Plastic Back

Enabling a Circular Economy

A low temperature, chemical process, that converts difficult-to-treat waste streams BACK to their valuable form.

האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

רשות החדשנות
Israel Innovation Authority

eit Climate-KIC

Co-funded by the European Union

Ministry of Energy
www.energy.gov.il

Plastic Back Supplies the petrochemical industry with plastic-derived feedstock which is upcycled to create new products.

A unique chemical process is utilized to convert unrecyclable plastic waste to valuable oils . The technology reduces landfilling on one hand, and virgin petroleum feedstock on the other

Waste policy

In order to address the plastic pollution crisis, business and policymakers are setting hefty targets that are driving demand for recycling solutions worldwide

370,000,000
Tons of plastic waste produced annually

Only **12%** recycled

The EU's Circular Economy Action Plan

Sets the goal of ensuring:

50% of all plastic packaging are recycled by 2030

10% of municipal waste to be landfill by 2030

Backed by legislation:

- Euro 800/ ton tax on non recycled plastic packaging
- Increased waste collection goals and extended producer responsibility schemes
- Waste export and import bans, such as the import ban imposed by China in 2017
- Plastic credits model

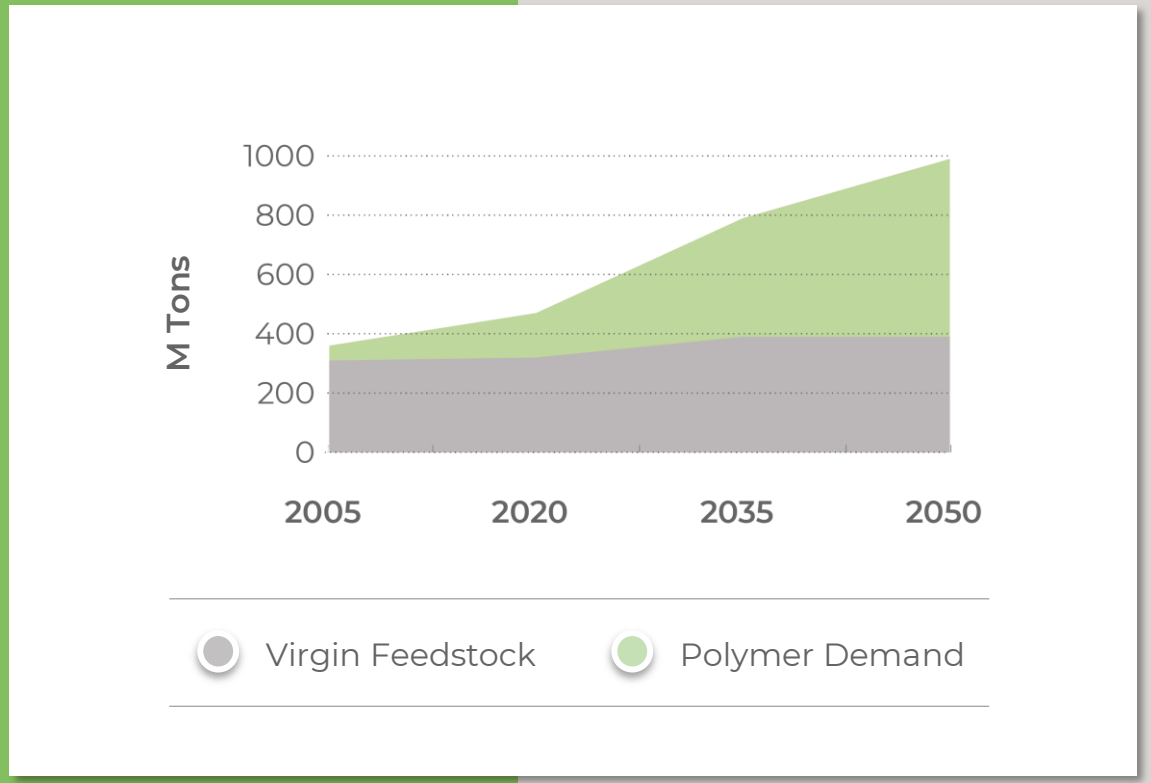
Polymer production

Projected demand for petrochemical products is expected to drastically grow. Plastic to oil recycling can play a key roll in the prevention of virgin feedstock increase

Even if all projects (lab to commercial scale) are realized by 2025, a capacity of only 4M tons will be reached. Still alot of available market.

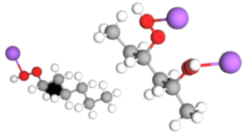
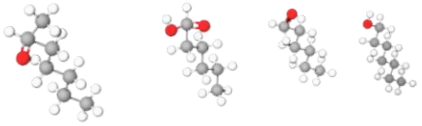
Global polymer demand. Mckinsey

Understanding the sharp rise of advanced recycling. Rabobank



Technology

Polymer oxidation and degradation by generating and controlling a SuperOxide attack

Solvents are used to treat the plastic polymer as a pre-oxidation-phase and are recycled back into the process	SuperOxide radicals are generated by a series of chemicals. The carbon-carbon bonds of the plastic polymer are attacked and oxidized	Short , liquid, Hydrocarbon and oxidated fractions are produced which are suitable for petrochemical integration.
		
Plastic polymer	**SuperOxide attack**	**Produced outputs**

	MECHANICAL RECYCLING	PYROLYSIS	PLASTIC BACK
MIXED MATERIALS	✗	✓	✓
SACLABLE	✗	✓	✓
CO2 REDUCTION	✓	✓	✓
PVC TOLERANCE	✗	✗	✓
NON THERMAL	✗	✗	✓

Plastic Back can improve energy efficiency for currently treated waste streams. And can address untreated, contaminated waste streams

Pyrolysis: 0.1% Chlorine levels

Plastic Back: No limit !

Energy efficient Conversion occurs under 100 °C.
Competition: 600-1,200 °C.

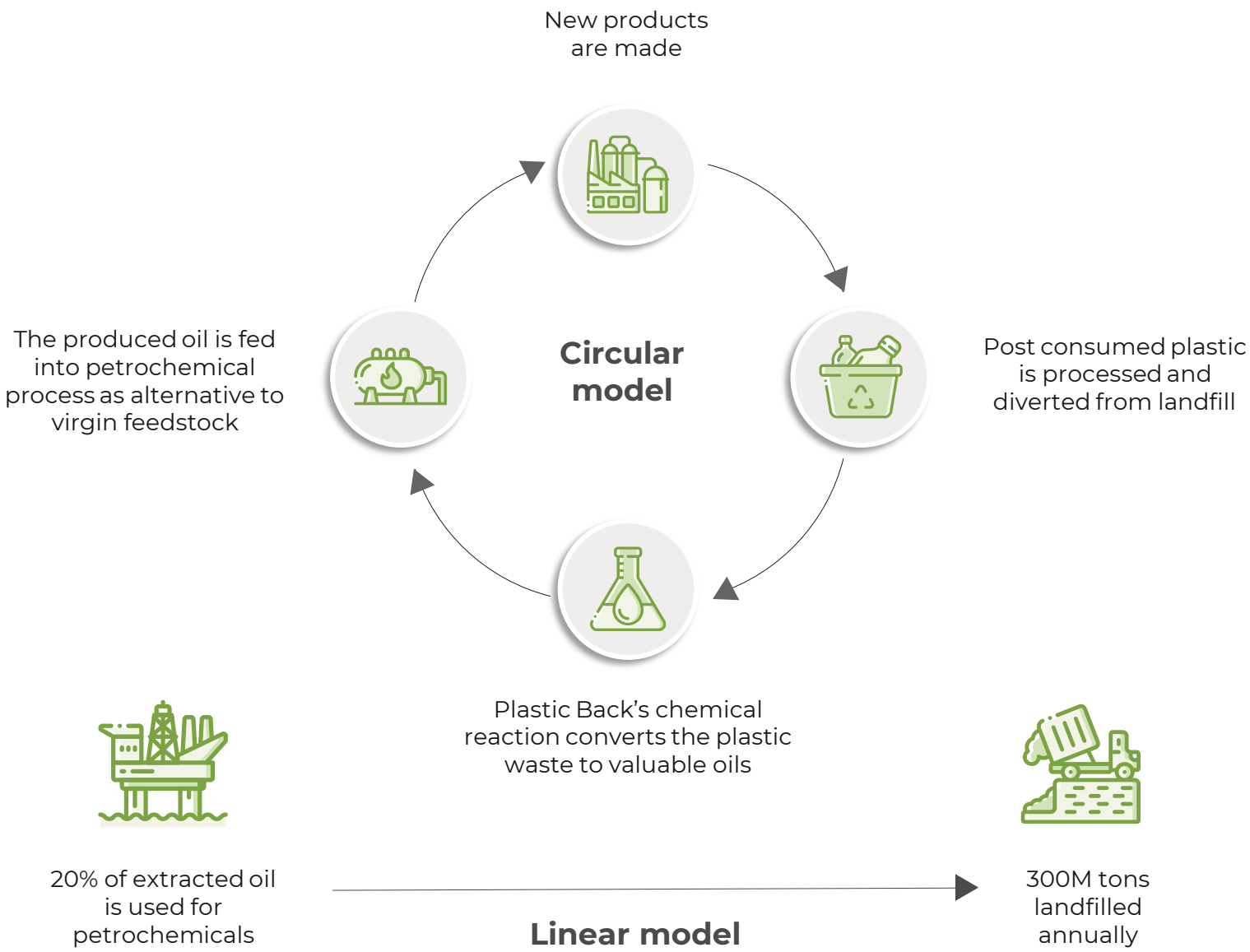
Unique process that can treat ‘difficult’ plastic types including PVC, mixed and contaminated

Due to low-temperature conversion, CO2 and other GHG emissions are substantially reduced

Linear to circular model

Disrupting a 70-year-old value chain. Plastic Back is positioned to close the loop between waste handlers and the petrochemical industry.

Plastic Back provides the advanced recycling technology to complement mechanical recycling



R&D scale up roadmap

Supported by the Ministry of Energy

Ministry of Energy
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Process optimization

HDPE, LDPE, PVC, mixed

Specified to customer's need

Laboratory scale up

2- 5 Kg / cycle

System engineering

Pilot

60 Kg / cycle

Beta site

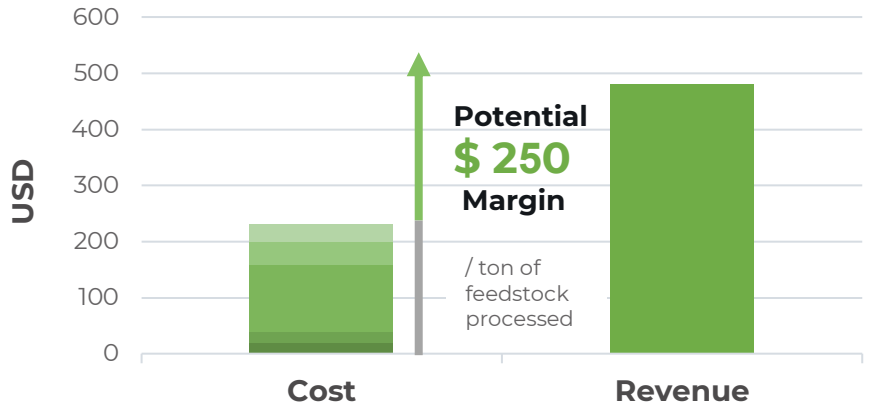
Mixed waste streams

Step 3 of the scale up process will produce demonstration plant at a Material Recycling Facility (MRF)

2021 — R&D Plan — 2023

Process economics

Economics per ton of plastic waste

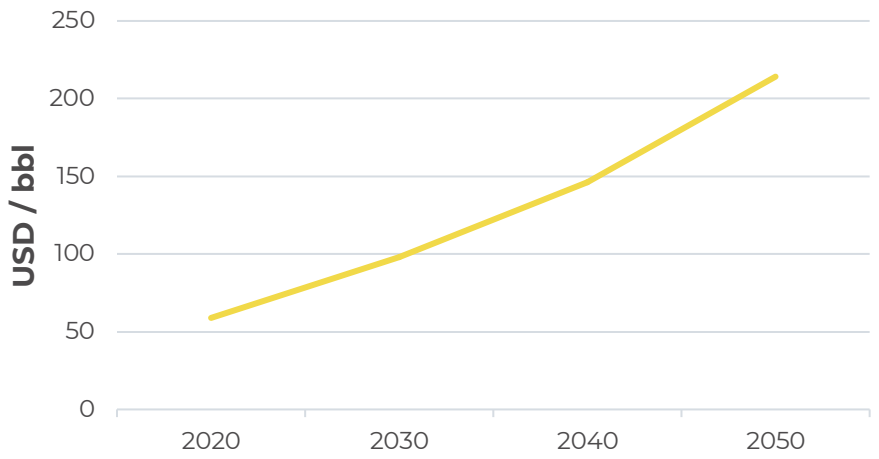


- 9% Feedstock
- 9% Residue disposal
- 52% Chemicals, electricity
- 17% Labor
- 13% Maintenance

6X **CapEx to Margin Ratio**

Assuming
USD 1,500 capital cost/ metric ton
80% yield
USD 600/ ton Naphta price

Crude oil price projections



Crude oil price forecast

Crude oil prices are projected to quadruple in the coming decades

Premium price above virgin oil due to green alternative (15-20%) is expected

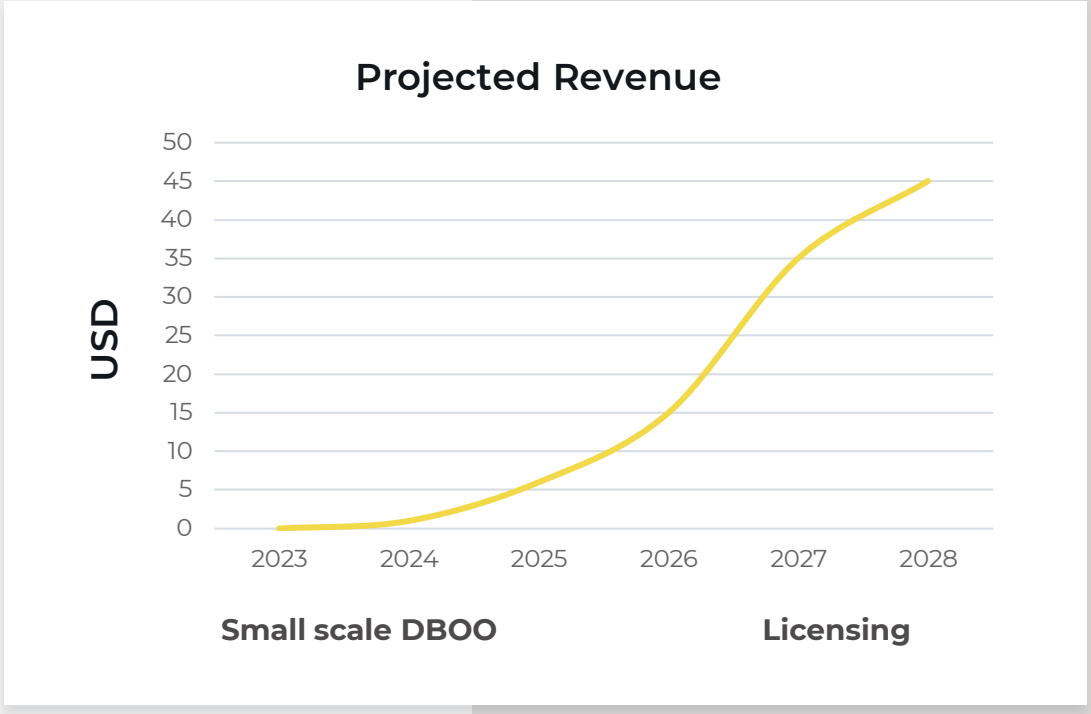
Business Model

Joint Venture model

Build Own and Operate (BOO) with:
Petrochemical company - off taking the output.
Waste handling company - providing the feedstock.

Licensing model

Plastic Back as a technology provider .
% of output revenue



Companies already integrating alternative oils

BASF	BP	Braskem	INEOS	Neste	Total
20,000 ton / year offtake	60,000 ton / year offtake	250,000 ton / year by 2025	30,000 ton / year	55,000 ton / year	80,000 ton / year

Company

Established 2020

Backed by VCs
and private angel investors

Intellectual Property:

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THE HEBREW UNIVERSITY OF JERUSALEM

IP Granted in the US, EU and CN. Covering the major polymers

High potential for additional IP generation

Substantial, unpublished, internal knowhow

Acceleration program:

PLUGANDPLAY

ALLIANCE TO END PLASTIC WASTE

eit Climate-KIC

Co-funded by the European Union

EU recognition

In line with EU SDGs

Diverting plastic waste from its final stop at the incineration plant/ landfill.

The more plastic waste processed, the more barrels of oil and gas will be left in the ground

Reducing emissions by allowing an alternative to conventional oil production and incineration process.

Team

Very strong technical team with extinctive academic and industrial experience, IP generation and development.

Tal Cohen MBA. CEO
Renewable energy start-ups
Biz Dev and project management

Alex Braun MBA. COO
R&D in biodegradable polymers and environmental projects

Uri Stoin Ph.D. CSO
Advanced oxidation process, green chemistry catalysis

Noam Steinman Ph.D. Lead Chemist
Organic and polymer chemistry

Ariel Givant Ph.D. Consultant
Organic and polymer chemistry
Alternative fuels

Prof. Yoel Sasson
Advisory Board
Advanced oxidation process

Accomplishments

2nd place.
New Energy Challenge
by Shell

1st place.
2050 Circular
Economy Competition

1st place.
Carbon Neutral
competition by HP

1st place.
Climate Launch Pad.
Clean tech

1st place
alternative
feedstock challenge

2021 Global Future
Star Award

Road map

01. 2016-2019

R&D IP development

02. 2020

Pre seed investment
first customer PoC

03. 2021

Governmental grant
VC investment

Euro 600k round

04. 2022

Scale up

05. 2023

Pilot plant

Market contacts

Funded PoC. Shell
LoI. Braskem
MoU. Milliken

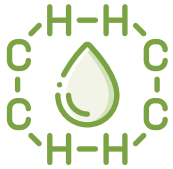
Summary

An immediate need

Plastic pollution is a pressing issue affecting countries and natural habitats worldwide.

Strong foundations

Experienced R&D and management team backed by VCs, private investors and governmental grants



Innovative technology

Unique energy efficient process able to close the loop between the waste handling and petrochemical industry

Right timing

Pressing regulation and consumer awareness are pushing towards recycling solutions.

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Thank You

www.plastic-back.com

tal@plastic-back.com