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# Water and Environment Support

in the ENI Southern Neighbourhood region



## N-E-JO-1

Contribution to the development of a joint public-private  
roadmap to transition to reduce the use of single-use  
plastics (SUPs) in Jordan

### Baseline Report on selected SUPs in Jordan (Task 2 - D.2)

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## **WATER AND ENVIRONMENT SUPPORT IN THE ENI SOUTHERN NEIGHBOURHOOD REGION**

The "Water and Environment Support (WES) in the ENI Neighborhood South Region" project is a regional technical support project funded by the European Neighborhood Instrument (ENI South). WES aims to protect the natural resources in the Mediterranean context and to improve the management of scarce water resources in the region. WES mainly aims to solve the problems linked to the pollution prevention and the rational use of water.

WES builds on previous similar regional projects funded by the European Union (Horizon 2020 CB/MEP, SWIM SM, SWIM-H2020 SM) and strives to create a supportive environment and increase capacity all stakeholders in the partner countries (PCs).

The WES Project Countries are Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Libya, Palestine, Syria and Tunisia. However, in order to ensure the coherence and effectiveness of EU funding or to promote regional cooperation, the eligibility of specific actions can be extended to neighboring countries in the Southern Neighborhood region.

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## ABBREVIATIONS

<i>EPR</i>	Extended Producer Responsibility
<i>DOS</i>	Department of Statistics
<i>GAM</i>	Greater Amman Municipality
<i>JIEC</i>	Jordan Industrial Estates Company
<i>HDPE</i>	High Density Polyethylene
<i>LDPE</i>	Low Density Polyethylene
<i>MoENV</i>	Ministry of Environment
<i>MoLA</i>	Ministry of Local Administration
<i>NGO</i>	Non-Governmental Organization
<i>PE</i>	Polyethylene
<i>PP</i>	Polypropylene
<i>PET</i>	Polyethylene terephthalate
<i>RSS</i>	Royal Scientific Society
<i>SUPs</i>	Single Use Plastics
<i>SWM</i>	Solid Waste Management
<i>WES</i>	Water and Environment Support

# 1 INTRODUCTION

The "Water and Environment Support (WES) in the ENI Neighborhood South Region" project is a regional technical support project funded by the European Neighbourhood Instrument (ENI South). WES aims to protect the natural resources in the Mediterranean context and to improve the management of scarce water resources in the region. WES mainly aims to solve the problems linked to environmental pollution and the unsustainable use of water.

The WES Partner Countries are Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Libya, Palestine, Syria and Tunisia. However, in order to ensure the coherence and effectiveness of EU funding or to promote regional cooperation, the eligibility of specific actions can be extended to neighbouring countries in the Southern Neighborhood region.

## 1.1 MAIN OBJECTIVES AND EXPECTED RESULTS

The objective of this activity is to provide technical assistance to the Ministry of Environment of Jordan to address Single-Use Plastics (SUPs). Worldwide, the generation rate of Solid Waste (SW) is rising, due to a linear economic system. This poses a problem to decision-makers on the national, regional, and local level. SUPs by design has a very short life span and are immediately discarded into the waste stream after one use. Accordingly, the raise in the use of SUPs causes a raise in Solid Waste Management (SWM) burden. Mismanaged SW has negative impacts on the human health as well as on the environment.

In the meantime, the SWM sector of the Hashemite Kingdom of Jordan finds itself in a phase of transformation, ignited by the endorsement of the National Municipal Solid Waste Management Strategy (NMSWMS) in 2015 and the surge in external funds by international donors and financial institutions. Currently, the waste management sector is being reconsidered and new plans are being prepared on the local municipal level, the regional level, and the national level. In parallel to waste management projects, priority is given to waste minimization efforts particularly for products that have a short life span before being discarded as waste such as SUPs.

The specific objectives of this activity are to:

- Provide information on production and good practices on replacing and/or recycling SUPs.
- Approach policy measures and financial options for curbing SUPs.
- Pave the way for a gradual phase-out of SUPs and provide recommendations for a relevant strategy.

## 1.2 SCOPE OF WORK AND DELIVERABLES OF THE PROJECT

- The project aims to develop public-private roadmap that will facilitate the transition towards curbing 4 SUPs in Jordan, the 4 selected SUPs have been agreed upon with the Ministry of Environment, and later defining roadmaps to curb these SUPs. Throughout the project, the consultant is expected to provide the following deliverables. An inception report which established the framework of the activity and included a selection of the 4 targeted SUPs was previously prepared. Whereas this report covers the baseline information on the selected SUPs

in Jordan including review of the plastic waste stream connected with SUPs. As part of this consultancy, it is also planned to develop the following remaining deliverables.

- Report on alternative options to the selected SUPs transition away from manufacturing SUPs.
- Public-private roadmap to transition towards curbing the production and use of selected SUPs in Jordan (Draft version).
- Presentations and minutes of the meeting(s).
- Final version of the public-private roadmap to transition towards curbing the production and use of SUPs in Jordan.
- Synthesis Report (progress, outputs and outcomes, lessons learned).

### 1.3 METHDOLOGY

The methodology used for preparation for this baseline report, included three main activities:

- 1) Regulatory review of relevant Jordanian and European regulations as summarized in Section 3 below.
- 2) Review of relevant reports and papers as referenced in the foot notes of this report
- 3) Interviews with Stakeholders and survey of industries involved in SUPs manufacturing as summarized in the following table.

**Table 1 List of interviewd stakeholders and factories**

Entity	Persons interviewed	Main Outcomes
JCI	Maen Ayasrah (Head of Energy& Env Unit) Ala Abu Khazneh (Plastic industrial sector coordinator)	There are no records of SUPs generation or consumption in Jordan. The number of factories involved in SUPs was provided
MeENV	Abdallah Zioud, Hajjar Majar, Maha Mayta, Hiba Zreikat, Hiba Zabalawi	There are regulation about plastic bags in Jordan but may require enhancement, there is a new project about EPR which could be helpful to recycle SUPs
DOS	Inas Arabyat (responsible for environmental surveys of the industrial sector)	She provided the data available about import and export of all plastics in Jordan but DOS do not have the plastics separated into SUPs and reusable products
JIEC	Ala Zurikat	They don't have records of SUPs but aware of this issue. Best place to get such data is JCI
Factories involved in SUPs	All Factories that were provided by JCI were contacted (17 plastic bags factories, 9 plastic bottles factories, and 11 food containers factories)	The factories avoided providing any concrete or documented data. Possibly worried that this may end up harming them in some manner



## 2 SELECTION OF SUPS

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According to the EU definition a ‘single-use plastic product’ means a product that is made wholly or partly from plastic and that is not conceived, designed or placed on the market to accomplish, within its life span, multiple trips or rotations by being returned to a producer for refill or re-used for the same purpose for which it was conceived<sup>1</sup>.

SUPs use worldwide including Jordan has tremendously increased over the last few decades. It has now become integrated into our daily activities much more than ever before. The overall list of SUPs is quite long and cannot be all tackled in one go. Therefore, in this project it was determined to proceed with 4 SUPs which were selected based on EU guidance documents and consultations with the Jordanian Ministry of Environment. The selection criteria of the SUPs as discussed with the MoENV include the following main aspects:

- To consider the SUP priority list presented in the Barcelona guide documents
- To consider selecting each of the SUPs to be from a different SUP group
- To consider selecting SUPs that are common in Jordan but that have some clear alternatives

After implementing the selection criteria and through consultations with the Jordanian ministry of Environment the following SUPs were selected:

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<sup>1</sup> EU directive 2019/904 on the reduction of the impact of certain plastic products on the environment

Table 2 Selected SUPs

Group of SUPs	SUP	Reason for selection
Packaging	Plastic bags	Shopping bags have already been targeted previously, and the MoENV wants to build on their previous work as Littering caused by plastic bags is still visibly high and it is found in large quantities in the waste stream
Food and beverage packaging	Plastic Drink bottles, caps and lids	Littering caused by Drink bottles, caps and lids is visibly high and it is found in can be seen in large quantities in the waste stream
On-the-go food and beverage packaging	Food containers including fast food plastic packaging	Littering caused by food containers is visibly high and it is found in large quantities in the waste stream
On-the-go food and beverage packaging	Plastic Cutlery, plates and trays	Littering caused by cutlery, plates and trays is visibly high and it is found in large quantities in the waste stream

### 3 REGULATORY FRAMWORK FOR SUPS IN JORDAN

#### 3.1 JORDANIAN REGULATIONS

The MoENV is the governmental entity in charge of issuing and overseeing the implementation of environmental regulations in Jordan including laws, regulations, and instructions. In addition to these legal documents there are strategies, policies and action plans which are not legally binding but show the desired directions proposed and recommended by the government.

The most important laws, regulations, instructions and strategies that that can support curbing plastic pollution include:

##### **Environmental Protection law No6 of 2017**

This is the main environmental protection law in Jordan and sets the basic rules of protecting marine, soil, air, and other water resources. It assigns the MoENV as the main entity in charge of environmental legislations and presents the framework for protecting the environment. It also enforces cleaning up in case some entity caused pollution and sets financial penalties and prison time for causing any serious pollution.

##### **Waste Management Framework Law No.16 of 2020**

This is the highest legal document that deals specifically with waste prevention and management in Jordan. It addresses several waste related topics including 1) Assigns responsibilities of waste producers for all types of waste (Hazardous, domestic, commercial, agriculture, industrial, demolition and construction....etc.), 2) Classifies waste producers as per their total waste generation, 3) Encourages segregation of waste to recycle more, 4) Reduction of littering, 5) National planning to improve future waste management practices, and 6) Sets penalties for illegal waste disposal.

### **Monitoring and Inspection of Economic Activities law No 33 of 2017**

This law sets the legal framework for the relationship between private sector economic activities and governmental inspection and monitoring sections. It assigns the Ministry of Environment the responsibility to monitor any environmental infringements from any economic activity which includes industry, trade, agriculture, tourism, services, IT, and health care.

**Extended Producer Responsibility (EPR) implementation instructions for Packaging waste (2021),** (Made by virtue of Clause C of Article 7 of the Waste Management Framework law of 2020). This document includes a road map for implementing the EPR principle in Jordan on packaging waste. For this purpose, a unit shall be established at JCI for EPR which will put in place the mechanisms for implementing the EPR system. The plan for EPR to be voluntary and first but to become compulsory by 2025 for companies that use packaging materials > 200 Tons per year.

**Environmental Classification & Licensing Regulation No 69 of 2020** (Made by virtue of Clause A of Article 5 of the Environment Protection Law No. 6 of 2017)

This regulation provides implementation details of the process of granting environmental permits for projects or activities that might have an environmental impact. Such permits typically require a detailed environmental study called an Environmental Impact Assessment and typically also involve conditions associated with proper monitoring and management of Environmental aspects during the construction and operation phases.

### **Biodegradable Shopping Bags Regulations (No 45 of 2017)**

This regulation is focused purely on shopping bags. It forbids importing, manufacturing or dealing in any way with nonbiodegradable shopping plastic bags. This regulation permits the use of biodegradable plastic shopping bags and does not deal with Garbage bags or agricultural plastic bags/products. Even heavy shopping bags that are 50 Microns or thicker are outside the scope of the regulation. The regulation organizes the import and manufacturing and labeling of biodegradable shopping bags.

### **Green Growth National Plan and Action plans**

Waste Sector Green Growth National Action Plan (Waste GG-NAP 2021- 2025) which is based on Jordan's Green Growth Vision: economic growth which is environmentally sustainable and socially inclusive. This action plan focuses on the minimization of waste production and the switching to a circular economy.

In addition to the above, the MoENV is working on developing a new draft bylaw regarding the management of non-hazardous solid wastes, draft instructions focusing on the Extended producer responsibility for the packaging wastes, in addition to the draft instructions related to the management of the special wastes. All of these legislations will be issued in accordance with the Waste Management Framework Law No. (16) for the Year 2020.

## 3.2 EU REGULATIONS & POLICY

Several EU directives and action plans support curbing the use of SUPs including:

### **EU directive on the reduction of the impact of certain plastic products on the environment (2019/904)**

This directive is really the most relevant directive related to SUPs minimization and elimination. It is concerned with the growing use in short-lived plastic applications, which are not designed for re-use or cost-effective recycling (basically SUPs). The directive encourages using items that can be reused and recycled rather than disposed after one use. The directive also recognizes the issue of marine littering as a growing global problem with direct link to SUPs. The directive proposes that in a circular economy SUPs should be reduced and eliminated to be replaced by reusable products.

### **Closing the loop - An EU action plan for the Circular Economy**

This action plan is about the transition to a more circular economy, where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste is minimized. Such concept clearly requires the elimination of SUPs as these items stay in the economy for very short period and are immediately converted to waste. The action plan requires a thorough evaluation of the entire life cycle of products from its production to consumption and waste management, then finally trying to convert waste back into a resource. Plastics are actually presented in this action plan as the number one priority as an essential component that must be controlled to transition to a circular economy.

### **Guidelines on tackling single use plastic products in the Mediterranean “Barcelona convention guidelines”**

As mentioned earlier in the report, these guidelines are the most relevant to this assignment as they present the priority SUPs in the Mediterranean and gives guidance on the alternatives. These recent guidelines compliment several previous Barcelona convention guidelines including:

- Guidelines to phase out single-use plastic bags in the Mediterranean
- Guidelines to address single-use plastics through public procurement in the Mediterranean
- *Legislative Guide for the regulation of Single- Use Plastic Products,*

## 4 EXISTING SITUATION OF THE SELECTED SUPS IN JORDAN

The selected SUPs which are plastic shopping bags, drinking bottles, food containers, and cutlery and plates are all commonly used all over Jordan. These products are either manufactured in Jordan or imported from outside the country. Most of the 4 selected SUPs, as mentioned by JCI, are manufactured in Jordan using raw plastic material imported from outside mainly from the Saudi Arabia, other Gulf countries, China, and other countries. The most common of the selected SUPs in Jordan is the SUP Bags (SUPB). The value chain of SUPB which is very similar to other SUPs is presented in below. It is noted that the majority of this cycle occurs in Jordan except for the first step which is converting Fossils fuels into plastic granulates.

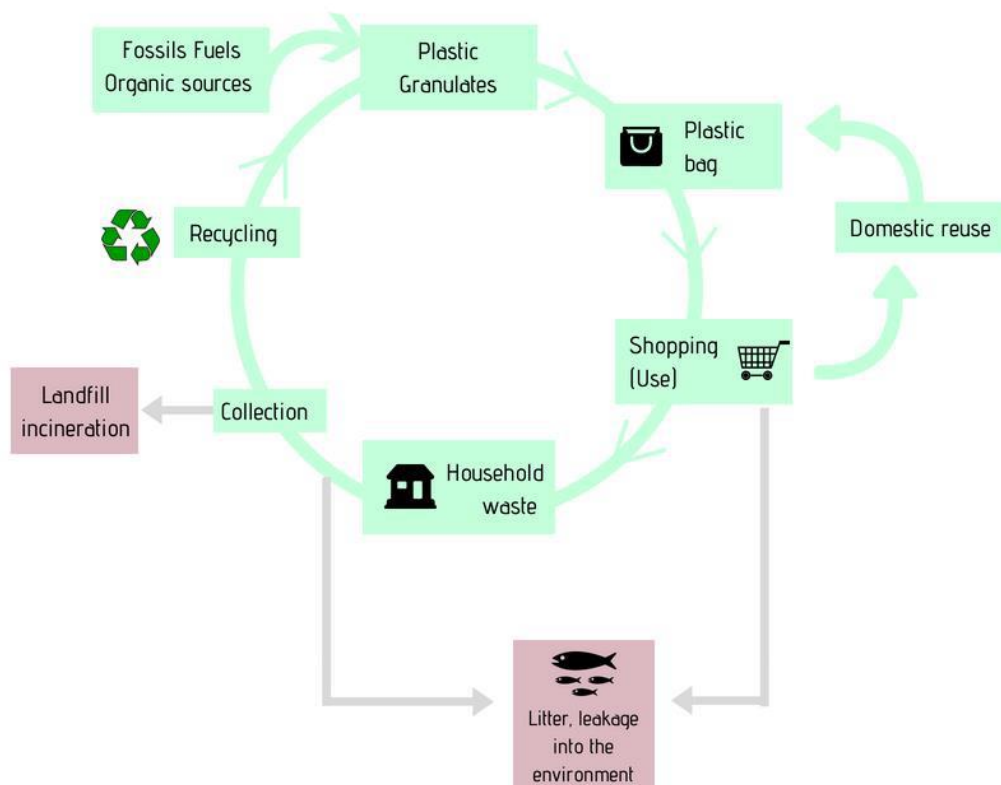


Figure 1 SUPB product-to-waste flow in MENA countries<sup>3</sup>

Some details about the existing situation in Jordan for each of the selected SUPs are presented in this section.

#### 4.1 PLASTIC SHOPPING BAGS

Plastic shopping bags are commonly used in Jordan by consumers in almost every retail shop including grocery stores, fresh vegetables and meat markets, bakeries, fast-food restaurants, electronics, apparel, and several other types of shops. Plastic bags are mostly manufactured in Jordan from imported polyethylene and are always provided free of charge due to its low production cost. In fact, it is customary to use more plastic bags than needed as a gesture of good service from the retail shops. The Jordanian culture in general welcomes the use of plastic bags and most Jordanians do not hesitate to use and dispose of these bags with no regard to the consequences. In fact, it has been reported that approximately 3 billion plastic bags are used per year in Jordan, which is about 300 bags per person per year. This value (3 billion bags) has been reported in several articles and Journal papers referenced as being originally reported by UNESCO<sup>2</sup> but the bases of this estimate is vague and does not seem to be based on a scientific estimation method. It is worth comparing this figure with the situation in other countries before nation-wide measures have been implemented<sup>3</sup>:

<sup>2</sup> Balash Kees - Leave the Bag | Environmental Awareness - UNESCO Multimedia Archives

<sup>3</sup> UNEP/MED WG.466 Inf.5 Background elements for the guidelines on phasing out single-use plastic bags: review of international experiences and alternative options.

Tunisia: 380 bags/person/year

Egypt: 136 bags/person/year

Lebanon: 673 bags/person/year

Morocco (pre-ban): 800-900 bags/person/year

Shopping bags in Jordan are regulated by “Shopping plastic bags regulation”<sup>4</sup> no 45 of 2017 which forbids importing, manufacturing or dealing in any way with nonbiodegradable shopping plastic bags. This regulation permits the use of biodegradable plastic shopping bags and does not deal with Garbage bags or agricultural plastic bags / products. Even heavy shopping bags that are 50 Microns or thicker are outside the scope of the regulation.

The regulation also organizes the labelling of biodegradable shopping bags and specifically requires the following labels be printed on the bags: “Keep your country clean”, “Reusable bag”, “Recyclable bag”, “Biodegradable bag”. The regulation also forbids dealing with black shopping bags from all sorts and types. Black garbage bags and plastic bags used in agriculture are excluded from this ban.

It was noted during the discussions with stakeholders that the existing regulation has had some positive impact on reducing the number of black bags and has increased the use of biodegradable plastic bags which are made locally. This impact however is not considered enough to solve the issue of plastic bags because biodegradable plastic bags do not always live up to their name. In fact, recent studies<sup>5</sup> showed that biodegradable bags may take many years in a landfill to biodegrade and that in some cases the degradation is not complete but it rather defragmentation of the bags to plastic pieces which are still harmful to the environment.

Typically most shopping bags are made of polyethylene (PE) which is a tough, light, flexible, synthetic resin obtained by polymerizing ethylene. Clean used plastic bags can be recycled but the main issue with bags recycling is that the bags are typically heavily contaminated with other wastes which makes recycling it a costly and difficult endeavour. For this reason plastic bags recycling in Jordan is limited to clean plastic waste from plastic bags factories and not plastic bags post disposal.

## 4.2 DRINKING BOTTLES

This category includes all plastic bottles and containers used to hold water, juice or other drinks for consumption in addition plastic caps and lids from bottles and containers, used to hold water, juice or other drinks for consumption.

Using drinking bottles has become an integral part of the daily life of Jordanians with the most common plastic drinking bottles in Jordan being:

- Mineral water bottles which comes in different sizes (250ml, 330ml, 500ml, 700, and 1500 ml)
- Juice bottles with the most common sizes 330, and 1000 ml

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<sup>4</sup> <http://moenv.gov.jo/AR/List/الانظمة>

<sup>5</sup> Napper, I., and Thompson R. (2019) “Environmental Deterioration of Biodegradable, Oxo-biodegradable, Compostable, and Conventional Plastic Carrier Bags in the Sea, Soil, and Open-Air Over a 3-Year Period, Env. Science and Technology

- Soda drinks with the most common sized 500 ml and 1000 ml
- Fresh milk with the most common being 1000 ml
- Other less common types of drinks

Typically most plastic drinking bottles are made of clear PET which is typically recyclable material but unfortunately no recycling facility for this product is available in Jordan. PET is collected and typically exported to outside Jordan.

### 4.3 FOOD CONTAINERS

Plastic food containers are commonly used in Jordan in many types and shapes. Examples from the Jordanian market include:

- Hummus and foul restaurants are very common to use plastic PE containers of different sizes
- Shawarma restaurants commonly use Styrofoam containers for meals
- Other local restaurants use all sorts of plastic containers (PE, PET, PP, and Styrofoam) for take away and delivery meals
- Most dairy products factories use plastic (PP) containers for yogurt, labaneh, cream cheese, and other dairy products.
- Grocery stores use plastic food containers (PE, PET, PP, and Styrofoam) for cold cuts, cheese, and other food items
- International brand restaurants seem to have switched to paper based containers but they still use plastic bags

The prolonged closures and declining patrons brought about by community lockdowns due to COVID 19 pandemic have imposed financial struggles to numerous restaurants and food establishments and has altered to behaviour of customers to prefer ordering food through delivery services. The growing demand for food delivery comes with increased use of disposable food containers, disposable cutlery, cups, straws, and bags which are mainly made of plastic. Initially this was hoped to be a temporary event but as time passes by it appears that the COVID-19 pandemic may have long term impacts on our habits and consumption behaviours.

### 4.4 CUTLERY, PLATES AND TRAYS

This type of SUPs has gained more popularity in the Jordanian society recently as people tend to use plastic cutlery and plates as a low-cost, convenient option for business or personal use. These utensils are lightweight, easy to transport, and are disposed of instead of having to clean them for reuse which is very much welcomed for households who have busy and hectic work schedules.

As mentioned earlier the increase in the demand for food delivery service due to the pandemic have caused an increase in use of plastic cutlery as well. Delivery restaurants usually will include a set of

plastic cutleries with the meals. Often customers may toss out the plastic utensils without using them as they are eating at home and prefer to use regular cutlery. Also, Individuals often buy plastic utensils for home or travel use as tossing used cutlery and plates at a home after a large gathering is much more convenient than cleaning and storing them.

## 5 PLASTICS INDUSTRIAL SECTOR IN JORDAN

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The plastic industrial sector in Jordan<sup>6</sup> is divided into the following subsectors:

- Flexible packaging
- Rigid packaging
- Construction material
- Agricultural plastics
- Raw material
- Furniture and housewares
- Foam products
- Medical supplies and packaging

The Plastic industrial sector in Jordan have around 614 institutions (258 industrial institutes and the remaining handicraft<sup>7</sup>) and employs around 10,757 people. The total output of the sector was about 763.1 Million JD in 2017 with 30% added value and 70% intermediate consumption.

The production of the Jordanian plastics covers approximately 42.2% of the total local consumption of plastic products with the remaining 57.8% being imported from outside the country<sup>8</sup>.

The setup of the plastic industrial sector as shown above does not identify SUPs separately but rather looks at plastic single and multiple use items together. To try to understand the size of the SUP sector in Jordan several meetings were organized with the JCI and Ministry of Environment. The only available information with this regard were the number of factories that produce SUPs as summarized below. The number of factories were provided by JCI but without any details to the total amount of production. The consultant team also tried to contact the factories directly but also could not get any information about the production and details about the products.

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<sup>6</sup> Jordan Chamber of Industry plastic sector profile (2020)

<sup>7</sup>Handicraft establishments are small business with capital investment < JD 30,000 and no. of employees< 10

<sup>8</sup> Plastics import and export Data provide by DOS (2022)



**Table 3 No of Factories Producing Selected SUPs in Jordan**

SUP type	Number of facilities
Plastic bags	60
Drink bottles, caps and lids	30
Food containers including fast food packaging	30
Cutlery, plates and trays	30
<b>Total</b>	<b>150</b>

The total number of SUP facilities is 150 facility which is approximately 25% of the total facilities in this sector.

## 6 IMPORTS AND EXPORTS OF PLASTICS IN JORDAN

Plastic imports and exports are documented by the Jordanian Department of Statistics (DOS) <sup>9</sup> through their data base system which is connected to the Jordanian customs system. Plastics are recorded as per the following items:

- Ethylene polymers raw material
- Propylene polymers raw material
- Styrene polymers raw material
- Polyvinyl polymers raw material
- Plastic Waste
- Plastic pipes and fittings
- Plastic tiles, false ceiling, and wall cladding
- Plastic shaped in plates, tapes, and other shapes
- Plastic tubes, sinks, and toilets
- Plastic packaging, plugs, caps, and capsules

Again, SUPs are not monitored separately but are mixed with multi use plastic products. Data about imported and exported raw plastic materials were provided by Department of Statistics (DOS) for the years 2015 to 2020. The data is provided as Kg of material and as value (JD). This data was used to develop the following figures related to plastic consumption in Jordan in tons and JDs. These values as mentioned earlier represent all plastic products manufactured and used in Jordan from the imported raw polymers. A part of it is SUPs but the rest are multiuse use plastics. The actual percentage of SUPs is still not known as it is not recorded but internationally the percentage of used plastics for packaging

<sup>9</sup> Plastic imports and exports data provided by DOS (2022)

is reported to be around 40%<sup>10</sup> from the overall plastics. The four selected SUPs for this report are mostly packaging so this percentage may be applicable.

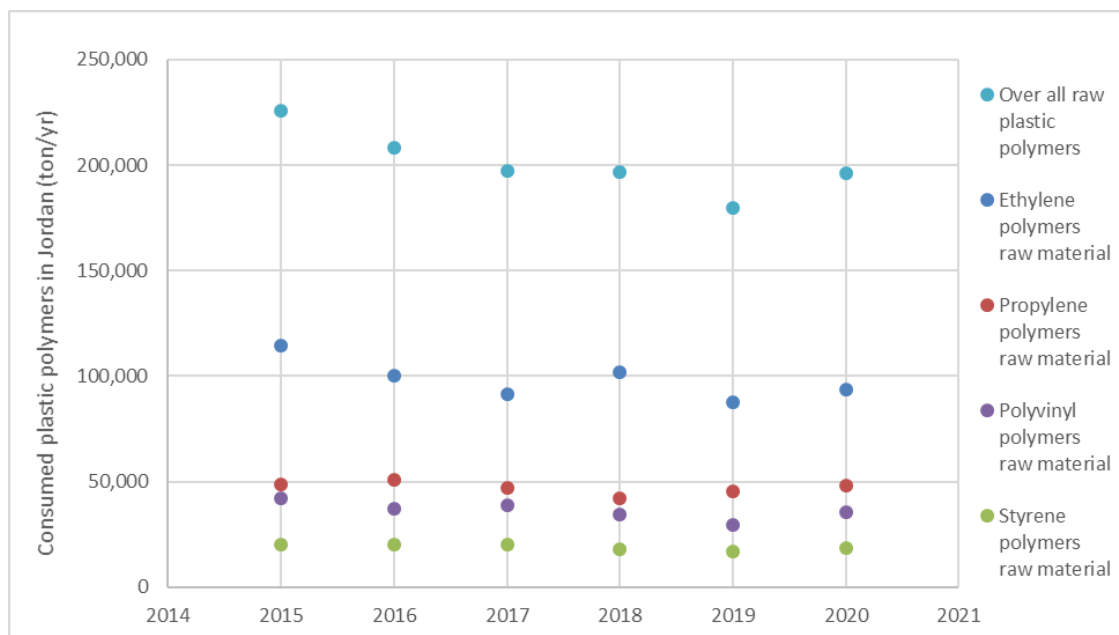


Figure 2 Consumed Plastic Polymers in Jordan (Tons/Yr) Source: DOS Data (2022)

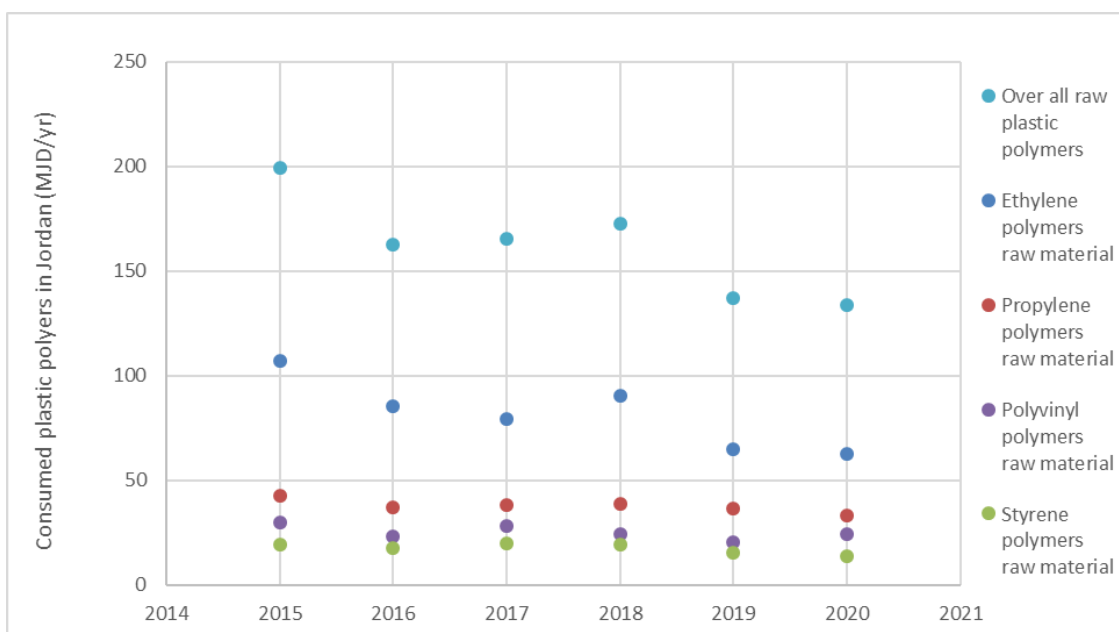


Figure 3 Consumed Plastic Polymers in Jordan (MJD/Yr) Source: DOS Data (2022)

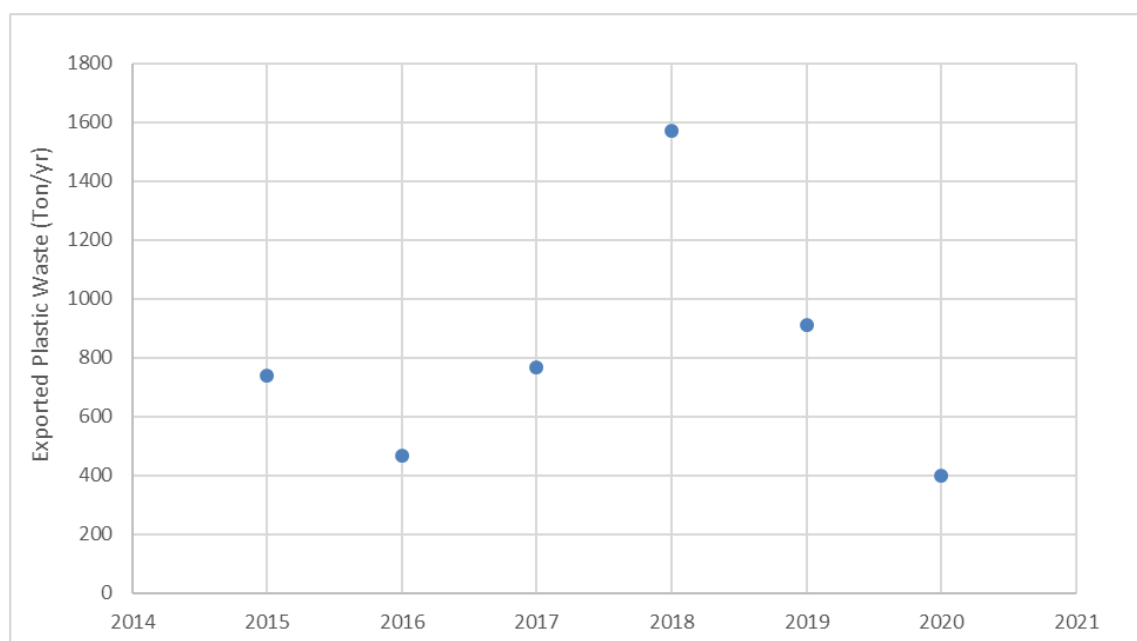
From the data above, it can be seen that the total raw plastics value used in Jordan in the year 2020 were about 140 M JD. If we consider 40% of it was used to make the 4 selected SUPs (similar to internationally reported value of 40% for Packaging), then 56 M JD would be the value of raw plastics

<sup>10</sup> Plastics - the Facts 2020 (plasticseurope.org)

used to make SUPs. Assuming 30% is the added cost of energy and maintenance and 30% added value as reported by JCI for the plastics sector the total value of SUPs market in Jordan would come up to around 89.6 M JD per year. This value indicates the large size of SUPs industry in Jordan which must be considered as we proceed with the road map to minimize and eliminate SUPs. The 89.6 M JD value is only related to the output of the industrial facilities working with SUPs but other businesses involved in SUPs value chain must also be considered as well such as:

- Bulk import companies the import plastics from outside the country as raw material to produce the SUPs.
- SUP distribution network. Typically, a distribution company will have different sorts of products so they are not dedicated to SUPs only.
- SUP retail stores. Most grocery stores and supermarkets will sell SUPs but recently dedicated stores have open all over the cities in Jordan that sell mainly SUPs with other disposal products

In addition to the raw material data, DOS also provided the amount of exported plastic waste from Jordan. This amount is shipped for recycling in other countries and is mainly related to PET as there is no means of recycling this product in Jordan. The amount of exported waste for the years 2015 to 2020 are presented in figure below.



**Figure 4 Exported Plastic Waste (Ton/Yr) Source: DOS Data (2022)**

It can be seen that the exported plastic waste in 2020 was about 400 tons per year which is really a negligible amount compared to the 200,000 tons of used raw plastic material in the same year. This can be due to the drop in the recyclables value because of the drop in oil prices. Oil prices control the price of virgin plastics and virgin plastics control the price of recycled plastics. If in the future oil prices go up then recycling feasibility will be improved and more plastic waste can be recycled.

To demonstrate the drop in the price of plastics over the last few years, the following figure was developed from the data obtained from DOS about imported plastics (tons per year and total cost per year) for the period 2018 to 2020 demonstrating a steady decline in the price of virgin plastics.

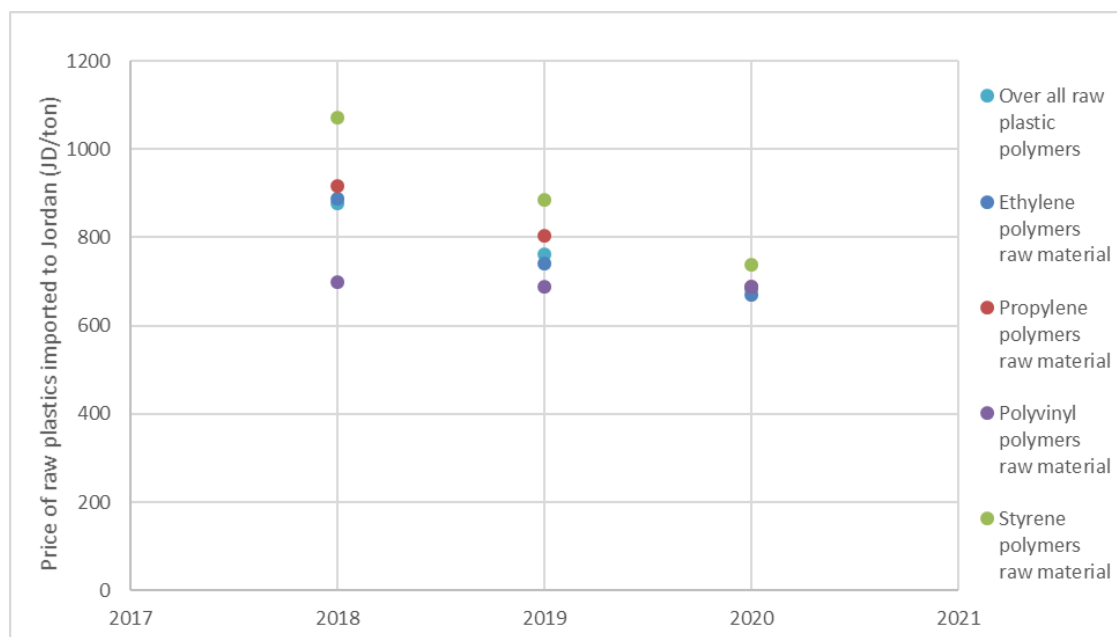


Figure 5 Price of Plastics Imported to Jordan (JD/Ton) Source: DOS Data (2022)

## 7 PLASTICS IN JORDANIAN WASTE

Two waste characterization studies were considered to investigate the types of plastics in Jordanian waste. One was conducted by Royal Scientific Society (RSS) in 2011 and the other was conducted by GIZ project in 2021. In the RSS study, samples were obtained from 16 locations and during each of the four seasons so 64 samples were obtained in total. In the GIZ study however, a total of 15 samples were obtained in one season only. RSS results are presented in the following figure.

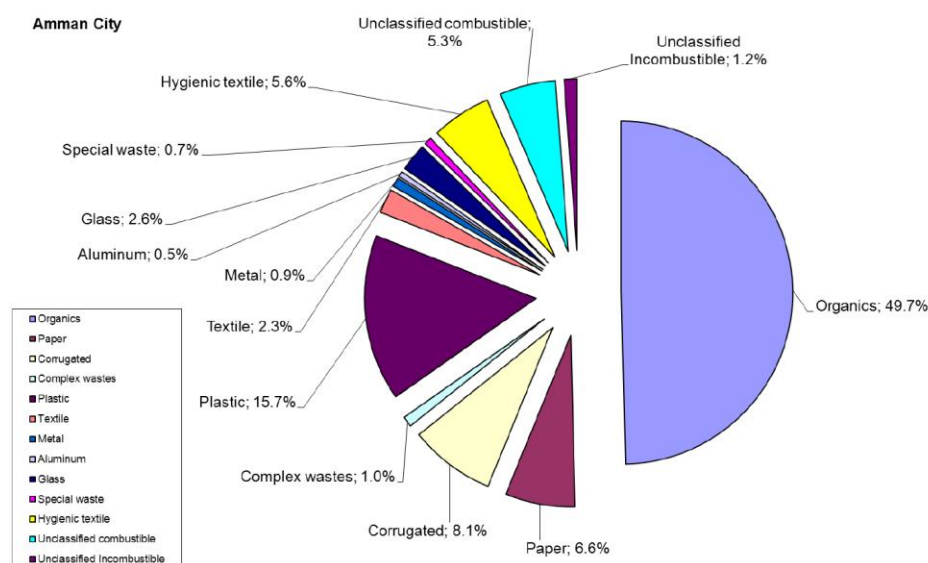


Figure 6 Waste Characterization of Jordan Waste. Source: RSS (2011)

Further assessment was done for the plastic portion in the waste to understand its exact composition and the results are presented in figure below. The results showed that the average weight percentage for the whole year of polyethylene (PE) (film and containers) is about 15.1% and is about 71.6% of the plastic waste which could be due to the extensive use of plastic packaging materials such as plastic bags, wraps, and other film applications (HDPE and LDPE). The results also showed that Polyethylene tetra-phthalate (PET) types of the plastic material constitute about 3.2% of the overall waste composition and about 15.2% of the plastic waste, which could be mainly due to the use of bottles for drinks. Polystyrene constitutes about 2.1% and is about 10% of the plastic waste and is mainly linked to food containers.

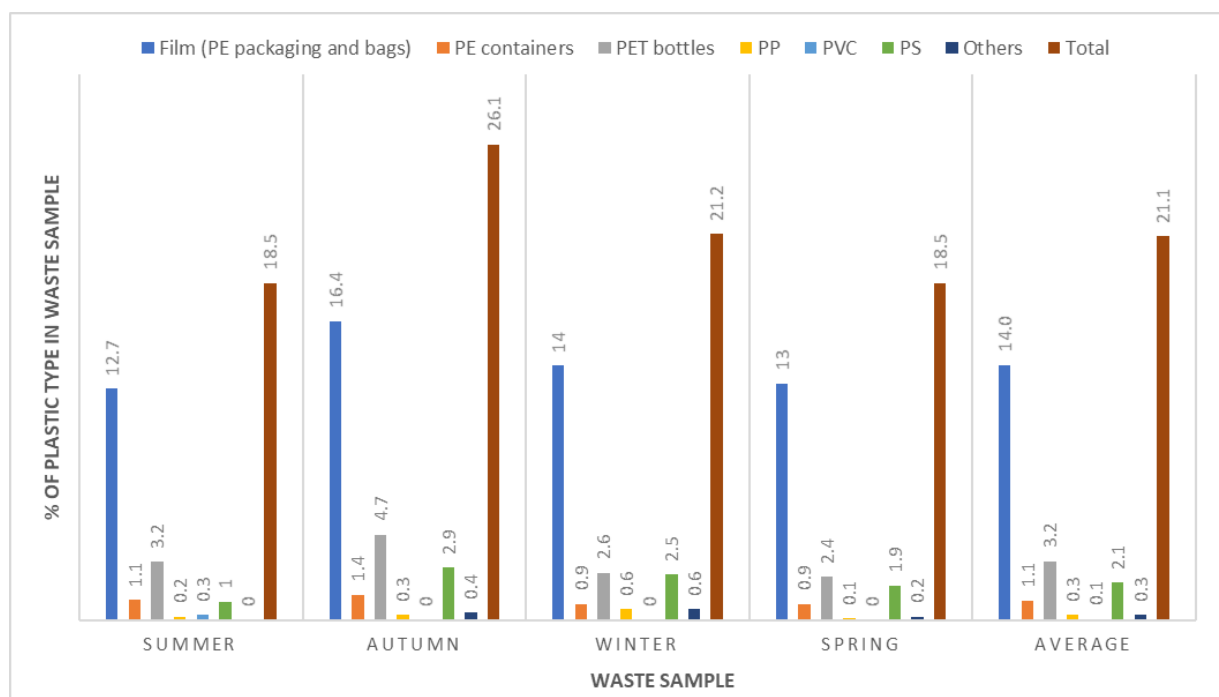


Figure 7 Types of Plastics in Jordan Waste (RSS Study, 2011)

The second waste characterization study which was examined (GIZ, 2021) showed that the average weight percentage of plastic film is about 11.8%. The results also showed that plastic containers (PE and PP) were about 4.2%, Polyethylene tetra-phthalate (PET) types of the plastic material constitute about 2.1%. The results also showed higher plastics in commercial areas and in the source separated sample as demonstrated in figure below. The source separated waste sample was obtained from a pilot recycling project in Amman and indicated positive change in the form of more plastic waste recovery. If this is implemented in full scale it would have positive impacts on plastic waste recycling.

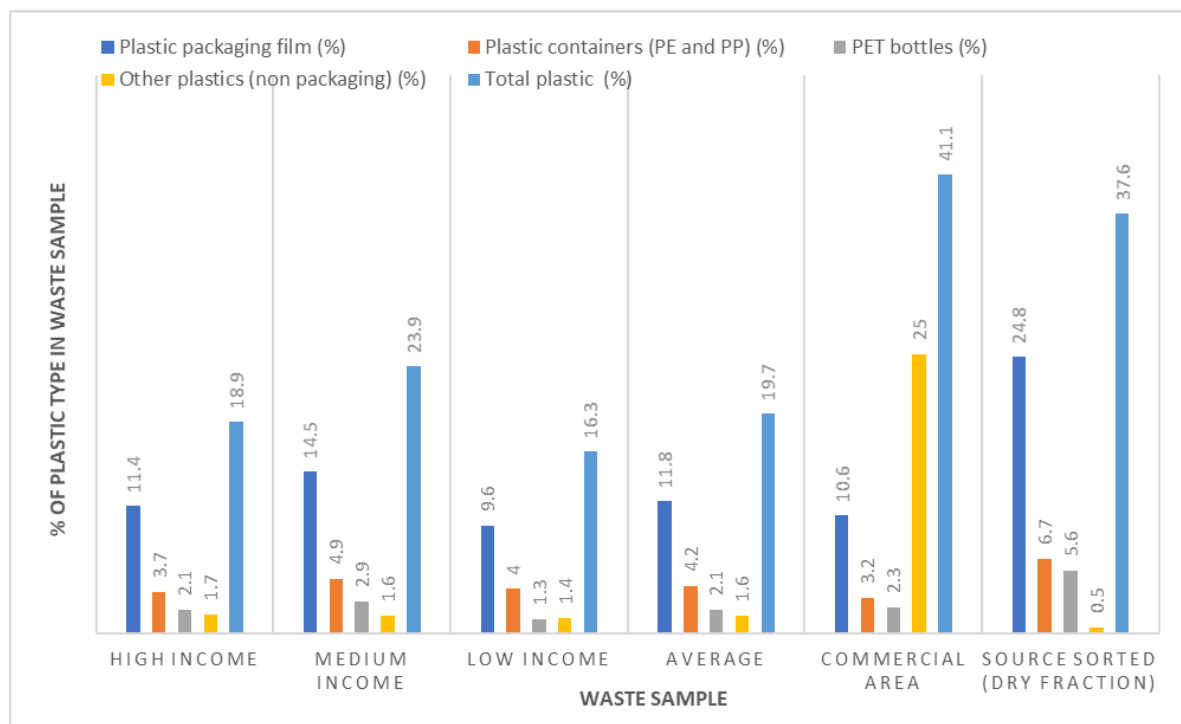


Figure 8 Types of Plastics in Jordan Waste (GIZ Study 2021)

## 8 PLASTIC WASTE RECYCLING IN JORDAN

Through the efforts of the informal waste sector (pickers and processing facilities), Jordan has a fairly well-developed plastics value chain recycling for all forms of plastic, with the exception of PET. Plastics recycling in Jordan go through several steps starting from collecting the plastic waste from bins which is mainly done through unlicensed waste dealers that pick recyclable plastics from bins on daily basis and try to get the recyclables before the municipality waste collection vehicle collects the waste. The collected plastic waste is then compiled in yards operated by individuals that work in this field. Once enough volume is collected, the collected plastic is shredded and palettized in preparation for remanufacturing. The quality of the produced plastic pellets depends on the purity of the plastic waste. If different types of plastics are mixed together then the final quality is inferior to the original plastic product and is typically used to manufacture black garbage bags. If the plastic waste however, is clean and pure, it can be recycled into its original type.

Also a big issue in plastic recycling is contamination of the plastic with other wastes such as organic waste or any other residue. This contamination causes low quality pellets which can hardly be used to manufacture anything useful and reduces significantly its value. Cleaning of plastic waste is possible but is expensive and will reduce the feasibility of recycling plastics.

Plastic waste recycling market in Jordan is reported<sup>11</sup> to process around 4000-6000 ton per month of plastic waste which are mostly reused within Jordan industrial sector with some exported to outside Jordan. The percentages of the types of recycled plastics are: 30% PP, 20% HDPE, 35% LDPE/LLDPE, 10% PVC, 5% PS. while PET is exceptional because the pre-consumer PET that is generated from factories is collected for export purposes. As reported earlier, there is currently no PET recycling industry on Jordan.

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<sup>11</sup> USAID Recycling in Jordan Activity, Market System Analysis (2021)

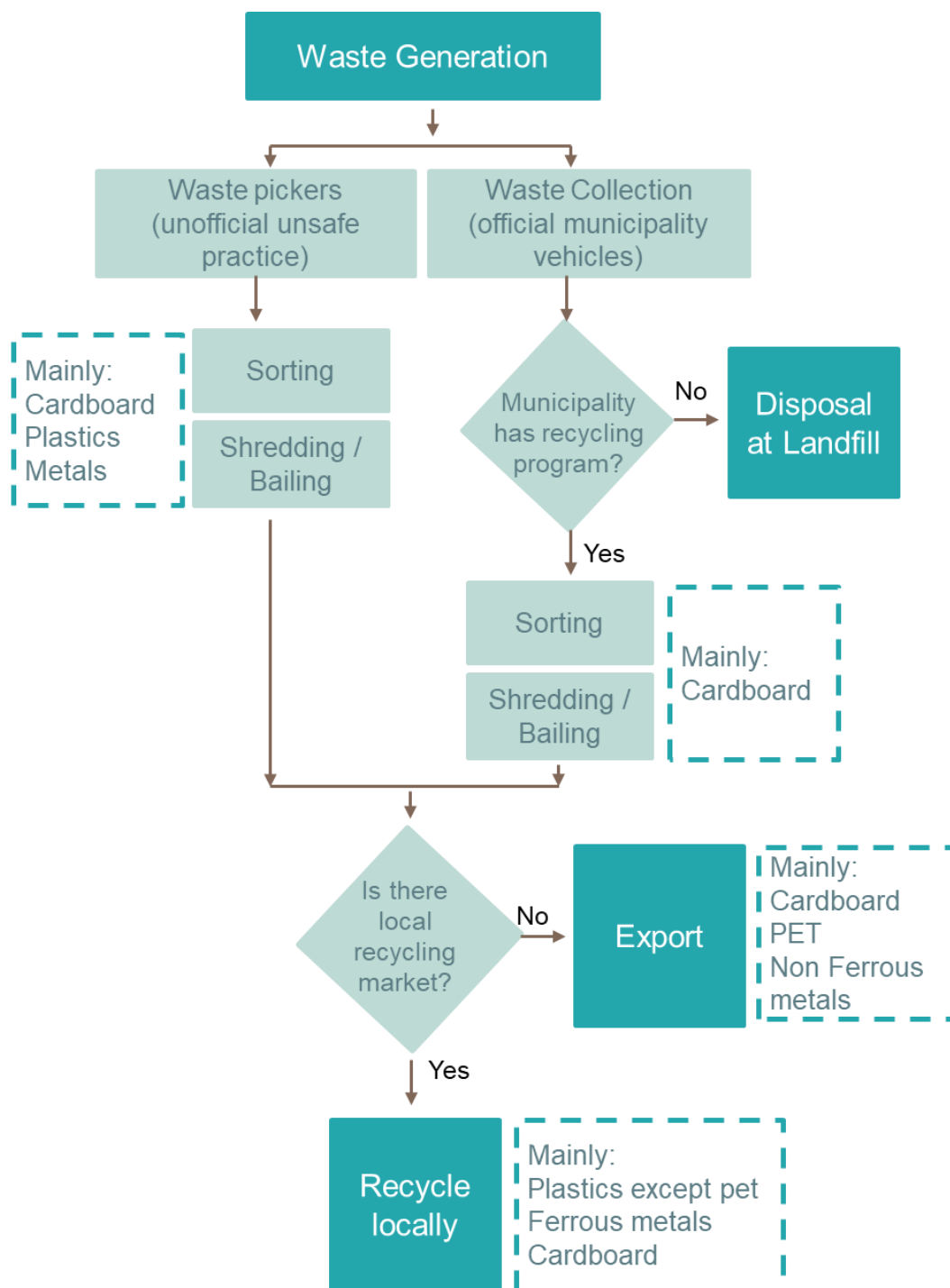


Figure 9 Waste Recycling in The Jordan Market

A demonstration of plastic recycling in Jordan is presented in the following diagram. In this example the recycled plastic pellets are used to produce plastic garbage bags. It should be noted that after the plastic pellets are produced depending on their purity other types of manufacturing is possible as well.





**Figure 10 Example of Common Plastic Recycling Cycle for PE in Jordan**

As mentioned earlier the price of virgin plastics fluctuates in the market depending on the price of oil and as mentioned earlier also any change in the price of virgin plastics will cause a change in the price of recycled plastics as recycled plastics are always 30 to 80% cheaper than the virgin material depending in the purity of the recycled plastics. Therefore the decline in oil prices in the last few years made virgin plastics cheaper which has had a negative impact on the plastic recycling industry.

As reported by USAID<sup>12</sup>, there are an estimated 40-80 plastic processors/crushers producing different quality grades of plastic flakes, pellets, and powder in Jordan (mainly in Sahab and Zarqa). More advanced processing, such as technologies for recycling PS (polystyrene/Styrofoam-EPS) do not exist. Given the lack of a PET recycling plant in Jordan so far, the post-consumer PET bottles are compacted and bailed for export, but this global market collapsed in 2018 when China stopped importing plastic. The pre-consumer PET waste generated from factories and manufacturers continues to be exported to global markets in Turkey, India, and southeast Asia countries who are considered to have large textile industry that convert PET to polyester and fabric strings.

## 9 IMPACT OF COVID-19 PANDEMIC

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COVID-19 pandemic preventive measures resulted in a high impact on SUPs use and waste management. Driven by hygiene concerns related to cross-contamination, consumers behaviour shifted towards using SUPs instead of reusable containers.

In addition to food related SUPs, the pandemic caused an increase in the use of other SUPs such as Personal Protective Equipment including masks and gloves. Production of masks in Jordan has been steadily increasing. It was reported in a news article that since the beginning of the pandemic and until 3<sup>rd</sup> of July 2021 Jordan has manufactured 500,000,000 disposable masks.

Consequently, unfortunately, COVID -19 Pandemic has led to withdrawals or postponements of SUP bans and fees in several countries. For example, some governments have delayed SUP bans amid COVID-19 concerns (e.g., the province of Newfoundland and Labrador in Canada, states of New York, Delaware, Maine, Oregon, Connecticut, Oregon, Hawaii, in the U.S., the United Kingdom and Portugal), while others reintroduced SUPs and even banned the use of reusable alternatives (e.g., the states of Massachusetts and New Hampshire in the U.S.)<sup>13</sup>.

Based on the above, the timing of the SUP reduction and limitation road map should consider the impacts of the pandemic and try to balance between health issues related to infection to the environmental impacts of SUPs.

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<sup>13</sup> Silva A., Prata J., Walker T., Campos D., Duarte A., Soares A., Barcelo D., Santos T., (2020) Rethinking and optimizing plastic waste management under COVID-19 pandemic: Policy solutions based on redesign and reduction of single-use plastics and personal protective equipment, *Science of the Total Environment*

## 10 CONCLUSIONS

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Main conclusions of this baseline study are summarized as following:

- Data about the amount and types of consumed SUPs are not available in Jordan as the existing monitoring and quantification systems do not separate SUPs from multi use plastics. Therefore, in order to proceed with the SUPs minimization road map, it is recommended to introduce quantification of SUPs into the existing reporting systems within JCI and DOS. This could be supported by the new EPR instructions issued by the MoENV
- The Market of SUPs in Jordan is fairly large and many types of business profit from it including factories, importing companies, and distributors and retail companies. The market for manufacturing SUPs alone is estimated to be around 89.6 M JD per year and that does not include the share of importing and retail companies. These economic activities must be considered through the process of reducing SUPs in Jordan as they will be negatively impacted.
- Plastic recycling in Jordan is well established for most plastics (except PET) with the main issue being the contamination of the plastic waste. To improve plastic waste recycling, programs should be developed to reach out to the consumers in order to clean plastics before disposal and to try to collect as much as possible plastic waste separately to avoid contamination.
- PET recycling is currently unavailable in Jordan although PET is highly recyclable. Possibly a PET recycling facility can be created with some financial support from the government or donors in order to improve the rate of PET recycling which is a major SUPs material. Such a facility is costly and requires a large and steady flow of PET waste.
- The industrial sector and retailers in Jordan are motivated by the market demand of products. As long as there is market demand, the products will be made. It is wise therefore to try to change the demand in the markets from SUPs to other alternatives of paper products that are recyclable or reusable products before trying to change the manufacturing process itself. Basically to work on citizen consumption patterns first
- From the interviews, most of the stakeholders were not in favour of complete banning of products or adding non-refundable taxes that increases the price of items as a first step. Most opinions were in favour of product labelling to encourage recycling and proper disposal, raising awareness of the dangers of SUPs, limited restrictions in natural and cultural heritage sites, and utilizing the EPR system in association with the private sector. In addition to promoting SUPs alternatives such as paper and cardboard products and reusable products.
- COVID 19 pandemic have created a favourable environment to use SUPs as people are worried about infection. It is therefore important to keep an eye on the pandemic as we develop the SUPs minimization road map possibly build in some flexibility in the road map to allow the pandemic to pass before any fees or restrictions on SUPs are applied.