



HELLENIC REPUBLIC
REGION OF THESSALY



Region of Thessaly

CONDEREFF

**Construction & demolition waste management policies
for improved resource efficiency**

CONDEREFF Action Plan



European Union
European Regional
Development Fund



Interreg
Europe
European Union | European Regional Development Fund



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1. Introduction

1.1. Interreg Europe

Through its cohesion policy the European Union works to reduce disparities in the levels of development, growth and quality of life in European regions. It promotes actions designed to make the European territory more innovative, more sustainable, and more inclusive. This is the EU policy agenda, called the Europe 2020 strategy.

The Interreg Europe programme, financed by the European Regional Development Fund (ERDF), was designed to support policy-learning among the relevant policy organizations with a view to improving the performance of regional development policies and programmes. It allows regional and local public authorities and other players of regional relevance across Europe to exchange practices and ideas on the way public policies work, and thereby find solutions to improve their strategies for their own citizens.

The Interreg Europe programme has a thematic focus on the following four policy topics, each related to regional development:

1. Research, technological development and innovation
2. Competitiveness of SMEs
3. Low-carbon economy
4. Environment and resource efficiency



The direct beneficiaries of the programme are staff and organizations across all the regions of the EU, plus Norway and Switzerland, who are involved in designing and delivering policies in the four topics listed above. As a result, the citizens and groups impacted by those policies will benefit from improved governance or implementation. [1]

1.2. CONDEREFF Programme

As the world population increases and economies rely progressively more on outside resources to meet their demand for energy, water and food among others, communities are under enormous pressure to find these resources and accommodate waste and emissions. [11]

Within the current linear production and consumption economic model, only a small share of waste produced is reused, recycled or traded as secondary materials. The vast majority, including valuable and scarce materials, goes to landfill or is incinerated. In light of finite resource flows, economies will no longer be able to rely on these linear production and consumption models. A circular economy is an alternative to this model. It aims to keep

products and materials in the value chain for a longer period and to recover raw materials after the lifetime of products for their next use. [11]

Based on volume, Construction and Demolition (C&D) waste is the largest waste stream in the EU – it represents about one third of all waste produced. Proper management of C&D waste and recycled materials – including the correct handling of hazardous waste - can have major benefits in terms of sustainability and the quality of life. But it can also provide major benefits for the EU construction and recycling industry, as it boosts demand for C&D recycled materials. [2,3]

However, one of the common hurdles to recycling and re-using C&D waste in the EU is the lack of confidence in the quality of C&D recycled materials. There is also uncertainty about the potential health risk for workers using recycled C&D materials. This lack of confidence reduces and restricts the demand for C&D recycled materials, which inhibits the development of C&D waste management and recycling infrastructures in the EU. [2]

COMMON CHALLENGE TACKLED BY CONDEREFF

The challenge and opportunity faced by the CONDEREFF regions is to accelerate their policy work on improving resource efficiency at territorial level. The EU Construction & Demolition Waste Management Protocol and the transition towards Circular Economy [4,5,6,7,8] can guide the regulative roll-out of C&D waste management across EU regions; accordingly, the proliferation of infrastructures & methods for recycling and re-use of C&D waste materials can introduce a green growth opportunity. Regions can exploit this opportunity by improving their policy instruments to factor these developments in, and support projects and processes to this direction. [10]

OBJECTIVE AND EXPECTED CHANGE

The CONDEREFF project brings together 8 partners from 7 countries to exchange experiences and practices on how to move forward from existing procedures on C&D waste management towards the adoption and further exploitation of the best practices and measures applied in the field. The project enables the participating regions to advance their goals for resource efficiency and green growth through the proper management of C&D waste, which can boost demand for C&D recycled materials and support both sustainability and recycling in the construction sector. [10]








Country	Partner
	Polytechnic University of Valencia (UPV)
	Region of Thessaly (RoT)
	Auvergne-Rhane-Alpes Energy Environment Agency (AURA-EE)
	The Regional Development Agency of the Pardubice Region (RRAPK)
	Italian National Agency for New Technologies, Energy and Sustainable Economic Development Lazio Region (Lazio)
	Styrian Provincial Government – Department 14 – Water management, Resources and Sustainability (STYRIA)
	Institute for Structural Policy and Economic Development (ISW)

Table 1 CONDEREFF Project Partners

2. General information



Part I-General Information

 HELLENIC REPUBLIC REGION OF THESSALY		 CONDEREFF Interreg Europe
Project:	CONDEREFF - Construction & demolition waste management policies for improved resource efficiency	
Partner organization concerned:	Region of Thessaly	
Country:	Greece	
NUTS2 region:	Thessaly	
Contact person:	Konstantia Vrakopoulou	
Phone number:	+302413506250	
Email address:	k.vrakopoulou@thessaly.gov.gr	

3. Policy context

3.1. Description of the policy instrument

Part II - Policy context

 HELLENIC REPUBLIC REGION OF THESSALY	 CONDEREFF Interreg Europe
<p>The Action Plan aims to impact:</p>	<p>X Investment for Growth and Jobs programme</p> <p><input type="checkbox"/> European Territorial Cooperation (Interreg) programme</p> <p><input type="checkbox"/> Other regional development policy instrument:</p>
<p>Name of the Policy Instrument addressed:</p>	<p>Regional Operational Programme of Thessaly 2014-2020</p>
<p>Geographical coverage of the Policy Instrument:</p>	<p>Thessaly Region</p>
<p>Responsible for the Policy Instrument:</p>	<p>Region of Thessaly</p>
<p>Main features of the Policy Instrument:</p>	<p>the OP supports actions such as:</p> <ul style="list-style-type: none"> ➤ Promoting recycling by screening waste at source ➤ Supporting waste treatment & recycling projects ➤ Supporting projects that develop “green areas” in the region ➤ Developing the citizens' awareness for recycling & resource efficiency
<p>Stakeholders involved:</p>	<ul style="list-style-type: none"> ➤ Licensed collectors-transporters of C&D waste ➤ Collective Alternative Management Systems (CAMS) ➤ C&D waste treatment plants ➤ Contractors ➤ Members of the Technical Chamber ➤ Technical Services Department of RoT
<p>Any other relevant information:</p>	<p>Projects and actions that support environment and resource efficiency in Thessaly are facing viability challenges, not only due to the outbreak of financial crisis, but also due to the low integration of Research & Development results especially with regards to construction and demolition waste management. The region of Thessaly needs to develop waste management support services and infrastructures so that they exploit new technologies and models to develop actions and products in this priority area.</p>

Thessaly’s OP supports key EU and national development priorities, including "Protecting the environment – Shift to an environmental friendly economy" (ERDF 25.02% of EU allocation), to promote actions for waste recycling. The OP covers 10 thematic objectives. The 6th focuses on preserving & protecting the environment and promoting resource efficiency. The project

relevant investment priority under this objective is: 6(a) investing in the waste sector to meet the requirements of the Union's environmental acquis and to address needs, identified by the Member States, for investment that goes beyond those requirements.

Region of Thessaly (RoT) aims at improving its ROP by importing effective ways, derived from interregional cooperation, to implement new projects relevant to construction & demolition waste management. Within this context, RoT will launch calls regarding construction and demolition sector projects for a) waste collection at source (including transport and disposal of waste), b) promotion of recycling and re-use of materials such as wood and metal, and c) waste treatment processes.

3.2. European legislative and regulatory framework related to C&D Waste

An indicative list of the up-to-date European legislation and regulations related to C&D Waste:

- **DIRECTIVE 2008/98/EC** OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008 on waste and repealing certain Directives.
- COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. «**Public procurement for a better environment**», {SEC(2008) 2124}, {SEC(2008) 2125}, {SEC(2008) 2126}, COM(2008) 400 final, Brussels, 16.7.2008.
- COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS **ON RESOURCE EFFICIENCY OPPORTUNITIES IN THE BUILDING SECTOR**, {COM(2014) 445 final}, Brussels, 1.7.2014
- COMMISSION DECISION **2014/955/EU** of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council.
- COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS «**Closing the loop - An EU action plan for the Circular Economy**», {COM(2015) 614 final}, Brussels, 2.12.2015.
- **EU Construction & Demolition Waste Management Protocol European Commission, 2016.** The overall aim of this Protocol is to increase confidence in the C&D waste management process and the trust in the quality of C&D recycled materials. This will be achieved by:
 - a) **Improved waste identification, source separation and collection;**
 - b) **Improved waste logistics;**
 - c) **Improved waste processing;**
 - d) **Quality management;**
 - e) **Appropriate policy and framework conditions.**
- **Public Procurement for a Circular Economy, European Commission, 2017.**
- COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS **on a monitoring framework for the circular economy**, {COM(2018) 29 final}, Brussels, 16.1.2018. *(..for construction and demolition waste, 20 Member States have reported that they already achieved the 70 % recovery target set for 2020. Given that by weight this is the single biggest waste stream in the EU, it is a positive sign. However, it should be noted that the target includes*

backfilling, a practice that does not keep the value of the materials in the economy and is therefore not conducive to a circular economy.)

- **DIRECTIVE 2018/851** OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 amending Directive 2008/98/EC on waste.
- **Guidelines for the waste audits before demolition and renovation works of buildings, European Commission, 2018.** The document provides guidance on best practices for the assessment of construction and demolition waste streams prior to demolition or renovation of buildings and infrastructures, called "waste audit". The aim of the guidance is to facilitate and maximize recovery of materials and components from demolition or renovation of buildings and infrastructures for beneficial reuse and recycling, without compromising the safety measures and practices outlined in the European Demolition Protocol. The protocol states that:
 - **Any demolition, renovation or construction project needs to be well planned and managed in order to reduce environmental and health impacts while providing important cost benefits.**
 - **Waste audits (or pre-demolition audit as defined in the European Demolition Protocol) are to be carried out before any renovation or demolition project, for any materials to be re-used or recycled, as well as for hazardous waste.**
 - **Public authorities should decide upon the threshold for pre-demolition audits (which is currently highly variable in the EU).**
 - **Waste audits take full account of local markets for C&D waste and re-used and recycled materials.**
 - **A good waste audit must be carried out by a qualified expert (the auditor).**
- **REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the implementation of the Circular Economy Action Plan, {COM(2019) 190 final}, Brussels, 4.3.2019.**
- **COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. «A new Circular Economy Action Plan for a cleaner and more competitive Europe», {COM(2020) 98 final}, Brussels, 11.3.2020.**

3.3. National legislative framework related to C&D Waste

The supervision of the alternative management of C&D waste (and of other streams of waste subject to alternative management) is conducted by a separate authority (EOAN – Greek Recycling Organization). The outline of actors involved in C&D waste management in Greece is shown in figure 1.

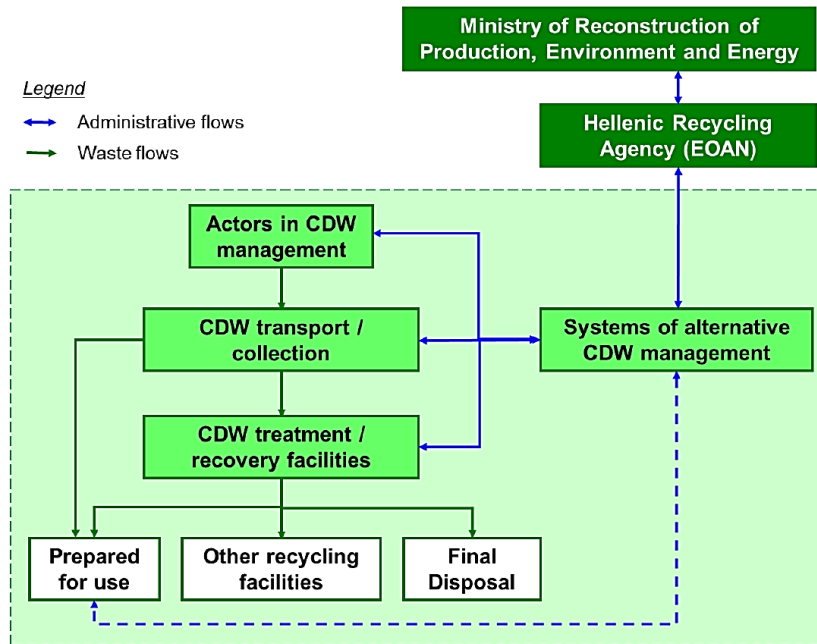


Figure 1 Outline of actors involved in C&D waste management in Greece

The program for the management of C&D waste in Greece was put in place with the **Joint Ministerial Decision 36259/1757/E103/2010** (Gov. Gazette, second issue, 1312/24.8.2010) in 2010. The provisions of the **JMD 36259/1757/E103/2010** on alternative management of C&D waste apply to waste generated by both the private and public projects. The JMD 36259/1757/E103/2010 together with other laws define the obligations the stakeholders involved must comply with. These obligations focus on:

- The achievement of targets and goals for the C&D stream of waste
- Submission of a waste management plan
- Submission of a letter of guarantee (for private projects)
- Submission of the agreement between the contractor and a Collective Alternative Management System
- Monitoring of the C&D waste from the production point to the treatment plant

The aforementioned **JMD** also deals with the necessity of organizing and developing networks for the collection, sorting and recovery of waste from construction, demolition and excavation activities.

The aim is the reduction of the final disposal of C&D waste by encouraging of primarily:

- reuse, recycling and material recovery in order to reduce the consumption of primary raw materials
- energy recovery as an effective utilization mean
- target setting for recycling and other waste recovery of C&D waste in the short and the long run
- provision of measures for the cooperation of all those handling C&D waste within the framework of the '**polluter pays**' principle and the **producer's responsibility**
- establishing a system of public information for adjusting the attitude and behavior concerning the management of C&D waste

The target (remains until today) set for C&D waste is that by 2020, the preparing for reuse, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste, excluding

naturally occurring material defined in category 17 05 04 in the list of waste, shall be increased to a minimum of 70 % by weight.

There is an obligation to submit to the responsible authority detailed information on the Management of Waste resulting from the construction/demolition activities, by the project contractors. In public and private projects, construction works contractors or demolishers have to submit a waste management plan that includes information on the different phases to be carried out in the construction or the demolition, estimating the total amount of the produced waste (per code of waste according to the European Waste Catalogue), the amount of the waste that can be reused on site, the amount of waste ending up to a treatment plant and the amount of waste for disposal (figure 2).

CODE OF THE WASTE	DESCRIPTION OF THE CODE	ESTIMATION OF PRODUCED WASTES (tn)	ESTIMATION OF RE-USED WASTES ON SITE (tn)	ESTIMATION OF RECOVERED WASTES IN TREATMENT PLANT (tn)	ESTIMATION OF DISPOSED WASTES (tn)
17 01 ΣΚΥΡΟΔΕΜΑ, ΤΟΥΒΛΑ, ΠΛΑΚΑΚΙΑ ΚΑΙ ΚΕΡΑΜΙΚΑ					
17 01 01	σκυρόδεμα	0.00	0.00	0.00	0.00
17 01 02	τούβλα	0.00	0.00	0.00	0.00
17 01 03	πλακάκια και κεραμικά	0.00	0.00	0.00	0.00
17 01 06*	μείγματα ή επιμέρους συστατικά από σκυρόδεμα, τούβλα, πλακάκια και κεραμικά που περιέχουν επικίνδυνες ουσίες	0.00			
17 01 07	μείγμα σκυροδέματος, τούβλων, πλακακιών και κεραμικών εκτός εκείνων που περιλαμβάνονται στο σημείο 17 01 06	0.00	0.00	0.00	0.00
ΥΠΟΣΥΝΟΛΟ					
17 02 ΞΥΛΟ, ΓΥΑΛΙ ΚΑΙ ΠΛΑΣΤΙΚΟ					
17 02 01	ξύλο	0.00	0.00	0.00	0.00
17 02 02	γυαλί	0.00	0.00	0.00	0.00
17 02 03	πλαστικό	0.00	0.00	0.00	0.00
17 02 04*	γυαλί, πλαστικό και ξύλο που περιέχουν επικίνδυνες ουσίες ή έχουν μολυνθεί από αυτές	0.00			
ΥΠΟΣΥΝΟΛΟ					
17 03 ΜΕΙΓΜΑΤΑ ΑΣΦΑΛΤΟΥ ΚΑΙ ΟΡΥΚΤΗΣ ΠΙΣΣΑΣ, ΛΙΘΑΝΘΡΑΚΟΠΙΣΣΑ ΚΑΙ ΠΡΟΪΟΝΤΑ ΠΙΣΣΑΣ					
17 03 01*	μείγματα ορυκτής ασφάλτου που περιέχουν λιθανθράκωπια	0.00			
17 03 02	μείγματα ορυκτής ασφάλτου εκτός εκείνων που περιλαμβάνονται στο σημείο 17 03 01	0.00	0.00	0.00	0.00
17 03 03*	λιθανθράκωπια και προϊόντα πίσσας	0.00			
ΥΠΟΣΥΝΟΛΟ					

Figure 2 Waste management plan

Especially for private projects, a letter of guarantee amounting to 0,2% of the total project budget for excavation works and 0,5% of the total project budget for construction and demolition works, is required by the Building and Urban planning authorities in order to make sure that the management of C&D waste will comply with existing legislation. The letter of guarantee will be returned to the contractor after the end of the works and after submitting a relative certificate by a Collective Alternative Management System which confirms the implementation of the waste management plan.

On both public and private projects, before the beginning of the works, the contractor must submit the agreement with a Collective Alternative Management System. The agreement ensures the obligation of the contractor to manage in a right way (and according to the plan submitted) of the C&D waste produced during the implementation of the project. After the end of the works, the CAMS provides the contractor with a certificate (as mentioned above).

From the production point until the facility for treatment or disposal, the shipments of wastes must be accompanied by a special monitoring form which is filled by each one of the stakeholders involved. The form in case of movement of non-hazardous wastes within the territory of Greece is shown in figure 3 and the relative form in case of transboundary movements of non-hazardous wastes [green listed waste destined for recovery or waste destined for laboratory analysis pursuant to Regulation (EC) No 1013/2006] is shown in figure 4.

MONITORING FORM FOR NON HAZARDOUS WASTE (EACH ENTERPRISE KEEPS A COPY IN ITS RECORD)																																							
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Figure 3 Monitoring form in case of movement of non-hazardous C&D wastes within the territory of Greece

INFORMATION ACCOMPANYING SHIPMENTS OF WASTE
AS REFERRED TO IN ARTICLE 3(2) AND (4)

Consignment information ⁽¹⁾

1. Person who arranges the shipment Name: Address: Contact person: Tel.: Fax: E-mail:		2. Importer/consignee Name: Address: Contact person: Tel.: Fax: E-mail:	
3. Actual quantity: Tonnes (Mg): m ³ :		4. Actual date of shipment:	
5.(a) First carrier (2) Name: Address: Contact person: Tel.: Fax: E-mail: Means of transport: Date of transfer: Signature:	5.(b) Second carrier Name: Address: Contact person: Tel.: Fax: E-mail: Means of transport: Date of transfer: Signature:	5.(c) Third carrier Name: Address: Contact person: Tel.: Fax: E-mail: Means of transport: Date of transfer: Signature:	
6. Waste generator (3) Original producer(s), new producer(s) or collector: Name: Address: Contact person: Tel.: Fax: E-mail:		8. Recovery operation (or if appropriate disposal operation in the case of waste referred to in Article 3(4)): R-code/D-code:	
7. Recovery facility <input type="checkbox"/> Laboratory <input type="checkbox"/> Name: Address: Contact person: Tel.: Fax: E-mail:		9. Usual description of the waste:	
11. Countries/states concerned: Export/dispatch: Transit: Import/destination:		10. Waste identification (fill in relevant codes): (i) Basel Annex IX: (ii) OECD (if different from (i)): (iii) EC list of wastes: (iv) National code:	
12. Declaration of the person who arranges the shipment: I certify that the above information is complete and correct to my best knowledge. I also certify that effective written contractual obligations have been entered into with the consignee (not required in the case of waste referred to in Article 3(4)). Name: Date: Signature:			
13. Signature upon receipt of the waste by the consignee: Name: Date: Signature:			
TO BE COMPLETED BY THE RECOVERY FACILITY OR BY THE LABORATORY:			
14. Shipment received at recovery facility <input type="checkbox"/> or laboratory <input type="checkbox"/>		Quantity received: Tonnes/Mg: m ³ : Date: Signature:	

- (1) Information accompanying shipments of green listed waste and destined for recovery or waste destined for laboratory analysis pursuant to Regulation (EC) No 1013/2006. For completing this document, see also the corresponding specific instructions as contained in Annex 1C of Regulation (EC) No 1013/2006.
- (2) If more than three carriers, attach information as required in blocks 5 (a), (b), (c).
- (3) When the person who arranges the shipment is not the producer or collector, information about the producer or collector shall be provided."

Figure 4 Monitoring form in case of transboundary movement of non-hazardous wastes

The **National Waste Reporting Mapping (NWRM) Tool** was developed by the Ministry of Environment in compliance with the Article 26 (Registration) of the **DIRECTIVE 2008/98/EC**:

"Where the following are not subject to permit requirements, Member States shall ensure that the competent authority keeps a register of:

- (a) establishments or undertakings which collect or transport waste on a professional basis;*
- (b) dealers or brokers; and*
- (c) establishments or undertakings which are subject to exemptions from the permit requirements pursuant to Article 24.*

Where possible, existing records held by the competent authority shall be used to obtain the relevant information for this registration process in order to reduce the administrative burden."

The National Waste Reporting Mapping (NWRM) Tool is an interactive web-based tool developed by the Ministry of Environment in order to facilitate the registered stakeholders of the Public and Private sector (Municipalities, establishments, undertakings) to report their data regarding the amounts of waste they manage (production, collection, transfer, storage, treatment, disposal). Through the electronic platform the stakeholders can submit their annual Waste Reports. The NWRM Tool is also useful for the community in order to have access to information such as:

- the availability of collection services for a range of waste
- the distribution of waste infrastructure (reprocessing facilities, transfer stations and landfills)

The scope of the platform is to track and trace the waste from the production point to the

point of treatment or final disposal. The stakeholders (Public and Private Sector) that have the obligation to register and use the platform are Municipalities, establishments and undertakings dealing with one or more phases of the waste management system (production, collection, transfer, storage, treatment, disposal). The tool gives the opportunity to the organization in charge (the Ministry of Environment) to have a clear view of the management of various streams of waste at a local and at a national level, to extract annual waste reports per stakeholder and to prepare national waste reports depicting the current status within the territory of Greece.

According to the tool's manual, the users of the platform are shown in figure 5.

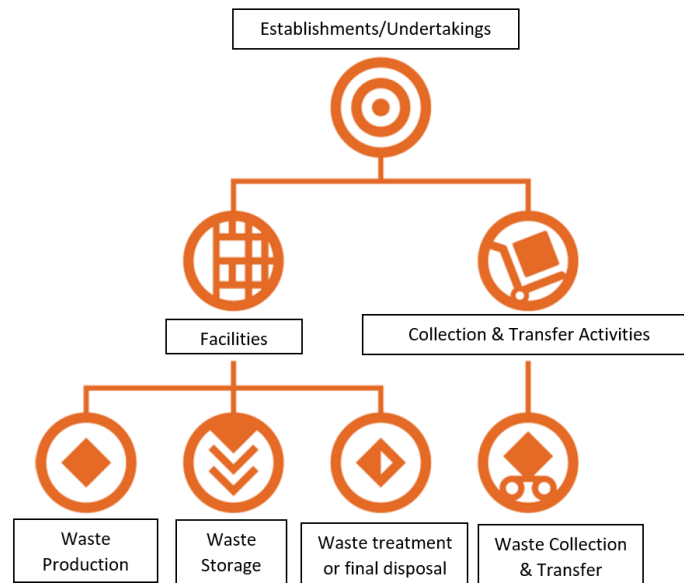


Figure 5 Registered users of the NWRM Tool

Until the 31st of March each user has the obligation to enter the platform and report the amounts of the various streams of waste managed during the previous year. Each user can be either a facility (production, storage, treatment, disposal) or conduct a collection/transfer activity. The amount of waste each user reports must be in accordance (cross-checks) with the amount of waste reported by the other users the particular user collaborated with (e.g. the amount of waste a transporter reports that took from a producer must be equal to the amount of waste the same producer reported to give to this particular transporter). In this way all the quantities of waste are recorded, closing the loop and eliminating the phenomena of “orphan” waste.

The Ministry of Environment monitors the whole procedure, forms a very realistic picture of the current situation and is in the position to estimate the progress of the achievement of the goals as described in the National Waste Management Plan.

The classification of the waste follows the same classification of the European Waste Catalogue (COMMISSION DECISION **2014/955/EU** of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council).

The NWRM Tool achieves its main objective which is the traceability of the waste (including C&D waste) from the production point to its reception at the treatment plants, and it is also useful to the community.

3.4. Waste Management Plans (WMP)

According to the Article 28 of the Directive (EU) 2008/98/EC, Member States shall ensure that their competent authorities establish one or more waste management plans.

3.4.1. National WMP

The national waste management plan sets out an analysis of the current waste management situation in the geographical entity of the country, as well as the measures to be taken to improve environmentally sound preparing for re-use, recycling, recovery and disposal of waste and an evaluation of how the plan will support the implementation of the objectives and provisions of the Directive 2008/98/EC.



Figure 6 Map of Greece

The new National Waste Management Plan of Greece for the period 2020-2030 was recently approved (31/08/2020). Construction, Demolition and Excavation Wastes are a distinguished stream of wastes and their amount is estimated up to 4.943.092 tons/year (year reference 2018). The quantities are based on data reported by Collective Alternative Management Systems (CAMS). For the year reference 2018, C&D wastes are estimated up to 1.500.000 tons. An evaluation of the development (follows the rate of the real GDP of the country) of C&D waste stream in the future is shown in table 2.

CDE WASTES	2018	2020	2025	2030
C&D WASTES (t)	1.500.000	1.436.790	1.578.909	1.651.251
E WASTES (t)	3.443.092	3.298.000	3.624.220	3.790.272
TOTAL PRODUCTION (t)	4.943.092	4.734.790	5.203.130	5.441.523

Table 2 Evaluation of the development of CDE wastes (NWMP 2020-2030)

The main targets for C&D waste, as described in the new NWMP 2020-2030, include:

- ✓ the goal of 70% by weight preparing for re-use, recycling and other material recovery, including backfilling operations, remains
- ✓ naturally occurring material defined in category 17 05 04 in the list of waste is excluded from the achievement of the goal
- ✓ naturally occurring material defined in the category 17 05 04 must be also reported
- ✓ CAMS must cover the whole territory of Greece
- ✓ more infrastructures (waste treatment plants) are needed
- ✓ a market for recycled C&D waste must be developed
- ✓ obligation for the use of recycled materials in public and private works, so they can replace raw materials.

Regarding Asbestos Containing wastes, they are estimated up to 1.000 tons/year. Currently, the asbestos-containing C&D wastes collected in Greece through certified operators are exported for final disposal (D1 or D5). The new NWMP 2020-2030 sets the goal of a national landfill for hazardous waste.

3.4.2. Regional WMP

For each region, a Waste Management Plan is established. The RWMP provides information related to C&D Waste, such as:

- the type, quantity and source of C&D waste generated within the regional territory, and an evaluation of the development of waste streams in the future
- existing C&D waste collection schemes and major disposal and recovery installations.
- an assessment of the need for new collection schemes, the closure of existing C&D waste installations, additional C&D waste installation infrastructure, and, if necessary, the investments related thereto
- general C&D waste management policies, including planned C&D waste management technologies and methods, or policies for C&D waste posing specific management problems
- organizational aspects related to C&D waste management including a description of the allocation of responsibilities between public and private actors carrying out the C&D waste management
- an evaluation of the usefulness and suitability of the use of economic and other instruments in tackling various C&D waste problems, taking into account the need to maintain the smooth functioning of the internal market
- the use of awareness campaigns and information provision directed at the general public or at a specific set of consumers
- historical contaminated C&D waste disposal sites and measures for their rehabilitation

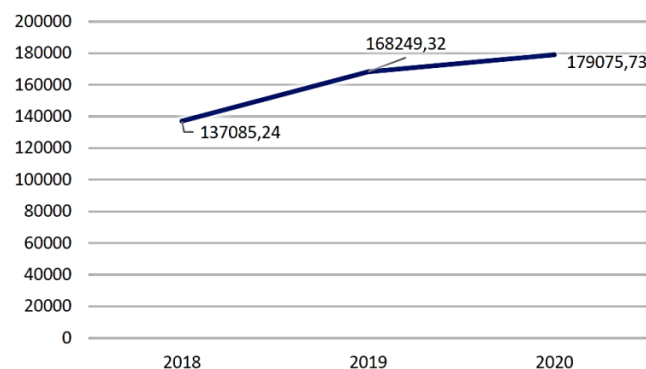


Figure 7 Thessaly Region and its Regional Units

At the present time, the RWMP of Thessaly must be revised in order to comply with the new National Waste Management Plan 2020-2030 of Greece. In the current RWMP 2014-2020 the estimated quantities of C&D waste produced aren't accurate because they were based on theoretical models (table 3). The new RWMP will be based on data reported by CAMS (graph 1).

Year	C&D waste	E waste	TOTAL
	(t)		
2013	74.155	170.352	244.507
2014	66.739	153.317	220.056
2015	60.065	137.985	198.051
2016	60.065	137.985	198.051
2017	60.065	137.985	198.051
2018	60.065	137.985	198.051
2019	60.065	137.985	198.051
2020	60.065	137.985	198.051
AVERAGE	62.661	143.947	206.608

Table 3 Evaluation of the development of CDE wastes in Thessaly according to the RWMP 2014-2020



Graph 1 C-D-E waste managed by ANAKEM CAMS in the Regional Unit of Larissa 2018-2020

Today, the C&D waste management in Thessaly is supervised by 3 Collective Alternative Management Systems:

- <https://www.aanel.gr>
- <http://www.anakem.gr>
- <http://anabe.gr>

and there are 11 waste treatment plants, in total. The current network of C&D waste treatment facilities is not sufficient in Thessaly (e.g. in the RU of Karditsa there aren't any plants).

4. Conclusions from the regional stakeholders' meetings – conduction of a self-assessment

Regional stakeholders' meetings are an important tool for getting support, developing synergies and for disseminate the aims of the project. They have to secure the stakeholders' and their contacts' involvement and input on the development and implementation of the regional action plans. [12]

They are also necessary on addressing the public perception, awareness and acceptance of C&D recycled materials, aiming to involve all actors in the value chain to promote awareness of the value inherent in working with C&D recycled materials, as well as having confidence in them. [12]

These meetings intend to be a kind of round table where each stakeholder can express his knowledge and discuss about their expected involvement and contribution to project goals and activities. [12]

The stakeholders who participated in the regional meetings organized by RoT team came from:

- Public authorities responsible for resource efficiency, sustainable development and regulation of C&D and waste management
- Regional and local public administrations involved in C&D waste & materials flows
- Public-private partnerships involved in materials' recycling
- Regional development and/or innovation agencies
- University, research centers and institutes supporting the development of green and sustainable services
- Regional chambers of commerce
- Business support centers
- Potential beneficiaries of the Regional Operation Programme of Thessaly

During these meetings, RoT team came to very useful conclusions, such as:

- The C&D waste management systems do not cover the entire Thessaly territory
- The current network of C&D waste treatment facilities is not sufficient in Thessaly
- There is no market for recycled C&D waste. Raw natural materials are still cheaper and easier to access than recycled ones
- There are not related Green Public Procurement requirements yet
- Quality management is a crucial step towards increasing the confidence in the C&D recycled materials
- There is still a preference for natural raw materials
- C&D waste is still not considered to be a waste stream that requires immediate attention and treatment
- With more C&D waste management systems starting their operations in the last years, comprehensive data on the recovery of C&D waste are going to be reported systematically in the following years
- The production cost of recycled aggregates is expected to fall when the market of recycled aggregates will be regulated and the recycling rate of C&D waste will raise making recycled aggregates cheaper

- Intensive controls for illegal C&D waste disposal are required
- The reuse of separated at origin wastes on site is very cost effective

Before the selection of specific actions, RoT team was able to answer to certain simple questions (conduct a self-assessment), such as:

- ! What is the present situation in the region?
- ! Is the goal of 70% [3,13] by weight (preparing for re-use, recycling and other material recovery) achieved in the region? (the level of recycling and material recovery of C&D waste varies greatly across the EU, as do the relevant definitions used throughout Europe [2])
- ! Is the legislative framework complete?
- ! Is there a market for recycled C&D waste? (quality management is a crucial step towards increasing the confidence in the C&D waste management processes and the trust in the quality of C&D recycled materials [2])
- ! Is there a lack of C&D waste treatment plants, installations or other enterprises (e.g. collectors-transporters) dealing with C&D waste in the region? (estimate the required capacity in a given territory, the feasibility of recycling is highest in densely populated and urbanized areas [2])
- ! Are the estimated quantities of C&D waste produced accurate (based on theoretical models or on the quantities reported by the treatment plants)?
- ! Can recycled materials replace a portion of virgin-raw materials? (in some cases, taxes on virgin materials may be an option, depending on the local situation [2])
- ! Do authorities at all levels provide incentives for promoting the use of C&D recycled materials? (the European Commission has identified the construction sector as a priority sector for green public procurement for a long time already [14])
- ! Are there any results from university researches and studies that could lead to the implementation of innovative and advanced C&D waste treatments?
- ! Are there any good practices of C&D waste management from other countries that could be implemented immediately in the region?
- ! What is the general mentality in the construction sector about C&D waste?
- ! What is the level of public awareness about C&D waste management? (it is important that all actors in the value chain are sufficiently aware of the value inherent in working with C&D recycled materials, as well as having confidence in them [2,3])

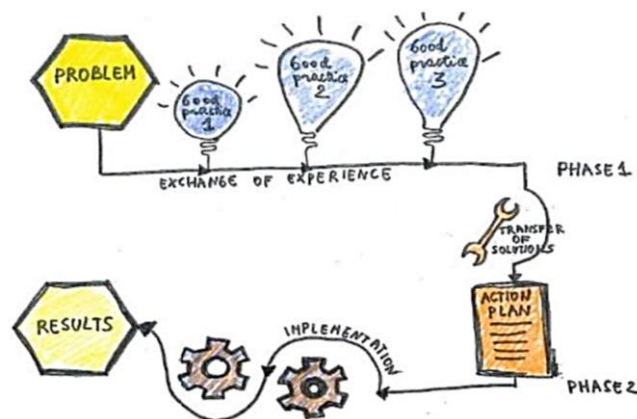
5. Details of the actions envisaged

The main purpose of an action plan is to provide details on how the lessons learnt from the cooperation will be implemented in order to improve the policy instrument addressed within the region. The action plan specifies the nature of the actions to be implemented, their timeframe, the stakeholders involved, the costs (if any) and funding sources (if any). In each participating region, the action plan specifies concrete measure(s):

- from the interregional exchange of experience
- implemented during phase 2

It can also:

- include possible actions / results from phase 1
- refer to other relevant policy instrument(s) if needed



So, an action plan:

- must be useful for each region and not to consider it just as a requirement
- has as ultimate objective that new solutions are finally implemented in the region
- must be adapted to the need of each region
- clearly links each action to the project activities
- ensures the nature of each action is precisely defined
- focuses on implementation related actions

In particular, this action plan complies with the legislation (European and National) and to other plans such as the National Waste Management Plan of Greece and the Regional Waste Management Plan of Thessaly.

The actions rely on the following axes:

- Proliferation of infrastructures for C&D waste management leading to green growth
- Compliance with the “polluter pays” principle
- Compliance with the principles of the Circular Economy Model

Part III- Details of the actions envisaged

Action 1: Funding of enterprises dealing with C&D waste management within the context of Thessaly's RIS3

1. Relevance to the project

There is a strong link of the addressed issue with the Thessaly's RIS3 as one of its priorities refers to "metals, construction materials". Within this context, the promotion of C&D waste management supports functional projects in the construction and building sector, as well as new recycled construction materials, enhancing regional competitiveness, attractiveness and the dynamic emergence of new industries.

In France, the ERDF-ESF Programme "Rhône-Alpes" is inherently connected with the region's RIS3 under the description "Eco-efficient factory". It identifies that investment in environmental and green infrastructures and processes is a prerequisite for making the regional economy competitive and innovative, by assisting SMEs and key stakeholders to invest in waste management and remediation activities, under the EU priorities for «sustainable innovation» and «eco-innovation».

In Czech Republic, resource efficiency is one of the priorities of the national RIS3 strategy; waste management is specifically named. Overall, the RIS3 strategy identifies that the promotion of resource efficiency is a prerequisite for making the economy competitive and innovative; to this end, it prioritizes the increase of the collected and processed waste (C&D waste), to promote green growth in the region and meet the national and EU targets agreed.

In Italy, interventions under axis 3 of the addressed policy instrument are implemented in the framework of Lazio Region's S3 which includes "green economy" as one of the regional specific thematic areas. In particular, the RIS3 identifies that the adoption of the best technologies for the improvement of production, consumption and disposal phases in industrial areas is a prerequisite for making the regional construction sector competitive.

The ERDF Program Investing in Growth and Jobs Austria 2014-2020 is inherently connected with the RIS3 under the description «Energy-Environment», identifying that promoting green growth based on green innovation and green R&D and investing in environmental infrastructures and processes is a prerequisite for making the regional economy and SMEs competitive and innovative.

One of most important conclusions that came up from the regional cooperation is that the current network of C&D waste treatment facilities is not sufficient in Thessaly. On the other hand, one of the main objectives of CONDEREFF programme is the proliferation of infrastructures & methods for recycling and re-use of C&D waste materials that can introduce a green growth opportunity.

Through Thessaly's RIS3, enterprises dealing with C&D waste management (collection/transfer, storage, treatment) can be funded in order to start or to expand their activities.

2. Nature of the action

Region of Thessaly as the Managing Authority of the policy instrument addressed (Regional Operational Programme of Thessaly 2014-2020) has already launched a call linked to the regional innovation strategy for smart specialization (RIS3). Among the beneficiaries are

enterprises dealing with C&D waste management (collection/transfer, storage, treatment), giving them the chance to start or to expand their activities.

This particular policy change has been validated and its implementation started during phase 1 of the CONDEREFF programme. The evaluation of the proposals of the beneficiaries has already taken place. RoT focuses on the monitoring of the progress of the particular action and its territorial effects. In order to achieve this, RoT monitors the whole procedure which is divided in the following distinguished phases:

- Launch of the call (status: done)
- Submission of the proposals by the potential beneficiaries (enterprises dealing with C&D waste management) (status: done)
- Evaluation of the proposals and selection of the beneficiaries (status: done)
- Funding of the beneficiaries (status: in progress)

In order to assess the success (or not) of the action, simple indicators are monitored, such as:

- The total funding in euro (€) of the selected enterprises dealing with C&D waste management
- The amounts of C&D wastes managed by the particular enterprises after their funding

3. Stakeholders involved

- Region of Thessaly as the Managing Authority of ROP
- Enterprises dealing with C&D waste management (collection/transfer, storage, treatment) as beneficiaries of the launched call

4. Timeframe

As mentioned above, this particular policy change has been validated and its implementation has already started. At this time, the funding of the beneficiaries is taking place, so in phase 2 of CONDEREFF Programme:



RoT will focus on the monitoring of the progress of the particular action and its territorial effects.

5. Indicative costs

Costs for monitoring of the call: 2.000€.

Indicative funding sources

The action 1 is financed through the Regional Operational Programme of Thessaly 2014-2020.

Action 2: Incorporation of the cost of C&D waste management in the budgets of public works

1. Relevance to the project

The “polluter pays” principle is set out in the Treaty on the Functioning of the European Union and Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage is based on this principle. According to the ‘polluter-pays’ principle: *“an operator causing environmental damage or creating an imminent threat of such damage should, in principle, bear the cost of the necessary preventive or remedial measures. In cases where a competent authority acts, itself or through a third party, in the place of an operator, that authority should ensure that the cost incurred by it is recovered from the operator. It is also appropriate that the operators should ultimately bear the cost of assessing environmental damage and, as the case maybe, assessing an imminent threat of such damage occurring.”* The directive entered into force on 30 April 2004; member states were allowed three years to transpose the directive into their domestic law and by July 2010 all member states had completed this.

The ‘polluter pays’ principle and the **producer’s responsibility** are common among EU member states. The interregional cooperation showed us that all partners face these issues and look for ways to comply with the above mentioned principles.

One of the main challenges and opportunities faced by the CONDEREFF regions is to accelerate their policy work on improving resource efficiency at territorial level. In Greece, the budgets of public works are based on articles describing each separate work/material needed for the implementation of the project. Since there aren’t still distinguished articles dedicated to C&D waste management (except from transport of C&D waste), RoT decided to find a way to incorporate C&D waste management cost in the budgets of its public works.

2. Nature of the action

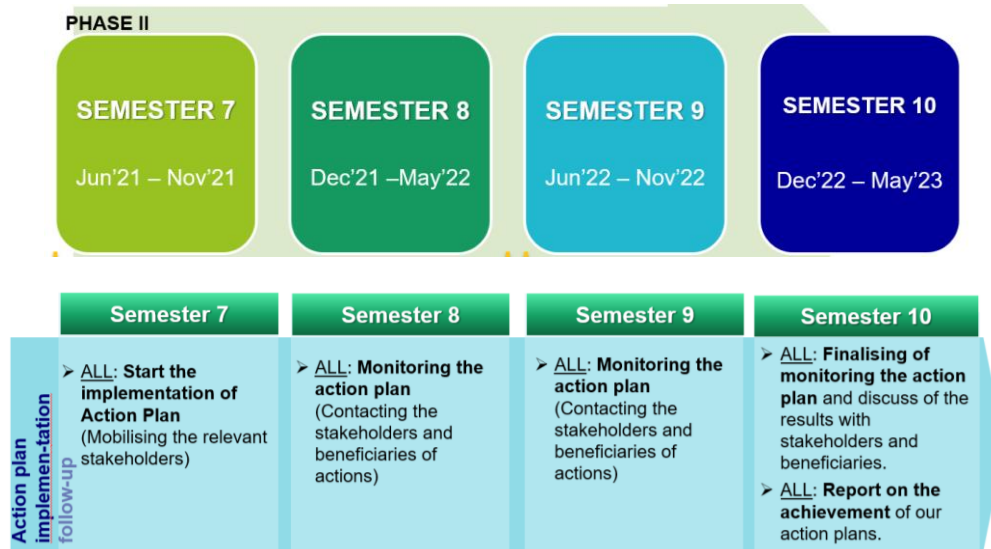
The inclusion of the cost of C&D waste management in the budgets of the public works will take place through the cost-plus works. In this way, the contractors will be paid for all their expenses (based on weigh tickets and invoices from the treatment plants) deriving from the obligation for sound management of the C&D waste produced during the implementation of the projects.

3. Stakeholders involved

- Region of Thessaly as contracting authority/project owner
- Contractors responsible for the implementation of public works and for the sound management (obligation set by law) of the C&D waste produced

4. Timeframe

The action 2 will take place during the phase 2 of the CONDEREFF programme.



5. Indicative costs

The indicative cost amounts to 0.3% - 0.5% of the total budget of each public work. Specifically, it is estimated at around 100.000€.

6. Indicative funding sources

The action 2 will be financed through the Regional Operational Programme of Thessaly 2014-2020.

Action 3: Replacement of raw materials by recycled ones (products of C&D waste treatment plants) in public works

1. Relevance to the project

Public procurement refers to the process by which public authorities, such as government departments, regional and local authorities or bodies governed by public law, purchase works, goods or services from companies. [5]

Green public procurement (GPP) is defined by the EU as “a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured” (COM (2008) pg. 400 “Public procurement for a better environment”). To procure in an environmentally-friendly way involves looking beyond short-term needs and considering the longer-term impacts of each purchase. This includes questioning whether a purchase should be made at all. [5]

Circular public procurement is an approach to greening procurement which recognizes the role that public authorities can play in supporting the transition towards a circular economy. Circular procurement can be defined as the process by which public authorities purchase works, goods or services that seek to contribute to closed energy and material loops within

supply chains, whilst minimizing, and in the best case avoiding, negative environmental impacts and waste creation across their whole life-cycle. [5]

One of most important conclusions that came up from the regional and interregional cooperation is that there are not related Green Public Procurement requirements yet. On the other hand, one of the main objectives of the CONDEREFF project is the transition towards Circular Economy, which means the adoption and further exploitation of practices and measures applied in this particular field.

The action clearly derives from the cooperation with the other partners of CONDEREFF project. It's a common conclusion among partners that there is still no market for recycled C&D waste, as raw natural materials are still cheaper and easier to access than recycled ones.

During the “Policy and industry symposium on promoting and incentivizing reuse of C&D waste” which was organized by RRAPK (24th February 2021) project partners were provided with the opportunity to:

- Gain insights and understanding of the priorities and initiatives in the field
- Identify challenges and needs to be addressed at the action plans implementation phase
- Homogenize their perceptions in themes related to the project
- Ensure the participation of key policy and industry stakeholders in the development and facilitation of action plans

The symposium covered the following thematic areas:

- Enablers for CDW reuse, recycling and recovery
- Obstacles and challenges to CDW reuse, recycling and recovery
- Stimulating an enabling environment for CDW reuse, recycling and recovery

The example of ERC-TECH in Czech Republic was presented:

- ERC-TECH (Effective Recycling Concrete-Technology) brings a revolutionary patented solution to the construction industry that tackles the problem of construction and demolition waste (C&DW),
- ERC-TECH is a global innovator in the development of first-class concrete mixtures and concrete construction elements from 100% recycled aggregates by replacing of 100% of natural aggregates (sand and crushed stones),
- ERC-TECH has developed a functional system where the endless process of raw material and material flow utilization is fully realized

Also, In Laboratory of Building Materials at the Department of Civil Engineering of Aristotle University of Thessaloniki, many studies have been conducted in order to certify the use of recycled aggregates in concrete production. Concrete mixtures, conventional and self-compacted one, have been produced by the use of recycled aggregates of random composition, age and origin as replacement of part of the natural aggregates. Properties examined included qualitative control of recycled aggregates, as well as concrete's mixtures' characteristics such as workability, air voids as well as properties in hardened state such as mechanical strength, resistance to high temperatures and stereoscopic examination. According to laboratory results, recycled aggregates are suitable for the production of new concrete. Also, stereoscopic examination showed satisfactory bonding between recycled aggregates and the rest of the mixture, leading to satisfactory mechanical strength.

According to the National Plan of Greece for improving Green Public Procurements 2020-2023 (approved by the JMD 14900/2021), there will be an obligation for the use of recycled materials-aggregates (about up to 15% by weight) in public works, so they can replace raw materials. Gradually this percentage will become bigger, in combination with the adoption of specific technical specifications for these materials.

RoT intends to provide incentives for promoting the use of C&D recycled materials and developing a new market for recycled C&D waste by starting using these materials in its projects.

2. Nature of the action

RoT intends to adopt the obligation for the use of recycled materials (products of C&D waste treatment plants) by the contractors to its projects. RoT will determine the percentage of the replacement of raw materials by recycled ones and develop technical specifications for specific recycled aggregates and recycled aggregate products. Taking into consideration that in some works the materials used do not need to comply with special specifications (e.g. backfilling), RoT intends to divide the action into two sub-actions:

Sub-action 3.1

Replacement of raw materials by recycled ones for which no special specifications are required [e.g. for backfilling- Article 11 of the Directive (EU) 2008/98/EC].

Sub-action 3.2

Development of technical specifications/standards for recycled aggregates and recycled aggregate products and their application in a small scale project. In order to develop a market for recycled materials it's essential to determine the specifications and the characteristics of various secondary materials that can be used. Since there is still a lack of official technical specifications/standards, RoT decided to develop such a study. The basic idea of the action focuses on the extended use of recycled aggregates that will replace a part of raw ones, based on specific technical specifications, characteristics and standards.

Standardization is the procedure through which Standards are created. Standards are prepared for activities, processes and products. The term product is used for materials (e.g. industrial products), non-materials (like services and software) or a combination of both.

More specifically, the action will focus on the development of specifications/standards for recycled aggregates which can be used in various applications, such as:

- the road pavement industry (e.g. in road pavement subgrade layer with unbound soil and in road pavement layers with unbound soil)
- the concrete production industry
- slope, river bed and embankment protection (e.g. built of wire-mesh gabions)

and also on the development of specifications/standards for specific recycled aggregate products. These products include specific types of coarse and fine aggregate designed for such uses as additives to asphalt and concrete mixes, as well as other construction uses.

Aggregates must conform to certain standards for optimum engineering use: they must be clean, hard, strong, durable particles free of absorbed chemicals, coatings of clay, and other fine materials in amounts that could affect hydration and bond of the cement paste. Aggregate particles that are friable or capable of being split are undesirable.

Depending on the application of the aggregates, specific European Standards are applied:

- EN 932-1 Tests for general properties of aggregates - Part 1: Methods for sampling
- EN 933-1 Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method
- EN 933-2 Tests for geometrical properties of aggregates - Part 2: Determination of particle size distribution - Test sieves, nominal size of apertures
- EN 933-3 Tests for geometrical properties of aggregates - Part 3: Determination of particle shape - Flakiness index
- EN 933-5 Tests for geometrical properties of aggregates - Part 5: Determination of percentage of crushed and broken surfaces in coarse aggregate particles
- EN 933-8 Test for geometrical properties of aggregates - Part 8: Assessment of fines - Sand equivalent test
- EN 1097-2 Tests for mechanical and physical properties of aggregates - Part 2: Methods for the determination of resistance to fragmentation
- EN 1097-6 Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption
- EN 1367-2 Tests for thermal and weathering properties of aggregates - Part 2: Magnesium sulfate test
- EN 1744-1 Tests for chemical properties of aggregates - Part 1: Chemical analysis
- EN 12371 Natural stone test methods. - Determination of frost resistance.
- EN 1925 Natural stone test methods. - Determination of water absorption coefficient by capillarity.
- EN 13139 Aggregates for mortar

The main deliverable of sub-action 3.2 will be the development of technical specifications/standards for recycled aggregates and aggregate products consisting of raw and recycled aggregates, based on laboratory tests. During the second phase of the sub-action, RoT will try to implement a small scale project, consisting of recycled aggregate products, for demonstration purposes as it will work as a case-study, contributing to the holistic approach of the action. The case-study project will work also as a prototype example and a proof that the use of recycled materials is feasible and can be regulated. The design of the small scale project will have as a goal the extended use of recycled materials, focusing on secondary aggregates that will replace a part of the raw ones:

- for the production of new concrete and/or asphalt mixtures
- in road pavement subgrade layer with unbound soil
- in road pavement layers with unbound aggregates
- for the built of wire-mesh gabions

The sub-action 3.2 is divided in the following distinguished phases:

- market investigation in order to determine the nature and the amounts of the secondary aggregates that are available in the area
- selection of secondary aggregates that could be used in the implementation of the small scale project
- development of the methodology on how to deploy specifications/standards for recycled aggregates and recycled aggregate products
- development of the required studies for the case-study project
- conduction of laboratory tests in order to determine the characteristics of the secondary materials and their products

- development of the technical specifications/standards for the secondary aggregates and the secondary aggregate products that will be built
- implementation of the project

This will give the opportunity to RoT as a managing authority of Thessaly's Operational Programme and as a contracting authority/project owner to adopt these technical specifications to tender documents, leading gradually to the replacement of raw materials by secondary ones in its works. As already mentioned, the aggregates are used in various types of products, which, by their individual design, require materials of specific characteristics. That's why responsible authorities publish listing of specifications for various construction aggregate products according to the nature and the requirements of the projects. If successful, RoT will be able to influence the OP, facilitating its adjustment to the requirements of Circular Economy and Green Public Procurements.

3. Stakeholders involved

- Region of Thessaly as contracting authority/project owner
- Contractors responsible for the implementation of public works and manufacturers of aggregate products
- Waste treatment plants as producers of recycled materials

4. Timeframe

The action 3 (sub-action 3.1 and sub-action 3.2) will take place during the phase 2 of the CONDEREFF programme:



5. Indicative costs (please estimate the costs related to the implementation of action 3)

-Sub-action 3.1.: amounts to 5% - 15% of the total budget of the selected public works, and is estimated up to 100.000 € in total.

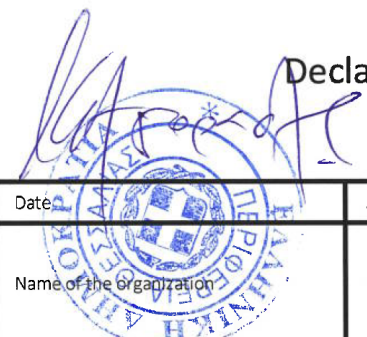
-Sub-action 3.2: the cost is estimated up to 50.000€.

6. Indicative funding sources

-The sub-action 3.1 will be financed through the Regional Operational Programme of Thessaly 2014-2020.

-Regarding the sub-action 3.2, RoT hasn't predicted the funding of such research projects in its annual budget (own resources), so it will attempt to claim resources from national funds.

Declaration of responsibility



Date	<i>June 28th 2021</i>
Name of the organization	<i>Region of Thessaly</i>
Signature of representative of the relevant organization	<i>Konstantinos Agorastos – Governor of Region of Thessaly</i>

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