

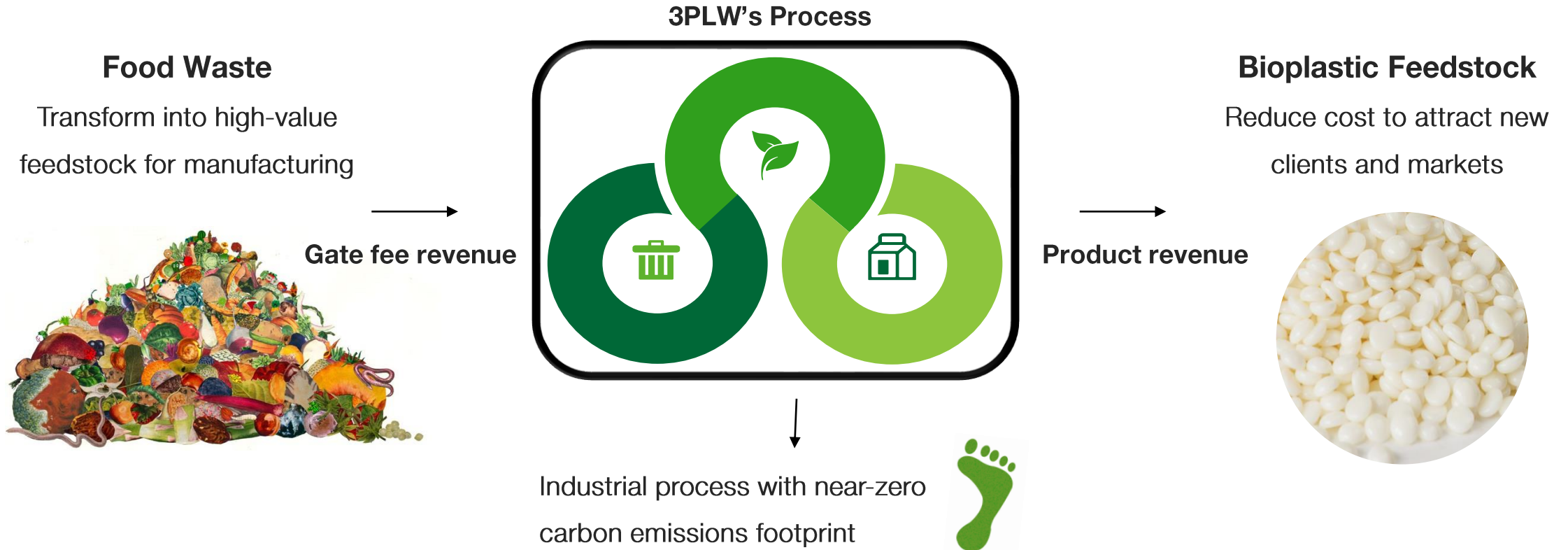


# Transform Food Waste into Bioplastics

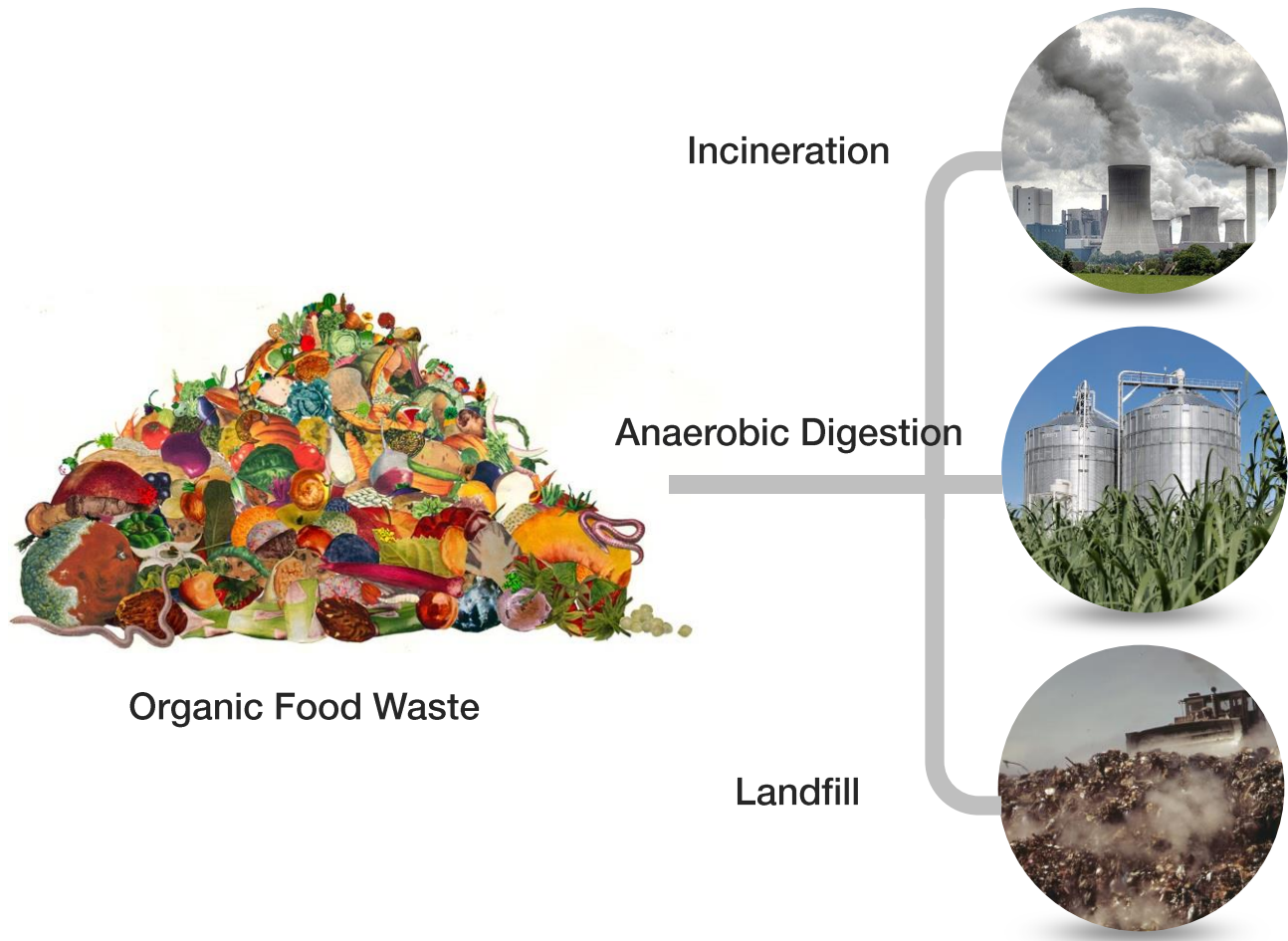




# A Triple Win for Industrial Manufacturing



# Organic Waste Solutions are not Sufficiently Monetized



- > Requires major CAPEX investments for emissions control
- > Organics have low caloric value
- > Heavily dependent on government subsidies
- > Generates major negative environmental impact
- > Banned by regulation in major EU countries

# The Case for Waste-Based Bioplastics



- Bioplastic is the rapidly growing, environmental alternative to fossil-fuel plastics. However, it is currently more expensive to purchase because it is made from food crops.
- Non-food, waste-based bioplastics are in high demand by clients such as major food companies
- Corn, sugar-cane or other food crops account for 50% or more of bioplastic production cost. Manufacturing is geographically restricted to countries with low sugar prices (e.g. Thailand)



# The Solution

Realize the full potential of  
organic waste

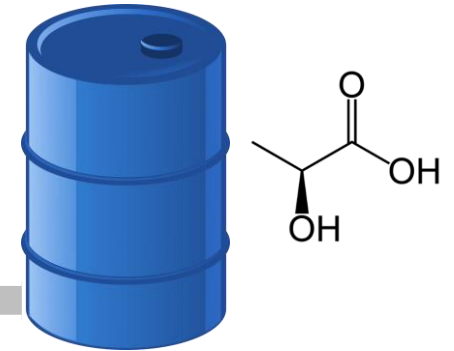


# The Technology – Bioprocess Utilizing Genetically Engineered Bacteria

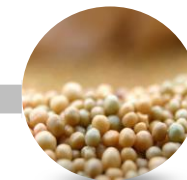
- › Proprietary recovery process and bacteria tailored to allow rapid hydrolysis and eliminate impurities. Three patent applications.
- › Demonstrated at least **25% reduction** in lactic acid production cost



Food Waste

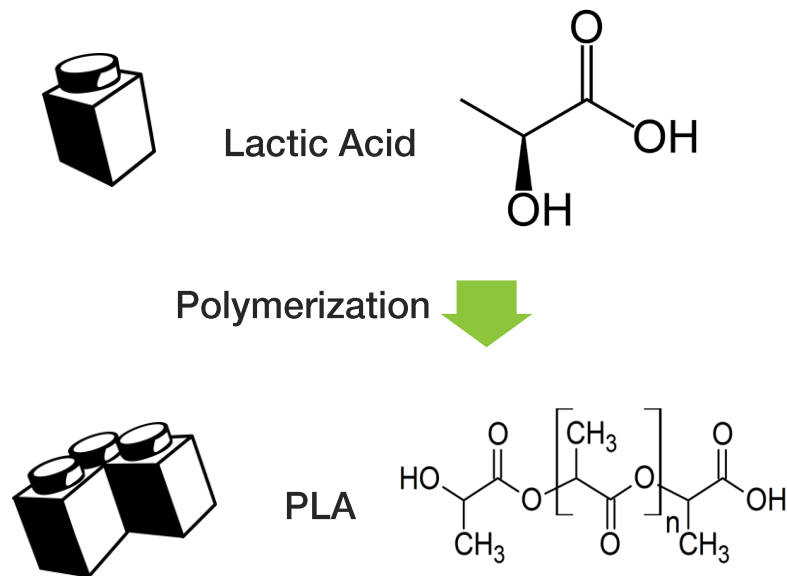


Lactic Acid  
PLA bioplastic  
building blocks



Energy product + compost

# The Product – Poly Lactic Acid (PLA)



**PLA market is expected to exceed \$2.5B by 2022**  
**Application include:**

- › Food packaging – dairy products, boxes, foam trays
- › Disposables – coffee capsules
- › Fibers – textiles, diapers, feminine hygiene products
- › 3D printing

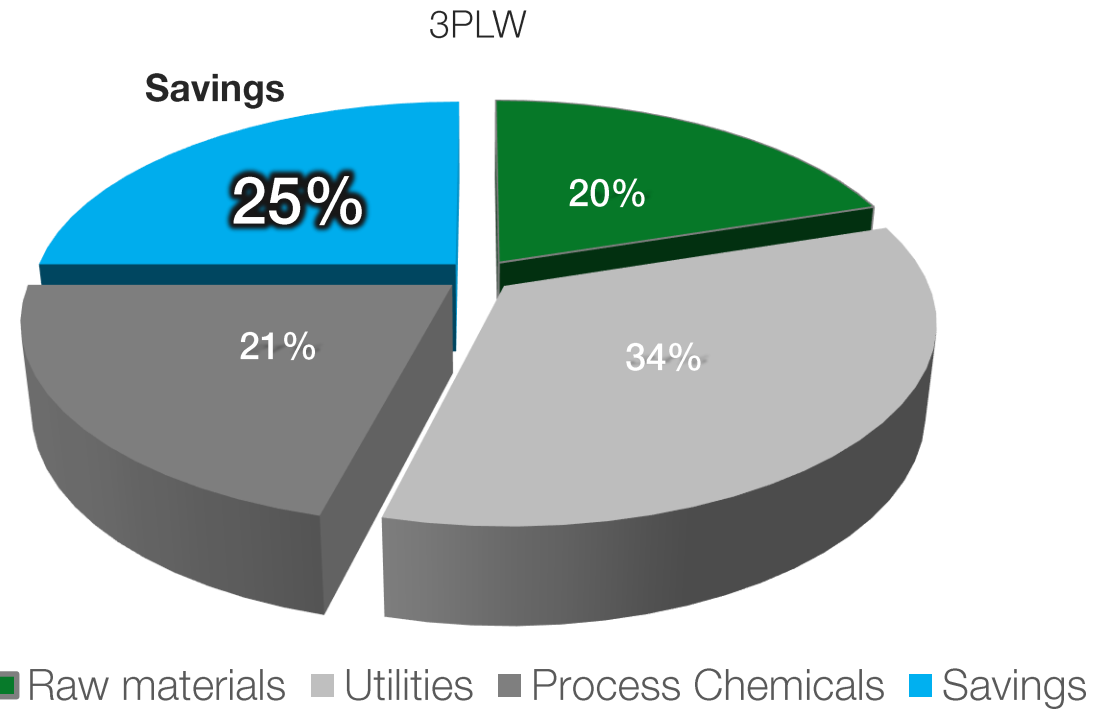
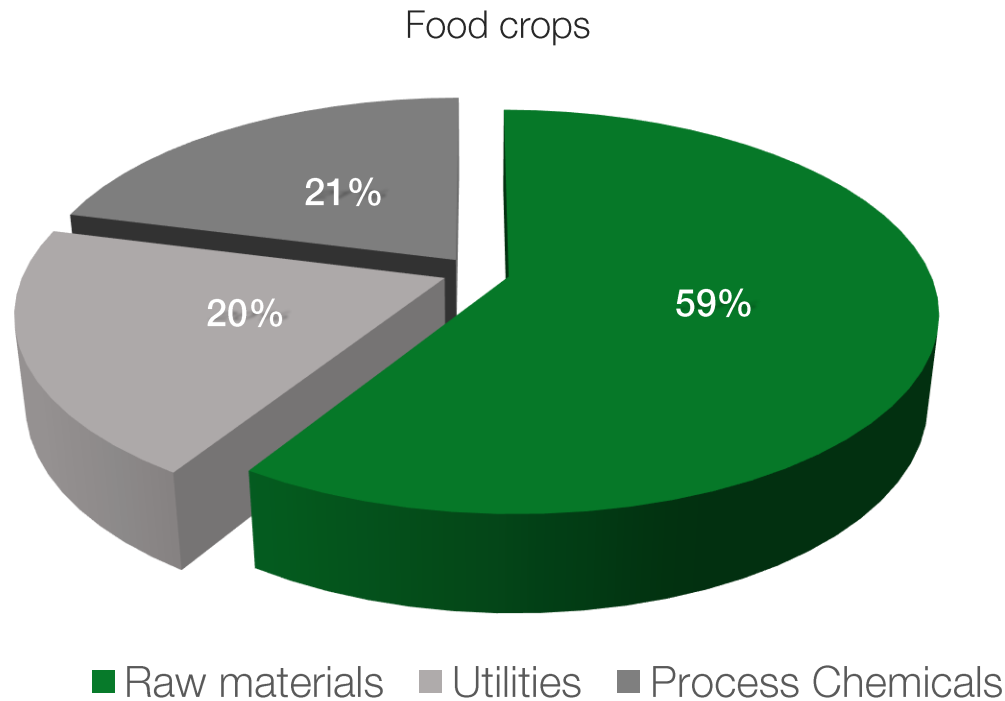






# Demonstrated Major Production Cost Savings

Comparison of lactic acid production OPEX

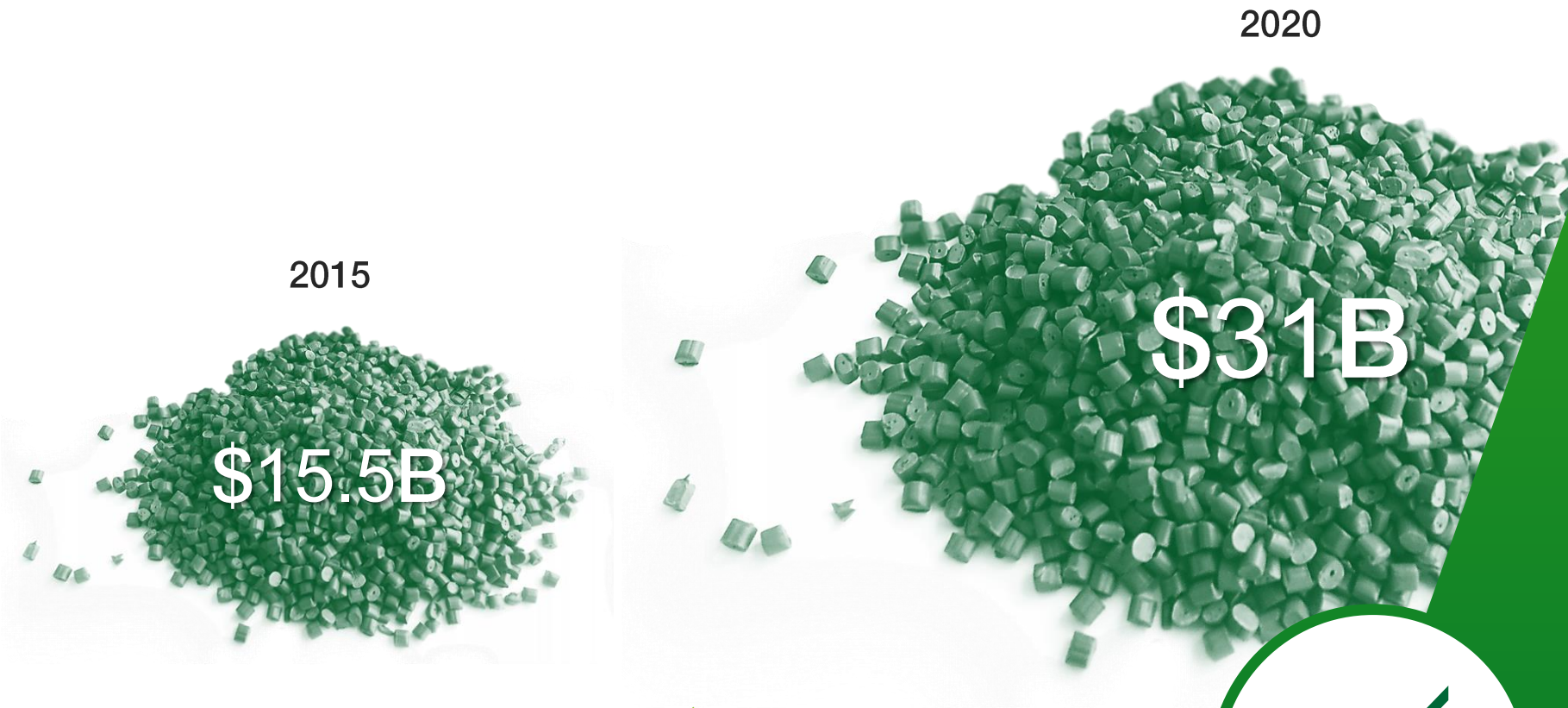





# Superior Performance for Food Waste Treatment

	3PLW	Anaerobic Digestion
Main product	Polymer grade lactic acid	Biogas (methane)
Residence time	High-throughput 48-56 hours	15-60 days
Direct carbon emissions	Near-zero	High
Sales of main product*	\$19,500,000	\$3,900,000
Estimated total revenue* All products sold + gate fee	\$29,000,000	\$9,100,000

\*Facility treating 130,000 tons/annum of source-separated food waste



Predicted Growth in \$Billion  CAGR of **15%**



## The Market

Trends in bioplastic demand promise long-term double digit growth



# PLA Market Growth

## Market Push

August 25, 2017 UPDATED 9 DAYS AGO

### Total Corbion launches PLA from sustainable sugarcane

Plastics News Europe

### With 1 billion pounds of PLA sold, NatureWorks sees rapid growth to 2 billion

By **Rhoda Miel**  
NEWS EDITOR

Published: March 6, 2014 11:48 am ET

ORLANDO, FLA. — When NatureWorks LLC began selling its Ingeo polylactic acid, the resin was an environmentally-friendly niche product with a

## Market Pull

### Danone first to switch to PLA for yogurt cup in Germany

Posted by Anne Marie Mohan May 24, 2011 | Post first comment  
Filed in: Containers, rigid, Food

### Nestlé, Danone, Unilever, form plant-based bioplastics alliance

BFA consists of eight founding companies: Coke, Danone, Ford Motor Co., H.J. Heinz Co., Nestlé, Nike Inc., Procter & Gamble Co., Unilever and World Wildlife Fund (WWF).

#ENVIRONMENT

JANUARY 14, 2017 / 2:39 PM / 7 MONTHS AGO

### Unilever commits to 100 percent recyclable plastic



# The Team

# The Team



**Daniel Porat**

Chairman of the Board



**Tal Shapira, M.Sc.**

President and CTO



**Amir Oranim, MBA**

CEO



**Elad Dinar, Ph.D.**

Chemical Engineer



**Moshe Avron MBA**

Process Designer



**Arnon Tal, M.Sc.**

Mechanical Engineer



**Rotem Tidhar, Ph.D.**

Biochemistry



**Ofir Avidan, Ph.D.**

Molecular Biology



**Yifat Iddan, M.Sc.**

Lab technician



# Partnerships and Collaborations

## Hutchison Kinrot, Israel

- › Technology incubator owned by Hutchison Water, a division within the international conglomerate CK Hutchison Holdings Limited
- › Hutchison Water is experienced in the construction, financing, and operation of major infrastructure facilities
- › Invested \$600K in 3PLW's seed round via Israel Innovation Authority (IIA) incubator program

## BBEPP, Belgium

- › 3PLW's subcontractor for scaleup and full-scale facility techno-economic model
- › Industrial scaleup project, demonstration capabilities up to 32M<sup>3</sup>.
- › Expertise in Down-Stream Processing (DSP)



## IMI TAMI, Israel

- › IMI TAMI is the Central R&D institute of Israel Chemicals (ICL) in Haifa, Israel
- › A well-known and experienced subcontractor. Performs process development from lab to commercialization
- › All relevant analytical and chemical industry equipment to perform the PLA polymerization reaction process development and scale up.



# 3PLW's vision: A True Circular Economy

