Demonstrating resource efficiency through innovative waste recycling schemes for remote areas

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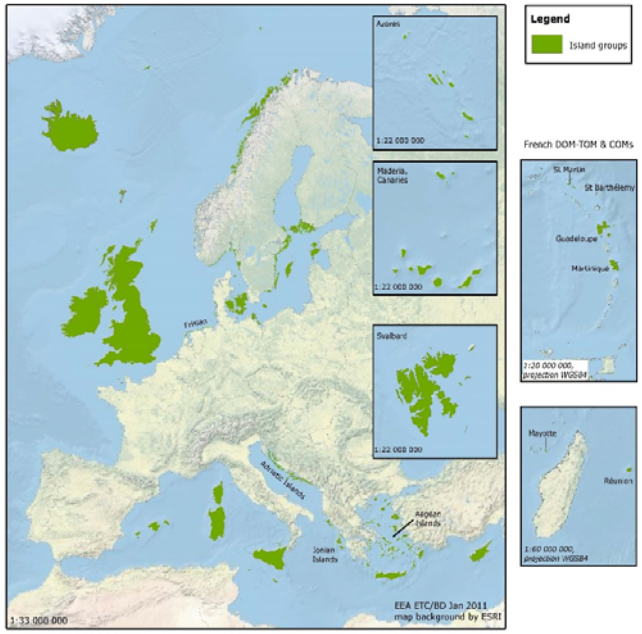
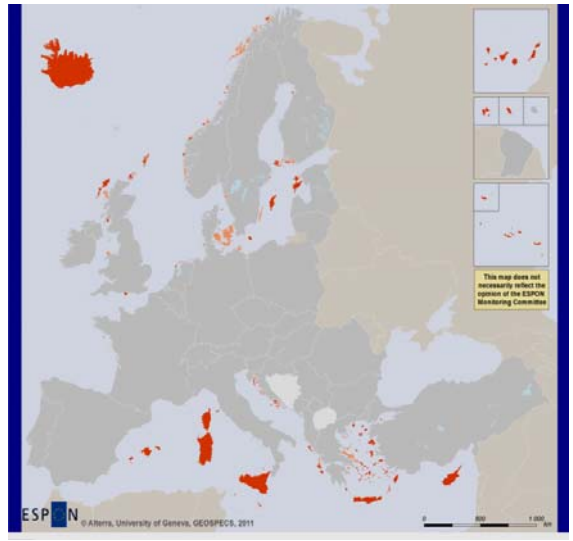
MSW Management Status & Challenges in islands

- In the EU, there are **hundreds** of islands
- EU islands are inhabited by more than **4 %** of the total EU population (i.e. **20 million residents** live in areas experiencing permanent disadvantages and vulnerabilities)
- The difficulty of effective and sustainable solid waste management practices is related to:
  - The **fragile ecosystems and limited natural resources** of these areas
  - The **significant seasonal fluctuations** of waste resulting mainly from touristic activities
  - The **non-favoured economies of scale**
  - The **distance** between islands and mainland



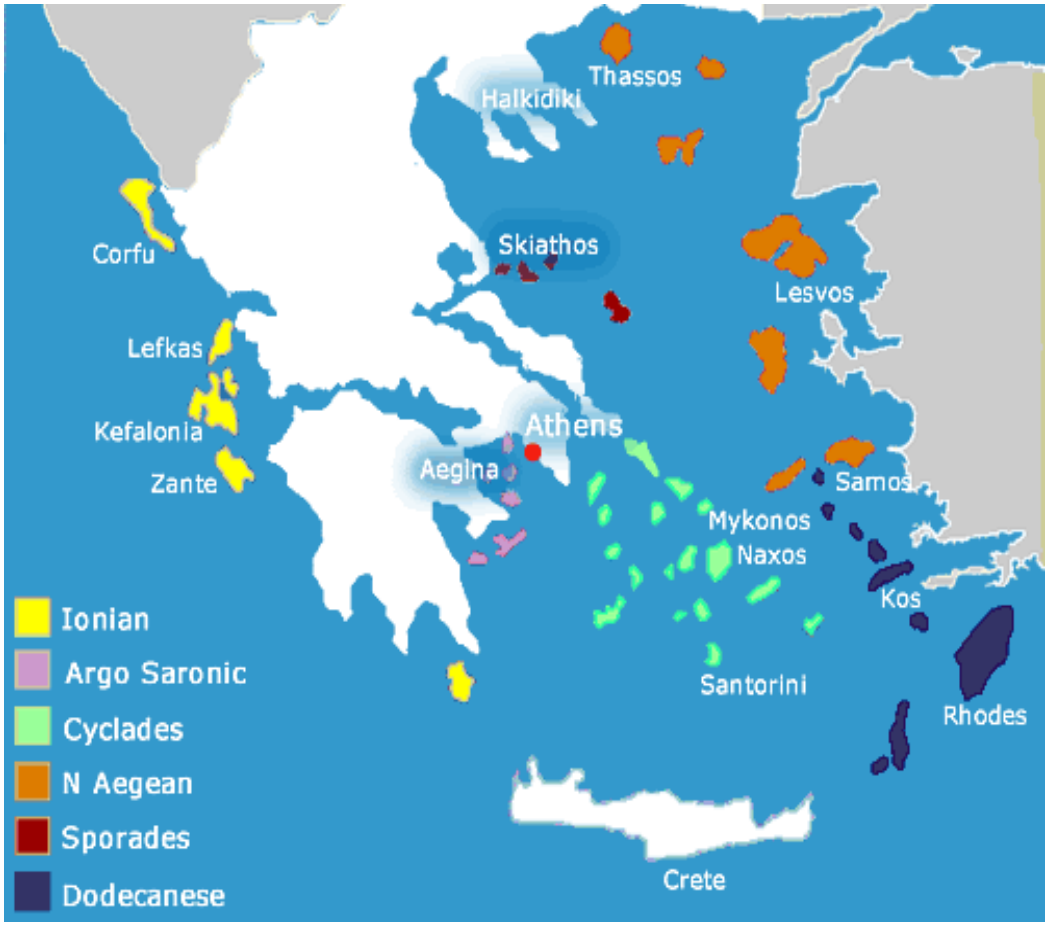
The islands of Europe in numbers

	Area		Population	
	sq km	% of Europe	Inh	% of EU
All European Islands	**274,931**	**5.6%**	**20,518,886**	**4.1%**
of which:	**sq km**	**% of total for Islands**	**Inh**	**% of total for Islands**
Island State	9,562	3.5%	1,189,803	5.8%
Without Fixed Link	263,000	85.8%	15,785,558	76.9%
Mountainous	121,695	44.3%	13,200,431	64.3%
South	118,808	43.2%	15,381,270	75.0%
North	156,123	56.8%	5,137,616	25.0%
Iceland	102,699	*37.4%*	*289,542*	*1.4%*



Cordina, G.(2013)
www.insuleur.org

The insular character of Greece



- Greece has an extremely large number of islands, with estimates ranging from somewhere around 1,200 to 6,000.
- The number of inhabited islands is variously cited as between 166 and 227.
- The Greek islands are traditionally **grouped into clusters**: Ionian, Dodecanese, Cyclades etc.
- Historically, geographically, politically and economically, **islands are very important** to Greece.

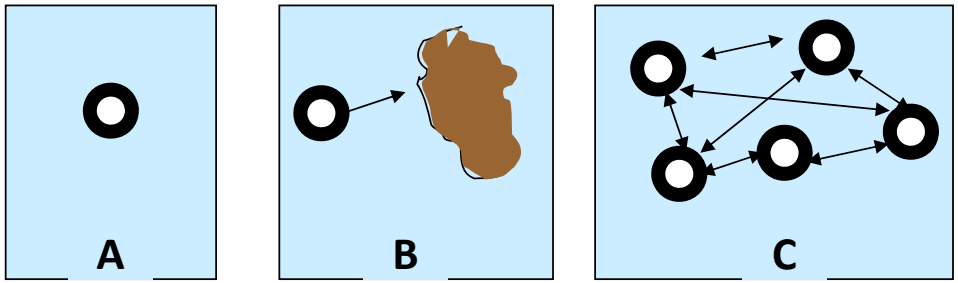
MSW Management Strategies in Islands

A. Single Strategy: All or major part of waste is managed on the island (typically possible for relative large islands and isolated islands with long distances from the mainland and from other islands)

B. Tandem Strategy: Waste transported to the mainland where it can be treated and disposed of in an environmentally sound way

C. Joint Strategy: Waste management cooperation between islands.

In practice a mix of strategies is applied for sound waste management



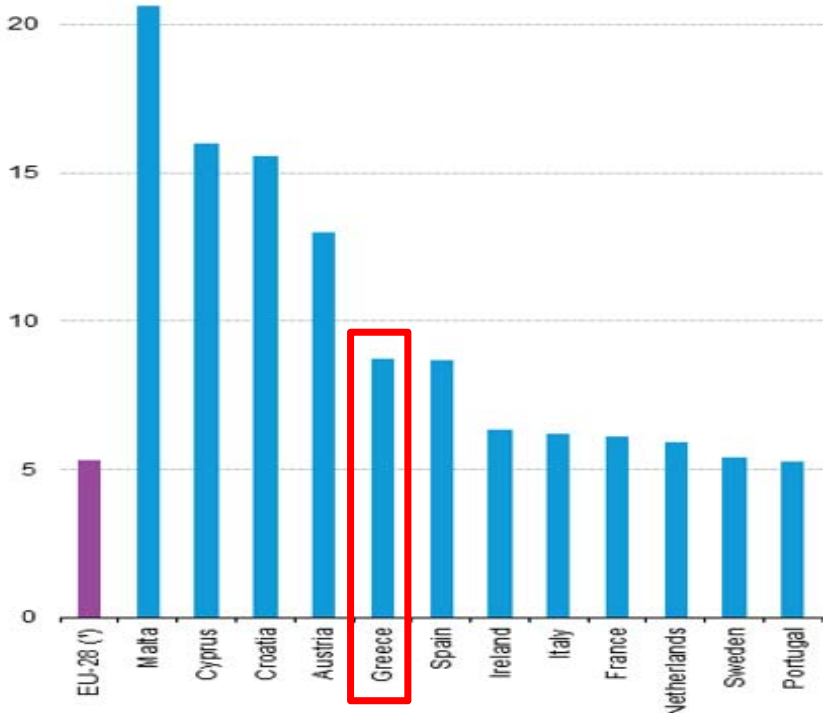
Source: EC (1997) Codes of practice for waste management on islands. Manual.

Which are the Global & European Challenges?

- ✓ **Pressure** on resources is increasing
- ✓ **Resource security** is threatened due to intensive use
- ✓ **More waste** which need to be treated is generated
- ✓ **Europe** is the **world's primary tourism destination** and tourism generates **10% of EU GDP**
- ✓ **Predominant factors** in choosing holidays destinations: **quality of natural features and landscape**
- ✓ **Tourists**: More environmentally conscious, eco-labelling…

Tourism Intensity

Most popular tourist destinations in the EU-28



Eurostat: Tourism intensity, 2014
(nights spent by residents and non-residents at tourist accommodation establishments per inhabitant)

Challenges for EU Recycling Industries to use secondary raw materials

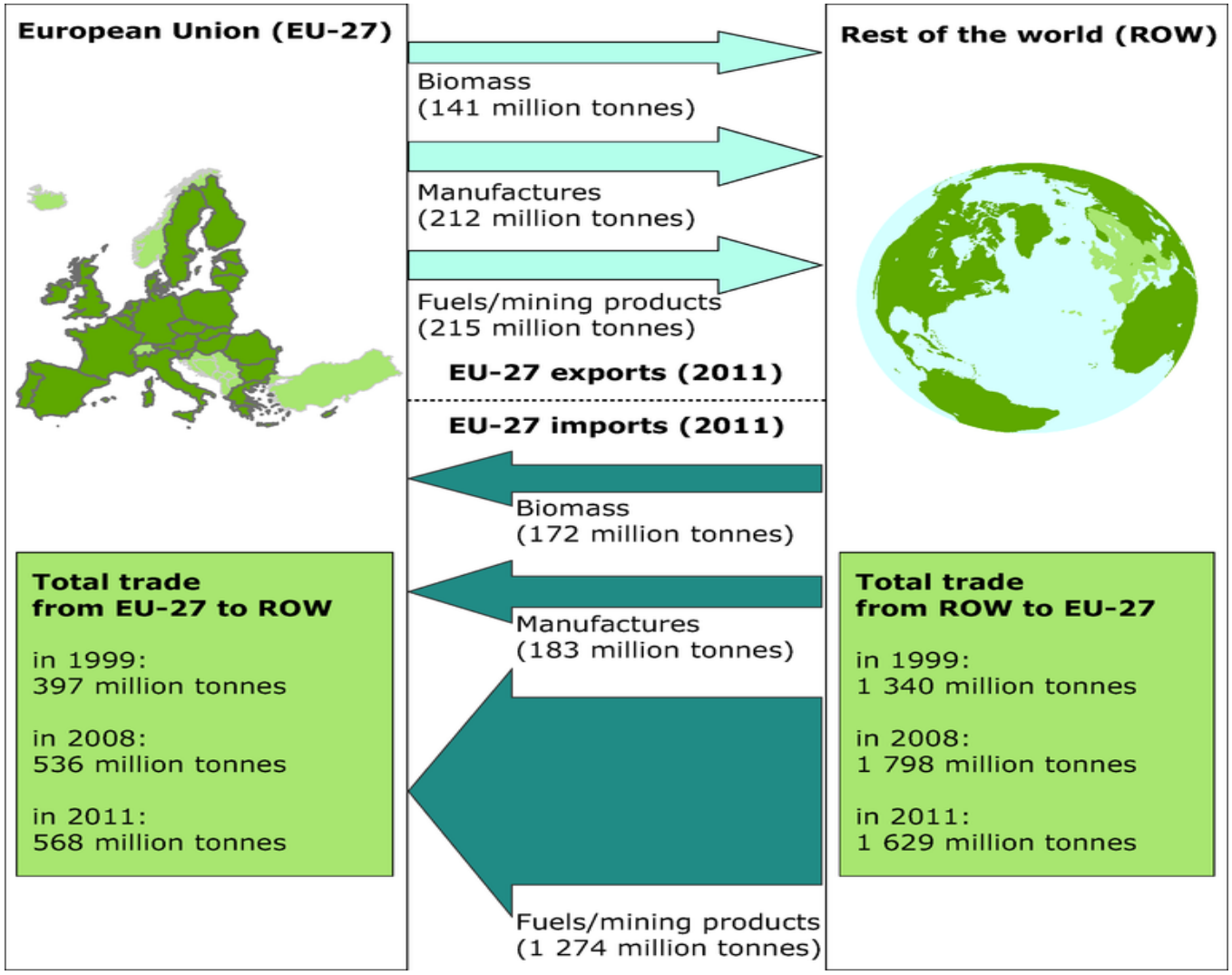
- **X** Shortage of secondary raw materials due to exports to non-European countries
- **X** Insufficient and contradictory policy support for closing the loops
- **X** Subsidies for the use of recyclable &renewable material for energy recovery
- **X** Insufficient recyclability requirements for converted products (EoW criteria)
- **X** Suboptimal end-of-life collection schemes
- **X** Technological hurdles to recycle increasingly complex products
- **X** Landfilling of recyclable waste
- **X** Inconsistencies in legislation in the field of waste, products and materials (EoW criteria)

Exports of European secondary raw materials are facilitated by:

- ✓ a strong demand for resources from emerging markets
- ✓ relatively cheap east bound shipping costs
- ✓ substandard environmental management of recycling processes outside Europe
- ✓ insufficient control at borders
- ✓ lack of quality of the collected material

Source:
Confederation of European Paper Industries, 2012

EU-27 physical trade balance with the rest of the world 2011

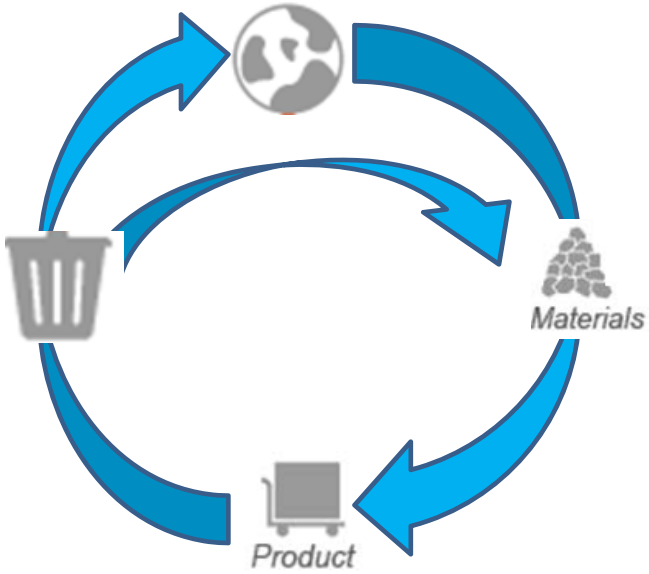


The alternative model of Circular Economy

The Linear Economy

It is widely recognised in Europe that the prevailing **linear model** of economic growth founded on resource consumption and pollutant emissions is **unsustainable**.

The Circular Economy



Circular economy is a global economic model that decouples economic growth and development from the consumption of finite resources.


Extraction of natural resources
Eco-design of products
Reuse, recycling, recovery
Manufacturing
Circular Economy
Resource Efficiency
Waste collection
Distribution
Disposal
Product use

RESOURCE EFFICIENCY

Using less, living better

EU long-term transition/intermediate targets related to environmental policy

2015	Thematic policies, timelines and deadlines
2020/2030	Comprehensive policies (Europe 2020, 7th Environment Action Programme), or specific target
2050	Long-term visions and targets with a societal transition perspective

Source: EEA (2014) Multiannual Work Programme 2014–2018

Why circular economy is important for islands?

- Currently, most circular economy models are implemented in centralised /urban supply chains, while burdens are experienced by mainly insular/ remote communities.
- Higher supply costs for imported resources - fuel, animal feeds, chemical products/fertilisers, other commodities…
- Natural resources / waste available
- Cost for waste and wastewater management is increasing
- Proximity & Self-sufficiency principle: Waste should be treated/disposed of as close to the point of generation as possible.
- Need for environmental protection
- Consumer choices are in favour of cleaner production
- Insight needed to handle or turn ‘permanent natural or demographic handicaps’ of insular areas into opportunities.

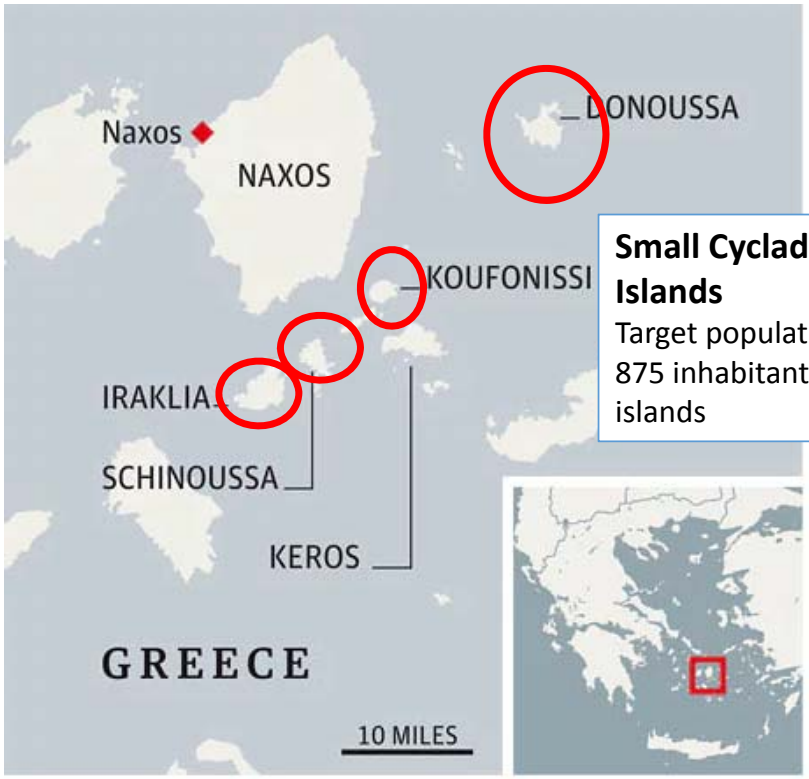
‘Good practice’ example of demonstrating RESOURCE EFFICIENCY and waste management in islands

LIFE 14 ENV/GR/000722

Website: www.pavethewayste.eu

The 'PAVEtheWAySTE' LIFE project

Demonstrating resource efficiency through innovative, integrated waste recycling schemes for remote areas



Small Cyclades Islands
Target population: 875 inhabitants in islands

- **LIFE 'PAVEtheWAySTE' project** in Small Cyclades Islands of Naxos Municipality (& Ancient Olympia):
  - Donousa
  - Schinoussa
  - Irakleia
  - Koufonissi
  - (& Ancient Olympia)

- Fine source separation in **15 different streams** and pre-treatment of recyclables **at neighbourhood level**

The ‘PAVEtheWAySTE’ LIFE project

OVERALL SCOPE:

This project aims to facilitate the implementation of the Waste Framework Directive in remote areas, by enabling local and regional authorities to improve their municipal waste recycling performance and thus pave the way to high resource efficiency.

‘PAVEtheWAySTE’ MSW management scheme (1)

1. Source separation in 5 main streams

MSW production

MSW source separation

Drop off site

Paper/Paperboard

Plastics

Glass

Metals

Specific waste streams

Green Kiosk
(20’ container)

‘PAVEtheWAySTE’ MSW management scheme (2)

2. Further separation in substreams

Green Kiosk

1 employee

Participants

ID card for participants Rewarding System

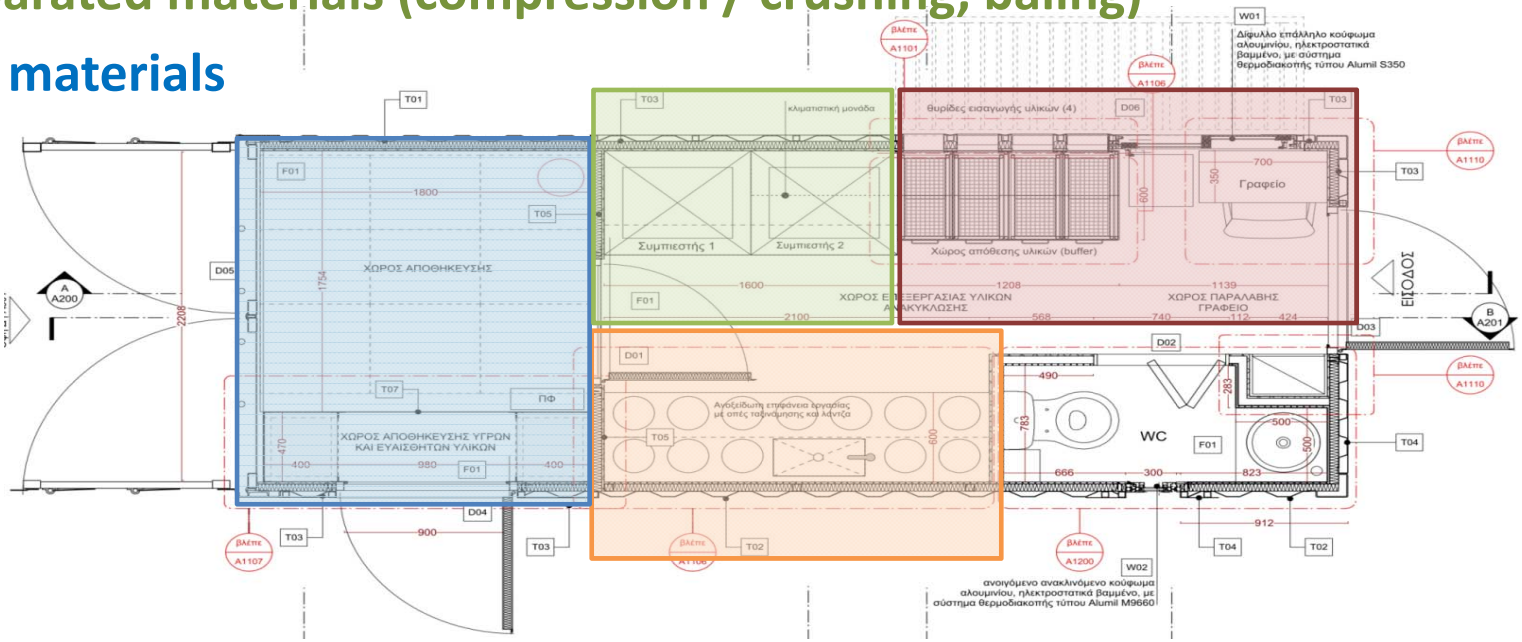
- Printed Paper
- Paperboard
- Mixed paper
- PET non-coloured
- PET coloured
- HDPE
- LDPE
- PP/PS
- Glass non-coloured
- Glass coloured
- Ferrous metals
- Non-ferrous metals
- Waste oils
- WEEE
- Batteries
- Lamps

The ‘PAVEtheWAySTE’ recycling system

The Green Kiosk consists of the following areas:

1. **Reception area of 5 pre-sorted waste streams (plastic, glass, metal, paper & special waste streams)**
2. **Fine separation area of pre-sorted waste into subcategories (PET, HDPE, LDPE, Aluminium, paperboard, etc.) by the system operator**
3. **Processing of fine separated materials (compression / crushing, baling)**
4. **Storage area of baled materials**

System Plan and space arrangement of **20m³ container**, (6.06m x 2.59m x 2.44m)



The ‘PAVEtheWAySTE’ recycling system (photos)

‘PAVEtheWAySTE’ MSW management scheme (3)

- Printed Paper
- Paperboard
- Mixed paper
- PET non-coloured
- PET coloured
- HDPE
- LDPE
- PP/PS
- Glass non-coloured
- Glass coloured
- Ferrous metals
- Non-ferrous metals
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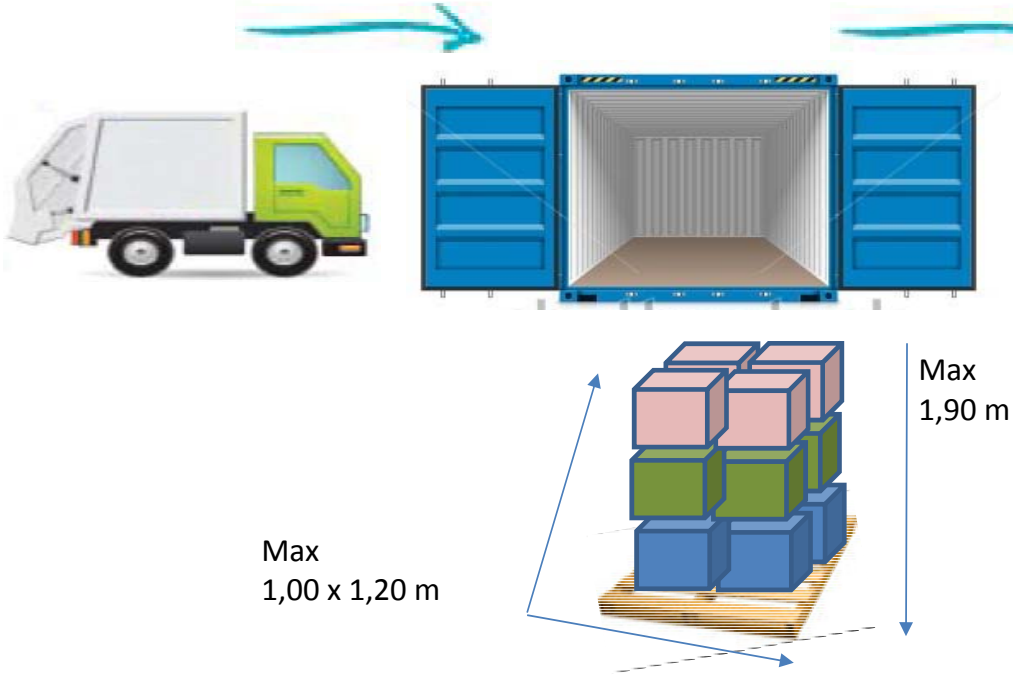
3. Temporal storage



4. Transportation to the market

- ✓ **Private Sector**
- ✓ **industries**

On-island recycling of waste plastics

ECOCYCLE Cube: 3d printing with recycled plastics

"Exclusively printing in post-consumer waste, the EKOCYCLE Cube 3D printer recycles what you use, so you can remake into new, meaningful, beautiful and better things"

Source: Arnison, R. (2016) Circular Economy Potential on Scottish Islands


Turn your plastic waste into new things

Objects from recyclable materials in School competition in Ancient Olympia

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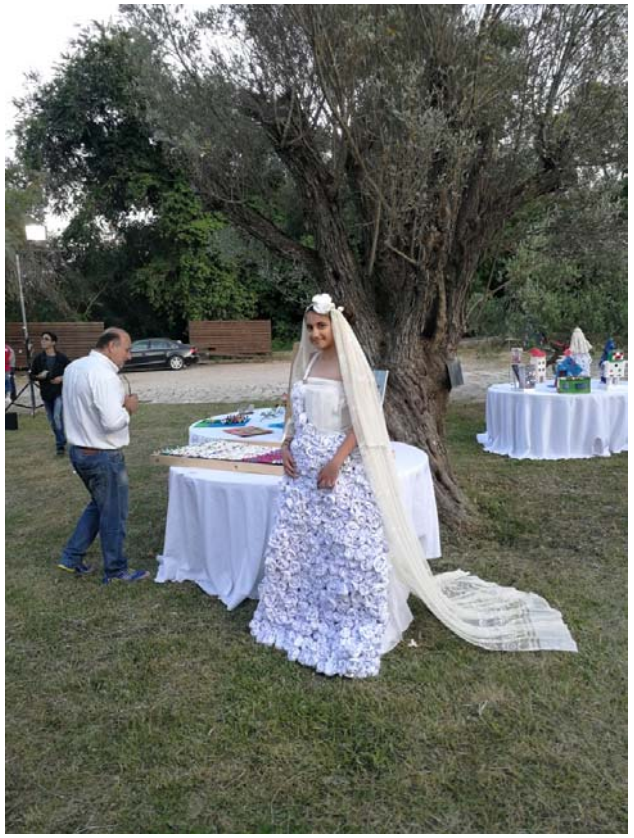

LIFE 'PAVEtheWAySTE' - Expected project results

- ✓ Development of an integrated, replicable system for source separation and treatment of MSW for remote areas in Greece and EU
- ✓ Increase of MSW recycling rate: (Ancient Olympia **60%** & Small Cyclades of Naxos Municipality **50%)**
- ✓ Establishment & demonstration of 9 prototype recycling systems
- ✓ Treatment of 400-500 kg MSW per system per day
- ✓ Raising of environmental awareness of citizens and tourists in participating municipalities
- ✓ Recovery of high quality recyclable materials
- ✓ Suggestions for full scale implementation in the participating municipalities of Naxos & Small Cyclades and Ancient Olympia
- ✓ 2 replication and transfer studies of the project in other remote Municipalities of Spain and Greece

What has to be done to implement successfully resource efficiency and circular economy in islands?

- ✓ Governmental vision
- ✓ Supportive legislation dedicated to insular and remote areas
- ✓ Innovation in energy & waste management schemes
- ✓ Transfer and development of technological and sustainable waste management planning knowhow in local actors
- ✓ Willingness to cooperate and work towards same national & EU targets
- ✓ Synergy development activities of all the actors involved
- ✓ Spatial planning
- ✓ Local job growth
- ✓ Awareness raising and active involvement of local societies
- ✓ Mobilization of sustainable funding and promotion

THANK YOU FOR YOUR ATTENTION!

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On Sustainable Solid Waste Management