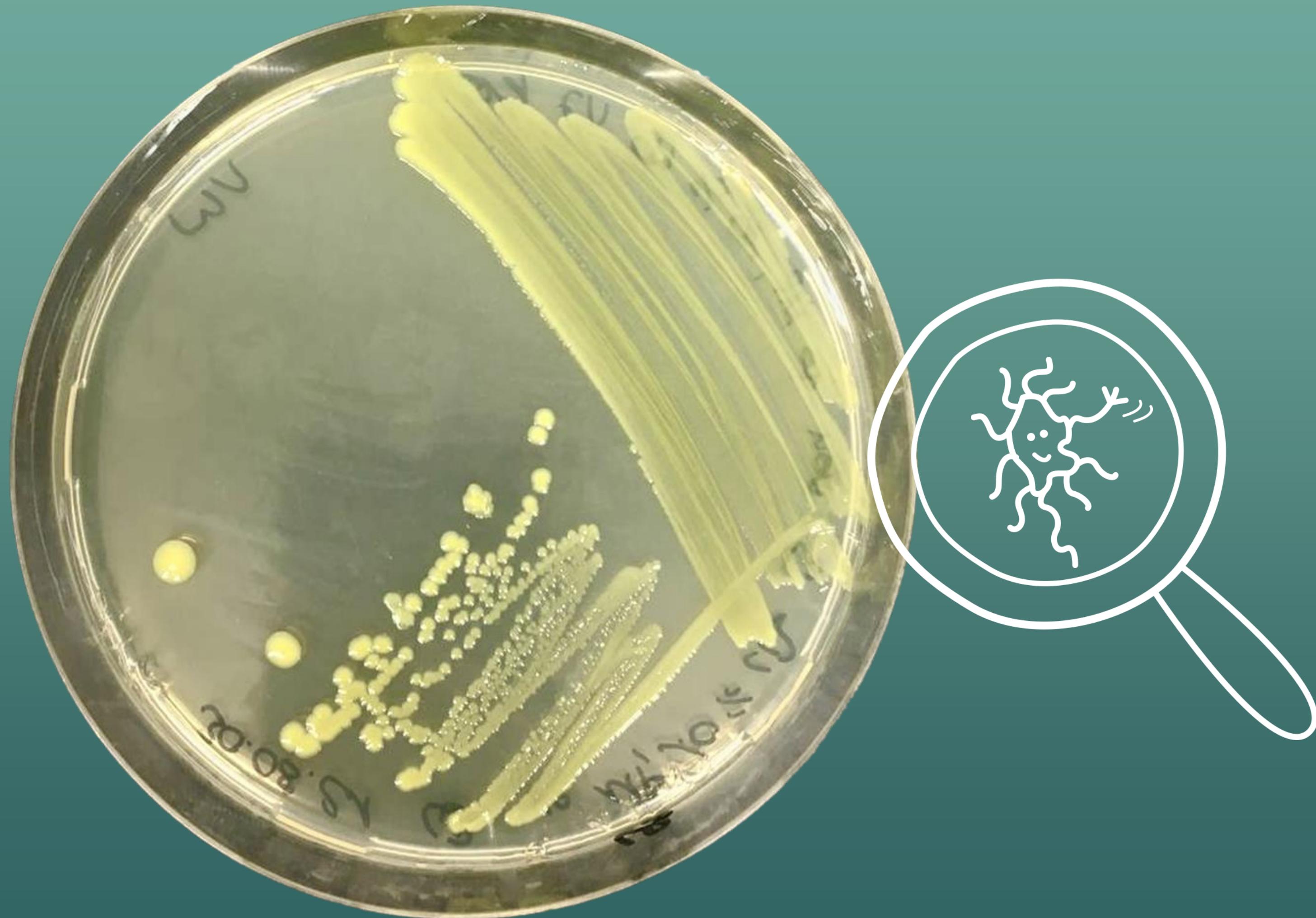
...TO CLOSE THE LOOP!



TECHNOLOGY BENEFITS

		Chemical Recycling	Thermal Recycling	Mechanical Recycling
Energy Requirement	+	-	+	+
Effectiveness on mixed plastics	+	+	~	-
Reuse of outcome	+	+	-	~

WHAT'S THE SCIENCE BEHIND IT?



ISOLATION PE-DEGRADING ORGANISMS



Dissection &
gut extraction

Growth in
minimal media with
only PE as carbon-source

Isolation
of the microorganisms
on solid medium

Identification
40 strains + 1 unknown
High-activity bacterium

SCALE UP...

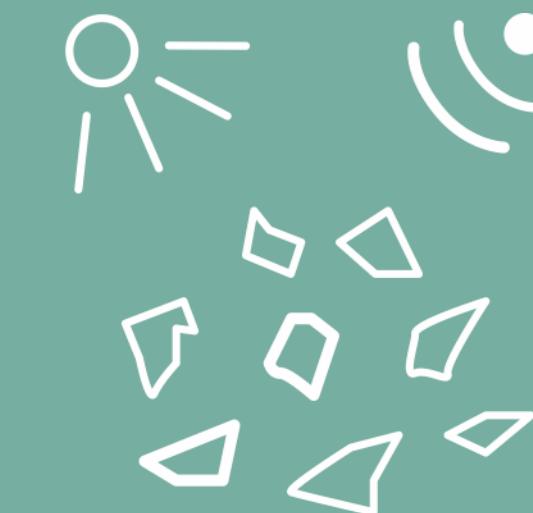
Heterogenous
waste stream



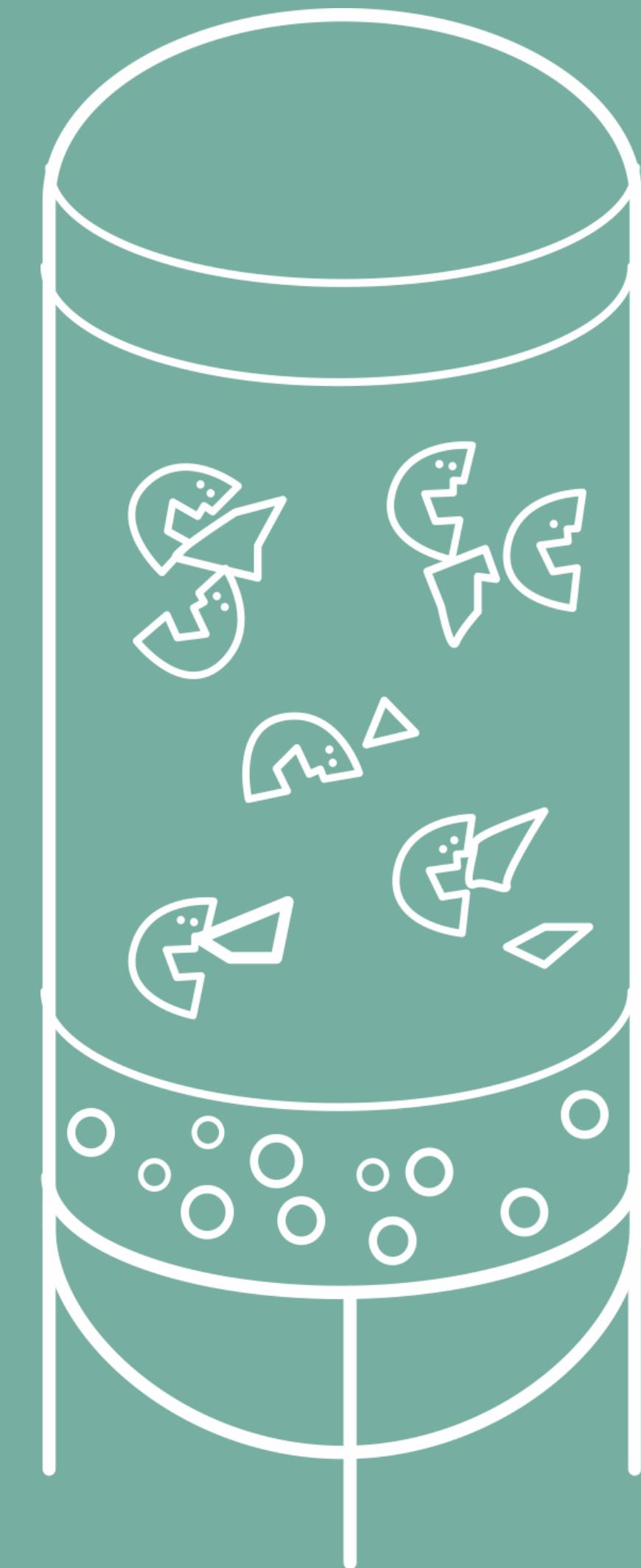
Removal
non-plastics
& high targets



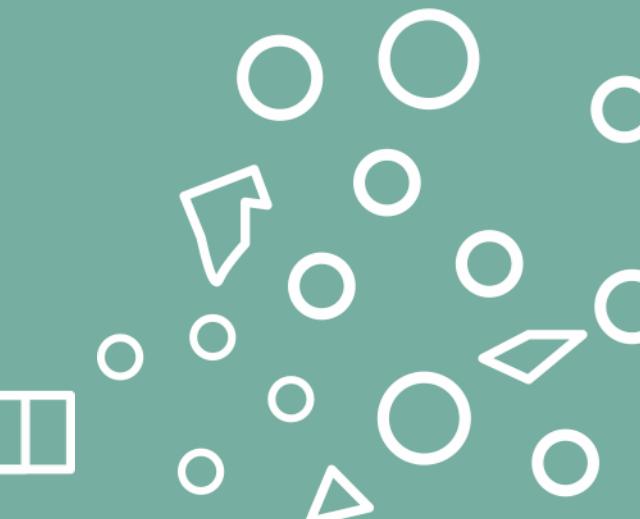
Shredded
fractions



Abiotic
pretreatment



Enzymatic
degradation
polyethylene



Ethanol, ethylene glycol
(bio)plastics production,
additives

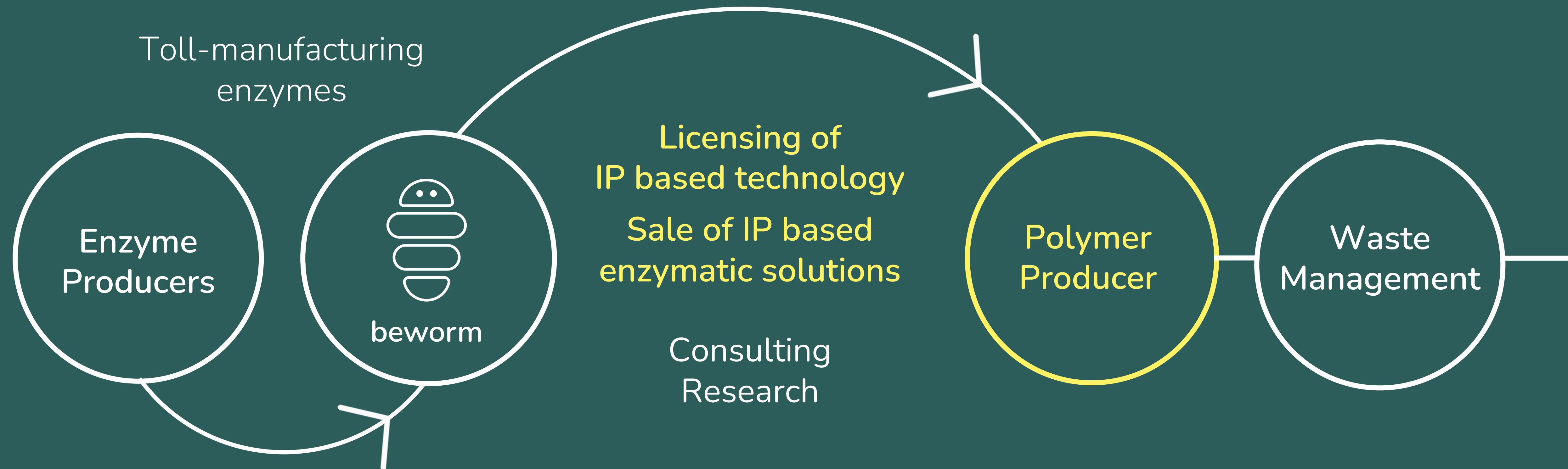


Other
feedstock
biofuels, oils,
waxes

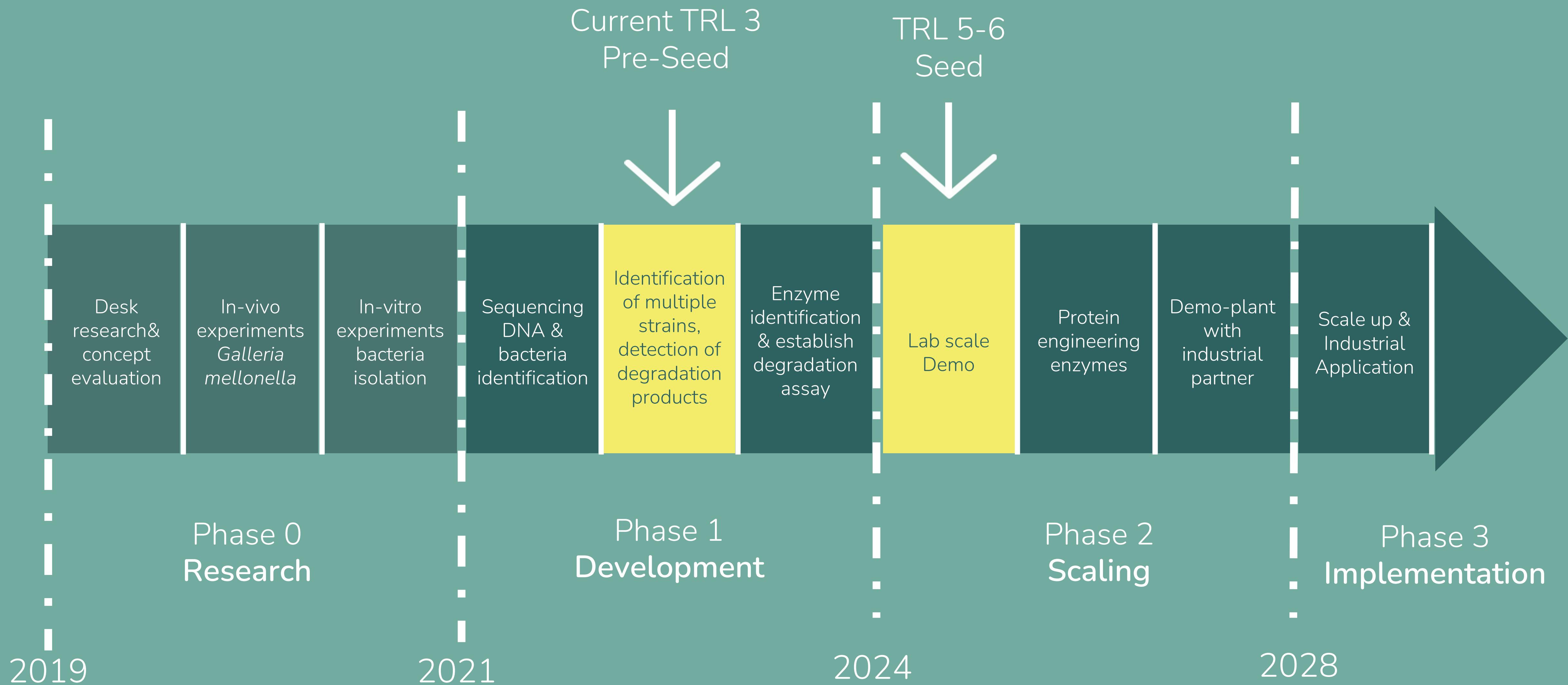


Further processing

AND LICENSING!



PROJECT PLAN AND MILESTONES



THE BIONEERS



Eleonore Eisath
MSc Industrial Design
Project Manager



Soukaina Mahfoud
Corporate Finance Executive
CFA charter holder

Maria Khomich
MSc Management & Tech
Product management



Verena Wolfarth
MSc Biology
Scientific Lead



Prof. Dr. Stephen Schrettl
Scientific Mentor
Functional Packaging
Group

Pepijn van Leeuwen
MSc Management & Tech
Financial Analyst



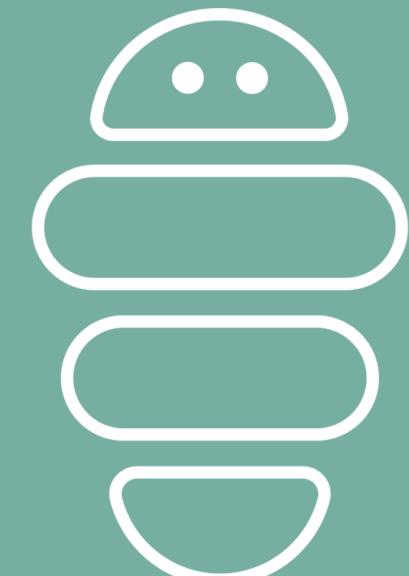
Stefan Szalay
MSc Biology | Dipl. Ing.
Electrical Engineering
Technical Lead

Patrick Seeburger
MSc Robotics & AI
IT-Management

FACILITIES & RESOURCES TUM

Functional
Materials for
Food Packaging

Prof. Stephen
Schrettl



Beworm GbR
(planned GmbH)

Chair of
Microbiology

Prof. Wolfgang
Liebl

Analytic
Chemistry Group
Prof. Strittmatter

TUM
Venture
Labs

KEY ACHIEVEMENTS IN 22

Funding:

65k BMBF
Industrial Innovator Grant
EIT Food Seedbed Grant

Technology:

TRL3 -40 Strains isolated
One novel bacteria discovered
Filing for first patent

Partnerships:

20+ Industry meetings
Potential collaboration with big player
Strategic research partnership



Team:

Additional founder | Finance
+4 Students
Key scientific advisor | Chemistry

Prices & Press:

MERCK Science Award 2022
Finalist of 6 further prices
Features in articles, podcasts, TV

Events:

ChangeNOW in Paris
EIT Events in Bilbao, Lisbon, Warsaw
Exclusive Meeting with EU-Vizepresident

BEHIND THE SCENES





My entrepreneurship
journey was like...





My entrepreneurship
journey was like...



following the white
bunny into the rabbit
hole.

3 MYTHS ABOUT SUSTAINABLE STARTUPS



1. Impact is more important then money!



1. Impact is more important then money!

NOT THERE YET



3. It's easier to get funding!



3. It's easier to get funding!

A photograph of a brown caterpillar crawling on a textured blue surface. A yellow speech bubble is positioned in the lower-left foreground, containing the text "I WISHED" and a small sad face emoji.

I WISHED 😞

2. You get more spotlight!



2. You get more spotlight!



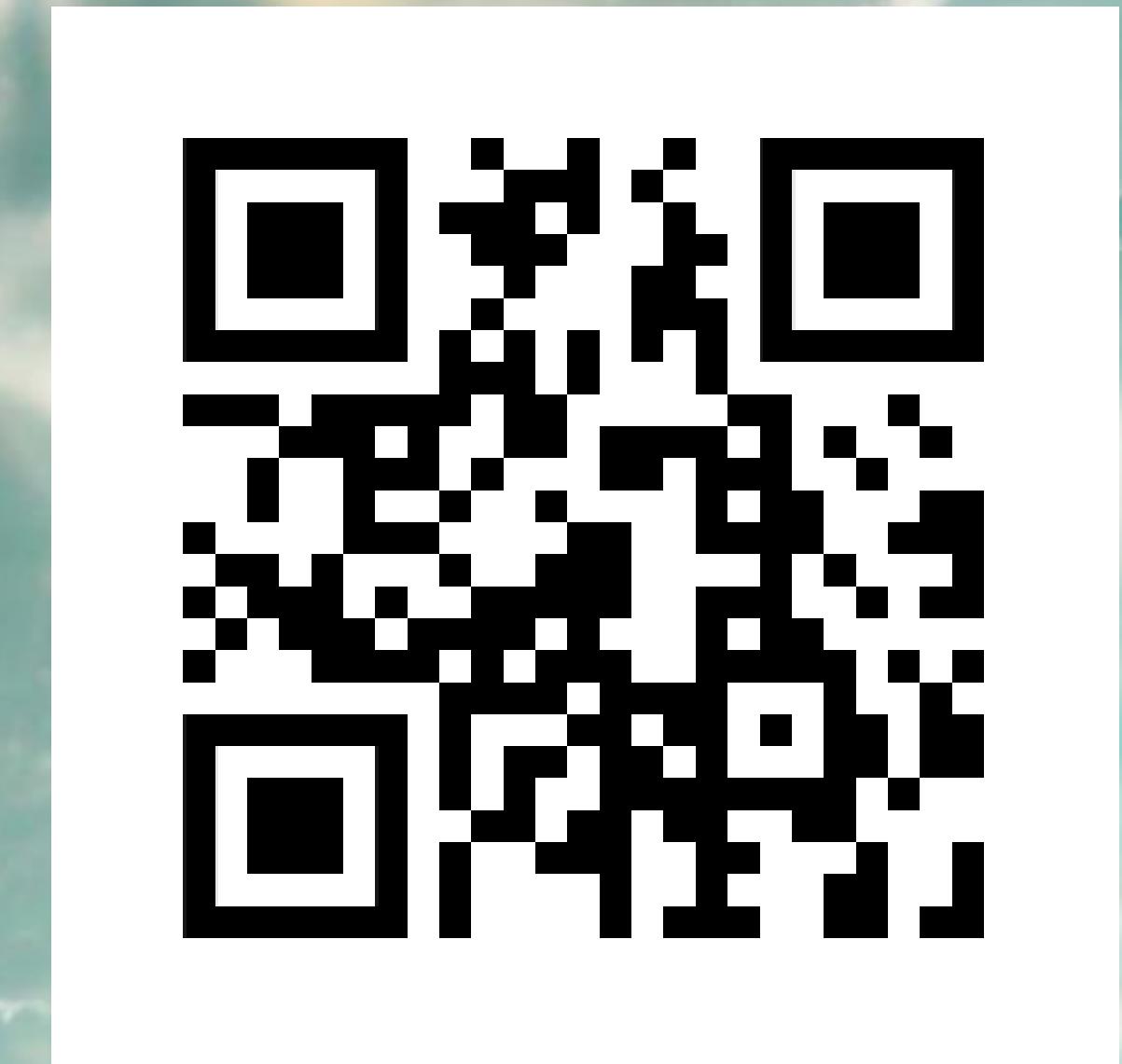
SOMETIMES ☺

Adopt a worm!

beworm.org

LinkedIn: beworm

YouTube:
The Plastics Pop Up Podcast



Federal Ministry
of Education
and Research



Funded by the
European Union