

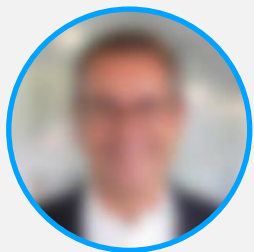


# Session 5B: Sustainable Planning of Industrial Parks



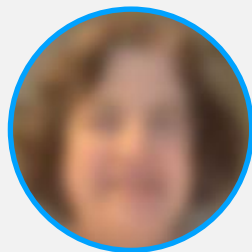
**Mohamed Mazen**

GIZ Egypt, Session Moderator



**Hannes Utikal**

Provdadis University of Applied Sciences Frankfurt



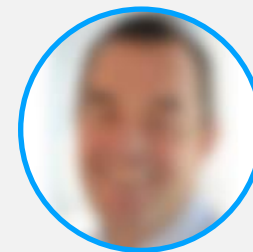
**Marian Chertow**

Yale University Center of Industrial Ecology



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Tomorrow Labs GmbH



Implemented by:



Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH



# Industrial Symbiosis Project in Sadat and Alexandria



Implemented by

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Zusammenarbeit (GIZ) GmbH



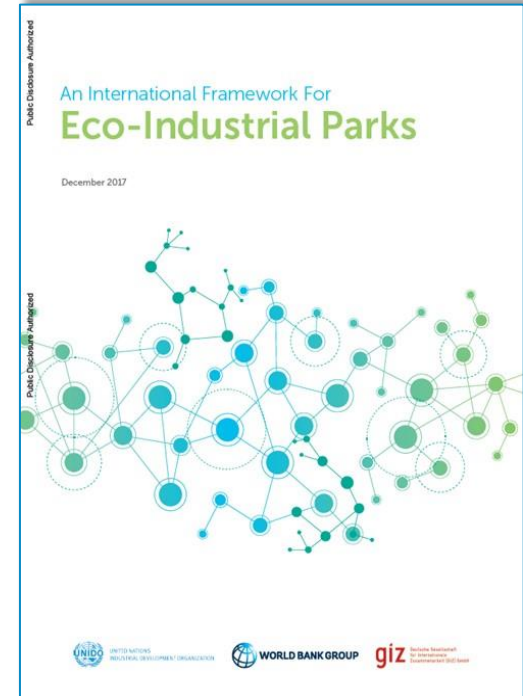
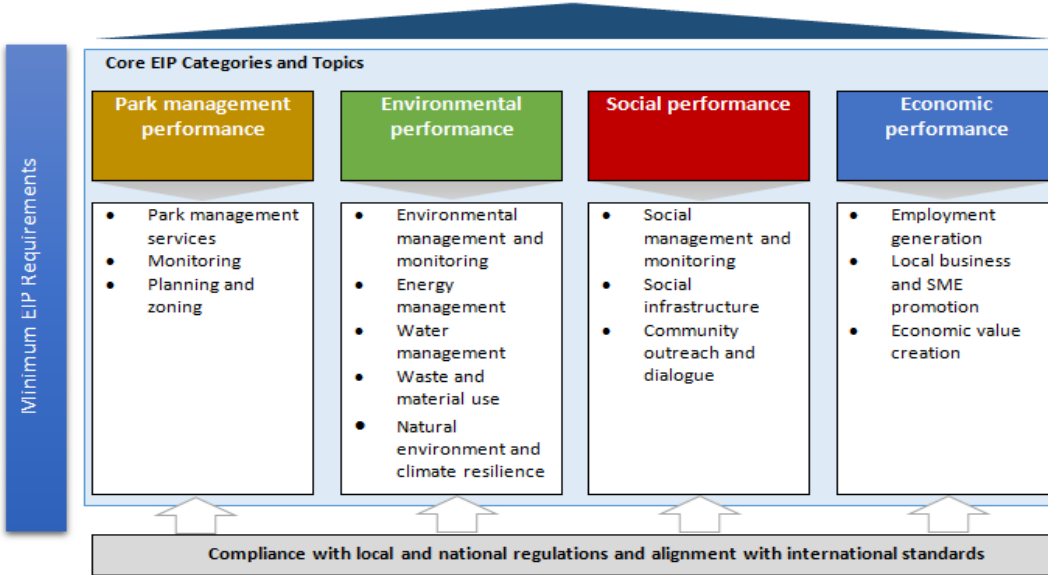
# Agenda

1. Industrial Symbiosis and Sustainable Industrial Parks
2. Industrial Waste Exchange Experience in Egypt
3. Sadat Industrial Zone Waste Exchange Case Study
4. Lessons Learnt and Reflections

# Industrial Symbiosis (IS) and Sustainable Industrial Parks (SIA)



Process of continuous improvement:  
Going beyond the minimum EIP requirements



# IS and SIA – Highly Need in Egypt SIA

- Based on the Chemonics Egypt CE database, the performance of industrial zones in Egypt varies widely, ranging between 20% and 60%
- Most of the areas assessed have objectives to pass 70%
- Performance is usually very low in terms of industrial waste
- Overall performance from highest to lowest
  - ✓ Economic factors
  - ✓ Industrial park management
  - ✓ Social factors
  - ✓ Environmental factors

**Waste management scores relatively low in Egypt industrial parks from EIP perspective**

Industrial Symbiosis is critical for Egypt SIA

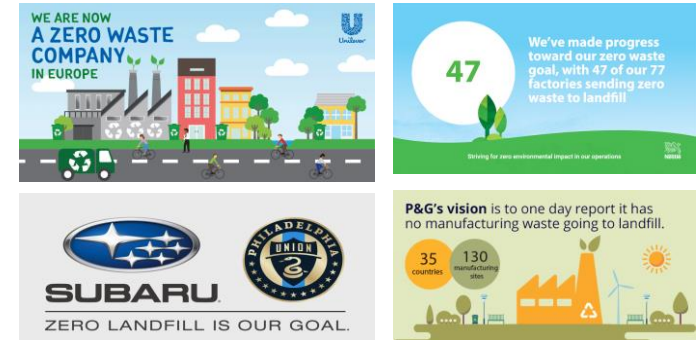
PARK MANAGEMENT	
75%	(Basic) park management services
25%	Monitoring and risk management
100%	Planning and zoning
ENVIRONMENT	
33%	Management and monitoring
22%	Energy
17%	Water
0%	Waste and material use
40%	Climate change and the natural environment
SOCIAL	
39%	Social management systems
57%	Social infrastructure
0%	Local community outreach
ECONOMIC	
100%	Employment generation
44%	Local business & SME promotion
78%	Economic value creation

# What is Industrial Symbiosis?

“Industrial symbiosis is a company or sector’s use of **underutilized resources** (including waste, by-products, leftovers, energy, water, logistics, operating capacity, expertise, equipment and materials) as well as others with the aim of keeping the resource longer in the productive use cycle”

Waste exchange is a subset of industrial symbiosis and focus on material exchange

Industrial symbiosis can improve EIP performance in Egypt and support tenants to meet growing environmental commitments and compliance



Egypt Law No. 202 of 2020  
Waste Management Law

# Industrial Waste Exchange as an Investment Opportunities

- Exchange of various material and industrial bi-products (waste) between a seller (waste generator) and a buyer (recycler or industrial facility seeking feedstock)
- It is a business transactions between the two parties, and the motivation is often financial and at times also environmental
- Can trigger new investments to utilize particular type of feedstock
- Benefits from industrial waste being generated regularly, with fixed specifications, and in large quantities over a small geographical area decreasing cost and risk of collection



# Industrial Waste Exchange Opportunities and Experience



Egypt



# Industrial Waste Exchange Opportunities and Experience

- The first waste survey and mapping was conducted in 2015 (IWEX project by AFDB - ENCPC)



**Exchange platforms**



**Facilitated Workshops**



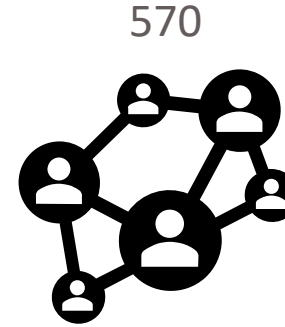
**One-on-Ones**

# Industrial Waste Exchange (IWEX) – IWEX Platform

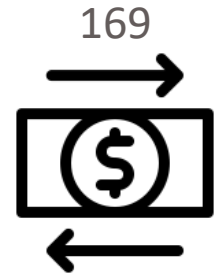


Building Waste (0) مخلفات البناء (0)	Batteries (5) بطاريات (5)	Appliances (stoves, fridges, etc) (6) الأجهزة (مواد، ثلاجات، الخ) (6)
Compostable and food Wastes (0) مخلفات السماد و الغذاء (0)	Chemicals (12) المواد الكيميائية (12)	Cartridges (0) خرطوش (0)
Fluorescent Tubes/CFLs (3) أنابيب الفلوريسنت/الصباح (3)	Dyes / Inks (1) الأصباغ/الحبر (1)	Computers/Electronics (E-waste) (4) أجهزة الكمبيوتر والإلكترونيات (مخلفات) (4)
Industrial/Other Equipment (3) معدات صناعية/أخرى (3)	Glass (0) الزجاج (0)	Furniture (2) أثاث (2)
Motor Oils/Greases (3) زيوت المحركات/شحومات (3)	Metals (4) المعادن (4)	Metal Sludges (1) الحمأة المعدنية (1)
Paints/Coatings (0) الدهانات/الطلاء (0)	Others (8) الأخرى (8)	Oils and Waxes/Food and Other (0) زيوت وشموع/لصقات و غذاء و أخرى (0)
Pharmaceutical Wastes (0) المخلفات الصيدلانية (0)	Pesticides/Herbicides/Agricultural Chemicals (0) المبيدات الحشرية/المبيدات/المغذيات الزراعية (0)	Paper/Cardboard (5) ورق/كرتون (5)
Textiles (15) المنسوجات (15)	Solvents (1) المذيبات (1)	Plastics/Composite packaging (e.g. Tetrapak) (8) اللدائن/المركبة وتغليف مركب (مثل تتراباك) (8)
Wood (8) خشب (8)	Tyres/Rubber (3) إطارات / مطاط (3)	Textiles/Leather (0) المنسوجات / الجلود (0)

**Stats in  
2 years of  
operations**



Negotiated transactions



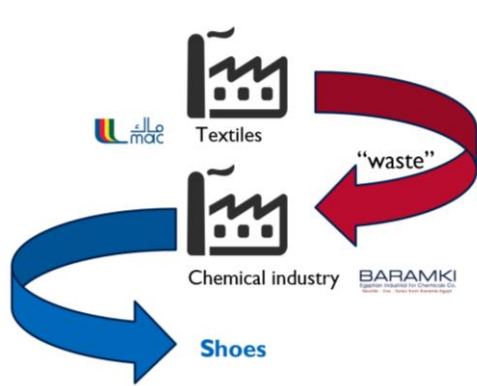
Commercial transactions

370

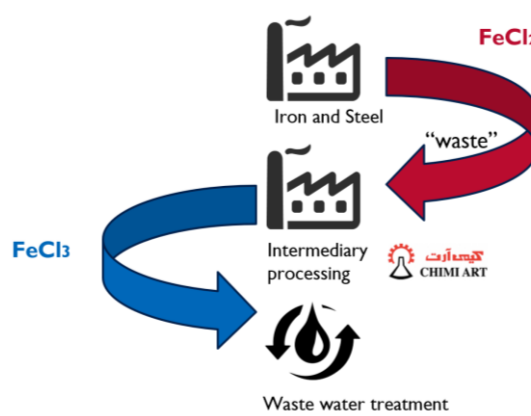


Active users

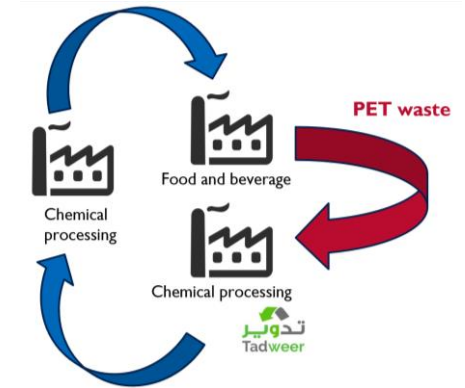
# Industrial Waste Exchange (IWEX) – IWEX Platform



Feedstock to products



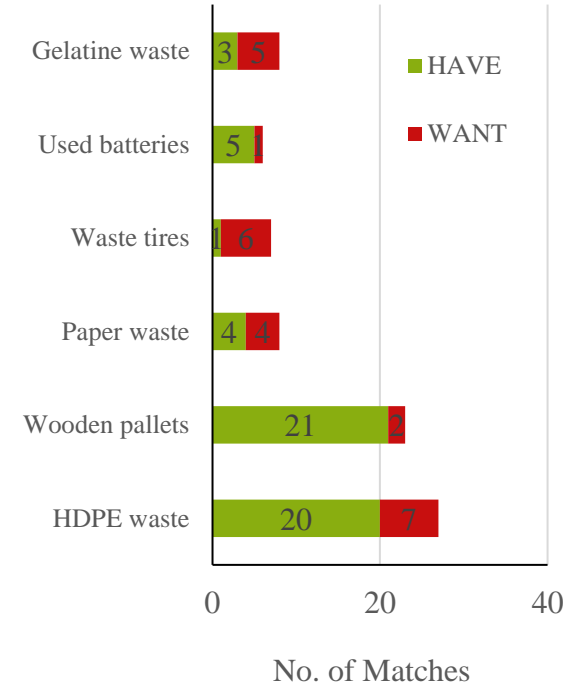
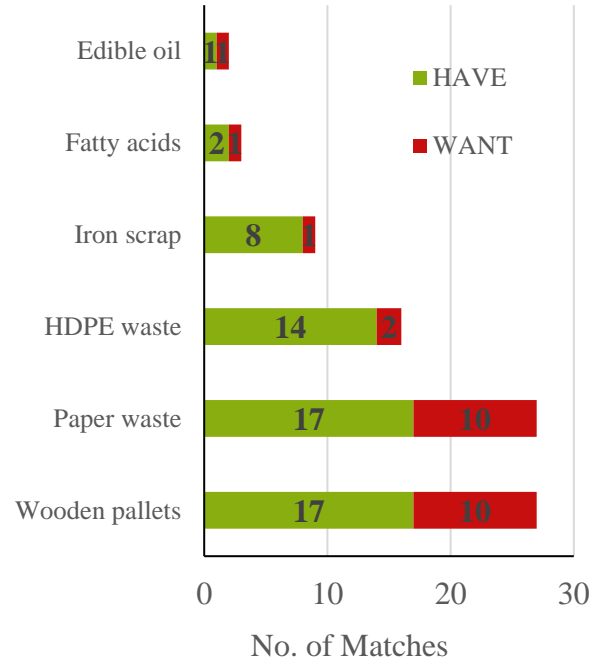
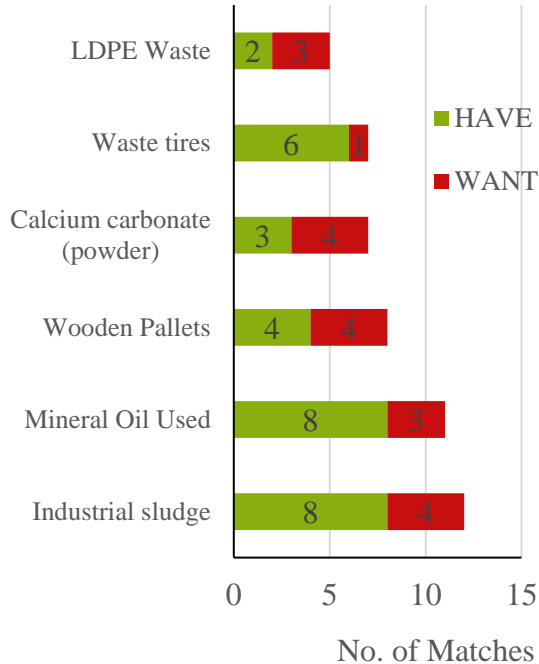
Across industries and initiated new investments



Circular models

# Industrial Waste Exchange Workshops

Typically 5-10 matches per attendees



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# Promoting Industrial Symbiosis and Business Matchmaking in Sadat and Alexandria

**Building on previous experiences and in support of wider concept of industrial symbiosis as well as business profitability and sustainability**

**GIZ is implementing a project entitled “Promoting Industrial Symbiosis and Business Matchmaking in Sadat and Alexandria”.**

The project aims to **encourage the adoption of industrial symbiosis** by promoting matchmaking and Industrial symbiosis in Sadat and Alexandria with a **specific focus on the Food Processing sector and other feeding** industries like Engineering, Packaging, Plastic, and Chemical industries

This is within the wider perspective of Private Sector Innovation (PSI) project linking symbiosis with value chain integration and sustainability

# Sadat City Industrial Zone Case Study

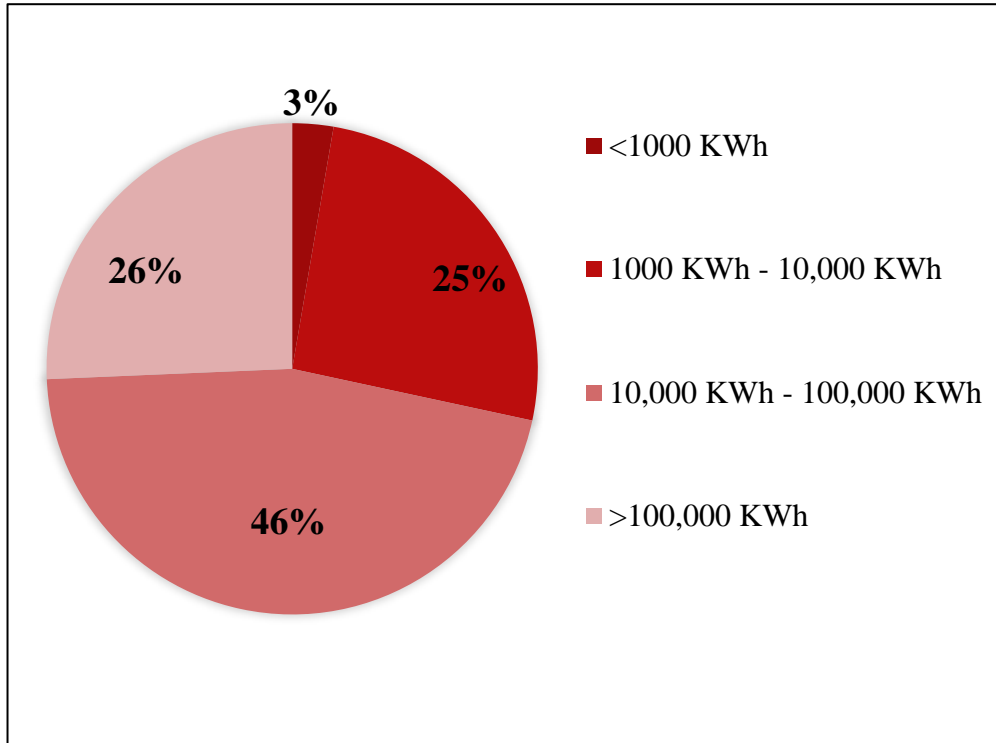
Targeted Sectors	Count	Percentage %
Food & Beverages	33	32%
Plastic	20	19%
Engineering	17	16%
Chemicals	17	16%
Paper	11	11%
Electric	4	4%
Glass	2	2%
<b>Total</b>	<b>104</b>	<b>100%</b>

**Samples should be statistically representative and data collection should be templated**

The project integrates best practices of waste exchange in Egypt

1. Mapping preceding IS activities maximizes impact by filling gaps and needs in workshops
2. Facilitating and pre-designing IS workshops maximizes impact
3. Capacity building and shadowing to stakeholders to replicate implementation

# Diversity of entities by size



**The data used for this analysis was collected from 101 factories demonstrating willingness of industrial facilities to provide information**

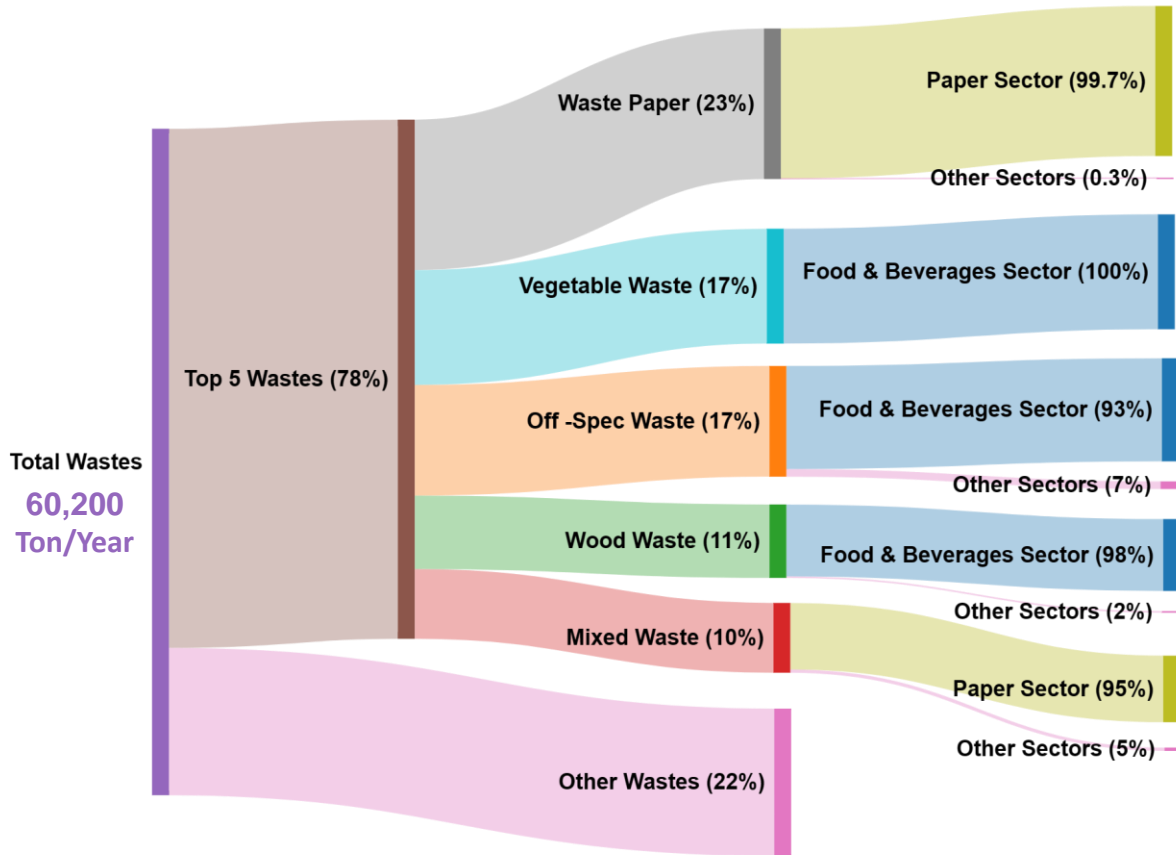
# Sectorial Insights

**Food sector is usually a major contributor to waste in terms of tons**

<b>Sector</b>	<b>Total waste generated (Ton / year)</b>	<b>Percentage by ton</b>	<b>Percentage by No of factories</b>
<b>Food &amp; Beverages</b>	30,030	50%	32%
<b>Paper</b>	25,103	42%	11%
<b>Chemicals</b>	3,957	7%	16%
<b>Engineering</b>	406	1%	16%
<b>Plastic</b>	380	1%	19%
<b>Glass</b>	180	0.3%	2%
<b>Electric</b>	161	0.3%	4%
<b>Total</b>	<b>60,217</b>	<b>100%</b>	<b>100%</b>



# Material Flow Insights

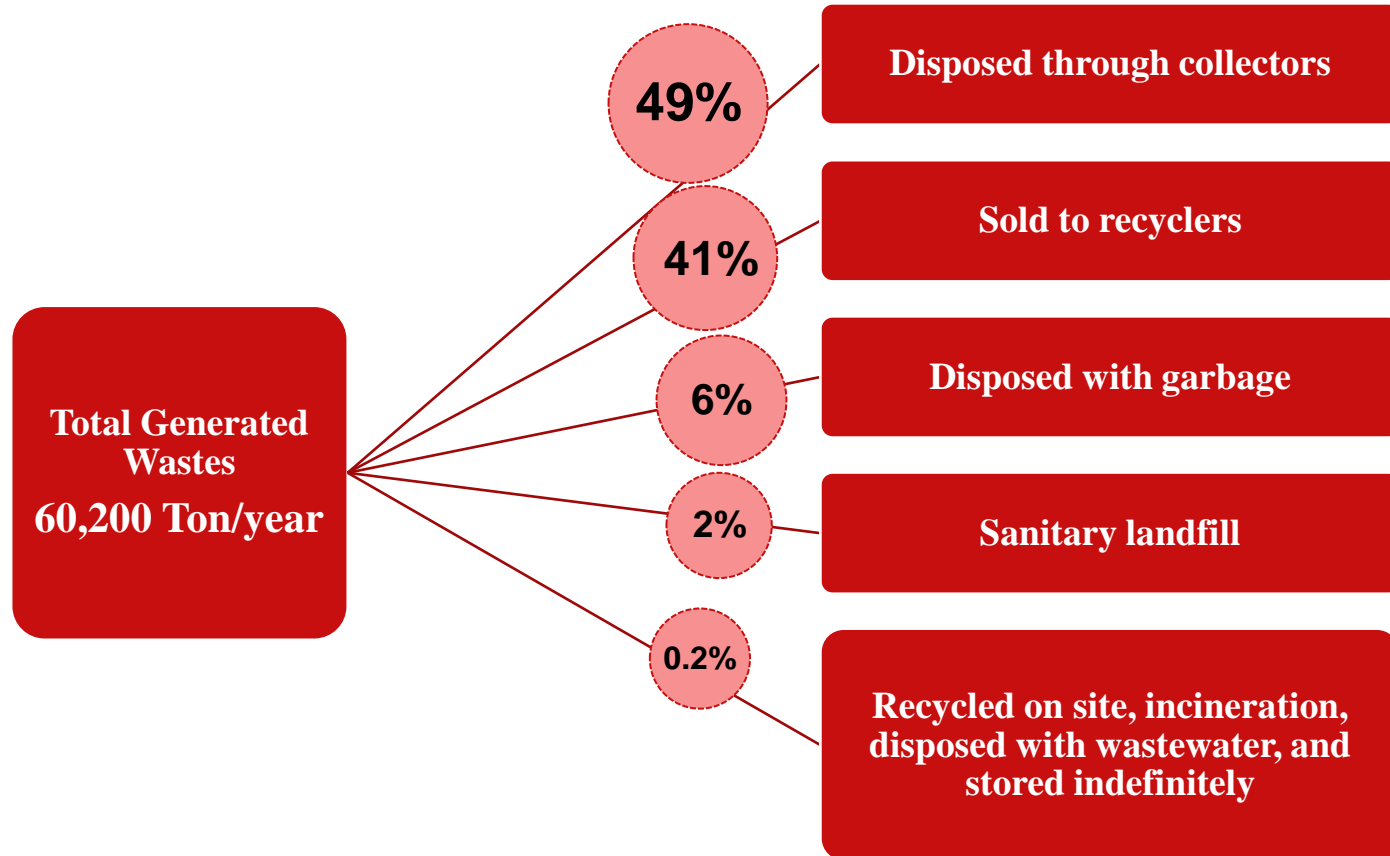


**Paper waste** producers return it to their local suppliers, and the weight of the waste is deducted from the purchasing value of the raw materials, as part of a well-known network in Sadat City.

Most of the **Off-Spec Waste** is fatty acids from an edible oil refining process, and sold to a chemical company

One factory is responsible for most of the **Mixed Waste** generation, from the sorting of recycled cardboard, and it is generally sold to traders.

# Waste Handling Insights



# Wastes Materials Disposed With Garbage

Limited segregation at site  
leads to material loss

NO.	Waste material	Quantity Generated (ton/year)	% of the total amount disposed of as garbage
1	LDPE	1300	36%
2	PS	766	21%
3	Vegetable waste	685	19%
4	Cardboard	640	17%
5	Rockwool	150	4%
	<b>Total</b>	<b>3,541</b>	<b>6% of Total Generated Waste</b>

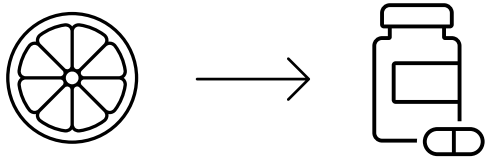
# Linkages and Waste Exchange Opportunities

Diverse opportunities exist

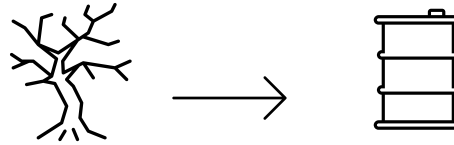
No.	Industrial Symbiosis synergies
1	Recycled cardboard and paper from paper/cardboard waste
2	Grocery bags and egg cartoons from paper/cardboard waste
3	Biodegradable tableware from paper/cardboard waste to end consumers
4	Hydroponic medium from rock wool waste
5	Bio-char from vegetable waste
6	Tableware from fruit peels, expired grains, and vegetable residues.
7	Pectin from orange peels.

No.	Industrial Symbiosis synergies
8	Vermi-compost from mixed vegetable waste
9	Biomass pellets from olive mill waste for heating
10	Protein supplements from vegetable waste to animal feed manufacturers
11	Alternative fuel from tree trimming
12	Recycled LDPE/ paving tiles and construction material from waste LDPE
13	Plaswood furniture (wood substitute ) and decorations from waste LDPE
14	Adhesives from waste polystyrene

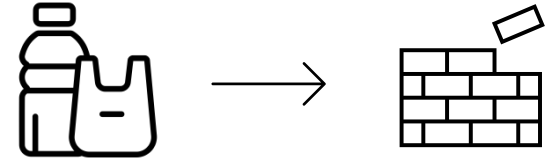
# Possibility for Opening Up New Markets



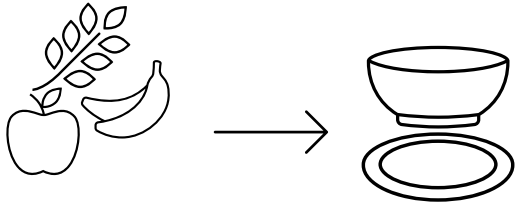
Extraction of pectin from orange peels.



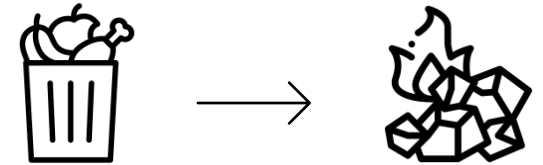
Production of alternative fuel from tree-trimmings, for **export**.



Recycling of plastics into construction materials.

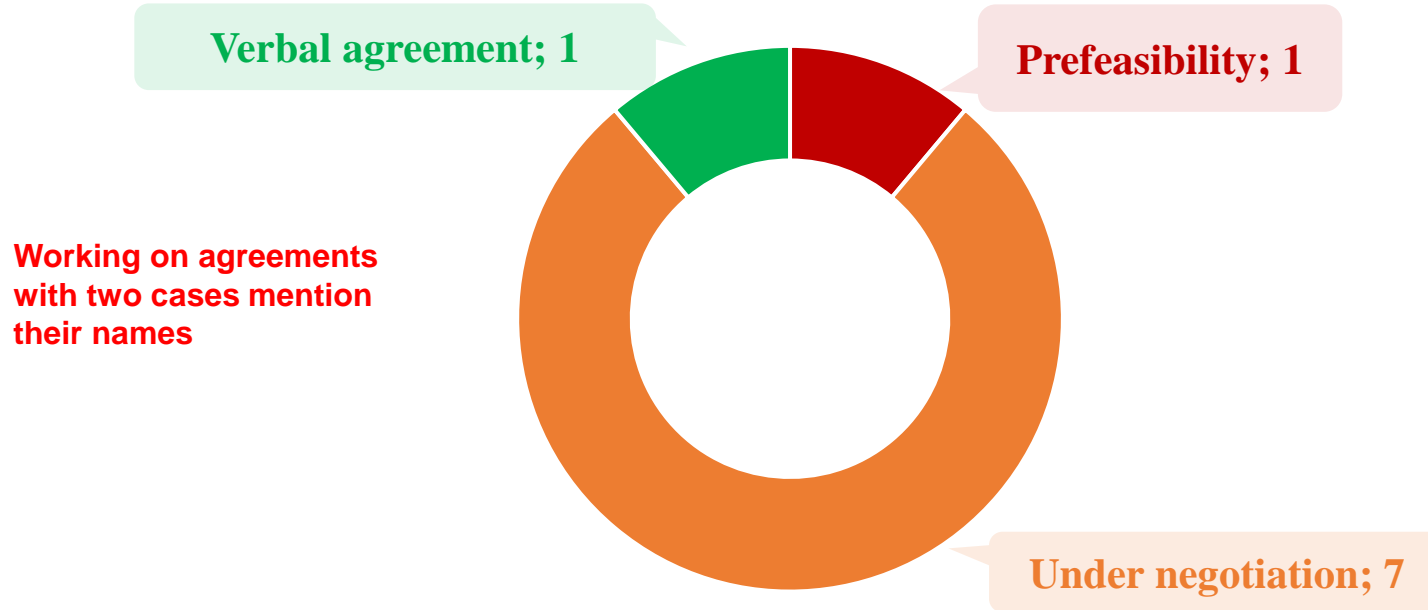


Tableware from fruit peels, expired grains, and vegetable residues.



Production of biochar from vegetable wastes.

# Pre-Workshop Matches Can Arise



Most generated waste can be linked to existing industrial facilities or recyclers

# Lessons Learnt and Reflections

**Waste mapping is critical to increase success rate**

**Material without exchange precedent are difficult in pricing**

**Technical assistance is needed to support negotiations**

**Never get involved in financial aspects**

**New investment opportunities can be triggered (Pectin)**

**None digital activities address a specific segment needs**

**Industrial facilities demonstrate high demand on IS services**



# Role of Park Operators

**Park operators are well positioned to facilitate IS**

**This can take place on one-on-one basis or through workshops**

**Waste collection with linkages to recycling against fees**

**Various revenue generation aspects can finance IS**

- ✓ **For platforms sponsorship and membership fees**
- ✓ **For technical assistance direct payments can be provided**
- ✓ **Workshop participation fees is a possibility**





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