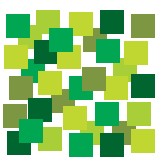
YOUR GUIDE TO WASTE MANAGEMENT IN JORDAN

WASTE SORTING INFORMATIVE BOOKLET



JORDAN GBC

المجلس الأردني للأبنية الخضراء

Jordan Green Building Council

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INTRODUCTION

WHAT IS MSW?

Municipal Solid Waste (MSW) is solid and semi-solid materials produced by households, as well as other waste similar in nature and composition resulting from any activity (commerce, offices, public institutions, etc.) and not included in the definition of harmful and hazardous waste, that are collected by or on behalf of municipal authorities or by the private sector (business or private non-profit institutions) and disposed of through the waste management system.

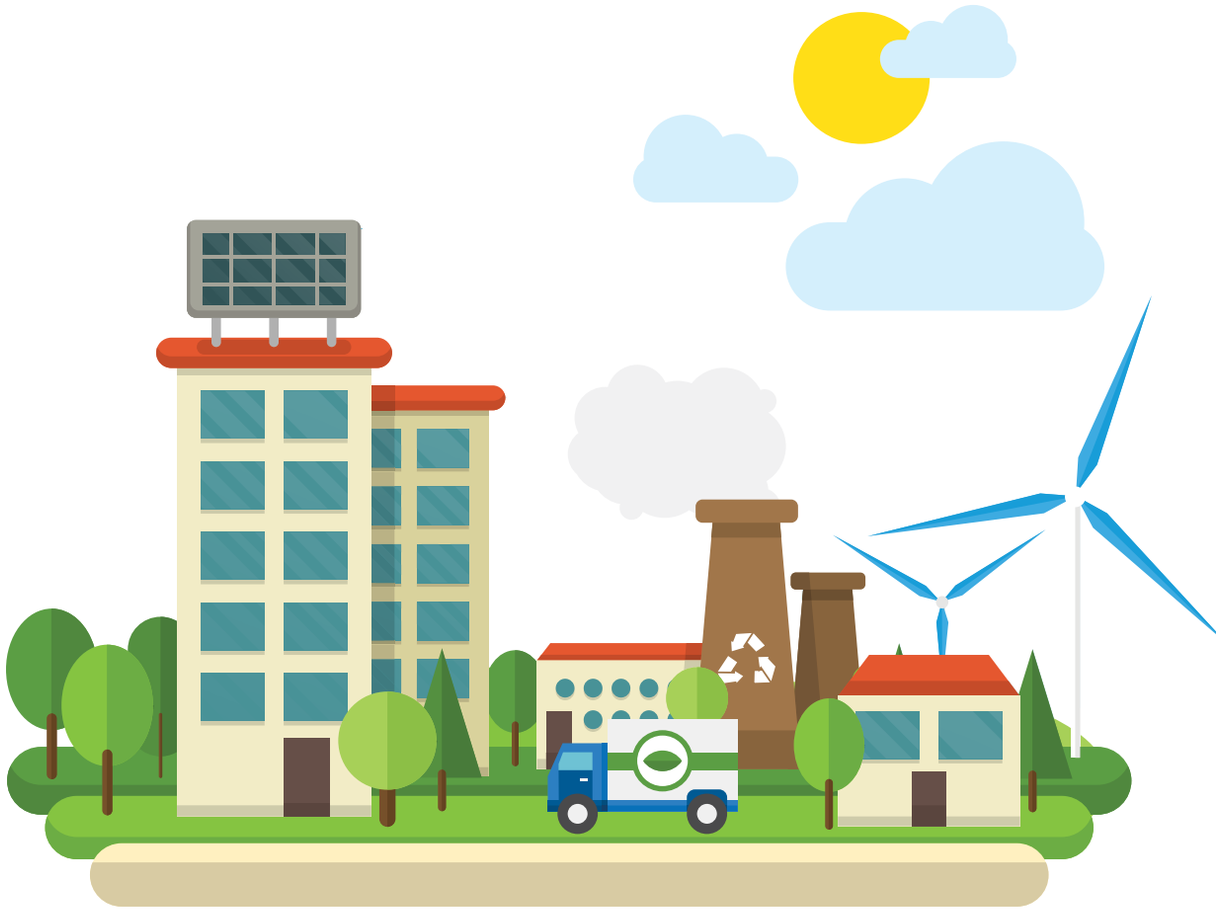
WHY SHOULD IT BE MANAGED?

Reduces or eliminates adverse impacts on the environment and human health.

Supports economic development and improved quality of life.

PROCESS?

A number of processes are involved in effectively managing waste for a municipality. These include monitoring, collection, transport, processing, recycling and disposal.



SOLID WASTE SITUATION IN JORDAN

MILLIONS of metric tons of MSW are generated in Jordan from agricultural, municipal and industrial sources every year. The growing industrialization and high population growth rate due to the recent forced migration has led to a rapid increase in solid waste generation in the country which has, in turn, put increasing pressure on the existing waste management infrastructure.

The current Solid Waste Management (SWM) services within the local municipalities are no longer of the same standard as that prior to **the massive influx of refugees** and the **daily generation rate of MSW** has dramatically increased.

350 tons of waste is currently being generated daily in Irbid and Mafraq; which should be collected and hauled away by the municipalities to the relevant final landfill "disposal sites".

THE SWM SECTOR IN JORDAN IS ONE OF THE MOST COMPLEX SECTORS DUE TO THE WIDE VARIETY OF SW TYPES AND COMPOSITIONS.

THE MINISTRY OF MUNICIPAL AFFAIRS (MOMA)
at the national level, which operates through its executive arms: the municipalities (at the local level), and Joint Services Councils (JSCs) at the regional level.

THE MINISTRY OF ENVIRONMENT (MOENV)
is in charge of relevant planning, policy and legislative frameworks of the municipal SWM systems, as well as monitoring of the environmental performance of the official disposal practices.

CURRENTLY THERE ARE
100 LOCAL MUNICIPALITIES AND 21 JSCs IN JORDAN.
However, 18 official disposal sites are currently operating in Jordan:

- 4 of the said landfills operate in the Northern Region.
- 5 in the Central Region.
- 9 in the Southern Region of Jordan.

Other public entities are directly responsible for SWM in specific areas in Jordan.

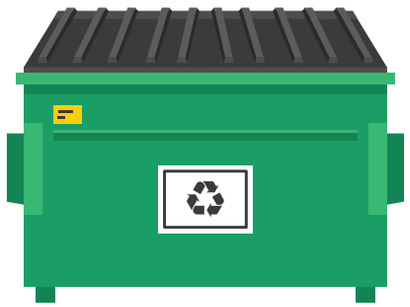
THE GREATER AMMAN MUNICIPALITY (GAM)
mainly responsible for the Greater Amman Area (Capital of Jordan).

THE AQABA SPECIAL ECONOMIC ZONE AUTHORITY (ASEZA)
responsible for the Special Economic Zone of Aqaba.

Both entities are working independently, having the delegation from the MoMA and using their own regulations.

AL GHABAWI LANDFILL
The largest final disposal site (FDS) operated by GAM is the only engineered sanitary landfill. The rest 17 FDS are dumpsites of variable condition and disposal practices, operated by the respective JSCs.

DUMPSITES AND LANDFILLS IN JORDAN



NORTHERN REGION

4 dumpsites operate in the northern region

- **Al Ekaider**
- **Al Aghwar Al Shamaliyah**
- **Al Huseyneyat**
- **Al Badiah Al Shamaliyah**

Al Ekadier site is the largest site in the northern region which located 35 km East of Irbid city and 15 km East of Ramtha city. Also, Al-Akaider site currently serves a total of 31 local municipalities in the Northern Region; as follows: 18 in Irbid, 6 in Jerash, and 7 in Ajloun Governorates. The site is operated under JSC of Irbid.

However, JSC Mafraq operates Al-Hussainyyat disposal site, which is located 20 km East of Mafraq. Al-Hussainyyat site currently serves 10 municipalities in Mafraq Governorate, as well as the Za'atri Syrian Refugees Camp located in Mafraq.

All the dumpsites in the northern region are not engineered dumping and suffer from infrastructure and equipments shortage.

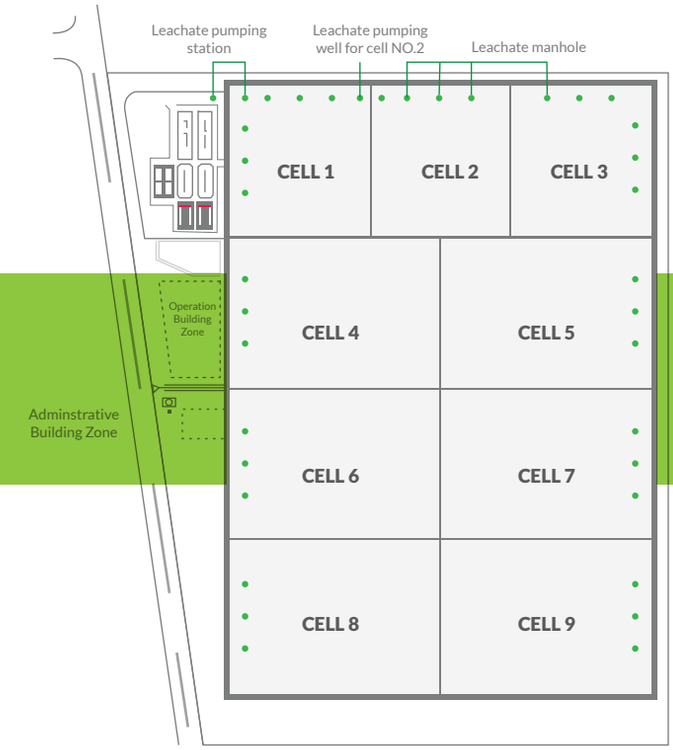
CENTRAL REGION

5 sites operate in the central region

- **Al Ghabawi,** which is the only engineered sanitary landfill in the kingdom.
- **Madaba, Al Homra, New Deir Allah and Al-Duleil:** are controlled tipping sites.

Al Ghabawi landfill is the largest landfill (2,000 dounm) and is the first of its kind in Jordan as it is designed and constructed with gas collection systems with financial assistance from the World Bank. The site was established in 2003 to include 9 cells.

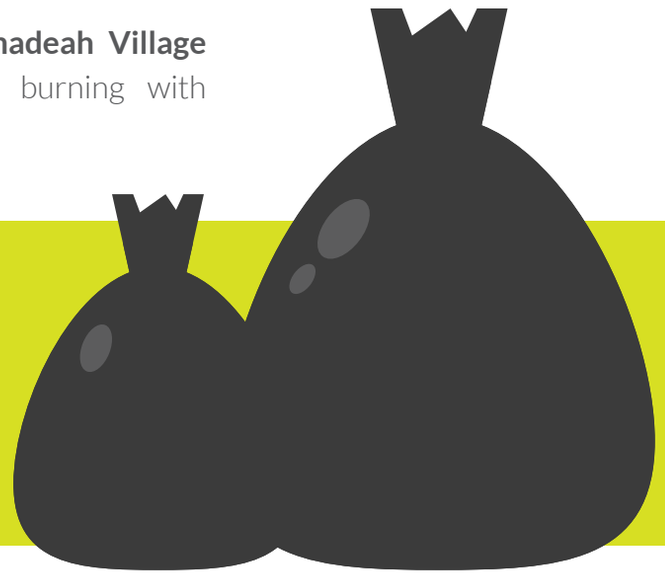
LAYOUT FOR AL GHABAWI LANDFILL

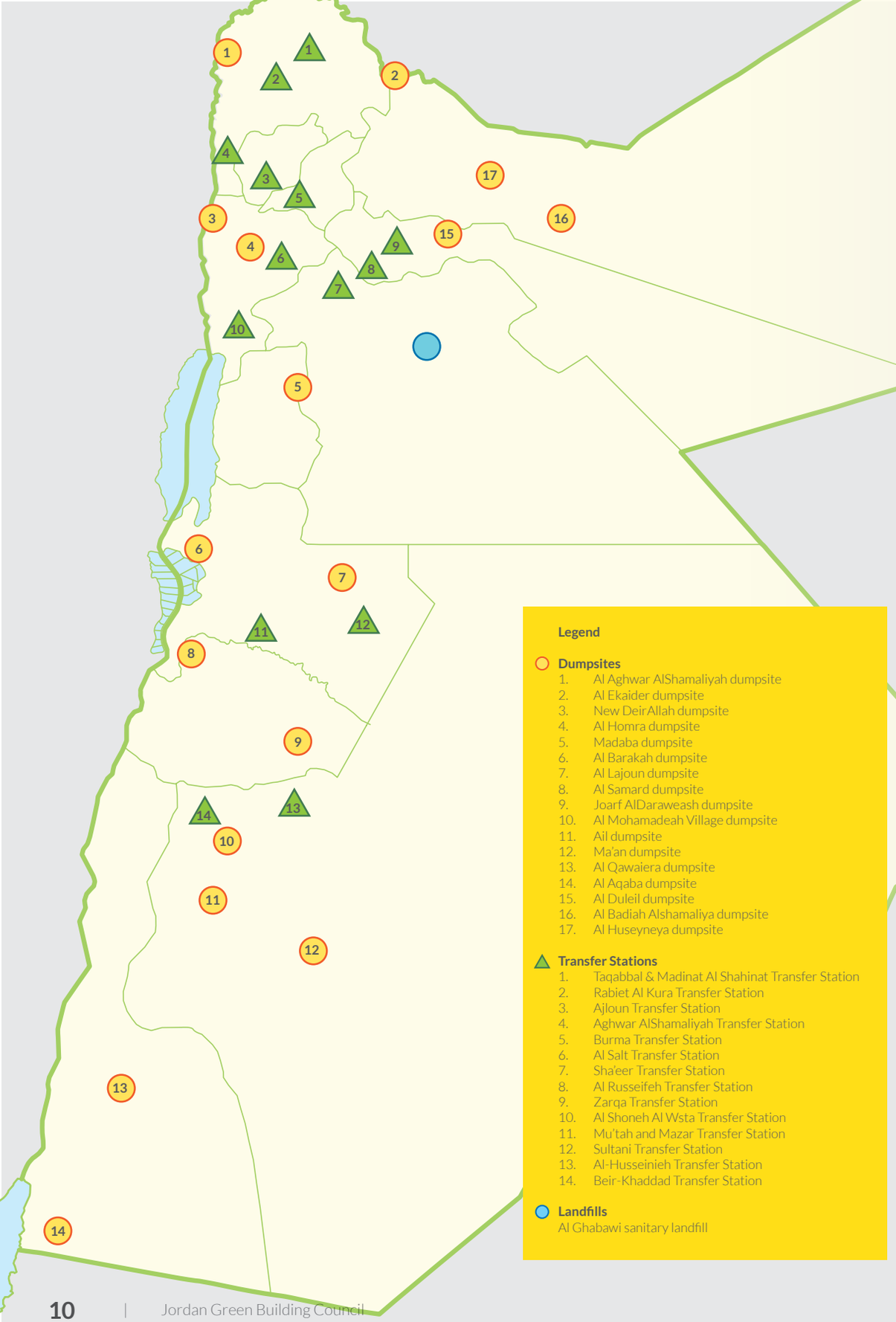


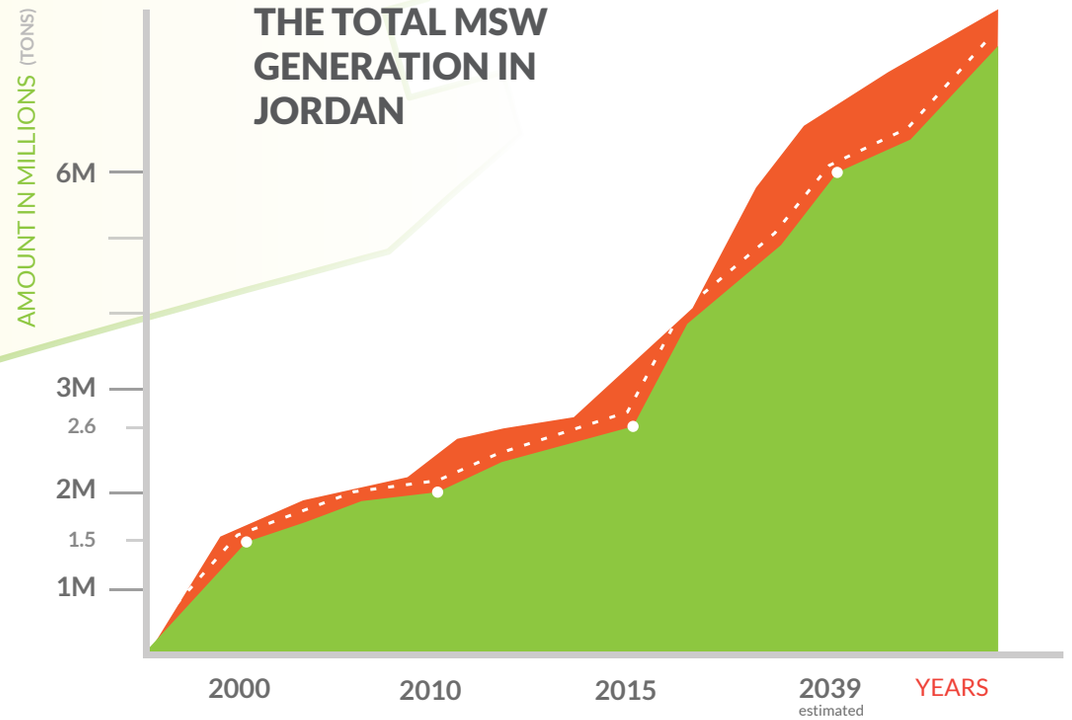
SOUTHERN REGION

9 dumpsites are active and operate in the southern region.

- **Al Aqaba, Al-Qawiera, Ma'an, Ail, Al Lajoun and Joarf Al Daraweash dumpsites:** are using controlled tipping method.
- **Al Barkah, Al Samar, Al Mohamadeah Village dumpsites:** are open dumping/ burning with occasional tipping.







AVERAGE GENERATION RATE (2015)

0.99 kg/cap/day in the urban areas

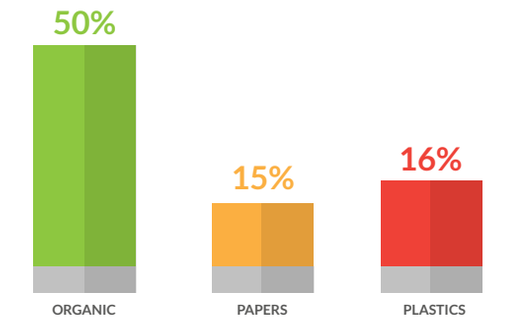
0.87 kg/cap/day in the rural areas.

COVERAGE MSW COLLECTION COVERAGE IS ESTIMATED

90% and **70%** for urban and rural areas[1] respectively.

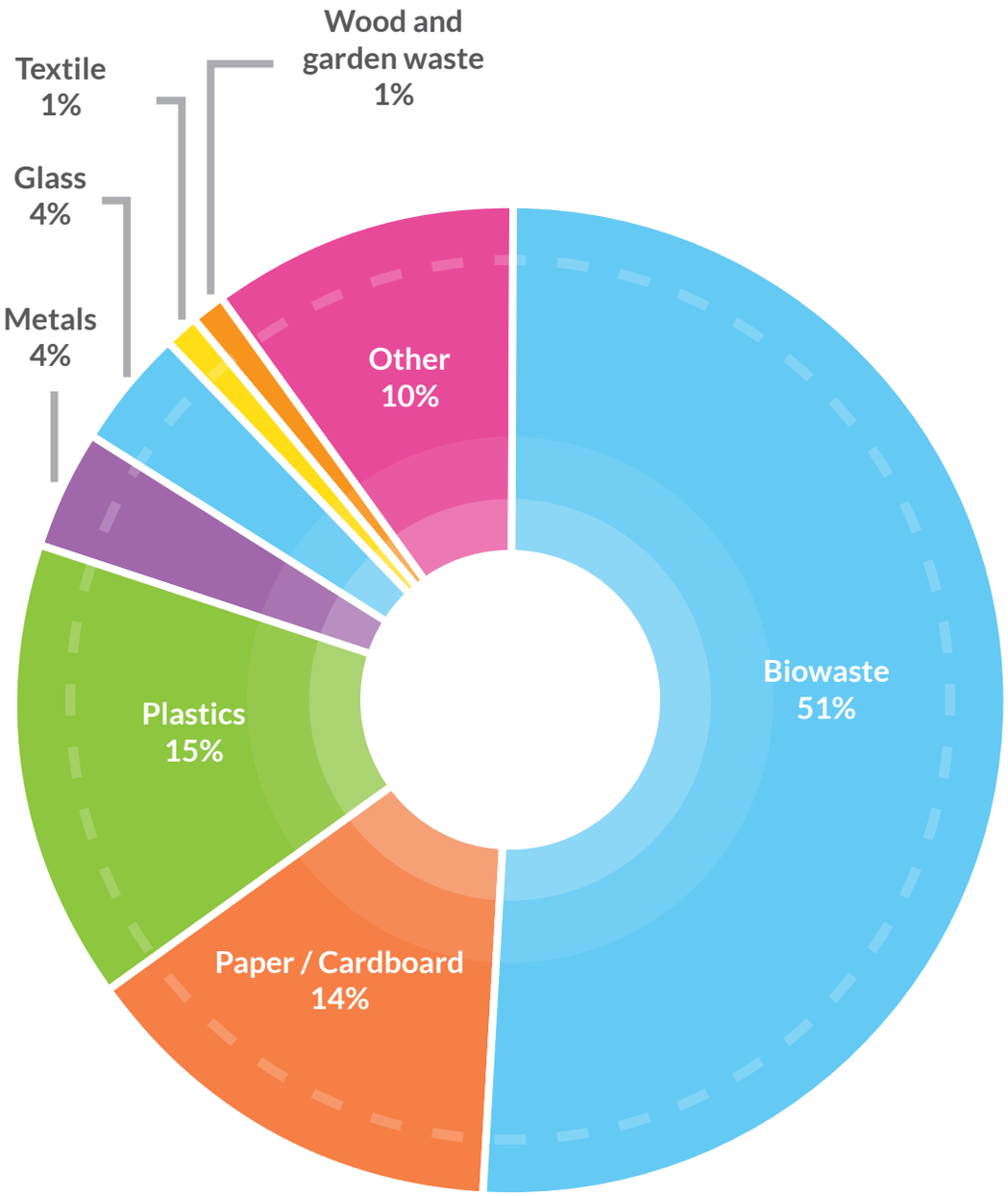
IN 2012

- studies show that out of the total MSW generated in Jordan.
- The residual included glass, metal and other miscellaneous types of household wastes[2].
- Most of MSW daily deliveries are diverted to the closest unsanitary landfills and/or dumpsites.



MUNICIPAL WASTE COMPOSITION IN 2012

1 Baseline Study of existing MSWM in Jordan, National SW strategy documents, Draft report, Sept 2014
2 Country report on the solid waste management in JORDAN, May 2014, GIZ, SweepNet



MUNICIPAL WASTE COMPOSITION IN JORDAN

WASTE HIERARCHY

The waste hierarchy has become a widely accepted guideline for waste management operations throughout the world.

The waste hierarchy figure ranks waste management options according to what is best for the environment. It gives top priority to preventing waste in the first place. When waste is created, it gives priority to preparing it for re-use, then recycling, then recovery, and last of all disposal (e.g. landfill).

PREVENTION

In waste prevention stage, it promotes using less material (and less hazardous materials) in design and manufacture. Keeping products safer and durable for longer re-use.

PREPARING FOR RE-USE

At this stage, it encourages materials re-use activities (without further processing) such as cleaning, repairing, refurbishing, whole items or spare parts.

RECYCLING

This stage implies processing and turning waste into a new substance or (bio) product. The waste recycling keeps materials in the competitive market and conserves the environmental and natural resources.

RECOVERY

The other recovery activities include re-use, recycling, reprocessing and energy recovery, consistent with the most efficient use of the recovered resources.

DISPOSAL

Finally, the waste hierarchy recognizes that waste disposal (landfilling) is the most appropriate management option when some types of waste cannot be safely recycled.

WASTE REDUCTION & RE-USE

THE HIGHEST PRIORITY?

In the waste hierarchy, avoiding and reducing the generation of waste, encourages the society (households, commercial sector, etc) to reduce the amount of virgin materials extracted and used.

WHAT CAN WE DO?

For instance, many municipal waste items can be repaired, re-used, sold or donated to charities. The goal is to maximize efficiency and avoid unnecessary consumption through behaviors such as:

Save your documents to your hard drives or in your email instead of printing hard copies of your documents.

Prior printing documents proofread them on the computer screen.

Change your printer settings to make double-sided pages to cut your consumption in half, and use ink-saving setting (draft mode printing) when possible. Do the same when making copies.

Change settings of your printed page layouts (use small point fonts when possible, single line, and reduce margins, etc).

Circulate memos via email/intranet to your employees and they decide whether or not they wish to print them.

Print in black and white when you can: Avoid color printing.

Save manuals, policies, and other documents online in pdf format rather than making individual copies for all personnel.

Re-use envelopes and file folders by sticking a new label over the previous one.

Re-use unwanted paper as packing material in shipments.

Re-use shipments- in boxes again for shipments out.

Provide a paper recycling bin next to every printer, copier and fax machine so that employees can deposit waste paper in them.

Reduce paper towel and napkins waste in toilets by providing air dryers as an alternative.

Disseminate recycling awareness with your employees and cleaning crew.

Choose the products with least wrapped packaging.

Recycle your E-waste (Cell phones, computers, printers and other equipment).

Get engaged in e-waste recycling programs in your area that accept these electronic wastes.

Compost vegetable leftover and garden waste.

Keep the plants trimmings remained on the soil to decompose and release important nutrients for the plants.

Do not accept carrying bags for your shopping in stores unless you really need them.

Give your food scraps to animals.

Maintain and repair households items (e.g. clothes, furniture, appliances) so they last longer.

Donate things you don't want instead of trashing them.

Borrow, rent or share things you don't use often (e.g. tools).

Buy reusable things (plastic or glass containers).

Replace your regular incandescent bulbs by low-energy fluorescent bulbs that last longer.

Order with minimal packaging, in concentrated form, or in bulk.

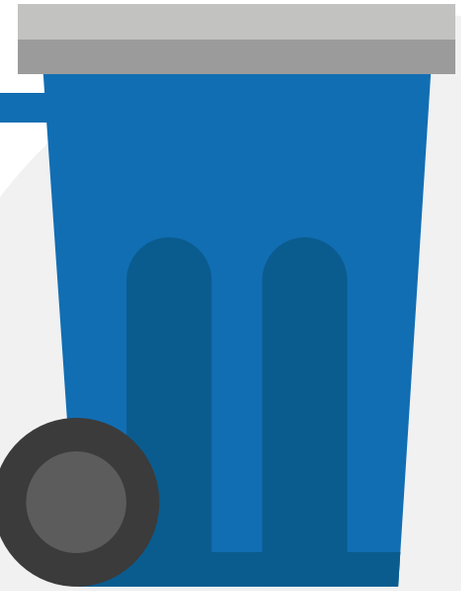
Request that bulk materials you order be shipped in returnable containers.

WASTE RECYCLING

SO, WHAT IS WASTE RECYCLING?

Basically, waste recycling can be defined as a process or mechanism in which used materials are reused to make new products to prevent the waste of raw materials.

In recent years recycling has become a priority in modern waste management since it is one of the three components of the waste hierarchy: Reduce, Reuse, Recycle (3Rs), which is one component of Integrated Solid Waste Management System (ISWMS). In other words, waste separation or "segregation" is the process of dividing garbage and waste products in an effort to reduce, reuse, and recycle materials. This also means dividing waste into dry and wet portions.



WASTE SEGREGATION

DRY WASTE
includes wood and related products, metals and glass.

WET WASTE
typically refers to organic waste usually generated by food establishments and are heavy in weight due to dampness.

WASTE CAN ALSO BE SEGREGATED ON BASIS OF

BIODEGRADABLE

NON-BIODEGRADABLE

LIMITATIONS AND CHALLENGES

Until now, there are no formal recycling or separation activities or infrastructures included in the entire public municipal SWM chain and systems in Jordan, and most of the currently running waste recycling and picking activities in Jordan are informal and being implemented by the private sector and/or individuals from the local community.

The SW recycling industry in Jordan remains untapped and most of the different existing and running SW recycling and waste picking activities are informal and limited to the private corporations, CBOs and NGOs as well as the individuals.

5–10% of Jordan's SW is being recycled at the moment, as there is no large-scale and effective government-run MSW sorting practices or recycling system yet in place[1].

PUBLIC AWARENESS

The public awareness and willingness of the local community in Jordan for waste recycling and separation practices are also not reaching the required level. Also the relevant public awareness campaigns were short term and carried out at pilot scales.

1 UNDP Jordan (2014) - www.hostcommunities-jo.org/focus-area/solid-waste-management/. Retrieved (17. March.2016

NEGATIVE IMPACT!

In absence of such kind of effective inventive programs. These weakly designed pilot public awareness campaigns are found not to be of proper positive impact, yet resulted in negative impact. Indeed, the public awareness campaigns should be considered as fundamental tools for increasing the social marketing of any waste recycling and sorting practices, and it should include different levels of social marketing and behavior change campaigns; in both of the upstream (advocacy) and downstream (behavior change) levels.

PILOT PROJECTS

The participation of the local Jordanian private sector in the different working fields of SWM is still limited and very modestly explored. Development in the Private-Public Partnership (PPP) concepts and models in waste recycling and segregation in Jordan has recently been explored, however, almost all MSW recycling activities in Jordan, present and past, are considered pilot projects and small-scale interventions. The vast majority of the running recycling pilot projects in Jordan are mostly initiated and supported by the NGOs and other international organizations; for short and/or mid–term funding schedules. The Corporate Social Responsibility (CSR) initiatives should be highlighted at the local community to ensure long-lasting and sustainable waste recycling and sorting practices in terms of investments, performance and outcomes.

In absence of national formal recycling systems or structures and due to the ever-present socio-economic needs especially in the poorer regions, an informal waste recycling sector consisting of local waste-pickers and scavengers has developed during the last twenty years.

Several thousand individual scavengers usually collect waste fractions of marketing value directly from the MSW collection containers dispatched over the urban cities, or the MSW delivered to the official landfill/dumpsites are sorted by them through a kind of contractual framework. In general, MSW recyclables are being collected through:

- Informal waste-pickers in the dumpsite level, usually selling to middlemen.
- Informal waste-pickers in the city level, usually selling to middlemen.
- Formal waste-pickers in the dumpsite level, being hired by contractors "small enterprises".

THE PUBLIC SHOULD PARTICIPATE!

In May 2015 a new National Strategy for MSWM was launched in Jordan to enhance the overall MSWM system including short, mid, and long term planning frameworks and implementation actions, infrastructure and investments, as well as the institutional setting at the national level. The National MSWM Strategy recommends mitigating the informal waste-picking of MSW through integration into the MSWM system including the establishment of partnerships between the public and the private sectors. The strategy motivates the public to participate in safe MSWM practices by increasing public awareness and education in MSWM related issues.

CAN WE APPLY THE RECYCLING PROCESS TO EVERYTHING?

The recycling process can be applied on a **household**, **farm**, **neighborhood** or **city scale**.

Depending on factors such as space **availability** and **location**, **logistics**, and **end product final use**.

SUCCESSFUL RECYCLING PROJECTS?

Incentive oriented programs and **awareness campaigns** should be considered as key components for the success of any intended SW recycling projects, and these components should be designed in line with the actual target group needs as per assessments that should be conducted in initiation phase.

MSW COMPOSITION AND INTERPRETATION

In 2015 According to the national solid waste master strategy issued, the average values of the MSW compositions according to the urbanization index are as follows:

MSW Sub-category	MSW Composition % based on Urbanization Index		
	0% - 50%	50% - 75%	75%- 100%
Food waste (organic)	65	57	50
Paper & cardboards	9	13	15
Plastics	9	13	15
Metals	2	3	4
Glass	2	3	4
Cloth	3	1	1
Wood & yard waste	5	2	1
Others	5	8	10
Governorates	Mafraq, Tafileh	Jerash, Madaba, Balqa, Ma'an, Karak	Amman, Irbid, Ajloun, Zarqa, Aqaba

Urbanization Index can be defined as the gross area of urbanely-cultivated spaces of a city or governorate attributed to the whole area of the governorate. In this context; it indicates the wealth and life-style development when contrasted with the composition of the SW for a given city.

EXAMPLE!

The organic waste for a city of 0% - 50% urbanization index is 65% of the whole collected SW of the city; whilst it drops to 50% of the SW for a city with higher urbanization Index. This drop can be attributed to **higher levels of other substances of SW** in more populated cities; due to factors such as consuming behaviors.

THE RECYCLABLE MATERIALS

PROSPECTS AND EXCEPTIONS

The recycling market and industry in Jordan is responsive and highly reactive to both endogenous and exogenous variables and shocks.

For instance, the local market prices are influenced by global commodity prices, internal demand and transport costs. The most impacting administrative measure is, however, the export duty taxation albeit limited to export oriented brokers.

IMPACT

Environmental regulations and production standards have some impacts on the recycling industry, which is very depending on the type of regulation and its level of enforcement.

For instance, the ban on recycled materials for plastic bags seems to have serious impact on the plastic recycling and manufacturers.

WHATS THE MAIN CHALLENGE TO JORDANIAN RECYCLING COMPANIES?

The high electricity prices are the main challenge to Jordanian plastics recycling companies. Moreover, the cost of energy multiplies its effect across the value chain of plastics, mainly when it is combined with the reduced international price.

STORAGE SPACE!

On the other hand, the informal recycling sector is less affected by taxation and customs regulations with the notable exception of the export duty tax on recyclables. The main challenges of informal sector (street waste pickers and itinerant waste buyers) are the limited availability of storage space. However, the recycling contractors at the dumping sites are the least vulnerable in this regard because they have access to plenty of storage capability either within disposal sites or in their proximity, and the costs for recovered materials cost coincide with those for labour.

Other challenge that is threatening the business of the informal sector is their vulnerability to price fluctuations. For instance, when unexpected drop in global prices occurs, the informal recyclers tend to sell at a loss to avoid incurring further losses and stop the trading in specific recyclables.

THE MSW COMPOSITION INCLUDES THE FOLLOWING RECYCLABLE MATERIALS

1. ORGANIC WASTE

50 AND 65 % OF GENERATED WASTE.

The organic waste (biowaste) is the predominant waste fraction within MSW and the major source of leachate and landfill gas. Moreover, it is the least valorized waste stream.

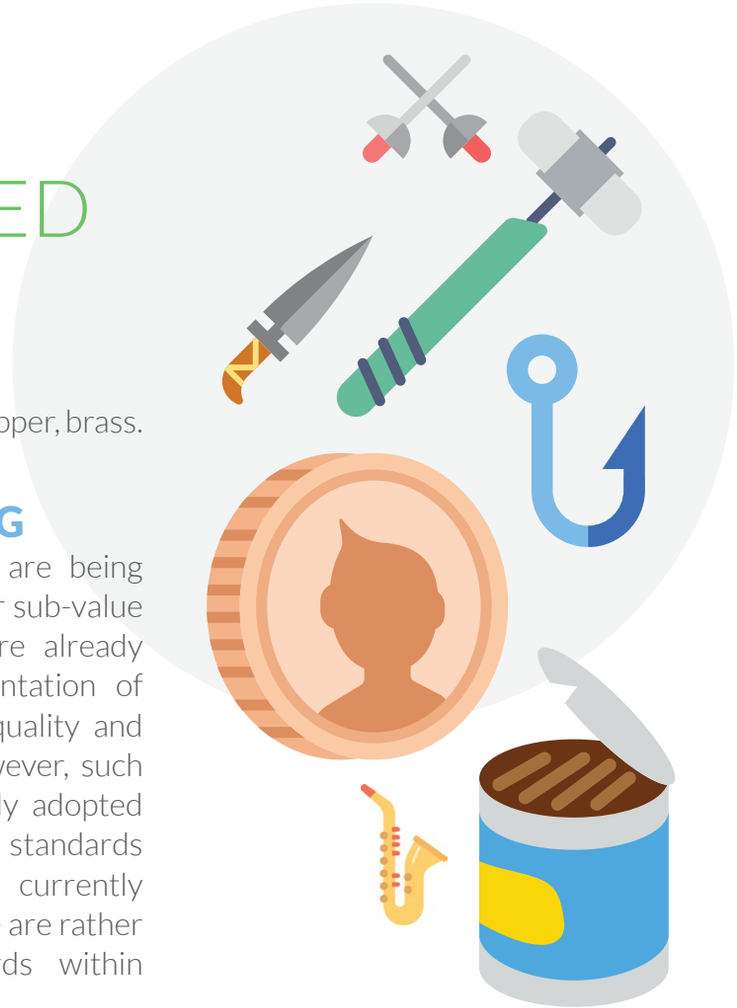
The organic waste includes:
fruits, vegetable residues, spoilt foodstuffs, leftovers, coffee grinds, tea-leaves, egg shells, garden waste, grass cuttings, dead leaves.

The only food waste being recovered is **bread**, which is then sold to sheep farmers for feedstock. For this reason (and possibly as a form of zakat) leftover bread is not thrown away directly in the trash bins, but is put in a bag next to it. Even in this case, such bags end up being transferred to the disposal sites; waste pickers operating there sort them along with other materials.

2. METALS

2 - 4% OF GENERATED WASTE.

Ferrous: iron, steel, tin.
Non-ferrous: aluminium, copper, brass.



METALS RECYCLING

Metals recycling activities are being more established than other sub-value chains. Metals recycling are already characterized by a segmentation of traded materials by type, quality and level of contamination: however, such practices are not universally adopted and there are no sectorial standards or best practices being currently enacted in Jordan, but there are rather different internal standards within each company.

RECYCLABLE	NONRECYLABLE
METAL	
Aluminum Cans (soda pop cans) Scrap Metal Tin Cans	Bottle and Jar Lids with Plastic Liners Cans Used for Chemicals or Paint Aerosol Spray Cans

3. PAPER AND CARDBOARD

9 AND 15% OF GENERATED WASTE.

Paper and cardboard recycling is now increasingly attentive to segmentation of recovered materials based on **origin**, **quality** and **contamination.**

However, such practices are more common among brokers exporting paper, as they compete on the global markets, and not among local recycling companies and the lower levels of the sub-value chain. Establishing different prices based on contamination and point of diversion and common standards for quality of the recyclables would allow for an increased quality of the recycled end products, expanding revenues throughout the whole sub-value chain, and promoting segregation at source.

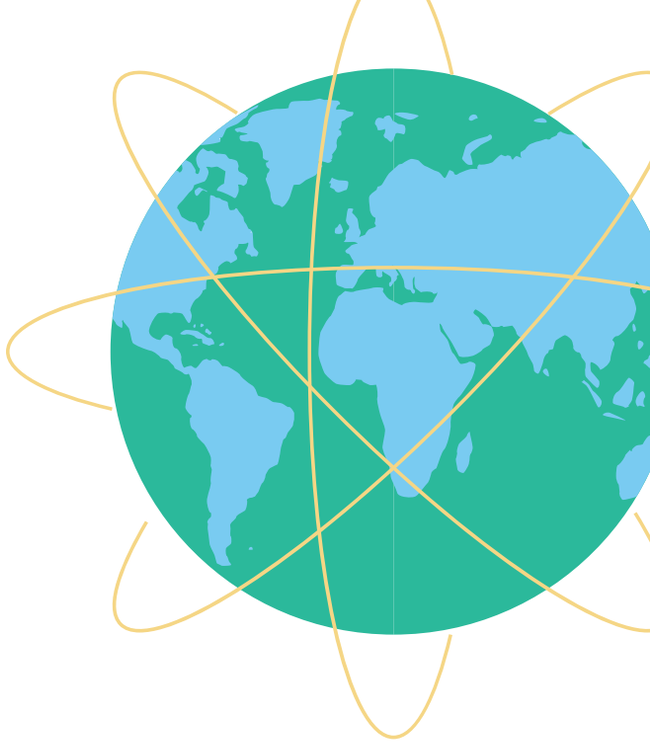
COMPETITION

The paper and cardboard market faces competition both internally and on the international markets, with raw virgin materials and imported recycled products being a viable substitute to the products recycled within national borders.

PRICE & QUALITY

In spite of an existing production of recycled paper in the country, some Jordanian cardboard manufacturers prefer to use imported substitutes as they present a better quality with a minimal price difference (525 USD per metric ton against 500 USD per metric ton).

Such recycled paper, along with many other paper products like paper towels, are imported from Saudi Arabia, and even Europe. Saudi products mainly benefit from reduced transportation costs, lower energy prices and increased economies of scale. Electricity prices seem, however, to bear the biggest burden on Jordanian companies, to the point most exported paper is shipped to Saudi Arabia to be then re-imported after recycling, and some businesses actually moved their production sites to the country.



RECYCLABLE	NONRECYLABLE
PAPER	
Newsprint - Office Paper Computer Paper - Phone Books Paper Grocery Bags Paper Egg Cartons	Soiled Paper - Wax or Plastic-coated Paper - Paper Laminated with Foil or Plastic - Used Paper Towels - Napkins - Tissues - Plates - Magazines - Catalogs
CARDBOARD	
Corrugated (packing boxes) Single Wall Cartons (cereal boxes)	Waxed Cardboard Waxed Milk Cartons

4. CLOTH: SYNTHETIC TEXTILE

Textile waste originates mostly from garment industries operating in the Free Trade Areas (FTAs, formerly Qualified Industrial Zones - QIZs), and its final destination depends on the scraps' size and composition.

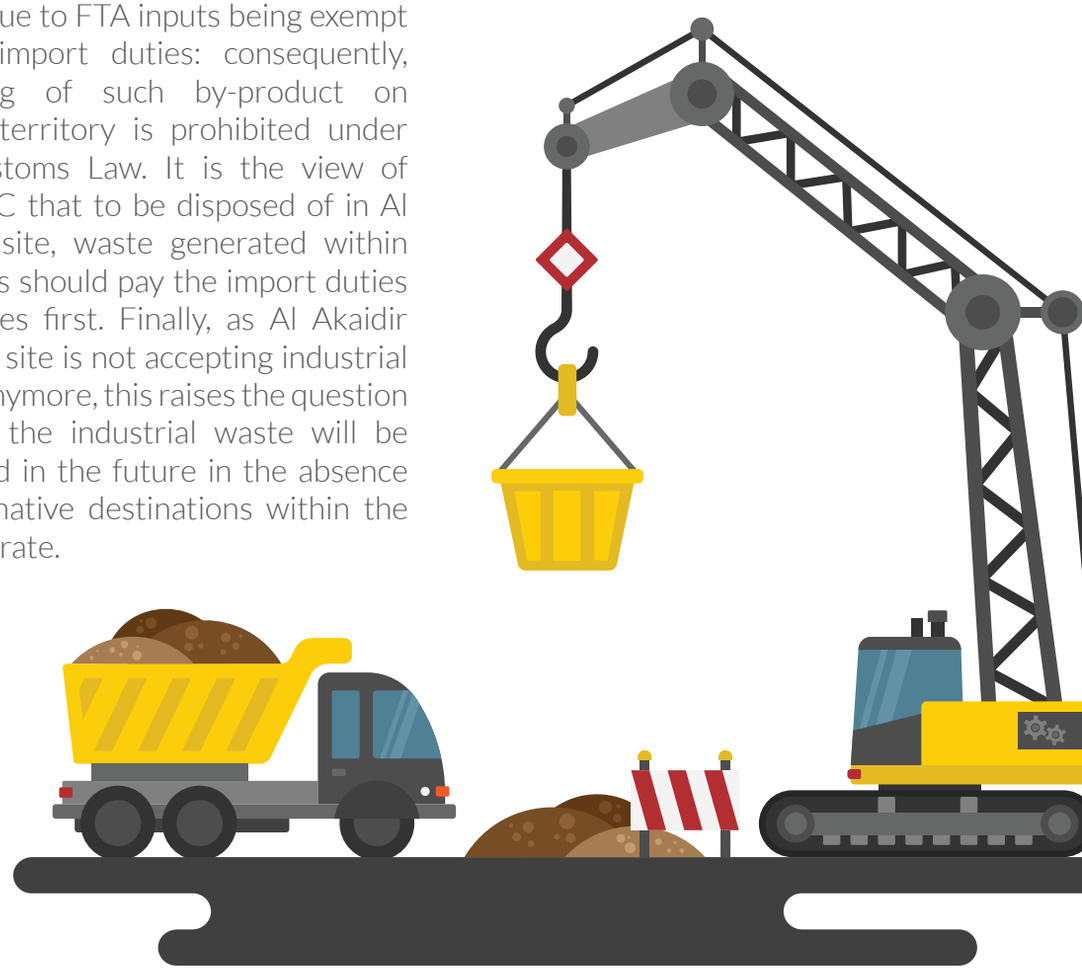
The Biggest Cloths cuttings (10x10 cm minimum) are sorted by manufacturers and then directly re-exported to Asia for reuse and recycling. **The Smaller scraps** are discarded by factories and end up in the waste streams. They are gathered by waste collection contractors and then sorted, based on their composition and final destination.

Cotton is sold to specialized brokers and exported to Egypt for reprocessing; white cotton scraps being especially sought after for the ease of dying. The market for recycled textiles experiences seasonal variations and offer can sometimes exceed current demand, thus making final disposal an alternative option to recycling. Synthetic scrap, oppositely, is sometimes sold to local companies for furniture fill; however, lacking a buyer for it, it's often the case it ends up in Al Akaidir dumpsite for disposal.

ABSENT ALTERNATIVES!

HOW WILL INDUSTRIAL WASTE BE MANAGED IN THE FUTURE?

Industrial waste from Free Trade Areas (FTAs) is not accepted in Al Akaideer, so the textile scraps are then dumped and burned just outside the site boundaries. This is due to FTA inputs being exempt from import duties: consequently, disposing of such by-product on Jordan territory is prohibited under the Customs Law. It is the view of Irbid JSC that to be disposed of in Al Akaidir site, waste generated within the FTAs should pay the import duties and levies first. Finally, as Al Akaidir disposal site is not accepting industrial waste anymore, this raises the question of how the industrial waste will be managed in the future in the absence of alternative destinations within the governorate.



5. PLASTIC

7 types of plastics identified by the Plastics Industry.
(SPI) code number ranging from 1 to 7. These numbers are usually found on the bottom of plastic containers inside a three-arrow recycling symbol. A description of each kind of plastic is presented below.

• PET (SPI = 1)

Polyethylene terephthalate (PET) is the most readily recyclable material at this time. Mostly in the form of plastic bottles, seems not to have a market in Irbid and Mafraq at the moment. This is an unusual state of affairs relative to other middle-income countries, where PET is one of the most widely traded plastic resins. This is due to a number of factors. First there is no internal market for recycled PET flakes as there is gap in the productive system: currently, there is no PET manufacturer employing recycled PET (rPET).

At the same time, the recent drop in oil prices has led to a major slowdown in rPET exports, with the exception of a handful of specialized brokers, mostly based in Zarqa and Amman. Consequently, the reduced prices paid to waste brokers had a knock-on effect on PET collection, due to the logistical costs of transporting the material from the North. Nonetheless, some actors who can afford to spare the required storage space are still accumulating PET bottles, waiting for commodity prices to rise again.

• HDPE (SPI = 2)

High-Density Polyethylene (HDPE) is currently recyclable in some areas. This class includes milk, juice, and water jugs, base cups for some plastic soda bottles, as well as bottles for laundry detergent, fabric softener, lotion, motor oil, and antifreeze.

• PVC (SPI = 3)

Polyvinyl Chloride (PVC, also referred to simply as “vinyl”) includes bottles for cooking oil, and mouthwash, as well as “blister packs” used for batteries and other hardware and toys.

• LDPE (SPI = 4)

Low-Density Polyethylene (LDPE) includes grocery bags, bread bags, trash bags, and a variety of other film products.

Nylon, as LDPE and PE bags and other plastic sheeting are commonly referred to in Jordan, is currently recovered to be recycled in country, but only to a minor extent compared to other plastics. The recent introduction of a ban for recycled plastic in plastic bags destined to contain food items will likely depress an already declining market for recycled PE.

CONTAMINATION IS THE MAIN LIMITING FACTOR TO RECOVERY!

Lack of source segregation and, consequently, contamination is the main limiting factor to recovery, as it introduces new costs to the recycling process in terms of cleaning and consequently, with stricter production standards in place, reduced marketability. For these reasons recyclers are now increasingly favouring pre-sorted waste from factories to plastic sheets recovered in the dumpsites.

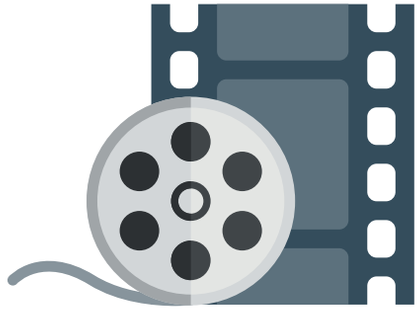
This is symptomatic of a general weakness of Jordan waste market place, where there is segmentation of materials diverted from the waste stream based on origin, quality and contamination levels is in its infancy.

POLYPROPYLENE (SPI = 5)

Polypropylene includes a wide variety of packaging such as yogurt containers, shampoo bottles, and margarine tubs. Also cereal box liners, rope and strapping, combs, and battery cases.

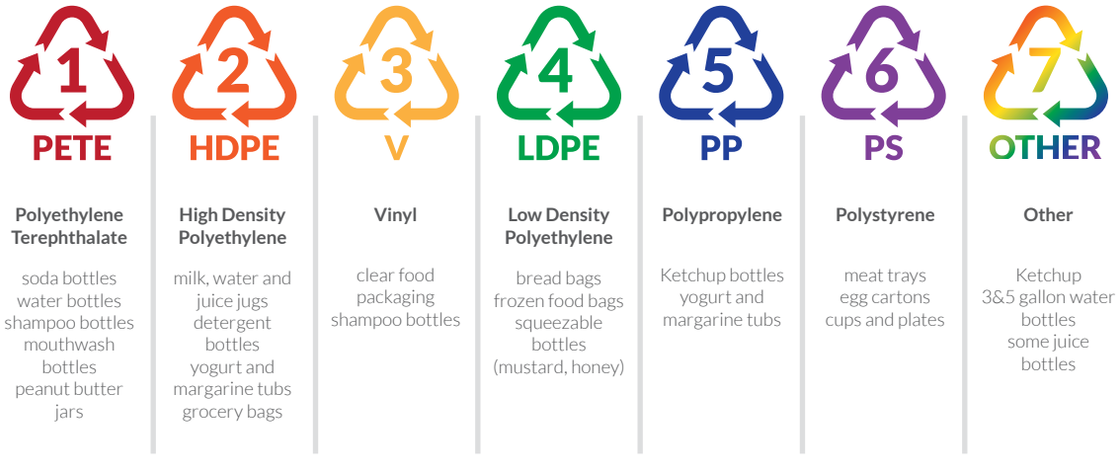
POLYSTYRENE (SPI = 6)

Polystyrene includes Styrofoam coffee cups, food trays, and "clamshell" packaging, as well as some yogurt tubs, clear carry-out containers, and plastic cutlery. Foam applications are sometimes called EPA, or Expanded Polystyrene. Some recycling of polystyrene is taking place, but is limited by it low weight-to-volume ration and its value as a commodity.



OTHER (SPI = 7)

Can refer to application which use some of the above six resins in combination or to the collection of the individual resins as mixed plastic (e.g., camera film can include several types of plastic resins). Technology exists to make useful items such as plastic "lumber" out of mixed plastic resins, but generally the materials are more useful and valuable is separated into the generic resin types described above.



6. GLASS

Before the Syrian crisis, glass was exported via Syria to Lebanon for recycling into local furnaces. This practice ended with the start of the Syrian civil war and consequent closure of the border with Syria.

WEAKER INTERNAL DEMAND!

Nowadays, glass is reported to offer too little value for being considered for recycling, and therefore there is no glass recycling taking place in Mafraq and Irbid, nor in the rest of the country. Weak internal demand led to the absence of glass factories in Jordan, with most manufacturing capacity concentrated in treating and processing imported glass, rather than producing the material. High transport costs in relation to the very low profit margins are another major constraint to glass recycling, a factor accentuated by the absence of regional alternative destinations to Lebanon.

There are nonetheless minor re-use and recycling activities seldom taking place. It is reported whole drinks' glass bottles are recovered, possibly due to existing buyback schemes for sodas and other drinks. Windowpanes are also being recovered for re-use along with other objects and materials from building demolitions.

RECYCLABLE	NONRECYLABLE
GLASS	
Jars Bottles (clear, green or brown)	Light Bulbs Glassware (cups, glasses, plates, etc.) Mirrors

7. CONSTRUCTION AND DEMOLITION (C&D) WASTE

Most excavation material and debris is dumped on the side of the streets, in illegal dumps, or simply next to the construction sites, with steel rods and wood being systematically recovered. Steel bars are either directly re-used after manual re-processing or sold as scrap to local scrapyards. Wood is recovered as fuel, or shredded and then sold as bedding to chicken farms. Any recoverable items in the house, such as doors, door and window frames, windowpanes, roof tiles, bathroom fixtures and so on are systematically recovered and bought by the specialised second hand trade.

8. TYRES

According to the literature, approximately one million pieces/year of the waste tyres are recycled and utilized in energy recovery.

9. WEEE (E-WASTE)

According to the literature, the WEEE is approximately 8500-9000 pieces/year which are recycled and exported. The e-waste includes PCs, white goods, batteries, CRTs & flat screens.

MARKET PRICES OF RECYCLABLES

The current prices of recyclable materials (January 2016) in the local market, based on the recent supply and demand status, are shown as follows:

RECYCLABLE ITEM	PRICE [JOD/TONE]
Mixed Plastics	280
PET	80
Nylon	250
Steel waste	65
Aluminum waste	600
Paper	35
Cardboard	30
Newspapers	40
Paper magazines	35

However, these prices are subject to change based on several market parameters and fuel prices.

RECYCLING COLLECTORS AND MANUFACTURES

If you are committed to helping the environment and want to make a deference in your workspace or home by introducing recycling.

Contact information for the main local recycling private sector, manufactures and other involved informal pickers and collectors are available in the index at the end of the booklet.

RECYCLING, UPCYCLING AND REUSE INITIATIVE

Upcycling, also known as creative reuse, is the process of transforming by-products, waste materials, useless and/or unwanted products into new materials or products of better quality or for better environmental value.

Contact information for some Upcycling initiatives are available in the index at the end of the booklet.

COLLECTION POINTS & CENTERS

There are two collection points that can be used by the public to discard recyclable materials in. These two points are located in Amman as shown below:

QUEEN RANIA SCHOOL FOR GIRLS - ABDOUN

this point was established by Jodan Green Building Council through (Dawerha Project).

COZMO SUPER MARKET SWEIFIEH

IDENTIFIED POTENTIAL RECYCLING COMPONENTS

POTENTIAL OPPORTUNITIES FOR CREATING JOBS!

The collection, sorting and processing of waste and reusable materials create considerable employment opportunities. More importantly, waste management chain creates substantial employment opportunities for less qualified people too. Therefore, the following have been identified as potential opportunities for creating jobs in MSW work activities:

PUBLIC AWARENESS CAMPAIGNS

- **PARTICIPATION OF NGO/CBO**

NGOs/CBOs often create crucial links between the formal and the informal private sector, in addition, to the Public Private Partnership (PPP). Furthermore, the NGOs/CBOs can effectively promote the "Re-use" option in the waste management hierarchy.

Entrepreneurial and innovative ideas can be promoted to unleash a "Waste Reuse-to-product" activities and small projects. This in fact needs **small grant/cash** to start up such viable business activities.

For instance, an entrepreneurial project idea for the reducing of the use of plastic bags in the market area through the production of shopping bags using reusable damaged tent material. The production of shopping bags in the recycling and reuse project is not for monetary gain but for environmental impact and concerns to reduce the use of plastic bags.

HERE ARE SOME BUT NOT LIMITED EXAMPLES:

Tin Can + Lid Solar cooker

House out of bottles

Plastic bottles Bricks

Fancy doll from waste materials

Re-use Plastics for handcrafts and mats production

• DOOR STEPPING

Doorstepping is already considered as an effective method for changing recycling behavior. It basically implies that persons involved in the recycling program knock at the doors of households to deliver information, having a (usually short) interaction at the doorstep regarding the importance of at source separation.

EFFECTIVE DOORSTEPPING

In recycling programs it is common for households to be informed in advance, and sometimes, for a local person to accompany the Doorsteppers to effectively make an introduction and give them credibility.

BEHAVIOR CHANGE

The main aim in designing a Doorstepping intervention is to achieve the target behavior change – in this case to increase the fraction of recyclables waste actually recycled. Moreover, the main message comprising the content of the information given at the door would be about the environmental consequences of waste sorting.

In this context **females are best fit for Doorstepping activities** (Job creation). Thus, they shall be well trained beforehand, and carry rehearsals (job creation and know-how transfer), to ensure they deliver the right message of waste recycling. However, Doorstepping activities will be done under umbrella of local NGOs/CBOs to avoid any possible negative social reactions at the local community.

STREETS SWEEPING

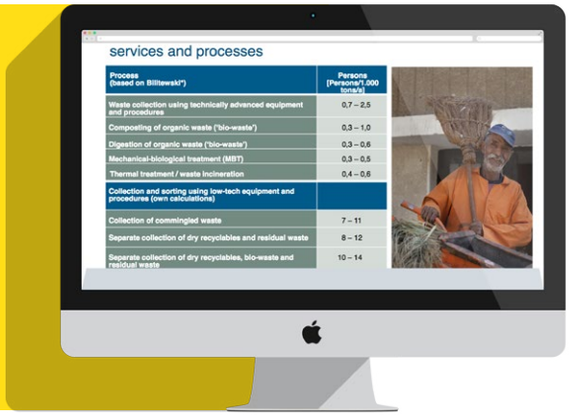
COLLECTION & SORTING
DOOR TO DOOR COLLECTION

As successfully investigated and proposed by **Dr.-Ing. Wolfgang Pfaff-Simonei**t model:

"The labor-intensive collection concepts based on technically simple processes generate vast employment opportunities."

The following Table shows the staffing requirements for different waste-management services and processes.

Kindly, check the attached link for more information
& to view the table:
http://bit.ly/drwolfgang



THEREFORE,

The amounts of recyclables that can be collected on daily basis depend on the tool [bag, pushcarts, animal-pulled cart, and motorized cart]. As shown in the table, each of these collection tools can enable the waste picker/street sweeper/collector to walk/drive through specific distance and gain certain amount of recyclables.

RECYCLABLES AMOUNTS COLLECTED ON DAILY BASIS USING DIFFERENT MEANS OF COLLECTION

6-7 KM/D
9-40 KG/D

10-15 KM/D
500 KG/D

6-10KM/D
200 KG/D

20-25 KM/D
25-60 KG/D

2,000-3,000 KG/D

The concept of **Dr.-Ing. Wolfgang** proposes that as long as the producers do not themselves pre-sort their waste, it is the responsibility of the collection personnel to sort the waste handed over to them directly at the front doors or on the pushcart, which is equipped with an appropriate number of standardised waste containers (MGB - “large refuse containers”)

Door to Door collection using several Standardized waste containers with a trolley.

SEPARATION AT SOURCE "INTO TWO FRACTIONS" (ORGANIC AND NON-ORGANIC)

CLEANLINESS

Mixed waste collection from municipalities increases the risk of contamination of recyclables and reduces their marketing possibilities. Cleaner materials are more valuable to re-processors and a higher proportion of these can be recycled.

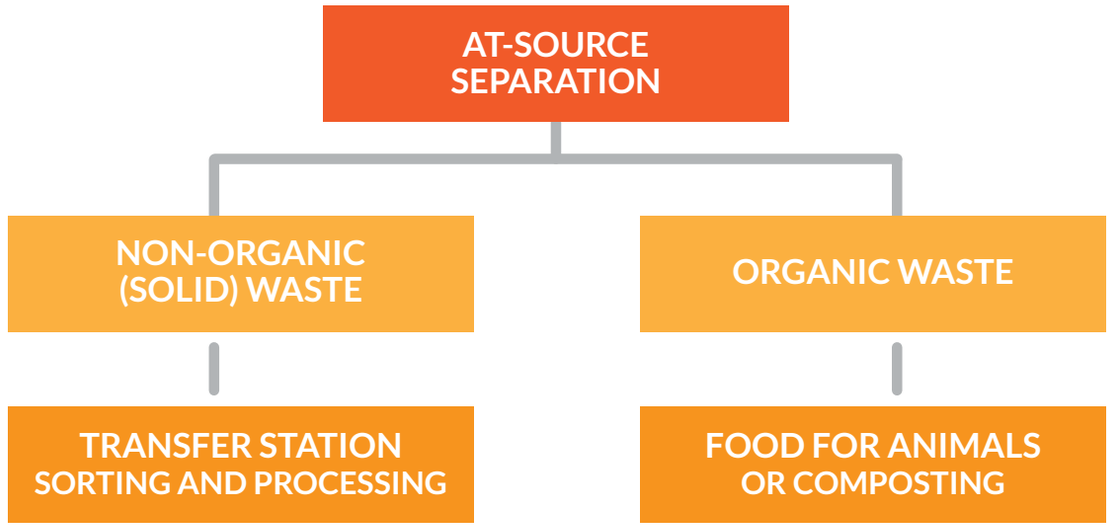
SEGREGATION

The proposed option in this project is to segregate the households waste into two fractions: organic waste to be delivered to the composting plant(s); while keeping the non-organic in the districts' houses to be sorted and separated by the street sweepers/ waste pickers, and eventually to be delivered to Waste Recycle Banks/ Buy-back centers.

OVERCOMING A NEGATIVE IMPACT!

When the collected mixed wastes are landfilled, the organic wastes have very high methane production potential in the landfill thus have a negative impact on the environment. The best way to overcome this problem is to use source separation of waste.

THE FIGURE SHOWS THE MATERIALS FLOW OF SOURCE SEPARATION SCHEME EXCLUDING THE FINAL FATE (LANDFILLING OR INCINERATION)



CONTAMINATION FREE

To produce a **good quality** of separated waste, it is vital that the collected material is free from contamination. To achieve this, it is important that clear guidance is provided to households / waste producers on the type of waste accepted in the scheme, and that this is monitored by the collection crew. The households /waste producers that do not adequately comply can be targeted for further guidance and support (Public Awareness Campaign).

NON-ORGANIC WASTE SOURCE SEPARATION

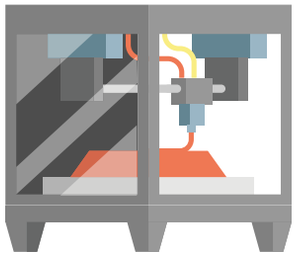
IN THE COMMERCIAL & INSTITUTIONAL CLUSTERS

This option involves separate collection of recyclables. Most usually, a number of four or more different bins/containers, as shown in the previous figure where they are being used to separate MSW into the following streams:

- Paper and cardboard
- Plastics; Metals
- Glass (optional)
- Residues (mixed waste).

HIGH PURITY OF RECLAIMED MATERIALS

The main advantage of this option is the respectively high purity of reclaimed materials, which allows for direct selling to the industry or reduces significantly the refining effort required. Further separation per specific sub-fraction may be elaborated in “clean” MRFs, achieving very good quality of recyclables (e.g. plastics divided in PET, PVC, PE, HDPE, film, etc.) and selling prices.



On the other hand, separate collection per each waste material requires relatively higher capital and operational cost, due to the bigger number of bins/containers, larger space requirements, bigger collection trucks fleet and higher number of kilometers per tons of collected MSW, etc. For the large commercial clusters, fixed large sized containers or static hydraulic containers can be used.

This option can be implemented in the commercial and institutional clusters in the governorate, mainly around the university, big malls and shopping centers. In general, the greater the degree of separation, the more complex, time consuming and costly it becomes, but on the other hand constitutes greater downstream benefits.

WASTE RECYCLE BANK

(BUY-BACK CENTER)

The waste cycle of Northern Jordan depends to a great extent on effective markets in Amman and Zarqa as this is where most of the recycling and manufacturing capacity of Jordan is located.

This identifies the increasing **transport costs** of the middleman the further they are located from the capital, and the weakening of the value chain in the peripheral areas of the country.

WASTE RECYCLE BANKS

would strengthen and expand the existing supply chain for recycled materials by creating collection points in more remote areas reducing transport time and costs for both waste pickers and itinerant waste brokers. Depending on the type of involvement of local government, Waste Recycle Banks can be transfer and sorting stations directly managed by the municipality, benefiting from both reduced quantities to be sent for disposal and the sale of recycled material. If that were not to be the case, Waste Recycle Banks can also be managed at a community level by CBO or simply by local waste brokers willing to expand their reach.

HOW DOES IT WORK?

The municipality or the NGO/CBO acts as a trader by buying recyclables, i.e., plastics, paper, glass, aluminum items, and metals, from Waste Recycle Bank's members and sorts these recyclables to increase the resale value. Finally, the municipality or the NGO/CBO sells sorted materials to a recycling company. Members and Waste Recycle Bank officers witness the weighting and sign in the transaction recording book. Here lies further opportunities for greater coordination between micro/meso businesses - and some further logistical involvement from the municipality regarding more effective and increased number of transit stations, time keeping and regularity of 'drops', so street pickers are in place to segregate.

It is evident that the relationship between Waste Recycle Bank (buy-back centers) and collectors are symbiotic in that both can benefit from each other. The success of these centers rests, amongst others, on the amount of material supplied to them by collectors. The Waste Recycle Bank can accept all recyclable refuse as shown in Figure:

RECYCLABLE REFUSE THAT ARE ACCEPTED AT THE WASTE RECYCLE BANK

- Fridges & Freezers
- Low energy bulbs
- Telephone directions
- Used Engine Oil
- Building Material
- Large Appliances
- Clear glass bottles & jars
- Books
- Mixed textiles & clothes
- Gas Bottles
- Electrical
- Brown glass bottles & jars
- Household plastic packaging
- Shoes
- Household & garden chemicals
- Small Appliances
- Green glass bottles & jars
- Aerosols
- Furniture
- Garden Waste
- TV & Monitors
- Paper
- Food tins & Drink cans
- Carpet
- Cooking Oil
- Batteries
- Cardboard
- Large tins
- Paint
- Household Waste
- Flurescent tubes
- Newspaper & Magazines
- Scrap Metal
- Wood & Timber
- Mixed Recycling

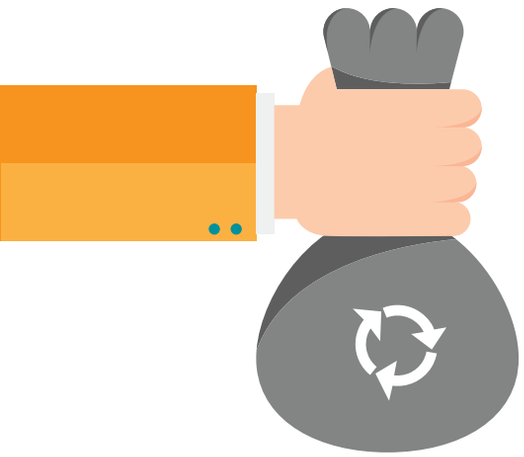
RECYCLING INCENTIVE SCHEMES

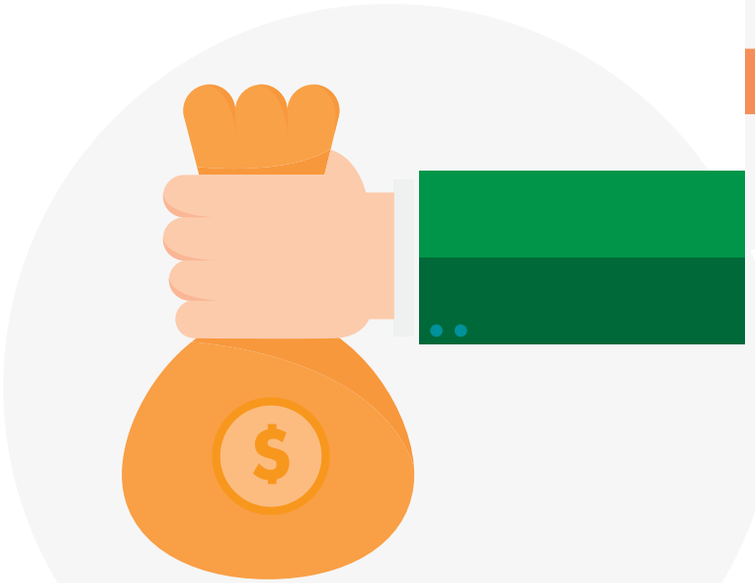
1. RECYCLING PROGRAM FOR SCHOOLS: SORT IT TO WIN

Sort it to Win is a campaign that shall encourage school to recycle more of their waste. The campaign is for schools students and their families whose recycling bins are presented every collection day throughout a four-week period entered into a prize draw to win a prize to the certain financial value. There will be five winners every four weeks. Prizes can be put towards a voucher which will be redeemable at many shops within the district.

2. "CASH FOR TRASH" SCHEME

In the Waste Recycle Bank, any residents/households can earn cash for their trash through the waste recycling initiatives and programs. Participating households simply sign up to have their recycling bins outfitted with special ID tags. These bins will then be weighed each time they are collected, and the weight of the recycled goods translates into points which can then be redeemed at a variety of local retailers. Other option is to deliver the waste to the Waste Recycle Bank's gate; once it is weighed then it is recorded into points as stated earlier.





WASTE SORTING AT THE TRANSFER STATIONS

1. TRANSFER STATIONS

Several Transfer Stations have been established by Municipalities or JSCs in many places of Jordan **(5 in Northern region, 5 in Centeral region, 4 in Southern region)** in order to minimize the transportation cost through reduced labor and operating costs, when MSW needs to be transported to a distant receptor. They also reduce the total number of vehicular trips traveling to and from the receptor.

Recycling activities have to be enhanced by establishing appropriate recycling facilities at transfer stations. The facility is designed in a flexible way to handle different input materials (residual waste or separate source collected materials) and segregate different recyclables depending on their marketing potential. The facility also includes a biological treatment for producing compost or RDF material.

The combined treatment facility will simultaneously act as transfer station, because the waste has to be unloaded there for sorting and treatment anyways prior to further transportation to the disposal site.

This facility can be owned and operated by the municipality, by a joint municipal company or by the JSC. Private sector participation (PSP) is possible, when the facility is publicly owned and the operation contracted to the private sector. This Figure shows an example for simple MSW recycling facility with semi-automatic processing.

SIMPLE MSW RECYCLING FACILITY WITH SEMI-AUTOMATIC PROCESSING

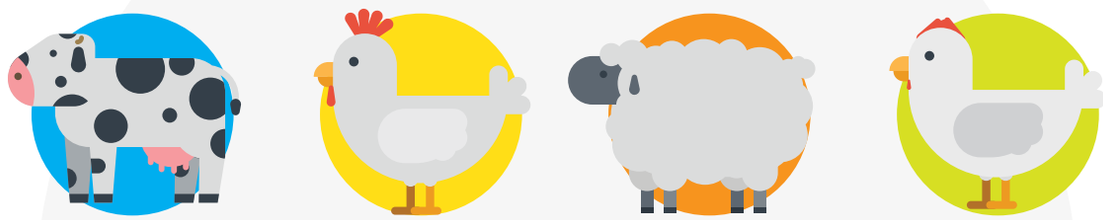
2. AEROBIC WINDROW COMPOSTING FACILITY

WHAT IS COMPOSITING?

Composting is the term used for the decomposition process that occurs naturally in the environment, in the presence of atmospheric oxygen. The technical process of composting is essentially a controlled and accelerated version of the natural process. Compost is used as soil improver and as fertilizer for plants. Its application to provide the nutrients to the soil, and it contributes to moisture retention and improves soil structure and texture. Using compost made from recycling, such as organic wastes, is considered environmentally sustainable.

Compost can be produced on a **small scale**, for example an individual household, or on a large industrial scale for market purposes. There is evidence of composting taking place on a small scale in selected locations in Jordan, to support small orchards at household level. The price of compost has reported to be, literally "the cost of transporting it". The main obstacle is then from the supply side, rather than the demand: weak enforcement of environmental regulations, lack of policies targeting organic waste, and the absence of composting plants all contribute to this gap in the waste value chain.

The results of survey which was conducted by **Jordanian Department of Statistics in 2009** indicate that the number of working farms in Jordan (2283 farms). The survey was updated by the Ministry of Agriculture in **2013/2014**.



982 COW FARMS

1553 BROILER FARMS

77 SHEEP FARMS

221 LAYING HENS FARMS

1,662,650

TONS OF WET MANURE EXPECTED TO BE PRODUCED EVERY YEAR!

The feasibility of establishing of compositing plant and the potential of job creation in such project, can be determined once the number of working livestock farm, number of animals, and amount of generated manure are provided in the targeted area. the figure shows the aerobic windrow composting station with medium to large scale capacity.

AEROBIC WINDROW COMPOSTING STATION WITH MEDIUM TO LARGE SCALE CAPACITY

RDF(REFUSE-DERIVED FUEL) PLANT

A SAMPLE FOR RDF FLUFF FROM MSW

One of the most favorable MSWM strategies is energy recovery from MSW to obtain cleaner renewable energy for industries. Among many WtE strategies, Refuse-Derived Fuel (RDF) is a solid recovered fuel that can be used as a substitute for conventional fossil fuel, as shown in the Figure

RDF is an alternative fuel produced from energy-rich MSW materials diverted from landfills. RDF can be used as a substitute energy source in different industries. An industry that is particularly well-suited to the employment of alternative fuels is the cement industry.

200 JOBS

Landfill is the most costly waste management and disposal option, as the odor, emissions, and soil erosion controlling require constant monitoring, and its environmental impacts are the highest. The maximum landfill saved is equal to the amount of RDF produced (to account for the landfill after RDF production as well). The RDF projects create from tens of direct jobs up to 200 jobs through the design, construction, and maintenance of a new facility.

THERE IS NO RDF PRODUCTION!

Presently, there is no RDF production to serve as supplementary fuel for cement industries in Jordan. This is due to lack of information for decision makers and investors to introduce RDF plant. Moreover, RDF can be served as supplementary fuel for specific types of industry. Therefore, it is needed to investigate the industries which can use RDF and have potential to handle with emission. RDF specification from potential users has to be investigated in order to make RDF that conforms to users' requirement.

2.5 MILLION waste tyres generated on Jordan annually **(1 million tyres are generated as a waste in Irbid and Mafraq governorates)**, therefore, the RDF plant can deal with the shredding and preparation of the waste tyres (95-99% rubber) to be utilized for heat recovery in the cement incinerators, as shown in the figure:

EXAMPLE FOR RECYCLED TYRE MATERIAL

RECYCLING PRIVATE SECTOR

	Name of Company / Entity	Contact Person(s) & Position	Tel. / Fax	Mobile	Email / Website	Physical Address	Area of interest
1	Jordan Environment Society (non-profit NOGs)	Ma'an Nasayrah Amneh Eid	+96265238205 +96265238146	+962798786339	jes@jes.org.jo	Amman-Jordan P.O. Box: 922821 Amman 11192	Paper, cardboard, metal, plastic
	جمعية البيئة الاردنية	معن نصايرة آمنة عيد			www.jes.org.jo	Shafa Badran District	
2	The First for paper & cartoon recycling	Khalid Naser	+96264163300 +96264163303	-	khnasr@hotmail.com	P.O.Box 8681 11121 Amman, Jordan	Paper, cardboard and plastics
	الاولى لتدوير الورق والكرتون	خالد نصر				Al-Rajeeb – Next to Mercedes Benz	
3	Entity Green (Old Name of the company)	Mahmood Aboud	+96264724001	+962776606707	om@be.jo	Amman - Jordan	paper, cardboard, plastic, metals
	شركة بيئي لخدمة البيئة ذ.م.م	محمود عبود			www.be.jo	Amman, Jordan P.O. Box 2551, Amman 11181	
4	Green Future for Sustainable Solutions	Hanan Murad	+96264628281	+962795839502	Majid.greenfuture@gmail.com	3rd Circle, Khatib St. Behind Aqila Hospital - Jabal Amman	All recyclables
	المستقبل الاخضر للحلول المستدامة	حنان مراد					
5	Bas waraq (NGO)	Shadi Al-Jahran	-	+962796330049	info@Baswaraq.com	48, Radhi Innab Street, Al Jandaweel Amman, Jordan	Paper
	مؤسسة بس ورق	شادي الجهران			www.baswaraq.com		
6	Jordan for recycling computers and electronic devices (Jocycle)	Jamal Salahat Atef Thawabteh	-	+962772484287 +962790878180	info@jocycle.com.jo jml_bader@hotmail.com	Sahab – Behind Police housing compound – next to Al-sharif mosque	E-waste, Hazardous waste containers and capacity building
	الاردنية لاعادة تدوير اجهزة الحاسوب الاجهزة الالكترونية جو سايكل	جمال صلاحات عاطف ثوابته			www.jocycle.com.jo		
7	Universal for Recycling & Trading LLC	-	+96265939862	-	info@unirecycle.com	Abdoun, Cairo Street Building 27	Paper, plastic, metals
	العالمية لاعادة التدوير والتجارة		+96265939863		www.unirecycle.com	P.O. Box: 851949 11185 Amman, Jordan	
8	New earth for used paper & cartoon trading	Mohammed Khalaf	+96264165451	+962798560392	basharelasmar@yahoo.com	Amman-Jordan P.O.Box 928 Postcode 11118	Paper, cardboard
	الارض الجديده لتجارة الورق والكرتون المستهلك	محمد خلف			-		
9	Clean City for Waste Management	Hassan Wahdani	+96264636516	+962799870707	adel.z@nassegroup.com.jo	Jabal Webdeh, Al Baonyeh St. Building No. 14 Aqaba, Amman	Collection, transportation of waste Waste Containers supplier
	شركة المدينة النظيفة	Mohmmad Wahdani			www.cleancityjo.com		
10	Queen Zain Al-Sharaf Charity Association/ Mafraq branch	Om osama Telelan	+96226234806	+962777787686	N/A	Mafraq- Jordan	Collection
11	Mosawah center	Ahmad Khwaldeh	N/A	+962797773028	N/A	Mafraq- Jordan	Collection
12	Individual Waste Picking Middleman	Ibrahim Saeed	N/A	+962786853107 +962785798682	N/A	Mafraq- Jordan	Collection
13	الهيئة الخيرية الاردنية الهاشمية (Clothes Bank)	-	+96264646644	-	http://www.jhco.org.jo/	Amman - Maan	Clothes
14	اسرع خطوة للتدوير	احمد الجميلي	-	+962789440500 +962799335251	fasterstep@gmail.com	Wadi al Ser	Collection, transportation, recycling, Paper, Cardboards, Plastic
15	Individual Collector	Wesam AlSharafat	-	+962788245398 +962790219669	WAlSharafat@oxfam.org.uk	Zaatari Camp	Collection

RECYCLING, UPCYCLING AND REUSE INITIATIVES

	Initiative Name	Phone number	FB page	Category	Material
1	Auto Art	+962795555120	auto-art	Furniture, Home accessories	cars motorbikes, airplanes
2	Zawayed	+962795334185	Zawayed	Souvenirs, Home accessories	Paper, Wood
3	Wheels	+962796009545	Wheels	Furniture, Decoration	Wheels
4	Khordda	+962799943795	Khordda خردة	Furniture, Home accessories, Handbags	plastic bags bottles, wood, metal
5	Ziadat for recycling	+962797270806	Ziadat for recycling	Ziadat for recycling	Pallet wood, others
6	Hangit	+96279993 3363	Hangit upcycled wire hangers	Home accessories	Wire Hangers, plexiglass
7	Badr Adduja	+96264650470 +962795526924	Badr Adduja	jewelries Home accessories, Furniture, clothing	All materials
8	Min Khashab	+962799454660 +962795155287	Min Khashab من خشب	Home accessories	Wood, wheels

ABBREVIATIONS

SW	:	Solid Waste
MSW	:	Municipal Solid Waste
SWM	:	Solid Waste Management
MOMA	:	Ministry Of Municipal Affairs
MOENV	:	Ministry Of Environment
JSCs	:	Joint Services Councils
GAM	:	Greater Amman Municipality
ASEZA	:	Aqaba Special Economic Zone Authority
CBOs	:	Community Based Organizations
NGO	:	Non-Governmental Organizations
PPP	:	Private-Public Partnership
CSR	:	Corporate Social Responsibility
MSWM	:	Municipal Solid Waste Management
ISWMS	:	Integrated Solid Waste Management System
FTAs	:	Free Trade Areas
PSP	:	Private Sector Participation
RDF	:	Refuse-Derived Fuel

JORDAN GBC
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Jordan Green Building Council

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