WaysTUP!

VALUE CHAINS FOR DISRUPTIVE TRANSFORMATION OF URBAN BIOWASTE INTO BIOBASED PRODUCTS IN THE CITY CONTEXT

D4.3: Local Engagement Plans

WP4 – A behavioural change approach for the collection of urban biowaste and usage of biowaste derived products with citizens & communities

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Summary

This is the third (3rd) deliverable report of Work Package 4 that focuses on the planning of the local engagement plans for the behavioural change of the stakeholders (target audience) involved in the three pilot cities: Valencia, Athens and Sant Just Desvern-Barcelona regarding the source separation of biowaste and their acceptance of bio-based products and materials.

In the framework of this report, the tools developed in Task 4.2 'Interventions for change: toolkit' are adapted to the local context by the coordinators of the WaysTUP! communities who have developed their own specific 'Local Engagement Plans' which are using the developed tools in the framework of appropriate activities with the aim to change the perception and behaviour of the stakeholders involved towards biowaste as a local resource, selective biowaste sorting and biobased products acceptance.

The following three (3) individual 'Local Engagement Plans' are included as a distinct part in this report:

1. **Local Engagement Plan for the City of Athens**
2. **Local Engagement Plan for the City of Valencia**
3. **Local Engagement Plan for the City of Sant Just Desvern-Barcelona**

Each of the Local Engagement Plans includes, among others, the following information:

a. Description of the target area
b. A recording of the targeted stakeholders
c. A recording of the means and tools available to the pilot coordinators
d. The tools to be used for the behavioural change
e. A risk management plan
f. The tools from the toolkit in the language of the pilot coordinators

The effectiveness of each Local Engagement Plan shall be measured continuously throughout the implementation of the WP 4 and during the implementation of task 4.4. 'Monitoring and understanding the dynamics of behaviour towards biowaste recycling and derived products'.

It should be stressed that it was decided by the Task 4.3 leader to merge all three (3) Local Engagement Plans into one deliverable report, keeping the plans separated in order to provide a clear presentation of each plan separately.

The activities foreseen will be undertaken by the pilot partners with the full support of ETAM in regard to the dissemination of each separate activity and IMEC in regard to the behavioural change methodology implementation in the pilot areas. All activities are estimated to begin in

M24 and finalised by M36, considering an additional 3-4 months in case the COVID-19 restrictions cause more delays to the organization of events.

The tools to be used by the project pilot partners have been developed by IMEC and are included as Annex I of this report. These contain the main behavioural change messages that will be used to alter the perception of the target groups for biowaste and bio-based materials. Finally, it is noted that HSPN has developed, as a separate part of the toolkit, interactive educational material (experiments, games and digital presentations) for bioeconomy education at the local schools. This educational material contains activities ranging from climate change, circular economy, biowaste to bioeconomy. The ages covered are from 6 to 18 years old. This material is included in Annex II of this report. Both the toolkit and the educational material have been developed using the English language but all tools have been translated by the pilot partners in Greek, Spanish and Catalan in order for the pilot partners to be able to transfer the information, messages and educational activities in the respective areas.

D4.3: Local Engagement Plan_Athens_Pilot

WP4 – A behavioural change approach for the collection of urban biowaste and usage of biowaste derived products with citizens & communities

Authors: Anthi Gkesouli, Nikoletta Maneta

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Introduction

This deliverable is part of the third (3rd) deliverable report of Work Package 4 and focuses on planning the Local Engagement Plan for the behavioural change of the stakeholders (target audience) involved regarding biowaste separate collection and their perception of bio-based materials in the city of Athens. In the framework of this report, the tools developed in Task 4.2 'Interventions for change: toolkit' will be adapted to the local context by the coordinator of Athens pilot, who will use them to implement the interventions with the aim to change the perception and behaviour of the stakeholders involved towards biowaste as a local resource, selective biowaste sorting and biobased products acceptance.

The effectiveness of the behavioural change toolkit implementation through the Local Engagement Plans will be continuously monitored and evaluated through Task 4.4 'Monitoring and understanding the dynamics of behaviour towards biowaste recycling and derived products'.

The following chapters are included in this report:

Chapter 1 includes a brief description of the Athens pilot area (i.e. Municipalities of Vari-Voula-Vouliagmeni and Elliniko-Argiroupoli) focusing on the location, the total number of inhabitants and the existing waste management scheme.

Chapter 2, presents the stakeholders (target audience) mapping which includes the target groups that were identified in Tasks 4.2 and 4.3. In addition, more stakeholders that can take part in the behavioural change exercise regarding their perception of biowaste as a local resource and their acceptance of biobased products (but not regarding the selective biowaste sorting behaviour) are identified and included.

Chapter 3 contains the existing means and tools that are already in use in the pilot city to communicate and engage with their audience and local communities. These tools are detailed in the form of practical tables that provide concrete information on the existing means and tools.

Chapter 4 contains a summary of the tools developed as part of the behavioural change toolkit (i.e. Task 4.2) that will be used in addition to the already existing tools for the achievement of change through the interventions.

Chapter 5 describes the extent to which the tools will be implemented, and such per target group. The information is in the form of a table with concrete targets, expected results and milestones to be achieved, in the form of a practical 'action plan'.

Chapter 6 describes the possible risks for implementing of the 'action plan' including the level of likelihood and possible avoidance or mitigation measures.

In total six (6) different target groups have been identified for the Athens pilot; 26 different means and tools of SUST and HSPN which could be used for the behavioural change activities foreseen have been recorded, including: events, training and awareness raising programmes, publications, online media and tools, TV/radio stations and social media accounts; at least ten (10) different activities for the behavioural change of the different target groups have been included using six (6) of the tools included in the toolkit (i.e. Stickers and posters, Video clips, Social Media posts, Bags and bins, Events, Didactic material); while four (4) risks which could lead to important drawbacks in the implementation of the behavioural change have been identified and all the necessary contingency planning has been made.

1. Athens Pilot – Municipalities of Vari- Voula – Vouliagmeni and Elliniko - Argyroupoli

1.1 Location

Two (2) Municipalities of the wider region of Athens have been actively involved in the WaysTUP!: The Municipality of Vari-Voula-Vouliagmeni (VVV) and the Municipality of Elliniko-Argyroupoli (EA). The Municipality of Vari-Voula-Vouliagmeni, which is located in East Attica (i.e. the wider region of Athens) in Greece, was formed in 2010 through the aggregation of the three small independent Municipalities of Voula, Vari and Vouliagmeni, according to the Kallikratis Programme (Greek law 3852/2010). The Municipality covers a total area of approximately 33.94 km^2 and has a population of 48,399 inhabitants, according to the population census conducted by the Hellenic Statistical Authority in 2011 (Source: elstat[1], 2011). The Municipality is located about half an hour from the centre of Athens (by car) and has a long coastline. The seat of the municipality is Voula.

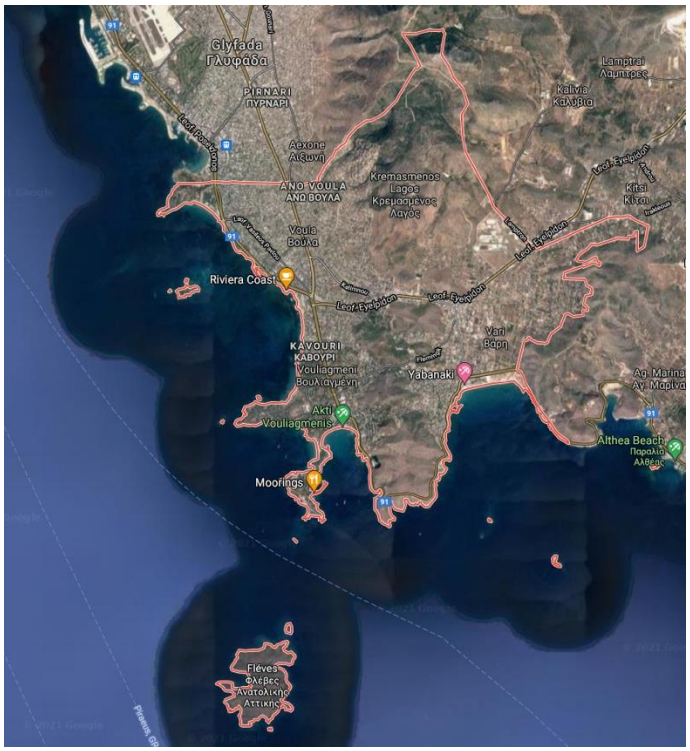

Figure 1.Municipality of Vari – Voula – Vouliagmeni

[1] https://www.statistics.gr/statistics/pop (filtered by topics)

In Figure 1, the administrative boundaries of the municipality are depicted by red line.

The Municipality of Elliniko-Argyroupoli, which is also located in East Attica in Greece, was formed in 2010 by the aggregation of the Municipalities of Elliniko and Argyroupoli according to the Kallikratis Programme (Greek law 3852/2010). The Municipality covers a total area of approximately 15.40 km^2 and has a population of 51,356 inhabitants, according to the population census conducted by the Hellenic Statistical Authority in 2011 (Source: elstat[2], 2011). The Municipality is located about half an hour from the centre of Athens (by car) and has a long coastline. The seat of the municipality is Argyroupoli.

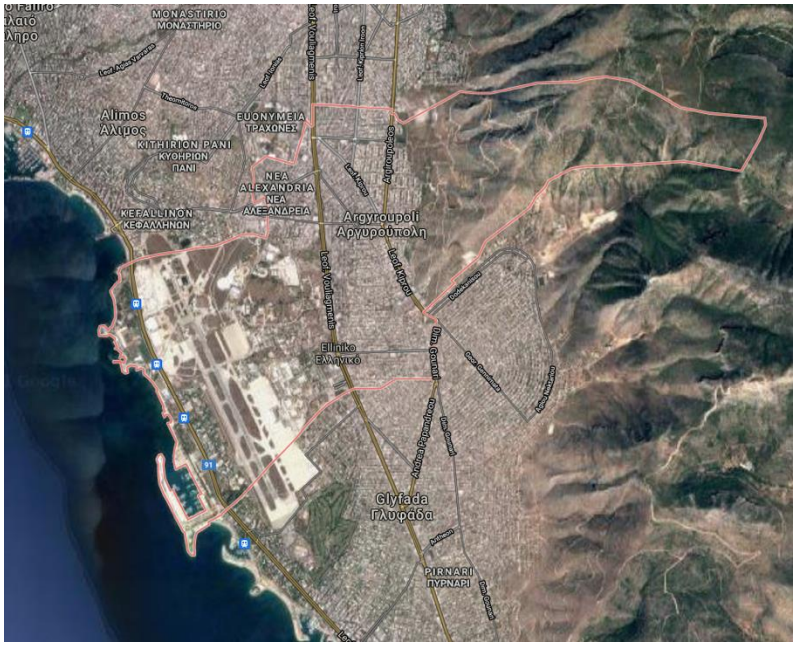

Figure 2. Municipality of Elliniko - Argyroupoli

In Figure 2, the administrative boundaries of the municipality are depicted by red line.

The municipalities of VVV and EA are neighbouring municipalities.

1.2 Total inhabitants

The most recent census, conducted and published in 2011 by the Hellenic Statistical Authority (ELSTAT), indicates a population of 48,399 and 51,356 inhabitants, for VVV and EA, respectively (Source: elstat[3], 2011). The respective average population density is approximately 1,426 and 3,335 inhabitants/km^2.

[2] https://www.statistics.gr/statistics/pop (filtered by topics)

[3] https://www.statistics.gr/statistics/pop (filtered by topics)

1.3 Waste collection scheme description

Municipality of Vari – Voula – Vouliagmeni

The waste collection scheme throughout the Municipality employs the use of special bins – containers for the collection of district fractions of solid wastes, namely: mixed municipal wastes - residual fraction (green container); glass (special bell-shaped blue container); light packaging – paper (yellow container); clothes, shoes and/or other fabrics (red container), mixed recycling (blue container); and food waste including small garden waste (brown container).

The waste collection scheme is characterized by heterogeneity. In other words, the above-mentioned containers are not placed in each neighbourhood. In most of the cases, green and blue containers do exist at a walking distance from residences (approximately one at each corner of each city block) providing comfort and proximity to the citizens; however, the network of the other container categories is much coarser. This fact usually discourages citizens from sorting their solid wastes.

Regarding the domestic residual and food waste fractions, i.e. the brown containers, the collection takes place every night (5/7 collection basis). The collection of mixed municipal solid wastes is conducted every night (7/7). The collection of the other fractions varies.

Figure 3. Brown bins of Municipality of Vari – Voula – Vouliagmeni

At the moment, there is no container control and locking system.

However, in two (2) different pilot areas of VVV, citizens have been provided with special bags having a barcode to collect their biowastes and stickers have been placed on the bins. The Municipality is now at the stage of making citizens aware of the importance of biowaste sorting (house visits to communicate the biowaste sorting plan and motivate them to participate) and they intend to gradually place brown bins in all neighbourhoods. This plan has faced a delay due to the COVID 19 restrictions.

Municipality of Elliniko - Argyroupoli

The waste collection scheme throughout the Municipality employs the use of special bins – containers for the collection of district fractions of solid wastes, namely: mixed municipal wastes - residual fraction (green container); glass (special bell-shaped blue container); light packaging – paper (yellow container); clothes, shoes and/or other fabrics (red container); mixed recycling (blue container); food waste including small garden waste (brown container).

The waste collection scheme is characterized by heterogeneity. In other words, the above-mentioned containers are not placed in each neighbourhood. In most of the cases, green and blue containers do exist at a walking distance from residences (approximately one at each corner of each city block) providing easy access to the citizens; however, the other waste collection containers are not so easily accessed. This fact usually discourages citizens from sorting their solid wastes.

This waste collection scheme is practically identical to the one of VVV.

The Municipality of Elliniko – Argyroupoli has also placed at specific municipal infrastructures the following containers for waste fractions collection: containers exclusively for paper collection at schools, underground containers for mixed municipal wastes, containers for branches at the construction site of the Municipality and containers for paper collection at some Municipal sites (e.g. municipal swimming pool, Department of Municipal technical services, etc.).

Regarding the domestic residual and food waste fractions, i.e. the brown containers, these are only placed at the local farmers' markets. There is no container control and locking system.

The collection depends on the frequency of the operation of the markets. The collection of mixed municipal solid wastes is conducted every night (7/7) and the collection of mixed recycling every two days (3-4/7). The collection of the rest fractions varies.

The brown bins used in the area of EA are shown in Figure 4. The Municipality bought the first 120 brown bins in October 2020 and has recently submitted a proposal for receiving funding to provide brown bins and tracks for biowaste. So, they intend to promote and reinforce the biowaste sorting at municipal level.

Figure 4. First brown bins of Municipality of Elliniko – Argyroupoli

1.4 Stakeholders (Target Groups) Mapping

The WaysTUP! project pilot beneficiaries (i.e. AMB, VAL, SAV and SUST) have previously identified the main target groups involved in the behavioural change exercise, such as: households, schools, hotels, restaurants, bakeries, farmers, taverns, as reported in Deliverables 4.1 and 4.2. In addition, other relevant stakeholders have been included in order to further enhance the impact of the project in terms of active involvement. The stakeholders for the case of the Athens pilot were categorized in two (2) sub-groups in order to be able to distinguish them and provide concrete data in terms of numbers. It is stressed that the HSPN's 'Green Key' hotel network and the HSPN's school network are also included in this 'Local Engagement Plan' for providing a complete picture of the activities undertaken in the broader Athens area, even though they are nationwide and different from the pilot area networks; thus the total number of target groups included is six (6).

The target audience which has been recorded is summarized in table 1.

Table 1. Target group of the Athens pilot area (including the HSPN's Green Key and Schools networks)

A/A	Beneficiary	Administrative authorities			Academic & scientific community	General Audience		Professionals/businesses	Other social partners	Target Number (number of stakeholders/number of individuals)
		Central Government	local authorities (Regions)	Second degree authorities (Municipalities)		Citizens	Students			
1	SUST	-	-	- Municipality of Elliniko – Argyroupoli	-	-	-	-	-	- 5,000 citizens from the Municipality (reached/engaged through various means)
2	SUST	-	-	- Municipality of Vari – Voula - Vouliagmeni	-	-	-	-	-	-5,000 citizens from the Municipality (reached/engaged through various means)
3	SUST	-	-	-	-	-	-Schools of VVV	-	-	- 2 Schools - 500 Students

4	SUST	-	-	-	-	-	-Schools of EA	-	-	- 2 Schools - 500 Students
5	HSPN	-Ministry of Environment and Energy -Ministry of Tourism	-	-	-	-HSPN members	-	- Hotels of the Green Key network, focusing on the Athens area - Teachers or the HSPN Environmental Education network	- Greek NGOs	-5 employees of the Ministry of Environment and Energy and the Ministry of Tourism - 500 HSPN members - 50 Green Key network hotels - 10 hotels in the Athens area -5 Greek NGOs -50 teachers of the HSPN education network

1.5 Means and tools used by the pilot coordinator

1.5.1 Events

In total five (5) events which could be used to actively involve the stakeholders were identified. The events which have been recorded are summarized in table 2.

Table 2. Events to be used for the active involvement of the stakeholders

A/A	Beneficiary	Event title	Frequency	Focus	Geographical Scale	Role of co-beneficiary	Categories of participants	Comments
1	SUST	Annual General Assembly	Every year	- Representatives of local authorities - Representatives of Central administration - Representatives of scientific community	National	Organiser	Central administration, first and second degree local authorities, research and scientific community.	WaysTUP! will be included in the agenda of the event
2	SUST	Assembly of Board of Directors	Every 4 months	Elected Representatives of local authorities	National	Organiser	Elected Representatives of local authorities	-
3	SUST	EUROPE DIRECT Peloponnesus	Once	Local Authorities	Regional	Organiser	-Local Authorities	WaysTUP! will be included in the agenda of the launch event of the European project

4	SUST	LIVING STREETS	Once	- Local Authorities - Citizens	Local	Organiser	- Local Authorities - Citizens	WaysTUP! will be included in the agenda of the launch event of the European project
5	HSPN	ANNUAL MEETING	12-month basis	HSPN members	National	Organiser	-Green Key network hotel owners -School teachers -General public	WaysTUP! Results will be mentioned in the meeting

1.5.2 Training and awareness raising programmes

A total of four (4) training and awareness raising programmes which could be used to actively engage the stakeholders involved in the Athens pilot were identified. The training and awareness raising programmes which have been recorded are summarized in table 3.

Table 3. Training and awareness raising programmes to be used for the active involvement of the stakeholders

A/A	Beneficiary	Title or theme of the program	Duration	Frequency	Venue	Geographical scale	Categories of participants	Comments
1	SUST	Special School training within the framework of WaysTUP!	–2 days / training	Once	Athens	Local – Municipality Level	Students Teachers	Selected Schools in the Municipality of Elliniko – Argyroupoli

2	SUST	Special School training within the framework of WaysTUP!	–2 days / training	Once	Athens	Local – Municipality Level	Students Teachers	Selected Schools in the Municipality of Vari – Voula – Vouliagmeni
3	SUST	Webinar for citizens within the framework of WaysTUP!	–1 day	Once	Virtually	National	Citizens	The webinar will include interactive activities focusing on practical examples and training, e.g. best practices, simple tips for behavioural change, quiz, provision of incentives
4	HSPN	HSPN Environmental Education programmes	Annual School period (September-June)	Annual	Athens	National	Students Teachers	Didactic material for bio economy will be distributed to the HSPN school network

1.5.3 Publications (print or electronic)

A total of two (2) publications (print or electronic) which could be used to actively engage the stakeholders involved in the Athens pilot area were identified. The publications which have been recorded are summarized in table 4.

Table 4. Publications to be used for the active involvement of the stakeholders

A/A	Beneficiary	Publication type	Title	Form	Frequency	Number of copies or recipients	Categories of readers / recipients	Comments
1	SUST	magazine	https://www.water-waste.com/%CF%80%CE%B5%CF%81%CE%B9%CE%BF%CE%B4%CE%B9%CE%BA%CE%BF/	Electronic	Monthly	-	General audience	It is also produced in hardcopy
2	HSPN	magazine	"I Fysi" (Nature)	Electronic and printed	4 times per year	700	General audience	The magazine focuses on environmental issues including waste management, climate change, biodiversity, etc.

1.5.4 Online media & tools

Overall seven (7) online media and tools which could be used to actively engage the stakeholders involved in the Athens pilot were identified. The Online media & tools which have been recorded are summarized in table 5.

Table 5.Online media & tools to be used for the active involvement of the stakeholders

A/A	Beneficiary	Website / Link (URL)	Type of media	Total number of visits	Total number of visitors	Audience categories to which it is addressed	Comments
1	SUST	https://www.sustainable-city.gr/	Website	18,247	5,197	General audience	Statistics: 01/05/2020 – 13/05/2021
2	SUST	Newsletter (Mailchimp)	Newsletter	-	Not available	General audience	1,643 Subscribers
3	SUST	https://water-waste.gr/site/	website	Not available	Not available	General audience	-
4	SUST	https://www.opinionpoll.gr/	Website - polling company	Not available	Not available	General audience	-
5	SUST	https://www.in.gr/	website	Not available	Not available	General audience	-
6	SUST	https://best-tv.gr/	website	Not available	Not available	General audience	-
7	HSPN	www.eepf.gr	Websites	107,000	55,000	-General audience	-

		https://greenkey.gr/				-Hotel administrators and staff, general audience	

1.5.5 TV/radio stations

One (1) TV station which could be used to actively engage the stakeholders involved in the Athens pilot area was identified. The TV station which has been recorded is included in table 6.

Table 6. TV station to be used for the active involvement of the stakeholders

A/A	Beneficiary	Type	Name	Geographical scale	Average TV viewing / audience	Comments
1	SUST	Video / Interview	BEST TV	Regional	Not available	-

1.5.6 Social media accounts

In total of seven (7) social media accounts which could be used to actively engage the stakeholders involved were identified. The Social media accounts which have been recorded are summarized in table 7.

Table 7. Social media accounts to be used for the active involvement of the stakeholders

A/A	Co-beneficiary	Social networking medium	Social networking account (link)	Account number followers	Comments
1	SUST	Facebook	https://www.facebook.com/sustainableCTgr	995	Since 27/07/2017
2	SUST	LinkedIn	https://www.linkedin.com/company/sustainable-city/	184	Since 01/05/2020
3	SUST	Twitter	https://twitter.com/SustainableCTgr	41	Since 01/11/2019
4	SUST	Instagram	https://www.instagram.com/citiesnetsustainablecity/	25	Since 28/04/2021
5	SUST	YouTube	https://www.youtube.com/channel/UCdP0_pYEXRuqNvzJ2ImgYzw	18	Since 12/06/2020
6	HSPN	Twitter	https://twitter.com/HSPN?lang=en	≈22,000	-
7	HSPN	Facebook	https://www.facebook.com/ProstasiaTisFysis https://www.facebook.com/blueflag.greece/ https://www.facebook.com/GreenKeyInt	≈ 9,000	Since 10/05/2021

1.6 Summary of the tools comprising the toolkit for the behavioural change

In total, six (6) different tools are included in the behavioural change toolkit developed in Task 4.2 including one (1) more (Didactic material for schools) developed by the HSPN which could be used to actively engage the identified relevant stakeholders. The tools are recorded in table 8.

Table 8. Summary of the tools comprising the toolkit for the behavioral change

A/A	Tool	Purpose of tool	Tool use	Geographical scale	Comments
1	Stickers and posters	Printed and electronic	Environmental restructuring	Local	-
2	Social media posts	Electronic	Persuasion	Local	-
3	Video clips	Electronic	Modelling	Local	-
4	Badges	Electronic or materialized	Incentivisation	Local	-
5	Bags and bins	Materialised	Enablement	Local	-
6	Events	Web-based or virtual	Join the loop	Local	-
7	Didactic material	Printed or electronic	Bioeconomy education	National	-

1.7 Tools to be used for the behavioural change at the local level

In total, five (5) tools which are included in the behavioural change toolkit developed in Task 4.2 will be used to actively engage the stakeholders involved. They tools to be used at the local level are summarized in table 9.

Table 9. Tools to be used for the behavioural change at the local level (including national level)

A/A	Partner	Target group	Tool use	Purpose of tool	Geographical scale	Behavioral change Indicators (Target value)	Method of measurement (source of information)	Milestones	Timetable	Comments
1	SUST	Citizens	Events (Launching event)	Change the behaviour of citizens regarding biowaste disposal	National	50	Number of attendees	Organisation of a national webinar	M26-M28	-
2	SUST	Citizens	Stickers and posters	Change the behaviour of citizens regarding biowaste disposal	Local – Municipal Level (for 2 Municipalities)	*to be updated after internal discussions with the Municipalities; initial - gross estimation 100	Residents reached out, i.e. individuals expected to receive this information	Placement of stickers and posters in the selected places	M24-M40	-
3	SUST	Students	Video clips	Change the behaviour of students regarding biowaste disposal	Local – Municipal Level (for 2 Municipalities)	600	Number of attendees	Presentation of the Videoclip in 2 schools	M24-M32	-

4	SUST	Citizens	Social Media posts	Change the behaviour of citizens regarding biowaste disposal	National	1,000	People reached out	Upload at least 10 posts in social media platforms	M21-M40	-
5	SUST	Citizens	Bags and bins	Change the behaviour of citizens regarding biowaste disposal	Local - Municipal Level (for 2 Municipalities)	40	People received the incentives	Provision of at least 3 bags per citizen; the possibility to provide a bin to a limited number of citizens will be investigated	M24-M40	-
6	SUST	Citizens	Events	Change the behaviour of citizens regarding biowaste disposal	National	200	Number of attendees	Presentation of WaysTUP! in the Conference of Local Authorities and Executives (2-4/7/2021, Corinth, Greece)	M23	-
7	SUST	Citizens	Events	Change the behaviour of citizens regarding biowaste disposal	Regional	100	Number of attendees	Presentation of WaysTUP! in the Launch Event of EUROPE DIRECT Peloponnesus	M25	

8	HSPN	Green Key Hotels in the Athens area, NGOs	Social media posts	Persuasion	National	60	Number of likes	Uploading of at least 12 posts related to the project	M23-M40	-
9	HSPN	HSPN members Ministries employees	Events	Join the loop	National	500	Number of attendees	Participation and presentation of the project in at least 4 events organised by HSPN	M23-M40	These events will be web-based if applicable
10	HSPN	HSPN school network	Didactic material	Bioeconomy education	National	50	Number of teachers	Training of at least 50 teachers	M23-M40	-

1.8 Risk management plan

The following risks and relevant mitigation measures and/or avoidance actions have been identified:

Table 10. Risk Management Plan

A/A	Risk	Stakeholder	Likehood (Low-Medium-High)	Avoidance (Yes or no)	Avoidance measure	Mitigation measure
1	Covid-19 pandemic outbreak	All	High	no	-	Use web-based tools for the behavioural change of the stakeholders involved. Update and revision of the Local Engagement Plan.
2	Low involvement	Citizens	Medium	Yes	Engage citizens from the early stages via posts, personal contacts, etc.	- Take more engagement actions, e.g. perhaps holding a 2nd webinar - Paid Campaigns in social media - Personal Interviews
3	Poor communication with the Municipalities	Municipalities	Low	No	-	-Phone calls and direct contact with Authorities and Civil Servants.
4	Difficulty reaching schools	Teachers and students	Medium	No	-	-Web-based methods of communication will be used.

D4.3: Local Engagement Plan_Valencia_Pilot

WP4 – A behavioural change approach for the collection of urban biowaste and usage of biowaste derived products with citizens & communities

Authors: Ignacio Cartagena (SAV)

Disclaimer

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Introduction

This deliverable is part of the third (3rd) deliverable report of Work Package 4 that focuses on planning the local engagement plan for the behavioural change of the stakeholders (target audience) involved in the Valencia pilot.

In the framework of this report, the tools developed in Task 4.2 'Interventions for change: toolkit' will be adapted to the local context by the coordinator of the Valencia pilot Communities who will use them to implement the interventions with the aim to change the perception and behaviour of the stakeholders involved towards biowaste as a local resource, selective biowaste sorting and biobased products acceptance.

The effectiveness of the behavioural change toolkit implementation through the Local Engagement Plans will be continuously monitored and evaluated through Task 4.4 'Monitoring and understanding the dynamics of behaviour towards biowaste recycling and derived products'.

The following chapters are included in this report:

Chapter 1 includes a brief description of the Valencia pilot area focusing on the location, the total number of inhabitants and the existing waste management scheme.

Chapter 2 presents with the stakeholders (target audience) mapping which includes the target groups that were identified in Tasks 4.2 and 4.3. In addition, more stakeholders that can take part in the behavioral change exercise in regard to their perception of biowaste as a local resource and their acceptance of biobased products (but not in regard to the selective biowaste sorting behaviour) are identified and included.

Chapter 3, contains the existing means and tools that are already in use in the pilot city to communicate and engage with their audience and local communities. These tools are detailed in the form of practical tables that provide concrete information on the existing means and tools.

Chapter 4 contains a summary of the tools developed as part of the behavioural change toolkit (i.e. Task 4.2) that will be used in addition to the already existing tools for the achievement of change through the interventions.

Chapter 5 describes the extent to which the tools will be implemented, and such per target group. The information is in the form of a table with concrete targets, expected results and milestones to be achieved, in the form of a practical 'action plan'.

Chapter 6 describes the possible risks for implementing of the 'action plan' including the level of likelihood and possible avoidance or mitigation measures.

In total six (6) different target groups have been identified for the Valencia pilot, 16 different means and tools of SAV which could be used for the behavioural change activities foreseen have been recorded, including: events, training and awareness raising programmes, publications, online media and tools, TV/radio stations and social media accounts; at least ten (10) different activities for the behavioural change of the different target groups have been included using six (6) of the tools included in the toolkit (i.e. Stickers and posters, Video clips, Social Media posts, Bags and bins, Events, Didactic material); while four (4) risks which could lead to important drawbacks in the implementation of the behavioural change have been identified and all the necessary contingency planning has been made.

2 Valencia Pilot

2.1 Location

Valencia is the capital of Valencia province (i.e. Figure 5) inside the Valencian Community (Valencian Community is an autonomous community on the Mideastern coast of Spain). Valencia is the third-largest city in Spain after Madrid and Barcelona, surpassing 800,000 inhabitants in the municipality according to data provided by the City Council of Valencia (VAL). The greater urban area also comprising the neighbouring municipalities has a population of around 1.6 million. Valencia is Spain's third-largest metropolitan area, with a population ranging from 1.7 to 2.5 million depending on how the metropolitan area is defined. The Port of Valencia is the 5th busiest container port in Europe and the busiest container port on the Mediterranean Sea. The city is ranked as a Gamma-level global city by the Globalization and World Cities Research Network (VAL).

Figure 5. Valencia province.

2.2 Total inhabitants

Valencia is the third-largest city in Spain after Madrid and Barcelona, with 800,215 inhabitants according to the latest census conducted by the National Institute of Statistics (INE).

2.3 Waste collection scheme description

The waste collection scheme model is based on street containers, bins for waste disposal of the five (5) main fractions located less than 100 meters from the user, sometimes complemented with containers for less common fractions, such as clothes containers.

The five (5) waste fractions collected separately are: glass (green container), paper/cardboard (blue container), light packaging (yellow container), food waste including small garden waste (brown) and residual fraction (grey).

Valencia is also collecting used oil (orange container) and informs citizens about the location of the containers through public maps.

Figure 6. Valencia recycling containers

These containers are distributed throughout the city according to the collection requirements of each neighbourhood. The containers are collected by the truck fleet responsible for each area, SAV being one of the companies responsible of the collection in Valencia. Hereunder one of the collecting routes is depicted:

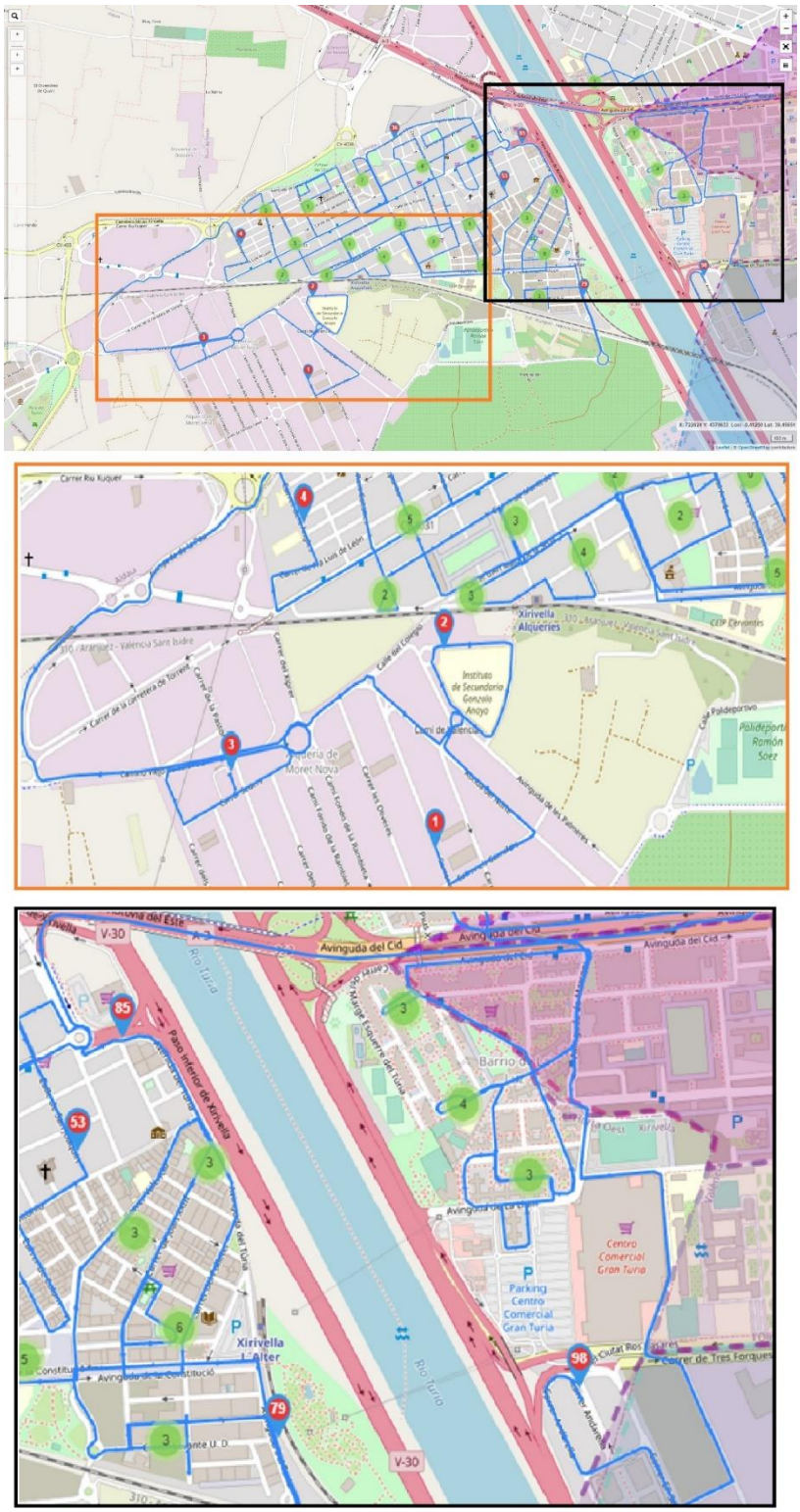

Figure 7. Image of one of the collection routes in Valencia (Xirivella area). In the first image we can see in blue the truck's route through a determined zone of the city. Meanwhile the containers are the markers on the map, being the green numbers the number of containers in place and the red numbers the containers

collected until that point during the route finalizing this one with 98 containers as we can see on the last magnified image.

Also, mobile green points are displayed for the collection of more uncommon waste, like small furniture, small home appliances, batteries etc.

Being a big and touristic city, the collection is organized in zones and executed in a daily basis. Food waste it is collected separately and sent to a treatment plant for processing on a daily basis.

The other waste fractions are collected separately and delivered to Manises treatment plant (SFS Instalación 3) for processing. Commercial and domestic waste is collected altogether.

Throughout 2020, 13,886 tons of packaging have been collected in Valencia. Regarding the number of yellow containers distributed throughout the city, there are currently 3,750 units, 48% more than in 2019.

Awareness raising campaigns have also been increased and new waste management schemes have been established, including the installation of brown containers for the collection of organic waste and the reorganization of the containers on islands to facilitate access and separation. During the first quarter of 2021, 6,521,100 kilos of waste were collected in the brown organic matter containers, while during the first three (3) months of 2020, 5,346,400 kg were collected).

In the same period, citizens have deposited 5,083,422 kilograms of paper and cardboard, while in 2020 4,721,365 were recycled.

Glass containers have gone from receiving 3,278,690 kilograms to 3,210,360 kilograms and finally, the containers that collect the remaining waste have experienced a decrease of 13.89% to 60,103,160 kilograms of waste during the first quarter of 2020 and 2021 respectively.

Moreover, a system that provides the resources for our pilot in Valencia, hostelry businesses using public institutions like the City Council (VAL) and the Commerce Chamber have been included as meeting points. This way local businesses will be provided with the necessary components for the pilot, through the collection of their product with SAV providing the collecting routes and fleet.

2.4 Stakeholders (Target audience) Mapping

The WaysTUP! project pilot beneficiaries (i.e. AMB, VAL, SAV and SUST) have previously identified the main target groups involved in the behavioural change exercise, such as: households, schools, hotels, restaurants, bakeries, farmers, taverns as reported in Deliverables 4.1 and 4.2. Additional stakeholders have been included in the case of Valencia in order to further enhance the impact of the project in terms of active involvement. For this, the stakeholders for Valencia were categorized into six (6) different target groups in order to be able to distinguish them and provide concrete data in terms of numbers.

The target audiences which have been recorded are summarized in table 11.

Table 11. Target audience included in the Valencia pilot 'Local Engagement Plan'

A/A	Administrative authorities			Academic & scientific community	General Audience		Professionals/businesses	Other social partners	Target Number (number of stakeholders/number of individuals)
	Central Government	Local authorities (Regions)	Second degree authorities (Municipalities)		Citizens	Students			
1		Valencian Community (Comunidad Valenciana)			Parents of the children from the schools	Students from the local schools			- 540 students approx. - 500 parents from students approx. - 10 Teachers approx.
2			Valencia City Council (VAL)		Valencia citizens				- 800,215 inhabitants
3							-Bar owners -Tavern managers -Wholesalers -Restaurant manager -Hotels		- 100 workers and managers from all professionals

							-Food market and stores		
4							"Sociedad Agricultores de la Vega de Valencia" personnel.		- 2000 employees

2.5 Means and tools used by the pilot coordinator

2.5.1 Events

In total of four (4) events which could be used to actively involve the stakeholders involved were identified. These events are recorded in table 12.

Table 12. Events included in the Valencia pilot 'Local Engagement Plan'

A/A	Beneficiary	Event title	Frequency	Focus	Geographical Scale	Role of co-beneficiary	Categories of participants	Comments
1	SAV	Businesses workshop: Waste potentiality engagement	Annual	Hostelry companies	Local	Organiser	Professionals	A webinar foreseen to be organised
2	SAV	Personnel formation: Agricultores de la Vega en contexto ECO	Annual	Sociedad de Agricultores de la Vega de Valencia personnel	Regional	Organiser	Professionals	A webinar foreseen to be organised
3	SAV / VAL	WaysTUP ! Merch & Poster Inauguration	Annual	Citizens of Valencia and online visitors	Local and general	Organiser	Citizenship	The event will be published and posted online if the 'Covid-19' restriction continue
4	SAV	Workshop Nacional del WaysTUP!	21/06/2021	General Audience	National	ORGANISER	Professionals Citizenship	2 hours long aprox.

2.5.2 Training and awareness raising programmes

A total two (2) training and awareness raising programmes which could be used to actively engage the stakeholders involved in the Valencia pilot were identified. These are included in table 13.

Table 13. Training and awareness raising programmes included in the Valencia pilot 'Local Engagement Plan'

A/A	Beneficiary	Title or theme of the program	Duration	Frequency	Venue	Geographical scale	Categories of participants	Comments
1	SAV	School training: Introduction on sub products and circular economy by WaysTUP!	semestral	Annual	Valencia	Regional	Students, parents, teachers	The students and their parents will learn about circular economy, our pilots and how relevant this project and it's meaning are to our way of managing waste
2	SAV	SAV staff training	semestral	Annual	Valencia	Regional	SAV workers	+2,200 potential assistants to a formative session on the project pilots, its potential and what each little part of waste management means in a bigger scale

2.5.3 Publications (print or electronic)

A total of two (2) publications (print or electronic) which could be used to actively engage the stakeholders involved in the Valencia pilot area were identified. These are included in table 14.

Table 14. Publications included in the Valencia pilot 'Local Engagement Plan'

A/A	Beneficiary	Publication type	Title	Form	Frequency	Number of copies or recipients	Categories of readers / recipients	Comments
1	SAV	Internal digital Platform	Internal magazine	Electronic	Monthly	-1 per employee	SAV workers	Sent to all the company members (+2200 workers)
2	SAV	Magazine	Biowaste for businesses	physical or digital copy	Unique	1 per business or employee	Engaged Businesses	They will receive it at the end of events, workshops and any other kind of participation

2.5.4 Online media & tools

Overall two (2) websites which could be used to actively engage the stakeholders involved in the VAL pilot were identified. These are recorder in table 15.

Table 15. Online media & tools included in the Valencia pilot 'Local Engagement Plan'

A/A	Beneficiary	Website / Link (URL)	Type of media	Total number of visits	Total number of visitors	Audience categories to which it is addressed	Comments
1	VAL	https://ivia.gva.es/es/waystup	Website	-	-	General audience	

2	SAV	www.sav.es	Website	3,000/y	-	General audience, professionals	

2.5.5 Social media accounts

In total of four (4) social media accounts which could be used to actively engage the stakeholders involved were identified. These are recorded in table 16.

Table 16. Social media accounts included in the Valencia pilot 'Local Engagement Plan'

A/A	Co-beneficiary	Social networking medium	Social networking account (link)	Account number followers	Comments
1	SAV	Instagram	https://instagram.com/sav_lavega?igshid=15b02ts9ql12c	+350	
2	SAV	Facebook	https://m.facebook.com/SAV.Valencia/	+1,400	
3	SAV	LinkedIn	https://www.linkedin.com/company/s-a-agricultores-de-la-vega-de-valencia	+700	
4	SAV	Twitter	https://mobile.twitter.com/sav_lavega?lang=es	+370	

2.5.6 Other means of local engagement

In total two (2) other means of local engagement which could be used to actively engage the stakeholders were identified. This is specified in table 17.

Table 17. Other means of local engagement included in the Valencia pilot 'Local Engagement Plan'

A/A	Beneficiary	Website / Link (URL)	Type	Total number of unique visits	Total number of visitors	Audience categories to which it is addressed	Comments
1	SAV / VAL	https://waystup.eu/	Collaboration platform	4,352	6,816	- Researchers, - Private Companies, - Government Agencies, - Local / Regional authorities, and - International research and educational organizations.	
2	SAV / VAL	Yet untitled press releases	Press realizes	Not available	Not available	- Depending of newspaper National or Municipal	

2.6 Summary of the tools comprising the toolkit for the behavioural change

In total six (6) different tools are included in the behavioural change toolkit developed in Task 4.2 including one (1) more (Didactic material for schools) developed by the HSPN which could be used to actively engage the stakeholders involved were identified. The tools are included in table 18:

Table 18. Summary of tools comprising the toolkit

A/A	Tool	Purpose of tool	Tool use	Geographical scale	Comments
1	Stickers and posters	Printed and electronic	Environmental restructuring	Local	-
2	Social media posts	Electronic	Persuasion	Local	-
3	Video clips	Electronic	Modelling	Local	-
4	Badges	Electronic or materialized	Incentivisation	Local	-
5	Bags and bins	Materialised	Enablement	Local	-
6	Events	Web-based or live events	Join the loop	Local	-
7	Didactic material	Printed or electronic	Bioeconomy education	National	-

2.7 Tools to be used for the behavioural change at the local level

In total three (3) of the tools which are included in the behavioral change toolkit developed in Task 4.2 will be used to actively engage the stakeholders involved. These tools are included in table 19.

Table 19. Tools to be used for the Valencia behavioral change intervention

A/A	Partner	Target group	Tool use	Purpose of tool	Geographical scale	Behavioral change Indicators (Target value)	Method of measurement (source of information)	Milestones	Timetable	Comments
1	SAV	Citizens	Event (launching event)	Change the behaviour of citizens regarding biowaste disposal	National	100	Number of attendees	Organisation of a national workshop (launching event)	Ongoing	-
2	SAV	-Students -Teachers -Workers -Professionals -Other stakeholders.	Posts in social media accounts	Change the behaviour regarding biowaste disposal	Local and National	1000 – 2000 followers	Google analytics	Uploading in at least 7 other websites	M20 - 40	-
3	SAV / VAL	-General audience	Stickers and posters	Change the behaviour	Local	100 to 300	VAL support	-	M20 - 40	-

				regarding biowaste disposal			Waste quantities measurement			
4	SAV	-Students, teachers and parents	Didactic material	Change the behaviour regarding biowaste disposal	Regional	100	Waste quantities measurement and class feedback	Target value achieved	-M30	100 budget DISCLAIMER: This event is strongly linked to schools' availability.
5	SAV	Citizens	Bags and bins	Change the behaviour of citizens regarding biowaste disposal	Local	50	Number of bags and bins	Target value achieved	-M20 to 34	-
6	SAV	EcoFeria de Valencia	Event	Change the behaviour of citizens regarding biowaste disposal	Municipal	200-500	Number of attendees	Setting a stand on Valencia's eco convention EcoFeria	M21-M37	-
7	SAV	SAV members	Formation events	Join the loop	Municipal	100 to 200	Number of attendees	Project presentation and diffusion	M20-M40	-

8	SAV	Triptych delivery around vaccination point	Information and diffusion	Join the loop	Municipal	500	Triptychs	Project presentation and diffusion	M20-M40	-
9	SAV	Visits to waste processing plants	Formation events	Change the behaviour of citizens regarding to biowaste disposal	Municipal	50 to 100	attendees	Project presentation and diffusion	M20-M40	-

2.8 Risk management plan

The following risks and relevant mitigation measures and/or avoidance actions have been identified:

Table 20. Risks identified for the implementation of the Local Engagement plan

A/A	Risk	Target audience	Likehood (Low-Medium-High)	Avoidance (Yes or no)	Avoidance measure	Mitigation measure
1	Covid-19 pandemic outbreak	ALL	High	no	-	Use web-based tools for the behavioural change of the stakeholders involved.

2	Lack of participation or commitment by schools	Students and parents of students	Medium	No	-	Use digital media to reach them through the school's notification system. (email or website)
3	Economic crisis on hostelry and lack of interest by businesses	Businesses	Medium	no	-	Inform them in a less invasive way. Flyers, social posts on hostelry forums, groups or associations.
4	Availability of the processing plants for visits	Citizens	Medium	No	-	Presentation style visit, although not very interactive.
5	Logistical indisposition of local authorities to materialize the inauguration event	VAL	Low	Yes	Adequate preparations should minimise any circumstance of this sort. Although as a public institution, priorities might change suddenly.	Online distribution, common posts and support.

D4.3: Local Engagement Plan_ Sant Just Desvern (Barcelona)_Pilot

WP4 – A behavioural change approach for the collection of urban biowaste and usage of biowaste derived products with citizens & communities

Authors: Marta Vila (Barcelona Regional) & Gloria Sánchez (AMB)

Disclaimer

Copyright Message

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Lead Beneficiary	HSPN		
Lead Author	Gloria Sánchez	Organisation	AMB
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0.3	26/05/21	Third Draft	Chapters: 7. Tools to be used for the behavioural change at the local level and 8. Risk management plan	Gloria Sánchez (AMB)
0.4	27/05/2021	Final Draft	Finalisation from HSPN	Angelos Sotiropoulos (HSPN)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 818308.

0.5	28/05/2021	Internal review	Changes proposed at a technical level	Laura Temmerman (IMEC) Manolis Tsantakis (ETAM)
0.6	03/06/2021	Final Draft	Modifications to the document based on the proposed changes by the reviewers	Angelos Sotiropoulos (HSPN)
1.0	18/06/2021	Final	Modifications made by the pilot coordinator	Gloria Sánchez (AMB)

Abbreviations

AMB. Àrea Metropolitana de Barcelona (Barcelona Metropolitan Area)

ARC. Agència de Residus de Catalunya (Waste Agency of Catalonia)

DIBA. Diputació de Barcelona (Barcelona Provincial Council)

IDESCAT. Institut d'Estadística de Catalunya (Statistical Institute of Catalonia)

KAYT. Know As You Throw

PAYT. Pay As You Throw

RFID. Radio-Frequency Identification

Introduction

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The effectiveness of the behavioural change toolkit implementation through the Local Engagement Plans will be continuously monitored and evaluated through Task 4.4 'Monitoring and understanding the dynamics of behaviour towards biowaste recycling and derived products'.

The following chapters are included in this report:

Chapter 1 1 includes a brief description of the Sant Just Desvern (Barcelona) pilot area focusing on the location, the total number of inhabitants and the existing waste management scheme.

Chapter 2 presents the stakeholders (target audience) mapping which includes the target groups that were identified in Tasks 4.2 and 4.3. In addition, more stakeholders that can take part in the behavioral change exercise in regard to their perception of biowaste as a local resource and their acceptance of biobased products (but not in regard to the selective biowaste sorting behaviour) are identified and included.

Chapter 3, contains the existing means and tools that are already in use in the pilot city to communicate and engage with their audience and local communities. These tools are detailed in the form of practical tables that provide concrete information on the existing means and tools.

Chapter 4 contains a summary of the tools developed as part of the behavioural change toolkit (i.e. Task 4.2) that will be used in addition to the already existing tools for the achievement of change through the interventions.

Chapter 5 describes the extent to which the tools will be implemented, and such per target group. The information is in the form of a table with concrete targets, expected results and milestones to be achieved, in the form of a practical 'action plan'.

Chapter 6 describes the possible risks for implementing of the 'action plan' including the level of likelihood and possible avoidance or mitigation measures.

In total four (4) different target groups have been identified for the Sant Just Desvern (Barcelona) pilot, 16 different means and tools of AMB which could be used for the behavioral change activities foreseen have been recorded, including: events, training and awareness raising programmes, publications, online media and tools, TV/radio stations and social media accounts; at least ten (10) different activities for the behavioural change of the different target groups have been included using six (6) of the tools included in the toolkit (i.e. Stickers and posters, Video clips, Social Media posts, Bags and bins, Events, Didactic material); while four (4) risks which could lead to important drawbacks in the implementation of the behavioural change have been identified and all the necessary contingency planning has been made.

3. Sant Just Desvern (Barcelona) Pilot

3.1 Location

Sant Just Desvern is a Catalan municipality of Barcelona (Figure 8) province (Catalonia is an autonomous community on the northeastern corner of Spain). Sant Just Desvern is located in the south-western slope of the Collserola mountain range and it is one of the 36 municipalities that comprise the metropolitan area of Barcelona. It is bordered to the north by Vallvidrera (Barcelona), to the west by Sant Feliu de Llobregat, to the south by Sant Joan Despí and Esplugues de Llobregat and to the east by Esplugues de Llobregat and Barcelona (Figure 1). Distance from the centre of Barcelona is approximately 10.6 km. This municipality has an area of 7.8 Km^2. The average altitude (above sea level) is 122 m (with a maximum level of 405 m and a minimum of 40 m).

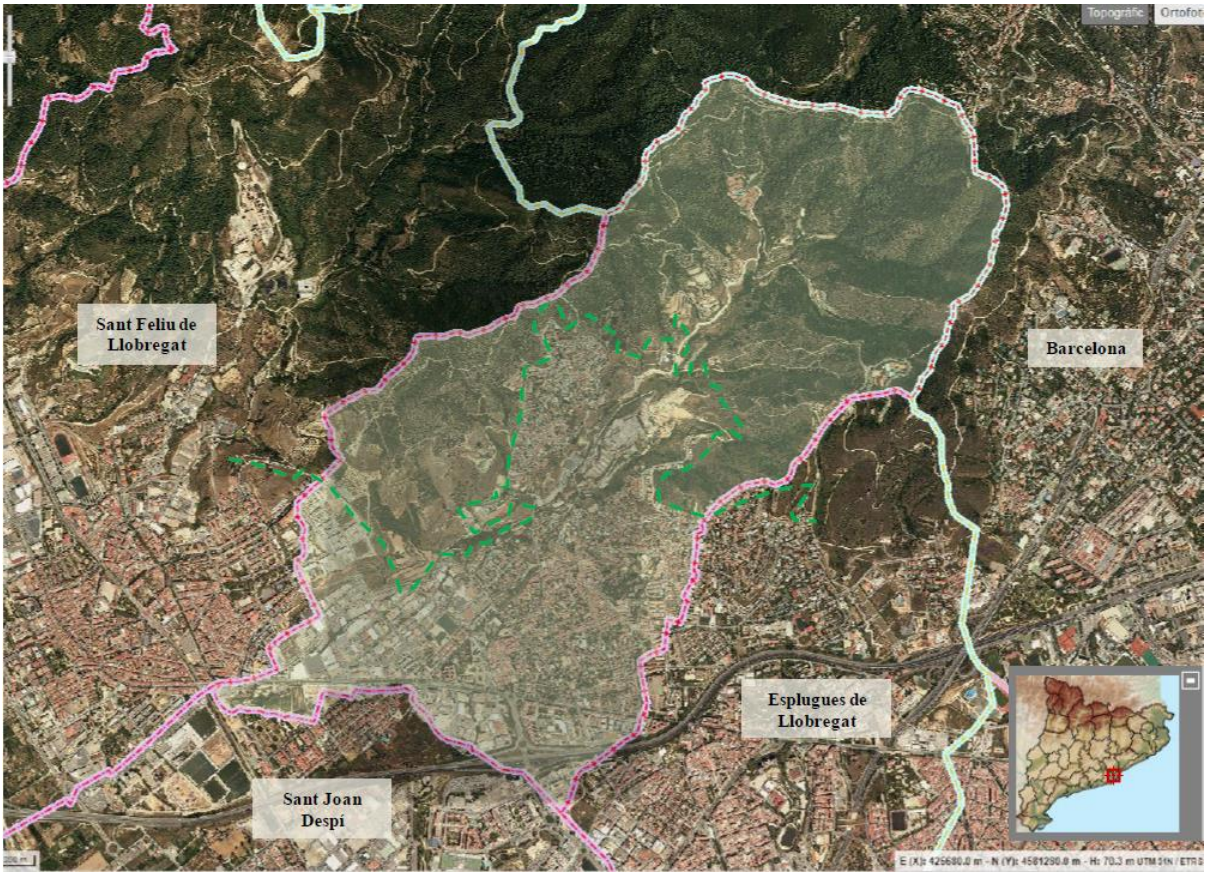


Figure 8. Sant Just Desvern Municipality (green dashed line are approximate boundaries for Collserola Natural Park; above this boundary the land is classified as non-developable, SNU in Catalan)

3.2 Total inhabitants

The most recent census, published in 2019, indicates a population of 17,805 inhabitants. The average population density is 2,279.8 inhabitants/km^2 (Source: Idescat[4], 2019).

3.3 Waste collection scheme description

The waste collection model is based on street containers for the disposal of the 5 main waste fractions, located less than 100 meters from the user. This model emphasizes the motivation of the user by providing comfort and proximity. The provision and frequency must be correct to ensure proximity and absorb the waste provided, and that no overflow is generated (waste outside the container due to saturation of its capacity).

The provision is usually between 50-100 inhabitants/container for sidewalk areas, and between 150-250 for contribution areas in urban centres. The reception capacity in general terms ranges between 600-1,200L/inhabitant/month.

The 5 waste fractions collected separately are: glass (green container); paper/cardboard (blue container); light packaging (yellow container); food waste including small garden waste (brown); and residual fraction (grey). The colours, shape and labelling of the containers or mailboxes are very important so that users can easily identify them and that errors do not occur at the time of deposit. A consensus is necessary with the colour of the receptacle and the information that is labelled (clear, understandable, specifying what materials each fraction includes).

Up until recently, in regard to the domestic residual and food waste fractions the collection was every night (7/7 collection basis). The separate collection of glass, light packaging and paper/cardboard fractions was during daytime. The commercial paper/cardboard was collected during the same trip as domestic collection. This was complemented with commercial collection and equipment on commercial users and some large producers. The company in charge of this management incorporated QR codes in the containers for their control. They paint the areas of containers annually and put up informative posters. In order to reduce noise pollution and nuisance, they apply new measures, using less noisy vehicles and machinery with sound reduction elements installed.

The abovementioned system has been in operation for more than 12 years. It promoted the participation and positive results of gross separate collection and, at the same time, it is well-accepted by the population (good perception). Although the Sant Just Desvern municipality percentage of separate collection is slightly above 50%, being one of the highest in the metropolitan area with a 5-fraction street container model for waste disposal, it is not enough

[4] 1https://www.idescat.cat/emex/?id=082212#h0 (filtered by topics)

to comply with the new regulations. The requirements of the new European regulations determine that it will be necessary to reach recycling targets of 50% by 2020 and 65% by 2035.

To achieve these targets, Sant Just Desvern decided to improve the waste collection system by introducing new elements. The new elements were already included in the new tender of waste and street cleaning collection services in 2018.

The main element of the new model is the use of locked smart containers for residual and food waste fractions, to identify the users that will access the containers using identification cards. The user identification technology provider is EMZ and it does not have volumetric restrictions (i.e. without a chamber system, that is, no limit of waste bags and volume, but registering container openings through users' cards). This identification system is integrated in a complete service management platform (MAWIS U2 platform, from MOBA) to monitor and collect information from all the collection and cleaning services.

The access control system with user identification is a system for the identification of users with a personal card or RFID key for controlling the access to waste containers. It allows knowing the use of the containers each user has made by registering the number of openings of residual and food waste containers.

The electronic access control system (see Figure 9) works with batteries that need to be changed approximately every two years with normal use, and sends the data via GPRS. The container blocking system does not allow unauthorized users to use the container. In addition, it allows the control of openings by user, blocks access when the container is full and generates the necessary warnings. As explained before, in the case of Sant Just Desvern there is no chamber system so no volumetric restrictions.

The access control system is considered to be very effective in encouraging recycling and reducing waste.

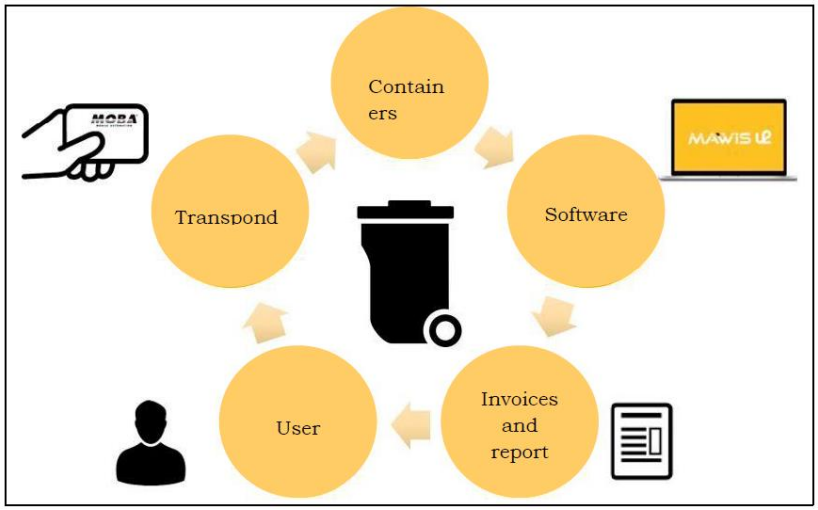


Figure 9. User identification system operation scheme

The benefits of using container access control and locking systems are:

• Measurement of the waste generation per user and their behaviour

• Improvement of separate collection

• Avoiding the use of unauthorized users

• Personalized information to users

Accordingly, this new model is supported by two additional services (in a different tendering process than the one for waste collection and street cleaning services):

The first one is aimed at monitoring, inspection and control of waste collection services and street cleaning services delivered by the contracted company (i.e. monitor and validate the correct execution of the services). It is also aimed at monitoring possible incidences and knowing the possible deviations from the expected service to determine the causes (e.g. incorrect sizing or execution), and finally determine the ways to correct/solve them. At the same time, it monitors citizen's perceptions, cleanliness of the public space and the results of the cleaning and waste collection services.

The second service consists of the elaboration and execution of a communication plan, the main objective of which is to raise awareness and inform the citizens about the implementation of the street cleaning and separate collection services. This service is directly linked with the implementation of the KAYT strategy in the framework of **LIFE REthinkWASTE project https://rethinkwaste.eu/.** That is, the new model with locked containers with user identification will be implemented in parallel with LIFE REthinkWASTE KAYT strategy. It will take into account four differentiated performance axes, as follows:

- To inform all citizens of changes in the model of waste collection in the municipality, both commercial and domestic.
- To inform and raise awareness throughout the commercial sector about the establishment of the new collection system.
- To inform and raise awareness of the citizenry about the implementation in phases of the new batteries of locked containers with identification cards.
- To realize communicative reinforcing actions in a personalized, dynamic and flexible way that allows influencing actions and continuous communication and messaging with citizens through the KAYT strategy.

Excluding the "big users" (industrial, commercial) the collection frequencies of domestic and non-domestic users are the same. For food waste and residual waste, the city is divided in different zones and routes according to the morphology:

- Municipality: rear loading two-compartmented compactor truck of 21 m^3 daily (7/7 at nights). Complemented by one morning service per week.

- Mountain urbanizations (La Miranda, Can Candeler and La Plana) and some disseminated areas: one compartment compactor truck of 12 m^3 (performing first the residual waste and then the waste food collection) four days per week at nights.

- Disseminated (Can Canadell, Tennis St. Gervasi, Masia Can Vilà and Can Biosca): specific service of containers' take out/put in. The removal of the full containers and substitution by empty ones, is made using an open box lorry with a platform and enough capacity to perform the service in one route. Besides the disseminated households mentioned, there are some other points in the centre (temporal at Bonavista and Marquès de Monistrol streets, and fixed at Padró and Dos de Maig streets). This service is also used as an auxiliary when required.

For the collection of small garden waste there is a specific service on demand (through an APP the citizen can request the service, and be informed about the time). The service is normally delivered on Mondays upon demand.

Table 21 summarizes the number of bins for each type of waste, together with the volume and number of bins of the different fractions.

Table 21. Number of bins for each type of waste, including the volume and number of bins of the different fractions

	Residual waste		Separate waste collection						Total
	1000L	360L	Glass 360L	Glass 240L	Paper/cardboard 1100L	Light packaging 1100L	Food waste 360L	Food waste 240L	
	264	3	89	142			24	218	1193
Total	267		231		225	228	242		1193

3.4 Stakeholders (Target Groups) Mapping

The WaysTUP! project pilot beneficiaries (i.e. AMB, VAL, SAV and SUST) have previously identified the main target groups involved in the behavioural change exercise, such as: households, schools, hotels, restaurants, bakeries, farmers, taverns as reported in Deliverables 4.1 and 4.2. In addition, several relevant stakeholders have been included in order to further enhance the impact of the project in terms of active involvement. For this, the stakeholders were categorized in four (4) target groups in order to be able to distinguish them and provide concrete data in terms of numbers.

The target groups which have been recorded are summarized in table 22.

Table 22 – Stakeholders (target groups) identified for Sant Just Desvern

A/A	Administrative authorities			Academic & scientific community	General Audience		Professionals/businesses	Other social partners	Target Number (number of stakeholders/number of individuals)
	Central Government	local authorities (Regions)	Second degree authorities (Municipalities)		Citizens	Students			
1		ARC							250 stakeholders from ARC
2					Citizens of Sant Just Desvern (8.013 (households)				17,805 inhabitants
3							Commercial and services activities		As minimum 482 stakeholders, inhabitants of Sant Just Desvern

4								Local civic associations, as ALNUS (environmental), neighbourhood entities, etc.	5.000 associations

3.5 Means and tools used by the pilot coordinator

3.5.1 Events

In total two (2) events which could be used to actively involve the relevant stakeholders were identified. These events are summarized in Table 22.

Table 22. Events which could be used to actively involve the stakeholders involved

A/A	Beneficiary	Event title	Frequency	Focus	Geographical Scale	Role of co-beneficiary	Categories of participants	Comments
1	AMB	ENV Day + Journalist Day	1 (2022)	Introduce the case studies to a large public and specialized stakeholders. Present the achieved results, share conclusions, thank for the participation… Journalist day to roll out the info about the project in the national broadcast networks	Local	Municipality in the framework of the LIFE project RethinkWASTE	Local stakeholders: citizens, commerce, local entities Press (local, related to environmental issues)	Possibility of presentations in the context of the KAYT event
2	AMB	Internal focus group	1 (December 2021)	Comment, evaluate and interpret the final results of the case studies, analyse defects an trim the operational strategy for the KAYT-PAYT large uptake phase	Local	Municipality in the framework of the LIFE project RethinkWASTE	Professionals	Possibility of presentations in the context of the KAYT event, specially to experts and regional authorities

3.5.2 Training and awareness raising programmes

A total of four (4) training and awareness raising programmes which could be used to actively engage the stakeholders involved in the Sant Just Desvern (Barcelona) pilot were identified. These training and awareness raising programmes are summarized in table 23.

Table 23. Training and awareness raising programmes which could be used to actively engage the stakeholders involved

A/A	Beneficiary	Title or theme of the program	Duration	Frequency	Venue	Geographical scale	Categories of participants	Comments
1	AMB	Communication letter and initial meeting with the citizens located in each implementation zone	From September 2021	One/all the program	-	Local(One per household)	Citizens	The letter will inform about the new waste collection system and will request the owner or occupant of the household to go to the information point to collect the corresponding identification cards. In the information point those stakeholders with specific needs will be identified (e.g. no use of smart phones, etc.)
2	AMB	Meetings with neighbourhood associations and trade associations for the engagement of local shops in order to obtain vouchers for citizens willing to participate to KAYT.			Neighbourhood associations and trade associations	Local	Neighbourhood associations and trade associations	

3	AMB	#Coneixelquellences platform	Until June 2022	Daily		Local	Citizens	Semi-automated chat-bot for bidirectional communication with the citizens through the mobiles of volunteers participants
4	AMB	Permanent information point (for locked containers issues and KAYT)	2 years	biweekly		Local	Citizens, enterprises	

3.5.3 Publications (print or electronic)

One (1) publication (print or electronic) which could be used to actively engage the stakeholders involved in the Sant Just Desvern (Barcelona) pilot area was identified.

Table 24. Publications which could be used to actively engage the stakeholders involved

A/A	Beneficiary	Publication type	Title	Form	Frequency	Number of copies or recipients	Categories of readers / recipients	Comments
1	AMB	Local magazine (general information about the municipality)	El Butlletí	Electronic + Paper	monthly		Citizens, local stakeholders	Ajuntament de Sant Just Desvern

3.5.4 Online media & tools

Overall, two (2) online media and tools which could be used to actively engage the stakeholders involved in the Sant Just Desvern (Barcelona) pilot were identified.

Table 25. Online media and tools which could be used to actively engage the stakeholders involved.

A/A	Beneficiary	Website / Link (URL)	Type of media	Total number of visits	Total number of visitors	Audience categories to which it is addressed	Comments
1	AMB	Ajuntament de Sant Just Desvern	Online magazine	3,000	N/A	-	Same as the online version but in print.
2	AMB	Sant Just Desvern – canviem de xip!	website	4,000	N/A	Citizens, commerce	Dedicated website to new waste collection and KAYT project

3.5.5 TV/radio stations

One (1) TV and radio station which could be used to actively engage the stakeholders involved in the Sant Just Desvern (Barcelona) pilot area was identified.

Table 26. TV/radio stations which could be used to actively engage the stakeholders involved

A/A	Beneficiary	Type	Name	Geographical scale	Average TV viewing / audience	Comments
1	AMB	Radio	RadioDesvern	Local		Ràdio Desvern (radiodesvern.com)

3.5.6 Social media accounts

A total of five (5) social media accounts which could be used to actively engage the stakeholders involved were identified.

Table 27. Social media accounts which could be used to actively engage the stakeholders involved

A/A	Co-beneficiary	Social networking medium	Social networking account (link)	Account number followers	Comments
1	AMB	Twitter	@santjustresidus	110	New official account only for waste management issues
2	AMB	Instagram	@santjustresidus	273	New official account only for waste management issues
3	AMB	Twitter	@santjustcat	2,753	General official account
4	AMB	Instagram	@santjustcat	3,199	General official account
5	AMB	YouTube channel	Ajuntament de Sant Just Desvern - YouTube	292	-

3.5.7 Other means of local engagement

One (1) other means of local engagement which could be used to actively engage the stakeholders involved was identified.

Table 28. Other means of local engagement which could be used to actively engage the stakeholders involved

A/A	Beneficiary	Website / Link (URL)	Type	Total number of unique visits	Total number of visitors	Audience categories to which it is addressed	Comments
1	AMB	Clean up Day	Annual event			Citizens, usually with quite high level of environmental awareness	Organized annually with volunteers

3.6 Summary of the tools comprising the toolkit for the behavioural change

In total six (6) different tools are included in the behavioural change toolkit developed in Task 4.2 including one (1) more (Didactic material for schools) developed by the HSPN which could be used to actively engage the relevant stakeholders that were identified.

The tools are included in the following table:

Table 29. Summary of tools comprising the toolkit

A/A	Tool	Format of tool	Purpose of tool	Geographical scale	Comments
1	Stickers and posters	Printed and electronic	Environmental restructuring	Local	-
2	Social media posts	Electronic	Persuasion	Local	-
3	Video clips	Electronic	Modelling	Local	-
4	Badges	Electronic or materialized	Incentivisation	Local	-
5	Bags and bins	Materialised	Enablement	Local	-
6	Events	Web-based or live events	Join the loop	Local	-
7	Didactic material	Printed or electronic	Bioeconomy education	National	-

3.7 Tools to be used for the behavioural change at the local level

In total three (3) of the tools which are included in the behavioral change toolkit developed in Task 4.2 will be used to actively engage the stakeholders involved

More specifically:

Table 30. Tools to be used for the behavioral change at the local level.

A/A	Partner	Target group	Tool use	Purpose of tool	Geographical scale	Behavioral change Indicators (target value)	Method of measurement (source of information)	Milestones	Timetable	Comments
1	AMB	Technicians of the town halls and the AMB	Badge and video clip	Change the behaviour regarding the biowaste disposal	Local municipal level (36 municipalities)	150	Number of attendees	Webinar	July 2021	Launching event
2	AMB	Citizens of Sant Just Desvern	Social media post	Change the behaviour regarding the biowaste disposal	Local-National	17,125 (followers facebook) 3,714 (followers twitter) 1,985(followers Instagram)	-Google analytics -Number of likes and retweets	Upload at least 10 posts in social media platforms	From July 2021	https://www.facebook.com/millorquenouAMB/ https://twitter.com/millorquenouamb?lang=en @millorquenou https://blogs.amb.cat/millorquenou/ca/
3	AMB	-Citizens of Sant Just Desvern -Local civic associations - Stakeholders from ARC - Commercial and professional businesses	Social media post	Change the behaviour regarding the biowaste disposal	Local-National	1,082 (followers facebook) 7,499 (followers twitter)	-Google analytics -Number of likes and re-tweets	Upload at least 10 posts in social media platforms	From July 2021	https://www.facebook.com/AMBEdusost https://twitter.com/sostAMB
4	AMB	Citizens of Sant Just Desvern	Video clip	Change the behaviour of	Local-National	8,480 (subscribers)	-Number of views	1 video clip	From July 2021	https://www.youtube.com/user/millorquenou

				citizens regarding the biowaste disposal						

3.8 Risk management plan

The following risks and relevant mitigation measures and/or avoidance actions have been identified:

Table 31. Risk management plan

A/A	Risk	Stakeholder	Likehood (Low-Medium-High)	Avoidance (Yes or no)	Avoidance measure	Mitigation measure
1	Covid-19 pandemic outbreak	ALL	High	no	-	Use web-based tools for the behavioural change of the stakeholders involved.
2	Sudden change of the current government	AMB	High	no	-	Explain the project to the new local government once it is constituted
3	Low involvement	Citizens	Medium	yes	Engage citizens from the early stage via posts, personal contacts, etc.	intensify communication campaigns

Conclusions

The pilot partners (AMB, SAV, SUST and HSPN) under the guidance of the HSPN and the advice of IMEC and ETAM, developed three (3) distinguished Local Engagement Plans for the three (3) pilot areas (i.e. Valencia, Athens and Sant Just Desvern-Barcelona). The methodology followed for their development was similar for all three Plans and was based on the stakeholders identified (size and characteristics), and the toolkit developed in the framework of Tasks 4.1 and 4.2, taking into account the main target of WP4 which is to change the behaviour of the stakeholders involved in the pilot areas.

In total 58 different means and tools which could be used by the pilot partners for transferring information and changing behaviour have been identified in the three (3) pilot areas, 23 different activities with the use of all seven (7) tools are foreseen while 13 risks which could delay the behavioural change process have been identified in the (3) Local Engagement Plans. The main risk identified in all Plans is the restrictions caused by the 'Covid-19' virus which may result in the delay, drawback and revision of the activities foreseen in the Plans in order to remain on track.

The foreseen activities are estimated to have an impact on more than 5,000 citizens, teachers, students, parents and professionals and more than 200 businesses.

Annex I Tools to be used in the behavioural change activities

Annex I-1: Stickers

Sticker.1

Sticker.2

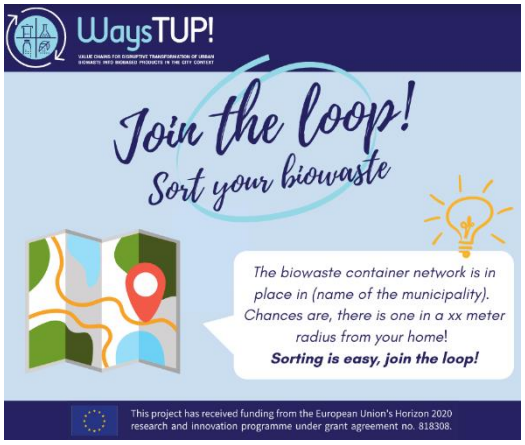
Annex I-2: Posters

Poster. 1

Poster.2

Annex I-3: Social media posts

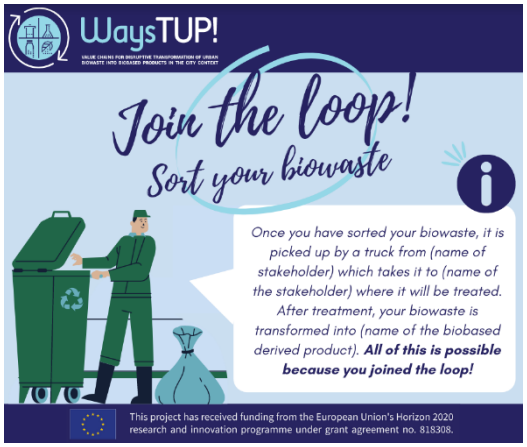
Social media post. 1



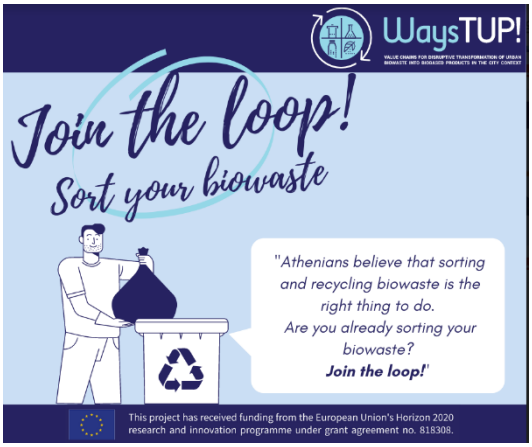
Social media post. 2

Social media post.3

Social media post.4



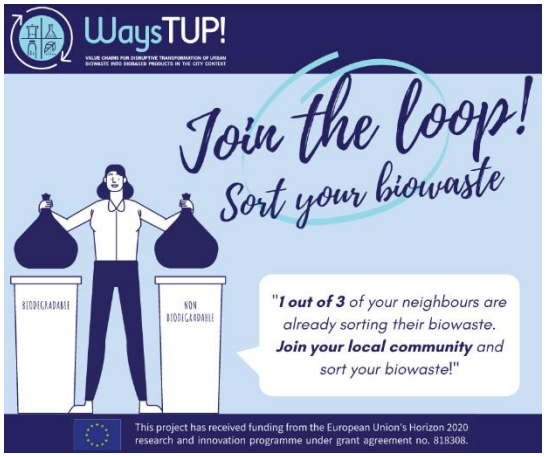
Social media post.5



Social media post.6

Social media post.7

Social media post.8



Social media post.9

Social media post.10

Annex I-4: Video clip

Video clip snapshot. 1

Video clip snapshot. 2

Annex I-5: Badge

Badge

Annex II: Didactic material for bioeconomy education

1. Experimental/Experiential learning: Circular economy and bioeconomy! - I

Brief description and connection with Circular economy and Bioeconomy!

Experimental learning of knowledge related to Circular economy and Bioeconomy

Purpose: Experiential education of students in Circular economy and Bioeconomy.

Ages: 5-8 years old

Duration: 50' min

Venue: Classroom/Junior Lab

General instructions: The teacher should get informed through liable bibliographical sources on the Internet and through books, regarding the meaning of the words "circular economy" and "bioeconomy". Furthermore, it is desirable that the teacher gets acquainted with storytelling and enriches his knowledge on experiments and activities that storytelling requires. The experiments should - in some cases - be carried out in groups of 4 to 5 students in order to promote cooperation and teamwork in the classroom. We should be really descriptive and we should change our voice accordingly, in order to keep the interest of the children awake. **Caution!** We always take every protective measure and give understandable guidelines prior to the experiments.

Introduction: The "WaysTUP!" EU funded project

Good morning. We are from the European project "WaysTUP!" and we have come here today to tell you a story… do you like stories? This story is going to be different from other stories, since it will have difficult trials that you will have to get over with the help of your classmates …… and win! That is why you have to be very careful and listen carefully to my instructions, so that we can reach to the end……but how does a story start, really?

The mystery of bioeconomy!

Once upon a time, in a school just like the one we are today, there were many children in a classroom having a lecture. During the lecture**,** a strange voice was heard outside of the windows…the kids were taken by surprise and the teacher did not know what to do…the leaves of the trees were shaking intensively and this strange voice was coming through the trees…there is a threat that threatens our planet and which is unknown to many people…you have to help me find it and we shall prevent it together! You will have to solve my first puzzle in order for you to find who is behind this threat.

(ppt.1)

1. Activity 1: Global warming (greenhouse effect) and climate change

   Materials: Sounds of rain falling intestinally, hail, intense wind (laptop, speakers)

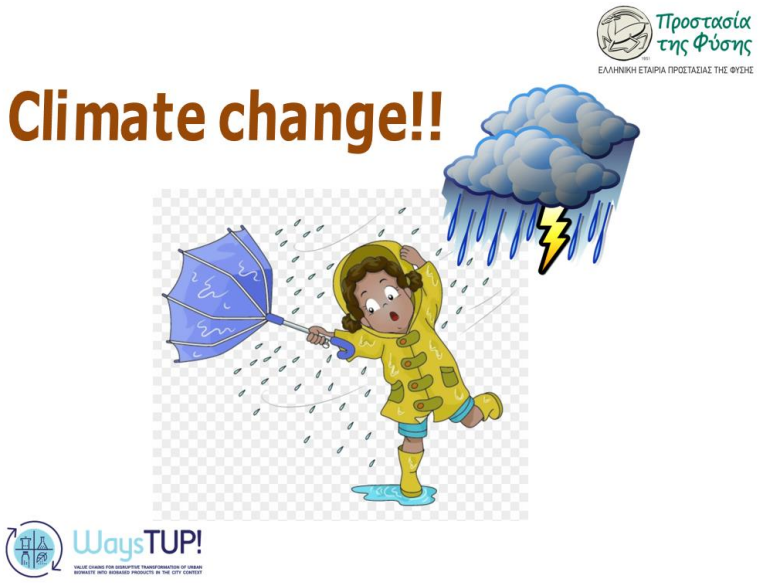
   Instructions:

   The children will need to recognize these sounds and understand what they are. The sounds are being played one by one, starting from the heavy rain and then, we ask the children to recognize what sound it is…when a child answers correctly, we move on to the next sound until they recognize all the sounds.

   Teacher's Question: Where does everything we hear take place (these weather phenomena … that's what they call them)?

   Answer. They take place in the atmosphere (we mention the air … ... even if it is not the exact definition) and their density has augmented during the past few years, due to the pollution that is being caused by people. The more we pollute the air, the more intense these phenomena are becoming. This phenomenon that threatens the earth is known as climate change…. let's shout it out loud together. Climate change is already here, it surrounds us and it will become more apparent in the years to come if we do not do something about it….

Congratulations you have solved my first puzzle… climate change threatens to change life as we know it, but we can still prevent it …how? Through polluting less …… and how can we achieve this?



(ppt. 2)

2. Activity 2: Linear and circular economy puzzle

Materials: Puzzles in pieces (a small number of them, so that the children are able to solve them)

Instructions:

The teacher could make photocopies of the shapes of the circular and linear economy, cut them into pieces and laminate them, so that he will be able to unite them.

The children work in groups of 4, 5 with half of the groups having linear puzzles and the other half having circular economy puzzles. We give out the puzzle to the groups and put some music on (which is used as timing) and when the music is over, the group that has completed the activity first….is the winner. If a group doesn't make it, we give them additional time…the music should be joyful and should last at least 5 minutes.

Teacher's Question: What do the puzzles show? What is the difference between the one puzzle and the other?

Answer. The first one is a straight line (linear) and the other one is a circle (circular). We explain to them that the life of everyone around us moves like a straight line; everything happens very fast, we produce a lot of things, we use them (e.g., the toys we have) and we throw a lot of waste, destroying our nature …… if people's lives would move like a circle, we would produce better and long-lasting things (we ask the children to give us some examples) and we would not make so much waste, but we would protect our nature. Which of the 2 shapes do you think is the best one for nature and mankind? We tell them that we like the circle (circular economy) because it can protect us from climate change that we have previously discussed…. because in this way we will be making less waste, thus polluting less….and how do scientists call this circle? Circular economy!

Circular economy puzzle

(ppt. 3)

Congratulations you have found an efficient way to save the earth from climate change….but how can I practice circular economy? Should I toss the things I do not need? Never… firstly, we should try to repair them and then make something else out of them, if possible (reuse them) ……

3. Activity 3: Making a rocket out of things we don't need

Materials: A thin Twine (at least 4 meters long), a Balloon, a straw, a duct tape.

Instructions:

The teacher ties the string from one end of the classroom to the other. He/She then passes the straw through the string, he/she then sticks the balloon to the straw by using the duct tape. He/She then inflates the balloon and leaves it free…the straw gets a push from the air coming out of the balloon and moves along the string … we made a rocket from materials we did not need… we reused them…. We then call the students one by one to play with the rocket.

The food that has expired, or the food waste…. what can we do with it? There is a solution….

(ppt. 4)

4. Activity 4: Experiment observation: Microscope

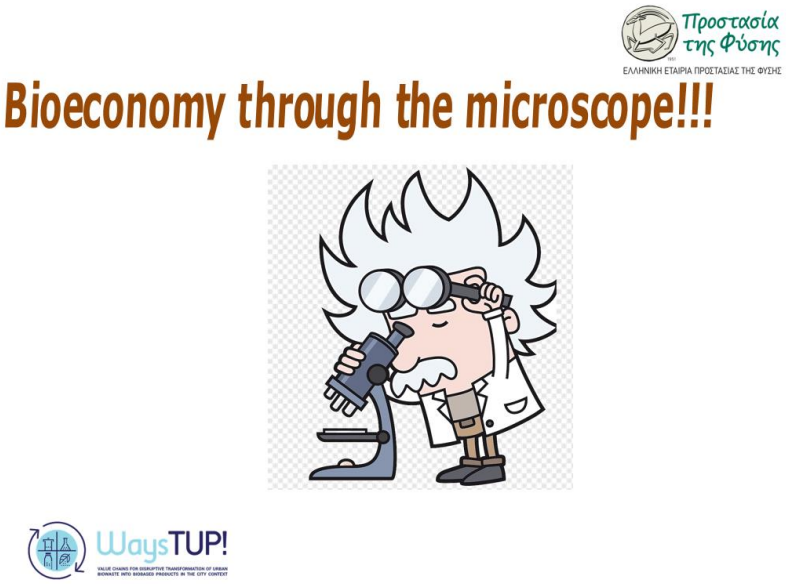
Materials: Microscope, yeast dissolved in water, earthworm sample on slide

Instructions:

The students are separated into groups of 4, 5 and after we have explained to them the way that the microscope functions, they observe living microorganisms or earthworm, if available…

Teacher's Question: Can a living organism produce anything that can be used?

Answer. Yes, of course it can. Such examples are: a. The wood (biomass) from which paper is produced, the yeast that is being used in the production of alcohol from the food that we would otherwise throw away. In the scope of circular economy, we can make many things just out of using biomass as raw material (things that were once alive). In the future we are dreaming of all the things we could produce in this way, so that we could stop using materials that are not recyclable.



(ppt. 5)

But in case something cannot be reused, do we toss it? Of course not!

5. Activity 5: Game: Recycling Basketball

Materials: Balls from paper, aluminum, plastic, fake fruits and vegetables and 6 boxes (3 for each group)

The instructions:

The children are separated into 2 large groups and they are standing in the classroom in front of the boxes (keeping enough distance from them, so that the game is more interesting) and they start playing basketball and trying to score each waste into the right box (one box for each material category per group). The winning team is the one that has the fewest mistakes in its baskets…one of the baskets should be brown to resemble the brown bin in which food waste is thrown….

Teacher's Question: When do you think that it is easier to make new things out of old ones? When we throw them away all together or when we separate them?

Answer. When we separate them, because that's when they are cleaner and it is easier to use them in order to make new things.

(ppts. 6, 7)

Congratulations everybody! You have not only managed to discover the threat of the planet, but you have also managed to find ways to defeat it. You are the little scientists of tomorrow! Well done!

(ppt. 8)

2. Experimental/Experiential learning: Circular economy and Bioeconomy! - II

Brief description and connection with Circular economy and Bioeconomy! Experimental learning of knowledge related to Circular economy and Bioeconomy

Purpose: Experiential education of students in Circular economy and Bioeconomy.

Ages: 9-18 year old

Duration: 80' minutes

Venue: School room / School lab

General instructions: The teacher should be ready to answer the students' questions about Circular economy and bioeconomy. Therefore it is proposed that the teacher should be informed on the subject through reliable sources from the World Wide Web and through relevant books. In addition, it is suggested that the teacher should the knowledge on the experiments and activities described in this manual. The experiments should - in some cases - be carried out in groups of 4 to 5 students in order to promote teamwork in class.

Be careful, we always use protective equipment and provide concrete and clear instructions to the students for conducting the experiments. We should not be in a hurry by any means!

Introduction: The "WaysTUP!" EU funded project

The EU funded project "WaysTUP!" is co-funded by the HORIZON2020 programme. This is a project where we participate as part of a team of 27 partners from 10 different member states of the European Union ..... our family, which concerns circular economy and the bioeconomy. Today's course has been developed as part of the project and aims to introduce you to the meaning of bioeconomy. Really what is bioeconomy? Can anyone tell me? I will explain you through experiments and games..... since I just mentioned experiments.....do you like experiments? Let's start then....!

(ppt. 1)

Course summary:

Our first experiment is related to global warming and climate change, concepts which are much talked about nowadays….but what is global warming? What is climate change? Who can tell me? Let's see both concepts through our first experiment…

1. Experiment 1: Global warming (greenhouse effect) and climate change

   Materials: Infrared lamp (or some other mean of heat production) and thermometer (alcohol or digital)

   The instructions:

   We divide the students into groups of 4-5 children each. We distribute a thermometer and an infrared lamp to each group. With great cautiousness we give roles to all members of the team ….it is proposed to give numbers to each team member and every time to assign a role to each e.g. you may say that number 1 should hold the infrared lamp very carefully in cooperation with number 2 while number 3 should hold the thermometer closer to the lamp. Numbers 4 and 5 try to heat the thermometer with your breath (like a toy). We give each group of students about 2 minutes to try to raise the temperature of the thermometer as high as possible.

   Teacher Question: What do you observe? What temperature does the thermometer show in your group? Does anyone know the temperature measurement scale?

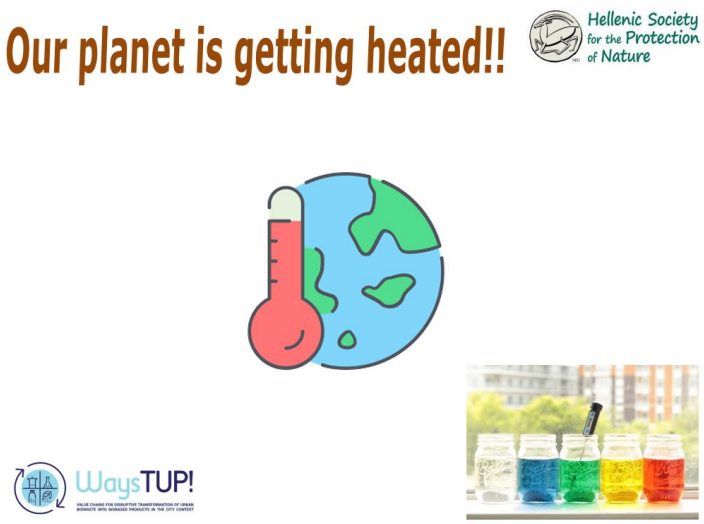
   Answer. The temperature was increased due to the heat coming from the lamp and the heat generated by the students. The temperature is not the same in each group, depending on how heated/ warm the thermometer gets in each group. The temperature measurement scale is Celsius (^{o} C). This measurement scale comes from the Swedish 'Anders Celsius' who lived in 1,700 AD. Of course there are other temperature scales (e.g. Fahrenheit) which are used in different countries and are intended to tell us each time how hot or cold something is.

   So it is with the planet. Not all areas are vulnerable to heating (heat) or cooling (cold) respectively. Other areas are very hot (such as the Sahara Desert) and others less so (such as the Nordic countries). In recent years the entire planet (especially the air that surrounds us) hyperthermia blood Neta (warm blood Neta too) due to human over-pollution production. The phenomenon of global warming causes climate change which results in, among other things, the increase of very heavy rains and the increase of heat waves (very heat) which in turn cause floods, drought and destruction of nature. Climate change is already here and is going to intensify in the coming years.

   Teacher Question: Are we vulnerable to global warming and climate change? What do you think?

   Answer. Yes. In fact, the Mediterranean region to which we belong has been characterized as one of the most vulnerable areas to the negative impacts of climate change and we must adapt (e.g. change lifestyle and take measures to protect

against extreme weather events). Scientists do expect more and more intense hot days but also more intense weather phenomena for the years to come. Let's now see such intense phenomena…..we saw the intense heat before with the experiment with the lamps… let's see a thunder….



(ppt. 2)

We choose one of the 2 experiments below depending on the availability of the materials

2. Experiment (2A): Extreme weather events (Storms)

Materials: Glass with water, shaving foam and food coloring

Instructions: Divide the students into groups of 4 to 5 children per group and provide the materials. Each group fills the glass with water up to just above the middle of it and places shaving foam on the surface of the water….the foam can also come out of the glass so that the cloud it forms is large…then the students throw pastry color above the foam and the water fills with color (rain)….the more the color they pour the more it rains.

Teacher Question: What do we see in the glass?

Answer. We see a storm. It becomes more intense the more food color we add…..the same happens in climate change, we expect the phenomena of storms to be more intense in the coming years……..

Experiment (2B): Extreme weather events (Storms)

Materials: Van der Graaf Generator, a small fluorescent lamp, confetti

Instructions:

The big sphere of the van der Graaf generator is the atmosphere with the charges it contains and the small one is the earth. They all turn off their electronic devices and do not approach them near the generator. We pick up one by one the students who approach the generator and do different experiments with their own protagonists. We make original experiments showing the operation of the generator and repeat finish when the one ^{the} circle with different students. The room is suggested to be as dark as possible.

Sub_Experiment 1. The student approaches the big ball very close and his hair rise….we raise a second, third, fourth student wondering each time what is happening…. we do not say anything to the students yet we leave it as a mystery wandering in the classroom….

Sub_Experiment 2. We ask a student to come close to us up a student and throw confetti at the big ball….which of course is thrown away and fills the classroom….we repeat the experiment with at least 5 more students… ……again we do not say anything and let the mystery unfold…

Sub_Experiment 3. We raise a student who takes the small discharge sphere and invite to approach the big sphere with the smaller one without being touched ……. at this point electrons are transferred from the large to the small sphere in the form of a strong spark (small lightning just as it happens in storm clouds… .Repeat the experiment with other students…

Sub_Experiment 4. We raise a student to whom we give a fluorescent lamp and we invite him/her to approach the edge of the lamp to the big generator ball…..At this point all students are sceptic and as they have seen the generator capabilities and the thunder (spark) in the previous experiment they fear that they might actually get an electric shock and the teacher just went crazy…… if the first student does not approach the lamp we invite the next one….we never push or scare a student… it has to be done in a comic way, having complete control…..the student who will finally approach the lamp to the big sphere notices that it lights up…..and everyone is excited….we repeat the experiment with many students and it always lights up.

Teacher Question: Why does the lamp turns on?

Because electric charges are transferred (very small invisible to the eye… .they are called electrons….and they are everywhere….even on us….they are infinite) from the big sphere to the lamp….the same happened before with the discharge (small lightning) and electrons are the reason all this is happening in the classroom today. The more and more violently electrons are transferred, the more intense phenomena occur…..such as lightning in thunderstorms.

Teacher Question: What kind of extreme events are we expecting to happen in the future and from which will we have to protect ourselves?

Answer. In the future, we expect that there will be intense phenomena, because, of climate change (e.g. more intense storms with more lightings and windier and severe droughts) thus we need to protect ourselves). We do not expect these phenomena to be the same all over the planet. In our area, however, we expect them to be severe.

(ppts. 3, 4)

We have seen and learned that there is a threat called climate change. It is already here and is expected to intensify. This is mainly due to the pollution caused by humans (the so-called greenhouse gases) which heat the atmosphere (air) a lot and cause all these dangerous phenomena; how can we pollute less by protecting the atmosphere from pollution?

3. Activity 3: Linear and circular economy Puzzle

Materials: Puzzle of linear and circular economy

Instructions:

The teacher can make photocopies of the shapes of the circular and linear economy, cut them into pieces and laminate them so that the students are able to join the pieces together.

The children work in groups of 4 or 5 with half the teams having the linear economy puzzle while half having the circular economy puzzle. Whichever team completes the puzzle first is the winner. We can also put time in the groups (with music) to create suspense….

Teacher Question: What is the difference between one puzzle and another?

Answer. One is linear (straight line) and the other is circular. One uses a lot of things and moves fast, while, it throws a lot of garbage and produces pollution… a lot of pollution. The second goes slower, repairs and reuses old items and throws away much less rubbish. The

circular economy is by far the best global response to the climate change that threatens the planet so much.

(ppt 5.)

What should we do this when talking about circular economy?

4. Experiment 4: Repair / reuse

Materials: Electric circuit, cables, led bulbs, batteries

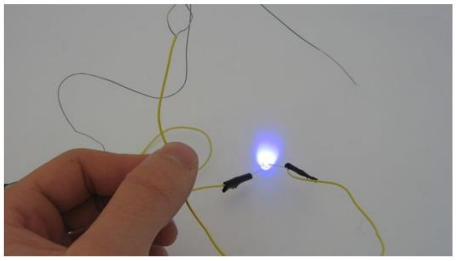
Instructions:

The students are divided into groups of 4, 5 in which we provide 2 wires, 1 small light bulb and 1 battery. Again we can give numbers to each member of the team and each number to do a job.... number one come to pick up the first cable, number two the batteries, etc. The teams start with our motto to repair the electrical circuit. The goal is to light their lamp and the winning team is the one that will do it first and correctly. We can give the children some time by putting music that will accompany the experiment and when the music is finished the groups will stop.

Teacher Question: Why did the lamp lit up? Do you think that when an object breaks down we should throw it away?

Answer. The light bulb lit up because loads were transferred through the cables (with the help of the battery). Responsible once again are the electrons that we saw before ... and there are all around us ... even upon us ... i.e. when we get electrocuted by opening the car door or when we touch a metallic table...when an object in the circular economy breaks down we should always try to repair it first and if it cannot be repaired we should do something else with it. But we must never throw it away. This is the only way the circular model and the bioeconomy model can work properly. Throwing less.... **bioeconomy?** .... what is bioeconomy really ....;

Repair/Reuse



(ppt. 6)

Now it's time to see how we can produce things and materials from the so-called biomass which is a renewable source…….have you ever heard about renewables?

5. Experiment observation 5: Microscope

Materials: Microscope, yeast dissolved in water, earthworm sample on slide

Instructions:

Students work in groups of 4, 5 and having them explain the operation and the parts of the microscope (e.g. lenses, always use slides, the light, etc.) make observation of living microorganisms or earthworm if we have available….

Teacher Question: Can a living organism produce any material or product from biomass?

Answer. Yes of course. Such examples are: a. The wood (biomass) which gives paper, the earthworm eats food scraps (biomass) and produce compost, even from garbage (food that we throw in our house….we can produce alcohol… .) . In the context of the circular economy we can make many things using biomass as raw material (things that were once alive). In the future we dream of all things being produced in this way so that we stop using materials that are not renewable.

(ppt. 7)

When something cannot be repaired or reused what do we do? Do we throw it away? Let's see….

6. Game 6: Recycling Basketball

Materials: Balls of paper, aluminum, plastic, fake fruits and vegetables and 6 baskets (3 different for each team)

Instructions:

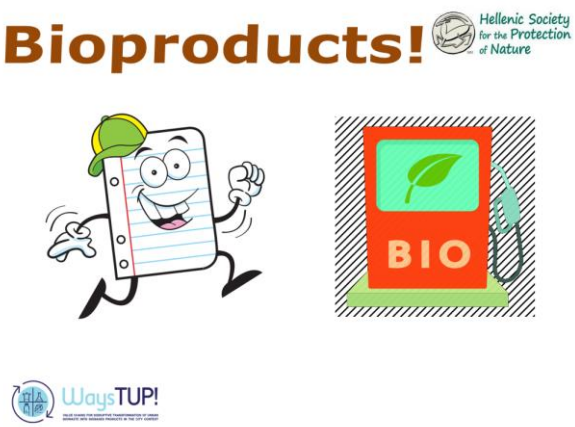
The children are divided into 2 large groups (in a straight line one behind the other) standing in the classroom opposite the boxes (far enough away from them…… to be interesting) and start playing basketball in order to throw the right trash in the right basket. (a basket for each different scrap. The winning team is the one that has the fewest mistakes in its baskets……the basket should be brown to resemble the brown bin in which food waste (food waste) is thrown ….

Teacher Question: When do you think it is easier to make new things from old materials? When we throw them all together or when we throw them separately?

Answer. When we separate them because they are cleaner and it is easier and cheaper to use them as raw material.

Teacher Question: Do you think the food we do not need and throw away can be used to produce materials?

Answer. Of course. For example, food scraps can make alcohol and then materials (biomaterials) with specialized methods and technologies that …at this very moment are under development…. bioeconomy remember?



(ppts. 8, 9)

(ppt. 10)