



MISSION REPORT

OUTLINE (TITLE)	Support on the sustainable management of Construction and Demolition Waste and glass recycling: (a) EU Strategies for C&D (b) EU Methodology for building up a national strategy (c) Case study (d) Building up the WC&D product market (e) Circular economy (f) Standartization (g) Subsidies (h) Glass recycling in the EU (i) Recycling C&D and glass in the EU
Mission Purpose (Project Activity #)	Expert Facility Activity No: EFH-IL-5
Number of days worked:	8 days for 2 NKE (4 travel days, 4 days meetings) and 5 days for the invited expert (2 travel days, 3 days meetings)
Period:	From 05.02.2019 to 07.02.2019
Organisations visited:	Israel Ministry of Environmental Protection (MoEP)

Meetings/Activities	Date	Participants (name), (title), (institution)
Meeting 1 (Task 2): Meeting with MoEP	05.02.19	Tahel Yashte, H2020 Focal Point, MoEP Nurit Neumark, Waste Department, MoEP Daniel Hoffman, Waste Department, MoEP Livnat Goldberg, Waste Department, MoEP Eran Shriker Waste Department, MoEP Uri Tal, Construction and Demolition Waste Division Supervisor, MoEP Yarden Shani Rockman, Waste Department, MoEP Netta Assael, Head of infrastructure – Central District, MoEP Oren Herman, Solid Waste Division – Haifa District, MoEP Yuri Gelfenbaum, Waste Department, MoEP Liesbet Van Cauwenberghe, TRACIMAT & SWIM expert Paolo Marengo, Project Manager, ACR+ & SWIM Expert
Meeting 2 (Task 3): Meeting with MoEP	06.02.19	Tahel Yashte, H2020 Focal Point, MoEP Rnana Ilan, Head of Infrastructure, the south district MoEP Netta Assael, head of infrastructure – central district, MoEP Neta Henik, CDW waste coordinator – central district, MoEP Leemor Raviv-Alon, Municipal Solid Waste recycling coordinator, central district MoEP Yoav Goell, deputy Director Jerusalem District, MoEP Daniel Hoffman, Waste Department, MoEP Uri Tal, Construction and Demolition Waste Division Supervisor, MoEP Anat Kaufman, Waste Recycling supervisor, MoEP Eran Shriker, Waste Recycler Supervisor, MoEP Livnat Goldberg, Waste Division officer, MoEP Chris Holcroft, GTS & SWIM expert Liesbet Van Cauwenberghe, TRACIMAT & SWIM expert Paolo Marengo, Project Manager, ACR+ & SWIM Expert
Meeting 2 (Task 4): Meeting with MoEP	07.02.19	Anat Kaufman, Waste Division, MoEP Daniel Hoffman, Waste Division, MoEP Eran Shriker, Waste Division, MoEP



Meetings/Activities	Date	Participants (name), (title), (institution)
		Yarden Shani Rockman, Waste Division, MoEP Yoav Goell, deputy Director Jerusalem District, MoEP Dan Beth-Din, Waste Managr – Tel Aviv District, MoEP Livnat Goldberg, Waste Division, MoEP Dalit Benish, TAMIR Eilat Amar, TAMIR Ronit Aurahami, EPR Division, MoEP Chris Holcroft, GTS & SWIM expert Paolo Marengo, Project Manager, ACR+ & SWIM Expert
Key Issues Discussed	Tuesday, February 5th / C&D waste - EU Strategy (Lead expert Ms Liesbet Van Cauwenberghe, Invited Expert Paolo Marengo)	<ul style="list-style-type: none"> - Israel overview - according to estimation, roughly 50% of the CDW is currently sent to authorized facilities, 50% is illegally dumped - The production per year varies between 3.6 – 6.2 Mt (even if it is difficult to have a clear picture, mainly due to the illegal dumpsites) - CDW quality - - > concrete based - Unregulated disposal is unexpansive - EU overview - ANTHROPOCENE age: landfill and urban mining (EU is dependent for virgin material) - 7th env action program (EAP) 2013 - waste framework directive (WFD) - prevention means design, reduce materials - backfilling: small difference between Landfilling sometimes, definition unclear - EoW criteria: from waste to products. Specific standards on recycled aggregates - wood: EoW for parquet and furniture are very difficult to meet - Metal slags: used in concrete as additives, but is this sustainable? Recyclability in a 2nd, 3rd life? What about leaching, more control is needed. Careful with negative environmental effects of circular economy. --> pay attention to companies that want to 'dump' their waste into building materials (cheaper than landfilling) - road map to resource efficient Europe (2001) - recycling concrete into concrete: up cycling not always sustainable (because of the porosity, more cement is needed → more CO₂ emission) - environmental performance of building - resource efficiency opportunities in the building sector (2014) - towards a circular economy : a zero waste program for Europe (2014) -phosphorus: in Israel many quarries. - EU CDW protocol - In France they recycle little CDW, because they have a lot of space (landfills). They have still a long way to go (even if they have good regulation on pre audit) - gypsum can be recycled to make plasterboard, but an external independent control body it is needed: to have a market, confidence of the user/designer is needed - rethink construction and demolition to accelerate clean energy in buildings - LEED labels for green building: in Israel a similar methodology for certification is in place, inspired by LEED methodology



Meetings/Activities	Date	Participants (name), (title), (institution)
		<ul style="list-style-type: none"> - logistic issue: keep the distances short maybe through Transfer Station or directly on site - quality analysis to measure the quality, problem of representative sampling - public procurement very important - Designing in a multi-functional way, to disassemble - wider benefits: green jobs - important of fair competition : driver to recycle - for the owner it is interesting to know what are the materials in the building, to control costs - producer of EEE (Electric and Electronic Equipment) can be interested in materials in CDW - EU pre demolition and renovation waste audits - In Israel there is no confidence about the quality of the recycled materials. Maybe an insurance scheme could be a solution. In Flanders there is an environmental pollution insurance policy related to excavated solution. This gives confidence in the material for the users - Tracimat case - Landfilling non-hazardous CDW it is not allowed - No landfill taxes for landfilling asbestos: this could generate a risk of a voluntary contamination to avoid landfilling costs. - > 90% of CDW is reused in Flanders - most of the CDW in Flanders is stony fractions (concrete, bricks, asphalt, etc.), than gypsum, plastic, glass, wood, ... - In future buildings there will be a higher quantity glass than nowadays - Negative driver to source selection of glass in CDW: if you demolish an old building you can avoid to selectively collect the glass because you are not exceeding the minimum limit (EoW) of glass in recycled aggregates - acceptance policy LMRP (Low Material Risk Profile) vs HMRP (High Material Risk Profile), according to risk profile - difference in price at the crusher, according to the risk profile - TRACIMAT is on voluntary basis, the strongest party in Flanders is against to make it mandatory because it is pushing for deregulation - TRACIMAT is a sort of credit body - TRACIMAT applied to be recognized as qualified body - TRACIMAT is also a way to take control of the contractor (no speculation..) <p>Wednesday, February 6th / C&D waste – market build up (Lead experts Ms Liesbet Van Cauwenberghe and Chris Holcroft, Invited Expert Paolo Marengo)</p> <ul style="list-style-type: none"> - how to create confidence to develop a market - the case of TRACIMAT - 3 different TRACIMAT systems: building, house, infrastructure - pre demolition inventory : expert are trained and have to be part of the TRACIMAT system - history to describe how Tracimat has started - action at the source is a key point - Industrial Symbiosis, as a driver to develop the market on recycling materials - Industrial Symbiosis cases in Israel: Biogas facilities (wastewater treatment, agricultural waste)



Meetings/Activities	Date	Participants (name), (title), (institution)								
		<ul style="list-style-type: none"> - Examples of industrial symbiosis across Europe - Barriers: community engagement, lack of information, technical, regulatory - Emissions monitoring in Israel: Ministry do the analysis according to the report by the industry, but not enough manpower to monitor. - NIMBY is an important phenomenon for new facilities proposals across Europe and Israel - Barrier in Israel: Low qualification for EoW criteria - Source separation stage is a key aspect - Drivers: leadership, Public authority’s commitment - Israel main applications for recycling material from CDW: infrastructures (in the foundations) - Drivers - Time, Tools, Trust, Facilitator, R&D, Trials, Data and indicators, Stability, Taxes, Regulation - Case studies (From FISSAC H2020 Project): New Green Concrete, Ecocement - Wood pallets in some countries are forbidden because of alien species - Glass scheme in Netherlands: the design of window complies with opportunity to source separate it - UVED: symbiosis case of Industrial Parks. 1960-70 started - Standardization: examples of different tests needed - different strategies to sample, physical-chemical characterization, - example: carpets for economy of services - At the moment, most products with recycling materials from CDW are at the research stage - In Israel, there is a law that every quarry can (not must) have a crusher facility to sell the recycling material - It is very important to provide tender with minimum requirement of recycled materials in the PUBLIC PROCUREMENT. This could push the use of the recycled materials non-currently sold and available - Proposal in Israel for EPR scheme for CDW, but it fails - Mobile crusher: what are the restrictions? environmental permit containing all the restrictions. A permit is needed for each project - Entrance/Gate fee according to the material and quality - Quarry owners are not the same of the crusher owners, this is a key barrier in Israel <p>Thursday, February 7th / Glass recycling (Lead expert Mr. Chris Holcroft, Invited Expert Paolo Marengo)</p> <ul style="list-style-type: none"> - Glass recycling OVERVIEW in Israel: glass as a package is under the Deposit Law - 1 facility that recycles glass, there is a tender call for a sorting facility via color in proximity of the recycling factory <p>Data on glass packaging in Israel</p> <table border="1" data-bbox="376 1854 1106 2060"> <tbody> <tr> <td>Import</td> <td>65000 ton/y</td> </tr> <tr> <td>Recycling plant</td> <td>65000 ton/y</td> </tr> <tr> <td>TOTAL put on the market</td> <td>130000 ton/y</td> </tr> <tr> <td>Deposit</td> <td>100 kt/y</td> </tr> </tbody> </table>	Import	65000 ton/y	Recycling plant	65000 ton/y	TOTAL put on the market	130000 ton/y	Deposit	100 kt/y
Import	65000 ton/y									
Recycling plant	65000 ton/y									
TOTAL put on the market	130000 ton/y									
Deposit	100 kt/y									



Meetings/Activities	Date	Participants (name), (title), (institution)
	Packages	20 kt/y
	Recycling	Roughly 67 kton (58%)
	Total glass	190 kt
	Glass from cars and demolition	60 kt
<ul style="list-style-type: none"> - CDW and car GLASS without any law - TAMIR collect - There are problems with DRS: illegal activities - GTS introduction: also biomedical applications (releasing minerals to the bodies), energy application (oil and gas extraction, solar panel), water filtration - glass in a car around 50 kg, but there are plastic layers in windscreens that make it difficult to put back in recycling (contamination), especially in high quality applications such as window. - In the UK there is not specific collection for decorative glass (e.g. lamps and tableware) - The lead contents in many tableware products can negatively affect the recycling process: so it is safer to take those products out from the source separate collection of bottles and jars - Chemistry on glass - Example Ingredients (mostly for clear glasses, high quality): 75 tonnes of clean broken glass cullet, 162 tonnes good quality sand (high quality glass quarries), 58 tonnes of sodium carbonate, 48 tonnes of limestone, 3.4 tonnes of calcined alumina, ... → theoretically it is possible to recreate glass from 100% of recycled glass, but at industrial scale to improve the process (bubbles of gas..) it is necessary to add a small amount of virgin materials - Every 1,2 ton of raw materials there are 200 kg of CO2 emissions from raw material break down - Glass factory in EU are based on BAT (Best Available Technics) - In UK the cost for the recycled material is approximately 75/t, roughly the same for the raw materials, but the cost for production is less as recycled glass melts at a lower temperature (energy for the process) - In UK the bottles are not reused (refilling them), the purpose is to recycle. Most companies have their own bottle shapes - WEE Law, EPR scheme <p>GLASS Recycling</p> <ul style="list-style-type: none"> - the use of glass recycled material as glass is 300 times CO2 savings comparing the use as aggregates - in green glass in UK 2011 the recycled content is up to 76%, in transparent glass only 40% - Color and weight of bottles are matter of concerns (marketing, etc.). GTS participated in a study to test the perception of consumer and suppliers (brands) - In Israel, they are using glass as drainage layer for a landfill - Potentially uses: filters for wastewater treatment, ceramic filler, ecocement, - In Israel, currently there is a lot of import of bottles already manufactured. In UK, it seems it makes more environmental sense to export cullet instead of manufacture bottles (if not usable in the local market. This is due also to the technology of the factories, that are designed for the production of bottles for the local market, often non-complying with the needs for other countries) - Contamination, what to avoid: Pyrex, lead, (flat glass can however be used in container compositions, currently 80,000 tonnes per year in the UK) - Currently in the UK there is not a system that guarantees the source collection of flat 		



Meetings/Activities	Date	Participants (name), (title), (institution)
		<p>windows (in Netherlands there is an effective scheme, see video displayed on day 2)</p> <ul style="list-style-type: none"> - Specification for colour contamination: maximum rate of clear, green and amber - Container Glass Recycling Schemes: curbside collection vs bring banks systems - Efficiency of different systems - In Israel, there were some vending machines but now they are disappearing, but as well, the employees in the retailing sector are not happy to collect glass packaging under the refund system - Job creation is not a real need in Israel - The higher is the participation rate the higher is the quantity collected, even if the quality decreases a bit - Sampling is a difficult aspect to analyse the quality - Based on CO2 it is better to export cullet than to use in aggregates - Ideally it could be better to source separate by colour, even if now the technology of the sorting plants allows the separation. Israel actually is currently investing in a sorting plant. - In Israel, there are 2 glass facilities - Sorting plant should be nearer where the glass is collected (no need to transport contaminants) - Now the packaging target is for pieces, it should be changed by material (otherwise it is easier to collect plastic)
Outputs		<p>The experts witnessed very honest and open discussions with all the attendees. A lot of issues were raised and discussed, exchanging experiences and analyzing the local opportunities/challenges.</p> <p>The introduction of Insurance Schemes on the use of recycled materials and fixing a minimum rate of CDW recycled materials in the Public Procurement processes could significantly contribute to develop a sustainable CDW circular economy in Israel.</p>
Difficulties Encountered or Other Comments		<p>An open discussion with the quarry owners and the stakeholders of the whole CDW value chain seems to be a key challenge to trigger a sustainable circular economy in the sector.</p>

Name	Date	Signature
PAOLO MARENGO	12/02/2019	