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D3.1: Policy design for the transition to circular economy – assessing the inclusion of water and territory in national action plans

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Deliverable Review and Approval

The individuals listed below are not directly involved in the preparation of this deliverable and will review the present document.

Name	Organization

Deliverable Development and Review Process

	Key Event	Deadline	Done by
1	Submission of Draft Deliverable to reviewers	31 October 2019	Teresa Fidélis
2	Initial Review and Comments obtained	22 November 2019	See above
3	Uploading and submission of Final Deliverable on Participant Portal		IRIS
4	Request for revision The document submitted for this deliverable while containing important and relevant information, does not address the deliverable description. Cannot see a concise policy review paper presented. Cannot find specific reference to water CE and water planning systems in the demo-site countries.	April 2020	Erik Pentimalli
5	Resubmission of Deliverable 3.1 Task Report in the form of a concise Policy Paper assessing the relevance attributed to water circular economy in national action plans for circular economy. Considering the difficulties of project partners to collecting relevant data about demo-sites, the analysis of the CE in spatial and water planning systems had to be postponed for D 3.2. The new version of D3.1 has been fully revised and assesses the integration of water circular economy and spatial concerns in the EU circular economy action plan and then how a set of European national action plans, including member states with the demo-sites, compare with.	June 2020	Teresa Fidélis

Contents

Introduction

Growing human pressures on water resources, different levels of availability of freshwater, climate change impacts and costs to assure adequate access to water have challenged decision-making approaches all over the world. Water policies need to tackle the impact of water use by forging new objectives of sustainability and resilience. These objectives, heightened by increasing problems of water scarcity, converge with the circular economy (CE) concept that urges to go beyond linear "take-make-dispose" models and favours closed loops of resources such as materials or other environmental resources, like water. Water reuse is a mean for sustainable water use and part of the CE concept. When applied to water resources, CE can contribute to water management innovations with technologies that, not only improve water quantity and quality by fostering its reuse, but also optimise the amount of energy, minerals and chemicals used in the operation of water systems. This transition, made by a fit-for-purpose approach, implies the establishment of new water loops, different types or qualities of water, new responsibilities and risks and a new set of actors involved in the water system.

Water resources, though, are not only related to the water utilities and man-made water infrastructures, but also, to the river basin hydrographic networks and ecosystems, including rivers, lakes, water reservoirs and aquifers. Water related services are associated with aquatic ecosystems, their interaction with land and with the hydrological cycle, through water purification, water retention and climate regulation. These services need to be considered as an integral part of the CE concept. Moreover, water resources are spread across the territory, interlinked with the spatial distribution of economic activities, and influenced by policy and decision-making processes. This brings land concerns, such as territorial and spatial planning issues, to the forefront of the transition into the CE.

Water reuse has been pursued by several policy approaches, including a sectorial approach by means of water policy, or, expectedly, an integrated approach, by means of a CE policy. Both should be intrinsically related to spatial planning, because the implementation of a water reuse system, with new water loops, is influenced by the territorial allocation of different economic activities and may be conditioned by spatial planning regulations and the related decision-making processes.

This policy paper is part of Project Ô − Demonstration of planning and technology tools for a circular, integrated, and symbiotic use of water, and of WP3 dedicated to the Integrated water management, planning and CE. It assesses the integration of water and land related issues in national CE action plans of a set of European Union (EU) member states. So far, only two countries associated to the Project Ô demo-sites have a CE action plan, namely Spain and Italy. This paper also covers a set of other EU countries enlarging the scope of the analysis. It is structured into four sections. Section 1 describes the problem and challenges. Section 2 identifies the European policy approach for CE and questions how water and land related issues are considered. Section 3 assesses how these concerns have been taken into account in a large set of EU member states CE action plans. Section 4 suggests a set of policy recommendations for policy design of CE plans regarding water and land related issues.

1. The problem and challenges

The transition to water CE and the scaling-up of water reuse practices requires consistent and coherent policy approaches capable of ensuring a high level of protection of the environment and of human and animal health. Alongside the water policy approach and its related objectives and tools to foster sustainable and efficient use of water, the EU has also included water reuse under the concept and policy of CE. These two policy approaches should be mutually reinforcing and be followed by member-states to better forge water related policy objectives and measures.

Water reuse has been a concern of the EU water policy. Back in 1991, the Urban Wastewater Treatment Directive (91/271/EEC16), considered that treated wastewater should be reused whenever appropriate. After this, many member states have developed plans for efficient water use. In addition, the Water Directive Framework (WFD) (2000/60/EC), that established the common policy context for water management and environmental protection of water across Europe based on the concept of river basin planning, considered water reuse as a supplementary measure along with water-efficiency measures (EC, 2000). This directive considered the River Basin Management Plans (RBMP), with their programmes of measures, as the adequate tool for the implementation of water reuse. Moreover, the WFD established a new phase of European water legislation based on the concept of integrated water resources management that stresses the link between water resources planning and spatial planning (Kaika, 2003). In practice, however, the flexibility allowed for the implementation of WFD did not fully secured the expected nexus approach to water, land and related resources (Liefferink et al., 2011; EEA, 2012; Fidélis and Roebeling, 2014).

In 2015 the EU adopted its first EU action plan for CE ("Closing the Loop") (EU, 2015). This policy approach stated the aim of incentivising the transition from "*waste to resources*" and expand "*the market for secondary raw materials and water reuse*", while increasing water supply and alleviating pressures on the water environment (EC, 2015, p. 11). Since then, the European Commission took a series of actions to promote the reuse of treated wastewater, including the proposal for a regulation setting minimum quality requirements for water reuse, for agricultural irrigation, favouring the reduction of water scarcity and nutrients recycling by substitution of synthetic fertilisers (EC, 2018; EP, 2019). More recently a new version of the CE action plan ("*For a cleaner and more competitive Europe*") (EU, 2020) has been adopted. This plan refers water reuse within the frame of a key product value chain, associated to food and nutrients (EU, 2020). It adds the concept of water stress in the scope of a resource efficient and competitive economy, a concern included in the recent European Green Deal.

These proposals require new adaptive water governance approaches to ensure water reuse as a consolidated alternative source of water supply. The implementation or enlargement of a water reuse system and, the consequent new water loops, challenges water resources and spatial planning and entails the need to forge a consistent coherent CE' policy approach to facilitate the circularity of water while ensuring the safety of the water reuse system. This policy paper assesses the way water and land concerns are integrated in the CE policy approach. It first analyses how the EU CE plans consider these issues and then how they have been advanced by a set of member states national action plans.

2. Subsequent approaches

Method

Within the EU, action plans are usually made-up of concrete proposals for better policy, regulation, funding, and knowledge. Under the public policy context, an action plan is usually understood as a document stating a major public concern or challenge, outlining major priorities and objectives to be pursued, and defining a set of strategies and actions to be developed by particular groups of stakeholders within a community. The way these documents are designed has been recognised as relevant for their success (Schneider and Sidney, 2009). Action plans should ensure internal consistency, i.e. among problem showcase, goals, and actions, and horizontal consistency, i.e. among other related policy fields (Pal, 2013). Moreover, the way policy documents are formulated influence their understanding by the communities and related stakeholders, and consequently their assimilation and implementation (Phillips et al., 2004). Having in mind these assumptions and the objectives stated in the introduction, the analysis of the CE action plans undertook the following steps:

i) The first, identifies the top ten most frequent words of each document and how they compared to the frequency of the words "water", "land" and "territory";
ii) The second, widens the counting of words related with water and with land concerns by including terms, such as "wastewater", "rainwater", "hydro", "water reuse", etc. The words related to land-use concerns include "spatial", "land", "land use or land-use", "zone or zoning", "territory or territorial", "spatial planning", "land use planning", "town planning", "urban planning" or "regional planning". To allow the comparison of documents, the quantities were transformed into percentages (number of identified words/total number of words of the action plan)x100;
iii) The third, represented in word clouds all the words specifically related with water and with land of each action plan;
iv) The fourth, looked deeper to the content of each the action plans and explored if words identified are associated to the *problem-showcase*, *objectives*, *strategies and measures*, *stakeholders* or *performance indicators*. In this step also, all the counting is transformed into percentages (number of water or and related words associated with each component of the plan/total number of water or land related words)x100.

The analysis concentrates first on the two versions of the EU action plan (EU 2015, EU 2020) and second, on the existing national CE action plans of two countries of the Project Ô demo-sites, i.e. Italy (Italy National Action Plan, 2017) and Spain (Spain National Action Plan, 2018), and also other EU countries like Denmark (Denmark National Action Plan, 2018), Finland (Finland National Action Plan, 2016), Netherlands (The Netherlands National Action Plan, 2016) Germany (Germany National Action Plan, 2016), France (France National Action Plan, 2018), Greece (Greece National Action Plan, 2018), and Portugal (Portugal National Action Plan, 2017). The study used the assistance of *Atlas.ti* software and consisted on a qualitative content analysis (Elo and Kyngäs, 2008; Graneheim and Lundman, 2004), a widely used research method to analyse text data (Hsieh and Shannon, 2005), also used in studies related to CE (Galvão et al., 2018; Homrich et al., 2018; Kirchherr et al., 2017). The study used the English versions of the action plans, except the Spanish that had to be subject to a translation process.

Water and land related concerns in the EU circular economy action plans

The EU already counts with two CE action plans, one from 2015 and another from 2020. The first action plan is mainly centred on wastes, raw materials and to a lesser extent food' issues. The

references to “water” are far from being the most frequent issues mentioned, as it can be observed in Figure 1 representing the top ten words in each version of the EU action plans. The word clouds, presented in Figure 2, the types of words related water and land integrated in the plans. Despite the limited number of references to water, the 2015 EU action plan introduces water in the scope of a resource-efficient economy, and it does challenge member states to implement water reuse. It includes the objective of reducing water scarcity and adapting to climate change. It refers to water resources over-exploitation by considering the growing threats to its quality and quantity, either through water pollution or water over-abstraction (EU, 2015). Under this concern, it mentions water scarcity as a driver to action and a requirement to reduce pressures on the water resources. The plan states that “*in addition to water-efficiency measures, the reuse of treated wastewater in safe and cost-effective conditions is a valuable but under-used means of increasing water supply and alleviating pressure on over-exploited water resources in the EU*” (EU, 2015, p.12). It also states the need to promote water reuse with legislation setting minimum quality requirements (e.g. for irrigation and groundwater recharge), to support safe and cost-effective water reuse; deliver guidance on the integration of water reuse in water planning and management; disseminate best practices and finance innovation and investments (EU, 2015, Annex, p. 3). These measures have been developed and the regulation on minimum requirements for water reuse in agriculture irrigation is about to be issued, after a long process of hearings between the legislators and stakeholders (EC, 2020, 2019).

The most recent version of the CE action plan (“*For a cleaner and more competitive Europe*”) (EU, 2020), refers water and water reuse, mainly in the scope of the key product value chains namely, “food, water and nutrients”, mentioning industrial processes as other potential loops of reclaimed water, alongside agricultural irrigation. It also reveals the intention to develop an integrated nutrient management plan, to promote the markets for recovered nutrients (EU, 2020, p. 15). Nonetheless, the limited number of references to water in both EU action plans is evident when compared to waste, products, materials and, to a lesser extent, food issues. This is maintained if not aggravated in the 2020 version, where half of the references to water are made in the scope of the implementation of the Drinking Water Directive (98/83/EC) for ensuring the availability of drinkable tap water in public spaces, preventing waste and pollution with microplastics from water packaging. In this second action plan there is a reference to the extension of water reuse to other sectors (e.g. industrial) and to planning the creation of value through nutrients recovery. Finally, the inclusion of water related issues shifted from a problem showcase perspective, in the first action plan, to a strategies and measures perspective. However, water concerns are not associated with other structural components of the action plan, such as CE objectives, stakeholders, or performance indicators to assess the implementation of the plan.

In comparison to water, land concerns are even less frequent in the first European Action Plan. They are mainly referred to in the context of waste management, where legislative proposals include long-term targets to reduce landfilling (EU, 2015, p. 2). Other spatial related references are made in the context of bioeconomy, and the pressures that the renewability, biodegradability or compostability of the bio-based materials (i.e. biological resources such as wood, crops or fibers) may cause on land-use (EU, 2015, p.17). This trend is maintained in the second action plan, where references to land are exclusively associated to “landfill” and incineration taxes, “soil sealing” and the rehabilitation of brownfields, under the scope of strategies and measures (EC, 2020). Land is poorly stressed as an influencing factor for the

implementation of the CE in the first action plan, and it is only mentioned under a problem-showcase and objectives perspective, with no further references to land concerns associated with strategies and measures, stakeholders or indicators. In the second action plan land references are only mentioned in the strategy and measures. This analysis indicates that the EU action plans have not pondered the role of land and spatial issues for the implementation of CE.

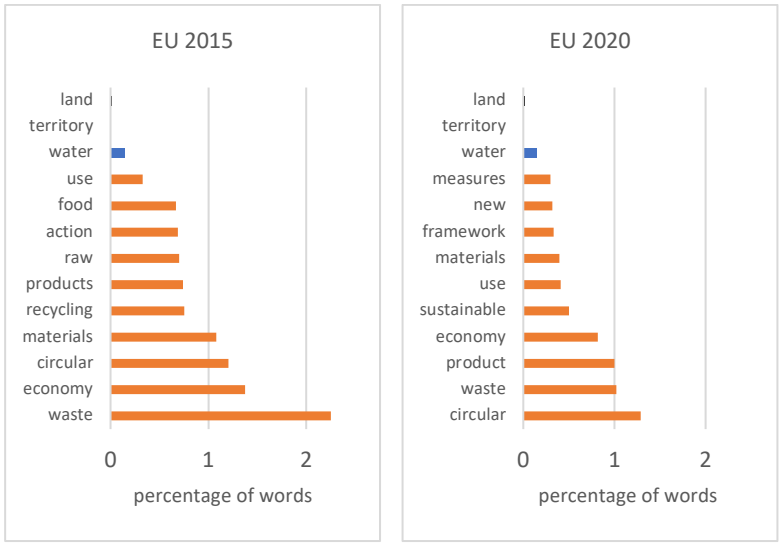

Figure 1. Top ten words in the EU Action Plans

Figure 2. Word clouds of the water and land related terms in the EU action plans

In brief, the analysis shows that the references to “water”, “territory” and “land” are far from being the top ten words of the European Action Plans, which are essentially dominated by waste, products, materials, recycling and food. Nevertheless, a closer look at the water related words shows that water reuse has a prominent place in both versions of the CE EU action plan, while there is no approach for integrating land related issues in the CE policy. Having this background into consideration, after the EU action plan of 2015, many EU member states have adopted their own CE national action plan. Have their approaches regarding the inclusion of water and land

related issues been similarly developed? Have they followed closely the EU action plans or have they further developed the inclusion of those concerns? Next section explores these questions.

Water and land related terms in a set of member states circular economy action plans

Similarly to what happens in the EU action plans neither water nor land concerns are close to the top ten words in the analysed set of CE national action plans. This can be observed in Figure 3, where the top ten words of the set of national action plans are represented. Water and land words are clearly peripheral in comparison with raw materials, waste and recycling. A closer look at the relative frequency of words in the action plans, represented in Figure 4, where the counting of all the terms related to water are represented, shows that there is a higher integration of water related terms in the national action plans of southern countries including Portugal, Greece, and Spain in comparison to northern countries, such as Denmark, Finland, and France. The inclusion of terms related to land concerns is much more irregular among countries, but France and Italy are clearly at the forefront.

Despite the limited number of references to water and land a set of details about the content of the plans is worth mentioning. The word clouds, represented in Figure 5, help to visualise the types of water and land related terms present in each plan. They uncover different approaches followed by the plans, which may be arranged in three groups. One group, that includes the plans of Greece, Portugal and Spain, on which "water reuse" or "regenerated water" are more frequent. Another group including the plans of Germany, Netherlands and Italy that emphasise wide terms such as "water resources", "water management" and "wastewater". And, another group including the plans of Denmark, Finland and France on which the references on water are almost absent. The Finnish plan mainly mentions water in contexts associated with transportation.

A deeper analysis of the plan shows that whilst growing scarcity of natural capital and raw materials is a common theme in the CE national action plans, only Portugal, Spain and Netherlands refer to water scarcity. While for Portugal and Spain the concern with water scarcity is a national problem, for the Netherlands it is a question of interest for international cooperation and trade. The Dutch action plan mentions that value chains and waste flows are international and there are opportunities for "*mutual gains approaches*" (symbiosis), that can be considered at the international level, recovering nutrients and "reducing vulnerability to water scarcity in other countries" (Netherlands action plan, 2016, p. 42). Wastewater treatment for the purpose of water reuse is frequently mentioned in the southern national action plans (Spain, Portugal, Italy, and Greece), while wastewater processing mainly as a source of recycled nutrients occurs in the action plans of the northern countries, such as Netherlands and Finland. Among the southern countries some go even further than the EU Action Plan (Portugal and Spain) by adding specific mentions to the integration of water reuse in the scope of water resources planning. In the Italian plan, water resources are stated as an important element of the CE (Italy action plan, 2017, p.50). The Spanish plan includes water reuse as one of its main action areas, on which policies and instruments are to be focused, separated from raw materials, allegedly for its importance in the Mediterranean area and its special impact on the economy (Spain action plan, 2018). Water reuse is most referred in the Greek case. Interestingly, even if Germany is a country with considerable water availability, the importance of preserving this resource is strongly established as an objective of the action plan (Germany action plan, 2016). The concept of virtual water trade is referred, highlighting the need to develop water footprint analysis, taking into consideration the water related negative impacts in the exporting countries (Germany action plan, 2016, p.37).

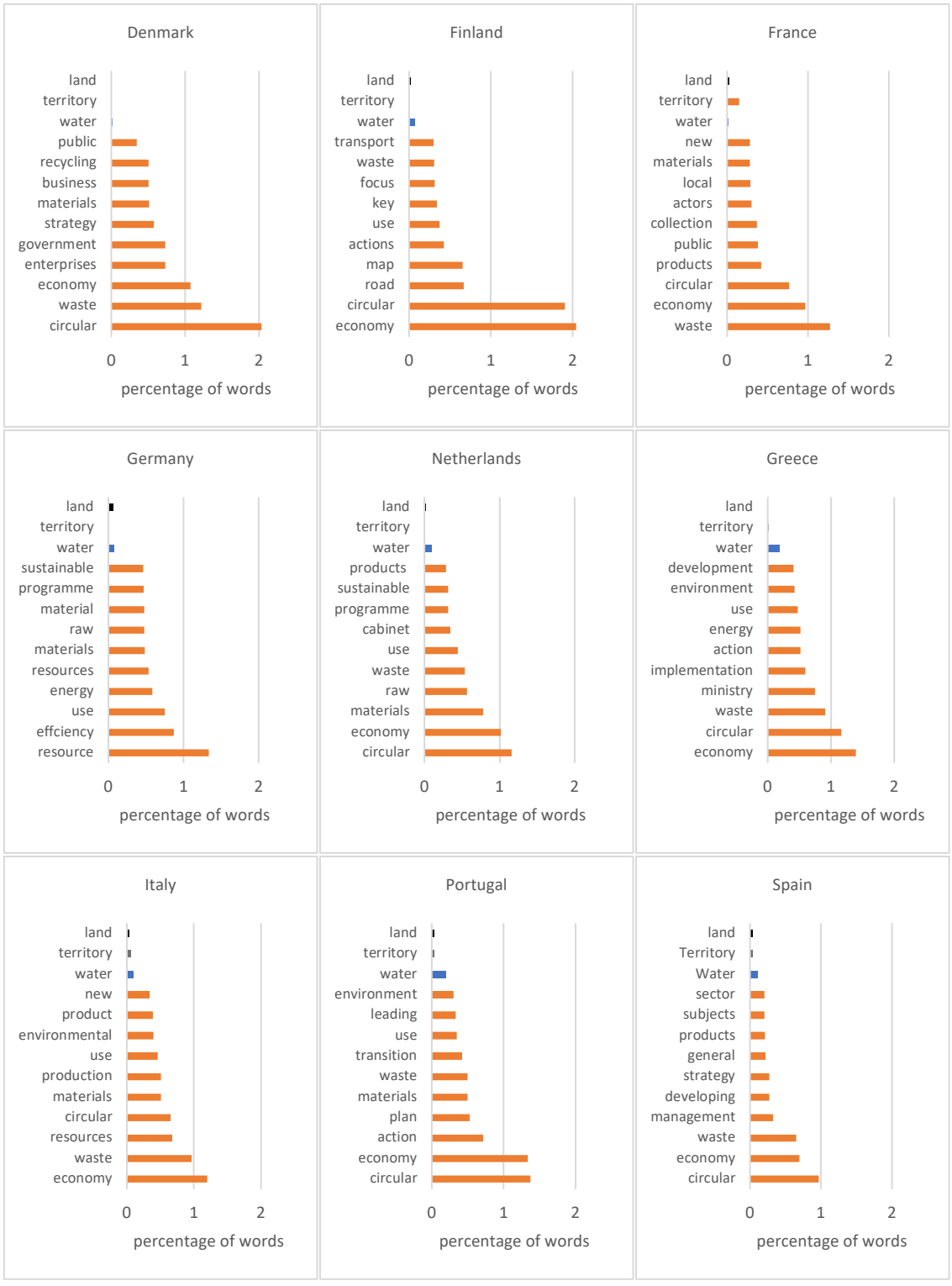

Figure 3. Top ten words of the selected national action plans for circular economy

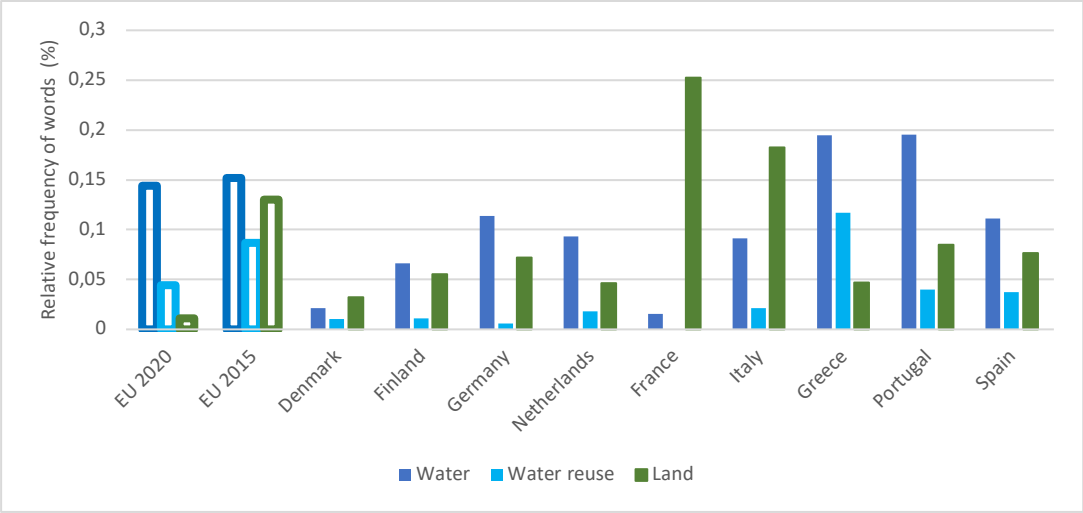

Figure 4. Water and land related terms for each action plan

The types of words related with land represented in the clouds of Figure 5 also show different paths followed by the action plans. One group of action plans, including Germany, Netherlands, Finland and Portugal, consider them in a richer way, using a set of different terms such as "territory", "spatial, land use or regional planning" and "zones", among others. In the remaining group of countries, land is rarely and poorly mentioned, similarly to what was observed in the EU action plans.

The analysis also shows that not all countries refer to the articulation between water and land concerns. Among the plans that do this are the ones from Germany, Finland, the Netherlands in northern Europe and Italy, Portugal, and Spain in southern Europe. The connection between water and land issues is mainly done in the sense of environmental media or factors of production. The German action plan is where this relation is stronger, with a higher number of conjoint references to integrated approaches that consider regional resource cycles with sustainable water and land programmes (Germany action plan, 2016, p.49 and p.86). The German action plan also mentions land use as "cross-cutting category", at the intersection between natural and socioeconomic resources (Germany action plan, 2016, p.76). This perspective accentuates not only the integration amid natural resources such as water and soil or land, but the view that the transition into the CE depends on the regeneration of natural capital/ecosystem services in their entirety and interconnectedness.

A deeper insight into the plans and the sections where words are used, enables a richer perspective about the inclusion of water and land related terms in the CE policy design. This was undertaken by analysing , how frequently the references to water and land were associated to the typical components of action plans, namely *problem showcase*, *objectives*, *strategies and measures*, *stakeholders* to be involved and *performance indicators.* A small selection of sentences illustrating how water and land concerns are mentioned under each of these structural components are presented in Table 1. The results of the counting for all the plans are represented in Figure 6.

Figure 5. Word clouds of the water and land related terms in the selected national action plans for circular economy

The results show that the allocation of water and land related concerns inside the action plans is rather varied. For water, notwithstanding differences among the countries, relatively consistent approaches are observed. Germany is the sole country that has water related words associated to all the plan components. Five in nine action plans refer water in the CE *objectives*, namely, Finland, Germany, Netherlands, Greece, and Portugal. The majority of the national action plans mention water under the *problem-showcase* and the *strategies and measures*. Only, the action plans of Germany, Portugal and Spain relate water concerns with specific stakeholders such as state agencies, water managers and planners. Also, the action plans of Germany, Italy, and Spain are the only to consider water in the *performance indicator*s. The inclusion of land concerns in the CE action plans is, broadly, much more irregular and poorer.

Table 1. Selected content related to water and land planning in the national action plans

	Water	Land/Territory
Problem-showcase	- "*Even the efficient use of **water resources** is an element of significant importance in a circular economy context. It is necessary to pursue actions, especially in the context of production processes, aiming at optimising **water consumption** and reducing discharges in **water bodies**, in particular through the reuse of treated **wastewater**, in conditions that are safe and cost-effective.*" (Italy action plan, 2017, p.50)	- *"In terms of the circular economy, **town planning** is the first decisive phase, because it can, for example, be used to steer construction efficiency and material choices" (Finland action plan, 2016, p.25)* - "*Land: A notable problem is the rapid rate of **land take** for development and transportation. Approximately half of all land thus used is made impermeable (surface sealing)"* (Portugal action plan, 2017, p.38)
Objectives	- "*To improve **water efficiency**; To increase **water reuse**;*" (Portugal action plan, 2017, p.43)	- "To *Protect life on **land***" (Portugal action plan, 2017, p.43)
Measures	- "***Re-usage of water** and use of the sludge from **wastewater** purifying plants"* (Greece action plan, 2018, p.15) - *"By gradually scaling up the standards to establish, say, full circularity with respect to **emissions to land,** air and **water**, companies will be forced to innovate and adopt circular substances and technologies*" (Netherlands action plan, 2016, p.23)	- "***Spatial planning** solutions: The Netherlands Environmental Assessment Agency (PBL) indicates that **spatial planning** solutions can also contribute to the transition to a Circular Economy. (…). Through business park management and **urban planning**, companies in industrial parks can make use of one another's materials and residual streams…". (…) Regional **spatial planning** policy offers greater scope for supporting circular activities*" (Netherlands action plan, 2016, p.18)
Stakeholders	- "*State agencies for business, environment, **water**, agriculture, energy, innovation and health: develop and monitor activities, promote measures*" (Portugal action plan, 2017, p.43)	- "*Strengthen synergies between companies (Industrial and **territorial** ecology - Industrial symbiosis): Promote industrial and territorial ecology (industrial symbiosis) in regional schemes for regions that wish to participate*" (France action plan, 2018, p.38)
Performance indicators	- "*Recovery rate of phosphorus (for example in readily plant-available form) from **wastewater**/sewage sludge*" (Germany action plan, 2016, p.42)	- "*Future analyses will therefore additionally measure and separately present the **use of soil, water, land**, energy and raw materials associated with the production and transportation of imported goods together with the impacts on air quality, the climate and biodiversity*" (Germany action plan, 2016, p.43)

The vast majority of the plans refer to land concerns mainly in the *problem showcase, objectives* and *strategies and measures*. The plan of France presents the larger frequency of land related terms that occur mainly under the *problem-showcase, strategy and measures, and stakeholders* plan components. In this plan the term "territory" or "territorial" is mentioned many times, mostly under the *stakeholder's* component, where the importance of the territory as an appropriate scale to industrial symbiosis and cooperation is mentioned, and each measure calls for a specific stakeholder to implement. Only the plans of Italy, Greece and Spain fail to consider land issues in the *objectives* of the action plan. The association of land concerns with stakeholders was identified in the plans of Finland, Germany, France, Portugal, and Spain. The association of land concerns with indicators is rare, and only found in the plans of Italy and Germany. Interestingly, the plans of Germany and Italy are the only ones mentioning both water and land related terms under the *performance indicators* components.

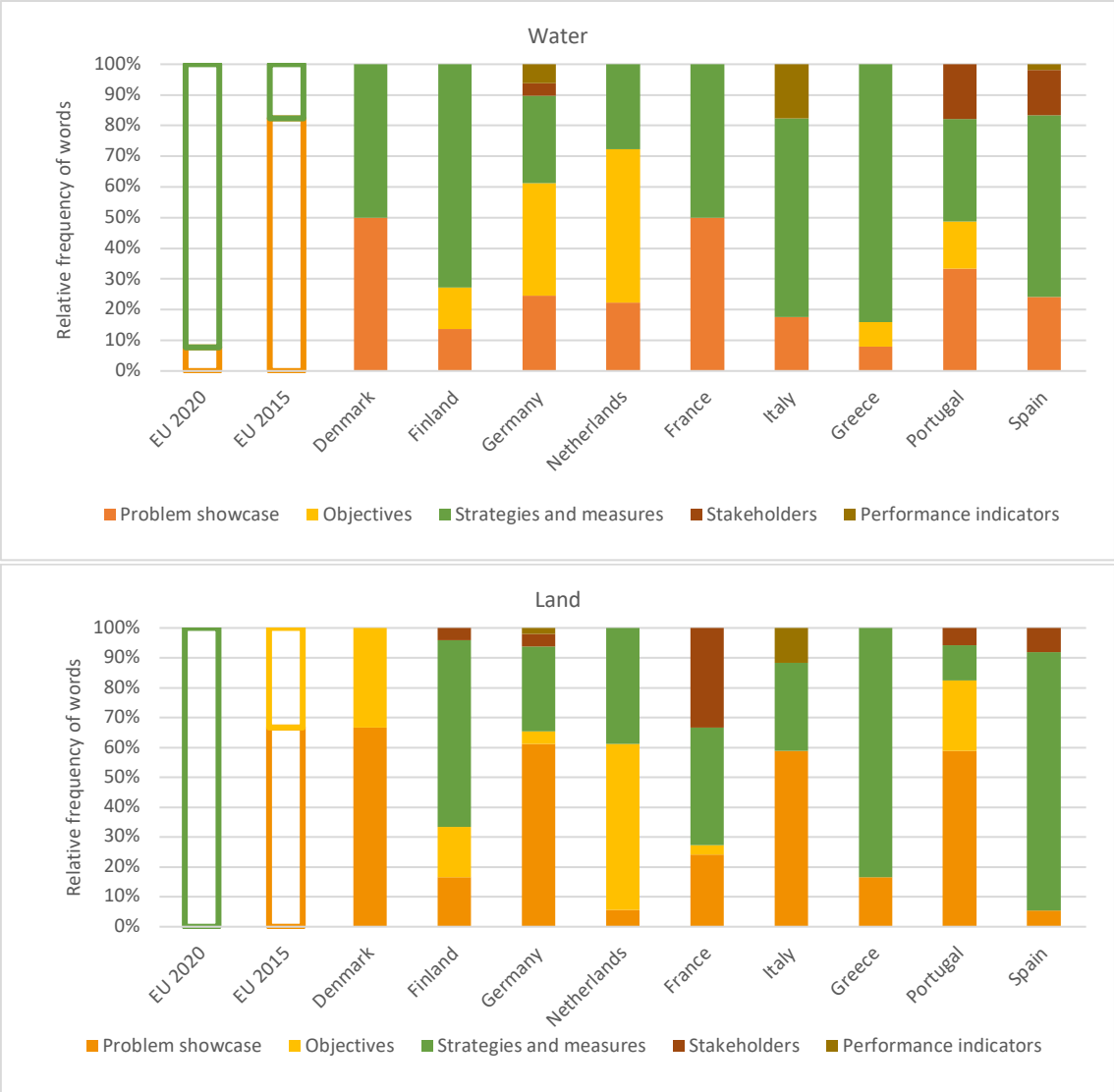

Figure 6. Association of the water and land related terms to the main components of the action plans

While references to water reuse are present in all the national action plans, probably influenced by the EU action plan, this analysis put in evidence different paths that were followed by the set of national action plans regarding the integration of water and land in their CE policy approaches. While some countries do stress these concerns in the design of CE policy, others clearly miss considering them. The next section will further extend an assessment of CE policy approaches regarding water and land issues as considered by the action plans.

3. Assessment

Substantive political-administrative dimensions are inscribed in action plans. This type of plans define intervention priorities, with economic, social and spatial contours, and seek to engage both private investors and various public authorities (Knoepfel et al., 2007). As mentioned in section 2 internal consistency, i.e. the inclusion of the relevant aspects of that policy in all the structural components of an action plan influences its assimilation by their specific target actors and other inter-linked policy sectors and stakeholders. The inclusion of water, especially water reuse, and of spatial issues in the CE action plans may mutually reinforce other policy domains dedicated to water efficiency and sustainability and, globally, contribute better to water circularity. This section synthetises the analysis undertaken in the previous section by assessing

the different courses followed by the set of member states action plans of CE after the 2015 EU CE action plan. For this purpose, it first classifies the plans according to the frequency of water and land related words[1] and then classifies the plans according to internal consistency with regards to the association of those terms to the typical components of an action plan[2]. The classification is represented in Figure 7.

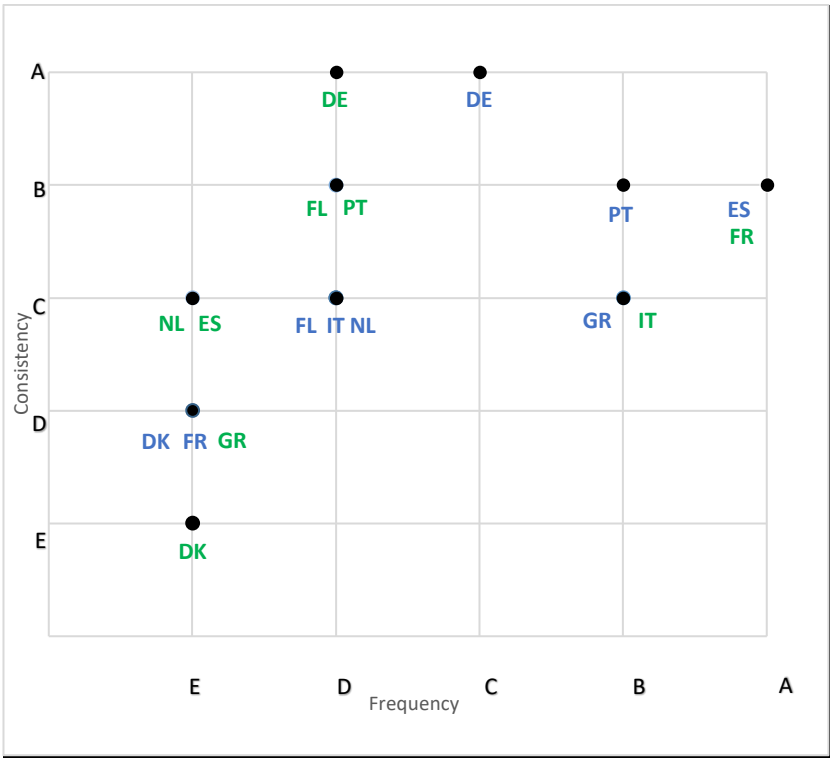

Figure 7. Assessment of Circular Economy National Action Plans (water, land; Countries: DK-Denmark; FL-Finland; DE-Germany; NL-Netherlands; FR-France; IT-Italy; GR-Greece; PT-Portugal; ES-Spain)

Regarding water, a group of action plans clearly emerge with stronger classification both in consistency and frequency, namely of Germany, Portugal and Spain, and to certain extend Greece. Although with a reduced frequency, the plans of Finland, Italy and the Netherlands also show fair classification in consistency. The remaining plans vary significantly in the classification factors. As for land and spatial related concerns, a much diverse pattern among action plans emerges. Still, the plans of France and Italy are worth mentioning considering both frequency and consistency. For instance, the centrality of the territory is referred in the Italian action plan for enabling the governance processes between different types of stakeholders, considered necessary to create opportunities for industrial symbiosis (Italy action plan, 2017). Some countries recognise that spatial issues are relevant for the CE policy, in particular for the implementation of symbiosis agreements, even though these concerns were poorly stressed in both version of the EU action plan. Though with lower levels of frequency, the plans of Germany, Finland and Portugal also reveal a good classification in consistency. The plans of Germany and

[1] For frequency, the classification used the following intervals of relative frequency of water and land related words: A (>0,20), B (0,15-0,2), C (0,10-0,15), D (0,05-0,10) and E (0-0,05).

[2] For consistency, the classification used the following criteria: existence of water and land related words in the CE associated to the action plan components: A (in all components), B (in four components), C (in three components), D (in two components one being *strategies and measures*), E (in two or less components not being *strategies and measures*).

Portugal are those where consistency for both water and land issues, relevant aspects of CE policy, is given similar importance in most of the components of the plan.

The assessment of the action plans derives only from the analysis of the integration of words related to water and land in the set of CE national action plans. As such, it only focused on the consideration of water and land related words and on how they are used to design the CE policy approach. Other relevant issues, like the implementation of CE in these countries, or existing measures and actions underway in these domains, were not a matter of analysis. Further research should be extended to understand the influence these plans may have had on the institutional and legal settings of each country with regard to CE and how far they have included water, especially water reuse, and land concerns.

4. Policy recommendations

The horizontal integration of different sectoral policies, such as urban, agriculture, industry, energy or ecosystem protection has been considered as a major challenge for the transition into the CE, as all sectors interfere with water use and may be part of the adoption of new water reuse loops. This policy paper addressed water and land as major areas of concern for the implementation of CE, assuming their relevance for the horizontal consistency of CE policy approach. Moreover, it assumed that the policy design of CE action plans should ensure internal consistency by integrating those concerns in the various components of action plans. After the 2015 CE policy approach, the assessment undertaken by this paper showed a variety of subsequent approaches followed by a sample of member states. The emerging pathways suggest that future revisions of the EU CE action plan could benefit from national examples as they have gone much further regarding water and land related concerns. This also applies to the most recent version of the EU CE action plan. CE policy design may also learn from experiences developed at lower scopes such as urban scale projects, spatial master plans or symbiotic schemes, some already developed with success in member states included in the sample of this paper, in order to strengthen the potential challenging role of CE national action plans.

CE action plans should integrate several key requirements to facilitate the transition to water circularity and the implementation of water reuse and new water loop schemes, namely:

− they should include water and land concerns, in as much as these are fundamental fields for the implementation of CE, ensuring horizontal consistency across related policies and strategies;

− they should offer a strong guidance for the implementation of water CE at lower levels, laying the ground for ensuring the vertical and horizontal consistency of CE policy;

− they should integrate water and land concerns in all the components of action plans, for internal consistency of CE policy;

− they should guide the development of water governance for the implementation of a water reuse system, including the need for new regulations, or the update of existing ones, and design the broad-based engagement of key stakeholders and partnership approaches for the implementation of new water loops;

− they should clearly include in the measures incentives for symbiotic agreements involving the use of water leading the way for the development of specific plans for symbiosis at the adequate levels of governance;

− they should identify barriers to the implementation of water CE and advancing measures to counteract them;

− they should clearly support and reinforce existing efficient water use or water reuse plans of each country.

CE policy should also be robust to ensure it maintains functionality and effectiveness in the attainment of policy objectives. This is relevant considering that the implementation of the water CE approach, and the adoption of new water loops, entails the addition of new stakeholders to water supply chains, with new risk management tasks, and should be able to respond over time to environmental and anthropic uncertainties.

There is standing evidence showing that water challenges require a broad framing, in particular, an integrated water resources management approach, that links water resources and land use planning and management, aiming at the transition into CE. For this, CE action plans should acknowledge this interdependency, favouring horizontal consistency among these policy fields and include these themes in their objectives, priorities and establish coordinated measures that consider the management of water, land and related resources. Broadly, CE policies, have mainly been driven by environmental economics and industrial ecology, fields that tend to neglect the interconnection with natural resources and land concerns in comparison to water or spatial fields. The need to stress this interconnection in the CE policies challenges the content of these action plans where the nexus between water and land should be much strongly stressed at the macro level of territories.

Next Deliverable, 3.2, will include the analysis of how water resources planning, and spatial planning systems develop CE policy and the assessment of drivers and barriers for the adoption of CE in the demo-sites contexts.

References

Araujo Galvão, G.D., De Nadae, J., Clemente, D.H., Chinen, G., De Carvalho, M.M., 2018. Circular Economy: Overview of Barriers. Procedia CIRP 73, 79–85. https://doi.org/10.1016/j.procir.2018.04.011

Elo, S., Kyngäs, H., 2008. The qualitative content analysis process. J. Adv. Nurs. 62, 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

EU Water Directors – EUWD, 2016. Guidelines on Integrating Water Reuse into Water Planning and Management in the context of the WFD.

European Comission – EC, 2018. Proposal for a regulation of the European Parliament and of the Council on minimum requirements for water reuse.

European Commission – EC, 2000. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Off. J. Eur. Communities 72.

European Council − EC, 2020. Position (EU) No 3/2020 of the Council at first reading with a view to the adoption of a Regulation of the European Parliament and of the Council on minimum requirements for water reuse. Off. J. Eur. Union 24–27.

European Council − EC, 2019. Proposal for a Regulation of the European Parliament and of the Council on minimum requirements for water reuse. Analysis of the final compromise text with a view to agreement. Brussels.

European Council − EC, 1991. Urban Wastewater Treatment Directive. Official Journal of the European Communities.

European Environment Agency – EEA, 2012. Territorial cohesion and water management in Europe: the spatial perspective. Copenhagen. https://doi.org/Technical report No 4/2012

European Parliament – EP, 2019. Minimum requirements for water reuse. European Parliament legislative resolution of 12 February 2019 on the proposal for a regulation of the European Parliament and of the Council on minimum requirements for water reuse. Belgium.

European Union – EU, 2020. Circular economy action plan − For a cleaner and more competitive Europe. Brussels.

European Union – EU, 2015. Closing the loop - An EU action plan for the Circular Economy. Brussels.

Fidélis, T., Roebeling, P., 2014. Water resources and land use planning systems in Portugal—Exploring better synergies through Ria de Aveiro. Land use policy 39, 84–95. https://doi.org/10.1016/J.LANDUSEPOL.2014.03.010

Graneheim, U.H., Lundman, B., 2004. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. Nurse Educ. Today 24, 105–112. https://doi.org/10.1016/j.nedt.2003.10.001

Homrich, A.S., Galvão, G., Abadia, L.G., Carvalho, M.M., 2018. The circular economy umbrella: Trends and gaps on integrating pathways. J. Clean. Prod. 175, 525–543. https://doi.org/10.1016/j.jclepro.2017.11.064

Hsieh, H.-F., Shannon, S.E., 2005. Three approaches to qualitative content analysis. Qual. Health Res. 15, 1277–88. https://doi.org/10.1177/1049732305276687

Kaika, M., 2003. The Water Framework Directive: A New Directive for a Changing Social, Political and Economic European Framework. Eur. Plan. Stud. 11, 299–316. https://doi.org/10.1080/09654310303640

Kirchherr, J., Reike, D., Hekkert, M., 2017. Conceptualizing the circular economy: An analysis of 114 definitions. Resour. Conserv. Recycl. 127, 221–232. https://doi.org/10.1016/j.resconrec.2017.09.005

Knoepfel, P., Larrue, C., Varone, F., Hill, M., 2007. Public Policy Analysis. The Policy Press University of Bristol, Bristol.

Liefferink, D., Wiering, M., Uitenboogaart, Y., 2011. The EU Water Framework Directive: A multi-dimensional analysis of implementation and domestic impact. Land use policy 28, 712–722. https://doi.org/10.1016/J.LANDUSEPOL.2010.12.006

Organisation for Economic Co-operation and Development – OECD, 2017. Land-use Planning Systems in the OECD. Country Fact Sheets. Paris.

Pal, L., 2013. Beyond Policy Analysis. Public Issue Management in Turbulent Times. Nelson Education Limited, Toronto.

Schneider, A., Sidney, M., 2009. What Is Next for Policy Design and Social Construction Theory? 1. Policy Stud. J. 37, 103–119. https://doi.org/10.1111/j.1541-0072.2008.00298.x

Tura, N., Ahola, T., 2019. Towards a circular economy by leveraging hazardous resources: A case study of Fortum HorsePower. J. Clean. Prod. 230, 518–526. https://doi.org/10.1016/j.jclepro.2019.05.121

National Action Plans

Denmark action plan – Ministry of Environment and Food and Ministry of Industry, Business and Financial Affairs. 2018. Strategy for Circular Economy More Value and Better Environment through Design, Consumption, and Recycling.

Finland action plan – Sitra. 2016. Sitra Leading the Cycle – Finnish Road Map to a Circular Economy 2016–2025. www.sitra.fi.

France action plan - Francaise, Republique. 2018. Roadmap for the Circular Economy, 50 Measures for a 100% Circular Economy.

Germany action plan – Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). 2016. “German Resource Efficiency Programme”

Greece action plan – Republic, Hellenic. 2018. “National Circular Economy Strategy.

Italy action plan - Ministero dell’Ambiente e della Tutela del Territorio e del Mare. 2017. “Towards a Model of Circular Economy for Italy - Overview and Strategic Framework.”

Portugal action plan – Republica Portuguesa. 2017. “Leading the Transition - Action Plan for Circular Economy in Portugal: 2017-2020”

Spain action plan – Gobierno de España. 2018. “España Circular 2030. Estrategia Española de Economía Circular. Borrador Para Información Pública.” Ministerio de Economía, Industria y Competitividad.

The Netherland action plan - Government of Netherlands. 2016. “A Circular Economy in the Netherlands by 2050.”