



Expert Facility Activity No: EFH-IL-4

Main issues and problems identified in the Israeli glass market and recommendations

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1	Main issues and problems identified in the Israeli glass market and recommendations	Christian Deltenre, Raf Vanswartenbrouck, Lisa Labriga	Tamar Raviv



THE SWIM AND H2020 SUPPORT MECHANISM PROJECT (2016-2019)

The SWIM-H2020 SM is a Regional Technical Support Program that includes the following Partner Countries (PCs): Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, [Syria] and Tunisia. However, in order to ensure the coherence and effectiveness of Union financing or to foster regional co-operation, eligibility of specific actions will be extended to the Western Balkan countries (Albania, Bosnia Herzegovina and Montenegro), Turkey and Mauritania. The Program is funded by the European Neighbourhood Instrument (ENI) South/Environment. It ensures the continuation of EU's regional support to ENP South countries in the fields of water management, marine pollution prevention and adds value to other important EU-funded regional programs in related fields, in particular the SWITCH-Med program, and the Clima South program, as well as to projects under the EU bilateral programming, where environment and water are identified as priority sectors for the EU co-operation. It complements and provides operational partnerships and links with the projects labelled by the Union for the Mediterranean, project preparation facilities in particular MESHIP phase II and with the next phase of the ENPI-SEIS project on environmental information systems, whereas its work plan will be coherent with, and supportive of, the Barcelona Convention and its Mediterranean Action Plan.

The overall objective of the Program is to contribute to reduced marine pollution and a more sustainable use of scarce water resources. The Technical Assistance services are grouped in 6 work packages: WP1. Expert facility, WP2. Peer-to-peer experience sharing and dialogue, WP3. Training activities, WP4. Communication and visibility, WP5. Capitalizing the lessons learnt, good practices and success stories and WP6. Support activities.



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ABBREVIATIONS

BB	Bring Bank
d	Day
DtD	Door-to-Door
ELA	ELA Recycling Corporation
EPR	Extended Producer Responsibility
GPP	Green Public Procurement
ILS	Shekel
Inh.	Inhabitants
l	Litre
m	Month
MoEP	Ministry of Environmental Protection
MRF	Materials recovery facility
NIMBY	Not in my backyard
p	Person
PET	Polyethylene terephthalate
PRO	Producer Responsibility Organisation
t	Tonne
UK	United Kingdom of Great Britain and Northern Ireland
VAT	Value-added tax
w	Week
WEEE	Waste Electrical and Electronic Equipment



INTRODUCTION AND METHODOLOGY

Israel's waste management policies and regulations have evolved from mainly addressing unregulated waste dumping in the 1980s to a focus on integrated waste management, which promotes reduction at source, reuse, and recovery. The Districts of the Ministry of Environmental Protection (MoEP) are responsible for implementing waste management policy (as well as other national environmental policies). Israel's ultimate objective is a zero-waste policy, aimed at gradually decreasing the amount of non-recyclable waste created, such that within a number of years there will be only one landfill in Israel.

Local authorities in Israel bear responsibility for treating waste, though the Ministry of Environmental Protection (MoEP) provides financial support to the authorities for waste treatment, including programs that encourage residents to separate their waste and throw it into separate bins in their homes. Much of the money to fund these programs comes from the landfill levy, which requires landfill operators to pay a levy on every ton of waste received for landfilling. The waste-separation system is expected to be implemented gradually throughout the entire country over the coming years.

Separation of waste at source is key to the Recycling Revolution being promoted by the Ministry of Environmental Protection (MoEP) in Israel. It begins in each household, with residents dividing their trash into different streams: Organic, or wet, waste is biodegradable solid waste, such as leftover food and dry waste includes all but organic waste. This can be further separated into recyclable material and non-recyclable material. The recyclable material can and often is further separated (for example, into: electronics, packaging, plastic, paper and cardboard, textile, metals, and glass).

This activity is in support of Israel's integrated waste management policy by helping improve knowledge, capacity building and operational standards about best practices regarding glass sorting and recycling facilities; by promoting collaborations between various institutional entities that can contribute to the glass recycling market, and by providing an economic toolkit for improvement of market use and of the rate of glass waste recycling.

The main objective of the activity was to provide an assessment of technical, legislative and economic aspects of the glass sorting and recycling industry for the purpose of enhancing the utilization of recycled glass in Israel, especially in national infrastructures (i.e. roads and railroads).

In order to achieve the above objective, the SWIM-H2020 SM **used the knowledge and services of ACR+ (hereinafter referred to as the Consultant)**. All the subtasks assigned to the Consultants have been undertaken in consultation with the SWIM-H2020 SM Team Leader (TL) Professor Michael Scoullas (based in Athens, Greece).

The Consultants undertook the following task:



Organization of meetings for assessment of legislative and technical aspects of glass separation, sorting, recycling and reuse schemes.

Outcome 1: Assessment and gap analysis of the technical and legislative aspects of glass separation, sorting, recycling and reuse.

Outcome 2: Elaboration on best practice of glass separation, sorting and recycling facilities and techniques.

The activity has been developed under the 'Solid Waste Management' thematic of SWIM-H2020 SM and has been designed in complementarity with three other Expert Facility activities taking place in Israel:

EFH-IL-1: Green and circular public procurement in central and local government in Israel, through policy development and capacity building for manufacturers, procurers and producers

EFH-IL-3: Support for the plastic waste management and recycling

EFH-IL-5: Assistance in introducing Construction and Demolition (C & D) waste management, Also, the activity is linked to the regional activities of SWIM-H2020 SM:

(REG-1) on "Overview of the developments in Europe and the Mediterranean (see relevant protocol) on Marine Litter monitoring. Correlations with policies dealing with the use of plastics (particularly plastic bags)" (WP3).

(REG-9) on "Green economy focusing on technical support on SCP for SMEs with emphasis on whole life cycle of services and products (circular economy, eco-design, eco innovation)"

The activity took place in July 2017, from Monday 17th to Tuesday 18th. Two glass experts, namely Mr Christian Deltenre and Mr Raf Vanswartenbrouck, coming from Belgium were accompanied by an ACR+ expert. During their 2 days mission in Israel, they:

- took part in a meeting with representatives of Israeli Ministry of Environmental Protection (17/07/2017);
- had meetings with key stakeholders such as: Israel Paths - Transport Infrastructure National Company Ltd; Phenicia Glass Works Ltd; Ekoglass Glass Recycling Industries Ltd; Gadi Rozenthal – Glass expert (17/07/2017);
- had meetings with representatives of Israeli Ministry of Environmental Protection and key stakeholders such as: ASOFTA Recycling Corporation, TAMIR Accredited Body, Ron Gazit Rotenberg & Co. Law Offices (18/07/2017).

The present final report was realized in collaboration with all (Israeli) stakeholders, who were consulted during the mission and during the drafting. The report received a final review from the Team Leader of the project, Mr Scoullou.

GLASS RECYCLING AND GLASS WASTE MANAGEMENT IN ISRAEL

The responsible bodies for Municipal Solid Waste Management in Israel are the Ministry of Environmental Protection and the local authorities. There are no environmental agencies in Israel and there is one accredited body (TAMIR) that collects packaging waste. Recently, a few municipality clusters have been established in Israel, which could make positive changes for the economy of scale effects for municipalities regarding transportation and treatment of waste.

Municipal Solid Waste Management is an important issue in Israel: While 5.3 million tonnes of municipal and commercial waste were generated in Israel in 2016 (1.7 kg/p/d), approximately 78% of this waste is currently buried in landfills and less than a quarter is recycled. Due to a high population growth, Israel is furthermore facing an increase in waste production by 1.8 % per year (100.000 t).¹

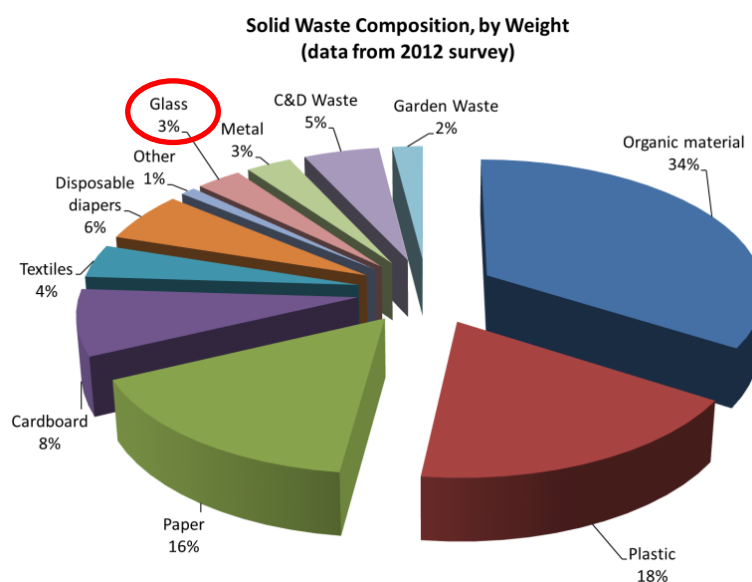


Figure 1: Solid waste composition by weight²

Even though glass waste is not a big fraction in the municipal waste composition in Israel (see figure 1 above), there are nevertheless important reasons to look into the fraction and push for more recycling:

- Glass recycling is easy and can be done in an endless closed-loop circle;
- If the feedstock is ensured there are strong economic reasons for glass recycling;
- Recycling glass has a big environmental impact, both in terms of avoiding the landfill of glass waste and in terms of glass production (less raw material used, energy savings, reduction of fuel used, reduced CO₂² emissions)

¹ Source: http://www.sviva.gov.il/English/env_topics/Solid_Waste/FactsAndFigures/Pages/default.aspx

² Source: Survey conducted by the Israel Ministry of Environmental Protection; in 2012-2013. http://www.sviva.gov.il/English/env_topics/Solid_Waste/FactsAndFigures/Pages/default.aspx



- Removal of glass necessary for ensuring safe and good quality recycling of the other waste streams

0.1 KEY LEGISLATION

Three key pieces of legislation have the biggest influence on the current glass waste management system and glass recycling in Israel: the Deposit on Beverage Containers Law and its Amendment from 1999/2010, the Amendment of the Cleanliness Law in 2007, and the Packaging Law from 2011, For a better understanding, each of the laws will be briefly described in the subchapter. The information has been gathered from the websites of the Ministry of Environmental Protection (MoEP) and via direct information from the staff of the MoEP.

0.1.1 Deposit on Beverage Containers Law and Amendment, 1999/2010³

The Deposit on Beverage Containers Law (further: Deposit Law) came into effect in 2001 and was amended in 2010. Under the law, manufacturers, importers and retailers are obliged to collect currently 0.30 ILS for all beverage containers that are bigger than 0.1 litres and smaller than 1.5 l. The main objectives were to reduce littering, reduce landfill volume, and encourage recycling and reuse of beverage containers. The law is the first of the legislations that make up the Extended Producer Responsibility system in Israel, which imposes responsibility of a product's entire life cycle, including once a consumer is finished with it, on a producer and/or importer of a product. Bottles larger than 1.5 litres are not included in the deposit system, but have been voluntarily collected through street containers ("cages") provided by local authorities and private recycling companies.

In order to implement the law, a recycling corporation – [ELA Recycling Corporation](#) (further: ELA) was established to institute a refund, bottle collection, and recycling system. The recycling corporation is required to comply with the graduated targets for the collection of empty beverage containers:

- Collection of 77 % of all bottles put on the market under the deposit law. Percentage of bottles is calculated on all bottles by number, regardless of material (plastic, glass) and not calculated in weight or volume.
- Recycling of 90% of all empty beverage containers collected each year by importers and producers.
- Non-compliance with targets leads to direct fines on manufacturers or importers.

Further obligations of the law

- Supermarkets and shops are obliged to accept containers from consumers up to an amount of 50 containers/p/d, otherwise they are subject to a fine;
- Prohibition of the sale of beverage containers which are not duly marked;

³ References: <http://www.sviva.gov.il/English/Legislation/Pages/WasteAndRecycling.aspx> and http://www.sviva.gov.il/English/env_topics/Solid_Waste/Extended-Producer-Responsibility/Pages/Beverage-Container-Deposit-Law.aspx



Additional activities under the responsibility and financing of producers, outside the framework of the law:

- Addition of 12,000 bottle collection cages throughout the country (in addition to the 8,000 now in existence). This would mean an increase of coverage from one container per 1500 inhabitants (now) to 1 container per 400 inhabitants. These cages are for plastic bottles only, not for other bottles (glass) or containers under the packaging law (such as olive oil, etc.)
- Investment of 4 million shekels per year in educational and information activities on recycling and cleanliness from the funds of the deposit scheme
- Voluntary higher deposit on 0.5 litres glass beer bottles lead to 90 % the collection and reuse after cleaning

Organisation of the system:

- ELA and another, private company (ASOFTA, see also annex IV) collect the deposit from the drink manufacturers and importers registered in their system.
- Drink manufacturers / importers charge businesses 0.30 ILS deposit fee for each drink container. This fee is passed on to the consumer through the price of the drink.
- Ideally, the consumer returns the empty drink container to the business or municipal recycling stations⁴ and receives his deposit fee back (0.30 ILS).
- In practice, a large part of the empty drink containers are not returned via the businesses or municipal recycling stations but is collected by informal collectors, via cages for large beverage bottles, or end up in municipal waste.
- ELA and ASOFTA collect the drink containers from its costumers (= the businesses) and from the municipal recycling station and transports them to its processing centres.
- At the processing centres of ELA and ASOFTA the material gets unloaded, controlled and the data is entered into the monitoring system. The drink containers are then sorted by type of material and prepared for transfer as separate material streams to the recycling industries in Israel or for export.

0.1.2 Amendment of Cleanliness Law, 2007⁵

In 2007 (coming into effect on 1 July 2007), the existing Maintenance of Cleanliness Law of 1984 was amended with a regulation that requires landfill operators to pay a levy for every tonne of waste landfilled. The aim of the law was to internalize the full and real costs of waste treatment and disposal - including land consumption, air pollution, water pollution, soil pollution, and waste transport - thus paving the way to increased recycling and recovery.

⁴ In some areas, municipal recycling stations/ separate recycling centers exist where citizens can bring their source separate recyclables, such as paper, glass, plastic, aluminum, batteries, CDs, and more.

⁵ Sources: <http://www.sviva.gov.il/English/Legislation/Pages/WasteAndRecycling.aspx> and http://www.sviva.gov.il/English/env_topics/Solid_Waste/landfilling/Pages/LandfillLevy.aspx



The landfill levy is paid to a dedicated account of the Maintenance of Cleanliness Fund. The rate of the levy is set according to the type of waste - mixed waste, dry waste, waste residues after sorting, sludge, stabilized industrial sludge, and construction and demolition waste:

Table 0-1: Landfill levy per type of waste and type of landfill

Type of waste	Type of landfill	Levy (ILS/tonne)	Levy (€/tonne)*
MSW/ Food waste	Mixed	107.43	25.82 €
Dry household waste	Dry	71.62	17.21 €
Sludge	Mixed/Dry	143.24	34.43 €
Stabilized industrial sludge	Mixed/Dry	47.75	11.48 €
Construction & Demolition Waste	Dry	4.77	1.15 €

* Calculated based on ECB exchange rate of 27/07/2017: 4.1604 ILS = 1 Euro

The Maintenance of Cleanliness Fund is managed by the Ministry of Environmental Protection who redistributes the fund to support investments and communication on the improvement of waste management and recycling. The incomes from the levy are roughly 100.000 € annually, since the introduction of the levy, the fund collected a total of 2,594,456 ILS (roughly 610.000 €).

0.1.3 Packaging Law, 2011⁶

The Packaging Law came into effect on 1 March 2011 and introduced the concept of Extended Producer Responsibility (EPR), to packaging, imposing the responsibility for dealing with the entire life cycle of a product directly upon manufacturers and importers of that product. The Packaging Law applies to a wide range of packaging products, both household and industrial, made of any material, including paper, glass, plastic, metal, and wood. It excludes beverage containers covered by the deposit law.

Legal obligations:

- Manufacturers and importers must thus either treat the packaging waste of their products, or pay for it to be treated by a company approved by the MoEP. They must also submit periodical reports to the MoEP detailing quantity and weight of their products, material of packaging, and more. Manufacturers and importers that do not fulfil their obligations under the law are subject to fines, which are payable to the Maintenance of Cleanliness Fund.
- All local authorities must arrange for proper disposal and collection of packaging waste via contracting with the accredited body (TAMIR). TAMIR is obliged to make arrangements for the collection of packaging waste in their area, provide infrastructure for the separate disposal of packaging waste, and be in contact with the company approved for treating packaging waste to ensure the waste is collected. Local Authorities that fail to make appropriate arrangements are subject to fines by the MoEP of up to ILS 500,000.

⁶ Sources: <http://www.sviva.gov.il/English/Legislation/Pages/WasteAndRecycling.aspx> and <http://www.sviva.gov.il/English/Legislation/Documents/Packaging Laws and Regulations/PackagingLaw2011.pdf>



- Individual citizens and store owners are requested to throw packaging waste into the appropriate bins (Orange bins for packaging waste, Purple bring banks for Glass containers, Blue bins for paper).

Recycling targets and landfill ban:

- The law establishes targets for gradual recycling of 60% of the total weight of the packaging of products sold each year by 2014. Producers will also have to comply with annual recycling targets according to the type of material (e.g.: 60% of glass, paper, and cardboard; 50% of metal; 22.5% of plastic). Non-compliance with these targets will be subject to a sanction of ILS 2,500 per tonne.
- Under the packaging law - a total ban on landfilling of packaging waste should come into force in 2020.

Practical implementation:

- Currently there is just one accredited body for the treatment of packaging waste: TAMIR.
- TAMIR collects fees from the manufacturers and importers under their system and invests it in the collection and treatment of packaging waste.
- TAMIR enters in contracts with municipalities on the collection of packaging waste.
- Several arrangements for the (separate) collection of packaging waste are possible under the law and additional specifications from the MoEP. Local authorities provide between 2-4 bins to their citizens. The possible arrangements are:
 - Two bins: A brown bin for organic/biodegradable waste and a green bin for dry waste, including packaging.
 - Two bins: An orange bin for packaging waste and a green bin for all other waste
 - Three bins: A brown bin for organic/biodegradable waste, an orange bin for packaging waste, and a green bin for all other dry waste, excluding packaging.
 - Four bins: combination of waste streams, including paper and cardboard - collection is decided locally.
- Furthermore, purple bins exist for the collection of glass packaging waste at Bring Banks. Currently there is coverage of one purple bin per 1500 inhabitants.

0.2 GLASS WASTE MANAGEMENT AND PERFORMANCE

No confirmed data is available regarding the entire glass market in Israel. Based on the data received from the MoEP, Mr Gadi Rosenthal (waste advisor to MoEP) and the stakeholders met during the mission, the experts have drafted a mass balance diagram to illustrate the market situation and material flows in Israel (see figure 2 on the next page). According to this, a total of around 130,000 t of glass packaging is put on the market every year, of which half is produced at Phoenicia Glass Ltd. in Israel, and the other half is imported. Out of the total estimated available material, 53 % are collected.



Currently there are only two glass producers in Israel of which only one produces packaging glass. This packaging glass producer, Phoenicia glass, provides half of the estimated tonnes of glass packaging put on the market and being the sole glass recycler for packaging glass in Israel. Phoenicia recycles 38 % of the collected material, the rest is being exported.

With 53% of the estimated glass available on the market being collected for glass production or export, still almost half of all packaging glass in Israel goes to landfill. This valuable material is lost for recycling and has negative environmental impacts by being landfilled.

However, the most negative implication of glass not separated and collected is its impact on the quality-usability of all other streams of potentially recyclable material, contaminated by small or bigger glass fragments.

In other words the “cost” of separation of glass is not to be “balanced” by the recycling of glass alone but by the enhancement of the quality of all other recycled materials.

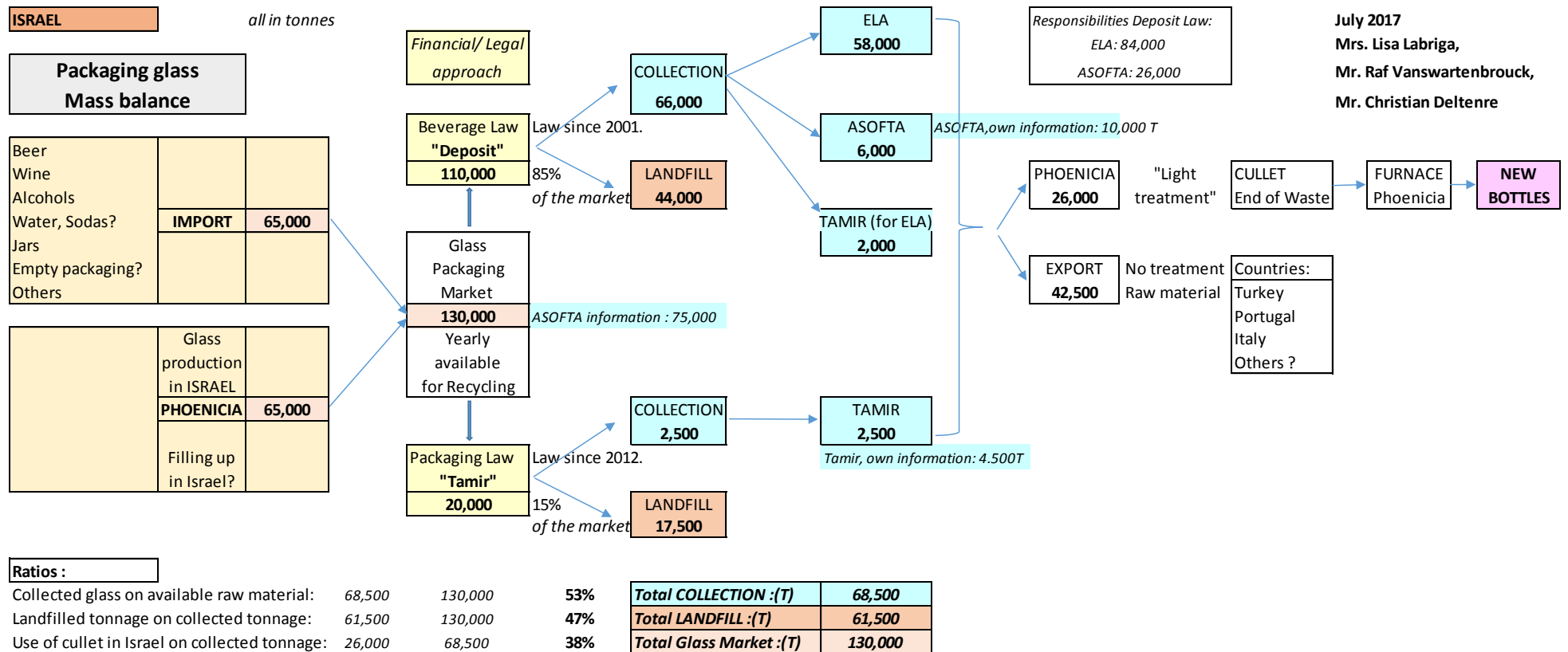


Figure 2: Mass balance for packaging glass in Israel.⁷

⁷ Source: Christian Deltenre, own design. Data based on information provided by the MoEP, Gad Rosenthal, glass expert and consultant to the MoEP, and by the stakeholders met during the mission.



0.2.1 Waste collection and treatment

The collection and transport of municipal waste is organised by the local authorities. The only legal obligation for local authorities is to set up separate collection systems for packaging waste via contracting with TAMIR and distribution of Orange bins. Other streams such as Organic waste (Brown bins) and paper are voluntary (see 0.1.3). The accredited body TAMIR offers different systems to the Local Authorities, which remain responsible for the collection of the waste. Collection of municipal waste (Green bin) can be either done by the local authorities themselves but usually it is contracted to collection companies.

Approximately 70% of Municipal waste is sent to transfer stations after collection. Some of these stations sort recyclable materials, including glass, paper, cardboard, cans, metals, plastic and organic streams. The MoEP is currently developing an electronic system to collect accurate data from all transfer stations.

Nevertheless, more than 75 % of all municipal waste is landfilled, and less than a ¼ is currently recycled or composted. Since 1995, all uncontrolled landfills were closed. To date, there are no energy recovery facilities in Israel, but the MoEP is currently planning the development of Waste to Energy Facilities.

Only 53% of glass waste is collected and only 38% of this share (20% of all packaging glass available) remains in Israel for further processing and recycling into new packaging glass.

0.2.2 Outcome/performance of legislation

0.2.2.1 *Deposit on Beverage Containers Law and Amendment*

Since the introduction of the beverage containers deposit law, the amount of sold and collected beverage containers constantly increased. Measured in number of bottles, the annual collection and recycling rate for beverage containers under the law is since 2011 on a constant level of around 77%.⁸ The constantly increasing target set by the law was overachieved since 2009.

However, there are several flaws in this result (see also chapter 1):

- Both the MoEP and all stakeholders confirm that a large number of free riders exist that have not registered with the system. Estimations vary, but probably around the double or triple of what is currently being accredited is actually put on the market (for all materials).
- Both the target and thus also the data collection is a) not specific per each material stream and b) it applies for number of bottles collected/ number of bottles sold and not per weight or per volume. For this reason, no adequate data is available for individual material streams such as glass. Furthermore, it also has an effect on the type of bottles collected: Since PET bottles are lighter and achieve a higher price on the market than glass bottles, collectors seem to tend to fulfil the recycling targets with the collection of PET bottles mainly.

⁸ 20012: 77 %, 2012: 76 %, 2013: 77 %, 2014: 79 %, 2015: 76 %. Source: PPT of MoEP.



- In practice, a large part of the empty drink containers are not returned via the businesses or municipal recycling stations but is collected by informal collectors, via cages for large beverage bottles, or end up in municipal waste. No data is available on this.
- No distinction is made between bottles collected and recycled. There does not seem to be a clear definition of recycling and all collected bottles seem to be counted also as recycled.

Since the set-up of the system, 230 million ILS have been put into the system for various purposes, of which the end-consumer claimed back only around 2 million ILS, less than 1%.

0.2.2.2 Landfill levy

The Maintenance of Cleanliness Fund is managed by the Ministry of Environmental Protection who redistributes the fund to support investments and communication on the improvement of waste management and recycling. The incomes from the levy are roughly 100.000 € annually, since the introduction of the levy, the fund collected a total of 2,594,456 ILS (roughly 610.000 €).

0.2.2.3 Packaging law

Since the packaging law came into force, the respective recycling rate⁹ constantly increased. While the target for recycling is increased every year, since the introduction it has always been overachieved.

Table 0-2: Recycling rate

	2012	2013	2014	2015
Packaging waste put on the market by the contracted manufacturers and importers (in 1000 t)	300	331	343	365
Packaging waste recycled (in 1000 t)	187	209	250	295
Recycling rate	62 %	63 %	73 %	81 %
Recycling target	40 %	50 %	55 %	60 %

As explained in chapter 0.1.3, legal obligations exist for manufacturers and importers. Enforcement proceedings are continuing against manufacturers and importers who have not yet arranged for their waste to be treated. As of June 2015, enforcement has begun against 400 importers and manufacturers who've violated the law.

0.2.3 Planned actions

During the mission, the MoEP has voiced several future actions that are relevant for the development of the plastic waste management system:

- A new National Policy and Management Plan for Municipal Solid Waste will be drafted
- New recycling targets have been set: 35 % recycling in 2020, 55 % recycling & recovery in 2030
- One or several energy recovery/waste-to-energy plants will be developed in Israel

⁹ Percentage of packaging waste recycled in relation to packaging waste put on the market by the contracted manufacturers and importers.



- By 2020, the packaging law foresees a ban on landfill for all packaging



1. KEY PROBLEMS IDENTIFIED

1.1 STRATEGY AND INSTITUTIONAL ARRANGEMENTS

A few issues at policy and institutional level have been identified that are not beneficial to reaching higher recycling rates for glass in Israel:

- Currently no ambitious and long-term strategy at national level with increasing targets exists. On a national level, there is no clear commitment and a long-term vision towards waste prevention, reuse, and recycling.
- Local Authorities are not subject to recycling targets and are not required to reach the targets set by MoEP. The only requirement they have is to report recycling and waste collection figure on an annual basis ("Form 1").
- Most Local Authorities work on their own to collect and transport waste; currently there are 5 municipal clusters and a few other structures in which neighbouring local authorities contract together in organising their waste management system and thus profit from an economy of scale effect. MoEP is promoting the development of clusters that will map the whole country.
- No Environmental Agency exists on a national level – an institution that exists in most EU member states and that contributes substantially to a successful implementation of the national strategy and targets, and that can also help in data collection, monitoring and control.
- Even though the MoEP wants to move away from landfill, still the largest part of municipal waste goes to landfill. Landfill is still an attractive option since the landfill tax is low (see chapter 0.1.2) and there are currently no bans on landfill, not even on untreated waste. Regardless, landfill capacity is very limited and currently, the landfill space available in planning permits will run out by 2024.
- There seems to be a lack of sufficient treatment facilities (sorting plants, anaerobic digestion and composting plants, waste-to-energy plants). Finding spots for new plants is difficult due to limited land available in the country. .

1.2 COLLECTION SYSTEM

In order to move towards higher recycling rates, the collection system needs to be well set up and well-functioning. Several issues have been identified in the current collection system:

- There is no legal obligation for local authorities to set up separate collection systems.
- Also citizens are not obliged to participate in separate collection system, apart from existing schemes for packaging waste.
- The Municipality taxes are generalised, and there are no Pay As You Throw schemes.



- The separate collection options that exist do not cover the whole country and vary from one local authority to another.
- The separate collection systems of glass in “bring banks” are often located in a quite high distance from the citizens; participation in separate collection is thus inconvenient and not many citizens seem to participate.
- Recycling in Israel still relies largely on the outcome of sorting stations/MRFs. This lowers the quality of the glass for recycling (as well as the quality of other fractions), as demonstrated by the experience in the U.K. Most European countries with the highest recycling rates have faced out MRFs and consider separate collection at source as the key measure.
- There is no separate collection by colours of glass. Combined with a lack of high technology equipment in sorting plants due also to the low quantities collected, this leads to expensive manual sorting systems in most facilities. .
- Due to the low quantity of collection of glass via the deposit law and especially the packaging law, the collection costs for glass are very high in Israel. The pure cost is around 400 €/t. If the benefits from the sales of the glass collected, but belonging to the deposit law are subtracted, it is still roughly 250 €/t. In Belgium with its very high density of population as a comparison, collection of glass costs around 50 €/t, already including the collection in two separate fractions, flint and coloured glass, renting and cleaning of the glass containers, and the transport to the plant of the recycling company). The higher the density and filling rate of the bins, the lower the collection cost per ton of collected glass waste.
- There is a lack of budget available in the EPR system for the improvement of the system mainly through the setup of more collection bins.
- The glass market in Israel is much smaller compared to Belgium and other European countries. Beverages and food are commonly sold in plastic containers. Businesses too use much more plastic containers than glass.

1.3 DATA COLLECTION & AVAILABILITY, MONITORING & ENFORCEMENT

A substantial **lack of data collection and availability** has been identified:

- Both the MoEP and all stakeholders confirm that free riders that have not registered with the system for both the deposit system and the packaging law. In addition, the total amount of glass waste produced is not collected. Therefore, no accurate data exists of total of glass containers put on the market.
- The difficulty in data collection on the tonnes of glass collected is due to a number of reasons:
 - Reports under the deposit law are not specific per waste stream and are furthermore collected by number of bottles instead of weight. Therefore, no direct data is available on tonnes collected under the deposit law per waste stream.



- Currently, most of the waste transfer stations are not connected to a data collection system. MoEP is developing a system which should be fully operational by 2019. Analysis will be much easily undertaken then.
- Local Authorities are obliged to report on an annual basis to MoEP regarding waste collection and recycling streams ("Form 1"), but only 2/3 of actually report. The data is not accurate and is variable. Currently, there is no legal form that obligates the local authorities connect to the Waste Data Flow System that is being developed.
- In practice, many beverage containers under the deposit law as well as much packaging under the packaging law are collected in other forms, via cages for large beverage bottles, or they end up in the residual fraction of municipal waste.
- The last national waste composition survey was conducted in 2013.

There seems furthermore to be a strong **lack of human resources** to comprehensively monitor the compliance with the legislation and to ensure **law enforcement** at the Ministry of Environmental Protection.

1.4 GLASS RECYCLING MARKET

Four main issues have been identified regarding the glass recycling market:

- **Quantity and quality of waste collected and reliability of collection system:**
 - Low availability of material due to low separate collection → low quantities collected.
 - The current system provides no reliability and stability of secondary raw material/feedstock availability for an investment in a local state-of-the-art processing plant..
 - This results in a lack of recycling factories in Israel. One additional plant in the centre of the country would be sufficient.
 - No colour sorting facilities
- **Competition of virgin material to secondary raw material:**
 - The production of glass on the base of virgin materials (sand, soda ash, and limestone) is cheap in Israel, energy costs are low, and there currently is no limit on mining.
 - Due to the high collection costs and the low costs for the virgin material, the secondary raw material (cullet) has difficulties to compete cost-price related, although there are several reasons for a glass producer to use cullet as a substitute for virgin raw material: the furnace life will be increased, CO2 emissions are reduced, the production capacity can be increased, for each 10 % of cullet used, 2.5% of energy can be saved,
 - There is a shortage of flint glass collected for glass production since the local production is focused on bottles of flint glass (10 months per year) and thus the demand for flint cullet is high (while production of green bottles takes place only 1-2 months per year).



- **International competition to Israeli recycling companies:** Much of the collected glass waste is currently exported. There are two main reasons why the currently only recycling plant in Israel does not receive all material:
 - The distance is too high and thus transportation is more costly in Israel than via shipping to another country
 - The requirements by the recycling facility on the glass waste received (colour-sorted and high percentage of flint glass) are difficult to meet by the collectors

1.5 DEPOSIT LAW AND PACKAGING LAW

Currently, the deposit law does not seem to have an important effect on the separation habits of citizens. From 200 million ILS input in the system, the consumers take back only 30 million ILS (15 %) for all streams.

The fact that glass containers are subject to two different legislations, the deposit and the packaging law, creates some issues:

- Different organisational bodies are responsible for different containers made from glass. This prevents a benefit from an economy of scale effect when putting one material under one system.
- The two systems require double organisational efforts and thus higher costs, not only in operation but also in administration, communication, etc.

For both the packaging and the deposit law it is furthermore not entirely clear **how recycling is defined**. In both cases each tonne/bottle collected seems to be accounted for as recycled but it is not clear where the material goes and if it indeed always goes to recycling facilities. Recycling of glass should be defined as the process that transforms waste glass to furnace-ready cullet with an end-of-waste status, which are then melted for the production of new bottles.

Another issue identified in the **deposit law** is the **definition of the targets**. Both the target and thus also the data collection is a) not specific per each material stream and b) it applies for number of bottles collected/ number of bottles sold and not per weight or per volume. This creates two main problems:

- Since Aluminium and PET are lighter and achieve higher prices on the market, the targets are reached by collecting mainly those materials rather than glass.
- Limited data is available for individual material streams such as glass.

A similar issue appears in the **packaging law**: Both the target and thus also the data collection is **not specific per each material stream**. For this reason, no clear data is available for individual material streams such as glass.



1.6 ENVIRONMENTAL AWARENESS OF THE POPULATION

The stakeholders see a lack of environmental education and awareness in the population. This leads to **low participation rates** of separate collection schemes, **contamination** of separately collected streams, and a **low demand** for products (partially) made from secondary raw material.



2. RECOMMENDATIONS

The experts were concerned by the fact that the glass recycling market is problematic in Israel, while it is generally more developed in EU countries, with very few exceptions. The mission on glass waste was very short and not sufficient to touch upon all critical issues. The first recommendation therefore is that the **work on glass waste should be continued** at the MoEP – we are ready to continue the work together in the framework of SWIM/H2020 or also in another project.¹⁰

Specifically the issue of plate glass has not been discussed at all during this mission. More and more plate glass is used in construction and it would be important to start discussing this issue in the future. Also glass in the automotive industry and glass used in solar panels could be looked at more closely. Glass is a material of the future and its market in these applications is growing, a further analysis of that part could therefore be particularly interesting.

Glass waste is a valuable raw material that perfectly meets the rules and advantages of a Circular Economy. Glass can be **recycled infinitely** without any loss in quality, if the secondary raw material for recycling is provided in sufficient quality. The main application of collected glass containers should always be the re-melting of the glass and the feeding into the production of new glass products. **Closed-loop recycling** of glass (bottle-to-bottle) is a sustainable system with numerous economic and environmental advantages. It **should be a key objective** for policy decisions that affect the glass recycling industry.

Apart from close-loop recycling, three other main niches for the usage of glass waste exist:

- Water filtration: interesting application but the potential quantities needed are very low;
- Glass blasting replacing sand blasting: interesting application but the potential quantities needed are very low;
- Concrete construction: In Belgium and most European countries, there is no technological or environmental interest to use glass in road construction. This issue was discussed briefly during one of the meetings, but the experts stressed that once the glass was used there it is lost for recycling (open loop). The use of glass in construction only makes sense for fine particles that can't be used in the closed-loop (maximum 3 %, depending on the collection and sorting processes).

Considering the Israeli market, the experts believe that even a small factory with a production of 80.000 t of cullet per year, placed at a strategic position (in the centre of the country), could already make a big difference and would be able to run profitable. Furthermore, there is a need for a colour sorting facility that is compatible with the glass recycling factory needs. If the **feedstock is ensured**, private investment will follow. If a reliable system is put in place that guarantees the sustainability and increase of the feedstock up to its potential (70 % of what is actually consumed on the market, around

¹⁰ In future project, some efforts should also be put in analyzing the quality of the collected glass waste, calculating the weight of the glass waste in relation to the pieces and investigating the exact amount of glass waste in household waste.



140.000 t), and investment in a state-of-the-art glass recycling plant will be feasible. Waste should be treated at its origin and not being exported.

The recommendations listed in the following subchapters would help setting the necessary conditions for this. The experts were surprised to see that in fact there is an operating glass factory producing new glass based on raw materials and representing a potential market for cullet in Israel, while glass waste collected is exported for further treatment to Turkey or even to Portugal and Italy.

2.1 STRATEGY AND INSTITUTIONAL ARRANGEMENTS

- **Ambitious strategy:** The MoEP is advised to develop a long-term and ambitious strategy on its waste management policy that
 - Sets a clear focus on the idea of circularity of materials and that pushes up the waste hierarchy;
 - Applies the polluter-pays principle;
 - Targets all actors and foresees cooperation and continuous communication with them;
 - Projects the development of material streams in the next 20 years;
 - Phases out landfill and takes the relevant measures (by raising the landfill tax or banning untreated municipal waste;
 - Foresees a ban for the landfilling of glass packaging (enforcing the packaging law)
 - Begin dealing with flat glass;
 - Aims at exporting only end-of-waste materials (furnace-ready cullet) and not waste (waste should be processed where it origins);
 - Formulates a long-term vision for glass for the next 20 years and sets clear targets for the next 3 and 5 years, with projected targets also for 10 years;
 - Foresees intermediate controls of progress;
 - Foresee measures to ensure the quality and quantity of the secondary raw material and thus to provide a security for investment;
 - Foresees enforcement procedures.

By doing so, the MoEP can set a clear framework to foster the market growth potential of a sustainable glass recycling and production market and thus lays the basis to establish trust in the system and security of investment.

- Set up an **environmental or waste agency** that is responsible for the implementation and delivery of the strategy and policy set by the MoEP
- **Clarify the responsibilities** for waste collection and sorting and ensure that each stakeholder of the value chain is thanks to the responsibilities and legal obligations pushed to move towards separate collection in high quantity and quality.



- Continue to develop a Waste Data Flow System that will connect all landfills, waste treatment facilities, recycling plants and local authorities and enable accurate data collection and analysis.
- Encourage and help in **forming municipality clusters** to allow for economy-of-scale effects in procurement.
- Make the costs of waste management visible to the citizen by obliging municipalities to decouple the **waste tax** from the general tax.
- Apply the polluter-pays principle to citizens by introducing a sort of **pay-as-you-throw system** (combined with monitoring and control measures).
- **Definitions and quality standards:** Legal definition of recycling and clear quality standards of when a material is considered recycling.
- Provide **public funding** for technological **innovation**.

2.2 RECYCLING TARGETS, COLLECTION SYSTEM & TREATMENT OPTIONS

- **Set ambitious recycling targets for individual material streams**, targets that increase over time and don't allow standstills. Contrary to what is currently envisaged it is furthermore essential to propose targets are specific to recycling and do not include (energetic) recovery. If recovery is included this can seriously hinder the development towards a higher recycling rate.
- Make **separate collection obligatory for both municipalities and the citizens** and collect separately at source. Some stakeholders had suggested abolishing separation at source and rely fully on sorting stations. We would strongly advice not to follow this suggestion. This is not a solution and should be avoided since it will significantly lower the quality of the glass for recycling (as well as the quality of other fractions), as demonstrated by the experience in the U.K. On the contrary, it is **strongly advised to focus on separate collection** and even on a **high quality collection** first, before aiming at higher quantities. Quality collection can be achieved by providing the correct collection system (convenient for the citizen, high density of containers) and by putting a focus on communication to the citizen – only providing the information on the container is not enough.

Furthermore, separate collection should be implemented by **separating into at least two glass fractions: flint and coloured glass**. This gives more value to the raw material and allows the recycling plant to produce cullet with higher values for the glass industry. Some European countries apply 3-4 glass colour separation schemes.

- Establish **systems of support for municipalities** to set up separate collection systems and to help **increasing the coverage of collection containers** in all systems. In Belgium, there is one bottle bank for every 750 inhabitants.
- **Define recycling criteria** and set quality requirements for end-of waste glass exports, ban glass waste exports.



- Clarify the legal situation on the **landfill ban for packaging** in 2020 (who is responsible) and ensure **monitoring, control, and enforcement**.
- **Phasing-out landfill** by putting up a landfill ban or by drastically increasing the landfill tax.
- **Consider direct investments** from the Cleanliness Fund in the **separate collection** infrastructure or in national communication campaigns to get the system started and to collect more material and material of better quality. This will then also drop the costs of the collection.
- In order to achieve private investment in glass recycling, stability and **trust in the feedstock** have to be created. This means that the feedstock needs to be assured for a period of ten years in order for private companies to make the investment.

2.3 DATA COLLECTION, MONITORING AND CONTROL

- **Improve data collection and monitoring** of tonnes of glass bottles and containers put on the market, ideally through a separate research platform rather than estimates or self-reporting. Ideally the monitoring based on the number of bottles should be maintained, at least for some years. The combination of the two sets of data could provide valuable information.
- **Systematic collection of data** on municipal waste produced, collected, and finally recycled (split per each municipality):
 - Residual waste
 - Recyclables in residual waste, split by material stream
 - Recyclables collected separately, split by material stream

A systematic collection of data is needed in order to get a **correct and complete image of the glass packaging put on the market** and the **glass waste put into recycling and landfill**. This in turn will then allow for a correct analysis of the market situation, as well as help understanding where the concrete bottlenecks in the system are.

- Strengthen the team for **law enforcement** of the existing legislation and reduce significantly the number of free riders in the EPR systems. When expanding legislation, ensure availability of adequate enforcement mechanisms to maintain credibility and drive transparency and progress.

2.4 GLASS MARKET AND ACCESS TO SECONDARY RAW MATERIAL

- Take up measures that **give glass as a second material a value**, for example by:
 - Allowing the issuance of CO2 emission reduction certificates for recyclates or high-energy consuming recycling industry;
 - Tax reduction or VAT exemption for products with recycled content;



- Bonus/malus system for the fees for producers to the EPR schemes, based on the actual recyclability of packaging/products in the existing infrastructure;
- Aligning with the retailers and use their market pressure to move towards recycling;
- Increase information and communication on the environmental impact on recycling and the benefits of recycled products and support thus movements of consumer pressure;
- Setting a requirement of a minimum level of recycled content and recyclability in certain new products put on the market (eco-design rules);
- Use Green Public Procurement (GPP) as a tool to foster recycling;
- Set quality requirements for the export of end-of waste glass; ban the export of glass waste.

During the mission, the **competition with other countries** for recyclable material was discussed frequently and several individuals asked the experts if a protection of the national market could be a potential solution and how it could be implemented. Under the condition of a free market, a protection of the market is not possible. However, if the waste management system for glass and the situation of the local market is improved through measures proposed in this report, the local market will be facilitated: the collection will be less expensive and the raw material will be less expensive, so there is no need to export anymore and the local industry will be competitive. Furthermore, changes in the market are also to be expected in the main export countries Turkey, Portugal, and Italy, which will make export less attractive and can help fostering recycling internally.

2.5 EPR SYSTEMS

- Introduce the **full cost-coverage principle for each EPR system**: cost of collection, sorting, recycling/recovery, investments, and communication.
- Set up a **clearing house** with experts for enforcements; paid by the producers but under supervision of an EPA or the MoEP directly.
- Consider the introduction of a **bonus/malus system** for the fees for producers to the EPR schemes, based on the recyclability of packaging in the existing infrastructure.
- Introduce a **separate collection obligation**;
- Introduce **clear quality standards** for recycling and ensure that all tonnes claimed as recycled fulfil the standards. Apply also for exported tonnes.
- Put **all single-use glass packaging under one system**. From our perspective the packaging law seems fit. Having all glass under one system will lead to substantial benefits of economy of scale and will also facilitate administration and communication. This will then also allow to provide a much denser system of bring banks for collection.
- **Deposit law**: Set the targets per tonne instead of per number of bottles.
- Set **ambitious targets for each material stream** individually and set targets in tonnages, not per number of bottles collected.



2.6 ENVIRONMENTAL AWARENESS OF THE POPULATION

Education for Sustainable Development (ESD), as described in the Mediterranean Strategy for ESD, and systematic communication campaigns are essential tools that are often decisive about the success of a change in the collection system.

- Invest in a **strong country-wide communication campaign**
- **Focus** communication campaigns **on the separate collection** of two glass fractions (flint and coloured glass separately) and high quality collection at the beginning and set the scaling up and reaching higher quantities only as a second objective after high quality collection. Comprehensive education of the consumers and training of all those involved in the glass recycling stream is key to a successful collection system.
- Consider providing further **support to municipalities for ESD and communication** campaigns.
- Make the EPR and collection systems transparent and show the citizens the efforts put into increasing the recycling.



3. FEEDBACK FROM KEY STAKEHOLDERS

During the mission the experts had the chance to meet a range of key stakeholders and discuss the glass waste management system in Israel with them. While having included the results from these meetings already in the analysis here above, you will furthermore find here in annex a set of factsheets, one for each of the key stakeholders (in order of agenda). These factsheets give a short description of the stakeholder and highlight the main problems mentioned and key recommendations given.

- Annex I: Netivei Israel – National Transport Infrastructure Company
- Annex II: Phoenicia Glass Works.
- Annex III: ECOGLASS
- Annex IV: ASOFTA Recycling
- Annex V: TAMIR