



INTELLECTUAL OUTPUT #2: Survey Report Identifying Six Case Studies of the Circular Economy

Macdac Engineering Consultancy Bureau Ltd – MECB, Malta
PROF.DR. ASEN ZLATAROV UNIVERSITY, BULGARIA
Camera de Comert si Industrie Bistrita Nasaud
Universitatea Politehnica din Bucuresti
Lawton School S.L.
Drosostalida
The Glasgow Caledonian University

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Reviewer	Jonathan Borg		22.3.2017	Director - MECB
Reviewer	Emmanuel Francalanza		24.3.2017	Project Manager - MECB

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INTRODUCTION

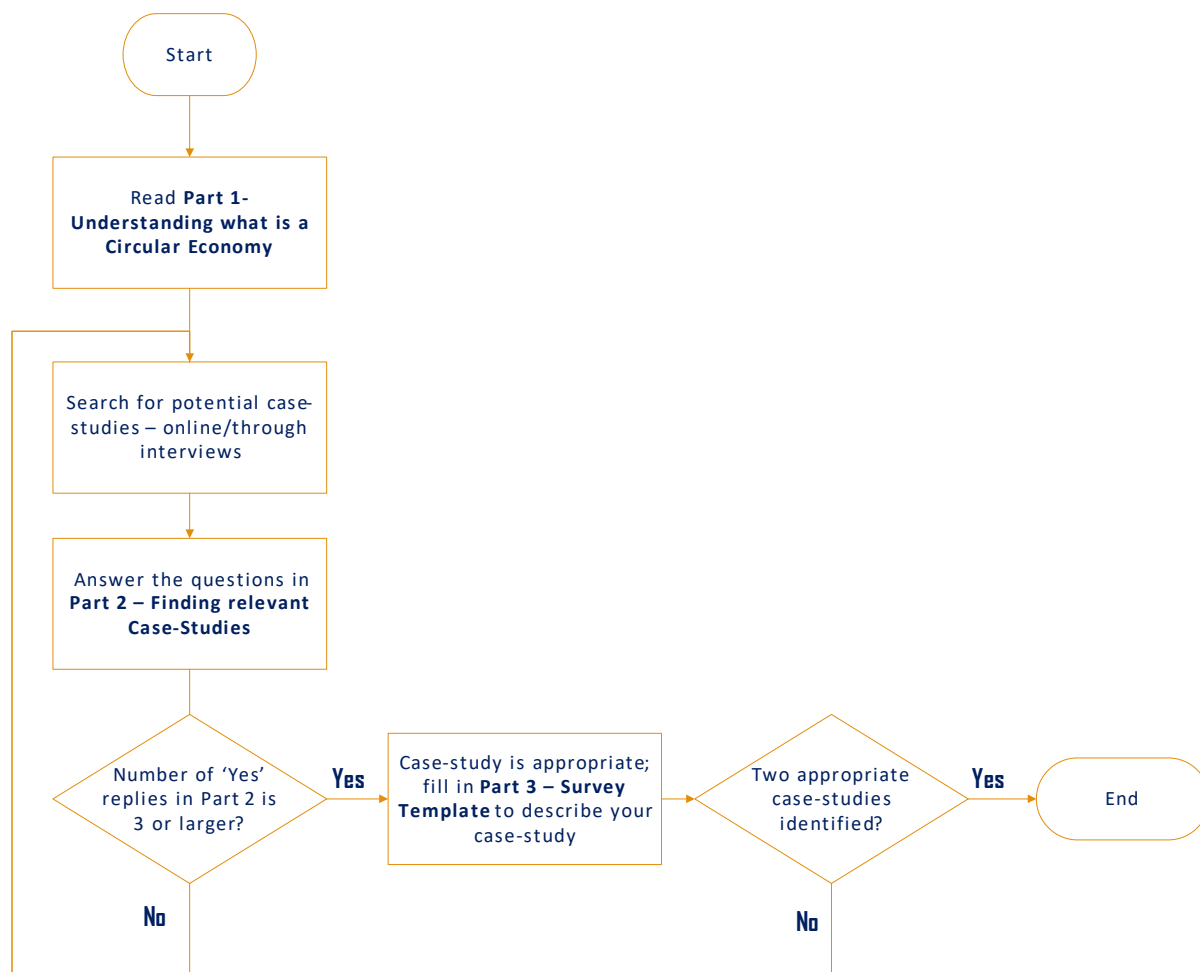
This report summarizes the results from IO2 of the Eng@ge project and includes the following:

- The approach used by the Eng@ge project partners to help establish relevant case-studies that demonstrate the concepts of Circular Economy and Green Entrepreneurship. Hereafter this will be referred to as *Survey Approach* (refer to Section A).
- The 14 case-studies identified by the project partners that demonstrate the concepts of Circular Economy and Green Entrepreneurship (refer to Appendices 1-7)
- The criteria used to select 6 case studies out of the 14 identified and the six selected case-studies (refer to Section B)



SECTION A: SURVEY APPROACH

The flowchart below explains the approach used by the Eng@ge project partners to help establish relevant case-studies that demonstrate the concepts of Circular Economy and Green Entrepreneurship.





Part 1: Understanding what is a Circular Economy

➤ Definition

The circular economy aims to systematically eliminate waste throughout the life cycles and uses of products and their components. Indeed, tight component and product cycles of use and reuse, aided by product design, help define the concept of a circular economy and distinguish it from the linear take–make–dispose economy, which wastes large amounts of embedded materials, energy, and resources (Adapted from [1]).

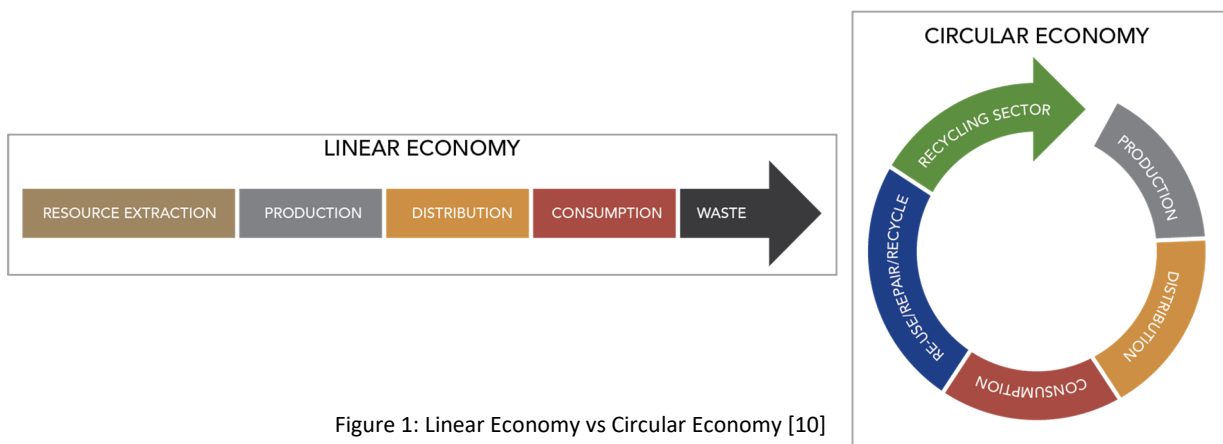


Figure 1: Linear Economy vs Circular Economy [10]

➤ Principles

Principle 1. Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows

Principle 2. Optimise resource yields by ensuring products, components and materials are at their highest utility at all times. This includes:

- sharing as an alternative to purchasing;
- extending product life;
- optimising reuse;
- designing for remanufacturing, refurbishing, and recycling.

Principle 3. Foster system effectiveness by reducing damage to human utility, such as food, shelter, education and health and managing externalities, such as land use, air, water and noise pollution. (Adapted from [2]).

➤ Videos

- https://www.youtube.com/watch?v=lK00v_tzkCI
- <https://www.youtube.com/watch?v=zCRKvDyyHmI>
- <https://www.youtube.com/watch?v=OXvqFPoJLuE>
- <https://www.youtube.com/watch?v=V1Tszs48xCI>



Part 2: Finding relevant Case-Studies

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?			
b. Is extending product life being considered in case-study?			
c. Is optimising reuse being considered in case-study?			
d. Are remanufacturing/refurbishing/recycling being considered in case-study?			
e. Does the case study promote hire or leasing of products as an alternative to purchasing?			
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction, more efficient use of resources)?			
Total			

What is the total of 'Yes' replies above?

- **3 or larger** – Case study is appropriate.
- **Smaller than 3** – Please find another case-study which better meets the principles of circular economy and answer Questions a. – f. again.



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Part 3: Survey Template

<i>Engage Partner Name</i>		<i>Case Study Number</i>	
<i>Case Study Title</i>			
<i>Sector (Please choose from list in link [8])</i>			
<i>Identified Problem description</i>			
<i>Application of circular economy principle</i>			
<i>Resulting benefits</i>			
<i>Source/Reference</i>			
<i>Target EQF Level (Please choose from list in link [9])</i>			



Part 4: Example of how to identify an appropriate case-study

Splosh sells customers a one-off 'starter box', containing a range of simply designed bottles. A sachet of concentrated liquid is added to the bottle with warm tap water to create cleaning products. Bottles can be used repeatedly, with refill sachets delivered in boxes through the post.

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?		X	
b. Is extending product life being considered in case-study?	X		Product life of plastic bottles is increased
c. Is optimising reuse being considered in case-study?	X		Plastic bottles are being reused many times
d. Are remanufacturing/ refurbishing/recycling being considered in case-study?		X	
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		X	
f. Does the case-study bring benefits for both the environment and the economy (e.g. in terms of waste reduction, more efficient use of resources)?	X		Yes, if a bottle is used 20 times it means 95% less packaging waste. Since less bottles need to be manufactured, packaging costs and packaging waste both decrease.
Total	3	3	

Total of 'Yes' replies = 3, therefore Case study is appropriate and case study summary template can be filled in.



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<i>Engage Partner Name</i>	XXXX	<i>Case Study Number X</i>
<i>Case Study Title</i>	Splosh -How rethinking the business model for cleaning products can influence design	
<i>Sector (Please choose from list in link [8])</i>	Consumer goods - Cleaning products	
<i>Identified Problem description</i>	Traditional cleaning product bottles are used once and thrown away, resulting in lots of waste and effort to recycle the used bottles. If these cleaning product bottles are used repeatedly, packaging waste is drastically reduced and the price of these products is less, making the products more competitive.	
<i>Application of circular economy principle</i>	<p>With Splosh, instead of buying new bottles filled with product on a weekly basis, customers purchase a one-off 'starter box', containing a range of simply designed bottles. Inside each bottle is a sachet of concentrated liquid – customers just add warm tap water to create cleaning products that Splosh claim clean with comparable effectiveness to competitors. These bottles can be used repeatedly, with refill sachets delivered in boxes through the post.</p>  <p>This system has necessitated a complete redesign of many standard household cleaning products. The first step was to create a completely new, concentrated form of cleaning fluids – a more difficult task than just removing the water – and the main challenge faced was in finding chemists that had suitable expertise. After creating the concentrate, packaging was chosen. The film pouch that holds the fluid is PVOH (polyvinyl alcohol), a dissolvable material used in a variety of industries. In this case it was an especially useful design choice, as once dissolved, PVOH actually improves the product, adding viscosity and a mild cleaning action to the mixed solution. The other aspect was the external packaging. This needed to be durable, but also integrate with the postage model. Packages left on doorsteps or returned</p>	



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	to sender would be inconvenient, so the box was designed to fit through a letterbox, and is classed as a 'large letter' by the UK's Royal Mail.
<i>Resulting benefits</i>	<p>Plastic bottles are being reused many times; if a bottle is used 20 times it means 95% less packaging waste</p> <p>Since less bottles need to be manufactured, packaging costs and packaging waste both decrease.</p> <p>Since Splosh is not sold on a shelf, Splosh products don't have to be designed to fight for attention with other brands. In addition, the new relationship with the customer opens up a direct marketing channel, an extremely valuable way of communicating with users.</p>
<i>Source/Reference</i>	https://www.splosh.com
<i>Target EQF Level (Please choose from list in link [9])</i>	Level 3 and higher



SECTION B: CASE-STUDIES SELECTION

Part 1: Criteria used

The Circular Economy case-studies completed by the project partners can be found in Appendices 1-7. The selection criteria used to select the best six case studies from the 14 case-studies are the following:

1. How easy it is to understand the concept of the circular economy from the proposed case-study?
2. Application of innovative approach to circular economy
3. Extent of economic benefits through reduce/reuse/recycle
4. Source: Local vs. well established
5. Can case-study exploit augmented reality technology?
6. Does the case study illustrate the principles of circular economy in context of the Engage Project course material?
7. Applicability in different firms/across different sectors



Part 2: Case-studies selected

The criteria listed in Part 1 were used by three evaluators to identify the six case studies that best demonstrate the principles of Circular Economy and Green Entrepreneurship. The selected case studies are the following (refer to Appendices 1-7 for details on each case study):

1. Case Study 2: How to handle used tyres from BTU
2. Case Study 4: Waste Water Recycling
3. Case Study 7: Vodafone
4. Case Study 10: Re-tek Ltd.
5. Case Study 12: Nudie Jeans
6. Case Study 14: Reduction of Plastic Waste



REFERENCES

- [1] <http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/moving-toward-a-circular-economy>
- [2] <https://www.ellenmacarthurfoundation.org/circular-economy/overview/principles>
- [3] <http://blog.exportleadership.com/2015/11/04/the-circular-economy-from-waste-to-wealth/>
- [4] <https://www.ellenmacarthurfoundation.org/circular-economy>
- [5] http://ec.europa.eu/environment/circular-economy/index_en.htm
- [6] <http://www.waste360.com/waste-reduction/circular-economy-isn-t-waste-business-usual>
- [7] <http://sustainablebrandsbarcelona.com/blog/circular-economy-closing-the-loop/>
- [8] https://biz.yahoo.com/ic/ind_index.html
- [9] https://en.wikipedia.org/wiki/European_Qualifications_Framework
- [10] <http://www.futuristgerd.com/2015/08/14/nice-and-simple-explanation-of-the-circular-economy/>



APPENDICES - Case-Studies

APPENDIX 1: - Prof. Dr. Asen Zlatarov University (BG)

Case Study 1: UCM 2009 Ltd.: How to better manage used oil disposal

UCM 2009 Ltd. was established in 2009 in the town of Kaolinovo (North-Eastern Planning Region of Bulgaria). The town is famous with its kaolin deposit (ceramics raw material base). UCM 2009 Ltd. is a contractor of Kaolin JSCO (www.kaolin.bg), part of Quarzwerke Gruppe, Germany. The scope of activities of the company includes mining and quarrying, maintenance and repair of motor vehicles, road construction trucks, truck transport and investment activities. The core business of UCM 2009 Ltd. is classified as 08.12 Mining of clays and kaolin (according to KID-2008) or 14.22: Mining of clays and kaolin (according to NACE codes) and truck transport (KID 49.41). In the North-Eastern Planning Region of Bulgaria there are 5 or 6 companies with similar scope of activity and not more than 20 firms in the same KID group in Bulgaria. The company possesses 30 trucks, 6 excavators, 3 bulldozers and 1 loader truck. It employs 30 people in a region with very high level of unemployment.

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?		x	
b. Is extending product life being considered in case-study?		x	
c. Is optimising reuse being considered in case-study?	x		
d. Are remanufacturing/refurbishing/recycling being considered in case-study?	x		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		x	
f. Does the case-study bring benefits for both the environment and the economy (e.g. in terms of waste reduction, more efficient use of resources)?	x		
Total	3	3	

Total of 'Yes' replies = 3, therefore Case study is appropriate.

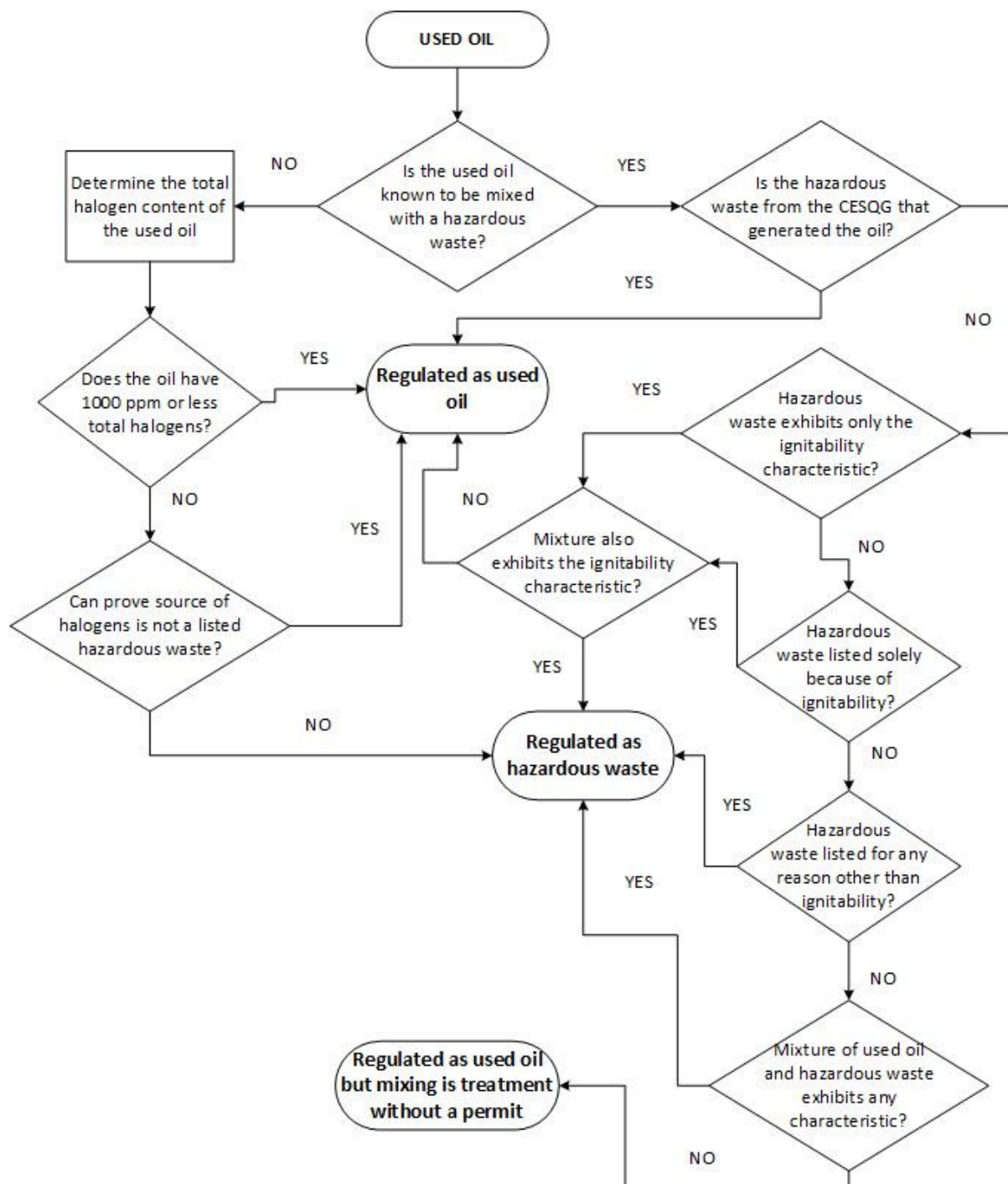


Engage Partner Name	UAZ BTU BG	Case Study Number 1																										
Case Study Title	UCM 2009 Ltd.: How to better manage used oil disposal																											
Sector	Mining of clays and kaolin (KID 08.12) and truck transport (KID 49.41)																											
Problem Background	<p>Because the company owns many motor vehicles which use around 2-3 tons of fuel and 100 l motor oil daily a gas station and a service-station are operated as well. In the service-station work 4 technicians and mechanics. Mr. Plamen Stoychev (a co-owner of the company) is responsible for them as well as for the hazardous waste management. The amount of used motor oil is around 100 l weekly. The company has a contract with Al+Co JSC which possesses specialised transport vehicles – three tank trucks, certified for transport of light fuels, and two tank cars, certified for transport of heating fuel, (marked by the Customs Agency) and five container trucks for delivery of oils and methane groups. The company stores the used motor oil in special tanks in a designated storage site and place. The specialised company collects the used motor oil once in ten days.</p> <p>The unemployment rate in the Municipality of Kaolinovo is quite above the average rate in Bulgaria. Around 45% of the inhabitants obtain lower secondary education.</p>																											
Application of circular economy principle	<p>UCM 2009 Ltd. is committed to providing the highest quality service and solutions. That is why the company went to the trouble and expense to become an ISO 9001:2008 certified company. As a part of ISO 9001:2008 implementation the company developed rules and documents for collecting the used oil.</p> <p>Truck spill check-list</p> <table><tr><th>Contents</th><th>Quantity</th></tr><tr><td>Hydrocarbon absorbent pads</td><td>10</td></tr><tr><td>Bag of particulate (Oil Dry or similar)</td><td>1</td></tr><tr><td>Absorbent socks</td><td>1 x 1.5 m 1 x 3 m</td></tr><tr><td>Hydrocarbon pillows</td><td>2</td></tr><tr><td>PVC drain cover</td><td>1</td></tr><tr><td>Folding trenching tool</td><td>1</td></tr><tr><td>Pair PVC gauntlets</td><td>1</td></tr><tr><td>Polythene disposal bags</td><td>1</td></tr></table> <p>Spill prevention To-Do List</p> <table><tr><th>Do</th><th>To prevent</th></tr><tr><td>Park away from traffic flows, and/or use safety cones if necessary</td><td>Tank wagon being hit by other traffic</td></tr><tr><td>Dip tank wagon and site tank before collection</td><td>Tank wagon overflow</td></tr><tr><td>Regular inspection of hoses, pumps and other equipment</td><td>Equipment failure</td></tr></table>		Contents	Quantity	Hydrocarbon absorbent pads	10	Bag of particulate (Oil Dry or similar)	1	Absorbent socks	1 x 1.5 m 1 x 3 m	Hydrocarbon pillows	2	PVC drain cover	1	Folding trenching tool	1	Pair PVC gauntlets	1	Polythene disposal bags	1	Do	To prevent	Park away from traffic flows, and/or use safety cones if necessary	Tank wagon being hit by other traffic	Dip tank wagon and site tank before collection	Tank wagon overflow	Regular inspection of hoses, pumps and other equipment	Equipment failure
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Hydrocarbon absorbent pads	10																											
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Dip tank wagon and site tank before collection	Tank wagon overflow																											
Regular inspection of hoses, pumps and other equipment	Equipment failure																											



	<p>Spill management check-list</p> <table><tr><th>Activities</th><th>Yes</th><th>No</th></tr><tr><td>Isolate the source of spillage and close vehicle valves</td><td></td><td></td></tr><tr><td>Contain and control the spill</td><td></td><td></td></tr><tr><td>Stop all operations in the immediate areas of concern and remove or shut down any ignition sources</td><td></td><td></td></tr><tr><td>Close the interceptor valve if there is one on site, and close and/or block any drains leading off the site</td><td></td><td></td></tr><tr><td>Report spillage to site operator</td><td></td><td></td></tr><tr><td>Start the clean up. Request assistance if necessary</td><td></td><td></td></tr><tr><td>Ensure that any materials used in the clean up are disposed of appropriately</td><td></td><td></td></tr><tr><td>If the spillage occurs on unsealed ground, the soil must be removed and disposed of appropriately</td><td></td><td></td></tr><tr><td>If there is a risk of oil entering a sewer, stormwater drain or natural waterway, the relevant local authority should be notified immediately</td><td></td><td></td></tr></table> <p>Used oil storage To-Do list</p> <ol style="list-style-type: none">1. Used oil storage containers must be free of leaks, and maintained in good condition.2. Used oil containers must always be closed except when necessary to add or remove used oil.3. Used oil storage containers and aboveground storage tanks must be labeled with the words “Used Oil” and the label must be legible.4. Fill pipes used to transfer used oil into underground tanks must be labeled with the words “Used Oil.”5. Containers and tanks used to store used oil at transfer facilities must be equipped with secondary containment.6. The generator must use appropriate controls to prevent spills and overflows from used oil storage tanks. These include, but are not limited to:<ul style="list-style-type: none">▪ Spill prevention controls in the form of check valves, dry disconnect couplings, or similar devices;▪ Overflow controls for continuously fed used oil tanks in the form of level sensing devices, high level alarms, etc.;▪ Freeboard controls in open used oil tanks; or▪ Direct observation by persons adding used oil to tank.	Activities	Yes	No	Isolate the source of spillage and close vehicle valves			Contain and control the spill			Stop all operations in the immediate areas of concern and remove or shut down any ignition sources			Close the interceptor valve if there is one on site, and close and/or block any drains leading off the site			Report spillage to site operator			Start the clean up. Request assistance if necessary			Ensure that any materials used in the clean up are disposed of appropriately			If the spillage occurs on unsealed ground, the soil must be removed and disposed of appropriately			If there is a risk of oil entering a sewer, stormwater drain or natural waterway, the relevant local authority should be notified immediately		
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If there is a risk of oil entering a sewer, stormwater drain or natural waterway, the relevant local authority should be notified immediately																															
Resulting benefits	<p>The resulting benefits are as follows:</p> <ol style="list-style-type: none">1. Recycle the used oil from trucks and construction vehicles.2. Protect the environment from spill of used oils.3. Reach 0 waste production process.																														
Source/Reference	Interview with Mrs. Kalinka Stoycheva (a co-owner and manager of UCM 2009 Ltd.)																														
Target EQF Level	Level 4 and higher																														

Used oil as hazardous waste determination flowchart





Case Study 2: UCM 2009 Ltd.: How to handle used tyres from BTU

UCM 2009 Ltd. was established in 2009 in the town of Kaolinovo (North-Eastern Planning Region of Bulgaria). The town is famous with its kaolin deposit (ceramics raw material base). UCM 2009 Ltd. is a contractor of Kaolin JSCO (www.kaolin.bg), part of Quarzwerke Gruppe, Germany. The scope of activities of the company includes mining and quarrying, maintenance and repair of motor vehicles, road construction trucks, truck transport and investment activities. The core business of UCM 2009 Ltd. is classified as 08.12 Mining of clays and kaolin (according to KID-2008) or 14.22: Mining of clays and kaolin (according to NACE codes) and truck transport (KID 49.41). In the North-Eastern Planning Region of Bulgaria there are 5 or 6 companies with similar scope of activity and not more than 20 firms in the same KID group in Bulgaria. The company possesses 30 trucks, 6 excavators, 3 bulldozers and 1 loader truck. It employs 30 people in a region with very high level of unemployment.

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	x		
b. Is extending product life being considered in case-study?	x		
c. Is optimising reuse being considered in case-study?	x		
d. Are remanufacturing/refurbishing/recycling being considered in case-study?	x		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		x	
f. Does the case-study bring benefits for both the environment and the economy (e.g. in terms of waste reduction, more efficient use of resources)?	x		
Total	5	1	

Total of 'Yes' replies = 5, therefore Case study is appropriate.



<i>Engage Partner Name</i>	UAZ BTU BG	<i>Case Study Number 2</i>
<i>Case Study Title</i>	How to handle used tyres	
<i>Sector</i>	Tyre recycling	
<i>Problem Background</i>	<p>There are three critical issues confronting the tyre recycling industries in the EU today: 1/ Tire sourcing for expansion; 2/ Sustainability and reach compliance, and 3/ The availability of new markets and continued interest and cooperation. Annual raises of tire recycling in 28 Member States (incl. Norway) during 2015 grew to +3,200,000 tonnes, with an additional +100,000 tonnes from off-road-vehicles. As manufacturing and sales patterns have changed, larger quantities of tyres are imported from outside of the EU – estimated at more than ±30% of EU tires are imported from non-EU producers. Additionally, the lingering recession impacted both sales and raises. A variety of tire management systems operate in the EU. While the systems vary, they successfully collect significant quantities of tires for use or treatment – approaching 90%. Data indicate that + 40% of tires collected are subsequently treated to attain material outputs, an equal amount is used for energy. The remaining are retreaded (+7%) - or exported (+11) – up from less than 4% in recent years.</p>	
<i>Application of circular economy principle</i>	<p>Tyre recycling is unique comparing to other recycling sectors. 1/ It is among the smallest waste streams; 2/ Tyres are essentially homogeneous; 3/ There is an interim treatment, retreading, which can extend the on-road life of a tyre; 4/ Recycling outputs are not used to produce the same or similar products as the original but have become strategic materials in over 50 different market sectors; 5/ under EU legislation, tyres, tire pieces, and recycling residues cannot be placed in landfills, compelling the development of new options for valorisation (Letcher and Vallero, 2011: 300).</p> <p>Reuse: Includes the sale of part-worn tyres for domestic on-road and other uses as well as for export to countries with less restrictive road-use requirements.</p> <p>Retreading: re-manufactures a tyre using as the core a carefully selected, undamaged casing, which reduces production energy as well as virgin resources.</p> <p>Recycling: transforms a waste into a road material that can be reintegrated into the economic stream as a resource to substitute the use of virgin resources.</p> <p>Recovery: transforms a waste into energy or fuel, which can be reintegrated into the economic stream as a resource to substitute the use of other energy sources.</p> <p>The means of tyre valorisation include (Shulman, 2016):</p> <ul style="list-style-type: none"> ▪ Re-use and/or export; ▪ Retreading; ▪ Material recycling including: <ul style="list-style-type: none"> ✓ Civil engineering and construction applications; ✓ Sport surfaces; ✓ Surface transport applications; ✓ New materials : devulc, micro, pyrolysis, compounds, etc. ✓ Environmental rehabilitation projects; 	

	<ul style="list-style-type: none"> ✓ Consumer and industrial products. ▪ Energy recovery for: <ul style="list-style-type: none"> ✓ Co-incineration; ✓ Cement kilns. <p>Each form of valorisation requires a consistent flow of input.</p> <p>Tyre management is incorporated into EU waste legislation under the concept of 'producer responsibility'. The legislation is transposed at Member State level for implementation.</p> <p>There are four basic management systems for used tyres: 1/ Producer responsibility: legal responsibility for 100% of tyres that arise; 2/ Multiple responsibility: more than one entity with legal responsibility for tyre management; 3/ Negotiated responsibility: legal responsibility for only a specified percentage of tyres (often below 100%); 4/ Free market: no legally defined responsibility for tyre management. Different adaptations exist as well as any combinations of the above.</p> <p>End-of-Life Tire (ELT) is a tire that can no longer be used for its original purpose; all tires including passenger car, truck, airplane, agricultural, 2-wheel & off-road tires result in ELTs; however, most ELTs result from car and truck tires.</p> <p>ELT-derived products include reclaimed rubber, shredded tires, ground and powdered rubber, char, oil, steel cord, textiles, etc.</p> <p>Used tires include recyclic rubber tires, second hand tires, exportable tires, and ELTs.</p> <p>ELT management is the process beginning at point when a Used Tire is designated as an ELT up to its supply to an ELT recycling or recovery company.</p> <div data-bbox="470 1205 1364 1697"> <p>Chart Flow</p>  <pre> graph LR A[Affiliated companies] --> B[Generation points] B --> C[Collection centres] C --> D[Storage and preparation centres] D --> E[Recycling and recovery centres] E --> F[Management] F --> G[reuse] F --> H[Recycling] F --> I[Energy recovery] </pre> <p>The flowchart illustrates the management flow of used tyres. It starts with 'Affiliated companies' leading to 'Generation points', then 'Collection centres', 'Storage and preparation centres', and 'Recycling and recovery centres'. From 'Recycling and recovery centres', the flow goes to 'Management'. From 'Management', the flow branches into three paths: 'reuse' (represented by a car wheel), 'Recycling' (represented by a pile of shredded material), and 'Energy recovery' (represented by a factory with smokestacks).</p> </div> <p>Figure 1. Management flow of used tyres</p> <p>Source: http://www.erf.be/images/New_Jersey/5_SIGNUS_JM_BERMEJO_16_9.pdf</p> <p>The responsibilities of each stakeholder must be clear and agreed by all throughout the design and implementation of an ELT management system. The cost transparency is assured by a separate line item on new tire invoice showing tire disposal fee.</p>
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<i>Resulting benefits</i>	The resulting benefits are: 1. Keep the environment clean. 2. Use as secondary material. 3. Use as burning material in metallurgy and thermo heat stations. 4. Use as by-products.
<i>Source/Reference</i>	Listed in section “Resources”
<i>Target EQF Level</i>	Level 3 and higher

Resources:

Evans, A., and Evans, R. UK Waste Tyre Management Best Practice: Handling of Post-Consumer Tyres – Collection & Storage, 22 February 2006. [available at:

<http://www.wrap.org.uk/sites/files/wrap/8%20-%20UK%20Waste%20Tyre%20Management%20-%20May%202006.pdf>]

Letcher, T., and Vallero, D. (Eds.) Waste: A Handbook for Management, Academic Press, 2011.

Mahlangu, M. Waste Tyre Management Problems in South Africa and the Possible Opportunities that can be Created Through the Recycling Thereof. University of South Africa, April/May 2009.

Shulman, V. Tyre Recycling: The EU Experience, [available at:

<http://static1.1.sqspcdn.com/static/f/1426334/26973658/1460726749247/05-04+Shulman+EU+Tire+Recycling.pdf?token=s6K6xi5CCrfBPv4oKQVtBCUc9sI%3D>]

Shulman, V. Tyre Recycling, Volume 15 of RAPRA review reports: RAPRA Technology Limited, Rapra Review Reports, ISSN 0889-3144, iSmithers Rapra Publishing, 2004.

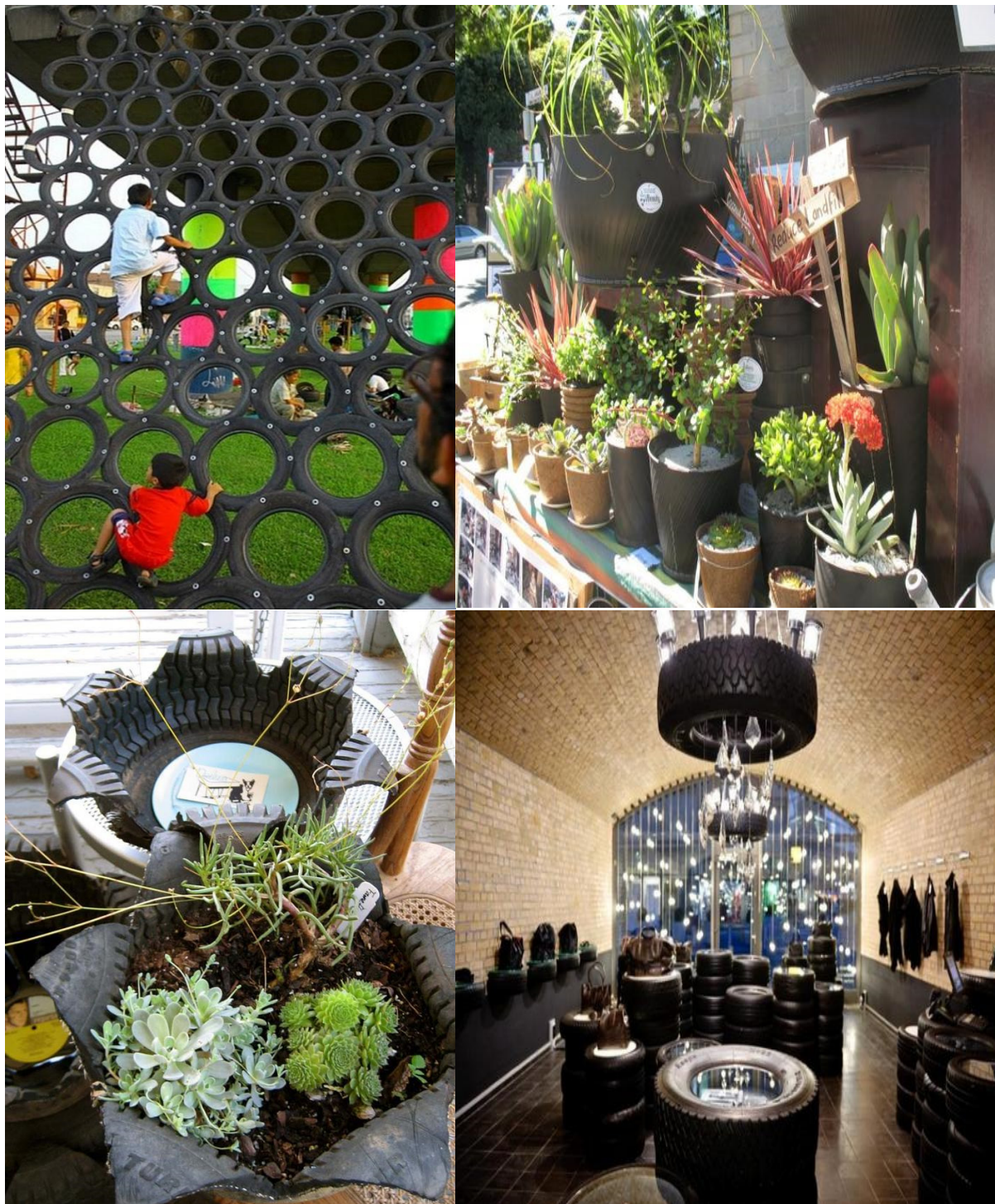
World Business Council for Sustainable Development. End-of-Life Tyres: A framework for effective management systems. [available at:

http://wbcserver.org/wbcserver/publications/cd_files/datas/business-solutions/tire/pdf/AFrameworkForEffectiveManagementSystems.pdf]

<http://www.ecomediana.bg/%D1%81%D0%B8%D1%81%D1%82%D0%B5%D0%BC%D0%B0%D1%82%D0%B0/%D0%BB%D1%8E%D0%B1%D0%BE%D0%BF%D0%B8%D1%82%D0%BD%D0%BE/%D1%83%D0%BF%D0%BE%D1%82%D1%80%D0%B5%D0%B1%D0%B5%D0%BD%D0%B8%D1%82%D0%B5-%D0%B3%D1%83%D0%BC%D0%B8-%D0%BA%D0%B0%D1%82%D0%BE-%D0%BE%D1%82%D0%BF%D0%B0%D0%B4%D1%8A%D0%BA>



Various ways to implement/re-use used tyres





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APPENDIX 2: MECB (MT)

Case Study 3: Recycling of unwanted clothing

The Maltese public has recently been given the opportunity to dispose of unwanted clothing they have either outgrown or which has gone out of fashion, hence giving them the opportunity to clear out their wardrobes and drawers. Such unwanted clothing items are being collected in an organised manner to be recycled. In 2015 a total of three tons of unwanted clothes were collected and now collection boxes have been placed in different localities around Malta where unwanted clothes can be disposed.

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	X		Pressure on virgin resources such as cotton or wool is reduced, as well as oil and other chemicals employed to produce synthetic fibres.
b. Is extending product life being considered in case-study?	X		The life of used clothes is extended as they are then used in other products.
c. Is optimising reuse being considered in case-study?		X	
d. Are remanufacturing/refurbishing/recycling being considered in case-study?	X		Unwanted clothing items are being collected in an organised manner to be recycled.
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		X	
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction, more efficient use of resources)?	X		Clothes recycling results in a reduced need for landfill space and reduced pressure on virgin resources.
Total	4	2	

Total of 'Yes' replies = 4, therefore Case study is appropriate.



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<i>Engage Partner Name</i>	MECB	<i>Case Study Number</i>	3
<i>Case Study Title</i>	Recycling of unwanted clothing		
<i>Sector (Please choose from list in link [8])</i>	Textile – Apparel Clothing		
<i>Identified Problem description</i>	<p>A common problem faced by many people is that of having a quantity of unwanted clothes and not knowing what to do with them. As a result, these clothes usually end up dumped in landfills as general waste. This is of great environmental damage especially in the case of clothing materials that do not disintegrate with time.</p> <p>In light of this issue, the Maltese public has recently been given the opportunity to dispose of unwanted clothing they have either outgrown or which has gone out of fashion, hence giving them the opportunity to clear out their wardrobes and drawers. Such unwanted clothing items are being collected in an organised manner to be recycled. In 2015 a total of three tons of unwanted clothes were collected and now collection boxes have been placed in different localities around Malta where unwanted clothes can be disposed.</p> 		
<i>Application of circular economy principle</i>	<p>This initiative started when the group Refab Malta launched a pilot project to collect used and even new clothes from various homes and institutes which receive clothes donations. Textile materials for recycling can be classified either as:</p> <ul style="list-style-type: none"> • post-industrial • as a by-product from yarn and fabric manufacture for the garment-making and retail industry or as post-consumer, originating from discarded garments, household items, vehicles, etc. <p>This initiative was successful and proved to be of great environmental benefit, in fact the clothes collection service is now being extended with various deposit</p>		



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	<p>containers being placed in localities around Malta such as Attard, Qormi, Żebbug, Mqabba and also in Gozo.</p> <p>Brian Cardona, a spokesperson for Refab Malta, said the plan is to spread this project on a national basis. Refab Malta is also continuing to develop this scheme in schools in order to increase awareness that unwanted items need not necessarily be thrown away but may be recycled. Additionally, in collaboration with Maltese Local Councils and the Ministry of Education, Employment and the Family, Refab has started collecting textiles on request in several locations and schools.</p> <p>After collection, textiles are sorted locally and eventually are shipped to Northern Ireland where the rest of the process takes place. The initial sorting includes baling - a process carried out in the Maltese Recycling Plant. Once shipped, clothes are re-sorted, shredded and pulled, carded and spinned.</p> <p>This project is providing employment not only locally but also overseas where consignments are sent. Therefore paid green jobs are being created in the recycling sphere.</p>
<i>Resulting benefits</i>	<p>Recovering and recycling textiles provides both environmental and economical benefits by:</p> <ul style="list-style-type: none"> • Reducing the need for landfill space: Certain synthetic fibre products do not decompose, while natural fibre such as wool does decompose but produces methane which contributes to global warming. In 2015 a total of three tons of unwanted clothes were collected; which would otherwise have ended up in landfill as general waste • Reducing pressure on virgin resources. This includes materials traditionally used in textiles such as cotton or wool, as well as oil and other chemicals employed to produce synthetic fibres. • Reducing pollution as well as water and energy consumption. • Reducing the demand for dyes and fixing agents. This, in turn, lowers the number of problems caused by their use and manufacture. • Creation of green jobs in the recycling sphere
<i>Source/Reference</i>	<p>http://www.tvn.com.mt/en/news/jekk-hrigit-minnhom-jeunwanted-clothing-can-now-be-deposited-in-boxes-to-be-recycledw-hargu-mill-modadepozitahom-ghar-riciklagg/ www.refabmalta.com/</p>
<i>Target EQF Level (Please choose from list in link [9])</i>	<p>Level 3 and higher (lower also possible considering that in Malta this scheme is being adopted also in primary and secondary schools)</p>



Case Study 4: Waste water recycling

One of the measures being taken in Malta to reduce the water stress level is the treatment of waste water. In particular, waste water treatment and re-use is increasingly being integrated in the utilisation of water resources in the private industry, especially the hotel industry. On a national scale, wastewater treatment in the private industry will reduce the burden on the heavily exploited aquifers and can reduce the demand from the desalination plants, which consume a lot of costly energy.

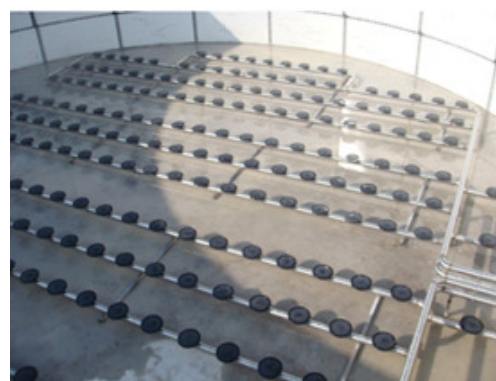
	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	X		Reduced burden on the heavily exploited aquifers and reduced demand from the desalination plants which consume a lot of costly electricity.
b. Is extending product life being considered in case-study?		X	
c. Is optimising reuse being considered in case-study?	X		Reuse of wastewater for second class purposes e.g. for toilet flushings and landscape irrigation.
d. Are remanufacturing/ refurbishing/recycling being considered in case-study?	X		Recycling of wastewater for second class purposes e.g. for toilet flushings and landscape irrigation.
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		X	
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction, more efficient use of resources)?	X		Local hotel industry investing in wastewater treatment technologies is benefiting from considerable operational cost savings; Reduced burden on the heavily exploited aquifers
Total	4	2	

Total of 'Yes' replies = 4, therefore Case study is appropriate.



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<i>Engage Partner Name</i>	MECB	<i>Case Study Number</i>	4
<i>Case Study Title</i>	Waste water recycling		
<i>Sector (Please choose from list in link [8])</i>	Water utilities		
<i>Identified Problem description</i>	<p>Malta is among the world's most water-stressed countries. Its groundwater reserves are being depleted. For 35 years, Malta has been increasingly dependent on energy-intensive desalination. However, groundwater still contributes most of the water used in the country, especially by water-thirsty agriculture during the dry seasons.</p> <p>One of the measures being taken to reduce the water stress level is the treatment of waste water. In particular, waste water treatment and re-use is increasingly being integrated in the utilisation of water resources in the private industry, especially the hotel industry. On a national scale, wastewater treatment in the private industry will reduce the burden on the heavily exploited aquifers and can reduce the demand from the desalination plants, which consume a lot of costly energy.</p>		
<i>Application of circular economy principle</i>	<p>The eventuality of higher water tariffs and possible introduction of a sewage tax in the near future, has triggered the local hotel industry to invest in wastewater treatment technologies, and as a result of these investments, these hotels are benefiting from considerable operational cost savings.</p> <p>One of these success stories is the five-star Hilton Hotel in Malta, which is recycling wastewater for second class purposes and reusing it for toilet flushings and landscape irrigation amongst others. The wastewater is totally disinfected and treated to the highest standards of application, and hence users are safeguarded from any health hazard. Apart from enhancing a 'green hotel' policy, such an investment has resulted in lower first class water consumption bills and lower operational costs.</p>		





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	<p>In many cases , on-site wastewater treatment is being utilised as a cost-cutting tool, especially when one considers that payback periods result to be within sustainable time frames. In the case of the Hilton Hotel Malta, savings are estimated to be over 5,000 cubic metres a year, which also reinforces Hilton Malta’s commitment to environmental sustainability.</p> <p>In order to re-use wastewater, it must be treated to relatively high standards, depending upon the re-use application. On a positive note, small to medium sized wastewater treatment plant technology is available in Malta, with some companies providing custom designed wastewater treatment technologies depending on the treated water quality required, type of application and site conditions. Such treatment plants occupy very small footprints and can be installed either at basement level, outdoor below or above ground installations. Technologies vary from traditional biological treatment in various forms to the latest innovations in the sector, such as membrane bio-reactor treatment. Applications can start from single house installations going up to small communities, hotels or any other sites with up to a population of 5,000.</p>
<i>Resulting benefits</i>	<ul style="list-style-type: none"> • Wastewater treatment reduces the burden on the heavily exploited aquifers and can reduce the demand from the desalination plants, which consume a lot of costly energy. • Lower first class water consumption bills for the private industry and lower operational costs as a result of wastewater recycling. • Creation of green jobs in the recycling sphere e.g. for production and sale of wastewater treatment technologies
<i>Source/Reference</i>	<p>http://www.timesofmalta.com/articles/view/20150506/opinion/Imminent-water-crisis.566982</p> <p>http://www.fmenvironmental.com/read.asp?id=93</p>
<i>Target EQF Level (Please choose from list in link [9])</i>	Level 3 and higher



APPENDIX 3: Universitatea Politehnica Din Bucuresti (RO)

Case Study 5: FibraPET (GreenFiber firm)

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	x		
b. Is extending product life being considered in case-study?	x		
c. Is optimising reuse being considered in case-study?	x		
d. Are remanufacturing/ refurbishing/recycling being considered in case-study?	x		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		x	
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction, more efficient use of resources)?	x		
Total	5	1	

Total of 'Yes' replies = 5, therefore Case study is appropriate.



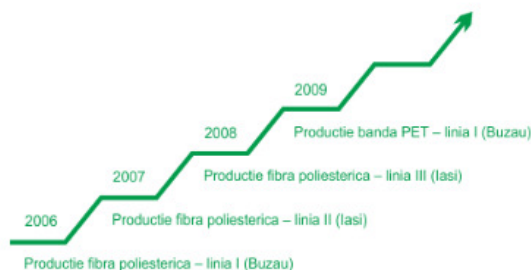
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<i>Engage Partner Name</i>	Camis - UPB	<i>Case Study Number</i>	5
<i>Case Study Title</i>	GreenFiber		
<i>Sector</i>	Textile Industry		
<i>Identified Problem description</i>	<p>The problem of the disastrous impact of plastics on the environment has raised the attention of international for a, particularly after 1988, when the US National Oceanic and Atmospheric Administration made a shocking prediction: because of the marine currents, an immense island shall appear in northern Pacific, made exclusively of wastes. Nowadays, the size and extent the island has reached are terrifying. According to the National Science Foundation - a US government agency, the island is twice the size of the Hawaiian archipelago.</p> <p>By 2020, Romania must get to the point where it recycles half of the population's discarded wastes, competed to the 6-7% being currently valued. During the past ten years, the only chapter our country has complied with, on an yearly basis, has been the one concerning the obligations undertaken to Brussels under the chapter on the packaging waste recycling, with an annual recycling of approximately 500,000 tons, generating circa EUR 70 million.</p> <p>The PET abbreviation comes from the chemical compound called polyethylene terephthalate, a thermoplastic polymer from the polyester family, used for the manufacture of synthetic fibres and packaging items for fluids and edible products. The devastating effects PETs have on the environment are known and, as a result of such effects, worldwide recycling programmes have been elaborates. An example of such a devastating effect: one hundred years must pass in order for a mere two-litre bottle to be completely disintegrated in the soil. This however never fully biodegrades; it only decomposes into granules, which are consumed by beings such as fish, birds or worms and in whose stomachs they stay until such beings die. Only 1.3% of the wastes are recycled.</p> <p>In Romania, a citizen produces, on an average, one kilogramme of wastes every day. So, 356 kilograms every year! 3 persons - one ton! Out of this ton, approximately half consists of recyclable items.</p> <p>The PET collection has become a major objective for Romania, an objective undertaken by many associations having the environment as their scope of business.</p>		



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	 <p>The Green Group Company undertook to collect PETs by contracting companies specialising in waste gathering so that they may process them and remarket them as recycled product.</p>  
<p><i>Application of the circular economy principle</i></p>	<p>GreenFiber International S.A. is the only Romanian producer and the second-largest European producer of recycled polyester fibre obtained from 100%-recycled raw material. The EUR 25 million investments made as of the company establishment, in 2006, aimed at starting two production lines in Iasi and one in Buzau. To date, GreenFiber International has a production capacity of 50,000 ton/year of polyester fibre and employs over 600 people.</p>



PET production - line 1 (Buzau)
 Polyester fibre production – line 3 (Iasi)
 Polyester fibre production – line 2 (Iasi)
 Polyester fibre production – line 1 (Buzau)

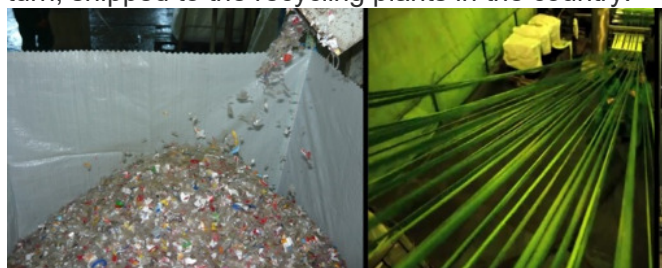
The raw-material reuse algorithm within the circuit is as follows:



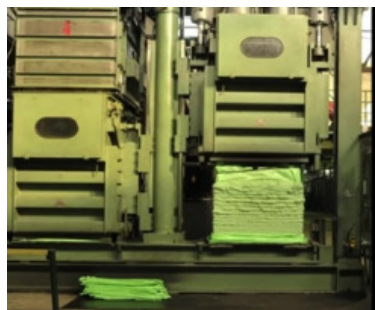
1. PET wastes are collected separately in the yellow container.
2. The Salubrity Operator picks it up using a special vehicle.



3. PETs arrive at the sorting plant where they are separated depending on the colour, material type and recyclability degree
4. PETs are compacted using presses thus making ballots which are, in turn, shipped to the recycling plants in the country.



5. At the recycling plant, PET packaging wastes are cleaned of impurities (glue, labels) by washing, degreasing, and then they are cut into smaller pieces and turned into plastic flakes or PET granules..
6. Granules are melted and turned into synthetic fibres, also known as polyester



7. Synthetic fibres are balloted and sent to textile factories.

8. There, T-shirt, scarves, pullovers, dresses, carpets, etc. are made.

Recycled **PETs** are turned into plastic flakes or PET granules, which are, in turn, used for making new products, such as: carpet fibres, vatin for pillows, plush toys, insulating material for sleeping bags, textiles for clothes, insulating sheets for roofs, trays for frozen food, containers, new packaging materials, duct tape, CD cases, parts for the car industry, parts of lighting installations, household devices.

All products are sustainable, reusable and 100% recyclable. The company is happy to be able to accompany their products throughout their entire life cycle, from their production, their repair, to the moment of their recycling. All the machines have been chosen for efficient energy consumption in so that emissions and carbon footprint generate the minimum possible impact on the products.

The company aim is to offers professional services and products of the highest quality, according to the standards in the field.

The company uses the integrated management system, in accordance with the applicable reference documents:

- SR EN ISO 9001:2008
- SR EN ISO 14001:2005
- SR OHSAS 18001:2008

Polyester Staple Fiber is able to substitute virgin fibres and provides advanced solutions in a wide range of applications.


The company supplies the textile industry, mainly, the non-woven textile sector, with a wide range of high-quality products obtained using state-of-the-art production technologies.

Types of supplied products:

- Solid staple fibres in the range of 1.3 - 30 dtex, different colours: white (semi-dull, optical white in two shades, super-white) and coloured (natural colours and dope dyed);
- Hollow fibres between 6.7-13 dtex, normal and siliconised;
- Hollow spiral siliconised (HCS) and non siliconised fibres (including slick type) of 6.7-13 dtex, white or coloured;

The products are certified according to the OEKOTEX Standard class 1 established for baby articles.

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<p><i>Resulting benefits</i></p>	<p>Using the GreenFiber recycled polyester fibres, the following products become green products (napkins, household textiles, fibres, textiles and clothes, car chair covers, furniture covers, hygiene items), marketable products.</p>  <p>Recycling transforms used materials, which would otherwise simply be waste, into very valuable resources. It saves energy, saves natural resources and helps maintain and protect the environment.</p> <p>All the products are CERTIFIED according to Oeko-Tex Standard 100. The OEKO-TEX® 100 standard is an independent testing and certification system for the raw, semi-finished, and finished textile products at all processing levels. The precondition for the certification of products in accordance with OEKO-TEX® Standard 100 is that all parts of an article meet the required criteria - in addition to the outer fabric, for example, also the sewing threads, inserts, prints etc., as well as non-textile accessories, such as buttons, zip fasteners, rivets, etc.</p>
<p><i>Source/Reference</i></p>	<p>http:// www.greenfiber.ro/ http://www.green-group.ro/</p>
<p><i>Target EQF Level</i></p>	<p>Level 3 and higher</p>



Case Study 6: GreenGlass

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	x		
b. Is extending product life being considered in case-study?	x		
c. Is optimising reuse being considered in case-study?	x		
d. Are remanufacturing/refurbishing/recycling being considered in case-study?	x		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?	x		
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction, more efficient use of resources)?	x		
Total	6	0	

Total of 'Yes' replies = 6, therefore Case study is appropriate.



<i>Engage Partner Name</i>	Camis - UPB	<i>Case Study Number</i>	6
<i>Case Study Title</i>	GreenGlass		
<i>Sector</i>	Glass industry		
<i>Identified Problem description</i>	<p>Glass, along with cardboard, paper and plastic is the most used packaging material in households and industry. It is a 100% natural product (made of quartz sand, limestone and ammonia soda), durable, inert and biologically inactive, i.e., it has no effect whatsoever on the quality and properties of the product it contains.</p> <p>Bottles are not biodegradable products, so once they are discarded at a landfill, they remain there forever, because glass has no decomposition properties. According to Eurostat, Romania deposits 99% of the wastes in landfills, being rated as the one but last among the civilised European recycling countries, such as Germany, with 1% wastes stored in landfills or the Netherlands with 1.1%.</p> <p>In 2011, 7.8 million tons of CO₂ were emitted in the atmosphere, out of which glass was to blame for 2%. It may seem little, but by thus making the calculation, glass manufacturing generated 156,000 tons of CO₂ in a single year. We should breathe healthier air if such quantity were reduced, only as a result of not depositing glass in landfills.</p> <div data-bbox="798 1093 1069 1373" data-label="Image"> </div> <p>The glass manufacturing process is a big energy and natural resource consumer and a greenhouse gas generator. The raw material is weighed and mixed, then melted in special ovens, fuelled with fossils (natural gas or oil) to temperatures between 1,300 and 1,600 degrees, which may also reach 2,000 degrees. It is afterwards modelled and finished. This may seem simple, but the overall process is extremely laborious and lengthy.</p> <p>Recycled glass however, turned into shards, has a lower melting point than that of the materials used for the initial manufacturing.</p> <p>According to recent studies, if we recycled glass, 20% less CO₂ emissions would be generated by the glass industry, and we should use less fossil fuel. The latest statistics show that, in Romania, our natural gas and oil resources will be depleted within a maximum of 10 years. It would be advisable to start saving as much as we can, wouldn't it? Another reason "for" is that glass can be indefinitely recycled without this affecting its quality, so long as the recycling process is done appropriately and it is contaminated.</p>		



*Application of
the circular
economy
principle*

The target Romania undertook to reach, as an EU Member State, concerning the recycling of glass packaging wastes amounts to 60% of the marketed quantity, starting as of 2012. The GreenGlass representatives state that the plant processes over 30,000 tons of glass, following an annual increase of 15,000 tons, until the maximum capacity is reached.

Established in 2013, GreenGlass Recycling SA is one of the most modern and high-performance glass waste recycling plants in South-Eastern Europe. Located near Bucharest, within the former Danubiana industrial platform, the plant is equipped with a glass waste recycling line with a processing capacity of 110,000 tons/year, and it is the first plant in Romania to have a state-of-the-art optoelectronic sorting facility, producing high-purity glass granules (at least, 98%).



GreenGlass Recycling is a member of the Green Group, the largest integrated recycling group in Romania and it is a member of the European Federation of Glass Recyclers (FERVER). Green Glass Recycling is an end-recycler of post-consumption packaging glass. Using the glass delivered by the salubrity companies, from the construction and car industries, from the HoReCa system, from municipal waste sorting stations and from authorised collectors,

GreenGlass has a direct contribution to mitigating the quantity of glass waste reaching the landfills. The GreenGlass representatives estimate that the plant can process all the glass wastes produced in Bucharest in only 7 days.



Glass is treated by separating the glass fraction and removing other materials, such as: ceramics, stone, paper, plastic, caps, metallic covers, wood, etc. At the same



	<p>time, it is sorted depending on the colour (transparent, green, brown) and granulation in order to increase the resulted debris purity.</p> <p>The de production process consists of 6 main stages:</p> <ul style="list-style-type: none"> - MANUAL SORTING. Manual sorting for removing the heavy debris: stone, ceramics, wood. - GRINDING. Glass waste grinding by pressing. Following this process, glass debris result, which are afterwards subject to the heat treatment process. - HEAT-TREATMENT. Heat treatment for removing the biodegradable impurities (oil, mayonnaise, etc.); this is a “thermal” washing process, resulting in very clean glass debris. - ASPIRATION. Aspiration of the plastic foils and labels in a cyclone installation. - MAGNETIC SEPARATION. Metals are magnetically separated from the glass. - GRANULATION SORTING. Sorting depending on the granulation: below 2 mm (sand), 2mm to 30mm (debris for the industry). <p>Considering our wish to constantly improve our performances, Greenglass Recycling intends to manage its resources as effectively as possible. The company commitment to the environment quality policies is reflected by the integrated management systems used, by the ISO certifications, and of the “End-of-Waste” Criteria Regulation Certificate (en of the waste status).</p> 
<p><i>Resulting benefits</i></p>	<p>The plant performs operations of: grinding, heat treatment, metal magnetic separation, aspiration of plastic foils and labels, manual sorting and granulation sorting, and the end-product consists of glass granules having an extremely high colour and material purity.</p> <p>GreenGlass is the only plant in Romania and Eastern Europe equipped with state-of-the-art sorting facilities, able to produce glass granule with a 98% purity level.</p> <p>Some of the most important Customers of GreenGlass are the large local manufacturers of glass packaging, flat glass or fibre glass, but the product is also exported, the recycled glass demand being on the rise at world level.</p>



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	Glass can be indefinitely recycled, without this affecting its quality, so long as the recycling process is appropriately performed and it is contaminated, this leading to the manufacturing of new glass packagings, jars, vases, or other glass design items.
Source/Reference	http://www.green-group.ro/ http://www.greenglass.ro/ http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Waste_treatment_2012_(thousand_tonnes)_YB15.png http://www.theguardian.com/sustainable-business/innovation-glass-manufacturing-green http://www.wrap.org.uk/sites/files/wrap/The_Case_for_Green_Glass_Containers.910fa7c6.10771.pdf
Target EQF Level	Level 3 and higher



APPENDIX 4: Drosostalida (GR)

Case Study 7: Vodafone

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	X		However, not clearly defined in bibliography how.
b. Is extending product life being considered in case-study?	X		
c. Is optimising reuse being considered in case-study?	x		
d. Are remanufacturing/refurbishing/recycling being considered in case-study?	x		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?	x		Somewhat, it considers decrease of fixed asset costs as alternative to providing substitute new mobile devices.
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction), more efficient use of resources?	x		
Total	6	0	

Total of 'Yes' replies = 6, therefore Case study is appropriate.



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<i>Engage Partner Name</i>	Drosostalida KOIN.SEP	<i>Case Study Number</i>	7
<i>Case Study Title</i>	Vodafone Greece		
<i>Sector (Please choose from list in link [8])</i>	Consumer goods – electronic equipment		
<i>Identified Problem description</i>	Problem was the linear use of electronic equipment leading to excessive waste and little re-use of parts for creating new electronic equipment. In addition, as part of the corporate responsibility, it was identified that clients should be motivated for a change of behaviour towards being more friendly to nature and recycling.		
<i>Application of circular economy principle</i>	Application of a holistic programme which will a. to reduce waste at the source, b. allows for the prolongation of life time expectancy of the equipment that is used through the reuse and, c. minimize waste going to landfills through the recycling process. Clients are informed about this initiative and efforts are being made to alternate consumer behaviour. Another initiative is to provide monthly price deductions to fixed asset costs, instead of the subsidy device at the end of the clients contract. Customer assessment in Vodafone stores allows for information transfer, knowledge enhancement and application of initiative.		
<i>Resulting benefits</i>	Gold award in Waste & Recycling Awards 2016 that took place in Athens, Greece. Reduced waste, client/consumer change. Positive company profile.		
<i>Source/Reference</i>	Vodafone website, www.vodafone.gr/portal/client/news/pressReleaseClient!pressReleaseDetails.action?pressReleaseId=40367&dateFrom=&dateUntil=		
<i>Target EQF Level (Please choose from list in link [9])</i>	Level 4 and higher		



Case Study 8: AEI FOROS S.A.

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	X		
b. Is extending product life being considered in case-study?	X		Using waste as raw materials
c. Is optimising reuse being considered in case-study?	x		
d. Are remanufacturing/ refurbishing/recycling being considered in case-study?	x		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		x	
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction), more efficient use of resources?	x		
Total	5	1	

Total of 'Yes' replies = 5, therefore Case study is appropriate.



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<i>Engage Partner Name</i>	Drosostalida KOIN.SEP	<i>Case Study Number</i>	8
<i>Case Study Title</i>	Aeiforos SA		
<i>Sector (Please choose from list in link [8])</i>	Industrial goods – Waste management		
<i>Identified Problem description</i>	Creation of waste and use of landfills for disposal which resulted in huge losses of possible re-use of waste parts. Acquisition of raw material from alternate sources is costly.		
<i>Application of circular economy principle</i>	<p>To valorise waste through the production of valuable secondary raw materials for the Industry as a true alternative to landfilling. The company collects, handles or processes solid industrial waste in accordance with environmental regulations and the precepts of Circular Economy. An example is the demolition of old industrial facilities, from the dismantling of metallic buildings till the safe disposal of hazardous waste or contaminants, the remediation of the area and reclamation of the land.</p> <ul style="list-style-type: none"> · Dismantling of facilities and waste management · Recycling of metallic waste after evaluation · Handling, treatment, valorization or disposal of other waste · Production of secondary raw materials or alternative fuels · Land remediation <p>The purpose of land remediation works is to decrease the contamination of the area, removing environmental and safety hazards and free the area for safe, future land use.</p>		
<i>Resulting benefits</i>	Silver award in Waste & Recycling Awards 2016 that took place in Athens, Greece. Alternative use of waste, creation valuable secondary raw material that can be re-used in various fields. Decrease of costs in finding raw material.		
<i>Source/Reference</i>	http://www.aeiforos.gr/en		
<i>Target EQF Level (Please choose from list in link [9])</i>	Level 4 and higher		



APPENDIX 5: The Glasgow Caledonian University (UK)


Case Study 9: Bookdonors – Reuse, refurbishment, recycling of books

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?		X	
b. Is extending product life being considered in case-study?	X		
c. Is optimising reuse being considered in case-study?	X		
d. Are remanufacturing/refurbishing/recycling being considered in case-study?	X		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?			
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction), more efficient use of resources?	X		
Total	4	1	

Total of 'Yes' replies = 4, therefore Case study is appropriate.



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<i>Engage Partner Name</i>	Glasgow Caledonian University	<i>Case Study Number</i>	9
<i>Case Study Title</i>	Bookdonors – Reuse, refurbishment, recycling of books		
<i>Sector (Please choose from list in link [8])</i>	Publishing - Books		
<i>Identified Problem description</i>	Purchased books are often discarded by the public, libraries, schools, and yet still have useful value to others. The challenge is how to make these pre-loved books available to the wider book market.		
<i>Application of circular economy principle</i>	<p>Bookdonors has established a business to acquire books from a number of sources (charity shops, schools, libraries etc) and to make these books available to a wider market, competing directly with commercial retailers in the online space. From over 3 million books per year, book donors undertake an initial triage. Pre ISBN are assessed for antique value, damaged books are supplied to pulp mill for recycling, and all other books are cleaned, catalogued and sold through 5 digital retail platforms, including Amazon and Ebay, and more recently their own online retail.</p> 		
<i>Resulting benefits</i>	Principally reuse, the books remain in the economic cycle for longer, and displace new books. The business is a Community Interest Company operating in the social enterprise space. They look to employ staff with disabilities and have a number volunteers.		
<i>Source/Reference</i>	www.bookdonors.co.uk		
<i>Target EQF Level (Please choose from list in link [9])</i>	Level 4 and higher		




Case Study 10: Re-tek Ltd.

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?		X	
b. Is extending product life being considered in case-study?	X		
c. Is optimising reuse being considered in case-study?	X		
d. Are remanufacturing/ refurbishing/recycling being considered in case-study?	X		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?			
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction), more efficient use of resources?	X		
Total	4	1	

Total of 'Yes' replies = 4, therefore Case study is appropriate.



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<i>Engage Partner Name</i>	Glasgow Caledonian University	<i>Case Study Number</i>	10
<i>Case Study Title</i>	Re-tek		
<i>Sector (Please choose from list in link [8])</i>	Consumer goods – Electronic equipment		
<i>Identified Problem description</i>	Electronic IT equipment is often discarded, yet still functional. If such equipment could be repaired/refurbished, the products' lifecycles would be extended and help reduce the consumption of new products		
<i>Application of circular economy principle</i>	<p>Re-tek repairs and refurbishes functional used IT products and sells them on to new owners, sharing the revenue with the previous owner. This includes laptops, PCs, flat screen monitors and hand held electronics.</p> <p>Most equipment equipment from medium to large-sized businesses and public sector organisations such as the NHS, and they aim to re-market as much of the material received as possible. Approximately 80% of all equipment received is refurbished and re-marketed.</p> <p>Only equipment which is non-functional or has no market value goes to conventional IT recycling partners. Of the recycling output, the average resulting landfill is just 1%</p> <p>The company operate an incentivized revenue share business model to encourage supplies of used IT equipment to engage in their programme and therefore increase capacity</p>		
<i>Resulting benefits</i>	<p>IT equipment is kept in use for longer, spare parts are recovered and re-used. The activity positively contributes to a suppliers corporate social responsibilities</p> 		
<i>Source/Reference</i>	http://www.zerowastescotland.org.uk/content/re-tek#sthash.phyUZ3ED.dpuf		
<i>Target EQF Level (Please choose from list in link [9])</i>	Level 4 and higher		



APPENDIX 6: Lawton School S.L. (ES)

Case Study 11: Nortpalet

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	X		
b. Is extending product life being considered in case-study?	X		Product life of pallets is increased
c. Is optimising reuse being considered in case-study?	X		Plastic pallets are constantly being reused
d. Are remanufacturing/refurbishing/recycling being considered in case-study?	X		Aged pallets are recycled
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		X	The company has a buyback policy
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction), more efficient use of resources?	X		Yes, recycling plastic favours the environment while the use of lightweight material has a direct influence on the economy as it reduces logistic and storage costs, as well as eliminating the need for land fill disposal.
Total	5	1	

Total of 'Yes' replies = 5, therefore Case study is appropriate.



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<i>Engage Partner Name</i>	Lawton School S.L.	<i>Case Study Number 1</i>
<i>Case Study Title</i>	Nortpalet- Asturias- Spain	
<i>Sector (Please choose from list in link [8])</i>	Synthetics - Plastics	
<i>Identified Problem description</i>	<p>Traditionally wooden pallets have been used in the transport and handling of any type of consumer goods. However, wooden pallets have many drawbacks. As trees need to be cut down to produce them they have a negative impact on the environment. They are heavy and hard to handle. As they age they have chips, displaced boards, protruding nails, and other elements with may damage loads and that demand costly maintenance not only of the pallet but of the facilities where they are used. The may constitute a health/accident hazard for handlers. Their weight and size changes if they come into contact with water or damp. Deteriorated wooden pallets cause annoying rejections on production lines. Sometimes chemical treatments are used to avoid the nesting of fungi and parasites in the wood. For certain exports, it is necessary to document their processing (ISPM 15) and to manage related documentation. At the end of their useful life they are of no value to the owner and their destruction may imply a cost.</p>	
<i>Application of circular economy principle</i>	<p>Nortpalet plastic pallets are more durable, with a longer life cycle during which they retain their shape intact. It is estimated that the average life span of a plastic pallet can be up to 5 times that of a wooden pallet. They are 100% recyclable, avoiding ending up in some landfill at the end of their useful life. As they lightweight, ergonomic and easy to use they help reduce the expense of fossil fuels thus reducing logistics costs. They are RFID traceable which enable the location of goods along the supply chain without any variable cost.</p> <p>Plastic pallets do not need the fumigations or chemical treatments that wooden pallets need to avoid infections; with a simple wash they are ready for their next reuse. Plastic pallets are extremely resistant to all kinds of conditions, providing excellent mechanical conditions in all kinds of situations (static, dynamic and rack).</p> <div data-bbox="620 1693 1230 1964" data-label="Image"> </div>	



Manufacturing Procedure

Nortpalet carries out an initial analysis of a need detected in the market or requirements provided by a client and a work profile is developed for each project. Once the project is ready a 3D model of the product is developed that serves as a basis for cost analysis.

Before investing, computer simulations are carried out using the most modern technology available and sophisticated calculation programs. This allows detection of possible incidents in the design phase using Flexion, Resistance, Dynamic Load Capacities, Static and Rack, Breaks and Impacts, and Structural Resistance as parameters. Once the Design and Simulation phases have been successfully completed, the necessary molds are constructed and the design is optimized for efficient production.

The product is then tested, validated and the units ordered are manufactured. Quality inspections are carried out on 100% of the production line. Most of the reusable products allow repair, so spare parts are supplied as well as the management of recycling of the units.

All Nortpalet's products are sustainable, reusable and 100% recyclable. The company is happy to be able to accompany their products throughout their entire life cycle, from their production, their repair, to the moment of their recycling.

All the machines have been chosen for efficient energy consumption in so that emissions and carbon footprint generate the minimum possible impact on the products.



Nortpalet, in line with their commitment to the environment, has envisaged a "Buy-back" Program. This program has been designed to recycle plastic pallets at the end of their useful life, avoiding the generation of waste and promoting respect for the environment.

It is a system of repurchase agreed with the customer of both spare parts and complete pallets, recycling 100% for the manufacture of new Units.



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	<p>The customer acquires the pallets he needs for his activity. Over time the pallet reaches the end of its useful life and it needs to be replaced.</p> <p>Through the Buy-back program, once the product life cycle ends, Nortpalet repurchases the pallets from its customers, allowing them a discount on the cost of the next purchase of pallets. The reclaimed pallets are then crushed inside the recycling plant. The crushed material becomes raw material, re-entering the production circuits and giving rise to new products.</p>
<i>Resulting benefits</i>	<p>Nortpalet offers customers 2 exclusive benefits in purchasing plastic pallets.</p> <p>a) The pallet becomes an asset for the customers. The pallet repurchase program offers customers the chance to recover the residual value of the product at the end of its useful life.</p> <p>b) Sustainable development and commitment to the environment.</p> <p>Nortpalet, in its commitment to the protection of the environment, has created a system that favors and involves its clients in minimizing environmental impact, while at the same time recovering part of their initial investment.</p> <p>The pallets are 100% recyclable, eliminating the need for landfills at the end of their useful life.</p> <p>Recycling transforms used materials, which would otherwise simply be waste, into very valuable resources. It saves energy, saves natural resources such as wood and helps maintain and protect the environment.</p>
<i>Source/Reference</i>	http://nortpalet.com
<i>Target EQF Level (Please choose from list in link [9])</i>	Level 3 and higher



Case Study 12: Nudie Jeans

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	X		
b. Is extending product life being considered in case-study?	X		The jeans can be constantly repaired
c. Is optimising reuse being considered in case-study?	X		It is the pillar of their business model
d. Are remanufacturing/ refurbishing/recycling being considered in case-study?	X		
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		X	The garment can be returned to the shop
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction), more efficient use of resources?	X		Their company philosophy ensure care of the environment and economical benefits for local producers of the raw materials
Total	5	1	

Total of 'Yes' replies = 5, therefore Case study is appropriate.



<i>Engage Partner Name</i>	Lawton School S.L.	<i>Case Study Number</i>	2
<i>Case Study Title</i>	Nudie Jeans		
<i>Sector (Please choose from list in link [8])</i>	Textiles - Apparel		
<i>Identified Problem description</i>	<p>When we think of pollution, we don't often think of the clothes on our backs, but fast fashion is the second largest polluter after oil. The overall impact the apparel industry has on our planet is quite grim. The fashion business involves long and varied supply chains of production, raw material, textile manufacture, clothing construction, shipping, retail, and use and ultimately disposal of the garment.</p> <p>Taking into account the pesticides used in cotton farming, the toxic dyes used in manufacturing, the great amount of waste discarded clothing creates and also the extravagant amount of natural resources used in extraction, farming, harvesting, processing, manufacturing and shipping, the fashion carbon footprint is tremendous.</p>		
<i>Application of circular economy principle</i>	<p>Some top clothing designers, such as Nudie Jeans, are on the leading edge toward reforming the fashion industry.</p> <p>Based in Gothenburg, Nudie Jeans have become a real hit, not only for the quality of the products but for the whole movement, a way of thinking, a concept, that is being created around these trousers. The company strives for sustainable consumption patterns by selling high quality products made in a fair way with 100% organic cotton, by offering a free repair service, reselling second hand products, and recycling worn-out products. Being able to prolong the life of the jeans contributes to more sustainable consumption. In 2015 they repaired 36,331 pair of jeans, 8,108 more pairs than the year before.</p> <p>The philosophy of Nudie Jeans is based on an independent spirit in which they become something more, a second skin. They also have jackets, T-shirts, sweatshirts, underwear, all made with 100% organic cotton and very environmentally conscious. The brand has even created repair shops for jeans, as they bet that a pair of their jeans can last a lifetime, with some mending. If the customer doesn't have the option to go by one of their repair shops, they can send a repair kit free of charge. If your jeans have become too small or too big you can hand them in to one of their repair shops and get 20% off when you buy a new pair. Each pair is washed and repaired and returned to the shop as second-hand. These used and repaired jeans have achieved the Swedish "Good Environmental Choice" eco label. Old worn-out jeans are transformed into new ones by cutting and milling the old ones down to a cotton-like pulp which becomes raw material for new yarn.</p>		



Their stores are called “Repair Shops” because they want to communicate to their customers that repair and care is a key idea in what they are doing. When opening new repair shops or renovating old ones, as much of the original surfaces is kept as possible and only what is necessary is renewed. Eco-labelled paint and raw materials such as wood or metal are used as far as possible. The most sustainable alternative is used when it comes to material choices. For example, only FSC labelled wood is used. The Forest Stewardship Council (FSC) is a certification to ensure responsible forest management. Lights in stores are always LED, to save energy. And when functionality permits, as many vintage and second-hand items as possible are used, for example furniture, lamps and old store counters that can be rebuilt to suit today’s needs. All bags and gift boxes used in the repair shops are made from 100% recycled paper and are FSC certified.



Responsible production

As with most other clothing brands, Nudie Jeans don't own the factories in which their clothing is made. However, they bear the responsibility of providing a safe, fair and



	<p>ethical working environment for all the people who are involved in the manufacture of their clothes. The company only works with a handful of partners, all of whom are required to comply with their code of conduct.</p> <p>Nudie Jeans only uses organic and Fairtrade cotton which benefits the environment, the people who grow and handle the cotton and the end consumer. Fairtrade certified cotton ensures that farmers have been paid a fair price for their cotton and that Nudie Jeans contributes to the growth of the local community through the Fairtrade premium they pay. The organic cotton ensures that an organic farming practice has been observed and that no harmful chemicals have been used in the process.</p> <p>Other garments are made from sustainable materials “Made-By Environmental Benchmark for Fibres”. It includes recycled materials, organic cotton and tencel (a sustainable fabric, regenerated from wood cellulose). Material not in these categories is leather and organic wool. For these they define organic wool and leather from organically reared animals as sustainable choices. All their suppliers, whether production is outside or inside Europe, are required to comply with chemical legislation within the European Union.</p> <p>Social responsibility Nudie Jeans consumers are not just interested in the quality of the products they buy; they also care about the work behind the brand and the social and environmental conditions of its production. Nudie Jeans wants sustainable and healthy development for people and the environment; to help improve conditions in the garment industry. They demand that everyone who works with them be concerned about human rights, wages, working hours and social accountability. Nudie Jeans requires its suppliers to guarantee good working conditions and a good working environment in manufacturing.</p>
<i>Resulting benefits</i>	<p>Nudie Jeans offers customers 3 benefits in purchasing their apparel.</p> <ul style="list-style-type: none"> a) The jeans can be repaired at a repair shop or by the owner with a free repair kit. b) They can be returned to the company for a 20% discount on a new pair. c) Nudie Jeans wearers can feel happy in the knowledge that their clothes have been manufactured according to FairTrade and ecological principles. <p>The company philosophy encourages responsible consuming and ensures care of the environment, Manufacturing according to FairTrade and ecological principles brings economical and social benefits for local communities at the source of the raw materials,</p>
<i>Source/Reference</i>	<p>http://www.ecowatch.com/fast-fashion-is-the-second-dirtiest-industry-in-the-world-next-to-big--1882083445.html</p> <p>https://cdn.nudiejeans.com/dist/files/Nudie-Jeans-sustainability-report-2015.pdf</p>
<i>Target EQF Level (Please choose from list in link [9])</i>	Level 3 and higher




APPENDIX 7: Camera De Comert Si Industrie Bistrita Nasaud (RO)

Case Study 13: Production of electricity using photovoltaic panels


	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	x		Yes, they use renewable, green energy (solar energy).
b. Is extending product life being considered in case-study?	x		Yes, the solar energy is captured and transformed in electrical energy.
c. Is optimising reuse being considered in case-study?	x		The electrical energy produced by the solar panels is used during the top hours of consuming (during the day).
d. Are remanufacturing/ refurbishing/recycling being considered in case-study?		x	
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		x	
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction), more efficient use of resources?	x		Decrease electricity costs by using energy produced by photovoltaic park in their production of plastics.
Total	4	2	

Total of 'Yes' replies = 4, therefore Case study is appropriate.



<i>Engage Partner Name</i>	POLIMED COM SRL BISTRITA	<i>Case Study Number</i>	13
<i>Case Study Title</i>	Production of electricity using renewable sources (photovoltaic panels) for the own technological consumption.		
<i>Sector (Please choose from list in link [8])</i>	Utilities – Electric utilities		
<i>Identified Problem description</i>	In the production of plastics goods the company use a great quantity of electric energy. Using the energy produced by the solar panels they don't need any more electrical energy produced by conventional methods.		
<i>Application of circular economy principle</i>	<p>A photovoltaic power station was created by the company, as a solar park, a large-scale photovoltaic system (PV system) designed for the supply of merchant power into the electricity grid. (detailed after Wikipedia)</p> <p>CEF (Photovoltaic Electric Central) – as ann active part of the business, contribute annual with a quantity of about 800 MW to the National Energetic System. It has an installed power of 0,652 MW and at this time, the company use 90% from the quantity of energy produced by the 2557 photovoltaic panels.</p> <p>Using in the technological process only green energy, renewable, the company save conventional energy, mostly, contribute with energy in the National Energetic System just at the right time, at the top hours, during the day, when the electric energy consumption is highest.</p> <p>Resource efficiency is the target of the company and the connection to circular economy consists in creation of social and economic value based on employment and economic growth. The company is licensed until year 2039.</p> 		



	
<i>Resulting benefits</i>	<ul style="list-style-type: none"> - save money by decrease the expenses for the electrical energy – economic result - using of green energy, renewable, non-pollution – social value - contribute to the equilibration of the National Energetic System, because the Photovoltaic Park works while its using is at the highest level – economic value - decrease the ecological footprint of the activity thus improving the local environment – environmental/social value - 1 work placement created - social value
<i>Source/Reference</i>	<p>SC POLIMED COM Interview with the owner</p>
<i>Target EQF Level (Please choose from list in link [9])</i>	<p>3 and up</p>



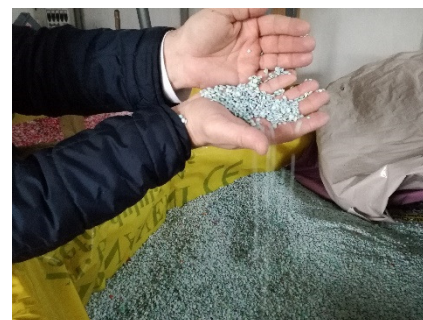
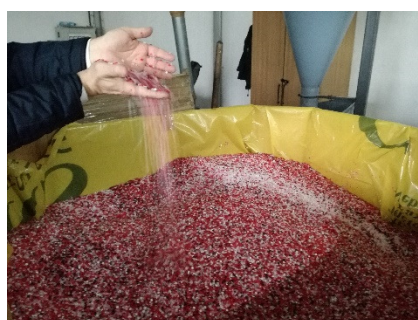
Case Study 14: Reduction of plastic waste

	Yes	No	Comments
a. Are technologies/processes that use renewable or better-performing resources used in case-study?	x		It is used technology able to process secondary raw material resulted from their technological waste.
b. Is extending product life being considered in case-study?	x		Product life of plastics foils is increased, the results are new types of foils for other fields of activity: agriculture, constructions works, packaging products.
c. Is optimising reuse being considered in case-study?	x		The process optimization is considered having in mind the quantity and quality of plastics waste.
d. Are remanufacturing/ refurbishing/recycling being considered in case-study?	x		Recycling their own plastics waste.
e. Does the case study promote hire or leasing of products as an alternative to purchasing?		x	
f. Does the case-study bring social/environmental/economic (e.g. in terms of waste reduction), more efficient use of resources?	x		Contribute to the environment protection based on less natural resources, money savings using recycled materials,
Total	5	1	

Total of 'Yes' replies = 5, therefore Case study is appropriate.



<i>Engage Partner Name</i>	Chamber of Commerce and Industry	<i>Case Study Number</i>	14
<i>Case Study Title</i>	Decreasing of the plastics waste quantity by reusing their own technological plastic waste and packaging's from imported raw material.		
<i>Sector (Please choose from list in link [8])</i>	Consumer goods - Packaging		
<i>Identified Problem description</i>	<p>Plastics waste is a very serious and actual problem, as well as a threat for the environment, due to its long life of persistence and to the fact that it is non-biodegradable into the ground.</p> <p>The problem appear also as pattern of consume as people use a wide range of packages made by polyethylene foils.</p> <p>The high level of eco-tax according to the provisions of the European Directive 94/62/CE concerning to the plastics packages and plastic waste.</p>		
<i>Application of circular economy principle</i>	<p>Goldplast SA produces: foils, bags and other kind of packages made by polyethylene. Due to the production process, plastic waste results as well as the packaging of raw materials.</p> <div data-bbox="588 1167 1233 1648" data-label="Image"> </div> <p>In order to reduce the quantity of their plastics waste GOLDPLAST purchased new technology which turns plastics waste into new raw material, passing 3 steps (stages): grinding, washing and re-granulating.</p>		



Those granules are used to produce foils with thickness more than 0,05 mm with final destination: agriculture, insulation for construction works, other packages, in this way, using less virgin raw material made by petroleum products.



Circular Economy Digital Training Toolbox to Foster Innovative Green Entrepreneurs

<i>Resulting benefits</i>	<ul style="list-style-type: none"> - Decrease the production costs of the new products, due to the secondary raw material re-granulated, which is cheaper than the original granules. - Decrease in transport costs for intra community acquisition - Creation of work placements - Contribute to the environment protection by decreasing the quantity of plastics waste. - Decrease of ecological footprint of the activity
<i>Source/Reference</i>	Interview with General manager of the company as well as with Quality manager
<i>Target EQF Level (Please choose from list in link [9])</i>	3 and up